LOCKWOOD HYDROELECTRIC PROJECT (FERC NO. P-2574)

SECTION 401 WATER QUALITY CERTIFICATION

VOLUME 3

(APPENDIX 2)

APPLICATION FOR A DEPARTMENT OF THE ARMY PERMIT (ENG FORM 4345) LOCKWOOD HYDROELECTRIC PROJECT (FERC NO. 2574) – UPSTREAM FISH PASSAGE FACILITY – JULY 13, 2021

July 13, 2021

VIA EMAIL

Ms. LeeAnn Neal
U.S Army Corps of Engineers
New England District
Maine Project Office
442 Civic Center Dr
Augusta, ME 04330

Re: Application for a Department of the Army Permit (ENG Form 4345)
Lockwood Hydroelectric Project (FERC No. 2574) – Upstream Fish Passage Facility

Dear Ms. Neal:

On behalf of Merimil Limited Partnership (MLP), a subsidiary of Brookfield Renewable Energy Group (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates (Kleinschmidt) herein submits to the U.S. Army Corps of Engineers (USACE) the enclosed Application for a Department of the Army Permit (ENG Form 4345) for the proposed installation of an upstream fish passage facility at the Project. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, in Kennebec County, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine.

Project Background

On March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) issued a new license for the Project. The license and corresponding August 26, 2004 Water Quality Certificate (WQC) (L-20218-33-C-N) included fish passage requirements. As stipulated by WQC Condition 3C, MLP installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided via a trap and truck program where migrants are transported upstream to spawning habitat. Both the license and WQC stipulate that installation of permanent upstream fish passage at the Project will be triggered by a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, lift and transfer facility at the Lockwood powerhouse or b) development of an alternate trigger for fishway installation based on the biological assessment process for the Atlantic salmon, alewife, and blueback herring, whichever comes first.

Since the 2005 FERC License was issued, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with FERC an Interim Species Protection Plan for Atlantic salmon (Interim SPP). On May 19, 2016, FERC amended the Lockwood Project License to include the Interim SPP that requires a volitional (swim through) upstream fish passage facility be designed and constructed at the Project. While originally envisioned to be a flume connecting the existing lift to the headpond, Brookfield, with the concurrence of the agencies and as a result of effectiveness testing of the existing lift for Atlantic salmon and shad, informed FERC in August 2017 of the decision to build a second fishway in the bypass reach that would serve the purpose of providing volitional passage at the Project. On July 13, 2020, FERC extended the operational date for the volitional upstream fish passage to May 31, 2022.

Because the Interim SPP expired on December 31, 2019, BWPH filed a Lower Kennebec SPP and Draft Biological Assessment to outline proposed actions it would take at the Lockwood Project (as well as Weston and Hydro-Kennebec Projects) for the protection of Endangered Species Act-listed Atlantic Salmon, Atlantic sturgeon, and shortnose sturgeon on May 31, 2021.[1] The Draft Biological Assessment incorporates construction activities associated with development of the upstream fish passage facility at Lockwood and therefore initiates Section 7 ESA consultation for the fish passage facility with FERC.

In accordance with the Lower Kennebec SPP, Interim SPP, FERC license, and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Lockwood Project bypass reach to provide volitional passage for upstream migration of salmon and other anadromous species.

The facility has been designed in consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MDIFW) to determine the appropriate fish passage technology for the Lockwood Project and to finalize all aspects of design (30%, 60%, and 90% design consultation is provided within the enclosed Additional Information Report).

[1] Brookfield White Pine Hydro LLC, et. al. submits Lower Kennebec Species Protection Plan and Draft Biological Assessment for the Lockwood, Hydro-Kennebec and Weston Projects under P-2574, et. al. FERC Accession No: 20210601-5152. Online: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15804246

Enclosed, please find MLP's Application for Department of the Army Permit (ENG Form 4345), Additional Information Report, Alternatives Analysis, and Access Permission Statement. Additionally enclosed you will find a copy of BWPH's Maine Department of Environmental Protection Permit Application filed with the State of Maine on January 26, 2021. Should you have any questions upon review, please contact Katie Sellers of Kleinschmidt at 207.416.1218 or Katie.Sellers@kleinschmidtgroup.com, or Kelly Maloney of Brookfield at 207.755.5606 or Kelly.Maloney@brookfieldrenewable.com.

Sincerely,

KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds
Regulatory Coordinator

KSR:TMJ

cc Kelly Maloney (Brookfield)
Gerry Mitchell (Brookfield)
Fatima Oswald (Kleinschmidt)
Dan Tierney, NOAA
Matt Buhyoff, NOAA

Enclosures:

1. Application for Department of the Army Permit (ENG Form 4345)
2. Additional Information Report
3. Alternatives Analysis
4. Access Permission Statement
5. Maine Department of Environmental Protection Permit Application (separate submittal)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (ENG FORM 4345)

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 02-28-2022

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Kelly Middle - O. Last - Maloney	First - Katie Middle - E. Last - Sellers Reynolds
Company - Merimil Limited Partnership (MLP)	Company - Kleinschmidt Associates
E-mail Address - Kelly.Maloney@brookfieldrenewable.com	E-mail Address - Katie.Sellers@KleinschmidtGroup.com
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address- 150 Main Street	Address- 6 Fundy Rd., Suite 500
City - Lewiston State - Maine Zip - 04240 Country - USA	City - Falmouth State - ME Zip - 04105 Country - USA
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business: 207-755-5606 c. Fax: 207-755-5655	a. Residence b. Business: 207-416-1218 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Katie Sellers Reynolds to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Kelly Maloney — SIGNATURE OF APPLICANT

July 12, 2021 — DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Lockwood Hydroelectric Project - Upstream Fish Passage Facility

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Kennebec River	Address: Benton Avenue
15. LOCATION OF PROJECT	City - Winslow State- Maine Zip- 04901
Latitude: ◦N 44°32'54.51"N Longitude: ◦W 69°37'34.38"W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID: Winslow Map 19; Lot 017-A Municipality: Winslow

Section - Township - Range -

17. DIRECTIONS TO THE SITE

Take Interstate 95 to the City of Waterville. Once reaching Waterville, take Kennedy Memorial Drive (ME-11/ME-137 exit) to the right approximately 2.3 miles, after crossing Messalonskee Stream, stay straight to go onto Silver Street (ME-137), in approximately 0.3 miles turn right onto Spring Street (ME-137), cross over the Kennebec River, then take the first left onto Benton Avenue. The site is located directly on the left of Benton Avenue, along the Kennebec River.

18. Nature of Activity (Description of project, include all features)

The proposed project will install a permanent upstream fish passage facility to provide volitional passage for the upstream migration of Atlantic salmon and other anadromous species at the Lockwood Hydroelectric Project (FERC No. 2574).

Construction of the proposed facility will take place in the waterway bypass reach and will include temporary fill, permanent fill, and permanent excavation below the Ordinary High Water line (OHW) of the Kennebec River.

Please see the enclosed Additional Information Report for further information.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

In accordance with the Lower Kennebec Species Protection Plan (SPP), a 2016 Interim Species Protection Plan (ISPP), the 2005 FERC license, 2004 Water Quality Certification, and 1998 Lower Kennebec River Comprehensive Settlement Accord, Merimil Limited Partnership (MLP) proposes to construct a permanent upstream fish passage facility at the Lockwood Hydroelectric Project to provide volitional passage for upstream migration of salmon and other anadromous species. The fishway will be an approximately 530-ft-long vertical slot fishway with an attraction flow channel and will be built on the east side of the Kennebec River, over the north dam spillway in the bypass reach.

The proposed facility has been designed in consultation with the National Marine Fisheries Service, Maine Department of Environmental Protection, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife to determine appropriate fish passage technology.

Construction is planned to begin in 2021 and the fishway will be commissioned by May 2022. Please see the enclosed Additional Information Report for further information.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Construction will require installation of a temporary cofferdam system and temporary earth fill wet road, excavation of bedrock material and a portion of the north concrete spillway to clear room for the fishway, and permanent concrete fill to construct the fishway.

Please see the enclosed Additional Information Report for detailed information.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type	Type	Type
Amount in Cubic Yards	Amount in Cubic Yards	Amount in Cubic Yards

Please see the enclosed Additional Information Report, Section 4.0 Construction Activities for detailed discharge amounts and further information.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet

Please see the enclosed Additional Information Report, Section 4.0 Construction Activities for detailed fill amounts.

23. Description of Avoidance, Minimization, and Compensation (see instructions)

The initial phase of Project construction will involve lowering of the impoundment, and construction of a temporary cofferdam system. A contractor designed temporary bulkhead cofferdam system will be constructed around the perimeter of the in-river work area to provide a de-watered workspace. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown areas. Pumps will be utilized throughout construction to control water in the construction area. A dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

Overall, the proposed fishway constitutes mitigation for fish passage/habitat enhancement within the Kennebec River.

Please see the enclosed Additional Information Report, Section 4.0 Construction Activities for further information.

24. Is Any Portion of the Work Already Complete? [ ] Yes [X] No IF YES, DESCRIBE THE COMPLETED WORK

N/A

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- **Please see the enclosed Additional Information Report, Section 8.0 Abutting Property Owners, for further information.**

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Kelly Maloney — SIGNATURE OF APPLICANT

July 12, 2021 — DATE

Kristi Dulle Reynolds — SIGNATURE OF AGENT

July 12, 2021 — DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Additional Information Report

U.S. Army Corps of Engineers Additional Information Report

Lockwood Hydroelectric Project
FERC No. 2574

Upstream Fish Passage Facility

Prepared for:
Merimil Limited Partnership a Subsidiary of Brookfield Renewable Energy Group

Prepared by:
Kleinschmidt Associates

July 2021

Kleinschmidt

EXECUTIVE SUMMARY

Merimil Limited Partnership (MLP), a subsidiary of Brookfield Renewable Energy Group (Licensee or Brookfield), herein submits to the U.S. Army Corps of Engineers (USACE) the enclosed Application for a Department of the Army Permit Application (ENG Form 4345) and associated Additional Information Report for the proposed installation of an upstream volitional fish passage facility proposed at the Lockwood Hydroelectric Project (FERC No. 2574) (Project).

The Lockwood Project is located at river mile 63 on the Kennebec River, in Kennebec County, and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine and will be constructed within the Project's bypass reach, on the east side of the Kennebec River. The facility will consist of a 530-ft-long concrete vertical slot structure at the north spillway of Lockwood Dam. The facility will be operated from May 1 to October 31 annually and is designed to pass migratory species native to the Kennebec River, including the endangered Atlantic salmon.

The requirement for volitional fish passage at the Lockwood Project is predicated on a number of regulatory requirements:

- 1998 Lower Kennebec River Comprehensive Settlement Accord, the terms of which were incorporated into the Project Water Quality Certification (WQC) on August 3, 1998 and the Project license on September 16, 1998 which stipulated the installation of permanent upstream fish passage at the Project predicated on biological triggers.
- March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) Order Issuing New License for the Project, Article 401 which required the filing of final fish passage designs for Commission approval.
- August 26, 2004 Water Quality Certificate (WQC) (L-20218-33-C-N) Condition 3C which included interim fish passage requirements and Condition 3E which required permanent upstream fish passage.
- May 19, 2016 FERC Order Amending License which approved an Interim Species Protection Plan (ISPP), developed in consultation with the agencies and filed with the Commission on February 21, 2013, and the terms and conditions of a July 22, 2013 Biological Opinion issued by the National Marine Fisheries Service (NMFS),

both of which included provisions for permanent volitional fish passage at the Lockwood Project.

- On July 13, 2020, FERC extended the operational date for the fish lift facility to May 31, 2022.

Brookfield installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided by a trap and truck program where migrants are transported upstream to spawning habitat. The amended Lockwood License requires a volitional (swim through) upstream fish passage facility be designed and constructed at the Project.

In accordance with the FERC license (which approved the ISPP), and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Lockwood Project to provide volitional passage for upstream migration of salmon and other anadromous species. The fishway will be an approximately 530-ft-long vertical slot fishway with an attraction flow channel and will be built on the east side of the Kennebec River, over the north dam spillway.

The proposed facility has been designed in consultation with the NMFS, U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MDIFW) to determine the appropriate fish passage technology and location for the Lockwood Project.

Fishway construction work is scheduled to begin in 2021.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

LIST OF APPENDICES

1.0 LOCKWOOD HYDROELECTRIC PROJECT DESCRIPTION

1.1 Project Facilities

The Lockwood Hydroelectric Project (FERC No. 2574) (Project) is operated in a run-of-river mode and consists of an 875-foot-long by 17-foot-high dam with two spillway sections equipped with 1.25-foot-high pinned flashboards and a 160-foot-long forebay headworks section; a 450-foot-long forebay canal; two powerhouses containing a total of seven generating units with a total installed capacity of 6.915 megawatts (MW); an approximately 1,300-foot-long bypass reach; and an 81.5-acre reservoir. The Project's tailrace returns the flow to the Kennebec River about 1,300 feet downstream from the east spillway section. Please see an overview figure of the Lockwood Project below (Figure 1, Figure 2, Figure 3).

An interim fish trap, lift, and transfer facility is located along the west side of the Kennebec River, on the east side of the Project powerhouse. The Project releases a minimum flow of 50 cubic feet per second (cfs), or inflow, whichever is less, into the bypass reach and a minimum downstream flow of 2,114 cfs, or inflow, whichever is less, downstream of the project powerhouse for protection of aquatic species.

1.2 Project Operations

The normal full pond elevation is 52.16 feet above mean sea level (msl) when the spillway flashboards are in place. The Project is normally operated to provide an instantaneous minimum flow of 2,114 cfs or inflow, if less, below the powerhouse to maintain downstream aquatic habitat in the river. Flow in the approximately 1,300-foot-long bypassed reach is currently limited to leakage around and through the flashboards, including through three (3-foot-long by 8-inches-high) engineered orifices cut into the flash boards (estimated at a total of 50 cfs), or as spill over the flashboards when river flow exceeds about 5,600 cfs.

Scheduled maintenance or inspection drawdowns below the 1-foot restriction occur with agency consultation/notification.

Figure 1 Lockwood Upstream Fish Passage - Proposed Work Area

Figure 2 Overview of the Lockwood Hydroelectric Project

Figure 3 Lockwood Upstream Fish Passage Project Area (Topographic Map)

2.0 FISH PASSAGE FACILITIES

2.1 Existing Upstream Passage

Upstream fish passage at the Lockwood Project is currently provided by a fish lift which was commissioned in spring 2006. The facility is located on the west side of the original powerhouse and adjacent to the Unit 7 powerhouse and is designed to pass up to 164,640 alewives, 228,470 American shad, and 4,750 Atlantic salmon. The fish lift is required to be operated annually seven days per week from May 1 to October 31, dependent on river conditions. The fish list is operated from early morning to evening to capture river herring, shad, and Atlantic salmon.

The timing and frequency of lifts are a function of the number of migrating fish, water temperature and river flow, and the lift is operated based on direct camera monitoring of the fishway and V-gate entrance. During the remainder of the season (approximately mid-July through the end of October), lift cycles are less frequent and are specifically for the capture of Atlantic salmon. Pursuant to MDMR's Atlantic salmon handling protocol, the fish lift is not operated when the river water temperature exceeds 24.5ºC, in order to prevent injury or mortality of Atlantic salmon. However, if this temperature threshold is exceeded while shad are still migrating, the Licensee in consultation with MDMR has the option of continued operation of the fish lift to accommodate shad passage. If a salmon is observed in the hopper during a lift, the hopper can be placed back down into the water allowing the salmon to volitionally swim back downstream.

The lift operates with an attraction flow of approximately 170 cfs, an entrance flow velocity of 4 to 6 ft per second (fps) and a flow velocity over the hopper of 1.0 to 1.5 fps. An auxiliary water system provides the attraction flow upstream of the hopper. The 1,800-gallon hopper discharges water and fish into a 12-foot diameter 2,500-gallon sorting tank. River herring and shad are sorted into one of two ten-foot diameter 1,250-gallon sorting tanks. Atlantic salmon are removed and held in a 250-gallon isolation tank. Liquid oxygen is supplied to the sorting tanks and isolation tank via carbon micro porous stones to maintain safe dissolved oxygen levels at all times. Two auxiliary water pumps provide a constant flow of ambient river water to all the tanks and for filling of stocking truck tanks. Block ice is used, as necessary, to reduce water temperature in the Atlantic salmon holding tank in preparation for transport to the cooler waters of the Sandy River by MDMR staff. Other species of non-anadromous fish captured in the fish lift are returned to the tailrace

via a discharge pipe. At the direction of MDIFW and MDMR, undesirable fish species (e.g. carp, white catfish, Northern pike, and gizzard shad, etc.) are removed and euthanized.

2.2 Proposed Upstream Fish Passage Facility

In addition to the main channel fish lift, Brookfield proposes to construct a vertical slot fishway within the Lockwood Project bypassed reach. The fishway will measure approximately 530-feet-long by approximately 60-feet-wide at its widest point. An attraction flow channel will be constructed on the west side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide. The north section of the Lockwood spillway will be removed to make room for the fishway. In addition to construction of the fishway and attraction flow channel, two 71-foot-wide crest gates and a 92-foot-long concrete floodwall will be constructed to replace the north spillway and replace spillway capacity.

The concrete upstream fish passage entrance will be placed at Elevation 32.0 feet and have an 8.0-foot-wide entrance, with an isolation gate and a hinged flap gate to track tailwater. Fish will be guided through a curved concrete entrance chamber leading to a 16-foot-wide fish channel that curves to lead to a gradual 530-foot-long fish ladder. The fishway exit will be an 8-foot-wide, concrete structure with a bar rack and fishway isolation gate.

The proposed fishway will be operational from May 1 to October 31 annually, and is designed for river flows between 2,690 cfs and 21,100 cfs. The fishway will maintain an 10 foot wide attraction flow channel and will pass an attraction flow of 100 cfs to 250 cfs. Flow within the fishway will be adjusted by a series of electronic controlled gates and valves. The fishway is designed to pass Atlantic salmon (population size 12,000), American shad (population size 210,000), alewives (population size 150,000), and blueback herring (population size 1,200,000).

The facility has been designed in full consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and Maine Department of Inland Fisheries and Wildlife (MIFW) to determine the appropriate fish passage technology and location for the Lockwood Project and to finalize all aspects of design. Design consultation for supporting studies, and the conceptual 30%, 60%, and 90% design efforts are provided within Appendix D and the fishway is shown in Figure 4.

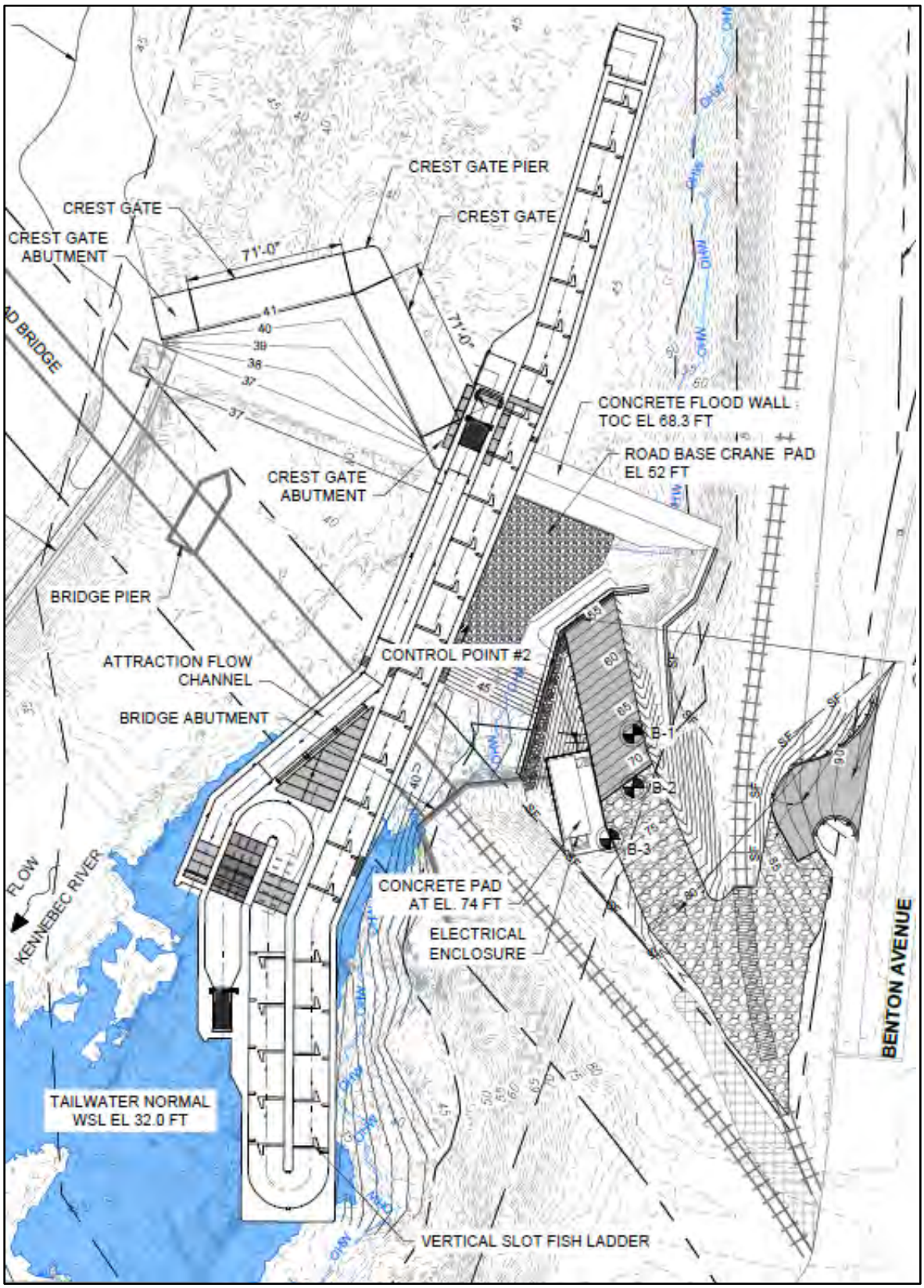

Figure 4 Proposed Lockwood Fishway

2.3 Regulatory Background

On May 26, 1998, the Licensees for the Lockwood Project filed the 1998 Lower Kennebec River Settlement Accord which modified a 1987 Agreement between a group of licensees known as the Kennebec Hydro Developer Group (KHDG) and the NMFS, USFWS, State of Maine and the Kennebec Coalition, a group consisting of American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited.

The modified 1998 KHDG Agreement stipulated that installation of permanent upstream fish passage at the Project will be triggered by a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, lift and transfer facility at the Lockwood powerhouse or, b) development of an alternate trigger for fishway installation based on the biological assessment process for the Atlantic salmon, alewife, and blueback herring, whichever comes first. The terms of the modified KHDG Agreement was incorporated into the Project WQC on August 3, 1998 and into the Project license on September 16, 1998.

On March 4, 2005, the Commission issued a new license for the Project. The license and corresponding August 26, 2004 WQC (L-20218-33-C-N) (Appendix B) included fish passage requirements that required the installation of an interim trap, lift and transfer facility at the Project by May 1, 2006 and continued the terms of the 1998 KHDG Agreement for the installation of permanent volitional passage predicated on biological triggers. As stipulated by the license and WQC Condition 3C, Brookfield installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided via a trap and truck program where migrants are transported upstream to spawning habitat.

Since the FERC License was issued, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with FERC an Interim SPP and Biological Assessment for Atlantic Salmon on February 21, 2013 and as amended on March 29, 2013. On July 22, 2013 and as amended on September 3, 2013, NMFS issued its Biological Opinion for the ISPP. On May 19, 2016, FERC amended the Lockwood License

to include the Interim SPP and the terms and conditions of NMFS' Biological Opinion that require a volitional (swim through) upstream fish passage facility be designed and constructed at the Project. While originally envisioned to be a flume connecting the existing lift to the headpond, Brookfield, with the concurrence of the agencies and as a result of effectiveness testing of the existing lift for Atlantic salmon and shad, informed FERC in August 2017 of the decision to build a second fishway in the bypass reach that would serve the purpose of providing volitional passage at the Project. On July 13, 2020, FERC extended the required operational date for the volitional upstream fish passage to May 31, 2022. Additionally, Brookfield filed an updated Biological Assessment (BA) for construction of the Lockwood upstream fish passage facility as well as for Brookfield's other upstream fish passage facility planned for construction (Weston). The BA was filed with FERC on May 31, 2021 with updated Endangered Species Act Section 7(o)(2) consultation for the proposed facility.

In accordance with the FERC license and WQC, Brookfield proposes to construct an approximately 530-ft-long vertical slot upstream fish passage facility at the Lockwood Project bypass reach to provide volitional passage for upstream migration of salmon and other anadromous species. The facility has been designed in full consultation with NMFS, USFWS, MDMR, and MDIFW to determine the appropriate fish passage technology and location for the Lockwood Project and to finalize all aspects of design. Design consultation for supporting studies, and the conceptual 30%, 60%, and 90% design consultation is provided in Appendix C.

3.0 EXISTING ENVIRONMENT

3.1 Kennebec River Basin

The Lockwood Dam is located on the Kennebec River in Kennebec County and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine on the east side of the Kennebec River.

The Kennebec River basin is the largest of the watersheds that comprise the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU). The Kennebec River watershed covers an area of 5,910 square miles, approximately 1/5 of the state of Maine, and flows 138 miles from Moosehead Lake to Merrymeeting Bay where it joins the Androscoggin River. The Kennebec watershed is bordered on the west by the Androscoggin River Basin, on the north and east by the Penobscot River Basin, and by coastal streams and the Gulf of Maine on the south.

The Kennebec River's mainstem originates at the outlet of Moosehead Lake and flows generally southward through the towns and cities of Bingham, Solon, Anson, Madison, Norridgewock, Skowhegan, Waterville, and Augusta. The river transitions from a high gradient cold water river from upstream of Indian Pond to Madison, to a warmwater river from Skowhegan to Augusta. A 24-mile-long, mostly freshwater tidal segment of the river exists downstream from Augusta, and slightly brackish conditions exist periodically in Merrymeeting Bay.

The Kennebec River basin has been extensively developed for over a century for industrial use, including driving of logs and pulp, mills, and hydroelectric power production. The Lockwood Project (FERC Project No. 2574), located at river mile 63, is the lowermost dam and hydroelectric plant on the mainstem river (Figure 5). The drainage area above the Lockwood Project is 4,228 square miles. Other mainstem projects upstream of Lockwood include Hydro-Kennebec (FERC Project No. 2611), Shawmut (FERC Project No. 2322), Weston (FERC Project No. 2325), Abenaki (FERC Project No. 2364), Anson (FERC Project No. 2365), Williams (FERC Project No. 2335), Wyman (FERC Project No. 2329), and Harris (FERC Project No. 2142). The Fort Halifax Project (FERC No. 2552), which was removed in 2008, was formerly located near the mouth of the tributary Sebasticook River, only about 0.5 miles downstream of Lockwood. Edwards dam (FERC Project No. 2389), which was removed in 1999, was located about 18 miles downstream of Lockwood on the mainstem.

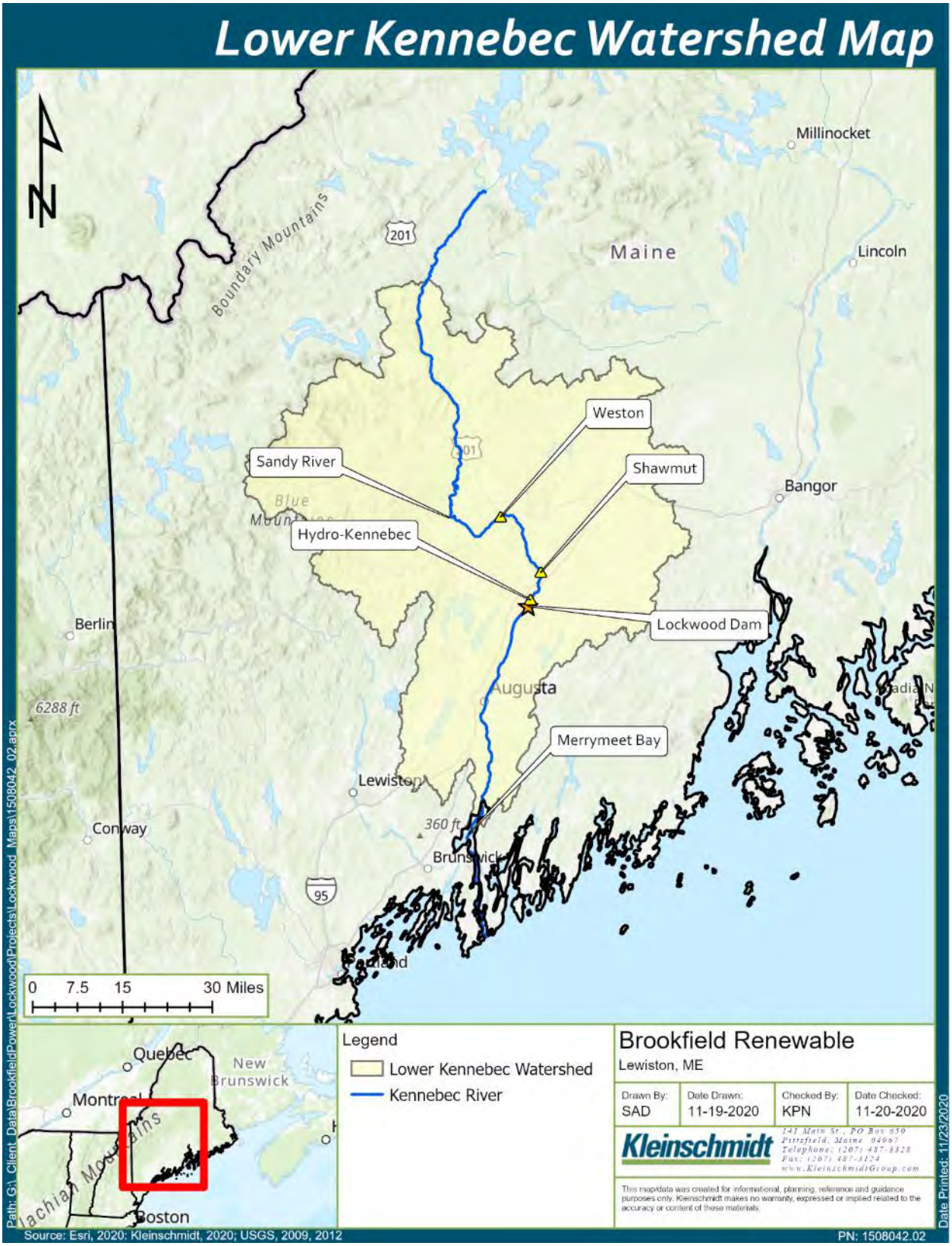

Figure 5 Kennebec River Watershed and Project Location

3.2 Proposed Project Area

The project area resides in an urbanized area but is isolated from public access as it is bordered by two roadways – Benton Ave and Bridge Street and two rail lines. The fishway is proposed to be constructed/installed in the river, on the rocks of the bypassed reach area of the Lockwood Dam. The proposed construction project will primarily occur within the riverway itself with an access and laydown area established on the river side of Benton Avenue. The in-river portion of the project area is on the east side of the Lockwood Dam spillway, in the in-river shallow rocky bypass reach area, and over the north spillway. The fishway will be adhered to the shallow rocks, which are exposed during low flow periods of the year, and just under water during high flow periods (see project location photos below). The laydown and access road will be located along the immediate river shoreline (laydown and access road is permitted by Maine DEP Permit #L-20218-34-N-N, Appendix A). The access road will be gated and locked.

The bank of the Kennebec River in the proposed project area is relatively steep and well defined within a small area of fragmented forest made up of early successional/young forest/shrub lands cover type, characteristic of previously disturbed sites. The proposed project area (both in-river and shoreline areas) has been previously disturbed by prior construction efforts stemming from construction of the Lockwood Dam itself, and construction of the adjacent main line railroad track and construction of the Mardens railroad track spur.

3.3 Critical Habitat

The Lockwood Project lies within the designated critical habitat of the Merrymeeting Bay SHRU for Atlantic salmon. The Kennebec River, in the vicinity of the Lockwood Project, serves as migration habitat for adults returning to freshwater to spawn and for smolts and kelts returning to the ocean.

Critical habitat for Atlantic sturgeon in Maine includes occupied habitat of the Penobscot, Kennebec, and Androscoggin rivers (NMFS 2017). The lower Kennebec River, extending downstream from the Lockwood Project, is considered critical habitat for the GOM DPS of Atlantic Sturgeon due to its identification as a spawning and rearing habitat for the species (NMFS 2017, NOAA 2017). Critical habitat has not been designated for shortnose sturgeon (NOAA 2019a); therefore, there is no shortnose sturgeon critical habitat within or adjacent to the proposed action area.

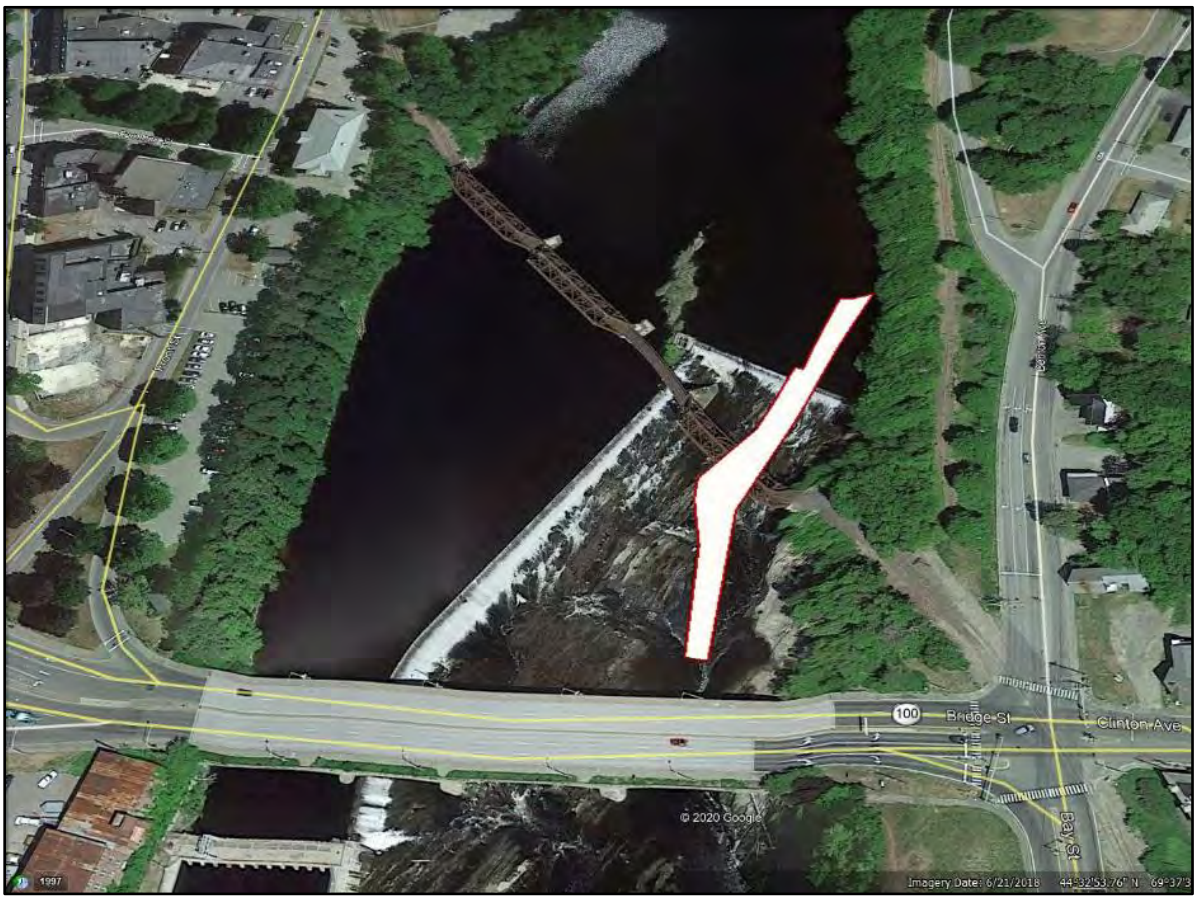

Photo 1 Approximate Proposed Fish Ladder Placement, Along the East Side of the Kennebec River, Under the Railroad Bridge, Over the North Section of the Dam.

Photo 2 **View Facing West Overlooking Proposed Fish Ladder Placement Area (And Railroad Bridge) to be Located in the Lockwood Dam Bypass Reach.**
View Facing West Towards Lockwood Dam. Photo Date: 2/28/2020.
Photographer Location: Along Kennebec River Shoreline.

Photo 3 **View Facing West Overlooking Proposed Fish Ladder Placement Area (and Railroad Bridge) to be Located in the Lockwood Dam Bypass Reach.**
Photo Date: 2/28/2020. Photographer Location: Along Kennebec River Shoreline.

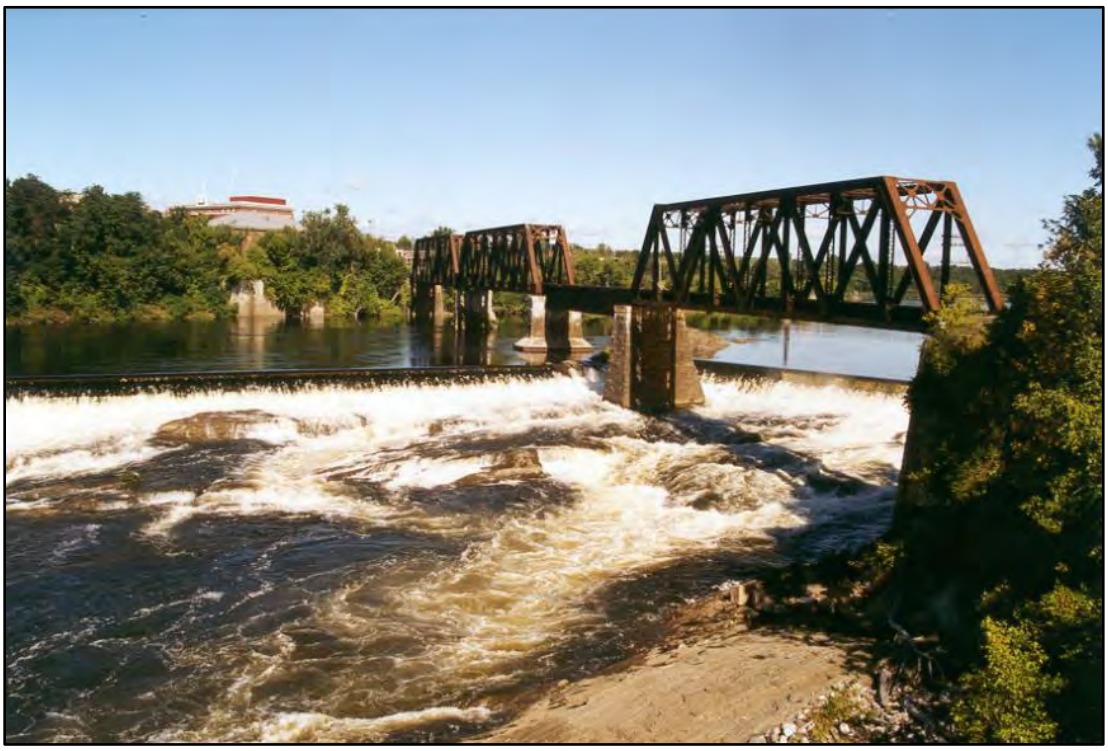

Photo 4 **Bypass Area Looking North, Proposed Fish Ladder Placement Area. Approximate Photo Date: 2000.**

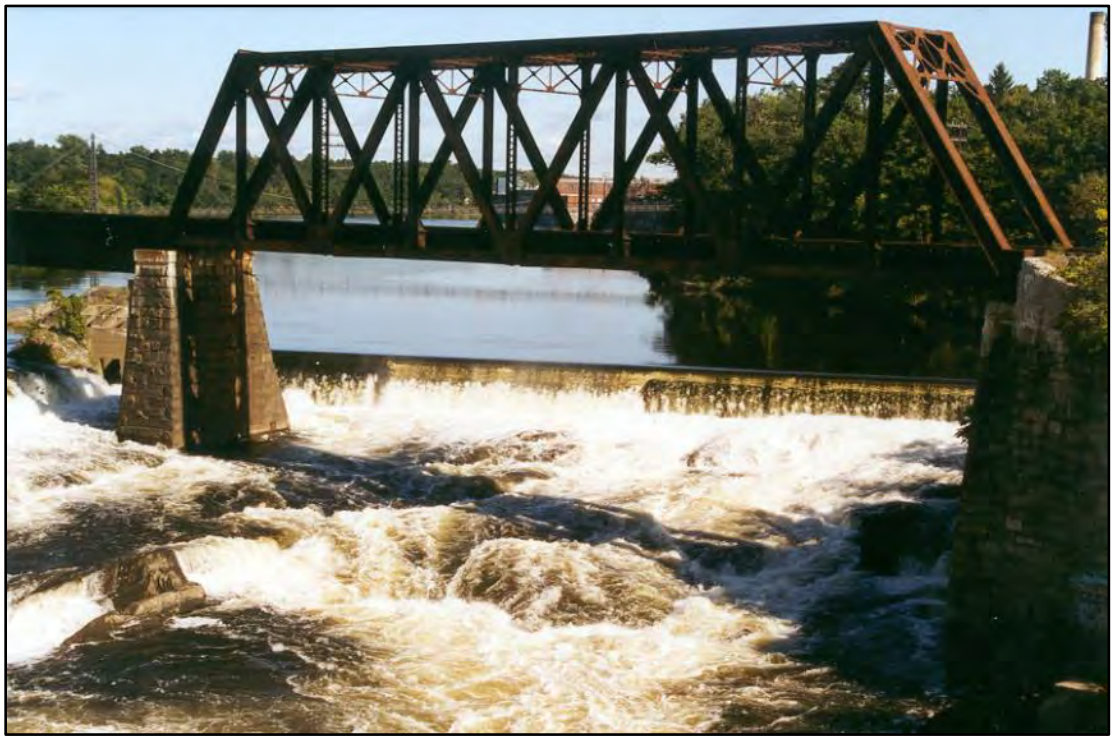

Photo 5 **Proposed Fish Ladder Placement Area. Approximate Photo Date: 2000.**

Photo 6 Proposed Fish Ladder Placement Area, East Side of the Kennebec River, East of the Spillway.
Approximate Photo Date: 2000.

Photo 7 Proposed Fish Ladder Placement Area.
Approximate Photo Date: 2000.

4.0 CONSTRUCTION ACTIVITIES

The proposed fishway will be built on the east side of the Kennebec River, within the Lockwood Project bypassed reach and over the north spillway.

Fishway construction work is scheduled to begin in 2021, commencing with the construction of the separately permitted access road. Fishway construction is currently anticipated to take approximately 3.5 years to complete.

4.1 Construction Overview

To allow for fish passage system construction, in-river bedrock removal will occur and the north concrete spillway will be removed. The fishway and attraction flow channel will be installed within the removed spillway area. Two 71-foot-wide crest gates will replace the spillway west of the installed fishway. A 92-foot-long concrete floodwall will be built to replace the spillway section east of the fishway. A permanent earth fill crane access pad will be constructed within the river at the end of the access road to allow for access during construction, and to provide an area for continued facility maintenance. Additionally, a small concrete pad will be constructed in an upland area just west of the access road and will serve as an equipment shelter.

A contractor designed temporary cofferdam system will be constructed around the in-river work area to provide a de-watered workspace. For safety during cofferdam construction and removal, the Project headpond will be lowered 1.5 feet. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown area. Pumps will be utilized during construction to control water in the construction area and a dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

Fishway construction work is scheduled to begin in 2021. In addition, this Project Review submittal is specific only to the proposed upstream fishway. A separately permitted fishway access road, can be seen on the project designs, and is proposed to be constructed just prior to the fishway. The access road will facilitate fishway construction access and eventual maintenance of the proposed upstream fishway. This proposed access road will not impact areas below the ordinary high-water line of the Kennebec River and has been separately

permitted by the Maine Department of Environmental Protection (Maine DEP) (Approval L-20218-34-N-N) on December 7, 2020 (Appendix A).

4.2 Construction Activities

4.2.1 Mobilization, Laydown Area and Access Road Construction

The initial phase of construction will involve materials delivery, lowering of the impoundment, and construction of the access road and temporary cofferdam system (see Erosion Control & Dewatering Plan Drawing G-103, project Drawings, Appendix D). A contractor designed temporary bulkhead cofferdam system will be constructed around the perimeter of the in-river work area to provide a de-watered workspace. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown areas. Pumps will be utilized throughout construction to control water in the construction area and a dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

For safety during cofferdam construction, the Project impoundment will be lowered 1.5 feet. The impoundment drawdown will not exceed a rate of approximately 1-inch per hour. When downstream flow regulation is necessary to raise the impoundment level after construction of the cofferdam, Brookfield will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment.

A permanent crane access pad road base will additionally be constructed within the river to connect with the access road and allow for work area access during construction, and to provide access for continued fishway facility maintenance and operation, after construction. A temporary earth fill wet road will be constructed in river, to facilitate access to the fishway construction area.

4.2.2 Demolition and Bedrock Removal

The next phase of work involves in-river bedrock removal and removal of the north spillway (see Demolition & Excavation Plan Drawing C-101, project Drawings, Appendix D), to prepare for fishway system construction:

- In-river bedrock excavation will occur in the proposed fishway footprint. These areas will be excavated to various slopes and elevations, in order to prepare the bedrock surface for the fish ladder. Bedrock excavation and rock removal will be

completed utilizing blasting and mechanical methods such as excavator mounted hoe rams (A Blasting Plan will be developed in consultation with the NMFS). Bedrock material will be removed from the river.

- The north concrete spillway will be removed, in order for the fishway, two crest gates, and flood wall to be placed in the spillway footprint. Both excavator mounted and handheld equipment (jack hammers, etc.) along with diamond saws and/or diamond wire tools will be utilized to remove the concrete spillway.
- Any excavated materials and/or spoils will be transported and disposed of in accordance with local, state, and federal regulations. Excavated materials may be temporarily stored on site.

4.2.3 Fishway Construction

The vertical slot fishway will measure approximately 530-feet-long by approximately 60-feet-wide at its widest point. An attraction flow channel will be constructed on the west side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide. Concrete fill will be placed over the excavated areas where the fishway will be secured; forms will be set and concrete pump trucks will be used.

The fishway and attraction flow channel will be installed within the removed north spillway section along with two 71-foot-wide crest gates, and a 92-foot-long concrete floodwall, to replace spillway capacity. The two crest gates will replace the spillway west of the installed fishway, and the concrete floodwall will be built to replace the spillway section east of the fishway.

4.2.4 Site Restoration and Demobilization

Upon completion of the fishway and associated crest gates, and floodwall construction, the impoundment will again be lowered 1.5 feet to allow for the contractor designed temporary cofferdam system to be removed. The turbidity curtain outside of the cofferdam system will be removed next. The work area and access road area will be cleaned and disturbed areas will be seeded with native seed mix. The upland silt fence system will be removed after the area is stabilized.

4.3 Waterway Impacts

The below table (Table 1) outlines the proposed project's temporary and permanent fill quantities as well as proposed excavation quantities.

Table 1 Excavation and Fill Quantities in Waters of the United States

Project Component	Temporary Fill (SF/LF/CY)	Excavated Fill (SF/CY)	Permanent Fill (SF/CY)	Impact Area
Temporary Dewatered Work Areas	48,450 SF/73,720 SF			Headpond/Tailwater
Upstream Cofferdam	400 LF/3,700 CY			Headpond
Downstream Cofferdam	550 LF/8,140 CY			Tailwater
Wet Road	4,000 SF/300 CY			Headpond
Wet Road	10,060 SF/750 CY			Tailwater
Earth Fill			9,090 SF/2,330 CY	Tailwater
Crane Pad			2,550 SF/950 CY	Tailwater
Bedrock Excavation		5,710 SF/590 CY		Headpond
Fishway Bedrock Excavation		19,570 SF/2,310 CY		Tailrace
Concrete Demolition		3,700 SF/1,340 CY		Dam
Crest Gate Bedrock Excavation		2,860 SF/85 CY		Tailrace
Fishway			5,530 SF/2,350 CY	Headpond
Fishway			17,860 SF/7,660 CY	Tailrace
Concrete Flood Wall			2,030 SF/1,140 CY	Tailrace
Concrete Crest Gate			2,860 SF/530 CY	Dam/Tailrace

Concrete fill (approximately 830 SF/180 CY) will additionally be placed above the ordinary water line, and adjacent to the access road to accommodate for the proposed equipment shelter.

Construction Schedule

The below proposed schedule (Table 2) is subject to change pending approvals from permitting entities. Schedule updates will be communicated with permitting entities as appropriate.

Table 2 Construction Schedule

Construction Phase	Construction Schedule
Contractor Mobilization and Access Road Construction (upland ground disturbance only; no in water work; 4 months to complete)	October 2021 – January 2021
Construct Temporary In-Water Access and Water Control Structures (target start of installation and work within in water work windows July 15 to September 30 and November 8 to April 9; 6 months to complete)	July 15, 2022 – September 30, 2022 and November 8, 2022 – March 8, 2023
North Spillway Demolition and Bedrock Removal (in the dry; 6 months to complete)	March 2023 – September 2023
Fish Passage, Crest Gates, and Floodwall Construction (in the dry; 14 months to complete)	October 2023 – December 2024
Remove Temporary Access and Water Control Structures, Contractor Demobilization (target removal within in water work windows July 15 to September 30 and November 8 to April 9; 6 months to complete)	January 2025 – April 2025; July 15, 2025 – September 30, 2025
Fishway Commissioning	May 2026

4.4 Equipment to be Used

Best Management Practices (BMPs) will be implemented before and during Project construction to limit any temporary adverse impacts to water quality, soil stability, and

the natural environment. Temporary erosion and sedimentation controls will be installed including a silt fence around the work and laydown area, designated construction entrances and exits will be established. A turbidity curtain will be employed around the temporary cofferdam. A temporary, bulkhead will be installed to facilitate dewatering of the project area to enable subgrade preparation and fill placement to occur in the dry. Pumps will be utilized as required to dewater the work area (or in localized areas as the work progresses). Trenches, sumps, and sump pumps will be installed as required to contain and control seepage or surface water and prevent ponding of water atop the work area. Water will be pumped to sediment containment bag(s) prior to being returned to the bypass reach, downstream of the work area.

Equipment used for in-river bedrock excavation and movement of permanent fill, will be determined by the contractor, but will likely include hydraulic excavator(s), hoe ram(s), excavator mounted and handheld equipment, diamond saws and or diamond wires for concrete removal at the spillway, and other small/support equipment.

Blasting may be required and a Blasting Plan will be developed by the contractor in consultation with NMFS. The Blasting Plan will outline pre-blast surveys and monitoring, blasting procedures and sequencing, and blast vibration and sound pressures. Blasting will be conducted in the dry to the greatest extent possible, vibration will be monitored and air blast overpressure levels will not exceed 133 peak dB (linear) two Hertz high-pass system. Sound pressure level (SPL) will be monitored with a minimum of hydrophones and a digital recorder. Charge weights will be limited and individual blasts will be delayed to keep detonation related sound pressures at a safe level for aquatic resources (less than an SPL of 206 dB re 1 uPa (3.6 psi) and below a Sound Exposure Level (SEL) of 187 dB re 1 uPa sq. sec. Blast monitoring and reporting will be provided to NMFS. In addition, blasting will occur at the end of the adult salmon migration period (anticipated in the fall) and the earthen cofferdam will provide a physical buffer from the blast locations.

5.0 PROJECT DESIGN DRAWINGS

See Appendix D for the Lockwood Hydroelectric Project Upstream Fish Passage Design Drawings. And see Appendix E for the Lockwood Vertical Slot Fishway Operations and Maintenance Plan.

6.0 FISH AND WILDLIFE RESOURCES

6.1 Fish Resources

6.1.1 Overview

The Kennebec River supports approximately 50 species of freshwater and diadromous fish species, including cold and warm water angling opportunities for wild and stocked brook trout, landlocked salmon, brown trout, rainbow trout, and smallmouth bass. The lower Kennebec River, including the Lockwood Project waters, supports runs of diadromous fish species, including American shad, blueback herring, alewives, Atlantic salmon, and American eel. Atlantic and shortnose sturgeon also occur in the lower Kennebec River, but typically no further upstream than the Lockwood Project.

One federally endangered fish species, the Atlantic salmon (*Salmo salar*), has the potential to occur below the Lockwood dam and within the proposed project area as identified by the USFWS Information for Planning and Consultation (IPaC) report completed on December 3, 2020 (Appendix F). The Atlantic Salmon Gulf of Maine distinct population segment (DPS) is listed as endangered under the Federal Endangered Species Act (ESA). The Kennebec River is identified as Critical Habitat for the Atlantic Salmon Gulf of Maine DPS and Atlantic salmon present in the Kennebec River are listed under the ESA.

In addition to Atlantic salmon, both Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) have the potential to occur below the Lockwood dam, and within the proposed project area. the Atlantic sturgeon Gulf of Maine DPS is listed as threatened under the ESA (the Atlantic sturgeon New York Bight DPS, Chesapeake Bay DPS, South Atlantic DPS, and Carolina DPS are listed as endangered under the ESA) and the shortnose sturgeon is listed as endangered under the ESA (NOAA Fisheries 2018). In addition, Critical habitat for Atlantic Sturgeon in Maine includes occupied habitat of the Penobscot, Kennebec, and Androscoggin rivers (NMFS 2017). The lower Kennebec River, extending downstream from the Lockwood Project, is considered critical habitat for the GOM DPS of Atlantic Sturgeon due to its identification as a spawning and rearing habitat for the species (NMFS 2017, NOAA 2017). Critical habitat has not been designated for Shortnose Sturgeon (NOAA 2019a); therefore, there is no Shortnose Sturgeon critical habitat within or adjacent to the proposed action area.

Upstream fish passage for Atlantic salmon, American shad, blueback herring, and sea-run alewife in the lower Kennebec River is currently provided through trap-and-truck operations at the Project fish lift facility on the west side of the River and fish are trucked to the Sandy River and elsewhere. As such, Atlantic salmon, Atlantic and shortnose sturgeon and other diadromous species are anticipated to be affected by construction activities for the upstream fishway as they migrate and are potentially attracted to bypass reach flows. In addition, downstream migrating smolt and kelt, as well as herring and shad, could be affected by the proposed construction project.

BWPH is currently completing Section 7 Endangered Species Act (ESA) consultation for construction activity with the NMFS and FERC.

6.1.2 Impacts Mitigation

Throughout construction, prescribed minimum flows will be maintained and existing upstream fish passage will continue to be provided via the current onsite fish lift facility and the downstream fish passage facility will continue to be operated. Construction activities and operation of the new upstream fishway will not change the normal pond elevation or downstream minimum flows and thus are not anticipated to have a negative effect on existing aquatic habitat with the exception of permanent fills that will occupy these habitats. The project will in fact enhance downstream minimum flows and potentially, downstream passage via the provision of fish lift attraction flows. Overall, the proposed project is viewed as a mitigation measure as it will provide permanent upstream fish passage past the Lockwood dam.

Construction of the fishway will take place within the waterbody, for a limited duration. Temporary effects will mostly be associated with the cofferdam construction and removal, as all other in-river work will occur behind the cofferdam. Some noise may be associated with construction and excavation, though it will be somewhat buffered by the cofferdam. Proposed construction activities are not anticipated to negatively affect water quality as sediment and erosion control BMP's will be implemented during project construction to limit any temporary adverse impacts to water quality (sedimentation inputs). As discussed above, a Blasting Plan will be developed by the blasting contractor in consultation with the NMFS.

No in water work will commence until the downstream smolt season has passed and it will be completed within the proposed work windows. As such, the project is not anticipated to significantly negatively affect Atlantic salmon or other diadromous species.

Overall, the intent of this project is to provide volitional upstream fish passage for Atlantic salmon and other migratory species. Operation of the new upstream fishway will not change the normal pond elevation or minimum flows and thus will have minimal effect on the existing aquatic habitat.

In addition, Brookfield filed a Biological Assessment for Atlantic salmon, Atlantic sturgeon and shortnose sturgeon for the Species Protection Plans (SPP) with FERC on May 31, 2021, to consult with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) including construction activities associated with development of the upstream fish passage facility.[1]

6.2 Wildlife Resources

6.2.1 Overview

The Lockwood Project is located in downtown Waterville. The project area is within an urbanized and previously disturbed area. The proposed project area has been previously disturbed by prior construction efforts stemming from construction of the Lockwood Dam itself, and construction of the adjacent main line railroad track and construction of the Mardens railroad track spur. The proposed project area resides within a small area of fragmented forest.

Wildlife species likely to inhabit the area are mostly rodent-type mammals (squirrel, rat, skunk, raccoon, muskrat, mice, etc.) and various bird species. One federally threatened wildlife species, the Northern long-eared bat (*Myotis septentrionalis*) (NLEB), may have potential to occur in the proposed project area as identified by the USFWS IPaC report completed on Dec 3, 2020 (Appendix F). The Northern long-eared bat is also identified as an endangered species by the State of Maine. There is no USFWS designated critical habitat for the Northern long-eared bat in the proposed project area.

[1] Brookfield White Pine Hydro LLC, et. al. submits Lower Kennebec Species Protection Plan and Draft Biological Assessment for the Lockwood, Hydro-Kennebec and Weston Projects under P-2574, et. al. FERC Accession No: 20210601-5152. Online: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15804246.

The bald eagle, protected by the Bald and Golden Eagle Protection Act, transiently occurs within the proposed project area. Per a review of the Maine Bald Eagle Nest Locations and Buffer Zone Map,[2] there are no bald eagle nests identified within or adjacent to the proposed project area (Figure 6).

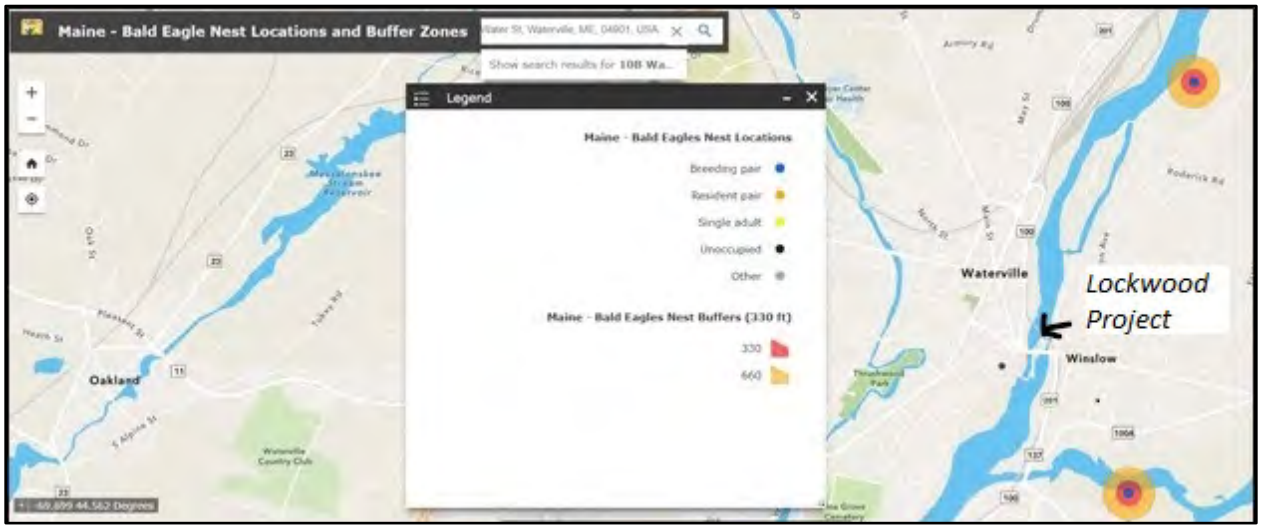

Figure 6 Eagle Nest Locations in Relation to the Lockwood Hydroelectric Project

6.2.2 Impacts Mitigation

There is a possibility that project construction may temporarily impact NLEB feeding patterns and disturb transient bald eagles however, no tree removal is proposed as part of this project.

Provided the temporary nature and short timeline associated with this project, impacts are expected to be temporary and short in duration.

[2] Maine Bald Eagle Nest Locations and Buffer Zone Map: https://www.arcgis.com/apps/webappviewer/index.html?id=796b7baa18de43b49f911fe82dc4a0f1

7.0 HISTORICAL/ARCHAEOLOGICAL RESOURCES

Brookfield consulted with the Maine Historic Preservation Commission (MHPC) State Historic Preservation Officer (SHPO) regarding the construction of the upstream fishway at Lockwood. On October 26, 2020, a Project Notification and Information for Project Review letter was submitted to the MHPC. On November 4, 2020, the MCHP confirmed that the Project will have no adverse effect on historic properties as defined by Section 106 of the National Historic Preservation Act, see Appendix G.

On October 26, 2020, Brookfield also consulted with the five following federal Maine Tribes: Aroostook Band of Micmacs, Houlton Band of Maliseet Indians, Passamaquoddy Tribe (Indian Township and Pleasant Point), and Penobscot Indian Nation. See Appendix G for the letter that was mailed to each of the Tribes and the USPS mail receipt. In addition, one reply was received, from the Passamaquoddy Tribe, siting that the proposed project will not have an impact on cultural and historical concerns, also included in Appendix G.

8.0 ABUTTING PROPERTY OWNERS

The abutting property owners, who were notified of the proposed project as part of the Maine DEP permit process, are as follows.

Table 3 Abutting Property Owners Distribution List

City	Name	Map Address	Map/Lot	Mailing Address
Winslow	State of Maine	Clinton Avenue	018/ 057	State of Maine, DOT Environmental Office, ATTN: David Gardner, 16 SHS, AUGUSTA, ME 04330-0000
Winslow	Gerard N & Susan R Boutin	119 Benton Avenue	018/ 069	119 BENTON AVENUE WINSLOW, ME 04901-6805
Winslow	Darrel Tudela	121 Benton Avenue	018/068	121 BENTON AVENUE, WINSLOW, ME 04901-0000
Winslow	Ronald D & Ann M Ball	117 Benton Avenue	018/ 074	117 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Trevor Elliott & Celeste Aline Gleason	115 Benton Avenue	018/ 075	115 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Jaspar Properties	107 Benton Avenue	018/ 088	107 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Pauline H Veillieux	99 Benton Avenue	018/ 089	99 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Sharon A Poulin	97 Benton Avenue	018/ 124	97 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Andrew Vear	93 Benton Avenue	018/ 126	PO BOX 8044 WINSLOW, ME 04901-8044
Winslow	Glen Cray	91 Benton Avenue	018/ 127	45 ST LAURENT STREET EPPING, NH 03042-0000
Winslow	Jean Theriault	89 Benton Avenue	018/ 128	89 BENTON AVENUE WINSLOW, ME 04901-0000
Winslow	Jamie M Bragdon	87 Benton Avenue	018/ 129	17 HALLOWELL ST WINSLOW, ME 04901-00000
Winslow	Arlene M Lessard	85 Benton Avenue	018/ 130	85 BENTON AVENUE WINSLOW, ME 04901-0000

City	Name	Map Address	Map/Lot	Mailing Address
Winslow	Robert & Sandra Siviski	12 Clinton Avenue	018/ 132	690 ABBOTT ROAD WINSLOW, ME 04901-0000
Winslow	Roland B Assaf	16 Clinton Avenue	018/ 133	223 SEWALL ST AUGUSTA, ME 04330-0000
Winslow	KENNEBEC RIVER DEVELOPMENT PARK	100 Benton Avenue	019/ 017	100 BENTON AVE WINSLOW, ME 04901-0000
Winslow	King Neptune Inc	21 Bay Street	021/ 001	21 BAY ST WINSLOW, ME 04901-7045
Winslow	Deane M & Edythe C Nason	11 & 15 Bay Street	021/ 002 & 003	11 BAY STREET WINSLOW, ME 04901-7045
Winslow	Humberto N & Olivia Rego C/O CRT C LLC	9 Bay Street	021/ 004 & 005	5 STRAWBERRY LANE WARREN, RI 02885-0000
Winslow	Adam Bradstreet		021/ 007 & 018/ 060 & 018/ 125	Town of Winslow Attn: Adam Bradstreet, Code Enforcement Officer 114 Benton Ave Winslow, Maine 04901
Winslow	REAL EZE ESTATES LLC	15 Clinton Avenue	021/ 021	357 SAINT MARKS AVE FREEPORT, NY 11520-0000
Winslow	Sarah E Given & Zachary A Jochem	17 Clinton Avenue	021/ 022	17 CLINTON AVENUE WINSLOW, ME 04901-0000
Municipal Officers				
Winslow	Lisa Gilliam & Adam Bradstreet			Town of Winslow Attn: Lisa Gilliam, Town Clerk Adam Bradstreet, Code Enforcement Officer 114 Benton Ave Winslow, Maine 04901

Source: Town of Winslow, Maine tax records.

Figure 7 Winslow Tax Map18 showing notified Abutters (within Red Circled Areas)

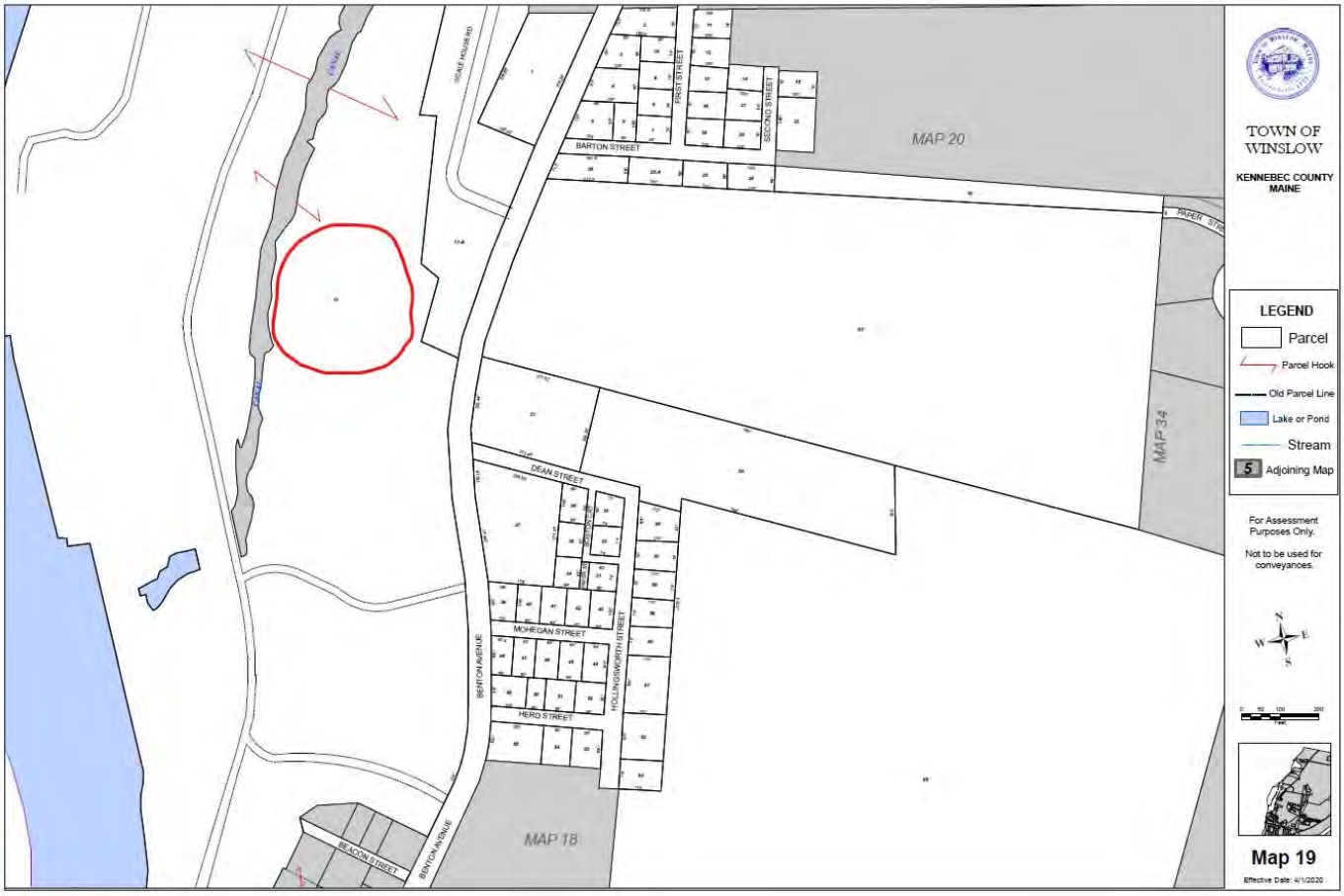

Figure 8 Winslow Tax Map19 showing notified Abutters (within Red Circled Areas)

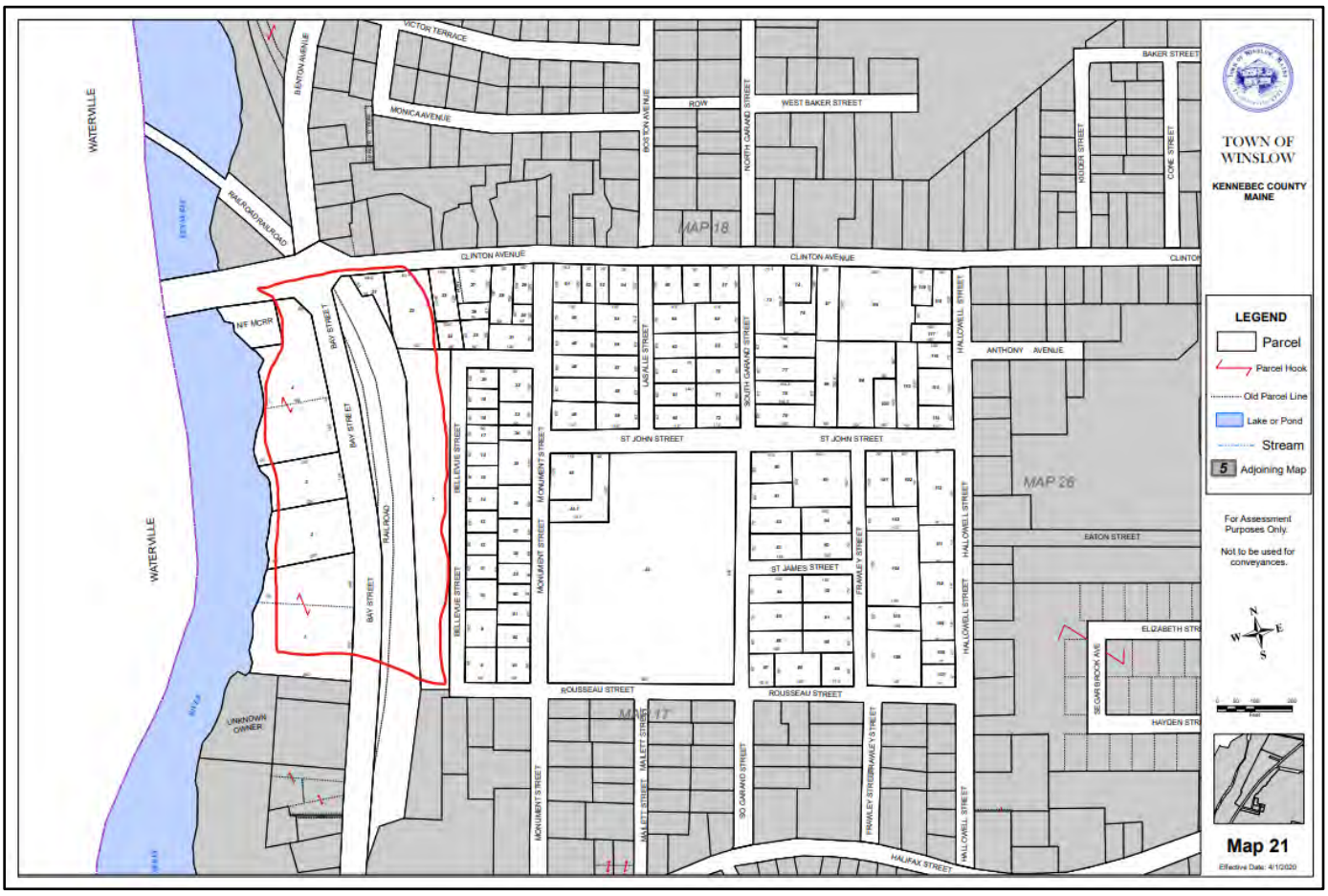

Figure 9 Winslow Tax Map21 showing notified Abutters (within Red Circled Areas)

9.0 REFERENCES

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APPENDIX A

DECEMBER 7, 2020 MAINE DEP ACCESS ROAD PERMIT

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

MERIMIL LIMITED PARTNERSHIP WINSLOW KENNEBEC COUNTY LOCKWOOD HYDROELECTRIC PROJECT FISHWAY ACCESS ROAD #L-20218-34-N-N (APPROVAL)	MAINE WATER QUALITY PROGRAM FEDERAL CLEAN WATER ACT WATER QUALITY CERTIFICATION

Pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. §§ 464–470, the *Maine Waterway Development and Conservation Act* (MWDCA), 38 M.R.S. §§ 630–637, the *Administrative Rules For Hydropower Projects*, 06-096 C.M.R. 450 (effective November 2, 2017), and Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act), the Department of Environmental Protection has considered the application of MERIMIL LIMITED PARTNERSHIP with its supportive data, agency review, public review, and other related materials on file, and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

Merimil Limited Partnership (MLP or the Applicant) submitted a MWDCA application for the construction of a fish passage access road at the Lockwood Hydroelectric Project (FERC No. 2574) (LHP or Lockwood Dam) located on the mainstem of the Kennebec River. The Maine Department of Environmental Protection (the Department or MDEP) accepted the application for processing on June 5, 2020. The Department has reviewed the application for access road construction at the LHP and finds the following facts.

2. REGULATORY HISTORY

A. FERC License.

The LHP is an existing hydroelectric project located on the Kennebec River, in the Town of Winslow, Maine. MLP, a subsidiary of Brookfield Renewable Energy Group, was granted a License to operate the LHP by the Federal Energy Regulation Commission (FERC) on March 4, 2005.

B. Fisheries Agreements and Water Quality Certification.

In May of 1998, a fisheries settlement agreement for the Kennebec River was entered into by the members of the Kennebec Hydro Developers Group (the KHDG Agreement or Agreement). The member of this group that are party to the KHDG agreement include MLP, a collection of non-governmental organizations referred to as the Kennebec Coalition, and state and federal resources agencies (the National Marine Fisheries Service (NMFS), the Maine Department of Marine Resources (MDMR), the Maine Department of Inland Fisheries and Wildlife (MDIFW) and the U.S. Fish and Wildlife Service (USFWS). Together, these state and federal resource agencies are referred to

hereafter as the Fisheries Resource Agencies. One of several purposes of the Agreement is to achieve a comprehensive settlement governing fisheries restoration, for numerous anadromous and catadromous fish species that will rapidly assist in the restoration of these species in the Kennebec River. One of the tenants of the Agreement is that formal filings will be made to MDEP to immediately incorporate all applicable terms of the Agreement into existing or proposed water quality certifications for hydropower facilities owned by KHDG members, including MLP and the Lockwood Dam. The Agreement also states that, by December 2014, if the biological triggers for permanent upstream passage facilities have not been met at the Lockwood Dam, the parties will assess the progress in restoring sea-run fish species and will attempt to reach consensus on future fish passage measures. Any disputes will be handled through the FERC process.

On August 26, 2004, the Department issued a Water Quality Certification (WQC) for the operation of the LHP (#L-20218-33-C-N). Pursuant to Condition E of the WQC, the Applicant shall install and operate permanent upstream fish passage facilities no more than 2 years following (a) the passage of at least 8,000 American shad in a single season through the interim trap, lift and trucking facility at the Lockwood Powerhouse or (b) development of an alternative trigger for fishway installation based on the biological assessment process from the Fisheries Resource Agencies for Atlantic salmon, alewife, and blueback herring, whichever comes first, provided that in no event shall permanent fish passage be required at the LHP before May 1, 2010.

In accordance with the May 19, 2016 Interim Species Protection Plan, to date, MLP has operated an interim trap and truck facility to pass anadromous fish species at the Lockwood Project. KHDG Agreement members continue to assess the status and growth of the population of Atlantic salmon, shad, and other anadromous fish in the Kennebec River drainage and determined, based on annual passage data since the installation of the interim trap facilities, that the interim fish trap at the LHP is ineffective at passing significant numbers of American shad and Atlantic salmon. As part of the fulfillment of the KHDG Agreement for the above-mentioned dams on the Kennebec River, MLP must develop permanent and comprehensive fish passage at the Lockwood Project to effectively restore anadromous fish populations in the Kennebec River.

On December 31, 2019, the Applicant filed the Proposed Species Protection Plan (SPP) and the related draft Biological Assessment (BA) for the four above mentioned hydroelectric projects on the Kennebec River, including the Lockwood Project, with FERC. On July 13, 2020, FERC rejected the SPP and draft BA based on comments from the Fisheries Resource Agencies. Concurrently, on the same date, FERC issued an Order granting a 2-year extension of time for construction of permanent fish passage at the LHP.

C. <u>MWDCA Maintenance and Repair Application – Lockwood Project – Permanent Fishway Access Road</u>.

MLP proposes to construct a permanent gravel and paved road on the eastern bank of the Kennebec River adjacent to the LHP dam in order to provide access to a future fishway

that MLP expects to construct. In the present application the Applicant seeks approval for the construction of the access road only, which is the first part, consisting of upland construction, of the overall fishway project. The proposed access road "will facilitate construction access and eventual maintenance of a proposed upstream fishway" anticipated to be constructed at the Lockwood Dam in the future. (Application, § 1(A).) The Applicant states it "will submit a separate permit application for construction of the upstream fishway which will encompass in-water work phases." (Application, § 1(A).)

3. DESCRIPTION OF EXISTING HYDROELECTRIC PROJECT AND OPERATION

The LHP is composed of a concrete gravity dam with two spillway sections connected by a small island, a forebay head-gate structure including a 450-foot forebay canal and two powerhouses with a total installed capacity of 6,915 kW and a hydraulic capacity of 5,660 cubic feet per second (cfs). The east spillway section is approximately 225 feet long and is topped by 15-inch-high wooden flashboards. The crest of the flashboards is 52.16 feet msl[1]. The West spillway section is approximately 650 feet long, of which 40 feet consists of a pier from the Route 201 bridge. The section of the spillway between the pier and the island is topped with similar flashboards with a crest of 52.16 feet. The sections between the bridge pier and the forebay has a fixed crest elevation of 52.0 feet. The forebay headworks extends approximately 160 feet from the end of the western spillway section to the west bank of the river. The dam was originally constructed in 1868 and was improved to a concrete structure 1913. The original powerhouse was built in 1919. The second powerhouse was completed in 1989. The impoundment formed by the Lockwood Dam is approximately 1.2 miles long with a surface area of 81.5 acres. The LHP is currently operated as a run of river facility; the LHP is automated to achieve a run of river operation by passing inflow as it is received from the Hydro Kennebec Project (HK Project) (FERC No. 2611), also owned by MLP.

4. SUMMARY OF PROJECT PROPOSAL

The proposed access road is intended to facilitate construction access and eventual maintenance of an upstream fishway that may be constructed at the Lockwood Dam in 2021 or 2022 (fishway designs and construction to be provided under a separate project review submittal). The proposed access road entrance will be located off of Benton Avenue in Winslow, ME and will terminate along the Kennebec River shoreline, above the ordinary high-water line, and adjacent to the Lockwood Dam. The access road will be approximately 210-feet-long and approximately 30-feet-wide at its widest point, will be bordered by rip rap, and will have a slope ranging from 15% to 21.3%. The road's entrance and lower limits will be paved while the middle portion of the road will be made of compacted gravel. A concrete wall that will be constructed on exposed bedrock ledge located along the river shoreline will support the final section of the road. The concrete wall will be approximately 115-feet-long and will vary in height from 7 feet 4 inches maximum height and will slope down to match existing grade. The wall will be 1 foot 5 inches thick and contain drainpipes. On either side of the access road the wall will be lined by rip rap and free-draining stone. Three gates will additionally be installed along the access road. A 30-foot-wide gate will be installed at the entrance, a 28-foot-wide leaf swing gate will be installed midway down the road (west of the

[1] Mean sea level

railroad tracks), and a 20-foot-wide swing gate will be installed at the end of the access road above the river. A chain-link and barbed wire topped fence will be installed at the terminus of the road, along the river and atop of the concrete wall. Once construction of the fishway is complete, the entire access road will then be paved with asphalt. The road will then serve as a permanent access way to maintain the fishway.

Erosion and Sedimentation Controls (E & S Controls) developed and implemented according to Maine Erosion and Sedimentation Control Best Management Practices Manual for Designers and Engineers (October 2016) and the Maine Erosion and Sediment Control Practices Field Guide for Contractors (2014) (collectively, the Maine BMPs) are described in detail elsewhere in this permit, and will be in place before work begins and remain in use until the work area is stabilized.

5. DETAILED PROJECT ACTIVITIES

Merimil Limited Partnership proposes the following sequence of activities to construct the fishway access road.

A. Site Preparation.

All work activity will occur on the shoreline and no in-water work is planned for the construction of the access road. Therefore, a drawdown of the impoundment upstream of the LHP will not be required and no changes to water levels will be needed up or downstream of the LHP. The Applicant proposes to take preliminary steps before work begins to mitigate erosion and sedimentation impacts. A silt fence is proposed down slope of the work and laydown areas to mitigate any disturbed soils which may be mobilized and washed to the resource. Rebar reinforced silt socks will be deployed downslope of the work area as needed on exposed ledge areas downslope of the concrete wall and rip rap installation, where silt fences cannot be installed. Erosion control blankets will be deployed on all newly graded slopes and ditches exceeding 8% slope. These will be installed according to Maine BMPs.

Once E & S Controls are in place, in order to prepare the work site, the Applicant proposes to clear and grub existing trees and brush within the 0.5-acre project area. The Applicant will use an existing clear area and right-of-way road on the eastern shore of the Kennebec River, adjacent to the railroad tracks, to stage equipment and construction materials. The right-of-way road can be entered from the intersection of Bridge Street and Bay Street. No temporary access roads will be constructed for this project. The construction access point will be directly adjacent to the laydown area and right-of-way. No materials will be dredged or excavated from or adjacent to the waterway.

B. Construction/Maintenance.

The proposed access road entrance will be located off Benton Avenue and will terminate along the Kennebec River shoreline, above the ordinary high-water line, and adjacent to the Lockwood Dam. After all erosion controls are in place, vegetation will be removed

as described above. Any sediment generated by vegetation removal will be contained by the silt fence and silt sock barrier described in Section 4(A) of this permit. After the work area has been cleared of vegetation, construction of the access road will commence. The access road will be approximately 210-feet-long and approximately 30-feet-wide at its widest point, will be bordered by rip rap, and will have a slope ranging from 15% to 21.3%. The final portion of the road will be supported by construction of a concrete wall that will reinforce the road foundation on exposed bedrock ledge located along the river shoreline. The concrete wall will be approximately 115-feet-long and will vary in height depending on ledge elevation. The maximum height of the wall will be 7 feet 4 inches and wall height will decrease to match the existing grade. The wall will be 1-foot-5-inches thick and contain drainpipes.

The access road will require approximately 1,130 cubic yards (CY) of permanent compacted gravel fill and approximately 65 CY of pavement fill. Approximately 300 CY of permanent rip rap fill will be placed along the access road and along the terminus of the road. Approximately 68 CY of free draining stone fill will be placed along the terminus of the access road, and approximately 101 CY concrete fill will be placed for the top of the end wall and used for footings. No temporary fills are associated with this project work. Fill material will be delivered by 10-wheeler dump trucks and backhoes and bulldozers will be required from roadway construction.

Once the road is constructed using rip rap and crushed gravel, its intended use is for access and construction of the upstream fishway at the Lockwood Dam. Several gates, including a 30-foot-wide gate at the road entrance, a 28-foot-wide leaf swing gate mid-way down the road, and a 20-foot-wide swing gate at the end of the access road, will be installed when the road is complete. After the projected fishway work is complete, the road will be paved with asphalt and be utilized as a permanent service road for the upstream fishway

The presence of hydrocarbons was detected during borings to test soil stability for the roadway construction. MLP has contracted with Environmental Projects, Inc. (EP Inc.) to test the existing soils and characterize the soil for disposal at a licensed landfill. EP Inc. will ensure that the handling, transporting, disposal and soil disposal documentation is in accordance with all local, state, and federal rules and regulations.

C. Stabilization and Closeout.

Once the construction of the roadway is complete, the new roadway is planned to be utilized for construction activities for the upstream fishway. Many closeout and stabilization activities, such as mulching, seeding and loaming surrounding soils will be conducted to stabilize disturbed soils prior to the construction of the fishway at the LHP. No in water work upstream or downstream of the Lockwood Dam is required for the roadway construction and all concrete work will be performed in the dry, poured in forms and allowed to cure for at least 7 days. If necessary, the local roads in the immediate vicinity of the work site and staging area located in the right of way, adjacent to existing

railroad tracks, will be restored to their original condition while silt fences remain in place along the laydown area. After all access road construction activities are completed and the work and staging areas are stabilized, E & S Controls will be removed from the site.

6. JURISDICTION

A. Hydropower Project Permit. The Applicant proposes to develop a new fishway access road at the LHP. The initiation of construction of a new portion of the hydropower project requires a permit under Section 633 of the MWDCA. Additionally, the construction of the road is part of the larger fishway project that will involve both the new road and structural alteration of the existing dam in ways anticipated change flows.[2] Pursuant to Section 634-A, the Department administers the permit process for projects located wholly or partly within an organized municipality.

B. Water Quality Certification. Section 401 of the CWA, 33 U.S.C. § 1341, governs state water quality certification of certain activities that may result in a discharge to navigable water of the United States. Section 635-B of the MWDCA establishes that the Department shall issue or deny water quality certification at the same time it issues a permitting decision pursuant to the MWDCA. The Department does so here with respect to the proposed fishway access road.

C. Terms and Conditions. Section 635 of the MWDCA provides that, upon receipt of a properly completed application, the Department shall either (1) approve the proposed project upon such terms and conditions as are appropriate and reasonable to protect and preserve the environment and the public's health, safety and general welfare, (2) disapprove the proposed project, or (3) schedule a hearing on the proposed project.

7. MWDCA APPROVAL CRITERIA

Pursuant to Section 636 of the MWDCA, a permit shall be approved when the Applicant has demonstrated that the following criteria have been met:

1. The Applicant has the financial capability and technical ability to undertake the project.

2. The Applicant has made adequate provisions for protection of public safety.

3. The project will result in significant economic benefits to the public, including, but not limited to, creation of employment opportunities for workers of the State.

[2] Because the proposed road construction is the comparatively smaller portion of the overall fishway project and the complexity of reviewing the road was anticipated to be consistent with the complexity of reviewing maintenance and repair projects that involve filling of land adjacent to a waterbody, the Department treated the proposed road construction as the equivalent of maintenance and repair for the purpose of calculating the application fee.

4. The Applicant has made adequate provisions for traffic movement of all types out of or into the development area.

5. Within the jurisdiction of the Maine Land Use Regulation Commission, the project is consistent with zoning adopted by the Commission.

6. The Applicant has made reasonable provisions to realize the environmental benefits of the project, if any, and to mitigate its adverse environmental impacts.

7. The advantages of the project are greater than the direct and cumulative adverse impacts over the life of the project based upon the following considerations:

   a. Whether the project will result in significant benefit or harm to soil stability, coastal and inland wetlands or the natural environment of any surface waters and their shorelines;

   b. Whether the project will result in significant benefit or harm to fish and wildlife resources. In making its determination, the DEP shall consider other existing uses of the watershed and fisheries management plans adopted by the Department of Inland Fisheries and Wildlife, and the Department of Marine Resources;

   c. Whether the project will result in significant benefit or harm to historic and archaeological resources;

   d. Whether the project will result in significant benefit or harm to the public rights of access to and use of the surface waters of the State for navigation, fishing, fowling, recreation and other lawful public uses;

   e. Whether the project will result in significant flood control benefits or flood hazards; and

   f. Whether the project will result in significant hydroelectric energy benefits, including the increase in generating capacity and annual energy output resulting from the project and the amount of nonrenewable fuels it would replace.

8. There is a reasonable assurance that the project will not violate applicable state water quality standards, including the provisions of the State's antidegradation policy, as required for water quality certification under Section 401 of the United States Water Pollution Control Act (a.k.a., Clean Water Act).

8. APPLICABLE WATER QUALITY STANDARDS

A. Classification. The waters of the Kennebec River are currently classified as follows:

The waters of the Kennebec River impounded by the Lockwood Dam are classified as Class C. 38 M.R.S. § 467(4)(A)(10-A)(a).

Kennebec River – main stem:

From the Shawmut Dam to its confluence with Messalonskee Stream, excluding all impoundments – Class B. 38 M.R.S. § 467(4)(A)(10-A).

B. Designated Uses. Class C waters must be of such quality that they are suitable for the designated uses of drinking water after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other aquatic life. 38 M.R.S. § 465(4)(A).

Class B waters shall be of such quality that they are suitable for the designated uses of drinking water after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and as habitat for fish and other aquatic life. The habitat of Class B waters shall be characterized as unimpaired. 38 M.R.S. § 465(3)(A).

C. Numeric Criteria. The dissolved oxygen content of Class C waters must not be less than 5 parts per million (PPM) or 60% saturation, whichever is higher.[3] [4] 38 M.R.S. § 465(4)(B). The dissolved oxygen content of Class B waters may not be less than 7 ppm or 75% of saturation, whichever is higher.[5] [6] [7] 38 M.R.S. § 465(3)(B).

[3] The dissolved oxygen content of Class C waters must not be less than 5 parts per million (PPM) or 60% saturation, whichever is higher except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes must be maintained.

[4] In order to provide additional protection for the growth of indigenous fish, the following standards apply. (1) The 30-day average dissolved oxygen criterion of a Class C water is 6.5 parts per million using a temperature of 22 degrees centigrade or the ambient temperature of the water body, whichever is less, if: (a) A license or water quality certificate other than a general permit was issued prior to March 16, 2004 for the Class C water and was not based on a 6.5 parts per million 30-day average dissolved oxygen criterion; or (b) A discharge or a hydropower project was in existence on March 16, 2005 and required but did not have a license or water quality certificate other than a general permit for the Class C water. This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004. (2) In Class C waters not governed by subparagraph (1), dissolved oxygen may not be less than 6.5 parts per million as a 30-day average based upon a temperature of 24 degrees centigrade or the ambient temperature of the water body, whichever is less. This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004. 38 M.R.S. § 465(4)(B).

[5] The dissolved oxygen content of Class B waters may not be less than 7 ppm or 75% of saturation, whichever is higher except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 ppm and the one-day minimum dissolved oxygen concentration may not be less than 8.0 ppm in identified fish spawning areas.

[6] Class B numeric criteria also include standards for Escherichia coli (E. coli) bacteria. *See* 38 M.R.S. § 465(3)(B). However, the presence or operation of a dam generally does not implicate E-coli bacteria levels, and absent affirmative evidence to the contrary, E-coli standards are generally not applied in the context of water quality certification with respect to a hydropower project's operation or construction activities.

[7] In accordance with 38 M.R.S § 464(13), compliance with dissolved oxygen criteria in existing riverine impoundments is measured as follows: 1. Compliance is not measured within 0.5 meters from the bottom; 2. Where mixing is inhibited due to thermal stratification, compliance is not measured below the point of thermal stratification

D. Narrative Criteria. Discharges to Class C waters may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of indigenous fish to the receiving waters and maintain the structure and function of the resident biological community. 38 M.R.S. § 465(4)(C).

Discharges to Class B waters may not cause adverse impact to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community. 38 M.R.S. § 465(3)(A), 38 M.R.S. § 465(3)(C).

E. Antidegradation. The Department may only approve water quality certification if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve water quality certification for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S. § 464(4)(F).

9. BURDEN OF PROOF

The Department's *Rules Concerning the Processing of Applications and Other Administrative Matters*, 06-096 C.M.R. ch. 2 (effective April 1, 2003, amended May 2013 and October 2015) provide that an applicant for a license[8] has the burden of proof to affirmatively demonstrate to the Department that each of the licensing criteria in statute or rule has been met. For those matters that are not disputed, the applicant shall present sufficient evidence that the licensing criteria are satisfied. For those matters relating to licensing criteria that are disputed by evidence the Department determines is credible, the applicant has the burden of proving by a preponderance of the evidence that the licensing criteria are satisfied.[9]

DEPARTMENT ANALYSIS

10. FINANCIAL CAPABILITY AND TECHNICAL ABILITY

A. Financial Capability.

The total estimated cost of this project is $700,000. A corporate search of The Maine Department of the Secretary of State, Bureau of Corporations, Elections and Commissions indicated that MLP is a legally existing limited liability company in good standing under the laws of the State of Maine and is a subsidiary company of Brookfield Property Management, LLC., which owns and operates a large renewable power portfolio with dozens of hydroelectric facilities. The Applicant reported that the fishway access

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when such stratification occurs; and 3. Where mixing is inhibited due to natural topographic features, compliance is not measured within that portion of the impoundment that is topographically isolated. Such natural topographic feature may include, but not be limited to, natural deep holes in river bottom sills.

[8] "License" means any license, license amendment, license renewal, transfer, permit, variance, approval or certification issued by the Department. 06-096 CMR 2(1)(J).

[9] 06-096 CMR 2(11)(F).

road project is planned as part of required fish passage improvements at the LHP and funds for this project have been budgeted and approved as part of the 2020 and 2021 capital budget. MLP, owner and licensee of the LHP, has the financial ability to perform the access road work at the LHP. The access road construction is planned to facilitate future upstream fish passage construction activities at the Lockwood Dam. Once construction of the fishway is complete, the access road will remain as a permanent roadway to service the new fishway facility at the Lockwood Dam.

B. Technical Ability.

MLP and its consultants possess the requisite technical ability to carry out proposed roadway construction activities at the Lockwood Dam. Permitting and construction management support for the proposed project has been provided by Kleinschmidt Associates. Kleinschmidt has proven experience in hydropower-related permitting and has consulted on successful maintenance and repair projects throughout the state.

C. Discussion.

The Applicant provided sufficient evidence to demonstrate that it and its consultants have the technical ability to complete the construction of the fishway access road. To satisfy the requirements of 38 M.R.S. § 636(1), the Applicant indicated that it has the financial capability to undertake the proposed maintenance and repair project at the LHP, as well as the cost of complying with the terms and conditions of this order. The Department finds that, based on the information provided, the Applicant has the financial capability and technical ability to undertake the project.

11. PUBLIC SAFETY

A. Applicant's Proposals.

The access road work area is regularly restricted to the public and there are no recreational use areas that will be impacted by this project. The staging area will be located adjacent to a railroad right of way and will also be restricted to public access. The Applicant will take a number of steps to protect public safety prior to and during construction, including: (1) A notice of access road construction activities will be published in a local newspaper; (2) fencing will be erected to block public access to the existing staging area when work personnel are not on site. The proposed work is not expected to have any adverse impact on public safety as public access to the work area will remain restricted for safety reasons. Once work is complete, the Applicant proposes to construct a series of three gates along the road and a chain link fence topped with barbed wire where the roadway meets the shoreline. These precautions will restrict public access and will ensure public safety at the access road site.

B. Discussion.

Based on the materials submitted, the Applicant has demonstrated that it has made adequate provisions to protect public safety during access road work at the LHP.

12. PUBLIC BENEFITS

A. Employment.

The Applicant plans to use Maine-based subcontractors and source materials for construction activities from local companies to the extent possible. MLP employed Kleinschmidt, a Maine based company, to assist with project proposals and planning. The Applicant solicited contractor bids for the project and bids were received from local Maine-based contractors. Workers from the project will benefit the local economy of Winslow and Waterville through general purchases of food, gas and other miscellaneous items.

B. Taxes.

No drawdowns of the Lockwood Dam impoundment or changes to downstream flows are planned for this project. Therefore, no impacts to property values or property taxes are expected as a result of water level changes from this project.

C. Other Public Costs and Benefits.

There are little public costs or benefits to the fishway access road project as the road will only service future fishway construction and maintenance and will be closed to the public. Recreational opportunities on the Kennebec River in the LHP area include a boat launch downstream of the LHP powerhouse on the western bank and informal access to the impoundment on the western bank. Access road construction will occur on the eastern bank and recreation will not be impacted by work activities.

D. Discussion.

Benefits of access road construction include the future construction of an upstream fishway, if the fishway is permitted and installed. This project will have little to no impact on recreation upstream or downstream of the Lockwood Dam. Based on its review of the information provided by the Applicant, the Department determines that access road construction proposed by MLP will have little or no public costs and will provide access for potential future fishway construction at the Lockwood Dam. The Department finds that the project will result in economic benefit to the public including creation of employment opportunities for workers of the State and continuance of existing recreational opportunities.

13. TRAFFIC MOVEMENT

A. Construction Traffic.

Materials and equipment for the construction will be moved to the work site and staging area over federal, state and town roads in Winslow and Waterville. The project area is located adjacent to Benton Avenue's intersection with Bridge Street in Winslow, that leads into Waterville. This section of Benton Avenue receives moderate to heavy traffic. Additionally, a right of way road related to the adjacent railroad tracks will be utilized to mobilize and stage equipment. The loading and unloading of equipment and materials and removal of waste will occur by truck and by hand on LHP property and in the existing right of way, on the eastern riverbank adjacent to the project. No adverse impact on existing traffic movement is expected from the proposed activity. The Applicant is required to apply for town permits and will coordinate with the Town of Winslow as needed regarding traffic and public safety measures prior to construction.

B. Roads and Bridges.

The Applicant's proposal indicates that no roads or bridges will be impacted by the maintenance and repair activities of this project.

C. Applicant's Proposals.

MLP's contractor will work with the Town of Winslow to finalize and gain approval for a Traffic Control Plan. The contractor is responsible for providing and installing all traffic control measures as acceptable to the town of Winslow and in accordance with Maine Department of Transportation and town of Winslow entrance guidelines. The southbound lane of Benton Avenue will be blocked off and traffic moving south will have two lanes of access. Jersey barriers and traffic control flaggers will be on either side of the blocked off lane to direct the flow of traffic. The closed down lane will be utilized for the delivery of materials by dump truck. MLP anticipates some minimal increases in traffic and has not proposed to conduct pre- and post-construction roadway condition surveys. Project related traffic is not expected to degrade the pre-construction quality of roads. The Department does not anticipate degradation to roadways since the Applicant proposes that heavy equipment and maintenance materials will be placed and launched from the staging area in the existing right of way. The Applicant plans to confer with the Town of Winslow, including police and fire officials, to address traffic and public safety measures and will acquire necessary city permits.

Aside from roadway traffic the proposed staging area will be located in an existing right-of-way and the work area will occur adjacent to an active main line railroad track that runs from Winslow across the Kennebec River into Waterville. Personnel, equipment and vehicles will need to cross these tracks to access the work site and the main line tracks will be active throughout the project. The contractor will ensure that all vehicles, materials and personnel and equipment are located a safe distance from the active track and will not be impacted by train traffic. MLP will proactively work with the railroad's

schedule regarding access and timing to the work site. Signage and provisions will be incorporated into the contractor's safety plan to address crossing tracks during work. The Applicant will construct and install a rubber raised seal and concrete paved railroad crossing intended to be utilized by heavy equipment in order to mobilize trucks and equipment across tracks to the work site. This will remain in place or a comparable permanent crossing system will be installed to facilitate access to the road once construction is complete.

D. Discussion.

The Applicant and its consultants have proposed sufficient provisions for both road and railroad traffic for movement into and out of the project area, both during and following access road construction activities. The proposed staging area is an existing right-of-way gravel access road which will facilitate trucks and other vehicles loading and unloading equipment and materials that need to be delivered or removed from the site. The Maine Department of Transportation (MDOT) reviewed the access road construction plan. In its comments MDOT stated that the proposed road is within the Town of Winslow and, therefore, the Town has responsibility for reviewing and approving this project. MDOT expressed concerns including jersey barrier end protection for the proposed closed lane, the lack of plans for monitoring the flow of traffic and the use of a MDOT right-of-way as a staging area for the project. The Applicant states that they will consult with the Town of Winslow and MDOT to finalize and gain approval for the Traffic Control Plan. The Department finds that, based on the proposed plans and continued consultation, the Applicant has made adequate provisions for traffic movement.

14. MAINE LAND USE PLANNING COMMISSION

Within the jurisdiction of the LUPC, the project must be consistent with the zoning adopted by the LUPC. The LHP and its impoundment are located entirely within the towns of Winslow and Waterville, which are organized municipalities. Therefore, the project is not subject to LUPC jurisdiction.

15. ENVIRONMENTAL MITIGATION

A. Review Standard.

The MWDCA, at 38 M.R.S. § 636(6), establishes that an applicant must demonstrate that reasonable provisions have been made to realize the environmental benefits of the project, if any, and to mitigate its adverse environmental impacts. The Department's Administrative Regulations for Hydropower Projects (Chapter 450), which implement the MWDCA, define "mitigation" to include any action taken or not taken in order to avoid, minimize, rectify, reduce, eliminate, or compensate for actual or potential adverse environmental impacts. Such actions include minimizing a potential impact by controlling the timing of an activity. Chapter 450, § 3(I).

B. Applicant's Proposals.

When constructing the fishway access road, as discussed further in Sections 4 and 5 above, MLP proposes to mitigate potential environmental impacts through implementation of erosion and sedimentation control measures, such as the use of silt fences and socks; installation of rip rap; and attention to the handling, transportation, and disposal of soil contaminated with hydrocarbons. The Applicant also proposes to implement the Maine BMPs.

C. Discussion.

The primary potential adverse environmental impacts associated with the access road are water quality impacts to the Kennebec River that could occur during construction. Potential impacts include decreased water quality from erosion and sedimentation associated with vegetation clearing and soil disturbance, grading, importation of fill, and construction activities generally. Additionally, there is risk of wet concrete being discharged downstream during construction of the retaining wall that will support the roadway at its end, nearest the Kennebec River. This potential impact may be mitigated through implementation of the Maine BMPs, including the following best management practices associated with use of concrete:

- Installing silt fences, turbidity curtains, and a debris catchment system downstream and downslope of the work area prior to installing fresh concrete,
- Installing fresh concrete in the dry,
- Not washing tools, forms, etc. in or adjacent to the waterbody and not discharging concrete wash water to the resources,
- Curing fresh concrete in forms for a minimum of seven days, and
- Ensuring flows over the cured concrete equal or exceed 15 gallons per square foot.

The proposed access road, the only portion of the overall fishway project presently before the Department, provides no environmental benefit by itself that the Department has been able to identify and does not affect any benefit of the hydropower project a whole. MLP proposes measures to minimize the potential adverse environmental impacts that may result during construction. These measures are appropriate, but by themselves do not constitute reasonable provision to mitigate the potential adverse environmental impacts to the Kennebec River. In the Department's experience, even projects where appropriate erosion and sedimentation control are proposed adverse environmental impacts may occur once construction begins.

In evaluating whether reasonable provision has been made to mitigate adverse environmental impacts, the Department considered the potential impacts, the significance

of the Kennebec River as a resource, the project purpose, and whether other practicable measures consistent with the project purpose may be available to the Applicant to mitigate the potential impacts. Given construction of the fishway for which the road is needed has not yet been permitted, the Department finds the risk of adverse environmental impact to the Kennebec River unreasonable, even if the risk is small in light of the mitigation measures proposed by MLP. There remains a possibility the fishway will never be built, making the potential adverse environmental impacts associated with construction of the fishway access road unreasonable at this time.

The Department finds that controlling the timing of the road construction activity to better ensure the road is not constructed unnecessarily is an additional form of mitigation readily available to MLP and consistent with the project purpose. By timing construction of the fishway access road to begin after construction of the fishway is approved, MPL can further avoid and minimize potential adverse environmental impacts. While the issuance of a permit authorizing construction of the fishway still would not guarantee the fishway would be built, the likelihood would be greater and nearly certain once that milestone is achieved. Accordingly, the Department finds the Applicant has made reasonable provision to realize the environmental benefits of the project, if any, and to mitigate its adverse environmental impacts, provided MLP:

- Implements the proposed E & S Controls,
- Implements the Maine BMPs, and
- Does not commence construction of the road until it obtains all necessary approvals from the Department for construction of the fishway that the road is intended to access.

16. ENVIRONMENTAL AND ENERGY CONSIDERATIONS

The MWDCA requires an applicant to demonstrate that the advantages of the project are greater than the direct and cumulative adverse impacts over the life of the project. 38 M.R.S. § 636(7). In making this evaluation, the MWDCA directs the Department to consider and balance six factors, each of which is discussed in subparagraphs A through F, below. When, as here, the hydropower project exists and the applicant proposes to initiate construction of a new portion of the hydropower project the Department evaluates whether on balance the advantages of this new portion are greater than the impacts over the life of the project.

A. Soil stability, Wetlands and the Natural Environment.

1. Soil Stability.

Existing soils include surficial geological deposits of glaciomarine silt, clay and sand, as well as stream alluvium sand gravel and silt deposited on floodplains. Bedrock or ledge outcrop is located on the eastern bank of the Kennebec River near the construction vicinity. The soil is described as predominantly man-made fill and Hartland very fine

sandy loam found on 15% to 25% slopes according to GIS layers from the United States Department of Agriculture. This is non-hydric soil with a relatively high runoff potential.

The proposed access road construction will require some excavation and disturbance of soils. Vegetation will be removed from the work site, approximately 1,100 CY of soils will be excavated, and roughly the same amount of permanent compacted gravel fill will be installed for roadway construction. MLP has proposed an E & S plan which is outlined in Sections 4 and 5 of the Order. Fill for road construction will be deposited within the area protected by erosion controls. All concrete for structural support on the shoreline will be poured in forms and air dried for a minimum of seven days. All concrete, sediment and wash spoils shall be removed for offsite disposal. After completion of the construction, disturbed areas of the shoreline will be seeded and mulched prior to removal of silt fences. The Applicant proposes to apply BMPs during project construction to limit any temporary adverse impacts to water quality from sedimentation

2. Wetlands.

The habitat upstream of the LHP is the impounded Kennebec River and habitat downstream of the LHP area is riverine in nature.[10] The Lockwood impoundment is classified as Class C habitat and the Kennebec River below the Lockwood Dam is classified as Class B. Freshwater forested wetlands are located outside of the project area, approximately 500 to 600 meters downstream on both the eastern and western banks of the river. The Applicant plans no drawdown of the impoundment and will maintain minimum flows through the powerhouse during the construction of the access road. As discussed in Section 4, 5 and 14 of this Permit, the Applicant has proposed to install silt fences, an erosion control blanket, and silt socks to prevent any wash of fill or installation material from reaching downstream habitat. Based on the proposed plans and as discussed in Section 14, the Department finds that the Applicant has proposed to take appropriate steps to minimize potential negative impacts road construction activities may have on riverine or freshwater forested wetlands and the fauna found there.

3. Natural Environment.

The proposed fishway access road does not include a permanent change to impoundment water levels or flows. The project involves some soil disturbance as vegetation will be removed, soils will be excavated, and fill will be added for roadway construction as described in previous sections of this permit. E & S Controls will be installed as described in Sections 4, 5, and 14. Construction requires the excavation of soil inadequate for road construction as well as the partial excavation of hydrocarbon contaminated soils. Only contaminated soil in the path of the proposed road construction will be removed. A licensed State Geologist will be on site during soil excavation and contaminated soils will be disposed of according to MDEP protocols. At the completion of construction, the Applicant shall seed, mulch or rip rap sloped disturbed areas before removal of the silt fence.

[10] 38 M.R.S. § 467(4)(A)(10-A)(a), 38 M.R.S. § 467(4)(A)(10-A).

B. Fish and Wildlife Resources.

1. Fish Resources.

The Kennebec River supports a number of cold and warm water fish species including smallmouth bass, largemouth bass, brook trout, brown trout, and provides spawning habitat for anadromous fish species, including Atlantic salmon, American shad, alewife, blueback herring, striped bass, American eel and sea lamprey. Atlantic salmon, including the Gulf of Maine distinct population segment (DPS), are listed as endangered under the Federal Endangered Species Act (ESA). The Kennebec River is identified as Critical Habitat for the Atlantic salmon Gulf of Maine DPS.

Generally, the restoration of anadromous fish species to their viable historic habitat is a long-range goal of the MDMR. The Fisheries Resource Agencies have specific plans to re-introduce anadromous fish to the Kennebec watershed upstream of the Lockwood Dam. MLP and MDMR currently co-operate an interim trap and truck fish passage facility located on the western bank of the Lockwood Project. Although the facility has moderate success passing river herring, over several years of operation the facility has poor passage results for American shad and Atlantic salmon.

The State resource agencies (MDMR, MDIFW) were requested to review the access road construction plan. In its comments MDMR stated that the access road is a small component of a larger plan to construct upstream passage for Atlantic salmon at Brookfield Renewable's four mainstem hydropower projects, pursuant to its Interim Species Protection Plan (ISPP) for the Lockwood, Shawmut and Weston Projects, and a similar ISPP for the HK Project. MDMR also commented that, based on agency management goals and activities, analysis of river-specific data and a federal recovery plan developed in consultation with the NMFS and the USFWS, MDMR finds that the cumulative impacts of the lowermost hydropower projects in the mainstem Kennebec River will result in significant adverse impacts to the recovery of endangered Atlantic salmon and on the restoration of the above mentioned anadromous fish species to their historic habitat in the Kennebec River. A project-by-project review of the proposed fishways (Lockwood, Shawmut, Weston) precludes consideration of cumulative impacts to fisheries resources in the lower Kennebec River. In its comments on the application, MDIFW stated that if erosion controls are deployed according to Maine BMPs, as proposed, minimal impacts to fisheries resources from the project are expected.

2. Wildlife Resources.

The area surrounding the LHP on the Kennebec River is partially upland forest but mostly urban development both upstream and downstream and on the eastern and western banks. Wildlife species include squirrel, rat, skunk, raccoon, muskrat, mice, etc., and various bird species. Habitat associated with one federally and state-listed threatened species, the Northern long-eared bat (NLEB), is identified near the LHP, however, no critical habitat, bat hibernacula or maternity roost trees are identified within the project area. Vegetation removal is proposed to facilitate project activities, and the Applicant, in

consultation with the USFWS, proposes to conduct tree removal during the winter to avoid the breeding, roosting, and rearing season for the NLEB as a protective measure. Additionally, the Department identified freshwater forested/shrub wetlands, which are inland waterfowl and wading bird habitat, 500 to 600 meters downstream of the work area. Potential sedimentation and concrete releases from the proposed road construction activities are proposed to be contained by erosion controls. The Bald eagle, protected by the Bald and Golden Eagle Protection Act, may transiently occur within the proposed project area. Per a review of the Maine Bald Eagle Nest Locations and Buffer Zone Map 2, there are no bald eagle nests located within or adjacent to the proposed work area. The access road project is not anticipated to adversely affect any transient Bald eagles that may occur within the project area. The Maine Natural Areas Program (MNAP) did not identify any rare botanical features within the proposed project area. Six state-listed rare plants were documented along the eastern shoreline downstream of the Bridge Street bridge, including Rivershore Outcrop, Garber's Sedge, Horned Beak-rush, Long-leaved Bluet, Shining Ladies'-tresses and Soft-leaf Muhly. No negative impacts to this habitat are expected.

C. Historic and Archeological Resources.

The original Lockwood dam was built in 1868 and was improved to a concrete dam in 1913. FERC License Article 406 requires that the licensee consult with a State Historic Preservation Officer (SHPO)[11] and develop a cultural resource management plan, prior to any ground disturbing activities. In a letter filed May 28, 2020, the Maine Historic Preservation Commission (MHPC) found that the LHP operations would have no effect upon any structure or site of historic or architectural significance as defined by the National Historic Preservation Act of 1966. The Applicant consulted with MHPC regarding archeological resources.

As referenced in the 2005 FERC Project license, cultural resource surveys of the LHP area were conducted during the licensing process. FERC staff contacted federally recognized Indian tribes within the state and none identified any properties to which they attach religious or cultural significance that would be affected by ongoing hydroelectric operations at the LHP. In accordance with Article 412 of the Project License, if previously unidentified archeological or historic structures are discovered during construction or any other phase of this project's development, the licensee shall stop all land clearing and land disturbing activities in the vicinity of the property and consult with the MHPC.

D. Public Rights of Access.

Currently there is no direct public access to the project area, which is located on private property owned by MLP. Roadway access will be restricted by the installation of a series of three gates as well as a chain link fence at the road terminus with the intention of

[11] The SHPO carries out responsibilities including surveying, evaluating and nominating significant historic buildings, sites, structures, districts and objects to the National Register and coordinating this information with the MHPC.

protecting public safety. There is a public boat launch approximately 500 feet downstream of the LHP powerhouse on the western bank. Angling is permitted at least 150 feet downstream from the powerhouse and interim fishway facilities. The Kennebec River upstream of the LHP can be reached for recreation through informal access points on the western bank outside of the LHP boundary. Recreational public access for fishing, boating, and other water-based recreational pursuits will be unchanged during and following access road construction activities.

E. Flood Control Benefits/Hazards.

The Lockwood Dam is classified as a low hazard by the Maine Emergency Management Agency. The LHP is operated as a run of river facility with no store and release mode and no appreciable water storage; the LHP is automated to achieve a run of river operation by passing inflow as it is received from the HK Project. Therefore, there is minimal appreciable impact the LHP can have as flood control. Flood control for the LHP is performed by the series of dams upstream of the LHP. During a flood situation the LHP passes flood flows over the spillway and through deep gates and the hydraulic unit at the dam. If flood flows increase, the flashboards on top of the dam are designed to fail, and will, therefore, pass additional flow.

F. Hydroelectric Energy Benefits.

The LHP is operated as a run-of-river facility. The proposed work will not require impoundment draws downs or changes to downstream flows. Water levels and downstream flow will be maintained according to the Project License and WQC. The LHP generates an average of 42,687,000 kilowatt hours of electricity annually. This is the equivalent to 71,145 barrels of oil or 19,780 tons of coal each year. The LHP contains two powerhouses with a total installed capacity of 6,915 kW and a hydraulic capacity of 5,660 cfs. The Applicant proposes no changes to power generation at the LHP related to access road construction.

G. Analysis of Project Advantages and Impacts.

The purpose of the proposed access road is to provide access to a proposed fishway that has not yet been authorized. The Department presumes that if construction of the fishway were approved the approved fishway would provide considerable environmental benefit and the currently proposed access road would be necessary to achieve this considerable benefit. The Department finds, however, that there is no environmental benefit or advantage of the access road if divorced from the larger fishway project. While MLP proposes appropriate measures to minimize the potential adverse impacts of erosion and sedimentation during construction, even with the measures proposed a risk of adverse impact during construction, to the water quality of the Kennebec River and fisheries resources in the river, remains. These potential adverse impacts outweigh the advantage of construction of the access road, unless the road is constructed as part of the larger fishway project, of which it is a necessary component. At present, with construction of the fishway not having been authorized, there remains uncertainty as to

whether the fishway will be built. While the issuance of a permit authorizing construction of the fishway still would not guarantee the fishway would be built, the likelihood would be greater and nearly certain once that milestone is achieved. Accordingly, the Department finds the advantages of constructing the fishway access road are greater than the direct and cumulative adverse impacts over the life of the project, provided MLP does not commence construction of the road until it obtains all necessary approvals from the Department for construction of the fishway that the road is intended to access.

17. WATER QUALITY

A. Effect of the Fishway Access Road on Water Quality.

Pursuant to Section 635-B of the MWDCA the Department must determine whether there is a reasonable assurance that the proposed activity associated with an MWDCA permit will not violate applicable water quality standards.

B. Discussion.

The Kennebec River waters impounded by the LHP are classified as Class C and the water downstream of the LHP are Class B waters. The LHP operates pursuant to a FERC License; licensing depends on the LHP meeting state water quality standards. As discussed in Sections 4, 5 and 14 of this Order, the Applicant's E & S Controls outline how the Applicant will mitigate potential degradation of water quality throughout the access road construction activities. The Applicant will assemble reinforced silt fences, silt socks and an erosion control blanket downslope of the existing staging and work areas. Maine BMPs will be implemented during project construction.

Fresh concrete can be toxic to aquatic life unless properly cured prior to coming into contact with surface water. Installation of the concrete roadway support requires concrete work that may have a detrimental impact to water quality, however, this potential impact may be mitigated through implementation of the Maine BMPs, which is proposed by MLP.

Based on the Applicant's proposals and the Department's review, the Department finds and determines there is a reasonable assurance that the proposed project will not violate applicable state water quality standards provided the Applicant.

18. REVIEW PROCESS

An application for a MWDCA permit to construct the fishway access road was accepted for processing by the Department on June 5, 2020. The Department requested project review from the Department's Division of Environmental Assessment (DEA), MDMR, MDIFW, the Maine Department of Agriculture Conservation and Forestry, the MHPC, and the Maine Department of Transportation. MDEP also received comments on the access road construction from the Kennebec Coalition. In their comments they stated that they do not

support construction of the fishway access road because the proposed road construction precedes valid and approved plans for an upstream fishway at the Lockwood Dam. Further, they note that FERC rejected the Applicant's proposed Species Protection Plan for the Lower Kennebec on July 13, 2020. They argued the application should not be processed. The Department reviewed and considered all comments received from the resource agencies and other commenters, and, where appropriate, incorporated them into the discussions and findings sections, above.

19. DRAFT PERMIT

No request for a draft order was received by the Department.

BASED on the above Findings of Fact and the evidence contained in the application and supporting documents, and subject to the Conditions listed below, which are appropriate and reasonable to protect and preserve the environment and the public's health, safety and general welfare, the Department makes the following CONCLUSIONS:

1. The Applicant and its contractor have the financial capacity and technical ability to undertake the project.

2. The Applicant has made adequate provision for protection of public safety.

3. The project will result in economic benefit to the public.

4. The Applicant has made adequate provision for traffic movement out of or into the development area.

5. The project is not located within the jurisdiction of the Land Use Planning Commission.

6. The Applicant has made reasonable provisions to realize the environmental benefits of the project, if any, and to mitigate its adverse environmental impacts of the project, provided the Applicant complies with the requirements in Section 14 and the corresponding conditions below.

7. The advantages of the project are greater than the direct and cumulative adverse impacts over the life of the project, provided the Applicant complies with the requirements in Section 15 and the corresponding condition below.

8. There is a reasonable assurance that the project will not violate applicable State water quality standards.

THEREFORE, the Department APPROVES the above noted application of MERIMIL LIMITED PARTNERSHIP to construct the fishway access road as described above, SUBJECT TO THE FOLLOWING CONDITIONS, and all applicable standards and regulations:

1. The Standard Conditions of Approval for projects under the Maine Waterway Development and Conservation Act, a copy is attached.

2. All terms and conditions of Department Water Quality Certification #L-20218-33-C-N, dated August 26, 2004, relating to the operation of the existing LHP shall remain in effect and enforceable by the Department.

3. MLP shall implement the proposed E & S Controls and the Maine BMPs, including the following:

    a. Install silt fences downslope of the staging area and work area in accordance with the submitted site plan. Silt fences shall be installed before the start of work and shall be removed after completion of work when the work area is stabilized;

    b. Install rebar reinforced silt socks on the downslope ledge areas to prevent any discharge of material downstream. All washed debris, concrete and sediment spoils shall be removed from the barrier and work area, temporarily stored according to Maine BMPs, and ultimately removed from the work area for off-site disposal;

    c. Deploy erosion control blankets where appropriate on newly graded slopes and ditches exceeding a slope of 8%, as proposed in E & S Controls; and

    d. Seed and mulch or rip rap disturbed area of the shoreline where appropriate after maintenance and repair/construction activities are complete prior to removing E & S Controls.

4. MLP shall implements the Maine BMPs, including the following that pertain to concrete:

    a. Install silt fences, turbidity curtains, and a debris catchment system downstream and downslope of the work area prior to installing fresh concrete;

    b. Install fresh concrete in the dry;

    c. Not wash tools, forms, etc. in or adjacent to the waterbody and not discharge concrete wash water to the resources;

    d. Cure fresh concrete in forms for a minimum of seven days; and

    e. Ensure flows over the cured concrete equal or exceed 15 gallons per square foot.

5. MLP shall not commence construction of the road until it obtains all necessary approvals from the Department for construction of the fishway that the road is intended to access.

6. In addition to any specific erosion and sedimentation control measures included in the Department reviewed plan, the MLP and its agents shall take all necessary measures to ensure that project activities do not result in erosion or sedimentation during or following the approved activities.

7. All removed vegetation, debris and construction spoils shall be reused, recycled or otherwise disposed of in accordance with the Maine Solid Waste Management Regulations.

8. In the event that any provision, or part thereof, of this permit and/or certification is declared to be unlawful by a reviewing court, the remainder of the permit and/or certification shall remain in full force and effect, and shall be construed and enforced in all respects as if such unlawful provision, or part thereof, has been omitted, unless otherwise ordered by the court.

DONE AND DATED IN AUGUSTA, MAINE, THIS 7TH DAY OF DECEMBER, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____
For: Melanie Loyzim, Acting Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

CS/L#2021834NN/ATS#86151

FILED
December 7, 2020
State of Maine
Board of Environmental Protection

Maine Waterways Development and Conservation Act
Standard Conditions of Approval

1. Limits of Approval. This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to the review and approval of the Board or Commissioner prior to implementation.

2. Noncompliance. Should the project be found, at any time, not to be in compliance with any of the conditions of this approval, or should the permittee construct or operate this project in any way other than specified in the application or supporting documents, as modified by the conditions of this approval, then the terms of this approval shall be considered to have been violated.

3. Compliance with all Applicable Laws. The permittee shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation.

4. Inspection and Compliance. Authorized representatives of the Board, Commission or the Attorney General shall be granted access to the premises of the permittee at any reasonable time for the purpose of inspecting the construction or operation of the project and assuring compliance by the permittee with the conditions of this approval.

5. Initiation and Completion of Construction. If construction is not commenced within 3 years and completed within 7 years from the date of issuance of this permit, this approval shall lapse, unless a request for an extension of these deadlines has been approved by the Board or Commission.

6. Construction Schedule. Prior to construction, the permittee shall submit a final construction schedule for the project to the Commissioner or Director.

7. Approval Included in Contract Bids. A copy of this approval must be included in or attached to contract bid specifications for the project.

8. Approval Shown to Contractor. Work done by a contractor pursuant to this approval shall not begin before a copy of this approval has been shown to the contractor by the permittee.

9. Notification of Project Operation. The permittee shall notify the Commissioner or director of the commencement of commercial operation of the project within 10 days prior to such commencement.

10. Assignment or Transfer of Approval. This approval shall expire upon the assignment or transfer of the property covered by this approval unless written consent to transfer this

approval is obtained from the board or Commission. To obtain approval of transfer, the permittee shall notify the Board or Commission 30 days prior to assignment or transfer of property which is subject to this approval Pending Board or Commission determination on the application for a transfer or assignment of ownership of this approval, the person(s) to whom such property is assigned or transferred shall abide by all of the terms and conditions of this approval. To obtain the Board's or Commission's approval of transfer, the proposed assignee or transferee must demonstrate the financial capability and technical ability to (1) comply with all terms and conditions of this approval and (2) satisfy all other applicable statutory criteria. A "transfer" is defined as the sale or lease of property which is the subject of this approval or the sale of 50 percent or more of the stock of or interest in a corporation or a change in a general partner of a partnership which owns the property subject to this approval.

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: November 2018 **Contact: (207) 287-2452**

SUMMARY

There are two methods available to an aggrieved person seeking to appeal a licensing decision made by the Department of Environmental Protection's (DEP) Commissioner: (1) an administrative process before the Board of Environmental Protection (Board); or (2) a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S. § 3451(4)) or a general permit for an offshore wind energy demonstration project (38 M.R.S. § 480-HH(1)) or a general permit for a tidal energy demonstration project (38 M.R.S. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

This information sheet, in conjunction with a review of the statutory and regulatory provisions referred to herein, can help a person to understand his or her rights and obligations in filing an administrative or judicial appeal.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

The laws concerning the DEP's *Organization and Powers*, 38 M.R.S. §§ 341-D(4) & 346; the *Maine Administrative Procedure Act*, 5 M.R.S. § 11001; and the DEP's *Rules Concerning the Processing of Applications and Other Administrative Matters* ("Chapter 2"), 06-096 C.M.R. ch. 2.

DEADLINE TO SUBMIT AN APPEAL TO THE BOARD

The Board must receive a written appeal within 30 days of the date on which the Commissioner's decision was filed with the Board. Appeals filed more than 30 calendar days after the date on which the Commissioner's decision was filed with the Board will be dismissed unless notice of the Commissioner's license decision was required to be given to the person filing an appeal (appellant) and the notice was not given as required.

HOW TO SUBMIT AN APPEAL TO THE BOARD

Signed original appeal documents must be sent to: Chair, Board of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017. An appeal may be submitted by fax or e-mail if it contains a scanned original signature. It is recommended that a faxed or e-mailed appeal be followed by the submittal of mailed original paper documents. The complete appeal, including any attachments, must be received at DEP's offices in Augusta on or before 5:00 PM on the due date; materials received after 5:00 pm are not considered received until the following day. The risk of material not being received in a timely manner is on the sender, regardless of the method used. The appellant must also send a copy of the appeal documents to the Commissioner of the DEP; the applicant (if the appellant is not the applicant in the license proceeding at issue); and if a hearing was

held on the application, any intervenor in that hearing process. All of the information listed in the next section of this information sheet must be submitted at the time the appeal is filed.

INFORMATION APPEAL PAPERWORK MUST CONTAIN

Appeal materials must contain the following information at the time the appeal is submitted:

1. *Aggrieved Status*. The appeal must explain how the appellant has standing to maintain an appeal. This requires an explanation of how the appellant may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions, or conditions objected to or believed to be in error.* The appeal must identify the specific findings of fact, conclusions regarding compliance with the law, license conditions, or other aspects of the written license decision or of the license review process that the appellant objects to or believes to be in error.
3. *The basis of the objections or challenge.* For the objections identified in Item #2, the appeal must state why the appellant believes that the license decision is incorrect and should be modified or reversed. If possible, the appeal should cite specific evidence in the record or specific licensing requirements that the appellant believes were not properly considered or fully addressed.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license or permit to changes in specific permit conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those matters specifically raised in the written notice of appeal.
6. *Request for hearing.* If the appellant wishes the Board to hold a public hearing on the appeal, a request for public hearing must be filed as part of the notice of appeal, and must include an offer of proof in accordance with Chapter 2. The Board will hear the arguments in favor of and in opposition to a hearing on the appeal and the presentations on the merits of an appeal at a regularly scheduled meeting. If the Board decides to hold a public hearing on an appeal, that hearing will then be scheduled for a later date.
7. *New or additional evidence to be offered.* If an appellant wants to provide evidence not previously provided to DEP staff during the DEP's review of the application, the request and the proposed evidence must be submitted with the appeal. The Board may allow new or additional evidence, referred to as supplemental evidence, to be considered in an appeal only under very limited circumstances. The proposed evidence must be relevant and material, and (a) the person seeking to add information to the record must show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process; or (b) the evidence itself must be newly discovered and therefore unable to have been presented earlier in the process. Specific requirements for supplemental evidence are found in Chapter 2 § 24.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, and is made easily accessible by the DEP. Upon request, the DEP will make application materials available during normal working hours, provide space to review the file, and provide an opportunity for photocopying materials. There is a charge for copies or copying services.
2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing your appeal.* DEP staff will provide this information on request and answer general questions regarding the appeal process.

3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed, the license normally remains in effect pending the processing of the appeal. Unless a stay of the decision is requested and granted, a license holder may proceed with a project pending the outcome of an appeal, but the license holder runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will formally acknowledge receipt of an appeal, and will provide the name of the DEP project manager assigned to the specific appeal. The notice of appeal, any materials accepted by the Board Chair as supplementary evidence, any materials submitted in response to the appeal, and relevant excerpts from the DEP's application review file will be sent to Board members with a recommended decision from DEP staff. The appellant, the license holder if different from the appellant, and any interested persons are notified in advance of the date set for Board consideration of an appeal or request for public hearing. The appellant and the license holder will have an opportunity to address the Board at the Board meeting. With or without holding a public hearing, the Board may affirm, amend, or reverse a Commissioner decision or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, the license holder, and interested persons of its decision.

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court (see 38 M.R.S. § 346(1); 06-096 C.M.R. ch. 2; 5 M.R.S. § 11001; and M.R. Civ. P. 80C). A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration project, or a general permit for a tidal energy demonstration project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board's Executive Analyst at (207) 287-2452, or for judicial appeals contact the court clerk's office in which your appeal will be filed.

Note: The DEP provides this INFORMATION SHEET for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.

APPENDIX B

FERC 2005 LOCKWOOD LICENSE & 2004 LOCKWOOD WQC

110 FERC ¶ 61,240
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Pat Wood, III, Chairman;
Nora Mead Brownell, Joseph T. Kelliher,
and Suedeen G. Kelly.

Merimil Limited Partnership Project No. 2574-032

ORDER ISSUING NEW LICENSE

(Issued March 4, 2005)

Introduction

1. On April 29, 2002, Merimil Limited Partnership (Merimil) filed an application for a new license, pursuant to sections 4(e) and 15 of the Federal Power Act (FPA), 16 U.S.C. §§ 797(e) and 808, respectively, for the continued operation and maintenance of the existing 6.915-megawatt (MW) Lockwood Project No. 2574, located on the Kennebec River, a navigable waterway,[1] in Kennebec County, Maine. This order is in the public interest because it provides for the continued generation of electric energy to serve growing regional demand, together with enhancements to the fish and wildlife, recreation, and cultural resources of the Kennebec River Basin.

Project Facilities and Operation

2. The Lockwood Project, located at river mile 63, is now the first dam on the mainstem of the Kennebec River.[2] The Lockwood Project includes an 81.5-acre reservoir, an 875-foot-long and 17-foot-high dam with two spillway sections and a 160-foot-long forebay headworks section, a 450-foot-long forebay canal, two powerhouses, and two transmission lines. The dam and forebay headworks span the

[1] *Central Maine Power Co.*, 13 FPC 1076 (1954). The Commission found the Kennebec River to be navigable from its mouth upstream to at least Moosehead Lake. The Lockwood Project is located within this stretch of the Kennebec River. Accordingly, the project is required to be licensed by section 23(b)(1) of the Federal Power Act. 16 U.S.C. § 817.

[2] The Edwards Project No 2389, located about 18 miles downstream, was removed in 1999. There are 19 licensed projects within the Kennebec River basin; eight are on the mainstem above the Lockwood Project.

Kennebec River immediately upstream of the U.S. Route 201 bridge along a site originally known as Ticonic Falls. The spillway sections dam the river on either side of a small island; the east spillway section begins at the east abutment of the dam and extends about 225 feet in a westerly direction to the small island. The west spillway extends about 650 feet from the small island in a southwesterly direction to the forebay canal headworks, which extend to the west bank of the river. Each spillway has 15-inch flashboards. From the headworks, the forebay canal directs water to two powerhouses located on the west bank of the Kennebec River: the original powerhouse contains six generating units having a total installed capacity of 4.800 MW, and the second powerhouse contains one generating unit having a total installed capacity of 2.115 MW. The project's tailrace returns the flow to the Kennebec River about 1,300 feet downstream from the east spillway section. The project is described in greater detail in ordering paragraph (B)(2). Upstream of the dam, the project boundary follows the contour line of 54.15 feet above mean sea level (msl), which is almost two feet above the normal reservoir level of 52.16 feet msl. Below the dam, the project boundary generally follows the normal tailwater elevation of 31.16 feet msl. The boundary deviates from the 31.16 foot contour to include the areas around the powerhouses and transmission lines.

3. Flow to the project is largely controlled by several large storage projects at the head of the basin, which are managed to provide, to the greatest extent possible, a uniform and reliable flow of 3,600 cubic feet per second (cfs) at Madison, Maine, located about 36 miles upstream of the Lockwood Project.[3] Merimil proposes and this license requires that the project continue to operate in a run-of-river mode. The minimum head pond elevation will be 51.66 feet msl (six inches below the top of the spillway flashboards) when the flashboards are in place, and 49.91 feet msl (1 foot below the spillway crest) when flashboards are being replaced.

4. There is no minimum flow requirement in the existing license. However, Merimil operates the project to provide an instantaneous minimum flow of 2,114 cfs or inflow, if less, below the powerhouse to maintain downstream aquatic habitat in the river. Flow in the approximately 1,300-foot-long bypassed reach is currently limited to leakage around and through the flashboards (estimated at 30 to 50 cfs), or as spill over the flashboards when river flow exceeds about 4,500 cfs. When the flashboards are being replaced, there are no minimum flows into the bypassed reach.

[3] Several projects located between these storage reservoirs and the Lockwood Project operate in a peaking mode, but other projects upstream of Lockwood are operated to re-regulate the flow of the Kennebec River.

Background

5. The original license for the Lockwood Project was issued to Milstar Manufacturing Company in 1969.[4] The expiration date for the license was December 31, 1993. In 1985, the license was amended to increase the authorized capacity of the project from 4,800 to 6,195 kilowatts, construct a new powerhouse,[5] and extend the expiration date of the license to April 30, 2004.[6] Also in 1985, the license was transferred from Milstar Manufacturing Company to Merimil.[7]

6. The Kennebec River in the vicinity of the Lockwood Project supports a varied fish population. The impoundment supports a warm water fish community, including naturally reproducing smallmouth bass. Migratory species in the impoundment include American shad, alewife, and American eel. The fish communities in the river below the project consist of both warm water and cold water species typical in the region, including smallmouth bass, largemouth bass, perch, black crappie and a variety of forage species. Anadromous species that could move up to the project tailwaters include striped bass, rainbow smelt, Atlantic sturgeon, shortnose sturgeon, Atlantic salmon, American shad, and alewife. Only American shad, alewife, and Atlantic salmon have historically migrated upstream of the project area. American eel have unobstructed access to the base of the dam. Large numbers of eels observed in the bypassed reach, in the impoundment, and at the Hydro-Kennebec Project (the next upstream dam) confirm that eels are successfully passing the Lockwood Project. Efforts are underway to restore American shad, alewife, Atlantic salmon, and American eel to the Kennebec River Basin.

7. In 1989, the license for the project was amended to include the terms of a January 1987 agreement (known as the Kennebec Hydro Developer Group [KHDG] agreement[8])

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[4] 42 FPC 1307.

[5] 32 FERC ¶ 62,711.

[6] 33 FERC ¶ 61,329.

[7] 33 FERC ¶ 62,434.

[8] KHDG includes Central Maine Power Company (now FPL Energy Maine Hydro, LLC), Scott Paper Company, Pittsfield Hydro Company, Benton Falls Associates, and Kennebec Hydro Resources, Inc. (Merimil Limited Partnership). The amendment application to include the terms of the 1987 agreement was filed in March 1989.

among the licensees of several projects on the Kennebec and Sebasticook Rivers[9] and state fisheries agencies to facilitate the restoration of American shad, alewife, and Atlantic salmon in the Kennebec River Basin.[10] The licensees agreed to provide funding to the state fishery agencies for interim trap and truck operations at the projects, to install and operate permanent downstream and upstream fish passage facilities according to a schedule, and to conduct studies related to the restoration efforts. Permanent upstream and downstream fish passage facilities were to be installed and operational at the Lockwood Project by May 1, 1999. This schedule was based on the assumption that fish passage would be provided at the Edwards Project by the late 1980s.

8. In April 1997, the licensees of the KHDG agreement projects requested the Commission to amend the licenses to delay installation of the permanent fishways at the projects (including Lockwood) until fish passage was available at the Edwards Project or the dam removed and restoration of salmon, shad, and alewives in the Kennebec River had proved successful. In September 1997, the Commission denied the applications to amend the licenses without prejudice.[11] In November 1997, the Commission denied the application for new license to operate the Edwards Project and ordered the Edwards Project licensee to file a plan for the removal of the project dam.[12]

9. On May 28, 1998, an offer of settlement, now known as the Lower Kennebec River Comprehensive Settlement Accord (1998 Accord), was filed by state and federal fisheries agencies, environmental groups, and the licensees of the Edwards Project and seven upstream projects.[13] The 1998 Accord modified the KHDG agreement and

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[9] The Sebasticook River joins the Kennebec River about 0.5 mile downstream of the Lockwood Project.

[10] 46 FERC ¶ 62,076.

[11] 80 FERC ¶ 61,377.

[12] 81 FERC ¶ 61,255.

[13] Signatories to 1998 Accord are: Edwards Manufacturing Company and the City of Augusta, Maine (the licensees for the now-removed Edwards Project); the U.S. Fish and Wildlife Service; the NOAA National Marine Fisheries Service; the State of Maine; Central Maine Power Company (licensee for the Fort Halifax Project No. 2552, Shawmut Project No. 2322, and Weston Project No. 2325); Merimil Limited Partnership (licensee for the Lockwood Project No. 2574); UAH-Hydro Kennebec Limited Partnership (licensee for the Hydro Kennebec Project No. 2611); Benton Falls Associates (licensee

(continued)

included provisions for removing the Edwards dam and, upon the occurrence of certain triggering events, installing fish passage at the upstream projects, including the Lockwood Project. The Lockwood license was amended in September 1998 to incorporate the terms of the 1998 Accord.[14] Merimil's relicense proposal includes these measures, which require Merimil to:

American Eels – Upstream and Downstream Passage

- Study feasibility of upstream and downstream eel passage and, if found to be feasible, develop and implement a plan for such passage.

American Shad, Atlantic Salmon, or River Herring[15] – Upstream Passage

- *Interim measures.* Install a trap, lift, and transfer facility at the project's powerhouses. These facilities are to be operational by May 1, 2006.[16]
- *Permanent measures.* Provide permanent upstream passage within two years of the earlier of: (1) 8,000 American shad are captured in any single season at the interim trap at the project; or (2) the licensee and resource agencies determine upstream passage is warranted.

American Shad, Atlantic Salmon, or River Herring – Downstream Passage

- *Interim measures.* Provide interim passage through the turbines.

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for the Benton Falls Project No. 5073); Ridgewood Maine Hydro Partners, L.P. (licensee for the Burnham Project No. 11472); and a group of intervenors, collectively called the Kennebec Coalition, comprised of American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited.

[14] 84 FERC ¶ 61,227. The fisheries measures applicable to the Lockwood Project are set out in Exhibit B, Section IV.B of the 1998 Accord and are attached to this order as Appendix B. The terms of the 1998 Accord are also included by reference as a condition of the water quality certification, which is included as Appendix A to this order. The water quality certification is discussed later.

[15] River herring refers collectively to alewives and blueback herring.

[16] Functional design drawings and an implementation schedule for an interim trap, lift, and transfer facility for the Lockwood Project were filed with the Commission on February 13, 2004, and approved by the Commission on May 27, 2004. 107 FERC ¶ 62,184.

- *Permanent measures.* Conduct studies of the effectiveness of various downstream passage techniques to determine the design of the permanent facilities, which are to be installed and operational when permanent upstream passage is operational.

10. On April 29, 2002, Merimil filed an application for new license for the Lockwood Project.[17] Public notice of the application was issued on July 3, 2002, setting September 3, 2002, as the deadline for filing motions to intervene. Timely motions to intervene were filed by UAH-Hydro Kennebec LP,[18] the Maine State Planning Office (Maine SPO), the U.S. Department of the Interior (Interior), American Rivers, the Atlantic Salmon Federation, Trout Unlimited, the Kennebec Coalition, and the Natural Resources Council of Maine. These entities support the inclusion of the terms of the 1998 Accord in a new license.

11. Friends of the Kennebec Salmon intervened in opposition to the relicensing of the project, contending that the goals of the fishery restoration programs in the Kennebec River Basin cannot be achieved using fish passage facilities at the Lockwood Project, and thus the license should be denied and the project removed.[19]

12. On October 3, 2003, the Commission issued a draft environmental assessment (EA) that analyzed the impacts of relicensing the project under the terms of the 1998 Accord (Merimil's proposal), as proposed by Merimil with additional staff-recommended measures (staff alternative), and without interim and permanent upstream fishways (no-action alternative). Typically, the analysis of the no-action alternative considers the effects of operating the project under the terms of the existing license, without any additional measures. The no-action alternative is intended to describe the environment as it exists today, and by which we judge the benefits and costs of any needed measures that would be applied under the new license. In this instance, the applicant has, in accordance

[17] The application was filed on behalf of Merimil by FPL Energy Maine Hydro, LLC (FPL Maine). FPL Maine is the owner of Kennebec Hydro Resources, Inc., a general partner of Merimil.

[18] UAH-Hydro Kennebec LP is a co-licensee for the Hydro Kennebec Project No. 2611, located just upstream of the Lockwood Project.

[19] Merimil opposed Friends of the Kennebec Salmon's motion to intervene. Because Friends of the Kennebec Salmon has an interest which may be directly affected by the outcome of this proceeding, we will grant the motion to intervene. *See*, 18 C.F.R. §385.214.

with the license, taken steps toward providing interim upstream and downstream fish passage, but fish passage has not yet been installed. Because most of the major costs to be incurred under the 1998 Accord (construction of the fishways by 2006 or later) and any benefits that would be accrued would occur within the term of any new license issued for the project, Commission staff concluded that including these measures as a part of the baseline would not reflect the environment as it exists today and would pre-judge the benefits and costs of including these measures in the new license.[20] Thus staff appropriately considered fish passage in the applicant's proposal and staff-recommended alternative, but not in the no-action alternative.

13. Comments on the draft EA were filed by Merimil, Interior, and the Kennebec Coalition. On April 22, 2004, the Commission issued a final EA. All motions to intervene and comments have been fully considered in determining whether, and under what conditions, to issue this license.

Water Quality Certification

14. Under section 401(a) of the Clean Water Act (CWA),[21] the Commission may not issue a license for a hydroelectric project unless the state water quality certifying agency has issued water quality certification for the project or has waived certification. Under section 401(d) of the CWA,[22] any conditions of the certification become conditions of the license, and only a reviewing court may revise or delete those conditions.[23]

15. On April 25, 2002, Merimil applied to the Maine DEP for water quality certification. Merimil twice withdrew and refiled the application for certification (April 18, 2003, and April 16, 2004). Maine DEP issued water quality certification for the project on August 24, 2004. Ordering Paragraph (D) incorporates into the license the conditions of the certification, which is attached as Appendix A.

16. In summary, Merimil must: (1) operate in a run-of-river mode; (2) minimize impoundment level fluctuations (within six inches of full pond when all flashboards are

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[20] EA at 10.

[21] 33 U.S.C. § 1341(a).

[22] 33 U.S.C. § 1341(d).

[23] *See American Rivers v. FERC*, 229 F.3d 99 (D.C. Cir. 1997).

in place and above the spillway crest when flashboard failure has occurred); (3) maintain minimum leakage flows of 30 to 50 cfs from the dam; (4) implement fish rescue measures during flashboard replacement or impoundment drawdown;[24] (5) maintain the existing shoreline angler access site in the project's tailwater; and (6) comply with the requirements of the 1998 Accord.[25]

17. For the effective administration of this license, Articles 401 and 402: (1) establish procedural schedules for both the completion of the certification's plan requirements and submission of the plans for Commission approval; (2) require documentation of completion of certain certification requirements, including the filing of reports; (3) prohibit changes to project operations or facilities prior to Commission approval of an amendment application; (4) specify the agencies with which the licensee must reach agreement to modify project operations for short periods; and (5) require Commission notification of any short-term modifications to project operations.

18. Although the conditions of the water quality certification require minimum leakage flows in the bypassed reach of 30 to 50 cfs when the reservoir is at full pond, as discussed below, we are requiring a continuous and verifiable minimum flow of 50 cfs from the dam (except when the flashboards are being replaced). Leakage through the flashboards can be variable and unreliable and will depend in part on the condition of the flashboards. Staff found that a continuous and verifiable minimum flow of 50 cfs from the dam, appropriately distributed to important pools below the dam, is necessary to maintain and protect the aquatic habitat and ensure connectivity of the pools for the fish species targeted for recovery in the basin and for the endangered shortnose sturgeon. The cost of providing a continuous flow of 50 cfs will depend on whether the licensee can find a reliable means to incorporate leakage flows into the minimum flow requirement. If the only reliable means to provide the minimum flow would be through a controlled release structure and leakage could not be channeled through the structure to meet the 50

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[24] Merimil typically draws the reservoir down 1 foot below the project spillway in late spring (May-June) to replace any failed flashboards. This can stop all flow into the bypassed reach for a short time (8 hours). Coordinating with state and federal agencies, Merimil collects any fish that may be stranded in the scour pools below the dam and returns them to the river below Ticonic Falls.

[25] Some conditions of the Accord required the licensee to take certain actions prior to issuance of this license, and those conditions do not impose any obligations under this license. (*See, e.g.* Appendix B, condition III.G.)

cfs minimum flow requirement, then up to 50 cfs of additional flow may be needed to meet the minimum flow requirement. This would result in an energy loss of up to 700 megawatt-hours (valued at $18,300) annually. We find the benefits of this measure to be worth the cost; Article 403 requires the licensee to file a plan to provide a minimum flow of 50 cfs or inflow.

Threatened and Endangered Species

19. Section 7(a) of the Endangered Species Act of 1973 (ESA), 16 U.S.C. § 1536(a), requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of designated critical habitat. When a federal agency determines that a proposed action may affect a threatened or endangered species, it must consult with the U.S. Fish and Wildlife Service (FWS) or National Oceanographic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) and if the action is likely to adversely affect the species or its critical habitat, it must obtain a biological opinion on whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

20. Federally listed species that occur in the project area are the threatened bald eagle and endangered shortnose sturgeon. In the final EA, staff found that relicensing the project would not be likely to adversely affect the bald eagle, but would be likely to adversely affect the shortnose sturgeon. Adverse effects on the shortnose sturgeon result from handling during the rescue of shortnose sturgeon that may become entrapped in isolated pools in the bypassed reach during flashboard repair, and during sorting and returning to the river any sturgeon caught in the fish lift that is to be constructed.[26]

21. On October 10, 2003, Commission staff requested the FWS' concurrence with its not-likely-to-adversely-effect determination for the bald eagle. A meeting was held on October 20, 2003, to discuss bald eagle protection measures. By letter filed June 9, 2004, FWS concurred with staff's determination, provided that the licensee develops a bald eagle management plan that includes provisions to: (1) identify and map potential bald eagle perch, roost, and nest trees; (2) develop management goals and recommendations for the eagle habitat; (3) encourage adjacent landowners to permanently protect eagle habitat; and (4) periodically monitor the integrity of the eagle habitat. The FWS said the plan should be developed in consultation with the City of Waterville, State of Maine, Maine Central Railroad/Guilford Transportation (collectively, the abutting landowners),

[26] EA at 59-64.

Maine Department of Inland Fisheries and Wildlife, and the FWS, and should include an implementation schedule.

22. Merimil does not believe that it should be required to develop a bald eagle management plan because, as the EA points out, most of the potential eagle nesting, roosting, and perching habitat is not within the project boundary; and continued project operation is not expected to alter or destroy this habitat.

23. Roosting and perching sites provided by the forested riparian habitats adjacent to the project are important to bald eagles foraging in the project reservoir and tailrace, particularly in the winter when project generation maintains ice-free water below the powerhouse. Article 411 requires the licensee to file a bald eagle management plan consistent with expectations provided in FWS's concurrence letter. This enhancement effort will have a nominal cost and will help conserve and protect a threatened species.[27]

24. On October 16, 2003, Commission staff requested formal consultation with NOAA Fisheries under section 7(a)(2) of the ESA on the shortnose sturgeon. NOAA Fisheries requested additional information, which was provided in the final EA along with a recommendation that Merimil prepare a sturgeon rescue plan that defines handling protocols and notification procedures. Appendix C to this license contains such a plan, which NOAA Fisheries developed in consultation with Merimil. The plan defines procedures for handling and returning shortnose sturgeon to the Kennebec River below the project during operation of the fish lift and during fish rescue efforts associated with flashboard replacement.

25. On January 14, 2005, NOAA Fisheries filed its biological opinion on relicensing the Lockwood Project, which found that relicensing the project with staff's recommended measures would not jeopardize the continued existence of the Kennebec River population of the shortnose sturgeon. NOAA Fisheries's biological opinion includes an incidental take statement with two reasonable and prudent measures to minimize take of shortnose sturgeon during fish rescue efforts and operation of the interim fish lift: (1) NOAA Fisheries must be contacted promptly before flashboard repair or replacement commences and again upon completion of these activities; and (2) the licensee shall report all interactions[28] involving shortnose sturgeon at the fish lift and/or in the event of a stranding. To implement these measures, NOAA Fisheries specifies six terms and

[27] Staff estimates that developing and implementing the plan would have an annualized cost of $1,900. (EA at 83).

(continued)

conditions that require the licensee to: (1) contact NOAA Fisheries within 24 hours of undertaking and completing flashboard replacement activities; (2) submit reports of all interactions with shortnose sturgeon by mail and fax to NOAA Fisheries; (3) review the sturgeon handling plan with NOAA Fisheries by January 1 of each license year and make any updates by April 1 of each year; (4) contact NOAA Fisheries by email or phone within 24 hours of any interactions with shortnose sturgeon; (5) photograph, measure, and preserve any dead specimens or body parts until picked up by NOAA Fisheries; and (6) photograph, measure, and retain any injured specimen, submit a reporting sheet detailing the extent of the injuries (see Appendix C), and train personnel operating the fish lift and conducting fish rescue efforts in sturgeon biology so that they can recognize the severity of the injury and understand handling protocols. Article 406 requires implementation of the shortnose sturgeon handling plan, which defines procedures for handling injured and dead sturgeon and provides for an annual review of the plan with NOAA Fisheries. Articles 407 and 408 requires Merimil to file for Commission approval a fish rescue plan and a fish lift operation plan, respectively, that includes provisions to adhere to the shortnose sturgeon handling plan and to train personnel in the handling procedures.

Recommendations of Federal and State Fish and Wildlife Agencies

26. Pursuant to section 10(j) of the FPA, 16 U.S.C. § 803(j)(1), the Commission, when issuing a license, includes conditions based on the recommendations of federal and state fish and wildlife agencies submitted pursuant to the Fish and Wildlife Coordination Act, 16 U.S.C. § 661 *et seq.*, for the protection and enhancement of fish and wildlife and their habitat affected by the project.

A. Recommendations Pursuant to Section 10(j) of the FPA

27. For the Lockwood Project, Interior and the Maine SPO on behalf of Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and the Maine Atlantic Salmon Commission submitted a total of 15 recommendations (some of which are duplicative) that fall within the scope of section 10(j). The license contains conditions consistent with all of these recommendations. These adopted measures require the licensee to: (1) study the feasibility of installing American eel passage facilities at the project, consistent with the 1998 Accord (Article 409 and conditions 3.A and 3.B of Appendix A); (2) install interim upstream fish passage

[28] Interactions include both lethal and non-lethal handling of shortnose sturgeon during fish rescue efforts associated with flashboard replacement and repair events and operation of the interim fish lift.

facilities at the project, consistent with the 1998 Accord (conditions 3.A and 3.C of Appendix A);[29] (3) consistent with the 1998 Accord, install permanent upstream and downstream fish passage facilities at the project when a fish population trigger is reached (conditions 3.A, 3.E and 3.F of Appendix A); (4) conduct effectiveness studies of all interim and any permanent upstream and downstream fish passage facilities at the project, consistent with the 1998 Accord (conditions 3.A and 3.H of Appendix A); (5) provide specified minimum flows in the bypassed reach (Article 403); (6) develop and implement instream flow and impoundment water level monitoring plans (Article 405 and condition 1.E of Appendix A); and (7) prevent upstream movement of non-management exotic species into the upstream passage facilities (Article 408).

B. Recommendations Pursuant to Section 10(a)(1) of the FPA

28. Interior and Maine SPO made other recommendations[30] we consider under the broad public-interest standard of FPA section 10(a)(1), 16 U.S.C. § 803(a)(1).[31]

29. Interior and Maine SPO recommend that Merimil: (1) provide funding for studies related to diadromous fish restoration activities; (2) conduct American eel passage studies at the project; and (3) consult with the resource agencies on all functional design drawings of upstream and downstream interim and permanent fish passage facilities.

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[29] Merimil filed, to implement the 1998 Accord, functional design drawings and an implementation schedule for an interim upstream passage facility for the Lockwood Project on February 13, 2004. The Commission approved the drawings and schedule on May 27, 2004. Ordering paragraph E incorporates the approved design drawings and implementation schedule into the license.

[30] Because these recommendations are not specific measures for the protection, mitigation, or enhancement of fish and wildlife, we do not consider them under section 10(j). For example, requests for studies that could have been conducted prior to relicensing the project, recommendations for recreation facilities, funding requests, or requests that an agency be consulted in the development of plans are not appropriate 10(j) recommendations. *See* 18 C.F.R. § 4.30(b)(9)(ii)(2004).

[31] Section(10(a)(1) requires that any project for which the Commission issues a license shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce; for the improvement and utilization of waterpower development; for the adequate protection, mitigation, and enhancement of fish and wildlife; and for other beneficial public uses, including irrigation, flood control, water supply, recreation, and other purposes.

These measures are included in this license as conditions of Maine DEP's water quality certification for the project.

30. Interior and Maine SPO recommend that Merimil conduct additional instream flow studies in the bypassed reach at flows higher than that of the 30- to 50-cfs flows evaluated by Merimil. The license requires the licensee to provide a minimum flow of 50 cfs or inflow, if less, to the bypassed reach (Article 403). Studies conducted to date indicate that a flow of 50 cfs would be adequate to maintain suitable water and aquatic habitat quality and zones of passage between pools below the dam. Releasing higher flows would not significantly improve habitat because the additional area wetted by higher flows consists almost entirely of bedrock, and combined with high velocities, would be of limited habitat value to fish and other aquatic biota.[32] Additionally, the upper portion of the bypassed reach that would be wetted by higher flows is only 600 feet in length and does not provide any unique or critical habitat for resident or migratory fish that might utilize the area. Therefore, no additional studies are required.

31. Interior also recommends that Merimil release flows in the river that are sufficient to maintain aquatic habitat while the reservoir is being refilled after flashboard replacement.[33] It is appropriate for Merimil to maintain adequate flows in the river during those times when the reservoir is being refilled to protect aquatic resources. We are including Article 404 in the license, which requires Merimil to maintain a minimum flow of 2,114 cfs, as measured downstream of the powerhouse, during reservoir refill.[34]

32. Interior recommends that Merimil, in consultation with Maine Department of Inland Fisheries and Wildlife (Maine IFW), Maine DEP, and Maine Department of Marine Resources, monitor recreation use of the project area to determine if the project is meeting demands of public use of fish and wildlife resources and to file a monitoring report every six years. Maine SPO (on behalf of Maine IFW) recommends that Merimil monitor recreation use through the FERC Form 80 process, but the process should assess the need for recreational access improvements along the east shoreline of the Kennebec River downstream of the dam. Existing use of recreational facilities are below capacity and are expected to continue to meet demands into the future. Low levels of recreation

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[32] EA at 42.

[33] Interior did not file the recommendation pursuant section 10(j) of the FPA but in response to comments on the draft EA.

[34] 2,114 cfs is the 7Q10 flow for the Kennebec River at the Lockwood Project.

use, the occurrence of a rare plant community, and steep topography, make additional access on the eastern shore unwarranted at this time.[35] Monitoring through the Form 80 process will indicate when recreation facilities begin to reach capacity, thus additional monitoring is not warranted. The water quality certification does however require Merimil to continue to provide public access at the tailrace for fishing.

Other Issues

33. Friends of the Kennebec Salmon argue that relicensing the project will prevent the restoration of Atlantic salmon, American shad, and alewives to the Kennebec River Basin. The group contends that fish passage inefficiencies at the Lockwood Project, and at other upstream dams, will reduce the number of fish that reach the upstream spawning habitat to the point that a self-sustaining population cannot be achieved. As a result, it argues that the application for a new license should be denied and that the project should be decommissioned and the dam removed.

34. As noted above, in 1987, Merimil, together with the other members of KHDG, entered into an agreement with fisheries resource agencies to facilitate the restoration of Atlantic salmon, American shad, and alewives to the lower Kennebec River Basin. KHDG provided funds to the agencies to help pay for acquiring and stocking fish to restore populations and studying restoration efforts. The KHDG licensees also agreed to construct and operate fish passage facilities according to a schedule that called for sequential construction of the facilities, beginning with the downstream projects and moving upstream. The licenses for the KHDG projects were amended to reflect the fish passage provisions of the agreement. In 1998, the agreement was modified (the 1998 Accord) to provide for the removal of the Edwards Dam and link the construction of fish passage facilities to biological triggers instead of to specific dates. The 1998 Accord continued the requirement for financial support by the licensees of the restoration activities.

35. Fishery restoration activities in the lower Kennebec River Basin have made significant progress. In 2003, the latest year for which data are available,[36] over 135,000

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[35] EA at 67.

[36] Normendeau Associates, *FPL Energy Maine Hydro, LLC Diadromous Fish Passage Efforts in the Lower Kennebec River Watershed During the 2003 Migration Season*, filed March 29, 2004.

alewives were trapped at the Ft. Halifax project.[37] This provided enough fish for the resource agencies to meet all their stocking goals and have additional fish available for stocking outside the Kennebec River Basin. The alewife spawning run is now large enough to meet the stocking needs and support a commercial fishery; reports from 48 percent of the commercial fisherman showed a catch of over 128,000 alewives from the Sebasticook River at Ft. Halifax. Earlier estimates of the size of the alewife run were 1 to 2 million fish and biologists reported that there seemed to be more alewives in 2003 than in previous years.

36. The number of shad fry stocked above Lockwood increased from 1.75 million in 2002 to 2.54 million in 2003, and the interim downstream fish passage measures at Lockwood, Hydro Kennebec, and Shawmutt appear to be allowing juvenile shad and alewife to migrate downstream without significant injury or mortality. The existing license for the Lockwood Project requires Merimil to install and operate interim upstream fish passage facilities by May 1, 2006.

37. The Maine Atlantic Salmon Commission does not currently have an active salmon restoration program in the Kennebec River. No Atlantic salmon are stocked in the Kennebec above Lockwood and any adult salmon returning to the river are either strays from other rivers or the result of natural reproduction in the Kennebec or its tributaries below Lockwood.

38. We believe that the 1998 Accord has created an effective, comprehensive, and coordinated program for achieving the fishery restoration goals for the lower Kennebec River Basin. The Accord provides for continuing restoration activities and installation of fish passage facilities as required by the growth of the fish populations and their expansion into upstream habitat. Friends of the Kennebec Salmon argue that dam removal is needed to guarantee success of the restoration efforts. The evidence to date shows that the restoration plans are making significant progress. We believe it is too early in the restoration efforts to conclude that the plan will ultimately succeed or fail. Therefore we do not agree that we should abandon the plan embodied in the 1998 Accord.

Coastal Zone Consistency Certification

[37] Ft. Halifax is located on the Sebasticook River, a tributary of the Kennebec River which joins the Kennebec just downstream of the Lockwood Project.

39. Under section 307(c)(3)(A) of the Coastal Zone Management Act, 16 U.S.C. § 1456(c)(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

40. In a letter dated July 23, 2002, the Maine State Planning Office stated that relicensing the project may affect coastal resources. The letter stated that "the State will deem that the enforceable policies of the Maine Coastal Program have been met if and

when DEP issued water quality certification for the Project."[38] The state issued the water quality certification on August 24, 2004; and it therefore concurs with the license applicant's determination.

Section 18 Fishway Prescriptions

41. Section 18 of the FPA, 16 U.S.C. § 811, states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce or the Interior may prescribe. The Commission's policy is to reserve such authority in a license upon the request of either designated Secretary. On October 27, 2003, Interior requested a reservation of authority to prescribe American eel passage facilities at the Lockwood Project.

42. Section III(G)(3) of the 1998 Accord provides that if agreement is not reached on either upstream passage location or downstream eel passage measures by June 30, 2002, any party shall be free to petition FERC to amend any license to insert appropriate terms and conditions. Because the timeframe contemplated by the 1998 Accord had past without agreement on eel passage measures and because the Commission's standard article 15 would permit state and federal agencies to reopen the license to address eel passage needs, staff initially recommended excluding this provision of section III(G)(3) of the 1998 Accord from any new license. During a meeting with Commission staff on November 20, 2003, Interior subsequently agreed to withdraw its request for reservation of authority if staff included a specific reopener that permitted Interior to petition the Commission to require Merimil to install upstream eel passage facilities and downstream eel passage measures in accordance with the 1998 Accord. By letter dated December 9, 2003, staff proposed the inclusion of a specific reopener that satisfied Interior (Interior

[38] Letter from Todd Burrowes, Maine State Planning Office, to Mike Hoover, FPL Energy, filed on July 26, 2002.

letter dated December 19, 2003). We deem Interior's request for reservation of authority for eel passage to be withdrawn and are including the reopener proposed by staff as Article 410 .

Cultural Resources

43. Before it may issue a new license for the project, the Commission must comply with the consultation requirements of section 106 of the National Historic Preservation Act (Act) and the implementing regulations of the Advisory Council on Historic Preservation (Advisory Council). *See* 36 C.F.R. Part 800 (2004). Consultation under section 106 usually results in the preparation of a programmatic agreement among the Commission, the State Historic Preservation Officer (SHPO), and the Advisory Council that provides for the protection of historic and cultural resources through the establishment of a Historic Resources Management Plan. Other interested entities, such as Indian tribes, may be asked to concur with the programmatic agreement.

44. Merimil conducted cultural resource surveys of the project area and concluded that there were no National Register-eligible properties within the project's area of potential effect. The Maine SHPO concurred with this finding in a letter dated May 8, 2002. Commission staff contacted the four federally recognized Indian tribes[39] within the state of Maine and none identified any properties to which they attach religious or cultural significance that would be affected by the project. If any unanticipated historic or archaeological properties are discovered during the term of the license, Article 412 requires the licensee to consult with the SHPO and prepare a cultural resources management plan to protect the properties. This consultation satisfies the Commission's responsibilities under section 106 of the Act.

State and Federal Comprehensive Plans

45. Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We have

[39] Aroostook Band of Micmac Indians, Houlton Band of Maliseet Indians, Penobscot Indian Nation, and Passamaquoddy Tribe.

identified and reviewed 14 comprehensive plans[40] that are applicable to the Lockwood Hydroelectric Project and have found no conflicts.

Applicants Plans and Capabilities

46. In accordance with sections 10(a)(2)(c)and 15(a)(2) of the FPA, we have evaluated Merimil's record as a licensee with respect to the following: (A) conservation efforts; (B) compliance history and ability to comply with the new license; (C) safe management,

[40](1) Department of Army, Corps of Engineers. New England Division. 1985. Hydrology of floods – Kennebec River Basin, Maine. Waltham, Massachusetts. October 1985. 14 pp. and appendices; (2) Department of Army, Corps of Engineers. New England Division. 1988. Hydrology of Floods – Kennebec River Basin, Maine, Part II. Waltham, Massachusetts. May 1988. 20 pp. and appendices; (3) Department of Army, Corps of Engineers. New England Division. 1989. Water resources study – Kennebec River Basin, Maine (reconnaissance report). Waltham, Massachusetts. March 1989. Two volumes; (4) Maine Atlantic Sea-Run Salmon Commission. 1984. Strategic plan for management of Atlantic salmon in the State of Maine. Augusta, Maine. July 1984. 52 pp. and appendices; (5) Maine Department of Conservation. 1993. Maine State Comprehensive Outdoor Recreation Plan, assessment and policy plan, volume 1. Augusta, Maine. December 1993. 193 pp.; (6) Maine Department of Conservation. 1982. Maine rivers study-final report. Augusta, Maine. May 1982. 181 pp.; (7) Maine State Planning Office. 1987. State of Maine comprehensive rivers management plan. Augusta, Maine. May 1987. Three volumes; (8) Maine State Planning Office. 1992. Maine comprehensive rivers management plan. Volume 4. Augusta, Maine. December 1992; (9) Maine State Planning Office. 1993. Kennebec River resource management plan. Augusta, Maine. February 1993. 196 pp.; (10) U.S. Fish and Wildlife Service and Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. 19 pp.; (11) U.S. Fish and Wildlife Service. 1989. Final environmental impact statement – restoration of Atlantic salmon to New England rivers. Department of Interior, Newton Corner, Massachusetts. May 1989. 88 pp. and appendices; (12) U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. 11pp.; (13) National Marine Fisheries Service. Atlantic Salmon (*Salmo salar*) – Amendment 1 to the New England Fishery Management Council's (NEFMC) Fish Management Plan (FMP) on Atlantic salmon (March 1988). October 1998; (14) National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, D.C. January 1982. 432 pp.

operation, and maintenance of the project; (D) ability to provide efficient and reliable electric service; (E) need for power; (F) transmission lines; (G) cost effectiveness of plans; and (H) actions affecting the public.

A. Conservation Efforts

47. FPA section 10(a)(2)(C) requires the Commission to consider the extent of electric consumption efficiency programs in the case of license applicants engaged primarily in the generation or sale of electric power. Although Merimil is engaged in the generation and sale of electric power, Merimil generates electricity for sale into the wholesale power market in Maine and the regional power pool. As such, it does not sell power directly to retail customers and is, therefore, not in a position to implement conservation programs by the end user. Electricity consumers in the region would likely be subject to the conservation programs of local utilities and, as such, we find Merimil's position with respect to conservation satisfactory.

B. Compliance History and Ability to Comply with the New License

48. FPA section 15(a)(3)(A) requires the Commission to take into consideration an existing licensee's record of compliance with the terms and conditions of the existing license. We have done so, and find that Merimil's overall record of making timely filings and compliance with its license is satisfactory.

C. Safe Management, Operation, and Maintenance of the Project

49. Merimil owns and operates the Lockwood Hydroelectric Project, which is classified in accordance with Commission standards as having a low hazard potential.

50. We reviewed Merimil's record of management, operation, and maintenance of the project and conclude that the dam and other project works are safe, and that Merimil has the ability to manage, operate, and maintain the project safely for future operation. Based on the results of this review, we conclude that the Lockwood Project would pose no threat to public safety if operated according to the regulations governing hydroelectric licenses.

D. Ability to Provide Efficient and Reliable Electric Service

51. FPA section 15(a)(2)(C) requires the Commission to review Merimil's ability to operate the project in an efficient and reliable manner. Based on our review, Merimil has

been operating the project in an efficient manner within the constraints of the existing license, and is likely to continue to do so under a new license.

E. Need for Power

52. FPA section 15(a)(2)(D) requires the Commission to consider the license applicant's short-term and long-term need for the project power. The project is located in the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Council (NERC). NERC annually forecasts electrical supply and demand in the nation and the region for a 10-year period. NERC's most recent report on annual supply and demand projections indicates that, for the period 2003-2012, the New England system summer peak demand for electric energy will grow from 25,120 MW to 28,710 MW, an annual growth rate of about 1.4 percent.

53. If a new license is issued to Merimil, continued operation of the project would provide about 48,082 megawatt-hours of energy annually. This generation would continue to help meet New England's expanding power demand projections. In the short and long term, the capacity supplied by relicensing the project would help to maintain sufficient capacity to meet regional demand, while contributing to resource diversification and displacing nonrenewable fossil fuel generation. The project will also continue to avoid emissions from fossil-fueled power generation.

F. Transmission Lines

54. FPA section 15(a)(1)(3)(A) requires the Commission to consider existing and planned transmission services of the applicant. The project's transmission facilities that are required to be licensed include a 4,160-volt transmission line that runs about 225 feet from the original powerhouse to the local utility tie-in, and a 1,000-foot-long, 12,400-volt transmission line that extends from the second powerhouse to a local utility tie-in. Merimil proposes no changes that would affect transmission facilities.

G. Cost Effectiveness of Plans

55. Merimil is not proposing, nor does this order approve any change in the installed capacity at the Lockwood Project. Due to the hydraulic limitation resulting from the U.S. Route 201 bridge abutment at the project canal intake and the bedrock outcrops in the forebay area, the project's generating units currently have a greater hydraulic capacity than can be utilized under normal operating conditions. Prior studies undertaken by Merimil indicate that any future upgrades are contingent upon eliminating the hydraulic

limitation at the intake. Potential solutions for the limitation, however, were determined to be cost prohibitive.[41] Merimil proposes and this license requires measures for the protection, mitigation, and enhancement of environmental resources in the Kennebec River Basin. Merimil's past record as a licensee indicates it is likely to carry out these measures in a cost-effective manner.

H. Actions Affecting the Public

56. The Lockwood Project generates electricity used to serve the regional power pool. The project provides employment opportunities and access to project lands for public recreation use. Merimil has been involved in the restoration of anadromous fish species since 1986 when it became a signatory to the KHDG Agreement, the precursor to the 1998 Accord. Merimil cites in its license application that as a participant in the fish restoration program, its involvement has included, but is not limited to, donating personnel and equipment and participating in various studies.

Economic Benefits of Project Power

57. In determining whether a proposed project will be best adapted to a comprehensive plan for developing a waterway for beneficial public purposes, the Commission considers the economic benefits of project power. Under its approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*, 72 FERC ¶ 61,027 (1995), the Commission employs an analysis that uses current costs to compare the costs of the project and the likely alternative power, with no forecasts concerning future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and costs of a project, and reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. In making its decision, the Commission considers the project power benefits under (1) the no-action alternative, (2) as proposed by the applicant, and (3) with the Commission's modifications and additions to the applicant's proposal.

58. To determine whether an alternative is currently economically beneficial, we subtract the cost of project power from the power value, which is computed as the cost of

[41] License application at A-17 to A-18 and B-9 to B-10.

the most likely alternative source of power.[42] Under the no-action alternative, the project generates an average of 42,687 MWh annually at a cost of about $1,650,100 (about $39/MWh), or $211,200 less than the $1,861,300 current value of this amount of power. As proposed by Merimil, the project would generate about 41,782 MWh annually at a cost of about $1,991,800 (about $48/MWh), or $154,200 more than the $1,837,600 current value of this amount of power. With the conditions adopted herein, the project will produce about 41,082 MWh of energy annually at a cost of about $1,985,100 (about $48/MWh), or $165,800 more than the $1,819,300 current value of this amount of power.

59. Although staff's analysis shows that the project as licensed herein would cost more to operate than our estimated cost of alternative power, it is the applicant who must decide whether to accept this license and any financial risk that entails. Also, although staff does not explicitly account for the effects inflation may have on the future cost of electricity, the fact that hydropower generation is relatively insensitive to inflation compared to fossil-fueled generators is an important economic consideration for power producers and the consumers they serve. This is one reason project economics is only one of the many public interest factors the Commission considers in determining whether or not, and under what conditions, to issue a license.

Comprehensive Development

60. Sections 4(e) and 10(a)(1) of the FPA[43] require the Commission, in acting on license applications, to give equal consideration to the developmental and environmental uses of the waterway on which a project is located. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration.

61. In analyzing public interest factors, the Commission takes into account that hydroelectric projects offer unique operational benefits to the electric utility system

[42] For the amount of energy and capacity provided by the Lockwood project, the power value power would be about $44/MWh based on replacing the project power using combined cycle combustion turbine technology with (1) an energy value of $26.21/MWh taken from the Energy Information Administration's *Annual Energy Outlook 2003,* and (2) a capacity value of $99.00/kW-year applied to Lockwood's dependable project capacity of 7.5 MW. (FEA, pp. 68-69.)

[43] 16 U.S.C. §§ 797(e) and 803(a)(1).

(ancillary benefits). Although the Lockwood Project does not have any appreciable storage, which is required for some ancillary service purposes, it will retain under this license any ancillary capabilities it currently provides to Merimil's power system.

62. The EA for the Lockwood Project contains background information, analysis of effects, support for related license articles, and the basis for a finding that the project will not result in any major, long-term adverse environmental effects. The project would be safe if operated and maintained in accordance with the requirements of this license. Based on our independent review and evaluation of the Lockwood Project, recommendations from resource agencies and other entities, and the no-action alternative as documented in the final EA, we conclude that operation of the Lockwood Hydroelectric Project as proposed, with additional enhancements recommended by staff, will be best adapted to a comprehensive plan for the use, conservation, and development of Kennebec River for beneficial public purposes. Operation of the project in the manner required by this license will further the goals of restoring anadromous and catadromous (American eels) species in the basin, maintain water quality, further the recovery of the bald eagle and possibly the shortnose sturgeon, protect and enhance fish and wildlife resources, protect any undiscovered cultural resources, and maintain public use of recreation facilities and resources within the area affected by project operation, while continuing to provide a dependable source of electrical energy. The electricity generated from the Lockwood Hydroelectric Project will be beneficial, because it will continue to reduce the use of fossil-fueled, electric generating plants, thereby conserving nonrenewable energy resources and reducing atmospheric pollution.

License Term

63. Section 15(e) of the FPA[44] provides that relicense terms shall not be less than 30 years nor more than 50 years from the date on which the license is issued. Our general policy is to establish 30-year terms for projects with little or no redevelopment, new construction, or new environmental mitigation and enhancement measures; 40-year terms for projects with a moderate amount of such activities; and 50-year terms for projects with extensive measures.[45] Also, it is the Commission's policy to coordinate to a reasonable extent the license expiration dates of projects in a river basin, in order that subsequent relicense proceedings can also be coordinated.[46]

[44] 16 U.S.C. § 808(e).

[45] *See* Consumers Power Company, 68 FERC ¶61,077 at 61,383-84 (1994).

[46] In issuing new and subsequent licenses, the Commission will coordinate the (continued)

64. The five remaining projects[47] included in the 1998 Accord, and the license expiration dates are: (1) Shawmut Project No. 2322, expiring January 21, 2021; (2) Weston Project No. 2325, expiring October 31, 2036; (3) Benton Falls Project No. 5073, expiring February 28, 2034; (4) Hydro-Kennebec Project No. 2611, expiring September 30, 2036; and (5) Burnham Project No. 11472, expiring October 31, 2036.

65. Four of the five project licenses expire within two years of each other, between February 2034 and October 2036. To closely align the license expiration dates of the projects included in the 1998 Accord, this license will expire on October 31, 2036, a term of 31 years and 8 months.

The Commission orders:

(A) This license is issued to Merimil Limited Partnership (licensee) to operate and maintain the Lockwood Project, for a period of 31 years and 8 months, effective the first day of the month in which this order is issued. The license is subject to the terms and conditions of the Federal Power Act (FPA), which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interest in those lands, enclosed by the project boundary shown by Exhibit G, filed April 29, 2002:

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expiration dates of licenses to the maximum extent possible, to maximize future consideration of cumulative impacts at the same time in contemporaneous proceedings at relicensing. *See* 18 C.F.R. § 2.23 (2004).

[47] This excludes the Fort Halifax Project No. 2552. The license for the Fort Halifax Project has been surrendered.

Exhibit G Drawing	FERC No. 2574-	Showing
Sheet 1 of 4	1006	General Map Project Area
Sheet 2 of 4	1007	General Map Powerhouse Area
Sheet 3 of 4	1008	General Map Reservoir
Sheet 4 of 4	1009	General Map Reservoir

(2) Project works consisting of: (1) 875-foot-long concrete gravity dam with two spillway sections equipped with 1.25-foot-high pinned flashboards; (2) a 160-foot-long forebay headgate structure; (3) a 450-foot-long forebay canal; (4) an approximately 1,300-foot-long bypassed reach; (5) two reinforced concrete powerhouses with a total installed capacity of 6.915 MW and a hydraulic capacity of 5,660 cfs; (6) six turbine-generator units with a total nameplate capacity of 4.800 MW located in the original powerhouse, and one turbine-generator unit with a nameplate capacity of 2.115 MW located in the second powerhouse; (7) a project impoundment with a length of approximately 1.2 miles and a surface area of 81.5 acres at the normal high water elevation of 52.16-feet mean sea level; (8) a 4,160-volt transmission line that runs about 225 feet from the original powerhouse to the local utility intertie, and a 1,000-foot-long, 12,400-volt transmission line that extends from the second powerhouse to a local utility tie-in; and (9) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibits A and F shown below:

Exhibit A: Pages A-1 through A-18 filed on April 29, 2002.

Exhibit F: The following Exhibit F of the license application filed on April 29, 2002:

Exhibit F-	FERC Drawing No. 2574-	Showing
1	1001	Plan of Dam and Forebay Canal Powerhouse
2	1002	Downstream Elevation and Sections of Dam
3	1003	Plan of Original and Unit No. 7 Powerhouses
4	1004	Section Thru Original and Unit No. 7 Powerhouses
5	1005	Powerhouse Elevations

(3) All of the structures, fixtures, equipment, or facilities used to operate or maintain the project, all portable property that may be employed in connection with the project, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibit A, F, and G, as designated in ordering paragraph (B) above, are approved and made a part of this license. Exhibits F and G shall be refiled in the Commission's electronic file format as specified in Article 301.

(D) This license is subject to the conditions submitted by the Maine Department of Environmental Quality under section 401 of the Clean Water Act, as those conditions are set forth in Appendix A to this order.

(E) The licensee's functional design drawings and implementation schedule for an interim trap, lift, and transfer facility for the Lockwood Project, filed with the Commission on February 13, 2004, and approved by the Commission on May 27, 2004, are made a part of this license.

(F) This license is subject to articles set forth in Form L-3 (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles.

Article 201. *Administrative Annual Charges*. The licensee shall pay the United States the following annual charges, effective as of the first day of the month in which this license is issued:

For the purposes of reimbursing the United States for the Commission's administrative costs, pursuant to Part I of the Federal Power Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 6,915 kilowatts.

Article 202. *Amortization Reserves*. Pursuant to section 10(d) of the Federal Power Act, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly included in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 203. *Headwater Benefits*. If the licensee's project was directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license. The benefits will be assessed in accordance with Part 11, Subpart B, of the Commission's regulations.

Article 301. *Exhibit drawings.* Within 45 days of the date of issuance of the license, the licensee shall file exhibit drawings F and G described in ordering paragraph (C) in aperture card and electronic formats.

(a) Three sets of the approved exhibit drawings shall be reproduced on silver or gelatin 35mm microfilm. All microfilm shall be mounted on type D (3-1/4" X 7-3/8") aperture cards. Prior to microfilming, the FERC Drawing Number (e.g., P-1234-1001 through P-1234-###) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (e.g., F-1, G-1, etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card.

Two of the sets of aperture cards along with form FERC-587 shall be filed with the Secretary of the Commission, ATTN: OEP/DHAC. The third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office.

(b) The licensee shall file two separate sets of exhibit drawings in electronic format with the Secretary of the Commission, ATTN: OEP/DHAC. A third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office. Exhibit F drawings must be identified as critical energy infrastructure

information (CEII) material under 18 CFR §388.113(c). Exhibit G drawings should be submitted as non-internet public (NIP) information in accordance with 18 CFR §388.112. Each drawing must be a separate electronic file, and the file name shall include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this license, and file extension [e.g., P-1234-####, G-1, Project Boundary, MM-DD-YYYY.TIF]. Electronic drawings shall meet the following format specification:

IMAGERY - black & white raster file
FILE TYPE – Tagged Image File Format, (TIFF) CCITT Group 4
RESOLUTION – 300 dpi desired, (200 dpi min)
DRAWING SIZE FORMAT – 24" X 36" (min), 28" X 40" (max)
FILE SIZE – less than 1 MB desired

Each Exhibit G drawing that includes the project boundary must contain a minimum of three known reference points, arranged in a triangular format. The latitude and longitude coordinates, or state plane coordinates, of each reference point must be shown and identified on the drawing. In addition, each project drawing must be stamped by a registered land surveyor.

(c) The licensee shall file three separate sets of the project boundary data in a geo-referenced vector electronic file format (such as ArcView shape files, GeoMedia files, MapInfo files, or any similar format) with the Secretary of the Commission, ATTN: OEP/DHAC. The file name shall include: FERC Project Number, data description, date of this license, and file extension [e.g., P-1234, boundary vector data, MM-DD-YYYY. SHP]. The geo-referenced electronic boundary data file must be positionally accurate to ±40 feet in order to comply with National Map Accuracy Standards for maps at a 1:24,000 scale. A single electronic boundary data file is preferred and must contain all reference points shown on the individual project boundary drawings. The latitude and longitude coordinates, or state plane coordinates, of each reference point must be shown. The data must be accompanied by a separate text file describing the map projection used (i.e., UTM, State Plane, Decimal Degrees, etc.), the map datum (i.e., North American 27, North American 83, etc.), and the units of measurement (i.e., feet, meters, miles, etc.). The text file name shall include: FERC Project Number, data description, date of this license, and file extension [e.g., P-1234, project boundary metadata, MM-DD-YYYY.TXT].

Article 302. *Contract Plans and Specifications.* At least 60 days before starting construction of the upstream fish passage facilities required by Conditions 3.C and 3.E, and the downstream fish passage facilities required by Condition 3.F of Appendix A, the licensee shall submit one copy to the Commission's Division of Dam Safety and

Inspections - New York Regional Engineer (Regional Engineer), and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections), of the final contract plans and specifications. The Commission may require changes to the plans and specifications to ensure the work is completed in a safe and environmentally sound manner. Construction may not commence until authorized by the Regional Engineer.

Article 303. *Quality Control and Inspection Program.* At least 60 days before starting construction of the upstream fish passage facilities required by Conditions 3.C and 3.E, and downstream fish passage facilities required by Condition 3.F of Appendix A, the licensee shall submit one copy to the Division of Dam Safety and Inspections – New York Regional Engineer, and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections) of the Quality Control and Inspection Program (QCIP) for the Commission's review and approval. The QCIP shall include a sediment and erosion control plan for construction activities.

Article 304. *Cofferdam Construction Drawings.* Before starting construction of the upstream fish passage facilities required by Conditions 3.C and 3.E and the downstream fish passage facilities required by Condition 3.F of Appendix A, the licensee shall review and approve the design of contractor-designed cofferdams and deep excavations. At least 30 days before starting construction of the cofferdams, the licensee shall submit one copy to the Division of Dam Safety and Inspections – New York Regional Engineer and two copies to the Commission (one of these copies shall be a courtesy copy to the Director, Division of Dam Safety and Inspections), of the approved cofferdam construction drawings and specifications and the letters of approval.

Article 305. *Temporary Emergency Action Plan.* At least 60 days before starting construction of the upstream fish passage facilities and downstream fish passage facilities, the licensee shall submit one copy to the Division of Dam Safety and Inspections – New York Regional Engineer, and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections) of the Temporary Emergency Action Plan (TEAP) for the Commission's review and approval. The TEAP shall describe emergency procedures in case failure of a cofferdam, large sediment control structure, or any other water retaining structure that could endanger construction workers or the public. The TEAP shall include a notification list

of emergency response agencies, a plan drawing of the proposed cofferdam arrangement, the location of safety devices and escape routes, and a brief description of testing procedures.

Article 306. *As-Built Drawings.* Within 90 days of completion of construction of the facilities authorized by any article of this license, the licensee shall file, for Commission approval, eight copies of the revised Exhibits A, F, and G, as applicable, to describe and show the project as built. The licensee shall file six copies with the Commission, one copy to the Division of Dam Safety and Inspections – New York Regional Engineer, and one copy to the Director, Division of Hydropower Administration and Compliance, Office of Energy Projects.

Article 401. *Scheduling and Reporting Requirements and Amendment Applications*.

(a) Schedule for Filing Plans for Commission Approval

Conditions 3.G and 3.H of Appendix A require the licensee to (i) prepare plans in consultation with various federal and state fish and wildlife agencies and (ii) file the plans with the Commission in accordance with a schedule to be established by the Commission. The plans shall be filed according to the following schedule:

Condition No.	Plan	Due Date
3.G and 3.H	Interim Downstream Fish Passage Effectiveness Evaluation	Within 6 months of license issuance
3.G and 3.H	Permanent Upstream and Downstream Fish Passage Design and Operation, and Effectiveness Evaluation	At least 90 days before starting construction of the permanent facilities
3.H	Interim Fish Lift Effectiveness Evaluation	February 1, 2006

Each of the plans shall contain an implementation schedule. Effectiveness evaluation plans shall also include a schedule for filing the results of the evaluations with the Commission.

The licensee shall prepare each of the plans after consultation with the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NOAA Fisheries), Maine Department of Inland Fisheries and Wildlife, Maine Atlantic Salmon Commission, Maine Department of Marine Resources, and Maine Department of Environmental Protection. The licensee shall include with the plans documentation of consultation, copies of comments and recommendations on the completed plans after the plans have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and other entities to comment and to make recommendations

before filing the plans with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plans. Implementation of the plans shall not begin until the licensee is notified by the Commission that the plans are approved. Upon Commission approval, the licensee shall implement the plans, including any changes required by the Commission.

If the results of the interim or permanent fishway effectiveness evalutions indicate that changes in project structures or operations are necessary to provide safe and effective upstream or downstream fish passage, the Commission may direct the licensee to modify project structures or operations. No such changes shall be implemented without prior approval from the Commission.

(b) Requirement to File Reports or Documentation of Completion

Condition 3.A of Appendix A requires the licensee to comply with the duties and obligations as set forth in the "Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the U.S. Fish and Wildlife Service," (1998 Accord) dated May 26, 1998. The licensee shall file with the Commission the following reports or documentation of completion of the following activities specified in the 1998 Accord.

Appendix B Reference No.	Activity or Report	Due Date
III.H	Annual Progress Report	By no later than March 31, 2005, and by March 31 of every license year thereafter

(c) Requirement to File Amendment Applications

Certain conditions in Appendix A contemplate unspecified long-term changes to project operations, facilities, or the requirements of this license for the purpose of mitigating environmental effects. These changes may not be implemented without prior Commission authorization granted after the filing of an application to amend this license. The conditions are listed below.

Condition No.	Modification
3.B.5	Unspecified eel passage measures
3.E	Alternative Trigger Date for Permanent Upstream Fish Passage

Article 402. *Temporary Operational Modifications*. Condition 1.A of Appendix A specifies that temporary modification of run-or-river operation may occur upon agreement between the licensee and "appropriate" state and federal agencies. "Appropriate" agencies for this purpose shall include the National Marine Fisheries Service, Maine Department of Inland Fisheries and Wildlife, and Maine Department of Environmental Protection. Temporary modifications for this purpose shall be for short periods. If run-of-river operation is temporarily modified for any of the reasons specified in Condition 1.A of Appendix A, the licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident.

Article 403. *Minimum Bypassed Reach Flows*. Within six months of license issuance, the licensee shall file for Commission approval, a plan to release from the project dam when the flashboards are in place, a minimum flow of 50 cubic feet per second (cfs), or inflow to the project reservoir if less, into the bypassed reach of the Kennebec River as measured immediately downstream of the project dam. The purpose of the minimum flow is to protect aquatic resources, including federally listed endangered shortnose sturgeon utilizing scour pools located in the bypassed reach immediately downstream of the east and west spillways of the project dam.

The plan shall include, at a minimum:

(a) a description of how the minimum flow will be released;

(b) the proposed location(s) of the minimum flow release(s) and scour pools targeted to receive the minimum flow;

(c) if additional project structures or modifications to project facilities are proposed to release the minimum flow, then: (i) detailed design drawings of the structures and modifications; (ii) interim measures for providing the minimum flow release; and (iii) a schedule for constructing the structures or making the modifications;

(d) a provision to allow temporary modifications of the minimum flow release if required by operating emergencies beyond the control of the licensee, and for short periods upon agreement among the licensee and the National Marine Fisheries Service (NOAA Fisheries), Maine Department of Inland Fisheries and Wildlife (Maine DIFW), and Maine Department of Environmental Protection (Maine DEP);

(e) a provision to notify the Commission of any temporary modifications of the minimum flow release as soon as possible, but not later than 10 days after each such incident; and

(f) an implementation schedule.

The licensee may use all or part of the leakage flows specified by Condition 1.B of Appendix A as needed to meet the 50-cfs minimum flow requirement specified by this article.

The licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service (FWS), NOAA Fisheries, Maine DIFW, Maine Atlantic Salmon Commission, Maine Department of Marine Resources, and Maine DEP. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how their comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and other entities to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 404. *Minimum Downstream Flows*. The licensee shall, during flashboard replacement and subsequent refilling of the project reservoir, release a minimum flow of 2,114 cubic feet per second, or inflow to the project if less, into the Kennebec River as measured downstream of the project powerhouse for the protection of aquatic resources.

This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon agreement among the licensee and the National Marine Fisheries Service, Maine Department of Inland Fisheries and Wildlife, Maine Department of Marine Resources, and Maine Department of Environmental Protection. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident.

Article 405. *Minimum Flow and Reservoir Water Level Gaging Plans*. In addition to the provisions specified in Condition 1.E of Appendix A, the minimum flow and reservoir water level gaging plans shall include, at a minimum:

(a) a description of the exact location of each gaging device, the method of calibration for each gaging device, the frequency of recording for each gaging device, and a monitoring schedule;

(b) a provision for maintaining a log of project operation and generation;

(c) a provision for filing the annual independent inspection/flow gaging report as specified in Condition 1.B of Appendix B with the Commission by July 15 of each license year; and

(d) an implementation schedule.

The licensee shall prepare the plans after consultation with the U.S. Geological Survey, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Maine Department of Inland Fisheries and Wildlife, Maine Atlantic Salmon Commission, Maine Department of Marine Resources, and Maine Department of Environmental Protection. The licensee shall include with the plans documentation of consultation, copies of comments and recommendations on the completed plans after the plans have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and other entities to comment and to make recommendations before filing the plans with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plans. Implementation of the plans shall not begin until the licensee is notified by the Commission that the plans are approved. Upon Commission approval, the licensee shall implement the plans, including any changes required by the Commission.

Article 406. *Shortnose Sturgeon Handling Plan*. Pursuant to the terms and conditions of the incidental take statement filed by the National Marine Fisheries Service (NOAA Fisheries) on January 14, 2005, the licensee shall implement the "Shortnose Sturgeon Handling Plan for Lockwood Project" (handling plan) contained in Appendix C of this license. Within 24 hours of any interactions with shortnose sturgeon (lethal and non-lethal), the licensee shall notify NOAA Fisheries by email or phone, complete the *Shortnose Sturgeon Reporting Sheet for the Lockwood Project*, and mail and fax the completed form to the attention of the NOAA Fisheries Endangered Species Coordinator.

By January 1 of each license year, the licensee shall discuss with NOAA Fisheries whether updates to the handling plan are necessary, file the updated handling plan with the Commission, and implement any needed updates by no later than April 1 of each license year. The Commission reserves the right to require changes to the handling plan. Any updates to the sturgeon handling plan that would result in long-term changes to project operations or facilities may not be implemented without prior Commission authorization granted after the filing of an application to amend this license.

Article 407. *Fish Rescue Plan*. Within six months of license issuance, the licensee shall file for Commission approval, a fish rescue plan. In addition to the provisions specified in Condition 2 of Appendix A, the Fish Rescue Plan shall include, at a minimum:

(a) a provision to notify the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NOAA Fisheries), Maine Department of Inland Fisheries and Wildlife (Maine DIFW), Maine Atlantic Salmon Commission (Maine ASC), Maine Department of Marine Resources (Maine DMR), and Maine Department of Environmental Protection (Maine DEP) at least 24 hours before drawdown of the impoundment to 1 foot below the dam crest for flashboard repair or replacement commences and within 24 hours of the completion of the repair or replacement activity;

(b) a provision to implement the shortnose sturgeon handling procedures and reporting requirements specified in Article 406 during fish rescue efforts;

(c) a provision to educate all handlers of shortnose sturgeon in the handling procedures specified in Article 406 and in sturgeon biology for the purpose of recognizing any injuries to rescued shortnose sturgeon; and

(d) an implementation schedule.

The licensee shall prepare the plan after consultation with the FWS, NOAA Fisheries, Maine DIFW, Maine ASC, Maine DMR, and Maine DEP. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after the plan has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and other entities to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 408. *Fish Lift Operation Plan*. By no later than February 1, 2006, the licensee shall file for Commission approval an Interim Fish Lift Operation Plan for the purposes of protecting shortnose sturgeon and sorting exotic species caught in the fish lift.

The plan shall include, at a minimum:

(a) a description of how and when the fish lift would be operated, including daily lift cycles; routine maintenance procedures, sorting protocols for exotic species, and periods of operation;

(b) a provision to educate all fish lift personnel in the handling procedures specified in Article 406 and in sturgeon biology for the purpose of recognizing any injuries to captured shortnose sturgeon; and

(c) an implementation schedule.

The licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Maine Department of Inland Fisheries and Wildlife, Maine Atlantic Salmon Commission, Maine Department of Marine Resources, and Maine Department of Environmental Protection. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after the plan has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and other entities to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 409. *American Eel Passage Plan*. Within six months of license issuance, the licensee shall file for Commission approval a plan for completing American eel upstream and downstream passage studies specified by Conditions 3.A and 3.B of Appendix A.

The plan shall include, at a minimum:

(a) documentation of already completed American eel upstream and downstream passage studies that fulfill the requirements of Conditions 3.A and 3.B of Appendix A;

(b) copies of any results of studies identified in item (a) that have not been previously filed with the Commission;

(c) a description of the study methodology for collecting all outstanding study data, including, but not necessarily limited to, study dates, study locations, sampling gears, and data recordation procedures;

(d) if there are any outstanding studies, a provision and schedule for filing for Commission approval a report that includes: (i) results of all outstanding studies, (ii) any proposals for the placement of upstream fish passage for American eel at the project dam, and downstream fish passage measures for American eel at the project; (iii) comments or recommendations on the report from the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NOAA Fisheries), Maine Department of Inland Fisheries and Wildlife (Maine DIFW), Maine Atlantic Salmon Commission (Maine ASC), Maine Department of Marine Resources (Maine DMR), and Maine Department of Environmental Protection (Maine DEP) after the agencies have been allowed a minimum of 30 days to provide comments or recommendations (include documentation of consultation); (iv) specific descriptions of how the agencies' comments are accommodated by the report; and (v) if the licensee does not adopt a recommendation, the licensee's reasons based on project-specific information; and

(e) if there are no outstanding studies, then a description of any proposals for the placement of upstream fish passage for American eel at the project dam and downstream fish passage measures for American eel at the project; and

(f) an implementation schedule.

The licensee shall prepare the plan after consultation with the FWS, NOAA Fisheries, Maine DIFW, Maine ASC, Maine DMR, and Maine DEP. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after the plan has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

If the results of the American eel passage studies indicate that changes in project structures or operations are necessary to protect American eel, the Commission may direct the licensee to modify project structures or operations.

Article 410. *American Eel Passage.* Consistent with the 1998 Lower Kennebec River Comprehensive Settlement Accord, Exhibit B, section III.G.3, the licensee shall provide an upstream eel passage facility and downstream eel passage measures as may be ordered by the Commission upon its own motion or upon recommendations by Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, or U.S. Fish and Wildlife Service for a specific location to provide an upstream eel passage facility or specific downstream eel passage measures, after notice and opportunity for hearing.

Article 411. *Bald Eagle Management Plan*. Within one year of license issuance, the licensee shall file for Commission approval a bald eagle management plan consistent with the conditions specified in the U.S. Fish and Wildlife Service's concurrence letter filed on June 3, 2004:

The plan shall be developed in consultation with U.S. Fish and Wildlife Service, Maine Department of Inland Fisheries and Wildlife, and abutting land owners (the City of Waterville, the State of Maine Department of Transportation, and Maine Central Railroad/Guild for Transportation) to the extent they wish to be involved.

The licensee shall include, with the plan, documentation of consultation, copies of comments and recommendations on the completed plan after it was prepared and provided to the consulted parties, and specific descriptions of how the consulted parties' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the consulted parties to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on site-specific conditions.

The Commission reserves the right to require changes to the bald eagle management plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 412. *Cultural Resources Management Plan.* The licensee, before starting any land-clearing or land-disturbing activities within the project boundaries, , including recreation developments at the project, shall consult with the State Historic Preservation Officer (SHPO). Construction of the interim fishways is excluded from this requirement

because they have been considered in this license.

If the licensee discovers previously unidentified archeological or historic properties during the course of constructing or developing project works or other facilities at the project, the licensee shall stop all land-clearing and land-disturbing activities in the vicinity of the properties and consult with the SHPO.

In either instance, the licensee shall file for Commission approval a cultural resource management plan (plan) prepared by a qualified cultural resource specialist after having consulted with the SHPO. The plan shall include the following items: (1) a description of each discovered property indicating whether it is listed on or eligible to be listed on the National Register of Historic Places; (2) a description of the potential effect on each discovered property; (3) proposed measures for avoiding or mitigating effects; (4) documentation of the nature and extent of consultation; and (5) a schedule for mitigating effects and conducting additional studies. The Commission may require changes to the plan.

The licensee shall not begin land-clearing or land-disturbing activities, other than those specifically authorized in this license, or resume such activities in the vicinity of a property, discovered during construction, until informed that the requirements of this article have been fulfilled.

Article 413. *Use and Occupancy of Project Lands and Waters*. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies, for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality

certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Energy Projects, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to

ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(G) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(H) The motion to intervene filed by Friends of the Kennebec Salmon in this proceeding is granted.

(I) This order is final unless a request for rehearing is filed within 30 days of the date of its issuance, as provided in section 313 of the FPA. The filing of a request for rehearing does not operate as a stay of the effective date of this license or of any other

date specified in this order, except as specifically ordered by the Commission. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

By the Commission.

(S E A L)

Linda Mitry,
Deputy Secretary.

APPENDIX A
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER QUALITY CERTIFICATION CONDITIONS FOR THE LOCKWOOD PROJECT

THEREFORE, the Department APPROVES the application of MERIMIL LIMITED PARTNERSHIP and GRANTS CERTIFICATION that there is a reasonable assurance that the continued operation of the LOCKWOOD PROJECT, as described above, will not violate applicable water quality standards, SUBJECT TO THE FOLLOWING CONDITIONS:

1. WATER LEVELS AND FLOWS

A. Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, or (3) emergency electrical system conditions, as defined below, or (4) agreement between the applicant and appropriate State and/or federal agencies, beginning within 60 days of FERC approval of the flow and water level monitoring plan described in Condition 1.E. below, or upon such other schedule as established by FERC, the Lockwood Project shall be operated in a run-of-river mode, with outflow approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement, and impoundment level fluctuations minimized. During normal run-of-river operation when all flashboards are in place, the headpond level will be maintained within six inches of full pond elevation 52.16 feet msl (top of flashboards). During times of flashboard failure applicant will maintain water levels above the spillway crest. During those times when flashboards are being replaced, the applicant will maintain water levels within one foot of the spillway crest.

B. Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, or (3) emergency electrical system conditions, as defined below, or (4) agreement between the applicant and appropriate State and/or federal agencies, full pond minimum leakage flows of 30 to 50 cfs to the bypass reach shall be maintained. The applicant shall conduct an annual independent engineering inspection/flow gaging to ensure a minimum leakage flow of 30 to 50 cfs, for both six inches below the top of the flashboards and at full pond, and submit a report to DEP by July 15, on the results of the inspection. If flows are calculated to be less than 50 cfs at full pond, applicant shall state the actions that have been taken to restore 50 cfs at full pond and the results achieved.

C. "Extreme Hydrologic Conditions" means the occurrence of events beyond the Licensee's control, such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions or other hydrologic conditions such that the operational restrictions and requirements contained herein are impossible to achieve or are inconsistent with the safe operation of the project.

D. "Emergency Electrical System Conditions" means operating emergencies beyond Licensee's control which require changes in flow regimes to eliminate such emergencies which may in some circumstances include but are not limited to equipment failure or other abnormal temporary operating condition, generating unit operation or third-party mandated interruptions under power supply emergencies; and orders from local, state or federal law enforcement or public safety authorities.

E. The applicant shall, within 6 months of issuance of a New License for the project by FERC or upon such other schedule as established by FERC, submit plans for providing and monitoring the water levels and flows required by this condition. These plans shall be developed in consultation with U.S. Fish and Wildlife Service (USFWS), Maine Department of Inland Fisheries and Wildlife (MDIFW), Maine Atlantic Salmon Commission (MASC), Maine Department of Marine Resources (MDMR) and DEP. These plans shall be reviewed by and must receive the approval of the DEP Bureau of Land and Water Quality.

2. FISH RESCUE PLAN

A. The applicant shall continue fish rescue efforts in the spillway during flashboard replacement and impoundment drawdown, with identification, enumeration, and return of all fish to pools at the base of Ticonic Falls. The applicant shall notify fisheries agencies prior to drawdown of the impoundment to 1 foot below the dam crest for flashboard replacement.

B. Prior to the initiation of impoundment drawdowns for flashboard maintenance, the applicant shall, in consultation with the U.S. Fish and Wildlife Service (USFWS), Maine Department of Inland Fisheries and Wildlife (MDIFW), Maine Atlantic Salmon Commission (MASC), Maine Department of Marine Resources (MDMR) and DEP develop a plan to continue fish rescue operations in accordance with Part A of this condition. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land and Water Quality prior to impoundment drawdown.

3. FISH PASSAGE

A. FISHERIES RESTORATION SUPPORT

The applicant shall provide funding, conduct studies, engage in consultation, install fish passage facilities, report on annual restoration activities, and comply with all additional duties and obligations as set forth in the Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the US Fish and Wildlife Service ("KHDG Settlement Agreement"), dated May 26, 1998.

B. EEL PASSAGE

(1) Study. The applicant shall, in consultation with the National Marine Fisheries Service and the US Fish and Wildlife Service, join other KHDG members and the Department of Marine Resources in undertaking a three-year research project to determine (a) the appropriate placement of upstream fish passage for American eel at each of the seven KHDG member-owned dams, and (b) appropriate downstream fish passage measures for American eel at each KHDG member-owned project.

(2) Consultation. Based on the results of the eel passage study and beginning no later than January 1, 2002 and ending no later than June 30, 2002, the applicant shall join other KHDG members in consulting with NMFS, USFWS, and DMR to attempt to reach agreement on the appropriate location of upstream-eel-passage at each KHDG member-owned dam, and the appropriate downstream eel passage measures to apply to each KHDG member-owned project.

(3) Upstream Passage. If agreement is reached by all consulting parties on the location of upstream eel passage at each project, the applicant shall install such passage facilities at the Lockwood Project during 2002.

(4) Downstream Passage. If agreement is reached by all consulting parties on appropriate downstream eel passage measures, the applicant shall join the other parties in requesting that FERC approve the agreed-to passage measures.

(5) Lack of Consensus. If no consensus is reached on eel passage issues by June 30, 2002, the applicant or any of the consulting parties shall be free to petition DEP or FERC to approve appropriate conditions relating to eel passage at the project.

(6) Lack of Funding. In the event that DMR does not receive the necessary appropriation or legislative spending authorization required to fund the eel passage study discussed above, all provisions of this condition regarding eel passage shall be null and void.

C. INTERIM UPSTREAM FISH PASSAGE

The applicant shall install an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Lockwood Project powerhouse, to be operational by May 1, 2006. This interim passage facility shall include video monitoring or other mechanisms to allow assessment of the effectiveness of the facility in trapping all species that seek passage, and shall be designed to empty into a trap and truck collection facility with adequate holding capacity.

D. INTERIM DOWNSTREAM FISH PASSAGE

The applicant shall continue and where needed improve existing interim operational measures to diminish entrainment, allow downstream passage, and eliminate significant injury or mortality to out-migrating anadromous fish, in accordance with the terms of the KHDG Settlement Agreement.

E. PERMANENT UPSTREAM FISH PASSAGE

(1) Installation and operation. Permanent upstream fish passage facilities shall be installed and operational at the project no later than 2 years following (a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, and transfer facility at the Lockwood powerhouse or (b) development of an alternate trigger for fishway installation based on the biological assessment process for Atlantic salmon, alewife and blueback herring described below, whichever comes first, provided, however, that in no event shall permanent upstream fish passage facilities be required to be operational at the project before May 1, 2010.

(2) Biological assessment process. State and federal fisheries agencies will continue to assess the status and growth of the populations of shad and other anadromous fish in the Kennebec River drainage. Should the growth of Atlantic salmon, alewife or blueback herring spawning runs make it necessary to adopt an alternative approach for triggering fishway installation to the shad trigger used above, the agencies will meet with the applicant to attempt to reach consensus on the need for and timing and design of permanent upstream fish passage facilities at the project. Any disputes on the need for an alternate trigger for fishway installation will be handled through the FERC process.

F. PERMANENT DOWNSTREAM FISH PASSAGE

Permanent downstream fish passage facilities shall be installed and operational at the project no later than the date on which permanent upstream fish passage facilities are operational at the project as required by this approval.

G. FISH PASSAGE FACILITIES PLANS

The applicant shall, in accordance with the schedule(s) established by FERC, submit final design and operational plans for all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, prepared in consultation with state and federal fisheries agencies. These plans shall be reviewed by and must receive approval of the fisheries agencies, the DEP, and FERC prior to construction.

H. FISH PASSAGE EFFECTIVENESS STUDIES AND RESULTS

(1) Studies. The applicant shall, in consultation with state and federal fisheries agencies, conduct a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, in accordance with the terms of the KHDG Settlement Agreement.

(2) Study plans. The applicant shall, in accordance with the schedule(s) established by FERC, submit plans for a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, prepared in consultation with state and federal fisheries agencies. These plans shall be reviewed by and must receive approval of the fisheries agencies, the DEP, and FERC prior to implementation.

(3) Results of studies. The applicant shall, in accordance with the schedule(s) established by FERC, submit the results of any fish passage effectiveness study or studies, along with any recommendations for changes in the design and/or operation of any interim or permanent upstream or downstream fish passage facilities constructed and/or operated pursuant to this approval. The Department reserves the right, after notice and opportunity for hearing, to require reasonable changes in the design and/or operation of these fish passage facilities as may be deemed necessary to adequately pass anadromous fish through the project site. Any such changes must be approved by FERC prior to implementation.

4. RECREATIONAL FACILITIES

The applicant shall maintain the existing shoreline angler access site in the project's lower tailwater area.

5. LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to review and approval of the DEP prior to implementation.

6. COMPLIANCE WITH ALL APPLICABLE LAWS

The applicant shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements and orders required for the operation of the project in accordance with the terms of this certification.

7. EFFECTIVE DATE

This water quality certification shall be effective concurrent with the effective date of the New License issued for the project by the Federal Energy Regulatory Commission.

APPENDIX B

EXHIBIT B

AGREEMENT BETWEEN MEMBERS OF THE KENNEBEC HYDRO DEVELOPMENT GROUP, THE KENNEBEC COALITION, THE NATIONAL MARINE FISHERIES SERVICE, THE STATE OF MAINE AND THE U.S. FISH AND WILDLIFE SERVICE (1998 Accord)

TERMS AND CONDITIONS PERTAINING TO THE LOCKWOOD PROJECT

The following terms and conditions exerpted from the 1998 Accord signed on May 26, 1998 pertain to the Lockwood Project and are included in this license for reference purposes.

II. Purposes.

This Agreement is intended to accomplish the following purposes: to achieve a comprehensive settlement governing fisheries restoration, for numerous anadromous and catandromous species, that will rapidly assist in the restoration of these species in the Kennebec River after the termination on December 31, 1998 of the existing agreement between the State of Maine and the Kennebec Hydro Developers Group; to avoid extensive litigation over fish passage methodologies, timetables and funding; to assist in achieving the removal of the Edwards dam; and to fund the next phase of a restoration program for these species on the Kennebec River.

III. Elements that apply to all parts of this agreement:

D. Term of Agreement

If by December 2014 the biological triggers for permanent upstream passage facilities discussed herein have not been met at one or more of the dams covered by this agreement, the parties will meet to assess the progress in restoring species covered by this agreement (alewife, American shad, blueback herring, Atlantic salmon, and American eel), and will attempt to reach consensus on future fish passage measures. Any disputes will be handled through the FERC process.

E. Consultation Process

The functional and final design of any interim or permanent upstream or downstream fish passage or collection facility discussed herein must be approved in writing by the resource agencies prior to filing that design with

the Federal Energy Regulatory Commission and Maine Department of Environmental Protection. Any disputes will be handled through the FERC process.

F. Effectiveness studies

KHDG dam owners will conduct effectiveness studies of all newly constructed interim and permanent upstream and downstream fish passage facilities at project sites. Study plans for these effectiveness studies will be filed with FERC and Maine DEP no later than the date on which passage at a particular project becomes operational, and will be subject to a consultation process with, and written approval from the resource agencies. In the event that effectiveness studies show that passage at individual projects is less than the targeted passage efficiency goals, KHDG dam owners will make a good faith effort to achieve these goals through modification of facilities and/or operations, following consultation with the resource agencies. In the event that studies show that, subsequent to said modifications, passage at individual projects continues to be less than the targeted efficiency goals, resource agencies may seek continued funding for trap and truck or other programs, or other mitigation from KHDG dam owners. Any disputes will be handled through the FERC process.

G. For American eel at all projects:

1. KHDG dam owners and DMR, in consultation with NMFS and USFWS, and subject to approval by FERC, shall undertake a three-year research project designed to determine: (a) the appropriate placement of upstream passage for American eel at each of the seven KHDG facilities based upon field observations of were eel are passing or attempting to pass upstream at each facility; and (b) appropriate permanent downstream fish passage measures, based upon radio telemetry and other tracking mechanisms, and field observation. Consultation between KHDG and the resource agencies to design and coordinate the research project shall begin no later than June 1, 1998. Performance of the studies shall begin during the 1998 migration season if possible, but in no case later than the 1999 migration season. The studies shall be in effect for three complete migration seasons, and shall be completed, including data compilation and analysis, by December 31, 2001.

2. The studies shall be supervised by DMR, based upon objectives and methods agreed to by KHDG and the resource agencies and subject to approval by FERC. The studies shall cost no more than $427,000, and shall be paid for by DMR.

3. Based on the results of these studies and beginning no later than January 1, 2002, and ending no later than June 30, 2002, KHDG dam owners and the resource agencies shall engage in consultation to attempt to reach agreement on the appropriate location of upstream eel passage at each facility, and the appropriate permanent downstream passage measure to apply to each facility.

   a. Upstream passage. KHDG dam owners agree that, if agreement is reached on the location of upstream eel passage at each facility, KHDG dam owners will install said passage at each facility during 2002. The cost to KHDG dam owners of materials for each upstream eel passage facility shall not exceed $10,000 and the total cost of materials to KHDG dam owners per dam shall not exceed $20,000, in the event that construction of more than one upstream passage facility is required per dam. The parties shall jointly request FERC to amend licenses and insert the agreed-upon terms and conditions for upstream eel passage.

   b. Downstream passage. If agreement is reached at consultation on the appropriate downstream passage measures, the parties shall jointly request FERC to amend licenses and insert the agreed-upon terms and condition for downstream eel passage.

   If consensus is not reached on either upstream passage location or downstream passage measures by June 30, 2002, any party shall be free to petition FERC to amend any license to insert appropriate terms and conditions.

4. In the event that, during the course of the eel tracking studies, it is revealed that certain interim downstream measures are needed to avoid significant downstream turbine injury and/or mortality (immediate or delayed) at a particular site, KHDG dam owners will consult with the resource agencies and agree to undertake cost-effective measures designed to minimize mortality at that site.

5. In the event that DMR does not receive the necessary appropriation or legislative spending authorization required to fund the studies discussed in paragraph III.G.1. & 2. above, the provisions in this Agreement governing American eel, found in paragraphs III.G.1 through III.G.4, are null and void, but all other provisions of this Agreement remain in full force and effect. In the event that paragraphs III.G.1 through III.G.4 become null and void, any party may petition FERC to amend any license regarding upstream and downstream passage of eel.

H. Reporting

Continuous progress assessments will be undertaken through annual reports which will be filed with FERC by KHDG dam owners, consistent with current practice by KHDG dam owners.

I. Successors, Assignees or Purchasers; notification

KHDG dam owners agree that the terms and conditions contained in this Agreement shall bind and insure to the benefit of all entities that might become successors, assignees or purchasers of any Licensee. Each KHDG dam owner agrees to provide notice of the existence of this Agreement, and a copy thereof, to any prospective buyer of its hydropower facility.

IV. Terms and conditions for specific projects:

A. BIOLOGICAL ASSESSMENT PROCESS FOR LOCKWOOD, UAH-HYDRO KENNEBEC, SHAWMUT AND WESTON

The schedule described herein for installing permanent upstream fishways at Lockwood, UAH-Hydro Kennebec, Shawmut and Weston projects is based primarily on the anticipated growth in the population of American shad in the Kennebec River. However, the State of Maine's goal is to restore anadromous species (with the exception of lamprey) to their historic range. This means restoring other anadromous species above Lockwood, UAH-Hydro Kennebec, Shawmut and Weston including Atlantic salmon, alewife, and blueback herring. The resource agencies will continue to assess the status and growth of the population of shad and other anadromous fish populations in the Kennebec River, as is being done of the Saco River and elsewhere in Maine. Should the growth of salmon or river herring runs make it necessary to adopt an alternative approach for triggering fishway installation (i.e., one not based on the project

specific, biologically-based trigger number for shad), the resource agencies will meet with the Licensee(s) to attempt to reach consensus on the need, timing and design of permanent upstream fish passage facilities at the Lockwood, Hydro-Kennebec, Shawmut and Weston projects. Disputes will be handled through the FERC process.

B. LOCKWOOD AND UAH-HYDRO KENNEBEC

1. Interim upstream fish lift.

At the Lockwood facility, Licensee shall install an interim trap, lift, and transfer facility for American shad, river herring, and Atlantic salmon at the powerhouse, to be operational by May 1, 2006. Licensee recognizes and acknowledges that the success of the resource agencies' and Kennebec coalition's efforts to restore shad, and to begin the restoration of Atlantic salmon to the Kennebec River Basin and achieve established fisheries management goals is dependent upon: (a) the State's ability to collect sufficient quantities of healthy shad brood stock from the Sebasticook River at the Fort Halifax dam, and from the Kennebec River at the Lockwood dam to use in DMR's Waldoboro hatchery and for stocking in upstream waters: and (b) the resource agencies' and other interested organizations' ability to collect available brook stock of Atlantic salmon from the Sebasticook River at the Fort Halifax dam, and from the Kennebec River at the Lockwood dam, to initiate a Kennebec River salmon hatchery operation. Licensee further recognizes and acknowledges that, assuming the prior removal of the Edwards dam, installation of an interim fish lift at the Lockwood dam in 2006 is needed, and Licensee will not seek to eliminate or defer this installation requirement before FERC or other regulatory bodies.

A part of the interim passage design and construction would include mechanisms (e.g., video monitoring) to allow operators and resource agencies to assess the effectiveness of the interim facility in trapping all species that seek passage. The interim lift shall be designed to empty into a trap and truck collection facility with adequate capacity for "holding" large quantities of fish, and not designed to discharge into the canal area.

In the event that the Edwards Dam has not been removed by May 1, 2006, any party to this Agreement retains the right to petition FERC to establish a new date for installation of an interim trap, lift, and

transfer facility at Lockwood for American shad, Atlantic salmon and river herring. It is understood that this ability to petition for a new date in the event that Edwards has not been removed applies only to the installation of interim fish passage at Lockwood, and permanent fish passage at Fort Halifax, as specified at paragraph IV.E.1.d.2. herein.

2. Permanent upstream passage.

Permanent upstream passage at Lockwood and UAH-Hydro Kennebec shall be operational 2 years following the earlier to occur of either of the following biological triggers. In no event shall permanent upstream fish passage be required to be operational before May 1, 2010.

a. 8000 American shad in any single season captured at the interim trap, lift, and sort facility at Lockwood; or

b. a biological assessment trigger initiated for Atlantic salmon, alewife or blueback herring, as described in IV-A above.

3. Downstream passage at Lockwood.

a. Interim passage beginning upon the effective date of this Agreement:

(1) Generally. Licensee will continue and where needed improve existing interim operational measures (e.g. controlled spills, temporary turbine shutdowns, sluiceways), to diminish entrainment, allow downstream passage of out-migrating alewife, Atlantic salmon, blueback herring and American shad, and eliminate significant injury or mortality (immediate or delayed) to out-migrating species. Licensee agrees to consult with state and federal agencies to develop an approved plan for interim downstream passage facilities and/or operational measures to minimize impacts on downstream migrating fish, with evaluation based on qualitative observations.

(2) Passage through turbines. Licensee and the resource agencies agree that fish passage by means of sluiceways and/or controlled spills are the first and preferred approach to interim downstream fish passage at Lockwood. In the event that fish passage using these methods is not successful[48], and to the extent that Licensee desires to achieve or continue interim downstream passage of out-migrating alewife, and/or juvenile Atlantic salmon or shad by means of passage through turbine(s), Licensee must demonstrate, through site-specific qualitative studies designed and conducted in consultation with the resource agencies, that passage through turbine(s) will not result in significant injury and/or mortality (immediate or delayed). If, after three years of such studies, the resource agencies, based on good cause shown, do not believe that the qualitative studies conclusively demonstrate that turbine passage is not resulting in significant injury and/or mortality, and Licensee desires to achieve interim downstream passage of these species through turbine(s), Licensee must demonstrate through site-specific quantitative studies that turbine passage will not result in significant injury and/or mortality (immediate or delayed). The quantitative studies shall be designed and conducted in consultation with the resource agencies.

In the event that adult shad and/or adult Atlantic salmon begin to inhabit the impoundment above the Lockwood Project, and to the extent that Licensee desires to achieve interim downstream passage of out-migrating adult Atlantic salmon

[48] Construction of new diversionary structures to achieve success is not required by this Agreement.

and/or adult shad by means of passage through turbine(s), Licensee must first demonstrate, through site-specific quantitative studies designed and conducted in consultation with the resource agencies, that passage through turbine(s) will not result in significant injury and/or mortality (immediate or delayed). In no event shall Licensee be required to make this quantitative demonstration for adult shad and adult Atlantic salmon before May 1, 2006.

Licensee shall conduct studies (designed in consultation with the resource agencies) prior to the date by which permanent downstream passage facilities are to be operational to determine the effectiveness of various downstream passage techniques in preparation for the design and installation of permanent downstream facilities.

b. Permanent passage: Permanent downstream facilities will be operational on the date that permanent upstream passage is operational. Licensee will be permitted to install permanent downstream passage at an earlier date if it so chooses.

Appendix C
Shortnose Sturgeon Handling Plan for the Lockwood Project
This plan may be updated annually as appropriate

The Lockwood Project (Project) is a run-of-river facility located on the Kennebec River at river mile 63 in Waterville and Winslow, Maine. The Project is licensed by the Federal Energy Regulatory Commission to Merimil Limited Partnership. FPL Energy Maine Hydro LLC (FPLE Maine) is the general partner for Merimil Limited Partnership and is responsible for operating the Project.

This plan addresses how shortnose sturgeon found at the Lockwood Project dam will be handled and how this handling will be documented. Shortnose sturgeon may be encountered by personnel during fish lift operations, and in the event of stranding during flashboard replacement or other operations causing no-spill or no-leakage conditions. Procedures for handling fish and documenting these interactions are outlined below. All contact information and the appropriate reporting form follow these procedures. All personnel counting fish at the fish lift counting windows and louver bypass fish sampler will be trained to properly handle shortnose sturgeon by NOAA Fisheries or a NOAA Fisheries designated representative.

Fish Lift Operations

Due to concerns regarding the safety of downstream passage for shortnose sturgeon and the fact that Ticonic Falls represents that historic limit of upstream migration for shortnose sturgeon, shortnose sturgeon are not to be allowed to pass above the dam. Should any shortnose sturgeon be found in the fish lift, the licensee shall implement the procedures and reporting requirements outlined below.

1. For each shortnose sturgeon detected, the licensee shall record the weight, length, and condition of the fish. River flow, bypass reach minimum flow, and water temperature will be recorded. All relevant information will be recorded on the reporting sheet (*shortnose sturgeon REPORTING SHEET FOR THE LOCKWOOD PROJECT*, a copy of which is attached hereto).

2. The licensee shall follow the contact procedure outlined below to obtain a contact with the appropriate ESA permit/approval for handling shortnose sturgeon.

3. If alive and uninjured, the shortnose sturgeon will be immediately returned downstream. A long-handled net will be used to place the shortnose sturgeon back into the river downstream of the dam.

4. If any injured shortnose sturgeon are found, the licensee shall report immediately to NOAA Fisheries (see contact information below). Injured fish must be photographed and measured and the reporting sheet must be submitted to NOAA Fisheries within 24 hours. If the fish is badly injured, the fish should be retained by the licensee, if possible, until obtained by a NOAA Fisheries recommended facility for potential rehabilitation.

5. If any dead shortnose sturgeon are found, the licensee must report immediately to NOAA Fisheries (see contact information below). Any dead specimens or body parts should be photographed, measured and preserved (i.e., refrigerated) by the licensee until they can be obtained by NOAA Fisheries for analysis.

Shortnose Sturgeon Stranding

The potential exists for shortnose sturgeon to be stranded in pools below the Dam whenever the flashboards are replaced or other operations cause no-spill or no-leakage conditions. If this situation occurs, these pools need to be checked as soon as possible for the presence of shortnose sturgeon and the following protocol shall be followed:

1. Designated FPLE Maine employees and fish lift operation staff must monitor the pools below the Dam while the flashboards are replaced.

2. The licensee shall follow the contact procedure outlined below to obtain a contact with the appropriate ESA permit/approval for handling shortnose sturgeon.

3. For each fish removed from the pool, the licensee shall record the weight, length, and condition. River flow, bypass reach minimum flow, and water temperature will be recorded. All relevant information will be recorded on the reporting sheet (*shortnose sturgeon REPORTING SHEET FOR THE LOCKWOOD PROJECT*, see attached).

4. If stranded but alive and uninjured, the shortnose sturgeon will be moved to the river below the Ticonic Falls that will provide egress out of the area.

5. If any injured shortnose sturgeon are found, the licensee shall report immediately to NOAA Fisheries (see contact information below). Injured fish must be photographed and measured, if possible, and the reporting sheet must be submitted to NOAA Fisheries within 24 hours. If the fish is badly injured, the fish should be retained by the licensee, if possible, until obtained by a NOAA Fisheries recommended facility for potential rehabilitation.

6. The licensee shall report any dead fish immediately to NOAA Fisheries (see contact information below). Any dead specimens or body parts should be photographed, measured and preserved by the licensee until they can be obtained by NOAA Fisheries for analysis.

7. Contact Mike Hoover (FPLE Maine 207-623-8415 Kirk Toth (FPLE Maine 207-474-3921 x11); Bob Richter (FPLE Maine 207-795-1342 x243).

Contact information:

- If any shortnose sturgeon are detected – Mike Hoover (FPLE Maine 207-623-8415); Kirk Toth (FPLE Maine 207-474-3921 x11) Bob Richter (FPLE Maine 207-795-1342 x243).

- If unavailable, contact - Tom Squires (Maine Department of Marine Resources (207) 624-6348

- Within 24 hours of any stranding event, contact with an injured or dead shortnose sturgeon, or detection of a shortnose sturgeon in the fish lift: contact NOAA Fisheries Northeast Regional Office –Julie Crocker (978-281-9328 x6530) or Pat Scida, (978-281-9208) and fax any reporting sheets to 978-281-9394. Messages should be left on voice mail or email (Julie.Crocker@noaa.gov) if unable to access by phone.

Reports at end of passage seasons

- At the end of the upstream and downstream passage seasons, copies of all reporting sheets will be sent to:

Endangered Species Coordinator
Protected Resource Division
NOAA Fisheries
One Blackburn Drive
Gloucester, MA 01930-2298

Bob Richter
FPL Energy Maine Hydro, LLC
150 Main Street
Lewiston, ME 04240

SHORTNOSE STURGEON REPORTING SHEET FOR THE LOCKWOOD PROJECT

Date:_____ Time:_____

Physical conditions
Is spill being released over the dam? YES NO
What is the approximate gaged river flow?_____ _____ (Ex. 45,000 cfs)
What is the approximate gaged minimum flow in the bypass reach?_____
Water temperature (^{o}C): _____

Is the fishway operating (circle) YES NO

Is project generating? YES NO

If yes, what units are currently being operating?

Location from where species was recovered (circle): FISHWAY / LIFT / BYPASS POOLS OTHER _____

If fish lift, estimate condition of lift: EMPTY / FEW FISH / MODERATE FULL / VERY FULL

Species information:
Total Length_____ Fork length:_____
Weight:_____
Condition of fish:
_____

Does the sturgeon have visible injuries or abrasions: YES NO
If Yes, circle and code area of abrasions on sturgeon diagram on back side of sheet.

Comments/other:
_____
_____
_____
_____
_____
_____
_____
_____

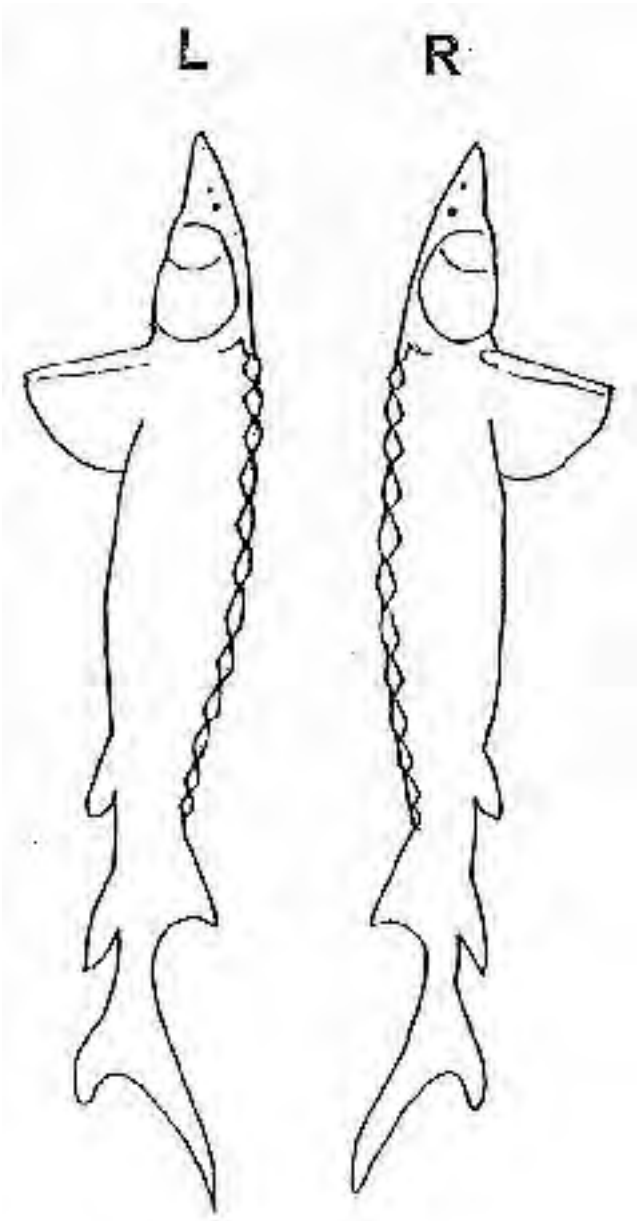
Name of watch observer:_____

Observer's Signature:_____

Abrasion Codes

None

Light	Whitening or smoothed scutes, Early sign of skin abrasion
Moderate	Early sign of redness on skin, scutes or fins, Erosion of skin over bony structures, Loss of skin pigment
Heavy	Large portion of skin red; scutes excessively worn, damaged, or missing; patches of skin missing; Boney structures exposed; flaccid musculature



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMENTS

August 27, 2004

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

RE: Application for New License
Lockwood Hydro Project
FERC No. 2574-032

Dear Secretary Salas:

This is in response to the Application for New License filed by Merimil Limited Partnership for the existing Lockwood Hydro Project, FERC No. 2574-032, located on the Kennebec River in the City of Waterville and town of Winslow, kennebec County, Maine.

The Maine Department of Environmental Protection has now issued Water Quality Certification for the proposed relicensing of the Lockwood Project. A copy of the Department Order granting this certification is attached.

In summary, the continued operation of the Lockwood Hydro Project has been certified as meeting applicable water quality standards, subject to the following special conditions:

1. Except as temporarily modified by specified conditions:

   A. The Lockwood Project shall be operated in a run-of-river mode, with outflow approximately equal to inflow on an instantaneous basis, and impoundment level fluctuations minimized to within six inches of full pond when all flashboards are in place and above spillway crest when flashboard failure has occurred.

B. Full pond minimum leakage flows of 30 to 50 cfs shall be maintained in the bypass reach below the project dam.

2. The applicant shall continue fish rescue efforts during flashboard replacement and impoundment drawdown, with identification, enumeration, and return of all fish to pools at the base of Ticonic Falls.

3. The applicant shall provide funding, conduct studies, engage in consultation, install fish passage facilities, report on annual restoration activities, and comply with all additional duties and obligations as set forth in the *Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries service, the State of Maine, and the US Fish and Wildlife Service,* dated May 26, 1998.

4. The applicant shall maintain the existing shoreline angler access site in the project's lower tailwater area.

5. Approval is limited to and includes the proposals and plans contained in the application and supporting documents, and any variances are subject to MDEP review and approval.

6. The applicant shall obtain and comply with all applicable federal, state and local licenses, permits, etc.

7. The certification shall be effective concurrent with the effective date of the license issued for the project by FERC.

We recommend that the foregoing conditions be included in the Articles of the license issued for the Lockwood Project, in compliance with the provisions of Sections 401(a) and (d) of the Clean Water Act.

By Executive Order of the Governor of the State of Maine, the terms and conditions in the attached Water Quality certification represent the State's official recommendations regarding the subject Application for License, superceding all preliminary recommendations by individual State agencies.

Please direct any questions regarding these comments to Dana Murch of the MDEP at 207-287-7784.

Sincerely,

/s/ Andrew C. Fisk
Andrew C. Fisk, Director
Bureau of Land & Water Quality

Attachment

cc: Michael Hoover, FPL Energy
Nick Bennett, NRCM
Jeff Reardon, TU
Greg Ponte, KVTU
John Burrows, ASF
Elizabeth Maclin, American Rivers
Steve Timpano, IF&W
Bill Woodward, IF&W-Region B
Keel Kemper, IF&W-Region B
Norm Dube, ASC
Gail Wipplehauser, DMR
Kathy Eickenberg, DOC-BP&L
Betsy Elder, SPO
Art Spiess, MHPC
David Miller, DEP
Leon Tsomides, DEP
Mark Margerum, DEP

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEPARTMENT ORDER

IN THE MATTER OF

MERIMIL LIMITED PARTNERSHIP	) MAINE WATER QUALITY PROGRAM;
Waterville and Winslow	) FEDERAL CLEAN WATER ACT
Kennebec County	)
LOCKWOOD HYDRO PROJECT	)
#L-20218-33-C-N (Approval)	) WATER QUALITY CERTIFICATION

Pursuant to the provisions of 38 MRSA Section 464 et seq. and Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act), the Department of Environmental Protection has considered the application of MERIMIL LIMITED PARTNERSHIP with its supportive data, agency comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

a. Application: Merimil Limited Partnership (Merimil) proposes the continued operation of the existing Lockwood Hydroelectric Project, located on the Kennebec River in the City of Waterville and Town of Winslow, Kennebec County, Maine (see Attachment A).

b. Existing Project Features: The existing project consists of a dam, a forebay headgate structure, two powerhouses, an impoundment and appurtenant structures (see Attachment B). The dam was originally constructed in 1868, and was improved to a concrete dam in 1913. The original powerhouse was built in 1919. The second powerhouse was completed in 1989.

i. The project structures include a concrete gravity dam with two spillway sections connected by a small island, a forebay headworks structure, a 450 foot long forebay canal, and two powerhouses with a total installed capacity of 6,915 kW and a hydraulic capacity of 5,660 cfs. The east spillway section is approximately 225 feet long and is topped by 15 inch high wooden flashboards. The crest of the flashboards is 52.16 feet (msl). The west spillway section is approximately 650 feet long, of which approximately 40 feet consists of a pier in the Rt. 201 bridge. The section of this spillway between the island and the bridge pier is topped by 15 inch high wooden flashboards with a crest of 52.16 feet. The section between the bridge pier and the forebay headworks currently has no flashboards and has a fixed crest elevation of 52.0 feet. The forebay headworks extends approximately 160 feet from the end of the western spillway section to the west bank of the river. The forebay canal is approximately 450 feet long.

ii. The original powerhouse measures approximately 170 feet long by 50 feet wide and contains six turbine/generator units with a total installed generating capacity of 4.8 megawatts. The unit 7 powerhouse measures approximately 31.5 feet by 52 feet and contains a single turbine generator unit with an installed generating capacity of 2.115 megawatts. The project has a gross head of 21 feet and a total hydraulic capacity of 5,660 cubic feet per second.

iii. The impoundment formed by the Lockwood Dam is approximately 1.2 miles long, with a surface area of 81.5 acres.

c. Existing Project Operation: The project is currently operated in a run-of-river mode. The project is automated to achieve run-of-river operation by passing inflow as it is received from the next upstream project (Hydro-Kennebec, FERC No. 2611). The project is owned by Merimil Limited Partnership, and operated by FPL Energy Maine Hydro LLC.

d. Proposed Facilities/Operation Modifications. Merimil proposes no modifications to the project, except those proposed in association with resource protection, enhancement and mitigation measures. The project will continue to be operated in a run-of-river mode, but with a minimum flow and restrictions on pond level fluctuation as described below.

e. Proposed Protection, Mitigation and Enhancement Measures. Merimil proposes the following project operational and non-operational measures for the protection or enhancement of, or mitigation of impacts on, public resources:

- maintain leakage flows of 30 to 50 cfs into the Ticonic Falls area downstream of the dam (the bypassed reach);
- conduct an annual independent engineering inspection/flow gaging to ensure a minimum leakage flow of 30 to 50 cfs, for both six inches below the top of the flashboards and at full pond, with a report to FERC by July 15, on the results of the inspection and actions taken to maintain the required flow;
- notify the fisheries agencies prior to drawdown of the reservoir to 1 foot below the dam crest for flashboard replacement;
- continue fish rescue efforts in the spillway during flashboard replacement, with identification, enumeration, and return of all fish to open water at the base of Ticonic Falls;
- continue the operation of the log/debris sluice as an interim downstream fish passage measure;
- install interim and permanent upstream and downstream fish passage facilities in accordance with the 1998 Accord to provide fish passage facilities in the Kennebec River Basin;
- protect existing wetlands and state-listed rare, threatened, or endangered plant species, through the continuation of run-of-river operations and maintenance of the leakage flows below the dam; and
- maintain the existing shoreline angler access site in the project's lower tailwater area.

2. PROCEDURAL HISTORY

a. Original Approval. By Order #L-10121-35-A-N dated July 25, 1984, the Board of Environmental Protection approved a Maine Waterway Development and Conservation Act Permit and Water Quality Certification for the proposed redevelopment of and amendment of license for the existing Lockwood Hydro Project.

b. First Fish Passage Modification. The applicant then proposed to modify the fish passage conditions of the DEP permit/certification and FERC license for the Lockwood Project to be consistent with the terms of the 1986 KHDG Agreement. By Order #L-10121-35-E-M dated February 24, 1988, the Board modified the terms of its original approval for the Lockwood Project to be consistent with the 1986 KHDG Agreement.

c. Second Fish Passage Modification. The applicant subsequently proposed to modify the fish passage conditions of the DEP permit/certification and FERC license for the Lockwood Project to be consistent with the terms of the May 26, 1998 Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the US Fish and Wildlife Service ("KHDG Settlement Agreement"). By Order #L-10121-35-G-M dated July 31, 1998, the Department modified the terms of its original approval for the Lockwood Project to be consistent with the 1998 KHDG Agreement.

2. JURISDICTION

a. Water Quality Certification. The proposed continued operation of the project qualifies as an "activity…which may result in (a) discharge into the navigable water (of the United States)" pursuant to the Clean Water Act (CWA), 33 USC 1251 et seq. Section 401 of the CWA requires that any applicant for a federal license or permit to conduct such an activity obtain a certification that the activity will comply with applicable State water quality standards.

This project was originally licensed by the Federal Power Commission (now FERC) in 1969. In 1985, FERC approved an amendment to the original license (FERC No. 2574) to increase the installed capacity from 4,800 kW to 6,915 kW and build a new powerhouse. The amendment included an extension of the term of the license to April 30, 2004. FPL Energy Maine Hydro LLC, on behalf of Merimil Limited Partnership, filed a new license application for the project with FERC on April 29, 2002.

The Department of Environmental Protection has been designated by the Governor of the State as the certifying agency for issuance of Section 401 water quality certification for all activities in the state not subject to Land Use Regulation Commission permitting and review. The Lockwood Project is located in organized municipalities that are not subject to LURC's regulatory jurisdiction. Therefore, the DEP is the certifying agency for the project.

b. Terms and Conditions. Section 401(d) of the CWA provides that a water quality certification shall set forth any limitations necessary to assure that an applicant for a federal license or permit will comply with any appropriate requirement of state law, and that such limitations shall become a condition on the federal license or permit issued for the activity.

3. APPLICABLE WATER QUALITY STANDARDS

a. Classification: The waters of the Kennebec River affected by the Lockwood Project are currently classified as follows: Kennebec River, from the Fairfield-Skowhegan boundary to its confluence with Messalonskee Stream, including all impoundments – Class C. 38 MRSA § 467(4)(A)(10).

b. Designated Uses: Class C waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation and navigation; and as a habitat for fish and other aquatic life. 38 M.R.S.A. § 465(4)(A).

c. Numeric Standards: The dissolved oxygen content of Class C waters may be not less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes must be maintained. 38 MRSA Section 465(4)(B).

d. Narrative Standards: Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community. 38 M.R.S.A. § 465(4)(C).

e. Antidegradation: The Department may only approve water quality certification if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve water quality certification for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S.A. § 464(4)(F).

4. DISSOLVED OXYGEN

a. Existing Conditions. The drainage area of the Kennebec River basin at the Lockwood Project is approximately 4,228 square miles. Inflow to the project consists of the regulated river flow released by upstream storage projects plus inflow from the contributing drainage area. The basin above the project ranges from rural and forested unorganized townships, through sparsely populated rural areas, agricultural development, and smaller industrial communities and cities. There are five municipal and industrial wastewater discharges in the watershed above the project.

b. Water Quality Data. The applicant conducted ambient water quality sampling in the Lockwood Project waters during August, 2000, and July –August, 2001, in accordance with the DEP's River Sampling Protocol. Temperature, Dissolved Oxygen, and Chlorophyll "a" were monitored at one location in the Lockwood impoundment and two locations in the Lockwood tailwater in the summer of 2000. Temperature and Dissolved Oxygen were monitored in seven locations in the Ticonic Falls ledge pools in the summer of 2001. The results of this survey indicate that the Lockwood Project waters attain Maine's dissolved oxygen standard for Class C waters under critical water quality conditions. These results are consistent with DEP sampling conducted in 1997 and 1998.

c. Applicant's Proposals. The applicant proposes to continue the operation of the Lockwood Project in a run-of-river mode with enhancements including a minimum flow for the bypass reach [see Section 1(e) above].

d. Discussion. The Department finds that the applicant's proposals will be adequate to ensure that the project continues to meet applicable dissolved oxygen standards.

5. AQUATIC HABITAT

a. Existing Conditions. The applicant operates the Lockwood Project in a run-of-river mode. The project is operated to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any given time, flows immediately below the project approximate the sum of inflows to the project reservoir. Seasonal and year-to-year variations in river flows are controlled through upstream storage in the basin at the Flagstaff, Brassua, and Moosehead Projects. Daily upstream peaking operations are re-regulated at the Williams Project, upstream of the Lockwood Project, so that inflows to the project area are relatively steady.

The Lockwood Project has an approximately 1,200 foot long bypass reach that is bordered on the west shore by the project's forebay, and on the east shore by a steep sided shoreline. The lower bypass reach is permanently backwatered by project generation flows. The upper bypass is known as the Ticonic Falls, which consists mostly of ledge and is wetted by spillage when river flows exceed 4,500 cfs. Such spillage occurs about 70% of the time annually, and 50% of the time during the July through September period.

b. Studies. The applicant has conducted studies to evaluate aquatic habitat suitability and angling opportunity in the Lockwood impoundment, and an assessment of suitable flows to provide habitat and fish passage opportunities in the Lockwood bypass reach relevant to fishery resource management goals in that segment of the Kennebec River.

The applicant conducted macroinvertebrate sampling at three locations during the summer of 2000 (in the impoundment about 300 meters upstream from the powerhouse, in the bypass reach adjacent to the powerhouse, and in the tailwater area about 400 meters below the powerhouse). Sampling was conducted in accordance with a study plan previously reviewed and approved by the DEP.

The results of the monitoring indicate that the sampled benthic macroinvertebrate communities in the project impoundment, bypass reach, and tailwater areas all met at least Class C aquatic life criteria (i.e., the waters are of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community).

c. Bypass Reach Aquatic Habitat

The applicant has conducted a study to map and characterize the aquatic habitat characteristics (substrate, cover conditions, and hydraulics) of the bypass reach under leakage conditions, conducted in 2000. The applicant has also submitted the results of a supplemental study conducted during the summer of 2001 to document habitat use, water temperatures, dissolved oxygen concentrations, zone of passage conditions, leakage flows, and habitat characteristics (depth, volume and velocity of pools) under leakage conditions.

Leakage flow occurs along the west spillway (past practice has been to not install flashboards along the section of this spillway between the highway pier and the canal headworks), through and under the flashboards along the east spillway, and over the ledge outcrop around the log sluice between the spillways. Leakage flow under full pond conditions was estimated to be about 51 cfs during the 2001 study.

d. Applicant's Proposals. Based on the studies conducted the applicant proposes to continue the operation of the project in a Run-of River mode and provide a minimum flow for the bypass reach, as follows:

- maintain leakage flows of 30-50 cfs into the Ticonic Falls area downstream of the dam (the bypass reach). This flow would be ensured by a headpond-level transducer that would relay headpond water levels to Merimil's Northern Hydro Regional Operations Center to maintain stable headpond levels that result in the desired level of leakage through the flashboards;
- conduct an annual independent engineering inspection/flow gaging to ensure a minimum leakage flow of 30 to 50 cfs, for both six inches below the top of the flashboards and at full pond, with a report to FERC by July 15, on the results of the inspection and actions taken to maintain the required flow;
- notify fisheries agencies prior to drawdown of the reservoir to 1 foot below the dam crest for flashboard replacement; and,
- continue fish rescue efforts in the spillway during flashboard replacement, with identification, enumeration, and return of all fish to pools at the base of Ticonic Falls.

During normal run-of-river operation when all flashboards are in place, the headpond level will be maintained within six inches of full pond elevation 52.16 feet msl (top of flashboards). During those times when flashboards are being replaced, the applicant will maintain water levels within one foot of the spillway crest.

e. Discussion. There must be both sufficient quality and quantity of habitat for aquatic organisms to meet aquatic life standards. In analyzing the need for a guaranteed minimum flow in the Lockwood bypass reach, the Department has considered spillage conditions, the results of water quality sampling, habitat suitability and use, and zone of passage considerations. Based on this analysis, the Department finds that current leakage flow at full pond, approximately 50 cfs, will be sufficient to meet applicable aquatic life standards in the upper bypass reach. This leakage has historically been present during full pond conditions.

The Department finds that the applicant's proposals to maintain historic full pond leakage flows, and to operate the project with headpond levels within six inches of full pond, with a target of full pond conditions, with fish rescue operations during flashboard replacement, will be adequate to ensure that project waters are suitable for the designated uses of habitat for aquatic life and fishing.

6. FISHERY RESOURCES

a. Existing Resources. The diadromous fishery resources most affected by the operation of the Lockwood Project include Atlantic salmon, American shad, alewife, blueback herring, striped bass, rainbow smelt, and American eel. MDMR states that the project is within the historic range of Atlantic and shortnosed sturgeon, though no studies have been directed at finding these species. A sturgeon, identified by MDMR as probably being an endangered shortnose sturgeon, was also documented in the upper bypass reach of the Lockwood Project during the replacement of flashboards at the site on May 19, 2003. The State of Maine's goal is to restore anadromous fish species to their historic range, which entails restoring these species above the Lockwood Project. The Lockwood Project is now the first dam on the Kennebec River. It currently does not have upstream fish passage facilities.

b. Existing Management Plans. The Kennebec River Basin is included in the Maine Atlantic Salmon Commission's (MASC) statewide Atlantic salmon restoration plan. A major component of the restoration plan is the installation of upstream and downstream passage facilities at all dams on the mainstem and major tributaries. There are currently interim downstream fish passage facilities in place, but no upstream fish passage facilities at the Lockwood Project.

The Lower Kennebec River Comprehensive Hydropower Settlement Accord, signed May 26, 1998, established a comprehensive settlement governing fisheries restoration for numerous anadromous and catadromous species to assist in the restoration of these species in the lower Kennebec River, including the Lockwood Project. This accord has subsequently been approved by FERC, and was amended to the licenses for each of the KHDG member-owned dams. The accord was designed to accomplish the following:

- A charitable donation of the Edwards Dam from Edwards Manufacturing Company to the State of Maine, and the removal of the Edwards Dam by the State of Maine in 1999 (The Edwards Dam was initially breached on July 1, 1999, and removal was completed in November of that year);
- Contribution of $2.5 million for dam removal and related activities by Bath Iron Works and $4.75 million for fish restoration activities and studies and dam removal by the members of the Kennebec Hydro Developers Group; and,
- The amendment of certain fish passage obligations at seven dams on the Kennebec and Sebasticook Rivers owned by KHDG members.

Included as part of the accord is the *Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the US Fish and Wildlife Service ("KHDG Settlement Agreement").* The Agreement is intended to: achieve a comprehensive settlement governing fisheries restoration, for numerous anadromous and catadromous species, that will rapidly assist in the restoration of these species in the Kennebec River after the termination on December 31, 1998 of the *1986 KHDG Agreement;* avoid extensive litigation over fish passage methodologies, timetables and funding; assist in the removal of the Edwards Dam; and fund the next phase of a fisheries restoration program for the Kennebec River.

c. Applicant's proposals. The applicant proposes to install interim and permanent upstream and downstream fish passage facilities and provide other support for fisheries resources in accordance with the terms of the 1998 KHDG Settlement Agreement. Under this Agreement, Merimil is obligated to:

- Provide funding for and conduct studies relating to anadromous fish restoration activities in the Kennebec River Basin;
- Undertake studies and install agreed-to facilities for eel passage at the Lockwood Project;
- Install interim upstream fish passage facilities at the Lockwood Project by May 1, 2006;
- Install permanent upstream fish passage facilities at the Lockwood Project as determined by specified biological triggers, but in no event shall these facilities be installed before May 1, 2010;
- Provide immediate interim operational measures for downstream fish passage at the Lockwood Project;
- Install permanent downstream fish passage facilities at the Lockwood Project no later than the date on which permanent upstream passage facilities are installed and operational at the project; and
- Conduct effectiveness studies of all interim and permanent fish passage facilities installed at the Lockwood Project.

d. Discussion. The Department finds that the applicant's proposals to provide fisheries restoration support, and provide eel and fish passage in compliance with the terms of the *KHDG Settlement Agreement* will be adequate to ensure that project waters are suitable for the designated use of habitat for fish.

7. RECREATIONAL ACCESS AND USE

a. Existing Conditions. The applicant, the City of Waterville, and the Town of Winslow all provide public access to the project area, both upstream and downstream of the project dam. Upstream of the dam, recreation activities focus primarily on shoreline activities utilizing public parks along the impoundment. The applicant maintains a shoreline angler access site downstream of the powerhouse tailrace on the west shore, with parking provided at an adjacent parking lot. In addition to other public parks downstream of the dam, the City of Waterville maintains a public boat launch.

b. Studies. The applicant has conducted a study to estimate recreational use of the project area, in consultation with an "Aquatics Study Team" made up of state and federal agencies, NGOs, and interested parties. The applicant conducted an evaluation of angler use in the project study area in 2000 to determine location and level of angler use. Almost all fishing effort observed was from the shoreline, rather than from a boat. The study also observed that other recreation occurring in the project study area was related to community-sponsored events at the public parks along the river. Other activities such as boating, picnicking, and bird watching were also noted as occurring in the project study area. The study concluded that existing facilities are adequate to accommodate existing use and projected future increases in use.

c. Applicant's Proposals. Based on the studies conducted, the applicant proposes to continue to operate and maintain its existing angler access site located in the project lower tailwater. Continued operation and maintenance of the site will consist of periodic monitoring to ensure the integrity of the shoreline is maintained, and parking availability is maintained for anglers. The applicant will also continue to monitor recreational use at the project through the Form 80 reporting process that is required by FERC.

d. Discussion. The Department finds that the applicant's proposals will be adequate to ensure that project waters are suitable for the designated use of recreation in and on the water.

8. WETLANDS AND WILDLIFE RESOURCES

a. Existing Resources. The applicant has conducted a survey of rare, threatened, and endangered species and terrestrial wildlife habitat in the project area. While a few rare mussels were observed, the project area was found not to provide any significant amount of suitable mussel habitat. Rare plant species were also identified in the project area. All rare plant populations appeared to be healthy and vigorous, indicating no adverse impacts from the current operation of the project. Similarly, existing wetlands in the project area showed no adverse affects from current project operations.

b. Applicant's Proposals. The applicant proposes to continue the operation of the Lockwood Project in a run-of-river mode and maintain minimum flows into the by-pass reach below the dam.

c. Discussion. The Department finds that the applicant's proposals will be adequate to ensure that project waters contained in wetlands are suitable for the designated use of habitat for aquatic life. Continued operation in run-of-river mode is not expected to have any impact on rare, threatened or endangered species in the project area.

9. HYDROELECTRIC POWER GENERATION

a. Existing Energy Generation: The Lockwood Hydroelectric Project generates an average of 42,687,000 kilowatt hours (KWh) of electricity annually. This is the equivalent to the energy that would be produced by burning about 71,145 barrels of oil or 19,780 tons of coal each year.

b. Energy Utilization. The power generated by the Lockwood Project is currently sold on the open market. All power generated by the project is fed into Central Maine Power Company's transmission and distribution system.

c. Existing Energy Policies/Plans: The State of Maine has developed a comprehensive energy plan (Final Report of the Commission on Comprehensive Energy Planning, May 1992) with the goal of meeting the State's energy needs with reliable energy supplies at the lowest possible cost, while ensuring that energy production and use are consistent with a healthy environment and a vibrant economy. Specifically, the Plan establishes the following targets for Maine's energy future:

- Reduce the State's level of dependence on oil from 50 percent to at least match the national average of 43 percent by the year 2000, with further reductions to at least the 30 percent level by 2010;
- Increase the percentage of renewable energy resources in the State's primary energy mix from 30 percent to 40 percent by the year 2000, and to at least 50 percent by 2010;
- Increase statewide energy efficiency relative to 1990 levels by 25 percent by the year 2000 and by at least 50 percent by 2010; and
- Work to stabilize long-term energy prices, in balance with Maine's other energy related goals, with a specific emphasis on enhancing Maine's competitive position relative to New England and the U.S.

With respect to renewable energy, the Plan recommends that Maine actively encourage the development of wind and solar energy resources and support the continued utilization and further development, where appropriate, of the State's renewable, indigenous hydro and biomass resources.

c. Applicant's Proposals. The applicant proposes to pass minimum flows from the project as described above. FERC has estimated that providing a minimum flow of 50 cfs would result in a 1.7% (700 MWh) reduction in average annual production.

d. Discussion. The Department finds that the applicant's proposals will be adequate to ensure that project waters are suitable for the designated use of hydroelectric power generation. The Department further finds that the losses in power generation due to minimum flows are reasonable and necessary to mitigate project impacts.

BASED on the above FINDINGS OF FACT, the evidence contained in the application, and subject to the conditions listed below, the Department CONCLUDES that the continued operation of the Lockwood Hydroelectric Project will result in all waters affected by the project being suitable for all designated uses and meeting all other applicable water quality standards, provided that:

1. Water levels are maintained as proposed;

2. Minimum flows are provided to the bypass reach as proposed;

3. Fish rescue operations during impoundment drawdowns are continued as proposed;

3. Fish passage facilities are provided as proposed;

4. Other measures to enhance fish passage and restoration are implemented as proposed; and,

5. Public recreational access and use facilities are maintained as proposed.

THEREFORE, the Department APPROVES the application of MERIMIL LIMITED PARTNERSHIP and GRANTS CERTIFICATION that there is a reasonable assurance that the continued operation of the LOCKWOOD PROJECT, as described above, will not violate applicable water quality standards, SUBJECT TO THE FOLLOWING CONDITIONS:

1. WATER LEVELS AND FLOWS

A. Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, or (3) emergency electrical system conditions, as defined below, or (4) agreement between the applicant and appropriate state and/or federal agencies, beginning within 60 days of FERC approval of the flow and water level monitoring plan described in Condition 1.E. below, or upon such other schedule as established by FERC, the Lockwood Project shall be operated in a run-of-river mode, with outflow approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement, and impoundment level fluctuations minimized. During normal run-of-river operation when all flashboards are in place, the headpond

level will be maintained within six inches of full pond elevation 52.16 feet msl (top of flashboards). During times of flashboard failure applicant will maintain water levels above the spillway crest. During those times when flashboards are being replaced, the applicant will maintain water levels within one foot of the spillway crest.

B. Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, or (3) emergency electrical system conditions, as defined below, or (4) agreement between the applicant and appropriate state and/or federal agencies, full pond minimum leakage flows of 30 to 50 cfs to the bypass reach shall be maintained. The applicant shall conduct an annual independent engineering inspection/flow gaging to ensure a minimum leakage flow of 30 to 50 cfs, for both six inches below the top of the flashboards and at full pond, and submit a report to DEP by July 15, on the results of the inspection. If flows are calculated to be less than 50 cfs at full pond, applicant shall state the actions that have been taken to restore 50 cfs at full pond and the results achieved.

C. "Extreme Hydrologic Conditions" means the occurrence of events beyond the Licensee's control, such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions or other hydrologic conditions such that the operational restrictions and requirements contained herein are impossible to achieve or are inconsistent with the safe operation of the project.

D. "Emergency Electrical System Conditions" means operating emergencies beyond Licensee's control which require changes in flow regimes to eliminate such emergencies which may in some circumstances include but are not limited to equipment failure or other abnormal temporary operating condition, generating unit operation or third-party mandated interruptions under power supply emergencies; and orders from local, state or federal law enforcement or public safety authorities.

E. The applicant shall, within 6 months of issuance of a New License for the project by FERC or upon such other schedule as established by FERC, submit plans for providing and monitoring the water levels and flows required by this condition. These plans shall be developed in consultation with U.S. Fish and Wildlife Service (USFWS), Maine Department of Inland Fisheries and Wildlife (MDIFW), Maine Atlantic Salmon Commission (MASC), Maine Department of Marine Resources (MDMR) and DEP. These plans shall be reviewed by and must receive the approval of the DEP Bureau of Land and Water Quality.

2. FISH RESCUE PLAN

A. The applicant shall continue fish rescue efforts in the spillway during flashboard replacement and impoundment drawdown, with identification, enumeration, and return of all fish to pools at the base of Ticonic Falls. The applicant shall notify fisheries agencies prior to drawdown of the impoundment to 1 foot below the dam crest for flashboard replacement.

B. Prior to the initiation of impoundment drawdowns for flashboard maintenance, the applicant shall, in consultation with the U.S. Fish and Wildlife Service (USFWS), Maine Department of Inland Fisheries and Wildlife (MDIFW), Maine Atlantic Salmon Commission (MASC), Maine Department of Marine Resources (MDMR) and DEP develop a plan to continue fish rescue operations in accordance with Part A of this condition. This plan shall be reviewed by and must receive approval of the DEP Bureau of Land and Water Quality prior to impoundment drawdown.

3. FISH PASSAGE

A. FISHERIES RESTORATION SUPPORT

The applicant shall provide funding, conduct studies, engage in consultation, install fish passage facilities, report on annual restoration activities, and comply with all additional duties and obligations as set forth in the Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the US Fish and Wildlife Service ("KHDG Settlement Agreement"), dated May 26, 1998.

B. EEL PASSAGE

(1) Study. The applicant shall, in consultation with the National Marine Fisheries Service and the US Fish and Wildlife Service, join other KHDG members and the Department of Marine Resources in undertaking a three-year research project to determine (a) the appropriate placement of upstream fish passage for American eel at each of the seven KHDG member-owned dams, and (b) appropriate downstream fish passage measures for American eel at each KHDG member-owned project.

(2) Consultation. Based on the results of the eel passage study and beginning no later than January 1, 2002 and ending no later than June 30, 2002, the applicant shall join other KHDG members in consulting with NMFS, USFWS, and DMR to attempt to reach agreement on the appropriate location of upstream-eel-passage at each KHDG member-owned dam, and the appropriate downstream eel passage measures to apply to each KHDG member-owned project.

(3) Upstream Passage. If agreement is reached by all consulting parties on the location of upstream eel passage at each project, the applicant shall install such passage facilities at the Lockwood Project during 2002.

(4) Downstream Passage. If agreement is reached by all consulting parties on appropriate downstream eel passage measures, the applicant shall join the other parties in requesting that FERC approve the agreed-to passage measures.

(5) Lack of Consensus. If no consensus is reached on eel passage issues by June 30, 2002, the applicant or any of the consulting parties shall be free to petition DEP or FERC to approve appropriate conditions relating to eel passage at the project.

(6) Lack of Funding. In the event that DMR does not receive the necessary appropriation or legislative spending authorization required to fund the eel passage study discussed above, all provisions of this condition regarding eel passage shall be null and void.

C. INTERIM UPSTREAM FISH PASSAGE

The applicant shall install an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Lockwood Project powerhouse, to be operational by May 1, 2006. This interim passage facility shall include video monitoring or other mechanisms to allow assessment of the effectiveness of the facility in trapping all species that seek passage, and shall be designed to empty into a trap and truck collection facility with adequate holding capacity.

D. INTERIM DOWNSTREAM FISH PASSAGE

The applicant shall continue and where needed improve existing interim operational measures to diminish entrainment, allow downstream passage, and eliminate significant injury or mortality to out-migrating anadromous fish, in accordance with the terms of the KHDG Settlement Agreement.

E. PERMANENT UPSTREAM FISH PASSAGE

(1) Installation and operation. Permanent upstream fish passage facilities shall be installed and operational at the project no later than 2 years following (a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, and transfer facility at the Lockwood powerhouse or (b) development of an alternate trigger for fishway installation based on the biological assessment process for Atlantic salmon, alewife and blueback herring described below, whichever comes first, provided, however, that in no event shall permanent upstream fish passage facilities be required to be operational at the project before May 1, 2010.

(2) Biological assessment process. State and federal fisheries agencies will continue to assess the status and growth of the populations of shad and other anadromous fish in the Kennebec River drainage. Should the growth of Atlantic salmon, alewife or blueback herring spawning runs make it necessary to adopt an alternative approach for triggering fishway installation to the shad trigger used above, the agencies will meet with the applicant to attempt to reach consensus on the need for and timing and design of permanent upstream fish passage facilities at the project. Any disputes on the need for an alternate trigger for fishway installation will be handled through the FERC process.

F. PERMANENT DOWNSTREAM FISH PASSAGE

Permanent downstream fish passage facilities shall be installed and operational at the project no later than the date on which permanent upstream fish passage facilities are operational at the project as required by this approval.

G. FISH PASSAGE FACILITIES PLANS

The applicant shall, in accordance with the schedule(s) established by FERC, submit final design and operational plans for all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, prepared in consultation with state and federal fisheries agencies. These plans shall be reviewed by and must receive approval of the fisheries agencies, the DEP, and FERC prior to construction.

H. FISH PASSAGE EFFECTIVENESS STUDIES AND RESULTS

(1) Studies. The applicant shall, in consultation with state and federal fisheries agencies, conduct a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, in accordance with the terms of the KHDG Settlement Agreement.

(2) Study plans. The applicant shall, in accordance with the schedule(s) established by FERC, submit plans for a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and/or operational measures required by this approval, prepared in consultation with state and federal fisheries agencies. These plans shall be reviewed by and must receive approval of the fisheries agencies, the DEP, and FERC prior to implementation.

(3) Results of studies. The applicant shall, in accordance with the schedule(s) established by FERC, submit the results of any fish passage effectiveness study or studies, along with any recommendations for changes in the design and/or operation of any interim or permanent upstream or downstream fish passage facilities constructed and/or operated pursuant to this approval. The Department reserves the right, after notice and opportunity for hearing, to require reasonable changes in the design and/or operation of these fish passage facilities as may be deemed necessary to adequately pass anadromous fish through the project site. Any such changes must be approved by FERC prior to implementation.

4. RECREATIONAL FACILITIES

The applicant shall maintain the existing shoreline angler access site in the project's lower tailwater area.

5. LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to review and approval of the DEP prior to implementation.

6. COMPLIANCE WITH ALL APPLICABLE LAWS

The applicant shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements and orders required for the operation of the project in accordance with the terms of this certification.

7. EFFECTIVE DATE

This water quality certification shall be effective concurrent with the effective date of the New License issued for the project by the Federal Energy Regulatory Commission.

DONE AND DATED AT AUGUSTA, MAINE, THIS *26th* DAY OF AUGUST, 2004.

By: */s/ Dawn R. Gallagher*
Dawn R. Gallagher, Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of receipt of application: 4/16/04
Date application accepted for processing: 4/16/04
(Initial application received 4/25/02 and subsequently withdrawn and refiled, 4/18/03 and 4/16/04.)

Date filed with the Board of Environmental Protection: *August 26, 2004*

This Order prepared by Mark Margerum, Bureau of Land and Water Quality
\L-20218-33-C-N

200408275023 Received FERC OSEC 08/27/2004 12:41:00 PM Docket# P-2574-032

Submission Contents

APPENDIX C

FISHWAY DESIGN CONSULTATION

Lockwood Fish Passage Design Agency Consultation Timeline

Description	Dates
Preliminary Design Consultations	
CFD study results submittal	3/23/2020
CFD Study Results Agency Meeting	3/27/2020
CFD study results supplemental results	4/7/2020
30% Design Consultations	
30% design submittal	7/10/2020
Lockwood and Weston Fish Passage Agency Meeting	7/23/2020
60% Design Consultations	
60 % design submittal	11/5/2020
60% design review meeting	11/10/2020
Supplemental information submittal (CFD and Hyd calcs)	11/19/2020
Sojkowski email response	11/30/2020
Final (90%) Design Consultations	
Final design submittal	2/4/2021
Final design review meeting	2/9/2021
NOAA design confirmation email	3/10/2021
FERC construction drawings and schedule submittal	3/10/2021

From: **Gregory Allen** <gallen@aldenlab.com>
Date: Wed, Mar 25, 2020 at 2:08 PM
Subject: Lockwood CFD Results
To: Bryan Sojkowski <bryan_sojkowski@fws.gov>, Pocquette, Kayla <kayla.pocquette@brookfieldrenewable.com>, Reny, Melissa <melissa.reny@brookfieldrenewable.com>, Matt Buhyoff - NOAA Federal <matt.buhyoff@noaa.gov>, Donald Dow - NOAA Affiliate <donald.dow@noaa.gov>, Bentivoglio, Antonio <antonio_bentivoglio@fws.gov>, Mitchell, Gerry <gerry.mitchell@brookfieldrenewable.com>, Wippelhauser, Gail <gail.wippelhauser@maine.gov>, Ben Mater <bmater@aldenlab.com>, Seyfried, Jason <jason.seyfried@brookfieldrenewable.com>, Dill, Richard <richard.dill@brookfieldrenewable.com>, Brown, Adam <adam.brown@brookfieldrenewable.com>, Anna Harris <anna_harris@fws.gov>, Baker, Nathan <nathan.baker@brookfieldrenewable.com>, Maloney, Kelly <kelly.maloney@brookfieldrenewable.com>, Seiders, Dwayne J <dwayne.j.seiders@maine.gov>, Christman, Paul <paul.christman@maine.gov>, Kurt Smithgall <ksmithgall@aldenlab.com>

Good afternoon,

I have attached our CFD results of the proposed fishway for Lockwood. We will present these results during our planned call on Friday morning. I will update the meeting invite to include details to login to a web meeting on the adobe connect platform.

Thank you,

Greg

Gregory Allen, P.E.
Director, Environmental and Engineering Services
ALDEN Solving flow problems since 1894
30 Shrewsbury St., Holden, MA 01520
(508) 829-6000 ext. 6409
gallen@aldenlab.com | www.aldenlab.com

ALDEN

MASSACHUSETTS | COLORADO | WASHINGTON | OREGON

Lockwood Hydroelectric Station: CFD Analysis of Proposed Fishway

Prepared For

Brookfield Renewable

Prepared By

Kurt Smithgall, EIT, CFM

Date

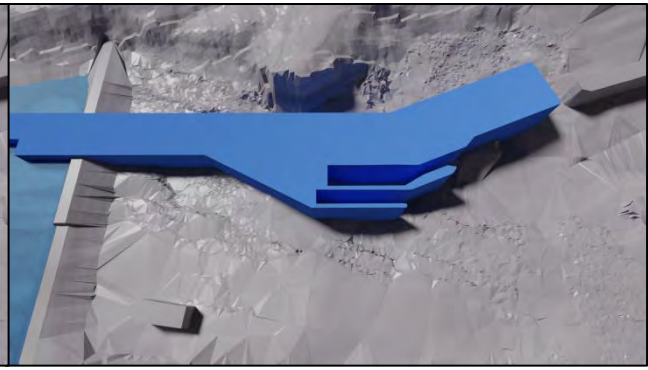
March 27th, 2020

Objective

Performing a CFD simulation study using FLOW-3D until a quasi steady-state is reached in order to evaluate *hydraulic conditions at select locations* for two different fishway entrance design iterations.

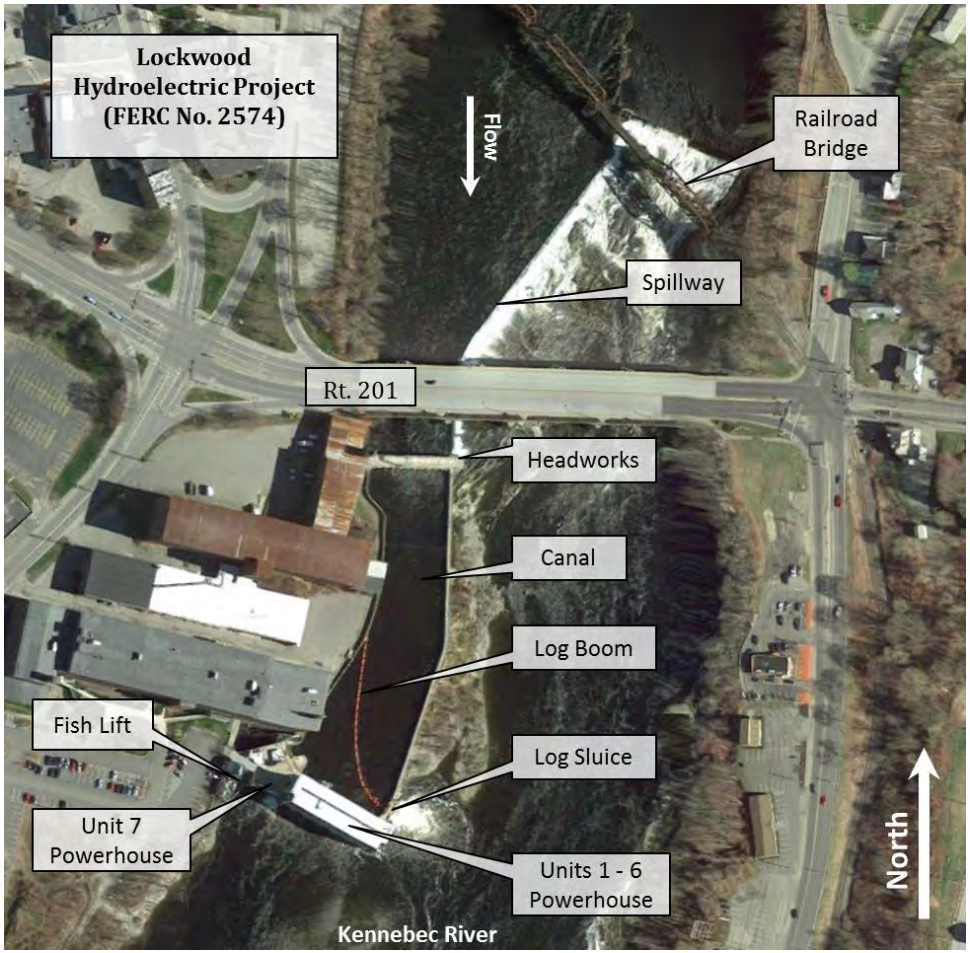
Existing Condition

Alternative 1



Alternative 2

Project Features

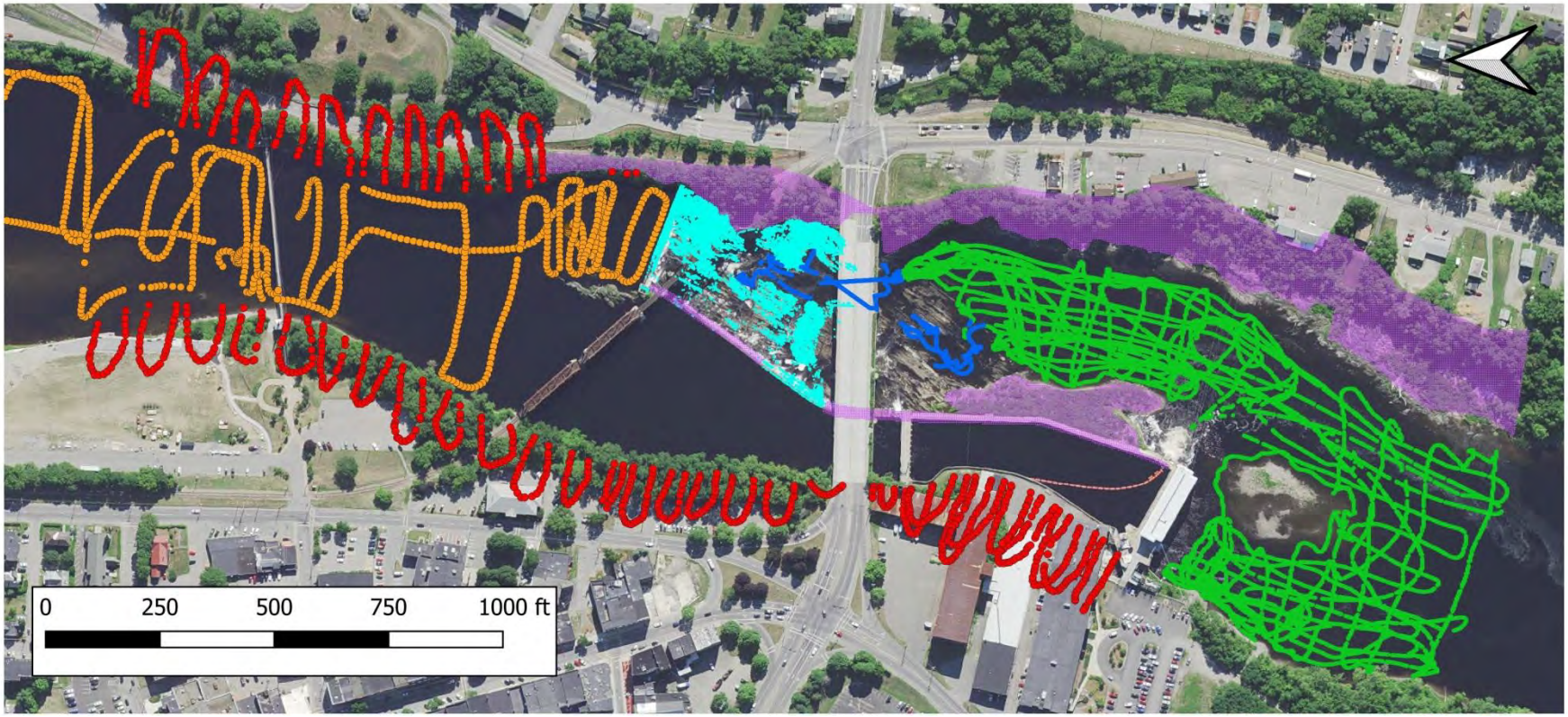


Existing Spillway Topography / Bathymetry

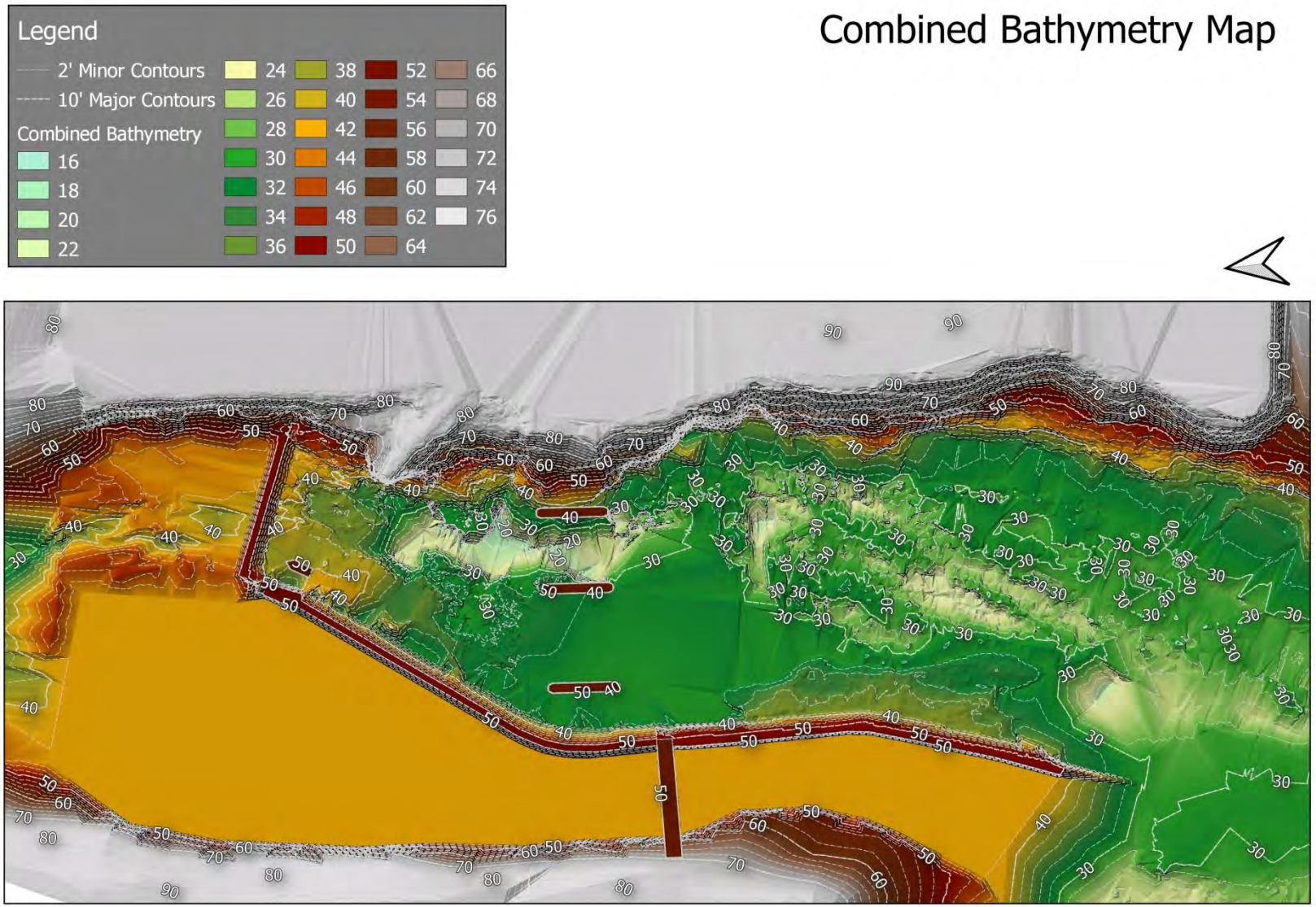
Bathymetric Data Sources

Legend

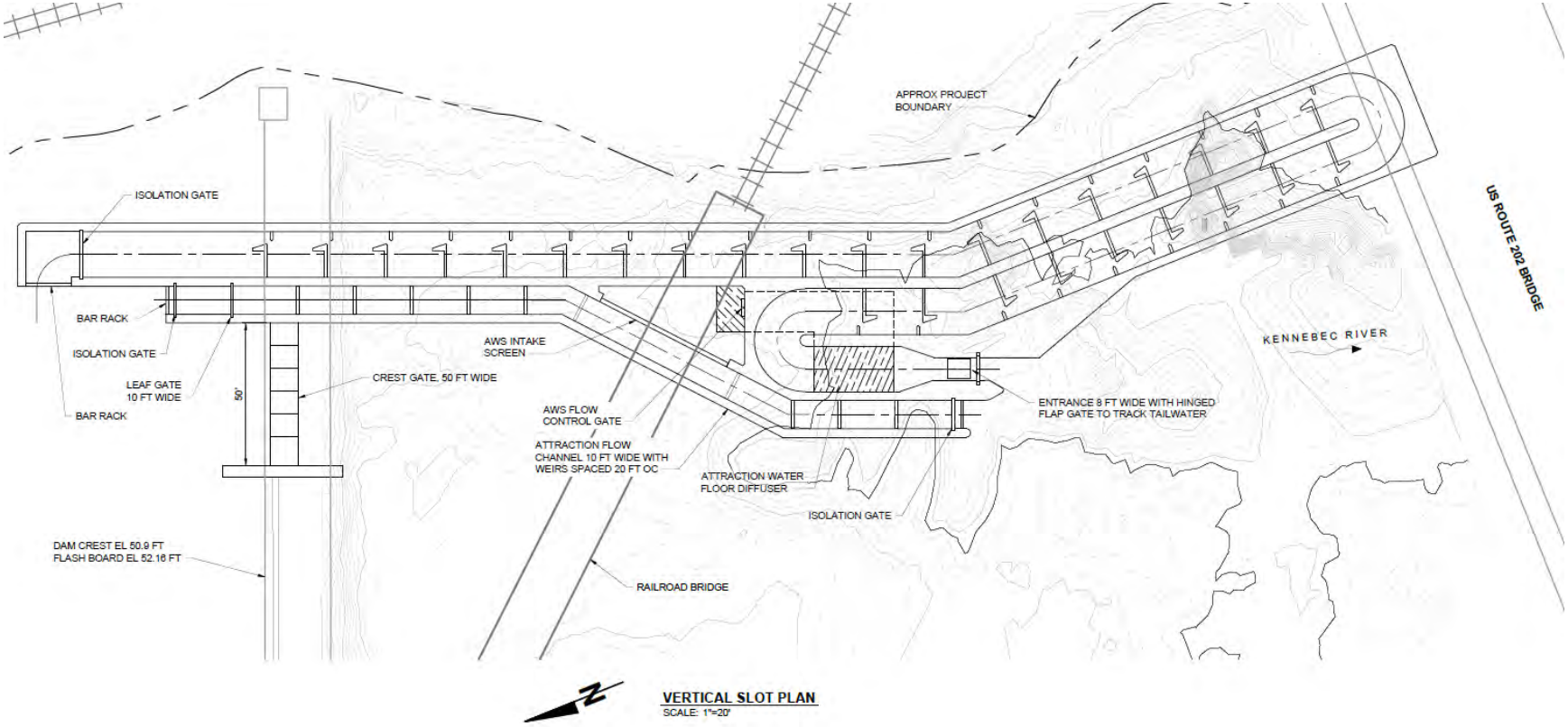
- 3-ft LiDAR (National Elevation Dataset, 9/23/15)
- 10-m LiDAR (GoogleEarth, 2019)
- Laser Scan (Alden, 9/21/17)
- Sonar (Normandeu, 10/28/15)
- Sonar (Maine Geo. Survey, 9/21/17)
- Sonar (Ocean Data Tech., 10/22/19)



Combined Bathymetry Map

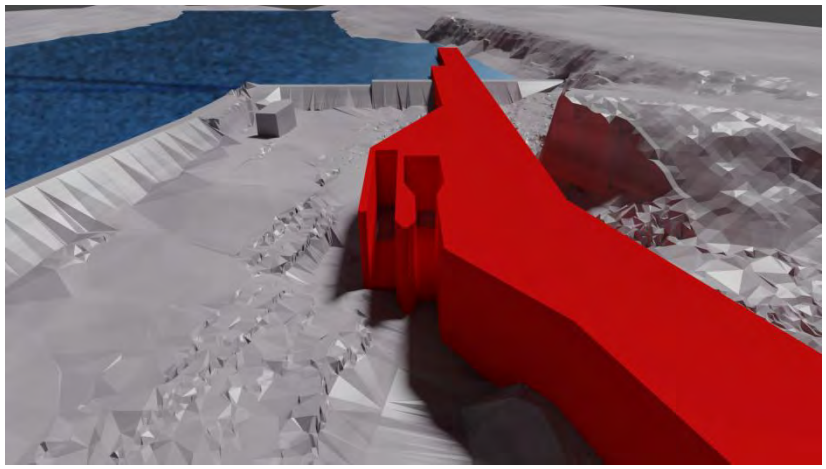


Preliminary Design - Vertical Slot Fishway

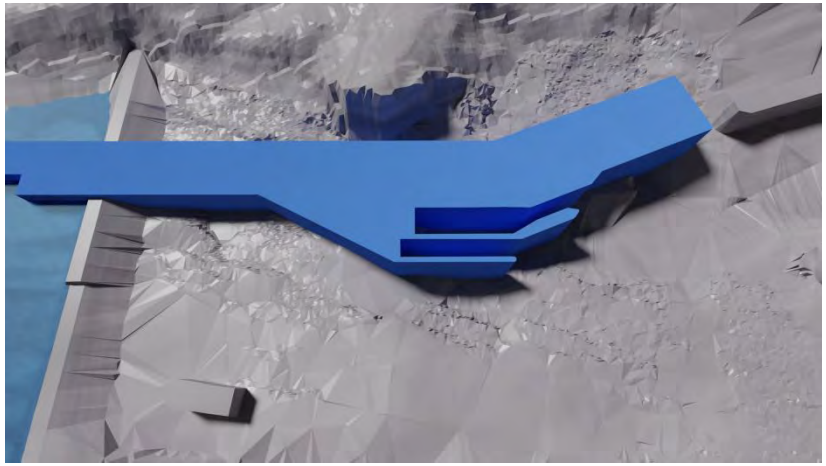


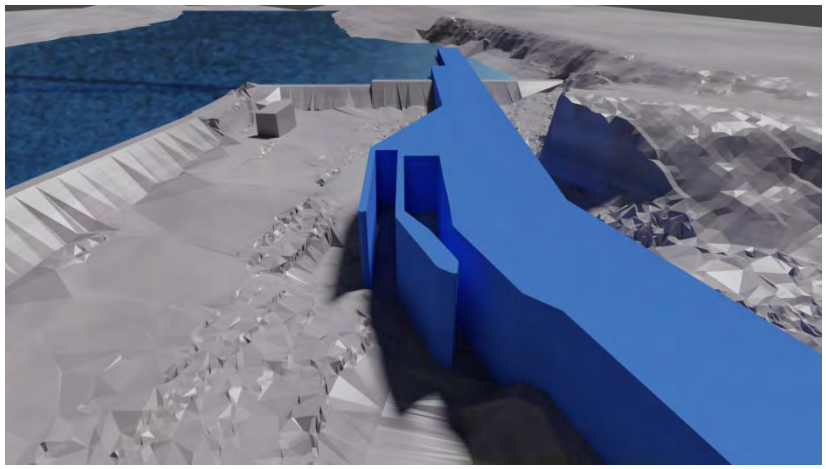
Model Geometry

Alternative 1 (initial design)

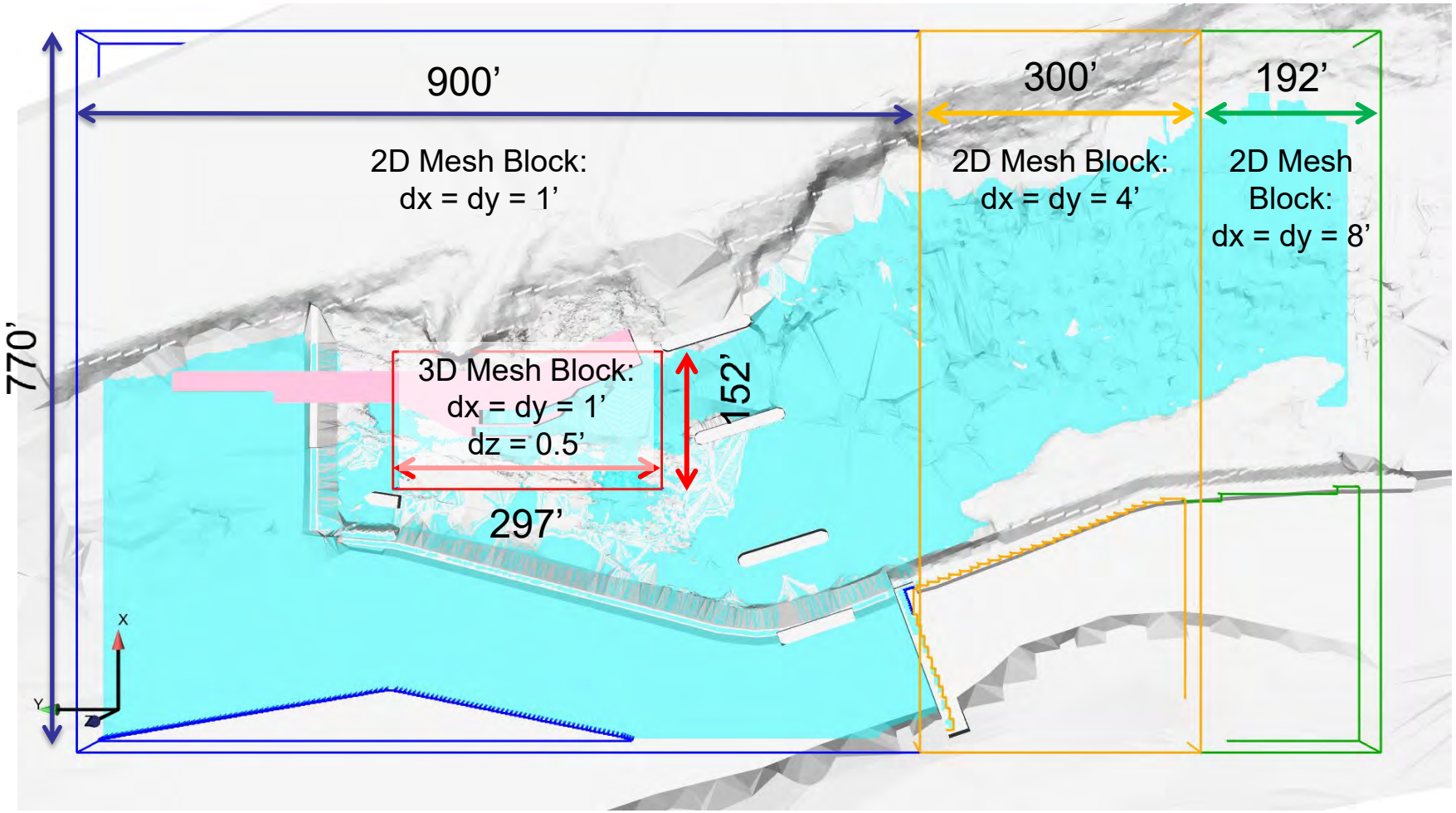


Alternative 2

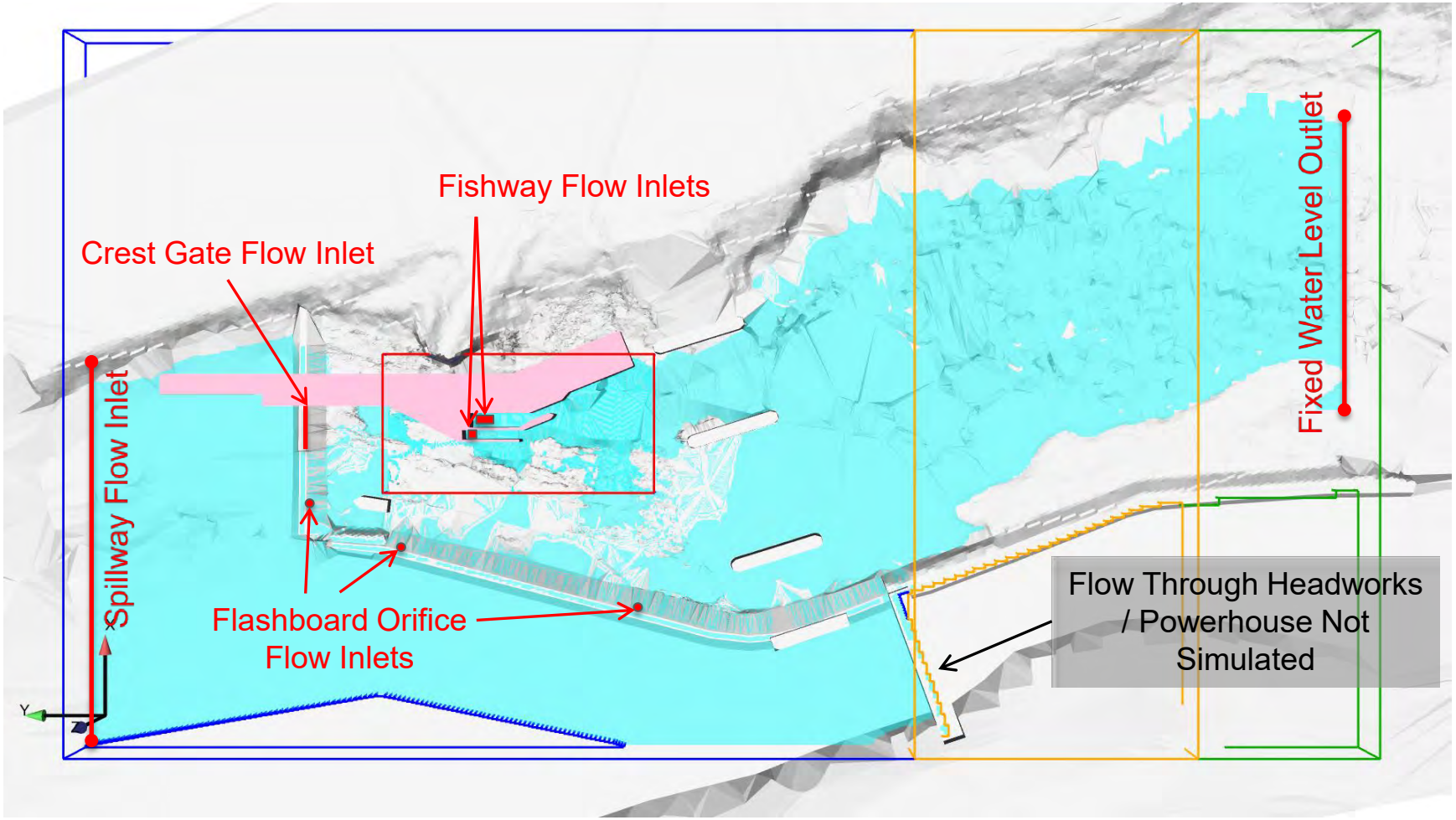




Model Setup: Domain & Mesh



Model Setup: Boundary Conditions



Pertinent Project Data

River Flow for May 1 through October 31

- 95% exceedance flow – 1,940 cfs
- 5% exceedance flow – 21,150 cfs

Head Pond Levels

- Design High El. 55.0 ft
- Normal (Top of Flash Board) El. 52.2 ft
- Design Low (Dam Crest) El. 50.9 ft

Tailwater levels

- Max El. 36.5 ft
- Normal El. 32.0 ft
- Min El. 30.5 ft

Powerhouse capacity – 5,660 cfs

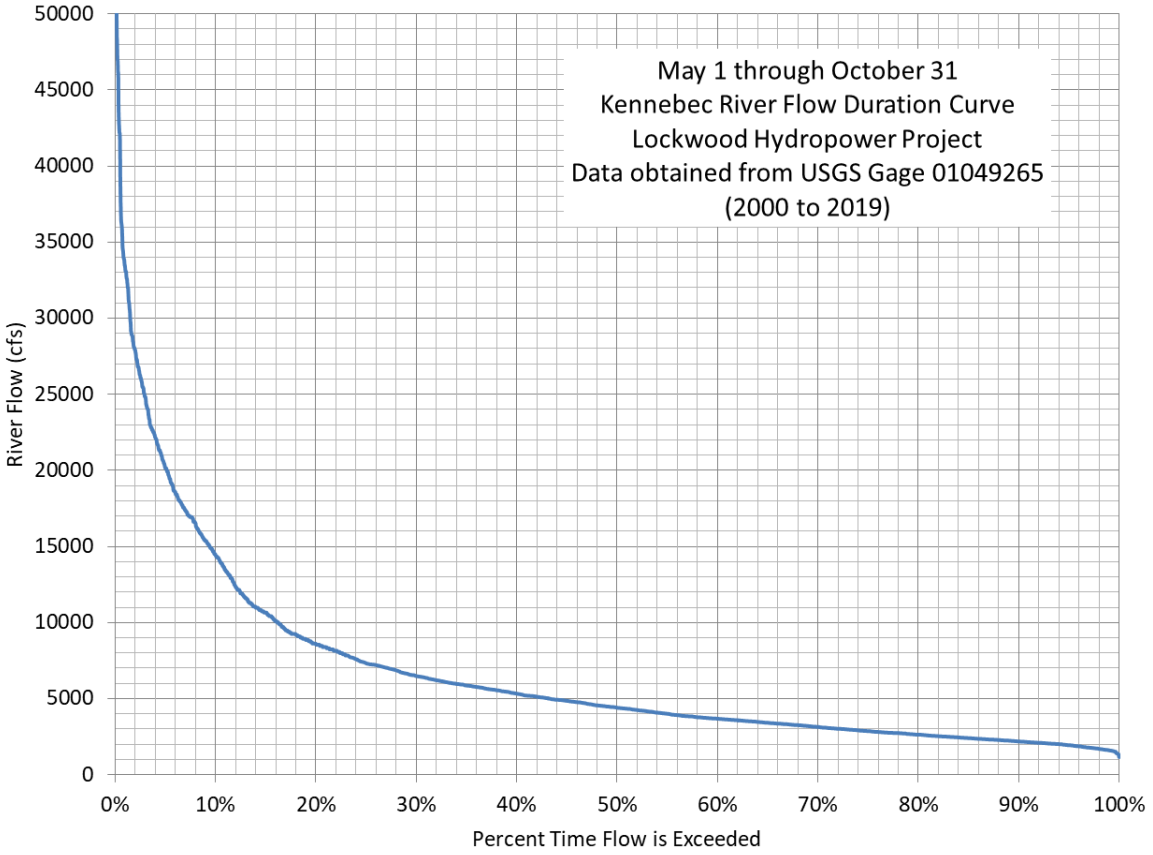
Existing fish lift – 170 cfs

- Operating May 1 through October 31

Proposed River Flow Conditions for Simulations

Exceedance	Flow (cfd)
40%	5,330
25%	7,340
10%	14,420

Flow conditions selected represent a minimal spill condition and 2 conditions with substantial spill.



Model Setup: Test Matrix

Existing Conditions – x3 Flow Rates

Alternative 1 (initial design) – x3 Flow Rates

Alternative 2 – x3 Flow Rates

9 Total Simulations

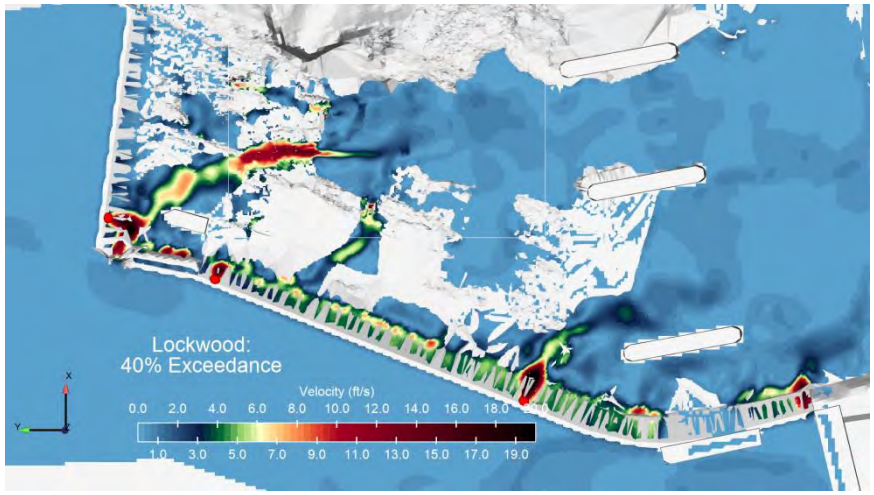
Existing Conditions

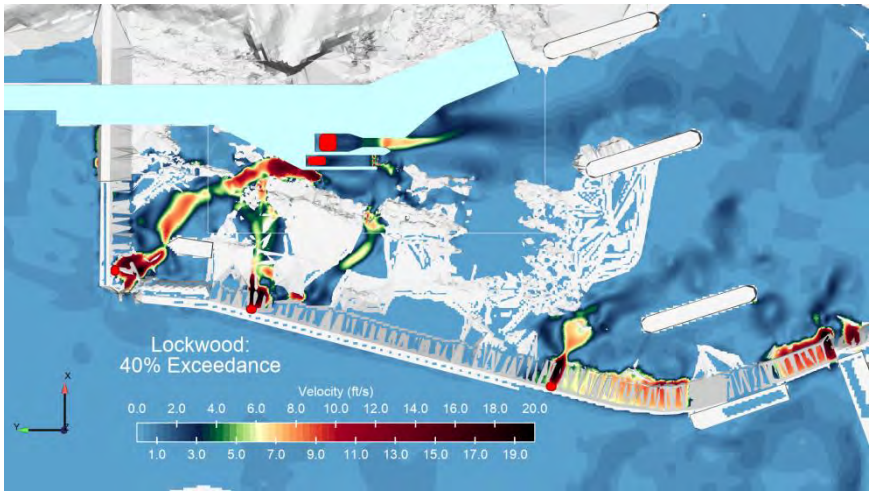
	Exceedance Interval		
	40%	25%	10%
Orifices [cfs]	50	50	50
Spillway [cfs]	50	1170	8250
Total Model Flow [cfs]	100	1220	8300
Total River Flow [cfs]	5,330	7,340	14,420
Tailwater [ft]	32	32.5	34.5

Proposed Conditions

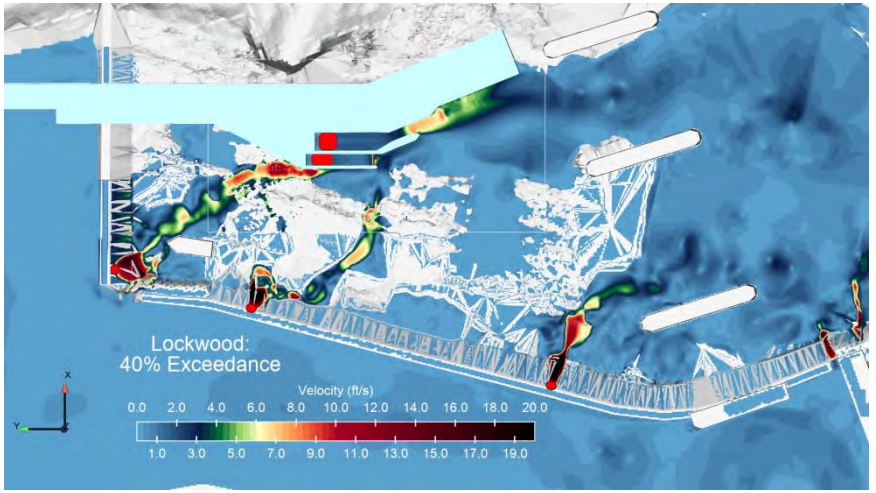
	Exceedance Interval		
	40%	25%	10%
Orifices [cfs]	50	50	50
Spillway [cfs]	50	50	4790
Crest Gate [cfs]	0	840	3180
Fishway [cfs]	180	180	180
Attraction Flow [cfs]	100	100	100
Total Model Flow [cfs]	380	1220	8300
Total River Flow [cfs]	5,330	7,340	14,420
Tailwater [ft]	32	32.5	34.5

Results: Overview – 40% Exceedance

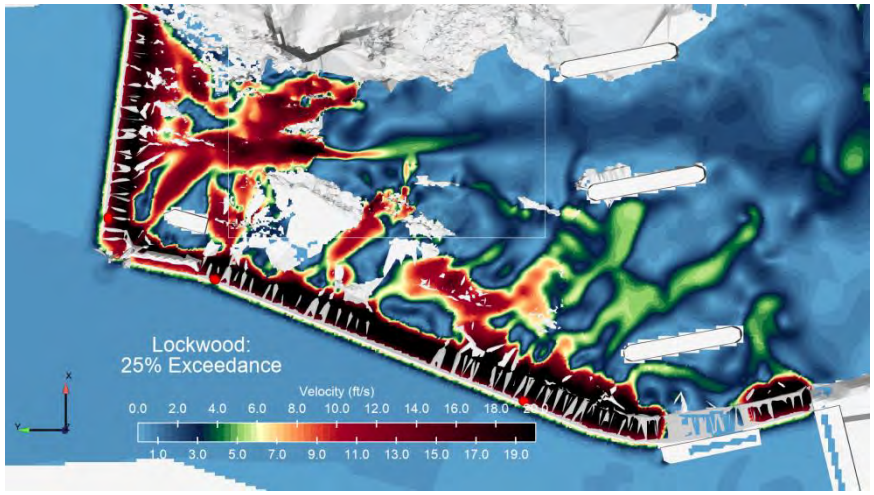


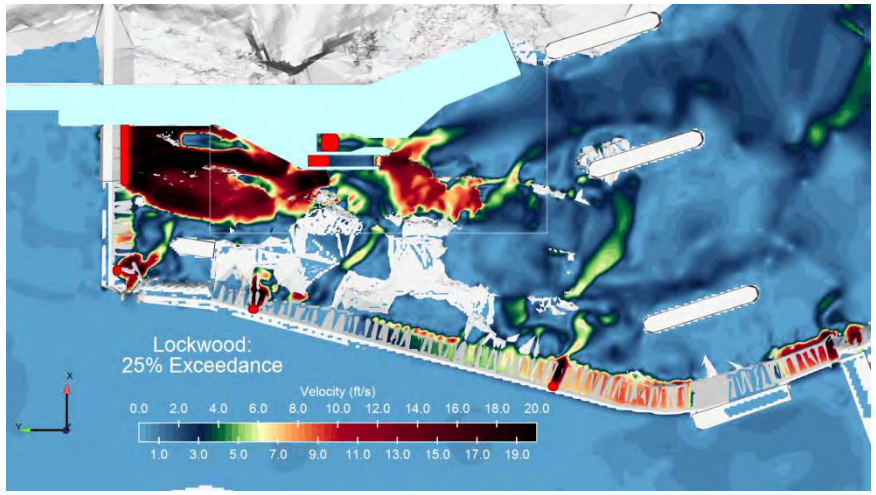


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

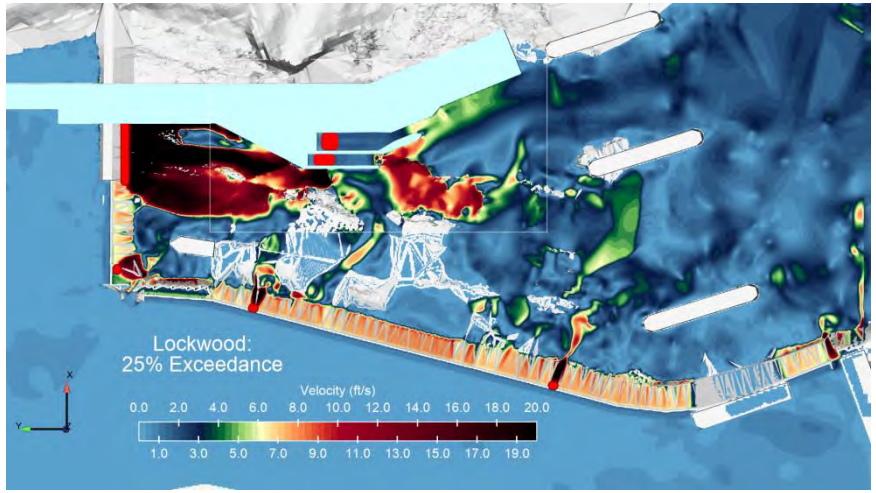


Results: Overview – 25% Exceedance

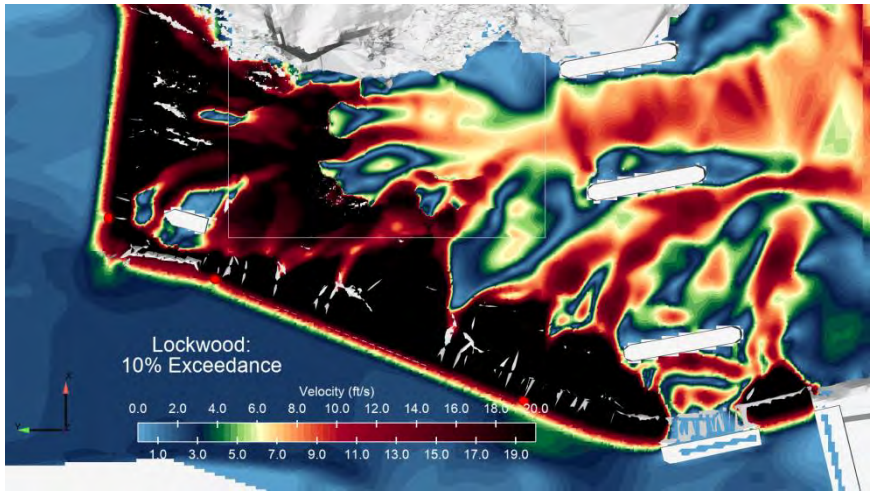


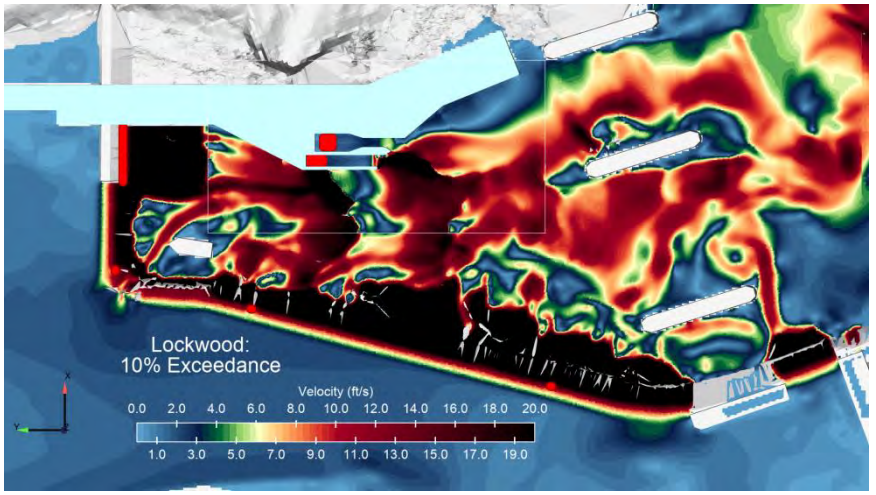


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

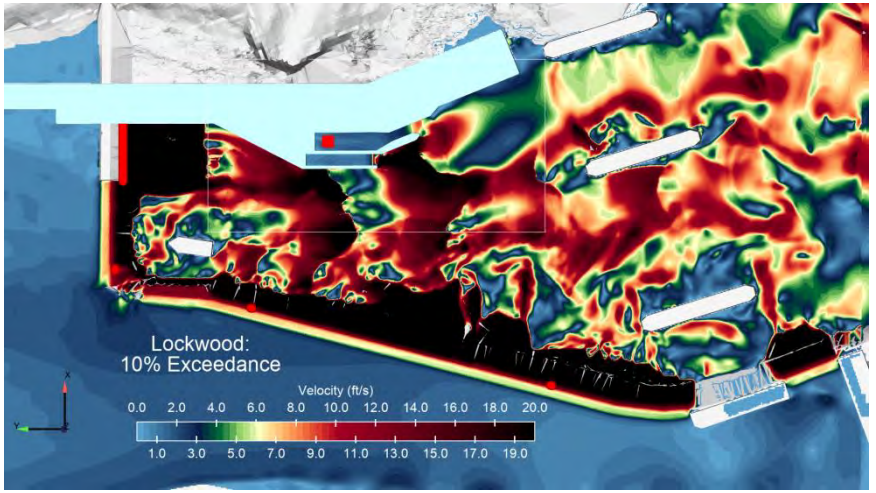


Results: Overview – 10% Exceedance

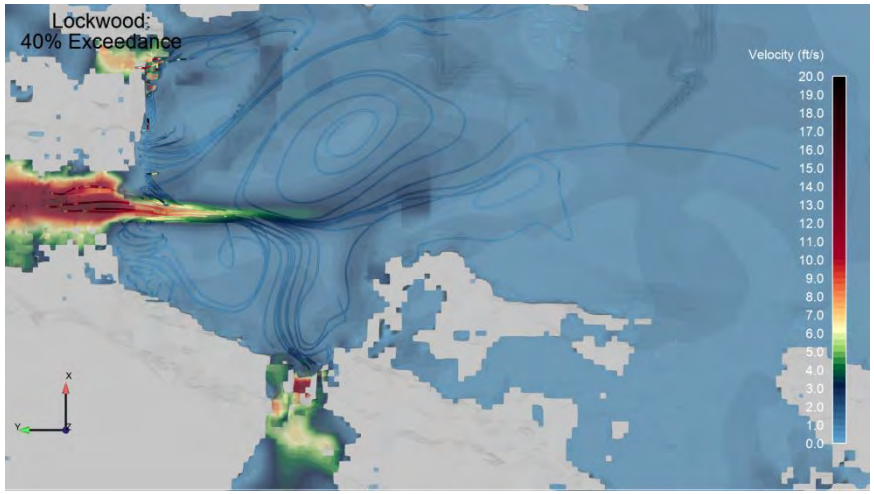


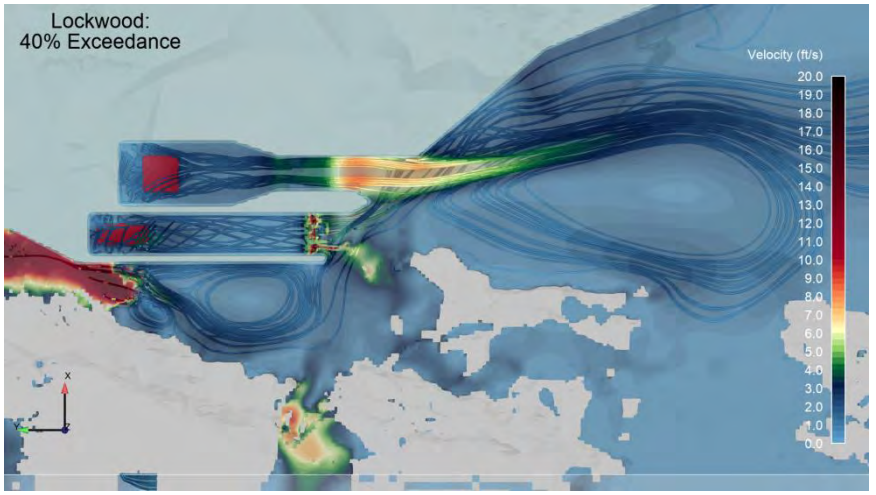


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

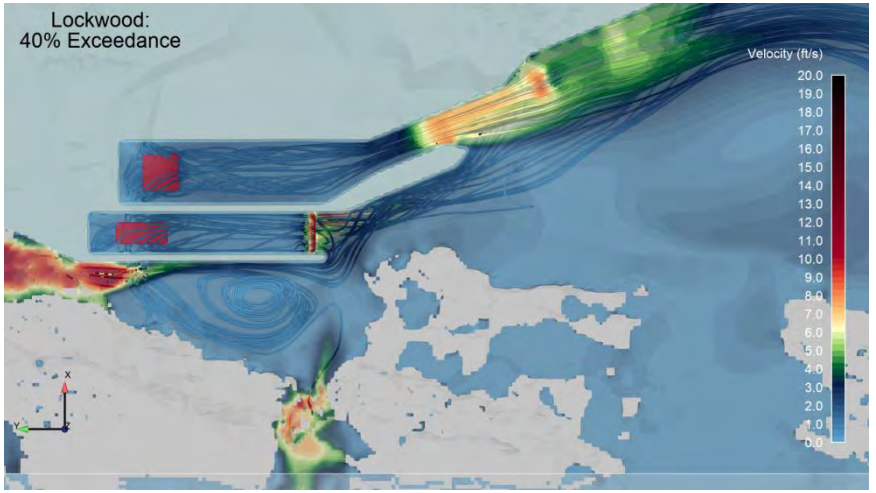


Results: Streamlines – 40% Exceedance

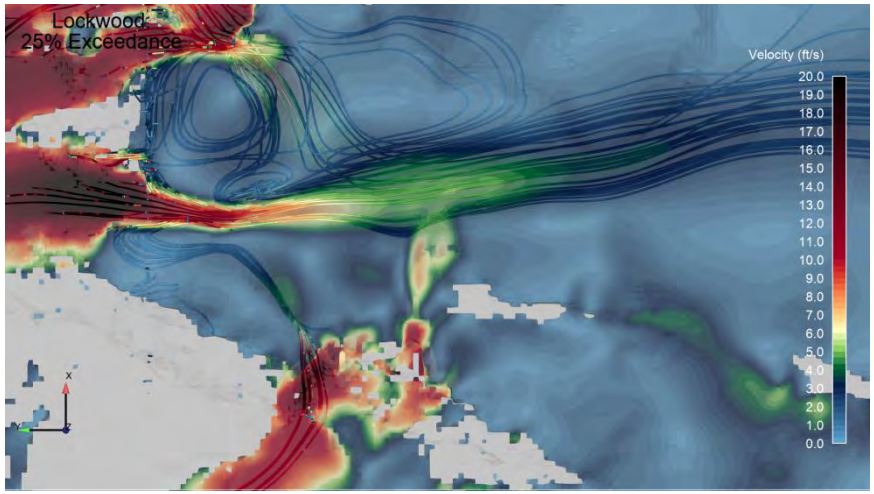


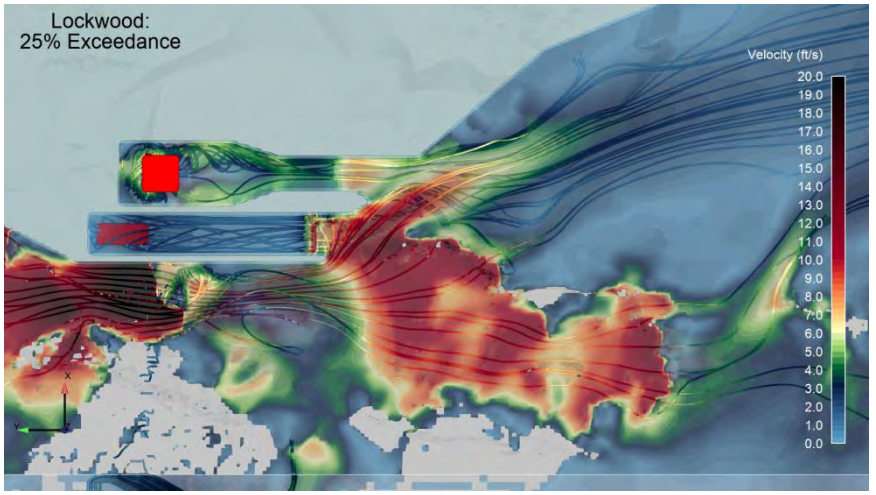


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

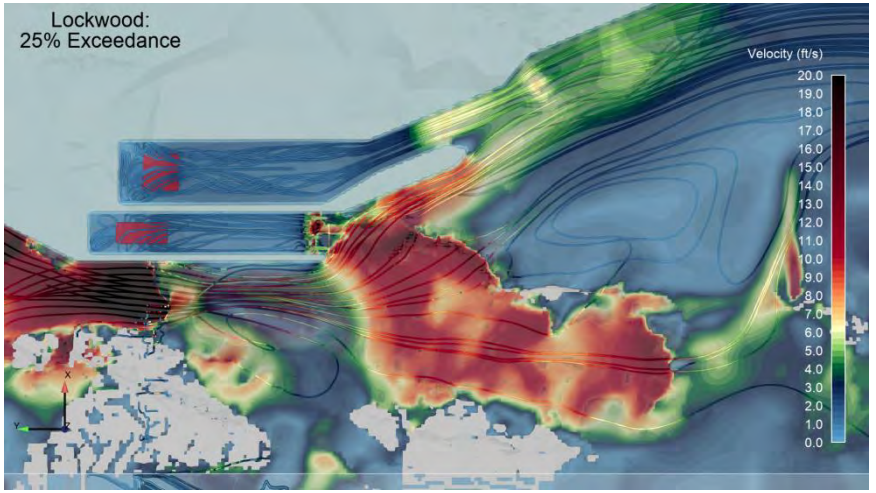


Results: Streamlines – 25% Exceedance

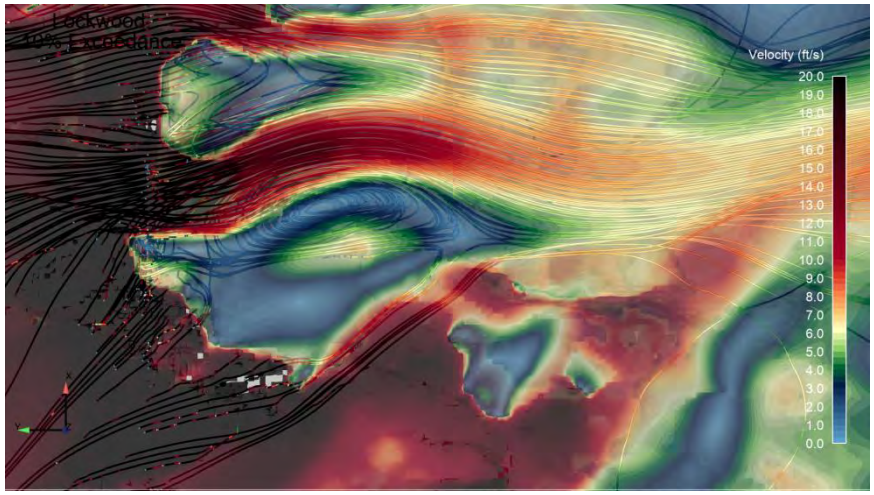


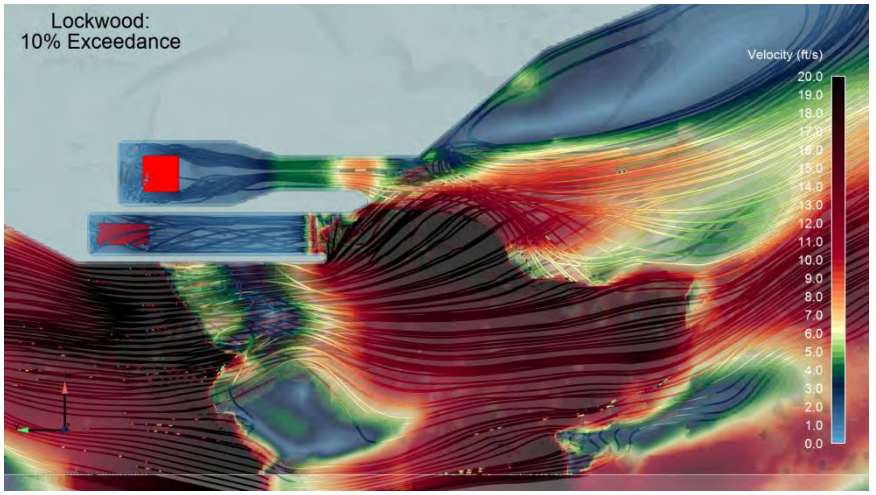


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

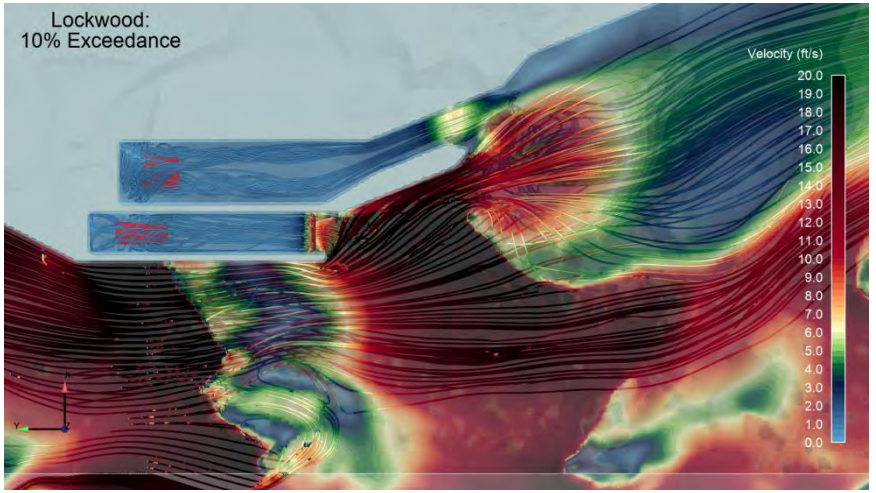


Results: Streamlines – 10% Exceedance

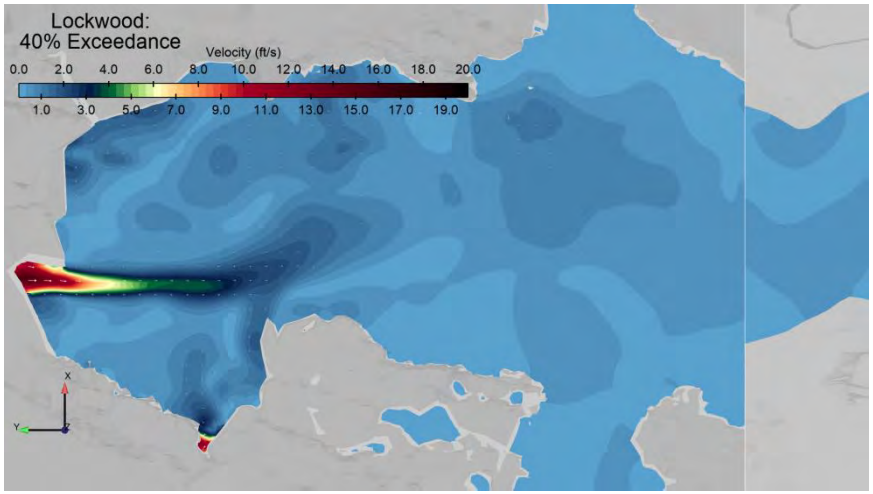


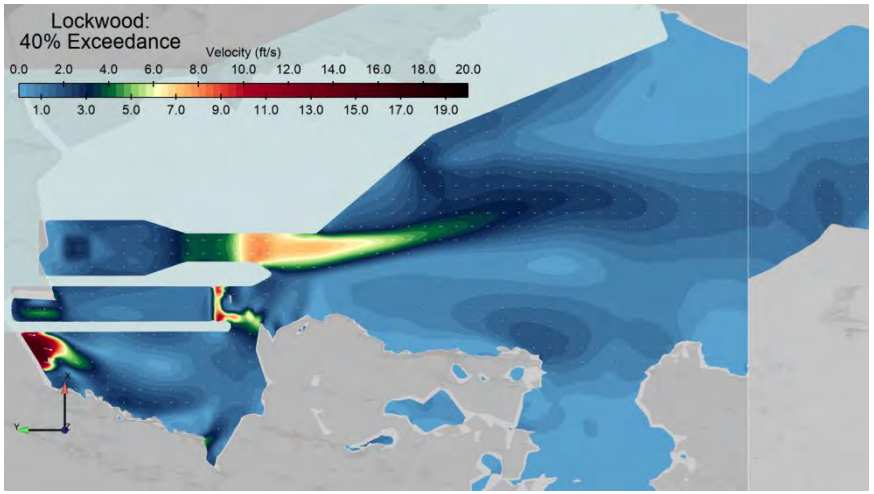


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2



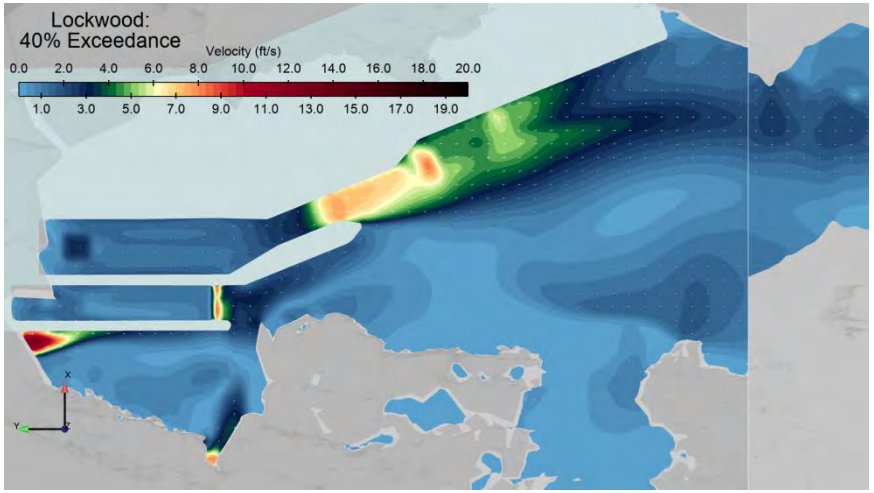
Results: Plan View Slice – 40% Exceedance



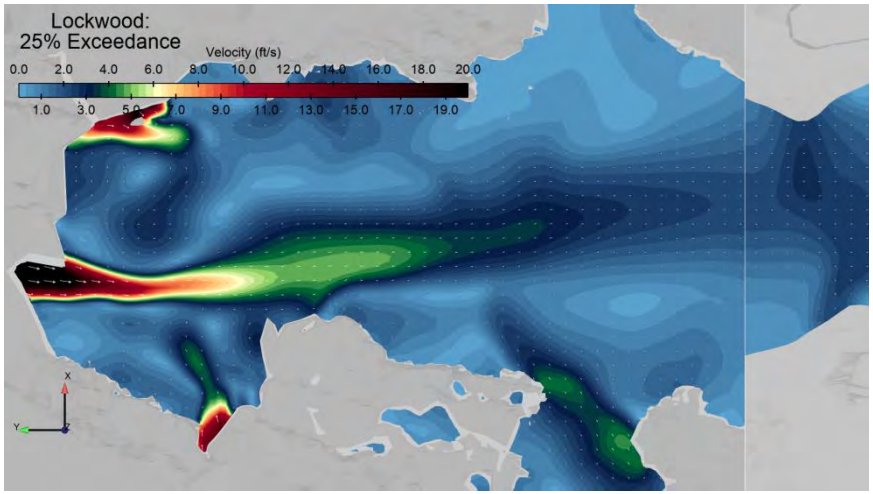


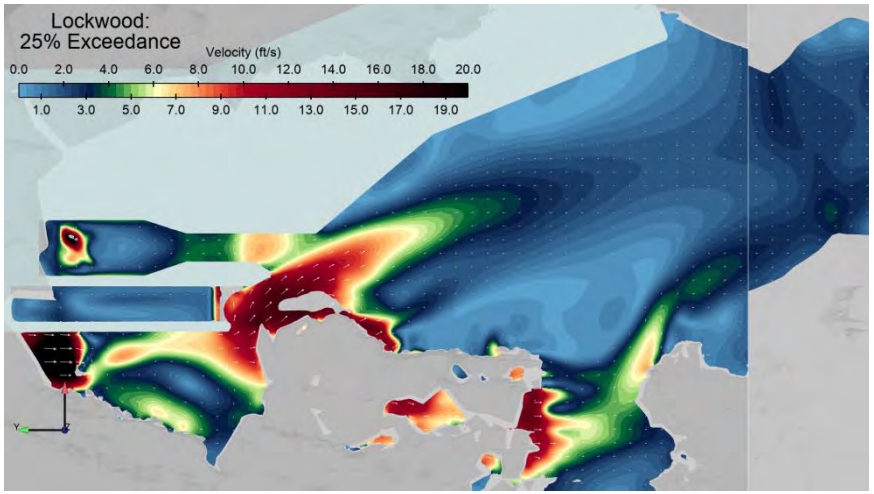
Slice Elevation = 31.5’
Pool WSEL ~ 32.1’
Fishway Gate Invert = 27.6’

Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2



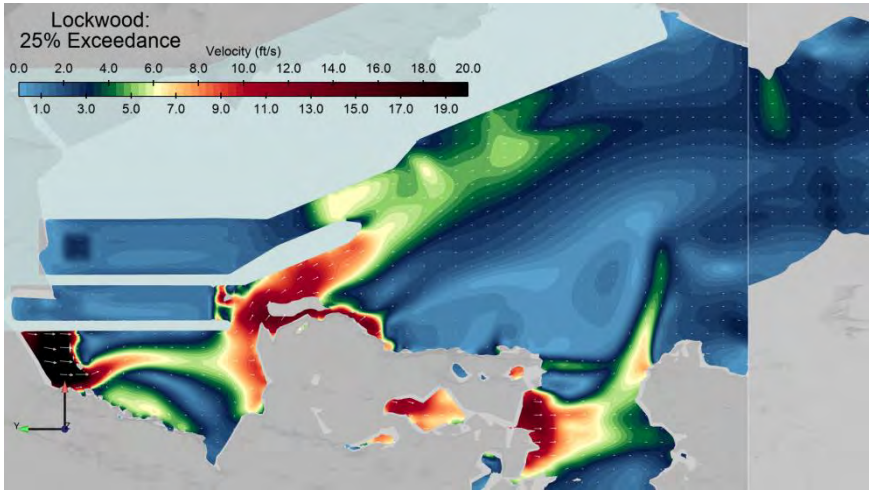
Results: Plan View Slice – 25% Exceedance



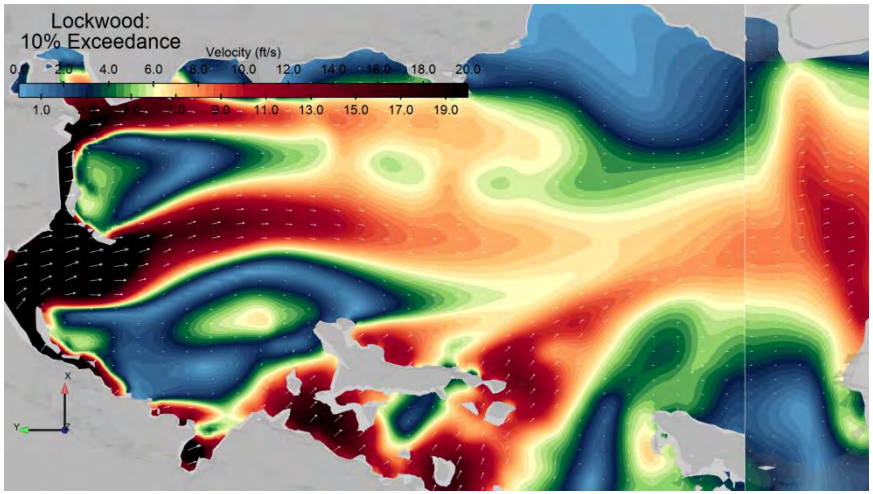


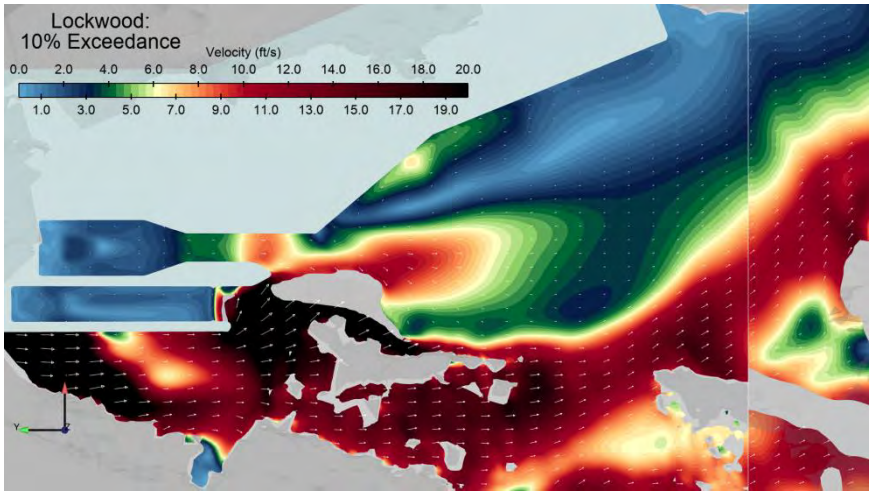
Slice Elevation = 31.5’
Pool WSEL ~ 32.3’
Fishway Gate Invert = 27.8’

Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2



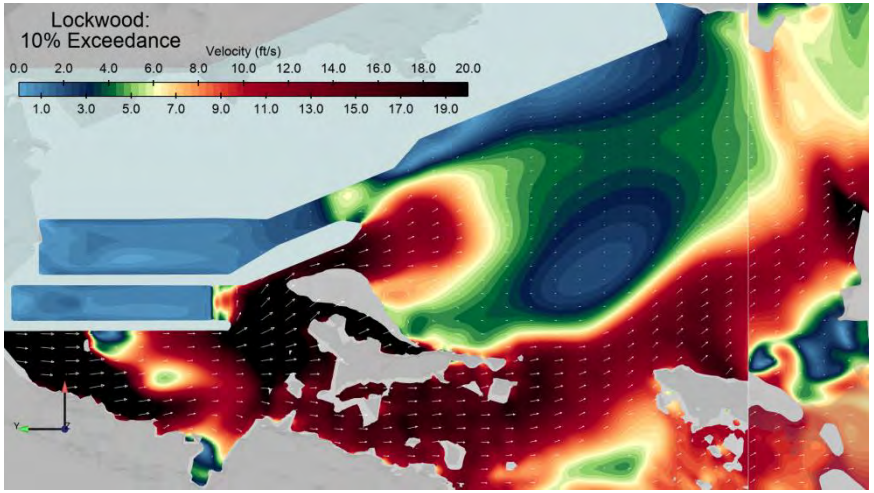
Results: Plan View Slice – 10% Exceedance



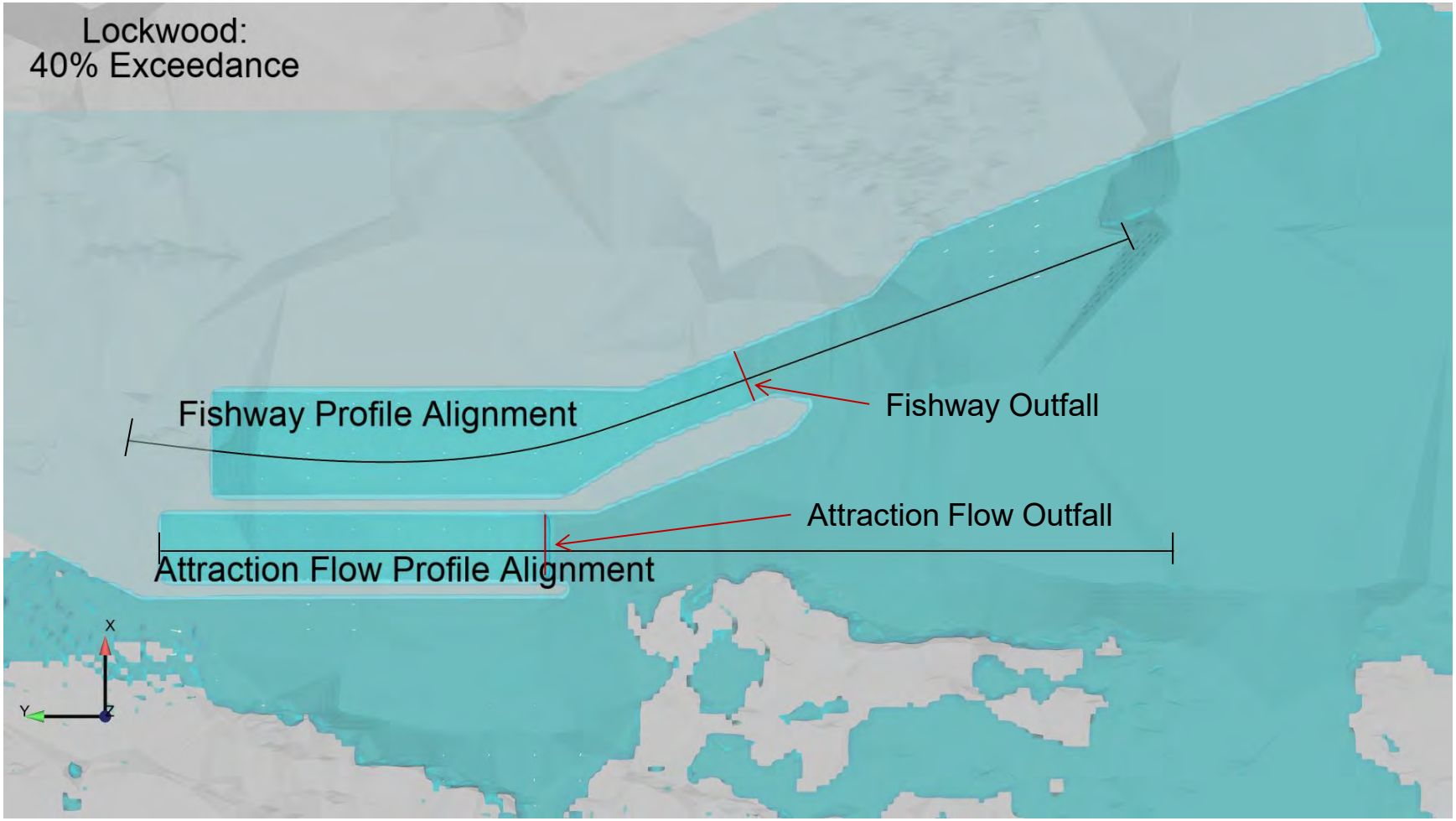


Slice Elevation = 32.5’
Pool WSEL ~ 35.2’
Fishway Gate Invert = 29.8’

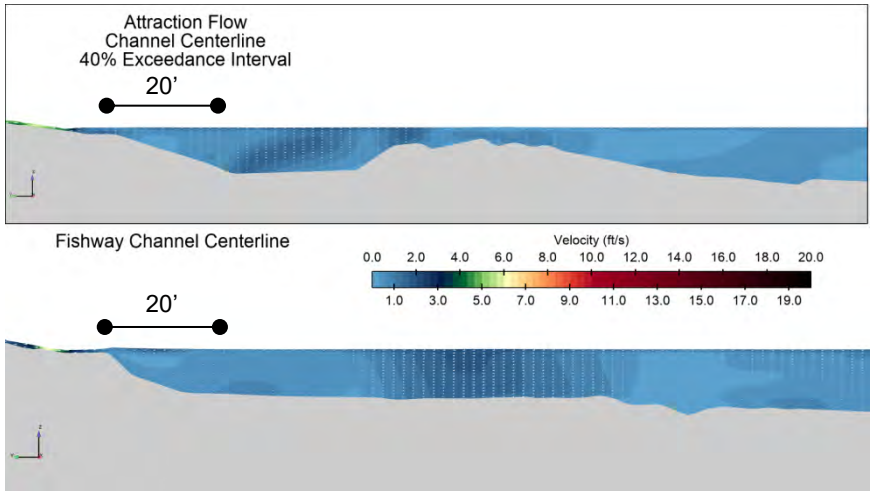
Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

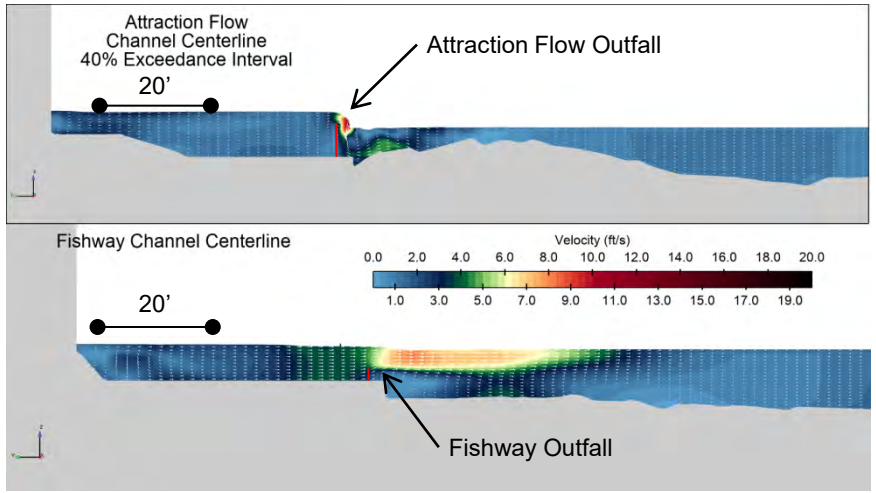


Profile Alignments

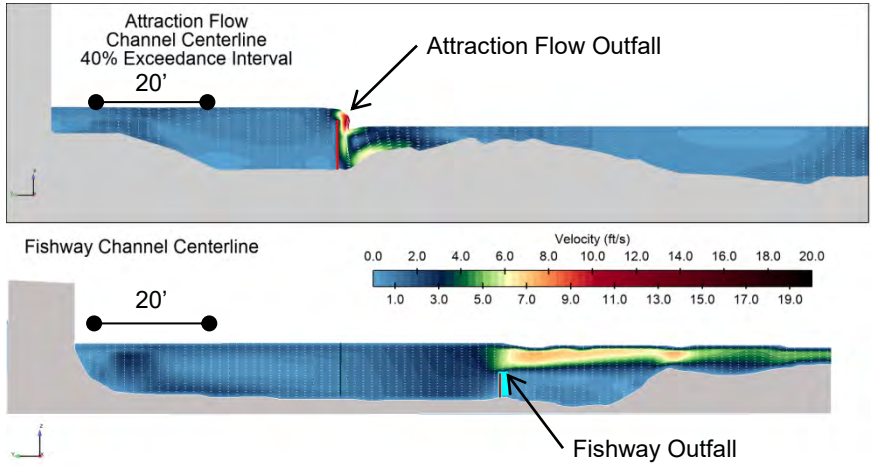


Results: Profiles – 40% Exceedance

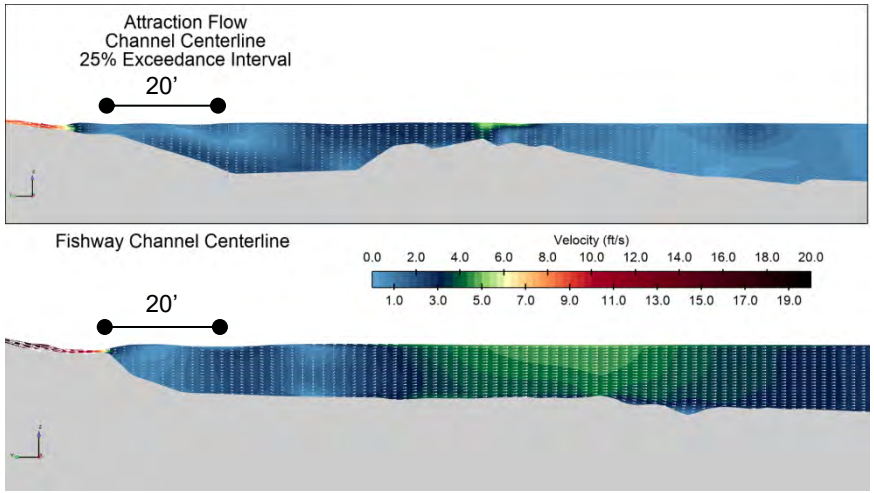


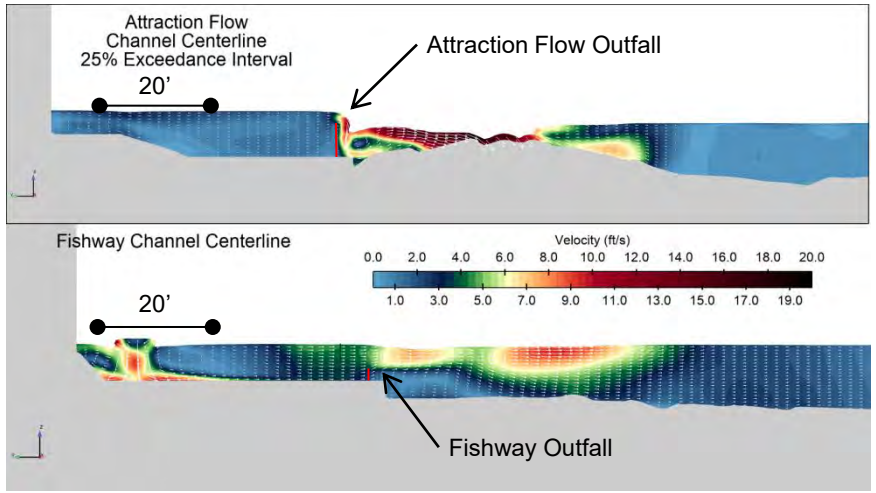


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

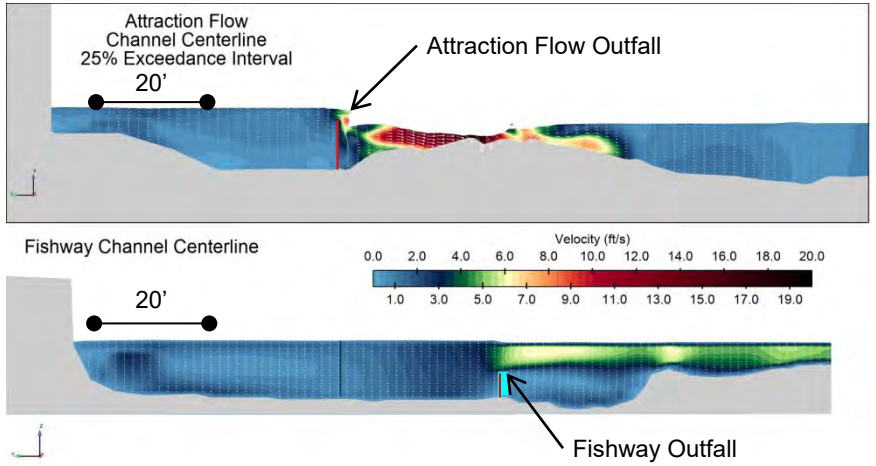


Results: Profiles – 25% Exceedance

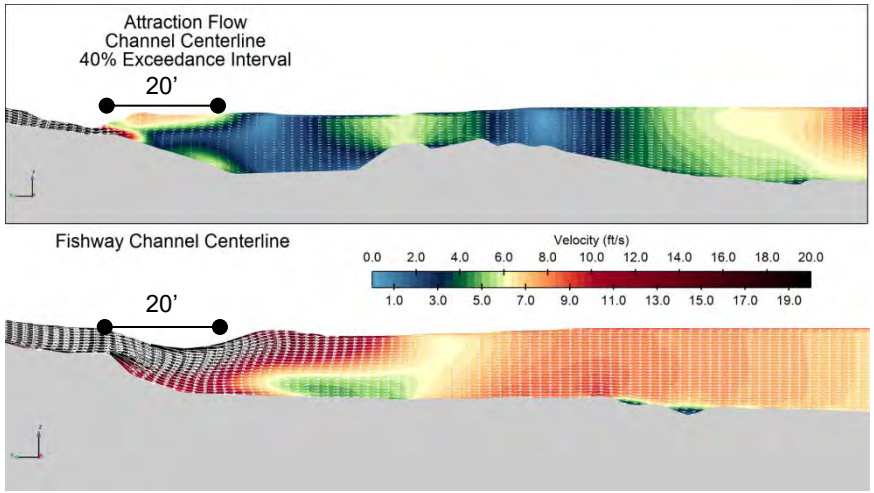


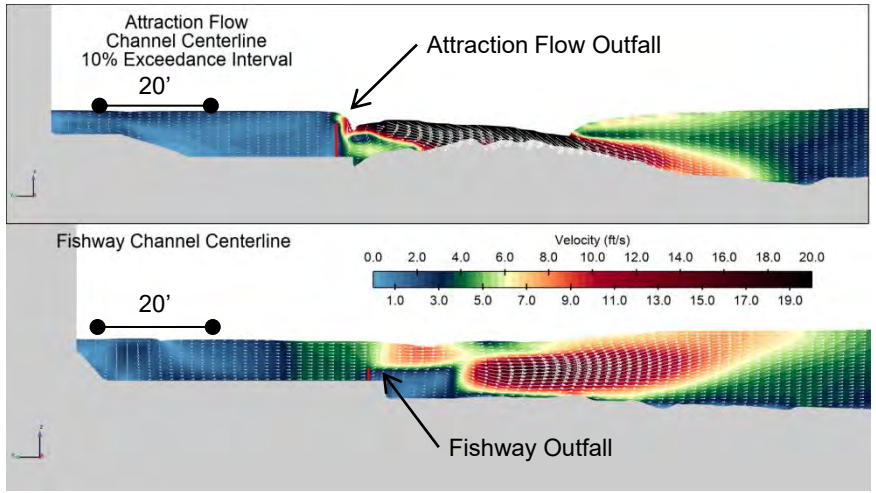


Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2

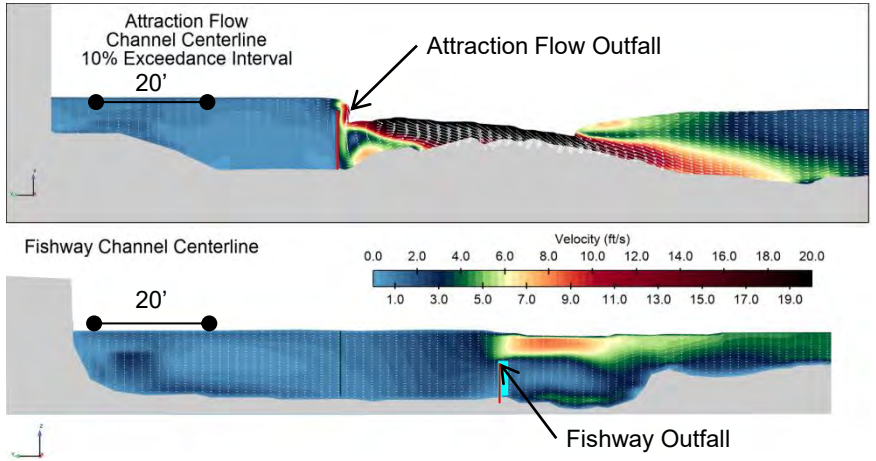


Results: Profiles – 10% Exceedance



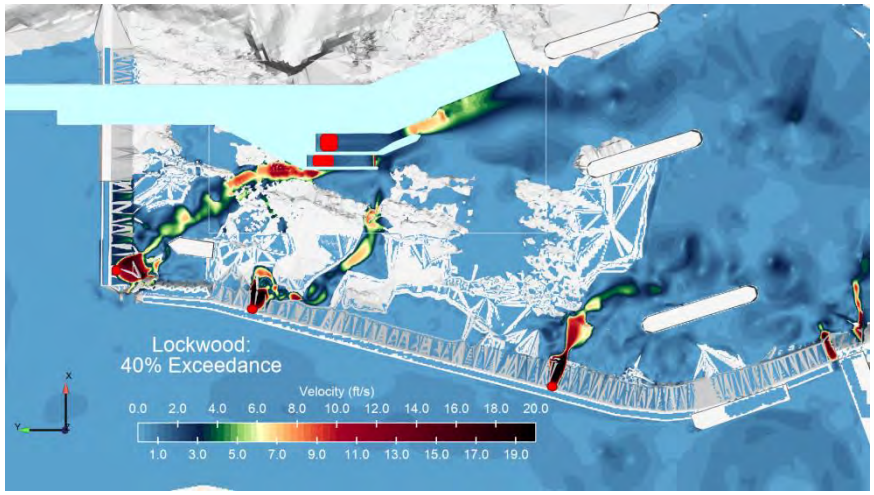


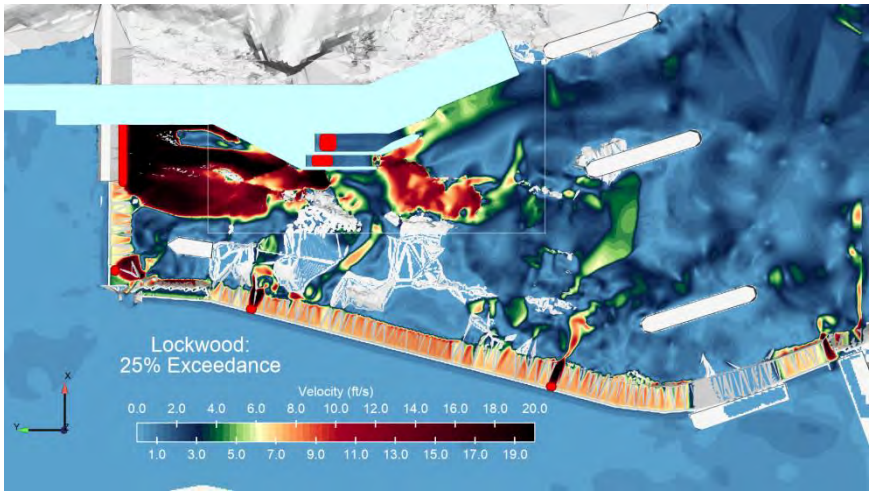
Top Left – Existing Conditions
Top Right – Alternative 1
Bottom Right – Alternative 2



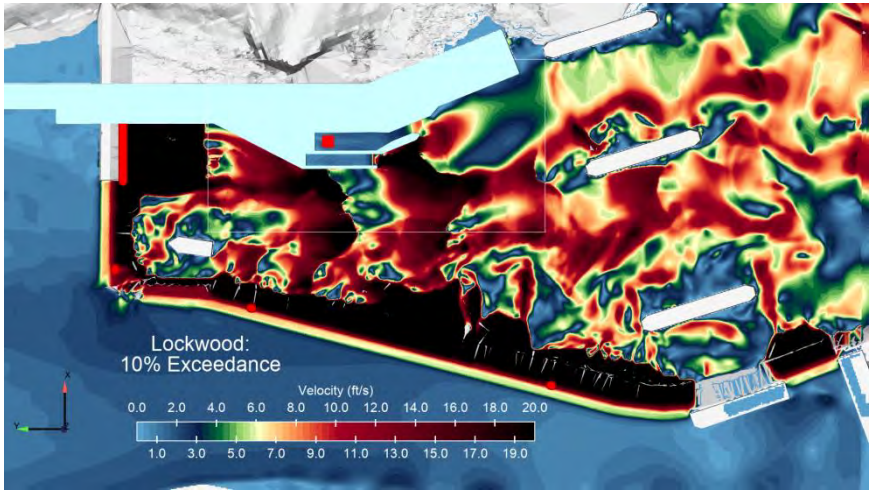
Alternative 2 – Detailed Results
Optimized Design

Results: Alternative 2 - Overview

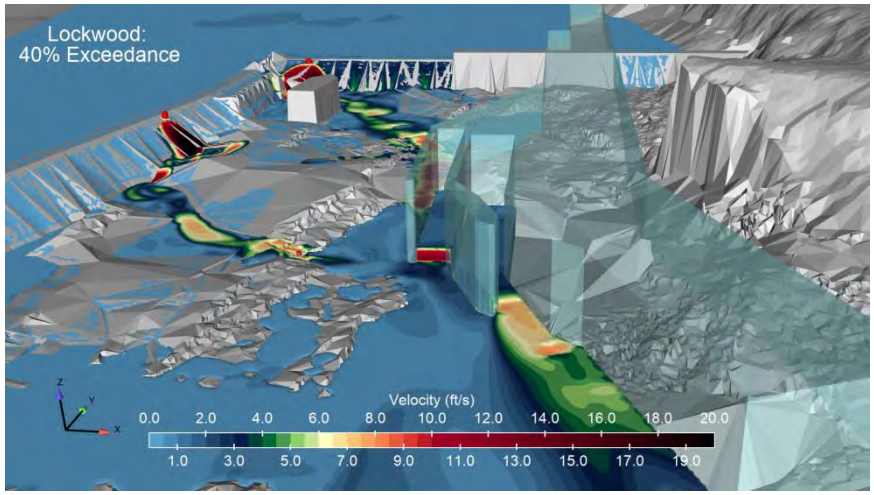


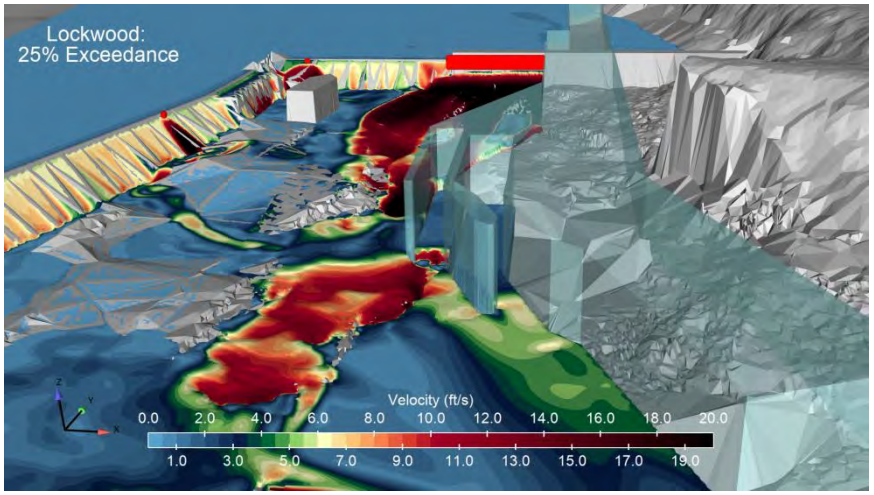


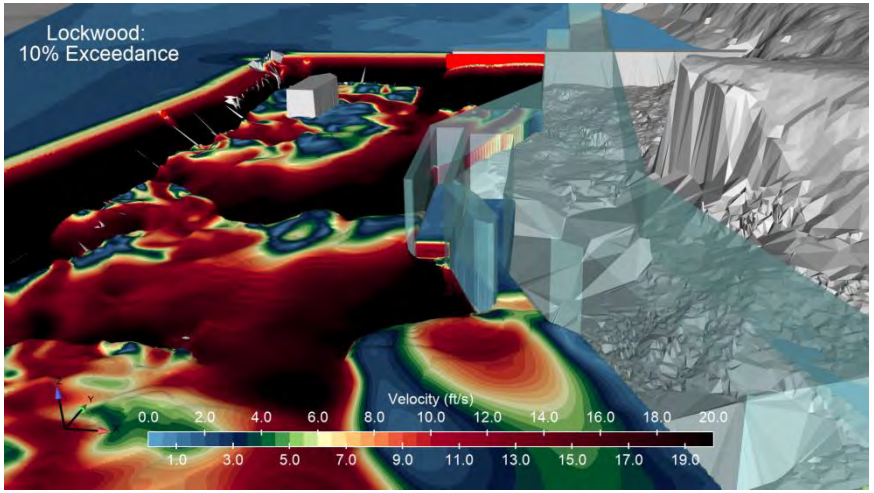
Top Left – 40% Exceedance
Top Right – 25% Exceedance
Bottom Right – 10% Exceedance



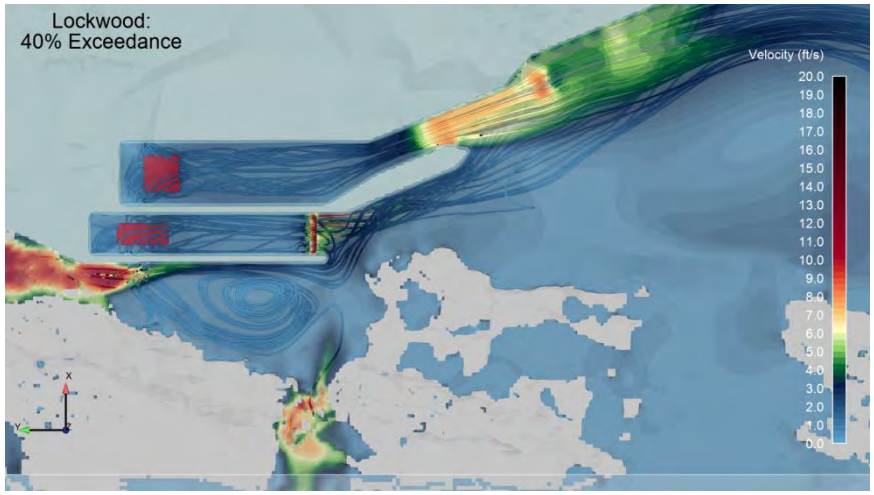
Results: Alternative 2 - Isometric

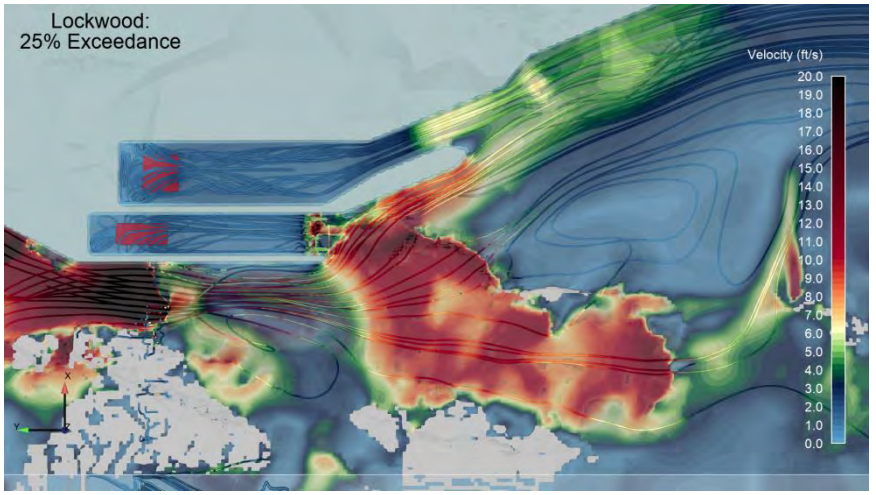




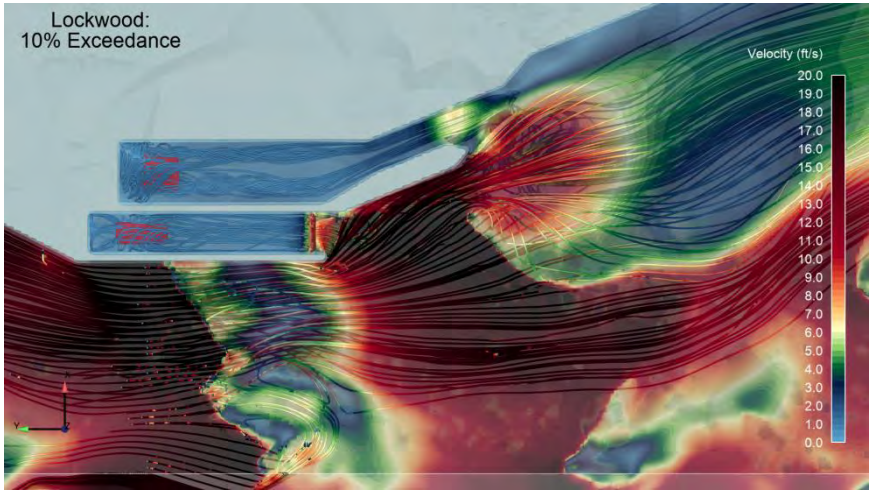


Results: Alternative 2 - Streamlines

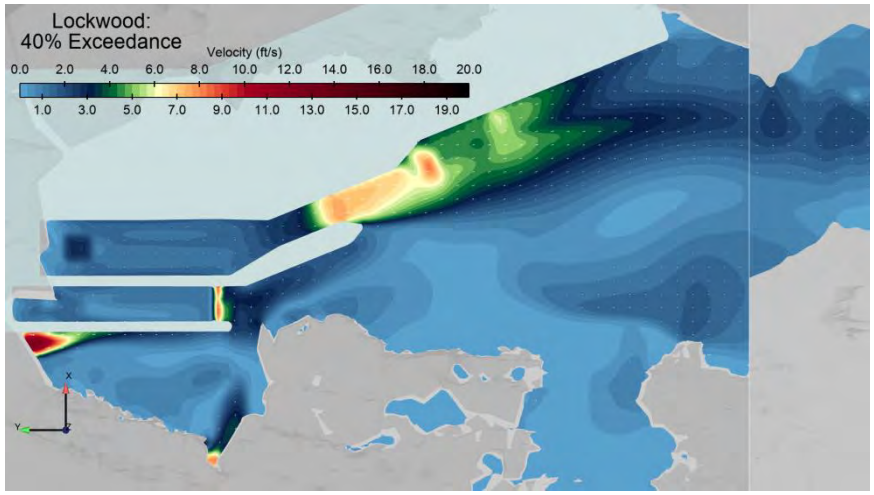


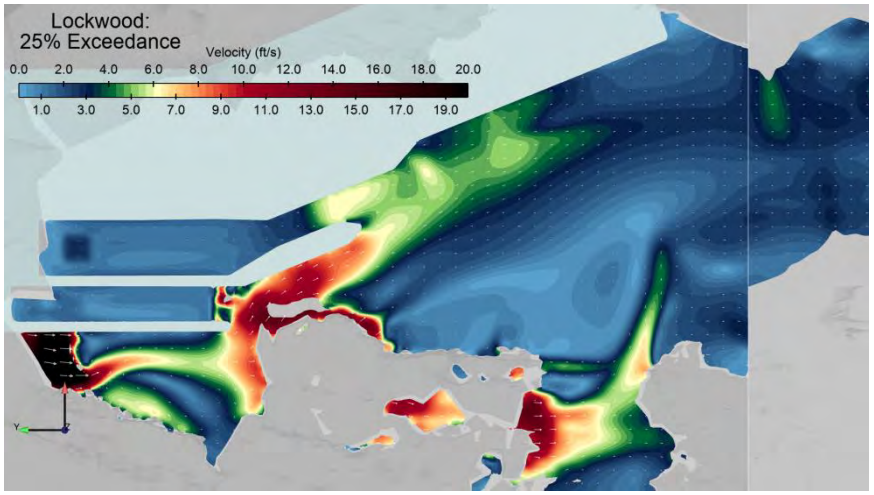


Top Left – 40% Exceedance
Top Right – 25% Exceedance
Bottom Right – 10% Exceedance



Results: Alternative 2 – Z Slice

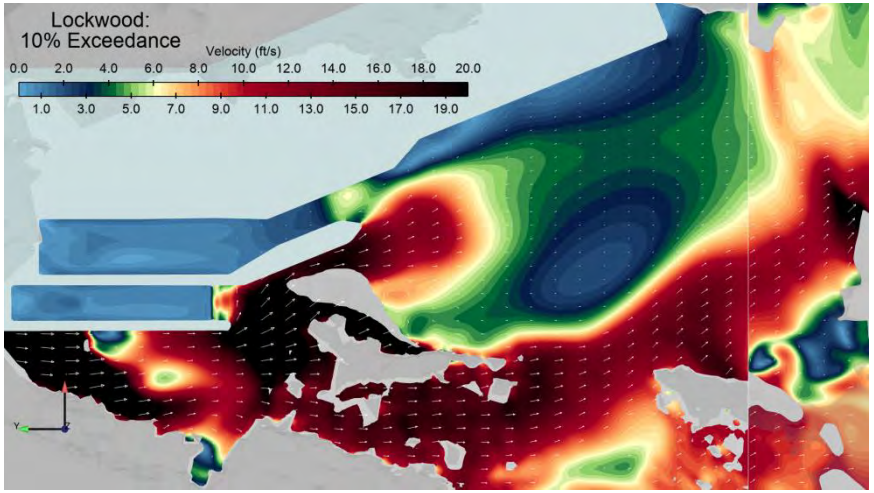




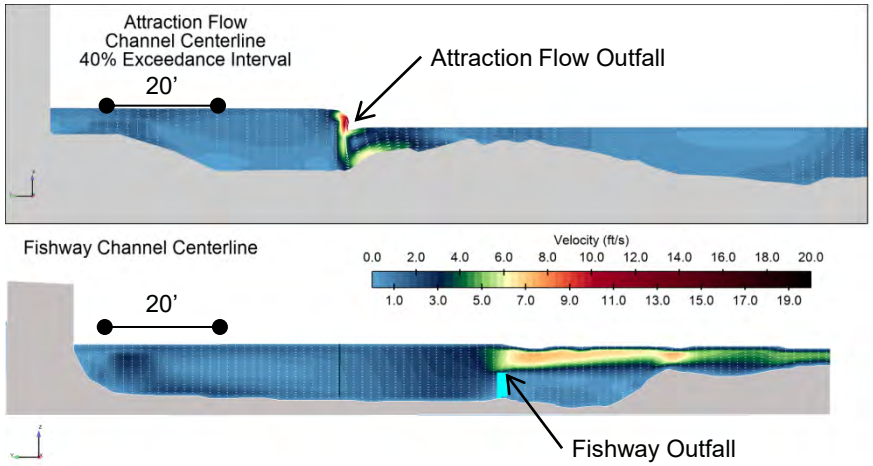
Top Left – 40% Exceedance
Slice Elevation = 31.5’

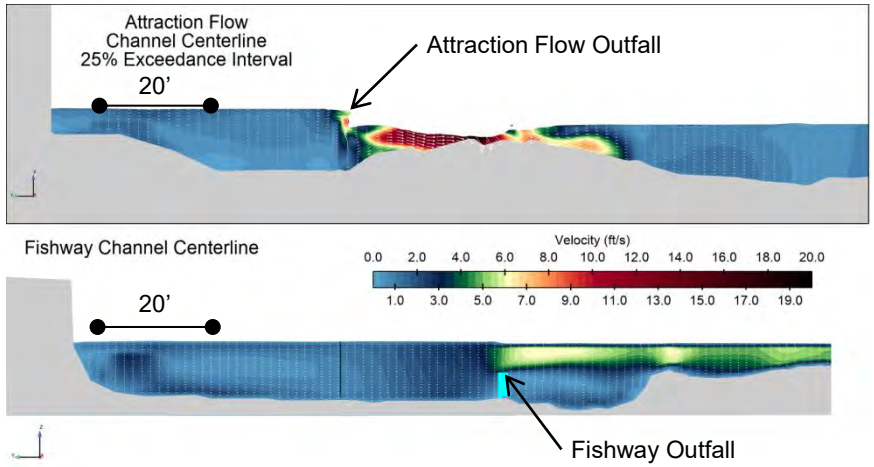
Top Right – 25% Exceedance
Slice Elevation = 31.5’

Bottom Right – 10% Exceedance
Slice Elevation = 32.5’

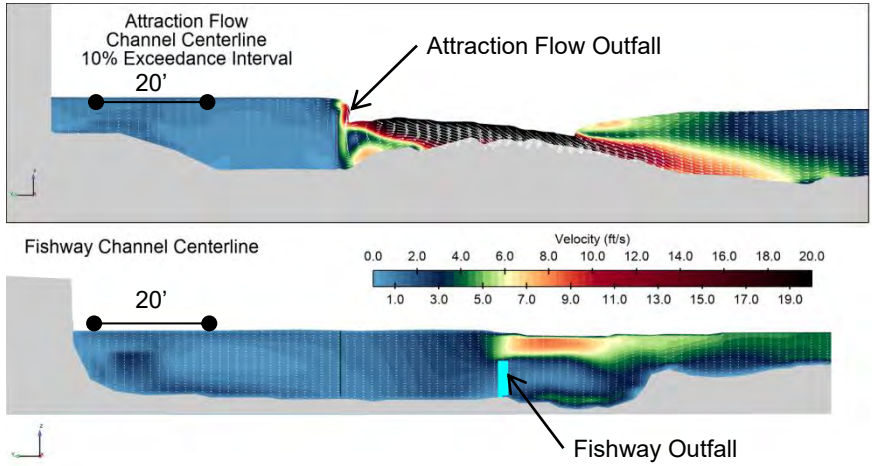


Results: Alternative 2 - Profiles

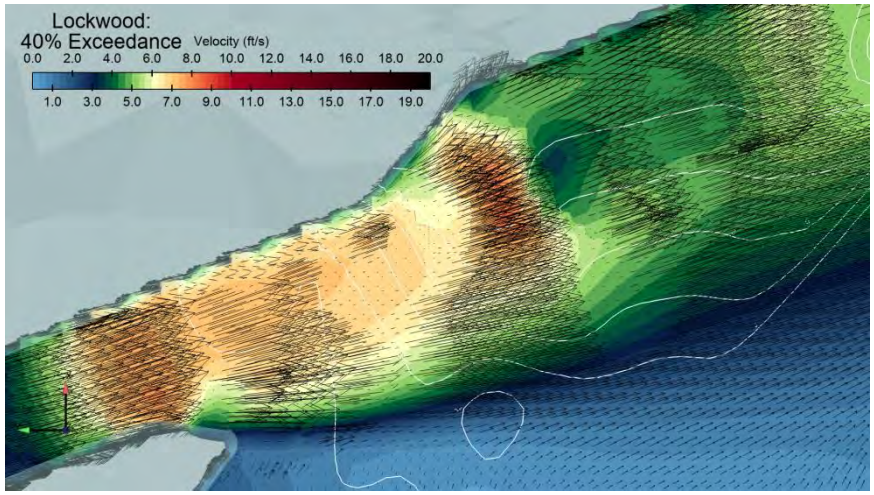


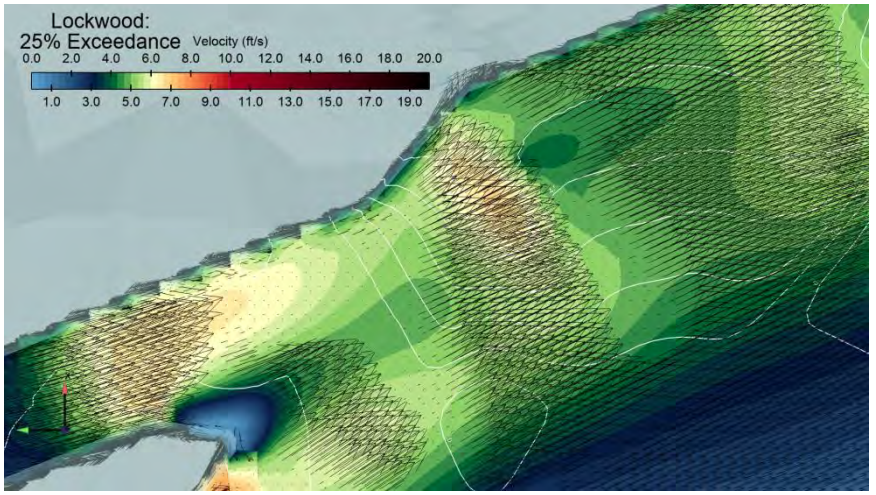


Top Left – 40% Exceedance
Top Right – 25% Exceedance
Bottom Right – 10% Exceedance

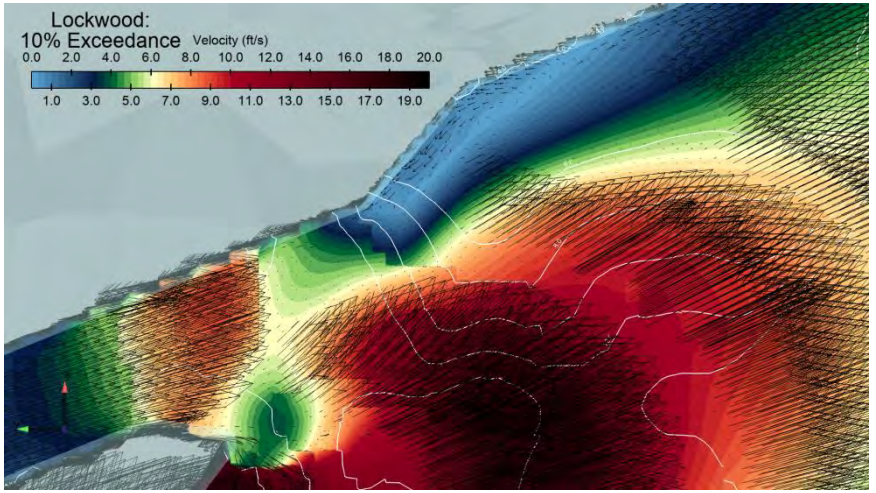


Results: Alternative 2 – Entrance Detail

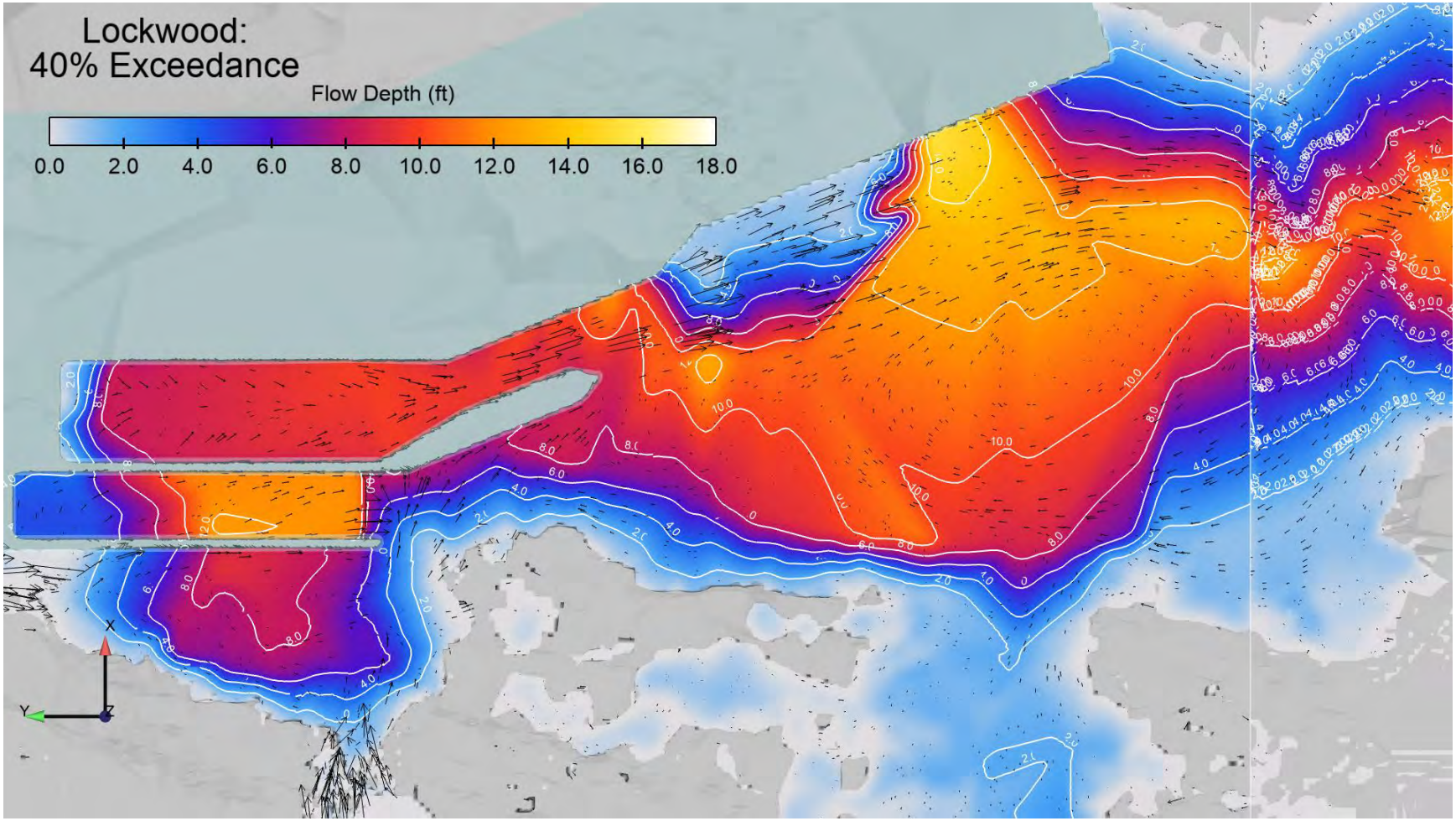




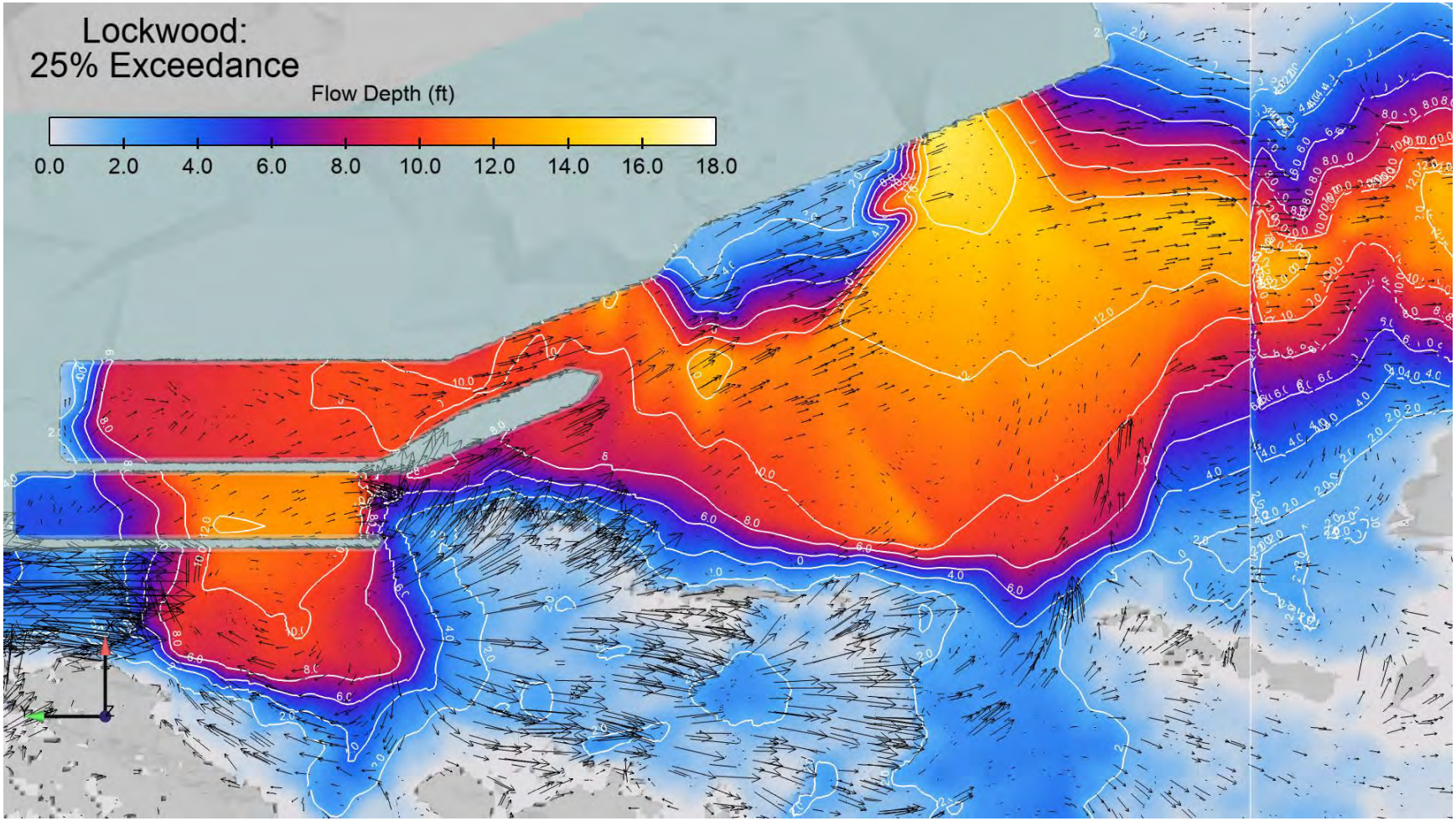
Top Left – 40% Exceedance
Top Right – 25% Exceedance
Bottom Right – 10% Exceedance



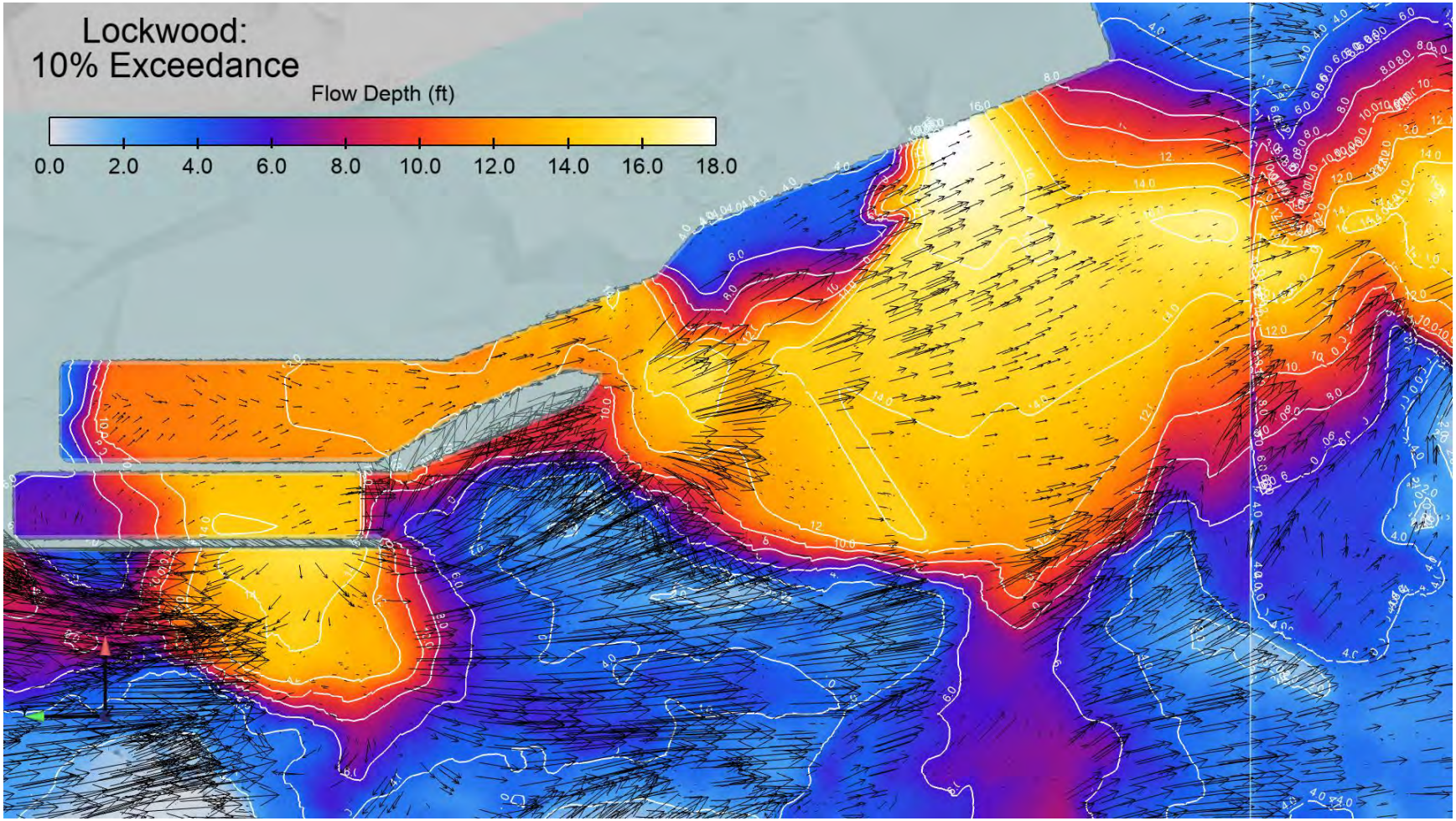
Alternative 2 – Depth – 40% Exceedance



Alternative 2 – Depth – 25% Exceedance

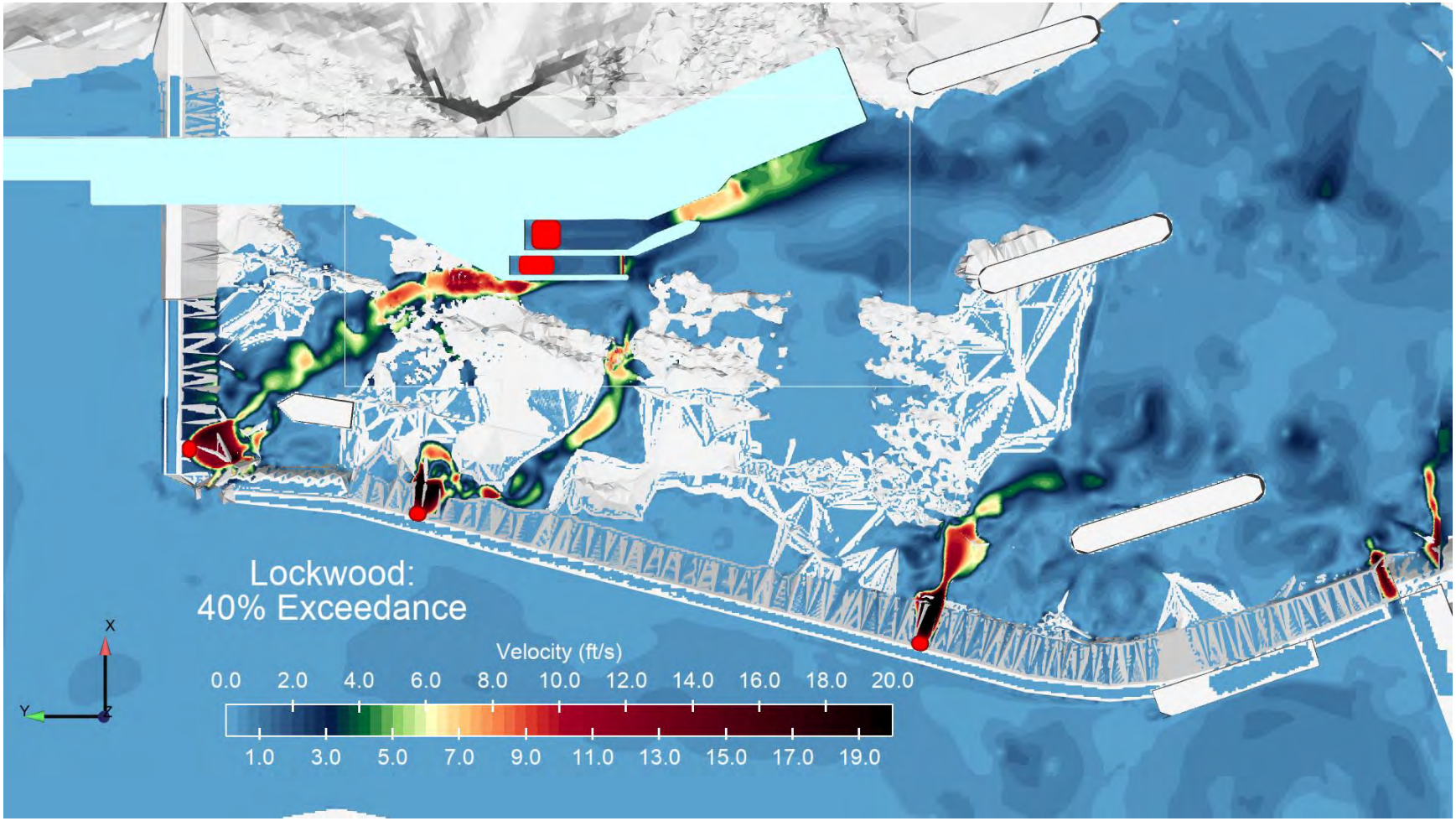


Alternative 2 – Depth – 10% Exceedance

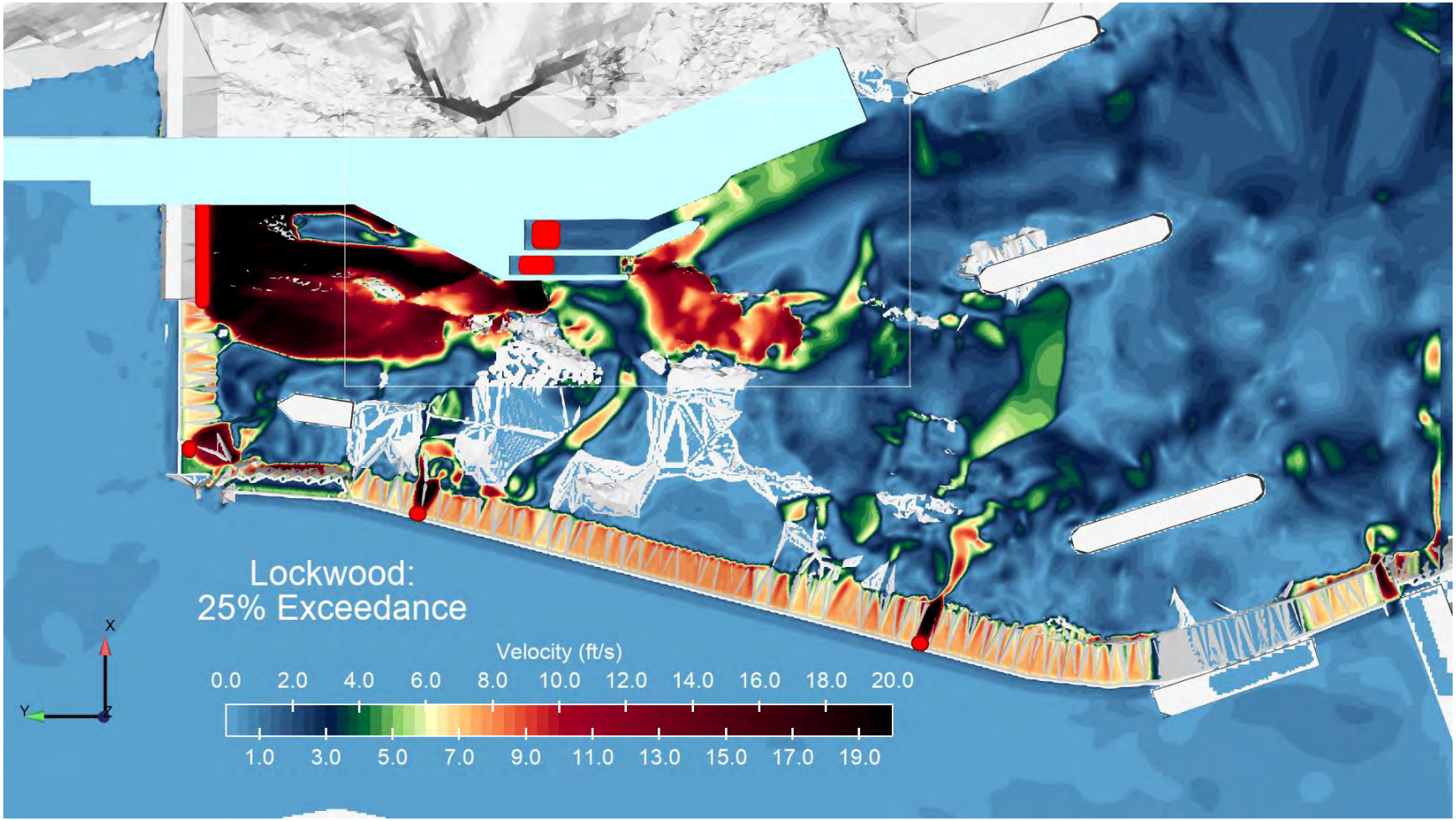


Questions?

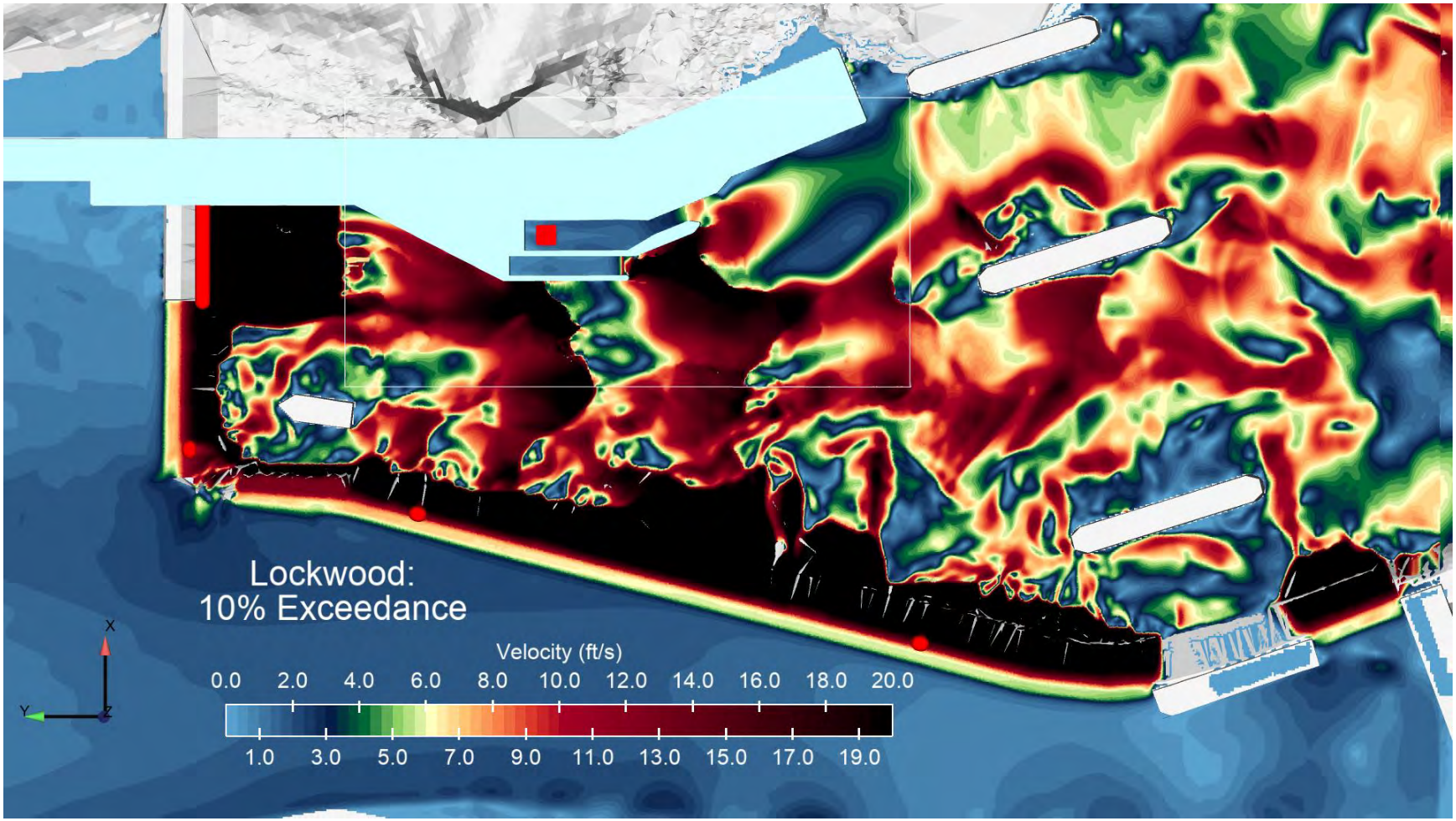
Alternative 2 – Overview – 40% Exceedance



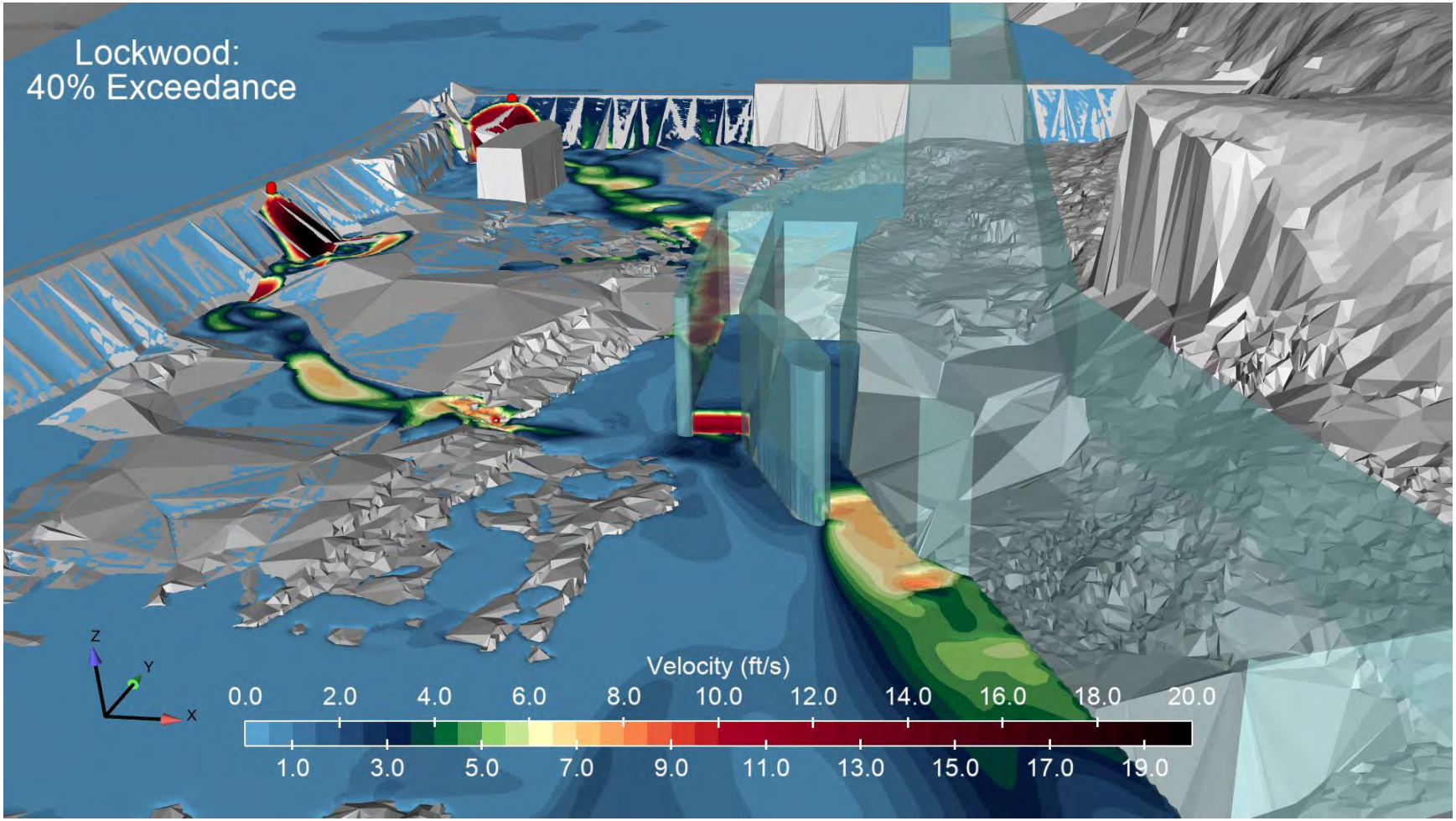
Alternative 2 – Overview – 25% Exceedance



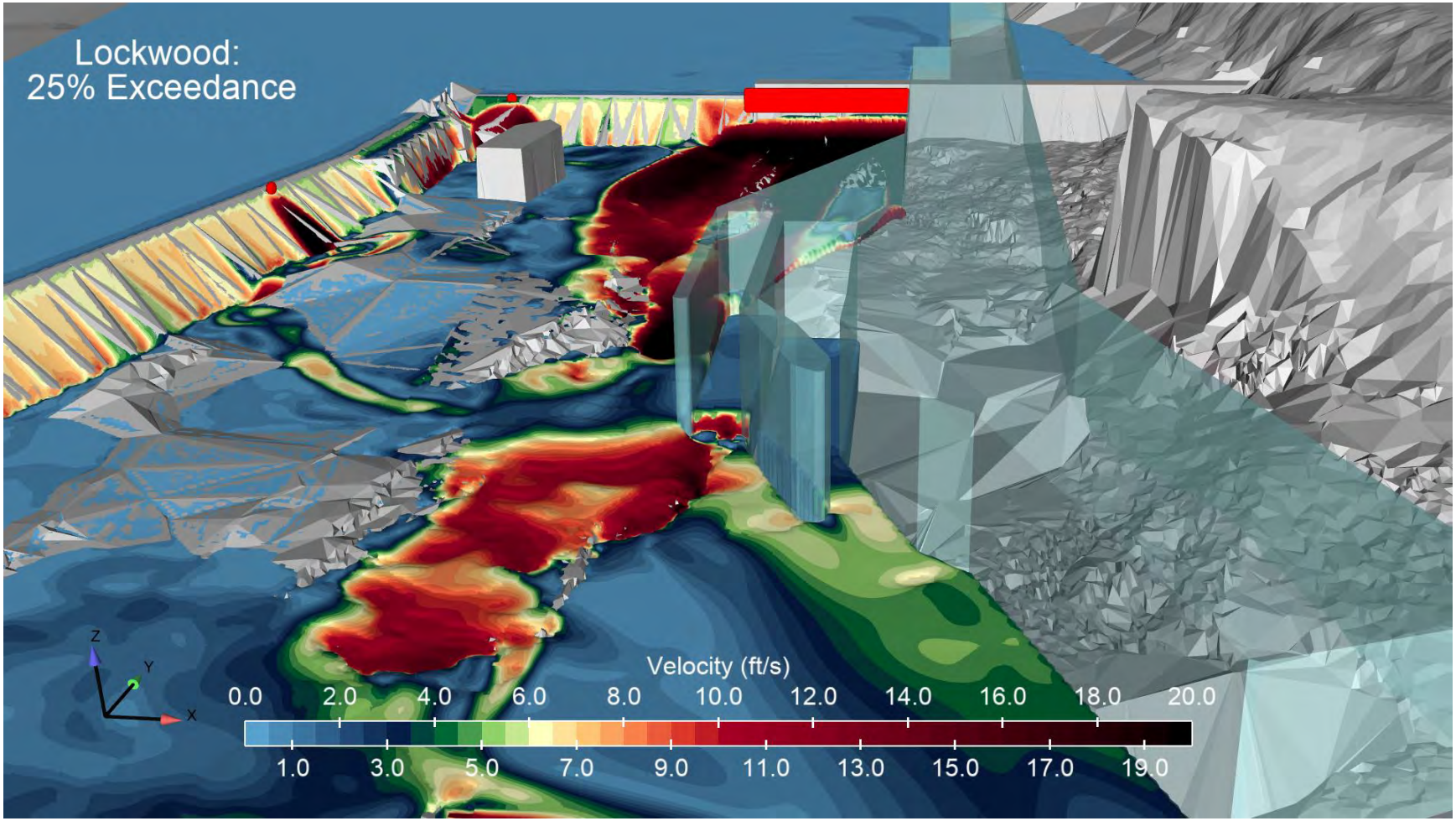
Alternative 2 – Overview – 10% Exceedance



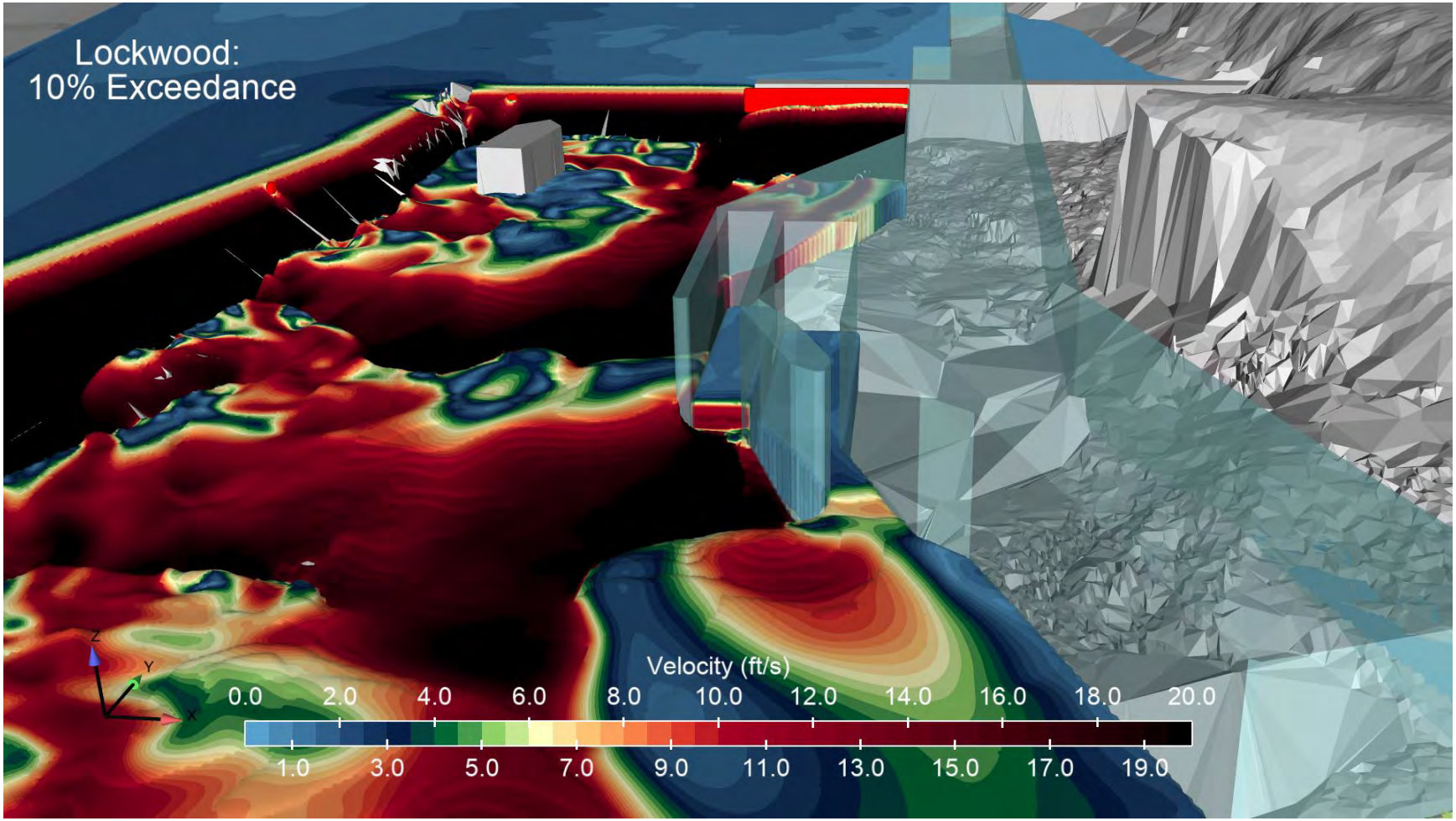
Alternative 2 – Isometric – 40% Exceedance



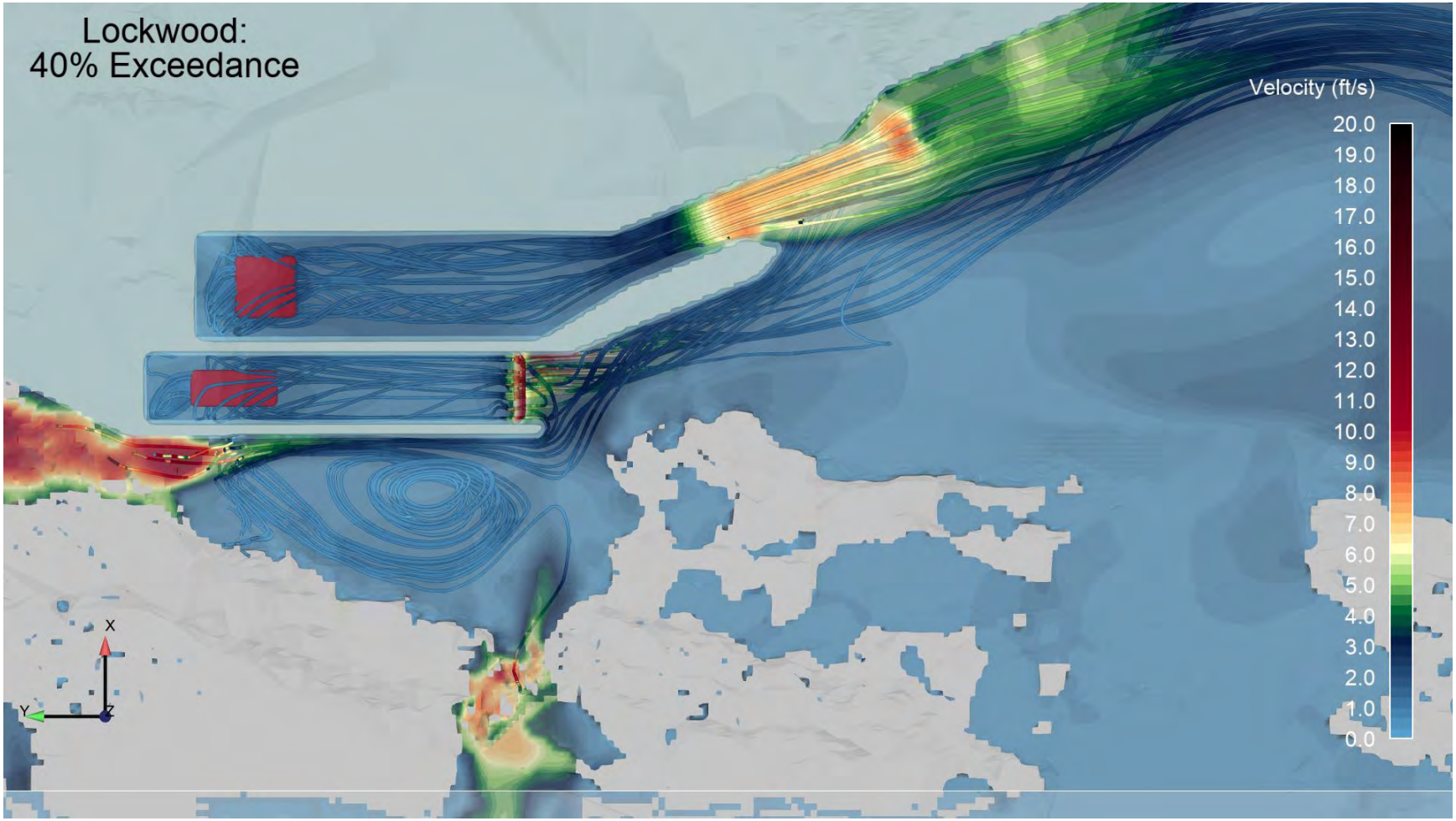
Alternative 2 – Isometric – 25% Exceedance



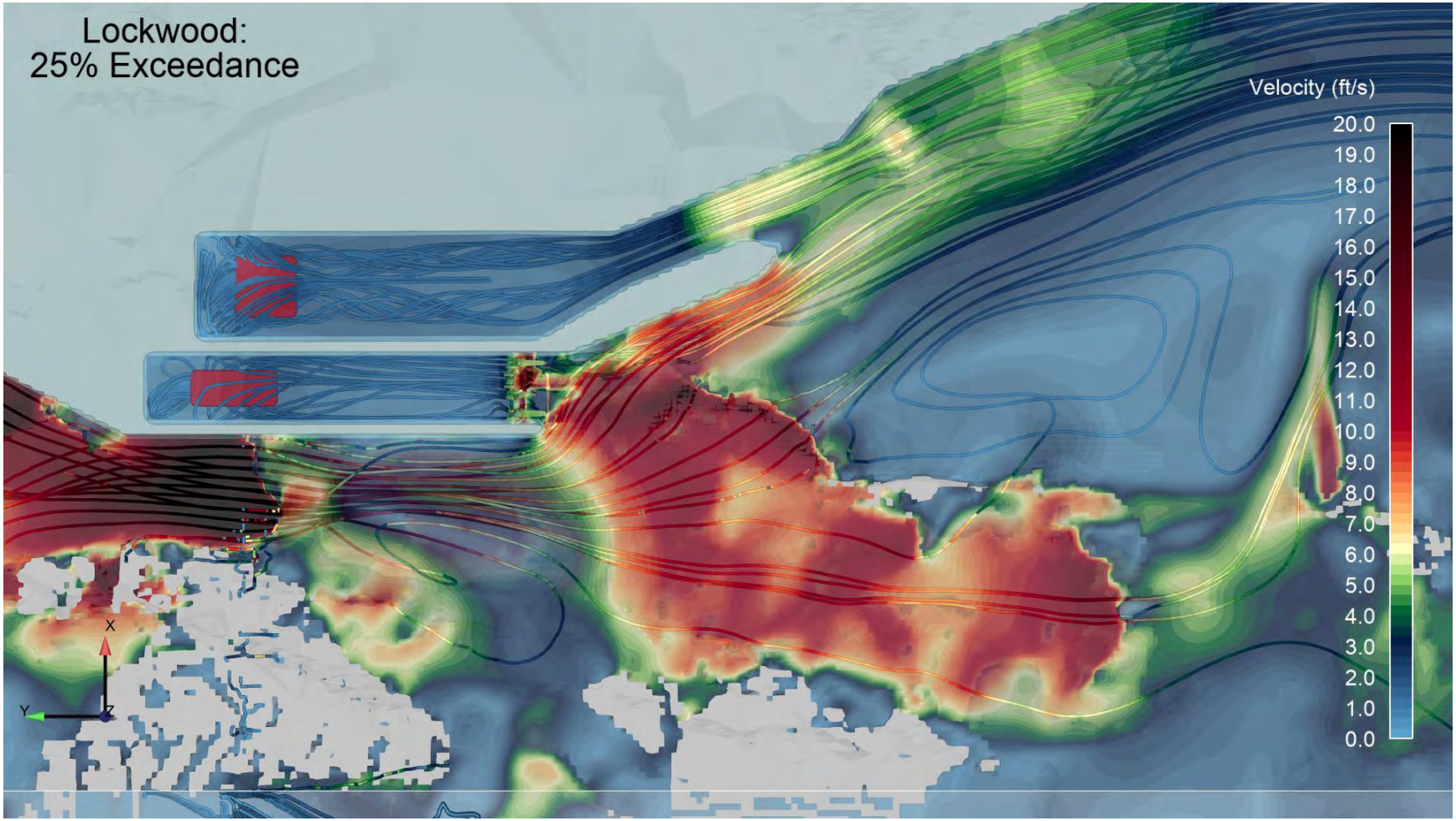
Alternative 2 – Isometric – 10% Exceedance



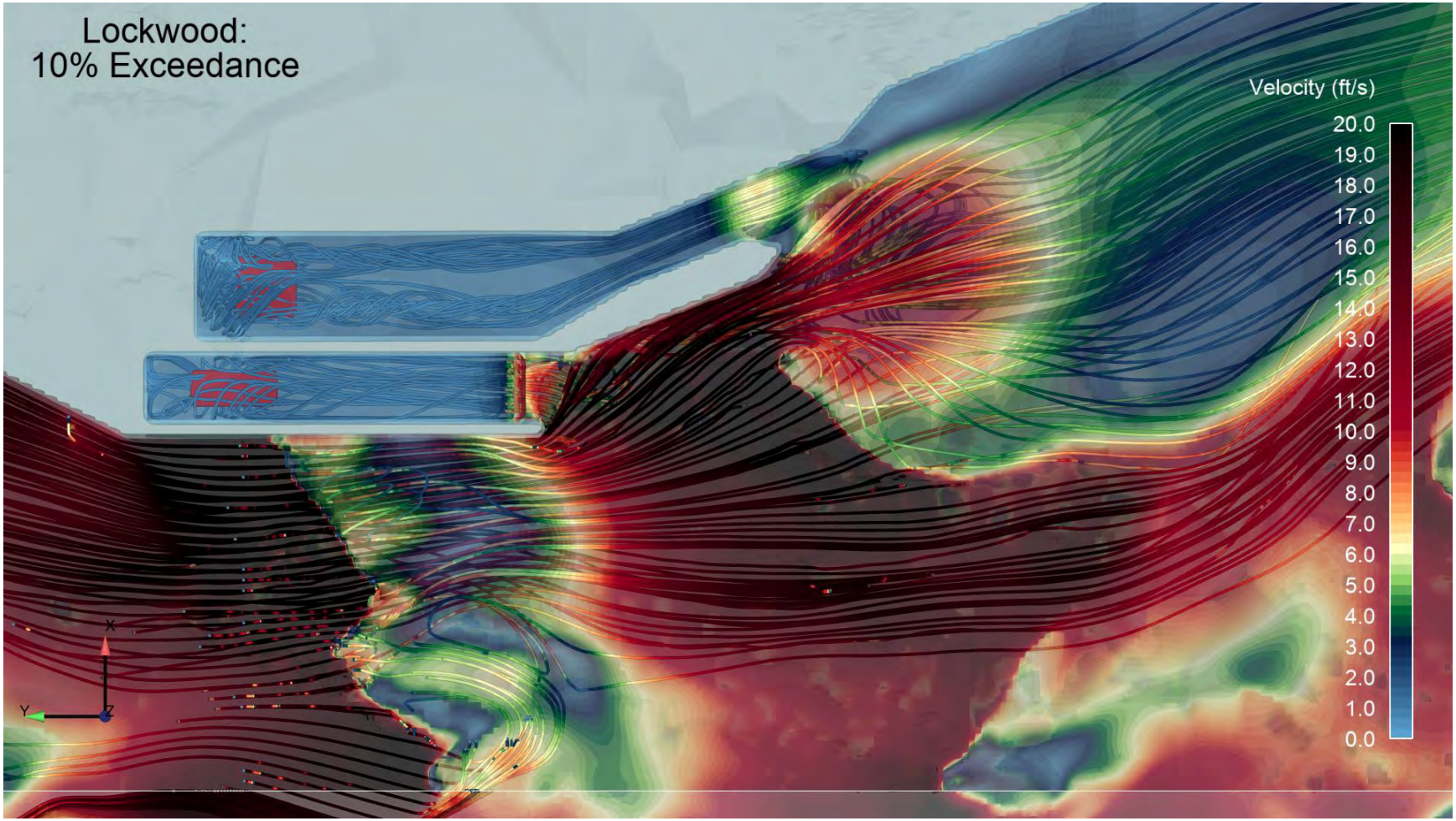
Alternative 2 – Streamlines – 40% Exceedance



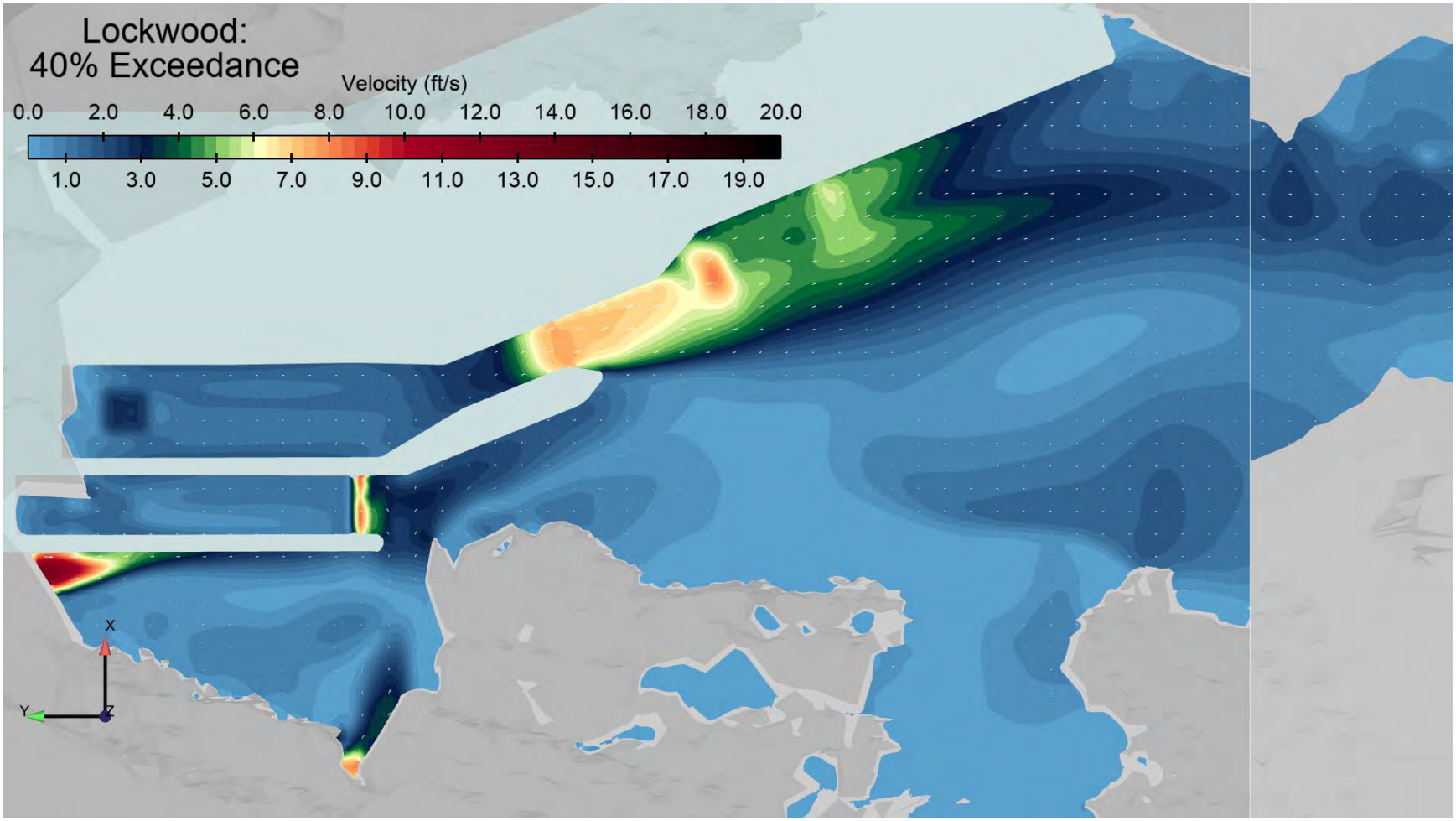
Alternative 2 – Streamlines – 25% Exceedance



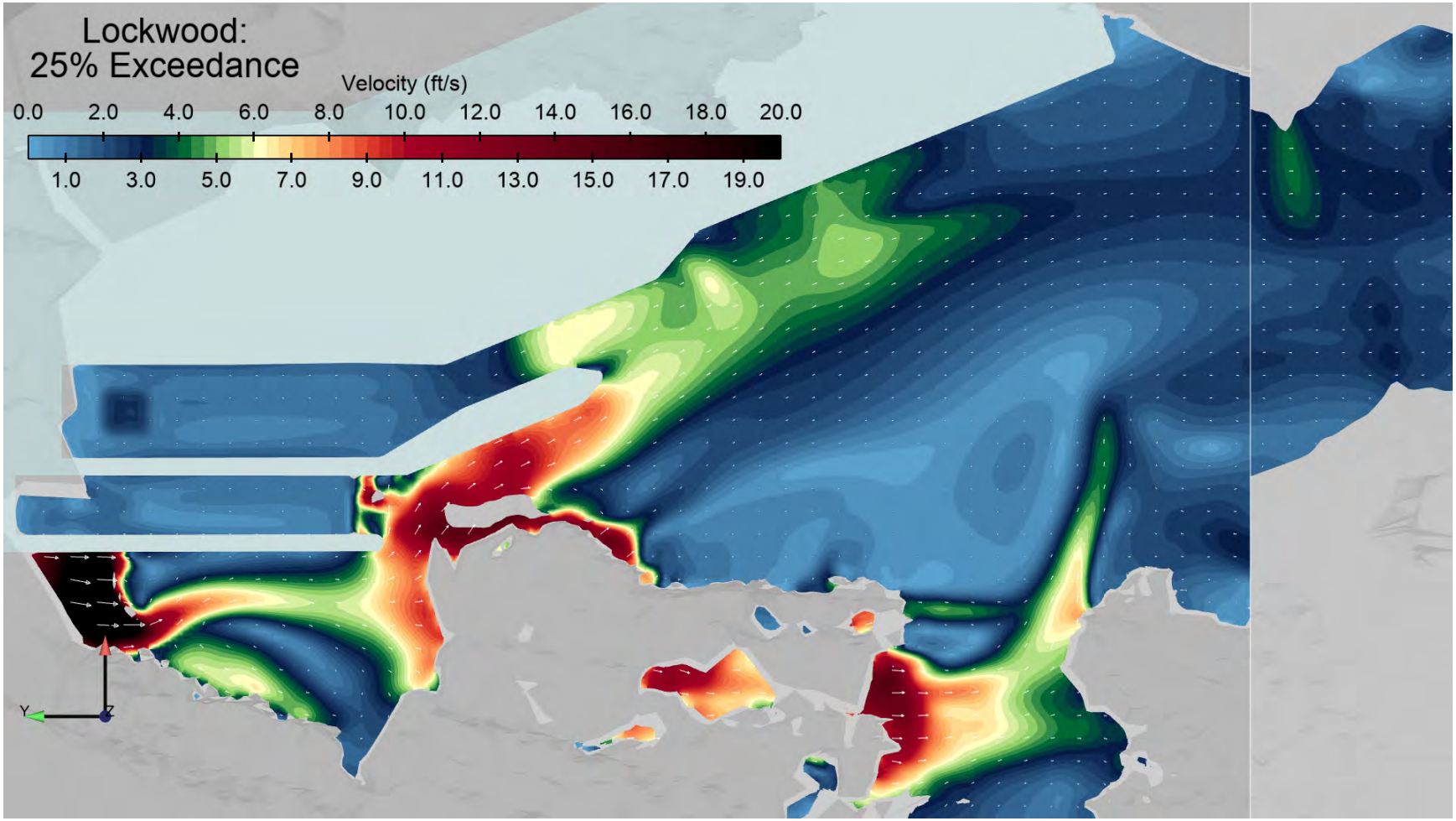
Alternative 2 – Streamlines – 10% Exceedance



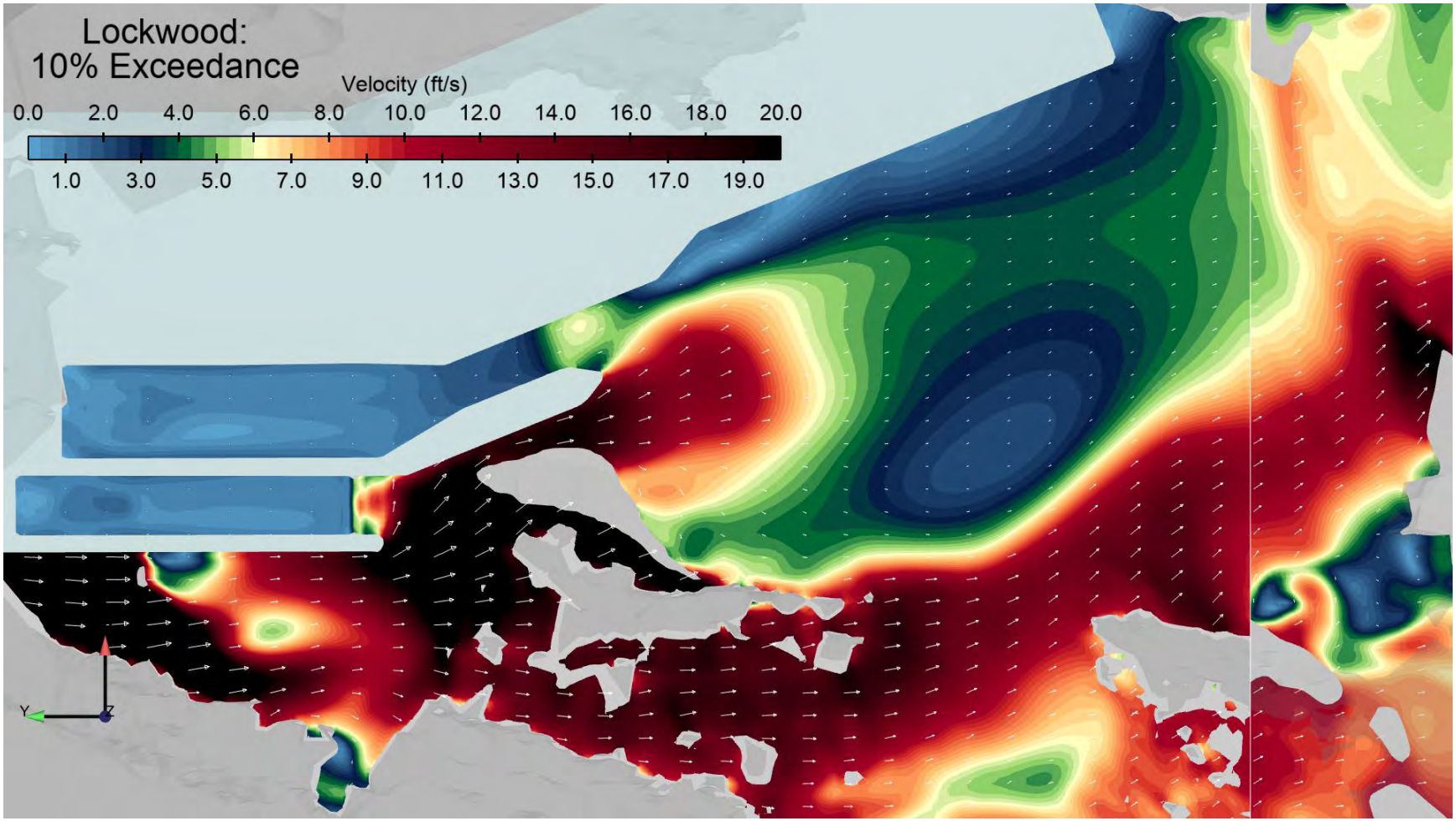
Alternative 2 – Z Slice (31.5') – 40% Exceedance



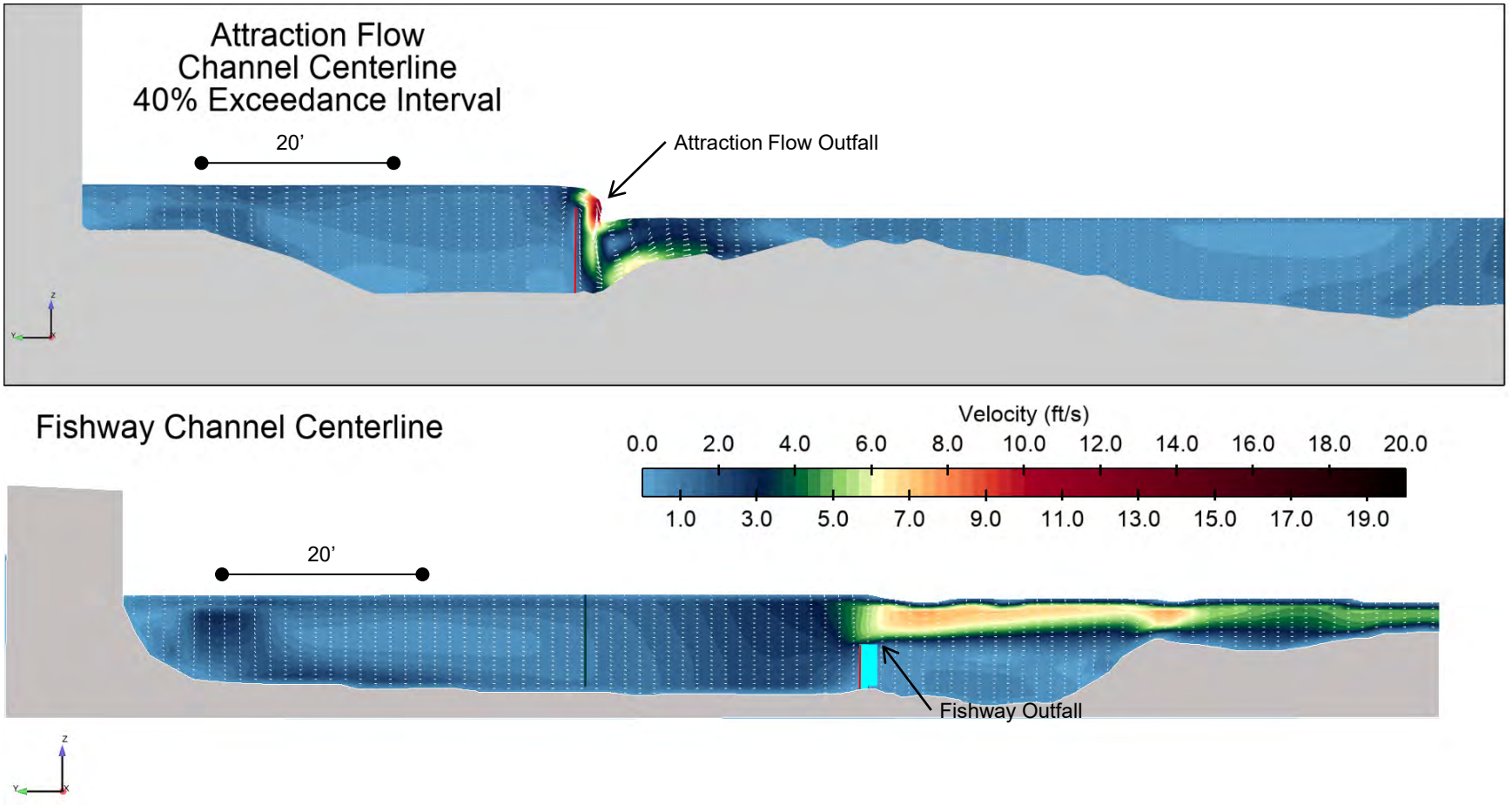
Alternative 2 – Z Slice (31.5') – 25% Exceedance



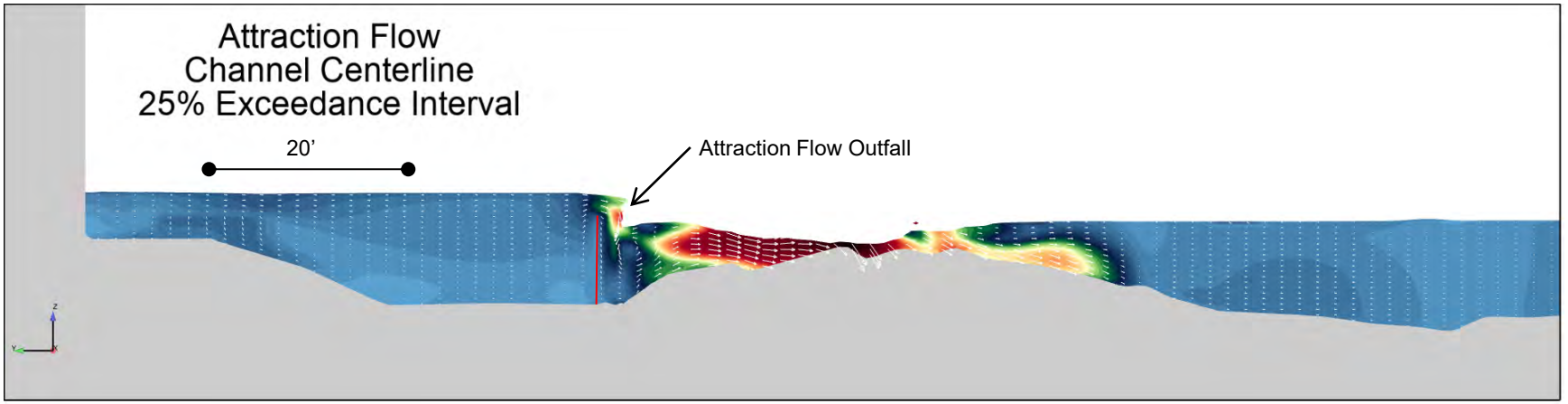
Alternative 2 – Z Slice (32.5') – 10% Exceedance

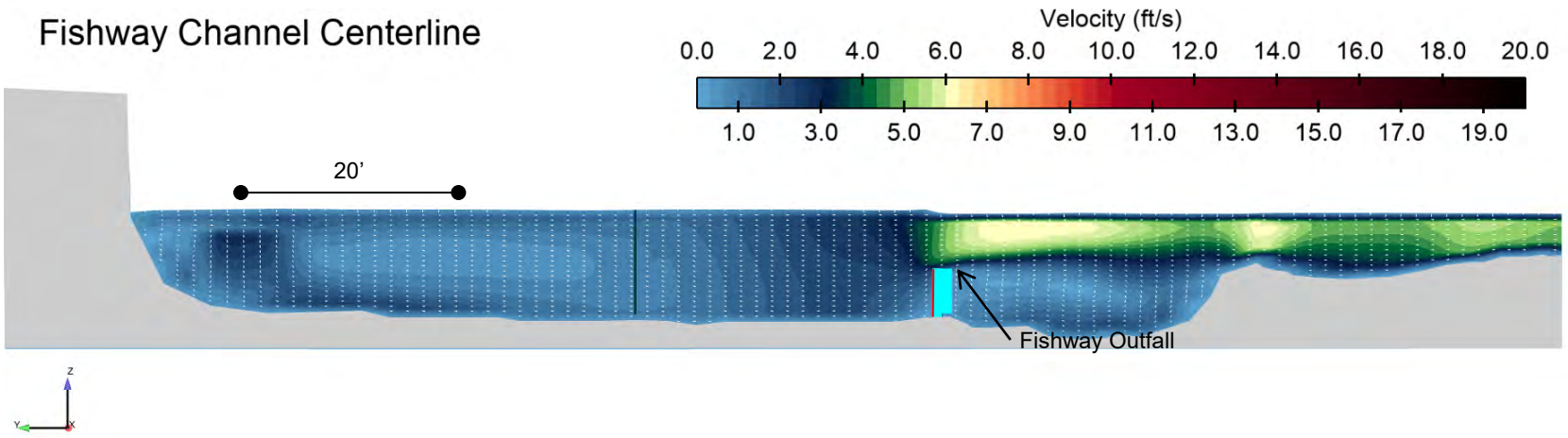


Alternative 2 – Profiles – 40% Exceedance

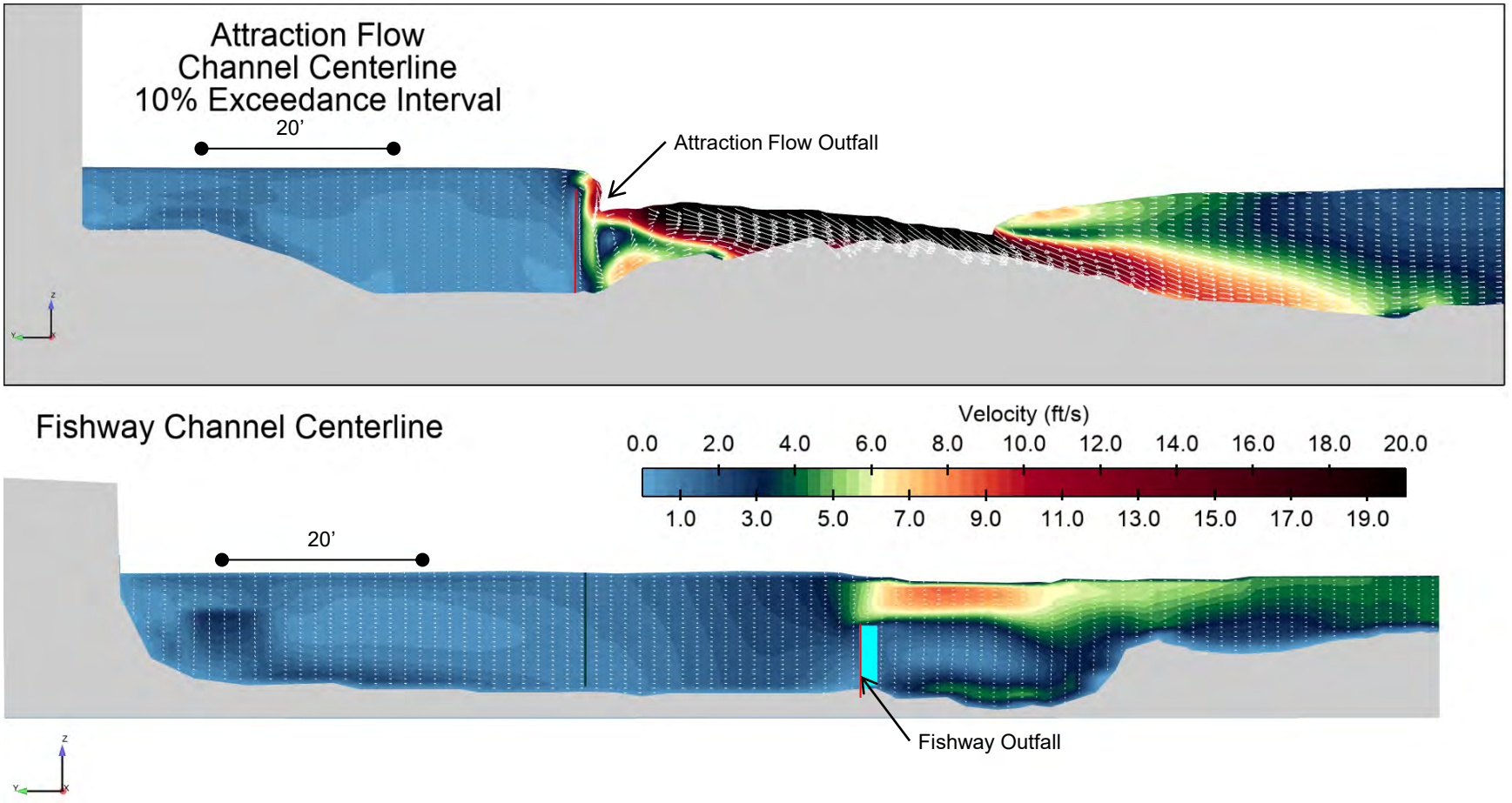


Alternative 2 – Profiles – 25% Exceedance

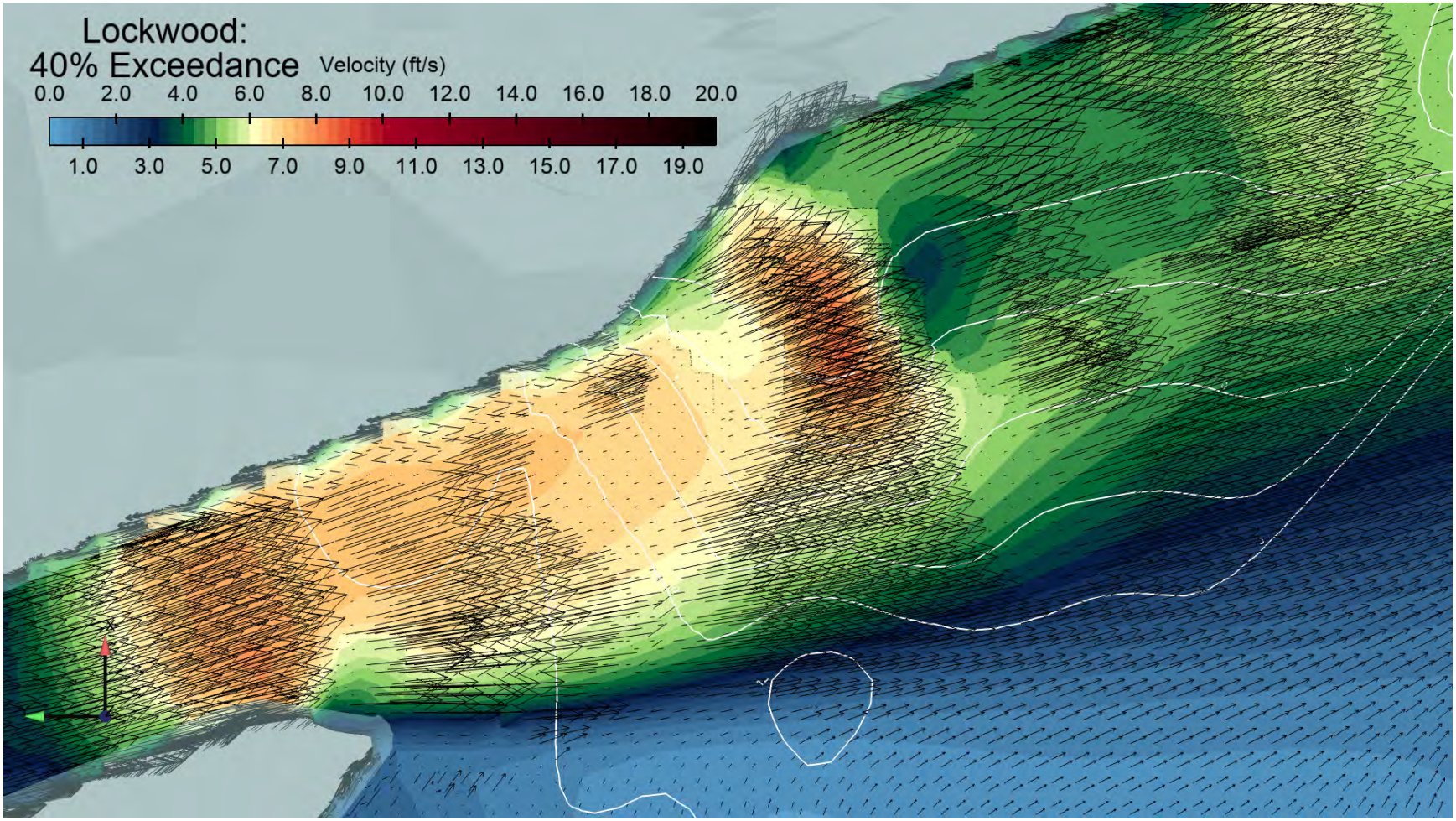




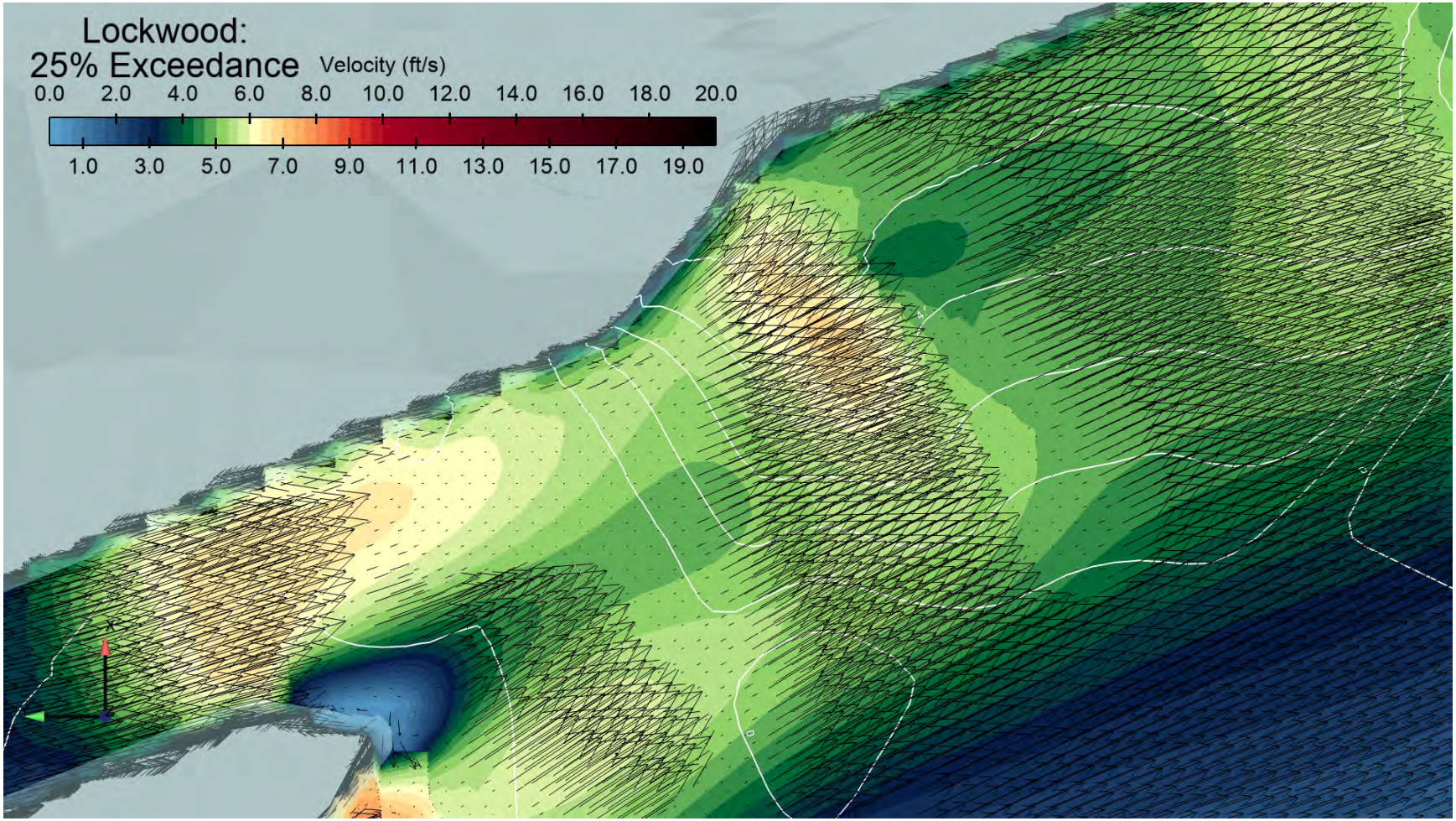
Alternative 2 – Profiles – 10% Exceedance



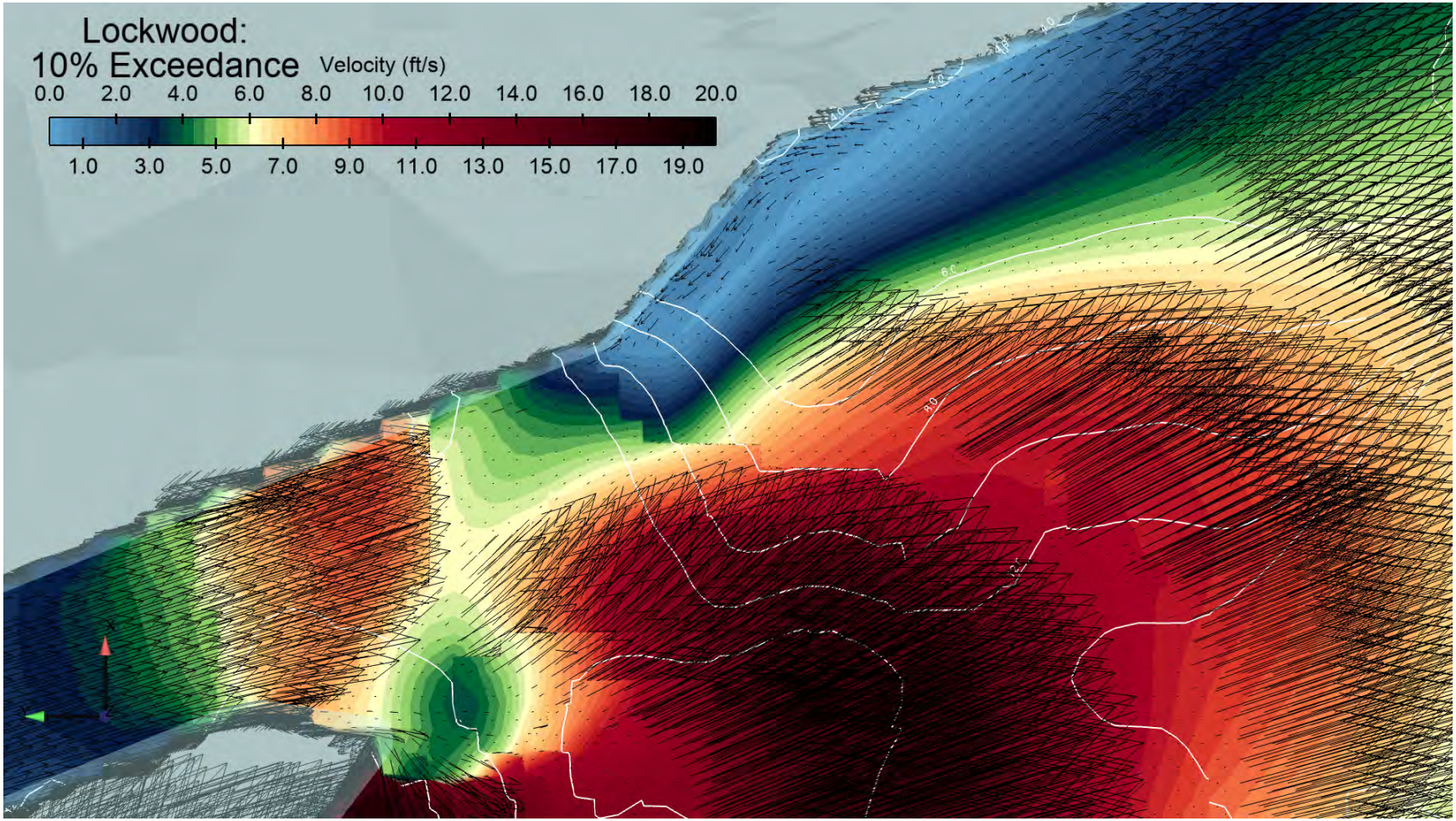
Alternative 2 – Entrance detail – 40% Exceedance



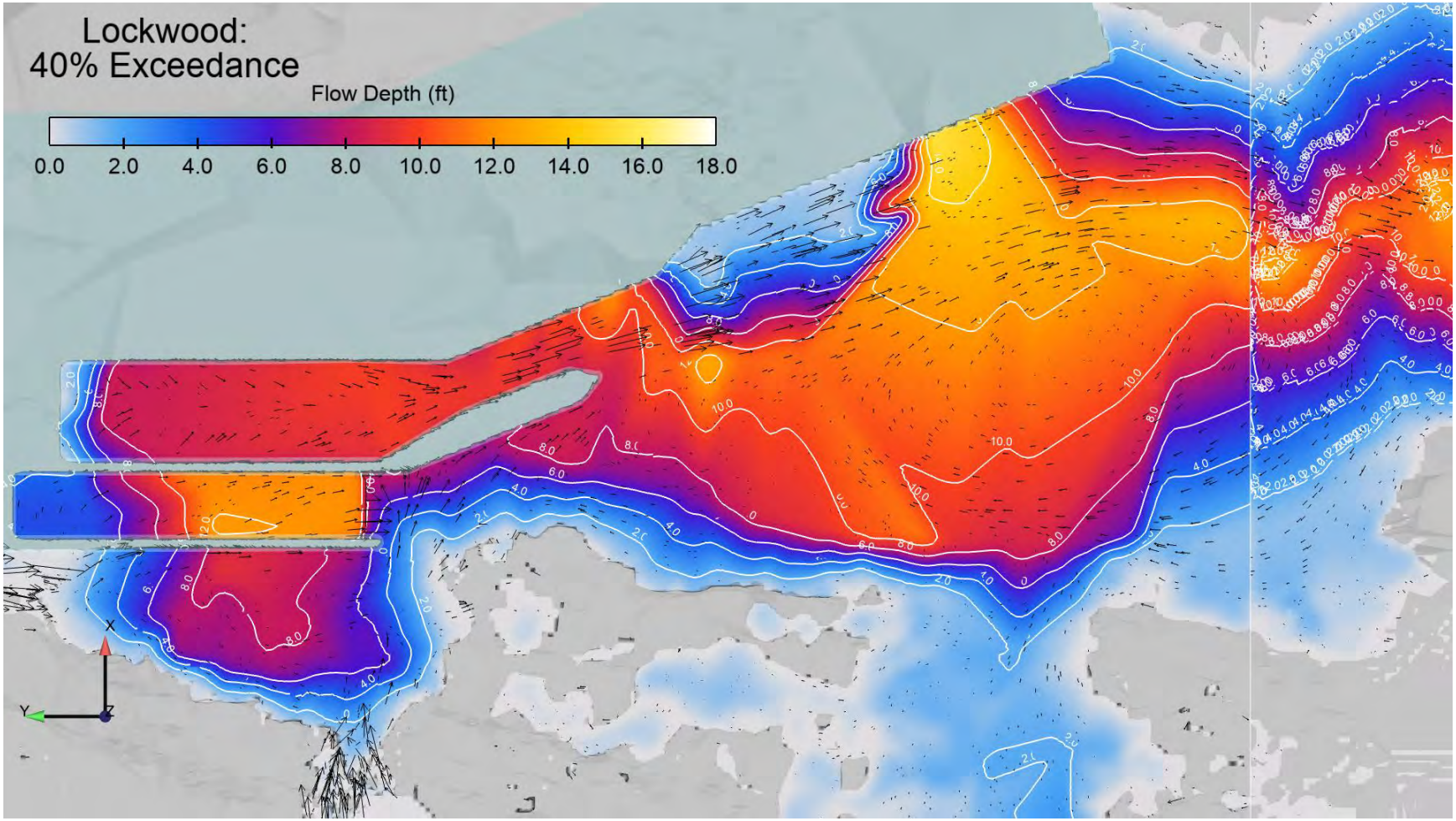
Alternative 2 – Entrance Detail – 25% Exceedance



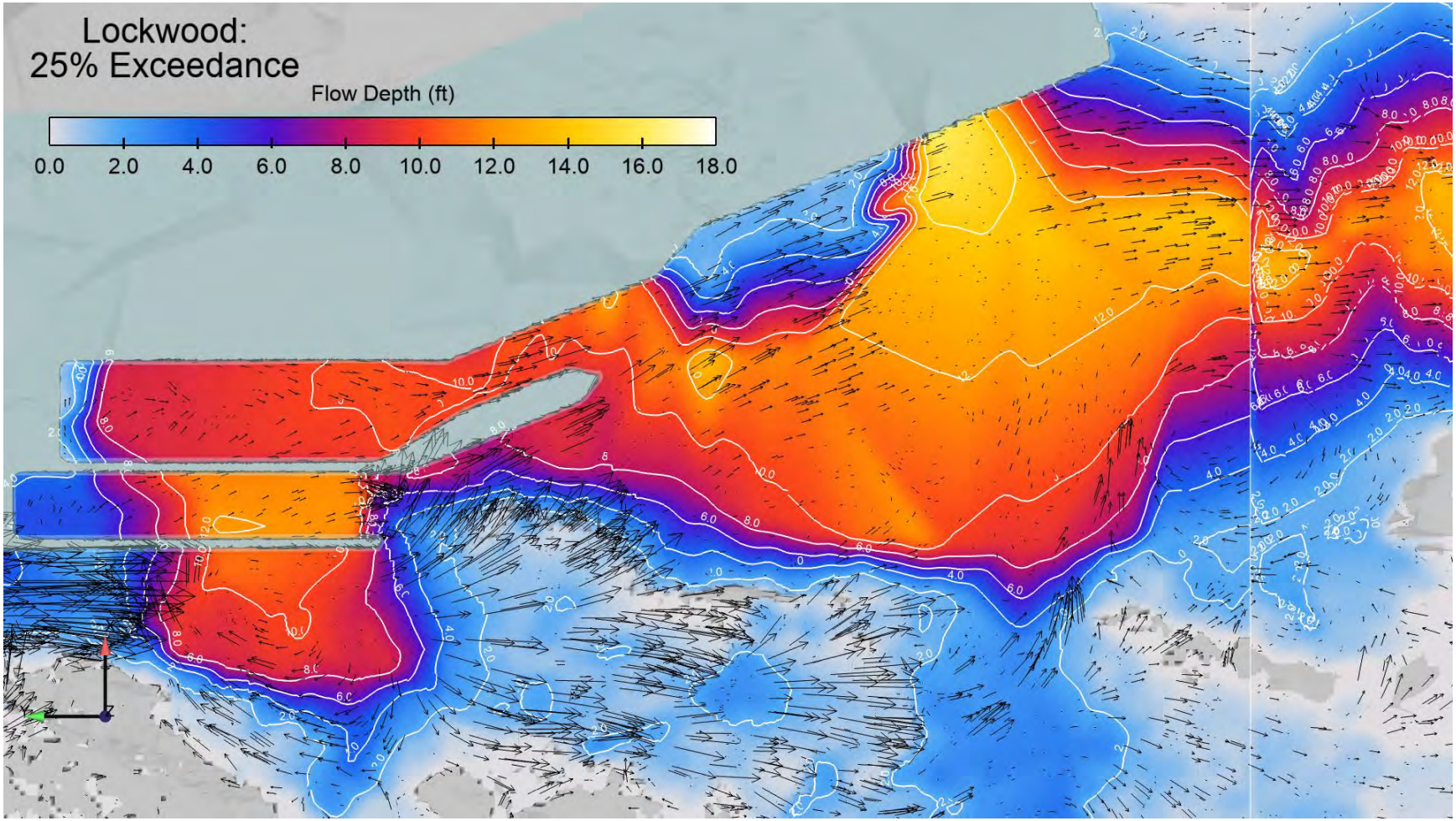
Alternative 2 – Entrance Detail – 10% Exceedance



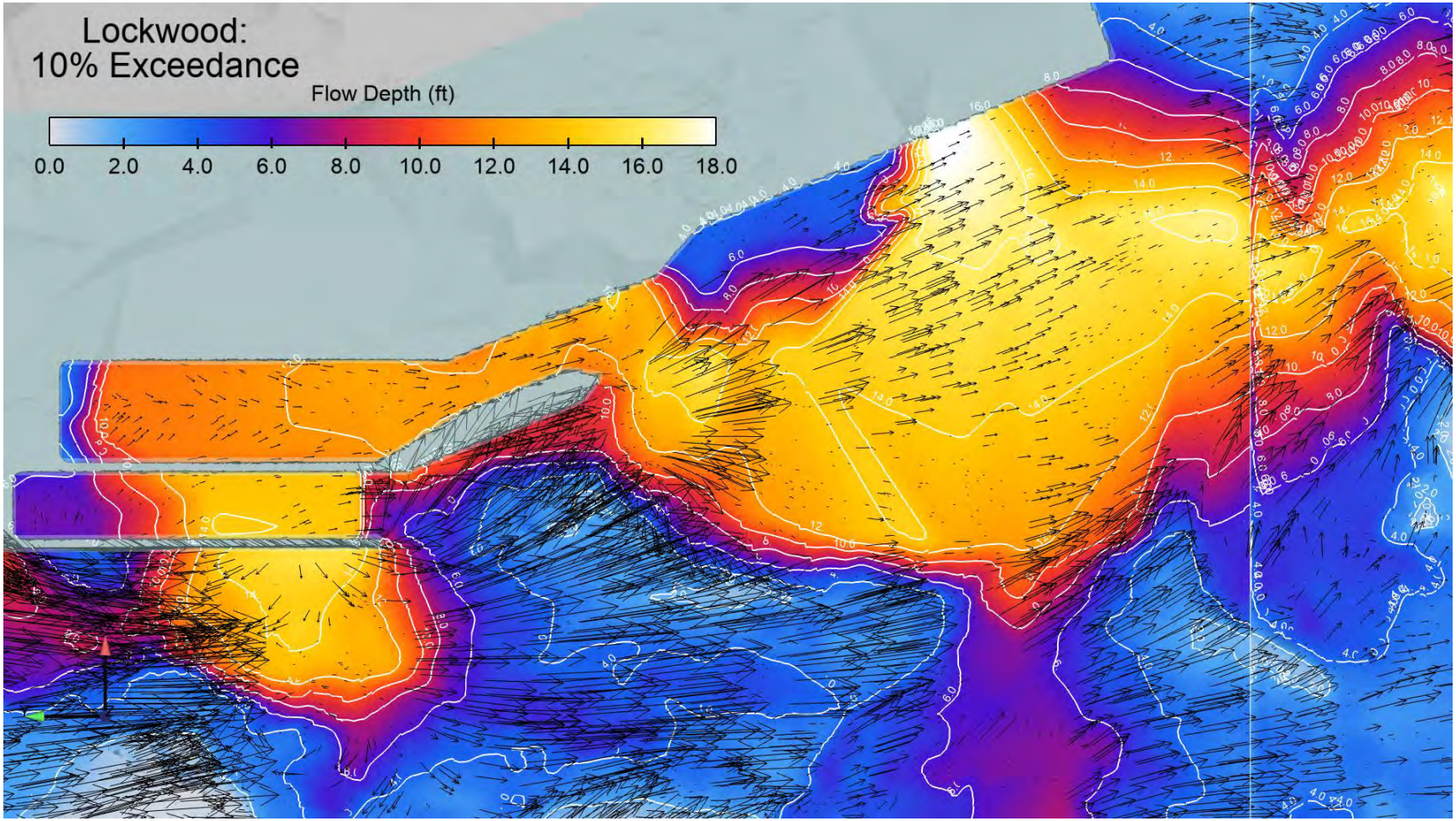
Alternative 2 – Depth – 40% Exceedance



Alternative 2 – Depth – 25% Exceedance



Alternative 2 – Depth – 10% Exceedance



Meeting Notes
Lockwood and Weston Fish Passage Meeting
Friday, March 27, 2020
9:00 AM – 12:00 PM

Attendees:

Gail Wippelhauser, (MEDMR)
Donald Dow (NOAA)
Matt Buhyoff (NOAA)
Jason Seiders (IF&W)
Bryan Sojkowski, (USFWS)
Antonio, Bentivoglio (USFWS)
Kelly Maloney (Brookfield)
Richard Dill (Brookfield)
Nathan Baker (Brookfield)
Gerry Mitchell (Brookfield)
Adam Brown (Brookfield)
Jason Seyfried (Brookfield)
Kayla Pocquette (Brookfield)
Gregory Allen (Alden)
Ben Mater (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/ teleconference on March 27, 2020. The two primary topics included a review of computational fluid dynamic (CFD) modeling of the proposed vertical slot fish ladder at Lockwood and a discussion of comments received from resource agencies for the Weston conceptual fish lift design.

Lockwood CFD Study Review

Ben Mater presented the CFD results of the fish ladder entrance conditions at Lockwood.

Comments and Discussion:

Bryan – prefers side wall diffusers rather than a floor diffuser. Bottom diffusers create flow problems at fishway entrances if not designed properly and can be more difficult to maintain.

Don – Is not as concerned with maximizing flow out the fishway entrance because the fishway is in the bypass reach and not competing with flow from an adjacent powerhouse. At 40% flow exceedance and lower river flows, the fishway is the primary flow in the bypass channel.

Greg – flow through the floor diffuser is adjustable with a slide gate.

Gail – expressed concerns with herring reaching the fishway for the 10% flow condition. Fish may not make it past the bridge.

Antonio – mentioned that the 10% river exceedance flow condition is a very high flow and fish may not be moving upstream in the bypass reach at this condition.

Gail – Expressed concerns with herring reaching the entrance for Alternative 2 for the 25% river exceedance flow condition. Velocities around 7 ft/sec are too high in her opinion and extend too far downstream.

Greg – mentioned the high ledge "shelf" can be excavated to reduce the velocities. This would provide greater area just downstream of the fish ladder entrance and reduce velocities.

Richard – mentioned the entrance gate can be adjusted to reduce the velocity at the entrance if needed to alleviate Gail's concerns.

The overall consensus of the group was to move forward with Alternative 2.

Lockwood Action Items

Resource agencies will provide any additional comments within 1 week (April 3).

Weston Discussion

Conceptual design drawings were presented to resource agencies for comment on October 11, 2019 at a meeting at Lockwood Station. Brookfield received comments from NMFS on Dec 17 & 19, FWS on Dec 19 and MEDMR on Dec 27, 2019 (see attached).

Bryan – described the conceptual sketch that was attached to FWS's comments showing all the attraction water flow being routed through the fish lift. He indicated he would like to see more flow allocated to the fish lift.

Greg – provided an overview of the proposed design that includes an Alden weir, horizontal wedgewire screen and spillway. The primary purpose for the proposed AWS intake and spillway configuration is to provide attraction water to the fish lift channel via a high velocity wedgewire screen. The proposed arrangement limits the impacts to the dam and the need for a large intake structure installed upstream of the dam. A secondary benefit is the opportunity to use the AWS spillway for downstream passage. He explained that if we allocate all of the AWS flow to the fish lift, then that would require a new standalone intake that is roughly 30 ft deep and 20 ft wide. This new intake is on the scale of one of the existing turbine intake bays. An intake of this size is needed to prevent fish impingement by maintaining through screen velocity to less than 1 ft/sec per FWS criteria.

Don – Mentioned he would like to see more flow allocated to the fish lift, rather than the AWS spillway, but acknowledged there is little space to work with.

Greg – explained that Alden will investigate designs to maximize the flow out the entrance. The overall width of the fish lift could be increased by 2 ft, thereby reducing the AWS spillway width by 2 ft.

The group agreed with the proposed AWS intake and spillway concept, assuming that flow to the fish lift entrance will be maximized.

Fish Lift Entrance Configuration

Bryan – mentioned his concerns with the fish lift entrance adjacent to the high velocity discharge from the log sluice are alleviated with the separation of the entrance from the log sluice, due to the AWS spillway located between them.

Gail – mentioned that her comment regarding modeling a training wall was only relevant if the entrance was moved adjacent to the log sluice (per FWS comments).

Bryan – concurred that modeling is not requested, assuming the entrance is not moved to be adjacent to the log sluice discharge.

Exit Pipe

Don – expressed concerns with the exit pipe discharge location. He would like assurance that fish do not fall back down the log sluice.

Greg – explained the exit pipe location is about 18.5 ft from the log sluice and asked for guidance on how far away it should be located. No guidance was provided.

Greg – explained that he would estimate velocity contours away from the log sluice entrance and use that information to make a judgement on where the exit pipe should be located. He asked if there is guidance on acceptable velocities in the impoundment where the fish would be discharged. No guidance was provided.

Weston Action Items

- Alden to revise the fish lift design by increasing the width by at least 2 ft and maximize the amount of flow discharged from the fish entrance.

From: **Gregory Allen** <gallen@aldenlab.com>
Date: Tue, Apr 7, 2020 at 9:05 AM
Subject: RE: Lockwood CFD Results
To: Bryan Sojkowski <bryan_sojkowski@fws.gov>, Pocquette, Kayla <kayla.pocquette@brookfieldrenewable.com>, Reny, Melissa <melissa.reny@brookfieldrenewable.com>, Matt Buhyoff - NOAA Federal <matt.buhyoff@noaa.gov>, Donald Dow - NOAA Affiliate <donald.dow@noaa.gov>, Bentivoglio, Antonio <antonio_bentivoglio@fws.gov>, Mitchell, Gerry <gerry.mitchell@brookfieldrenewable.com>, Wippelhauser, Gail <gail.wippelhauser@maine.gov>, Ben Mater <bmater@aldenlab.com>, Seyfried, Jason <jason.seyfried@brookfieldrenewable.com>, Dill, Richard <richard.dill@brookfieldrenewable.com>, Brown, Adam <adam.brown@brookfieldrenewable.com>, Anna Harris <anna_harris@fws.gov>, Baker, Nathan <nathan.baker@brookfieldrenewable.com>, Maloney, Kelly <kelly.maloney@brookfieldrenewable.com>, Seiders, Dwayne J <dwayne.j.seiders@maine.gov>, Christman, Paul <paul.christman@maine.gov>, Kurt Smithgall <ksmithgall@aldenlab.com>

Good morning,

I hope everyone is well.

At Gail's request, I have attached some additional views of CFD results for Lockwood. The views show velocity conditions downstream of the Rt 201 bridge for the optimized fishway entrance configuration. Please let us know if you have any additional comments or questions from our meeting on March 27th .

Thank you,

Greg

Gregory Allen, P.E.
(508) 829-6000 ext. 6409

From: Gregory Allen [mailto:gallen@aldenlab.com]
Sent: Wednesday, March 25, 2020 2:09 PM
To: 'Bryan Sojkowski'; 'Pocquette, Kayla'; 'Reny, Melissa'; 'Matt Buhyoff - NOAA Federal'; 'Donald Dow - NOAA Affiliate'; 'Bentivoglio, Antonio'; 'Mitchell, Gerry'; 'Wippelhauser, Gail'; Ben Mater; 'Seyfried, Jason'; 'Dill, Richard'; 'Brown, Adam'; 'Anna Harris'; 'Baker, Nathan'; 'Maloney, Kelly'; 'Seiders, Dwayne J'; 'Christman, Paul'; Kurt Smithgall
Subject: Lockwood CFD Results

Good afternoon,

I have attached our CFD results of the proposed fishway for Lockwood. We will present these results during our planned call on Friday morning. I will update the meeting invite to include details to login to a web meeting on the adobe connect platform.

Thank you,

Greg

Gregory Allen, P.E.
Director, Environmental and Engineering Services
ALDEN Solving flow problems since 1894
30 Shrewsbury St., Holden, MA 01520
(508) 829-6000 ext. 6409
gallen@aldenlab.com | www.aldenlab.com

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Gregory Allen, P.E.
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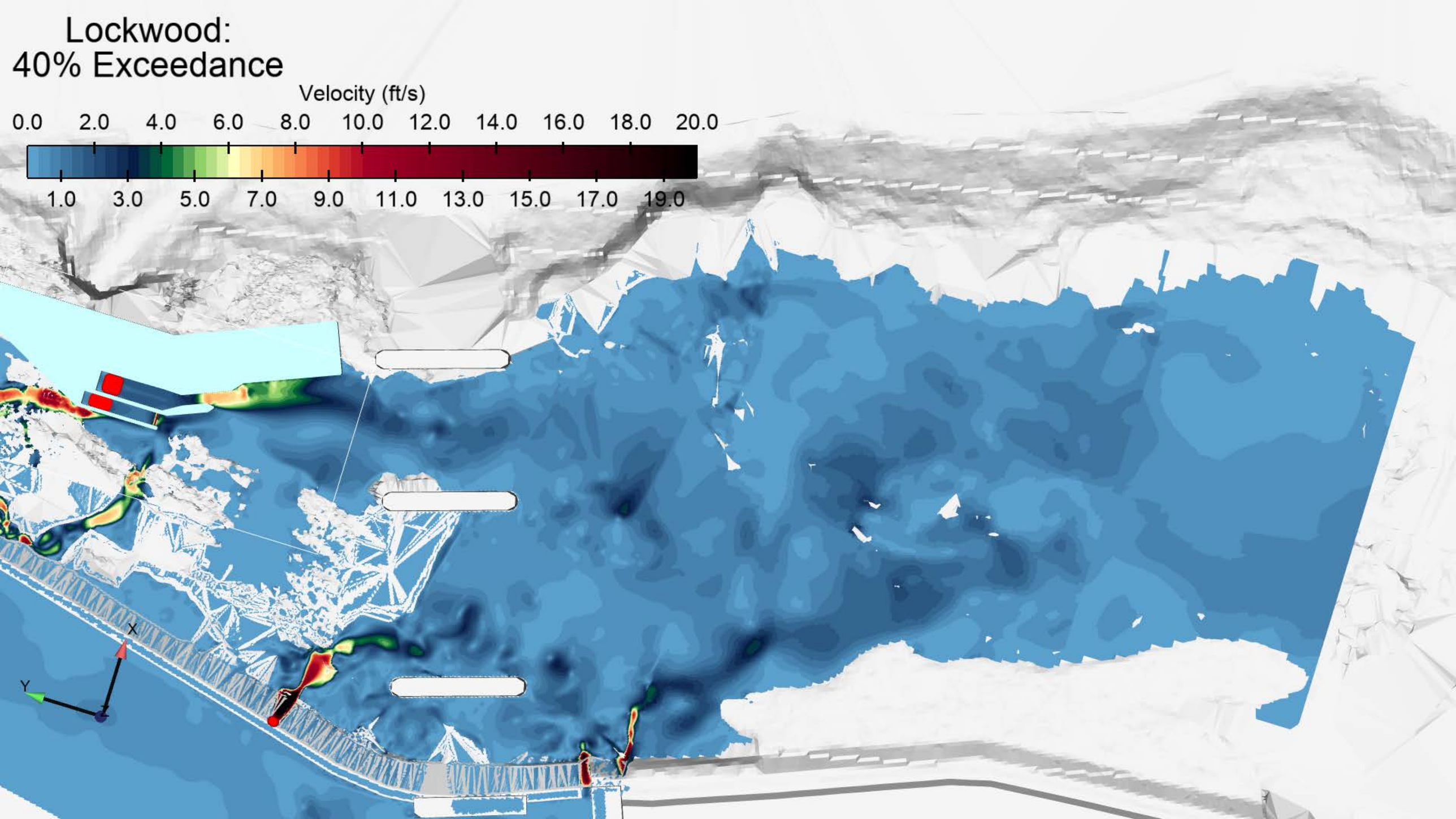
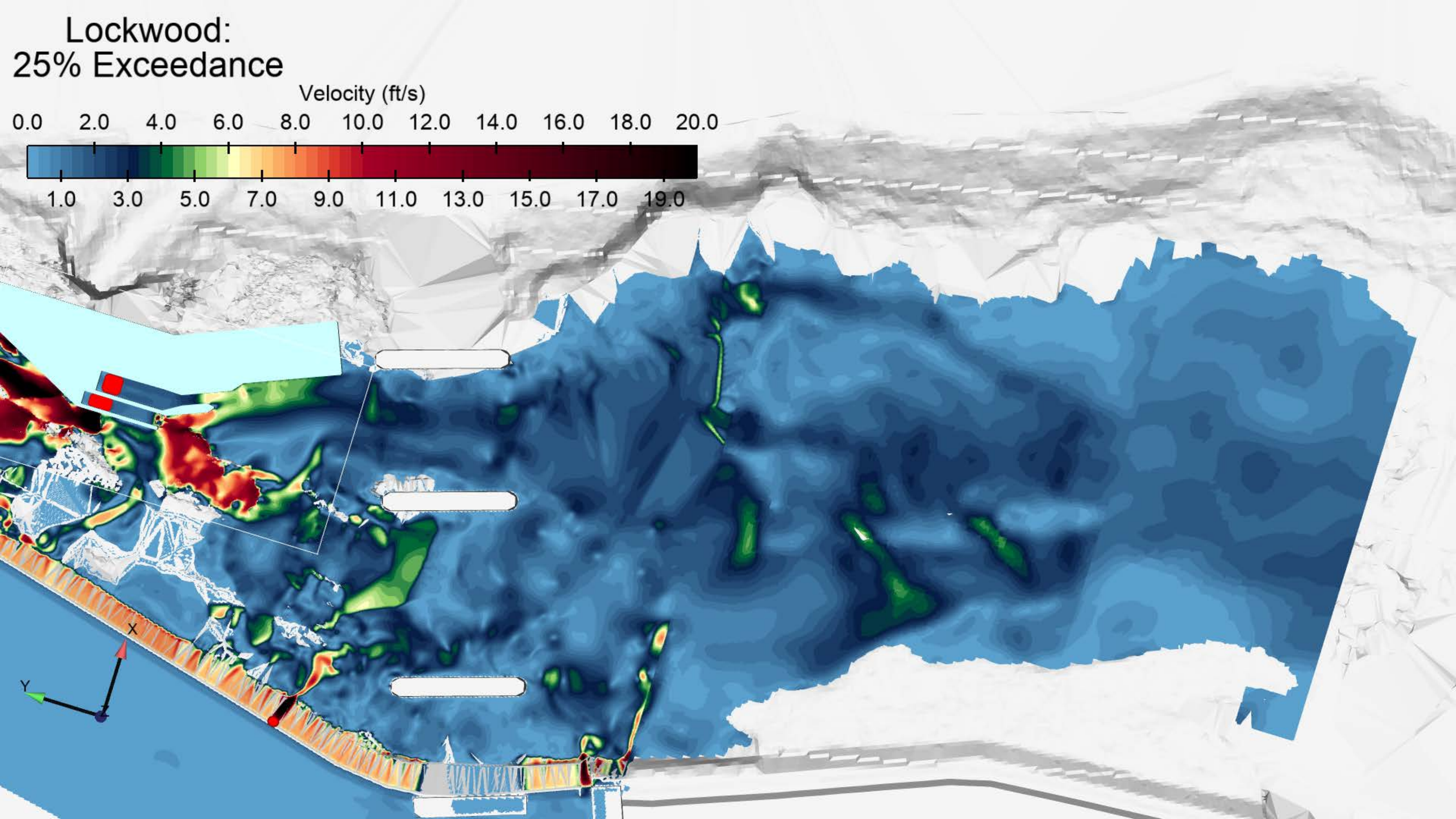
gallen@aldenlab.com

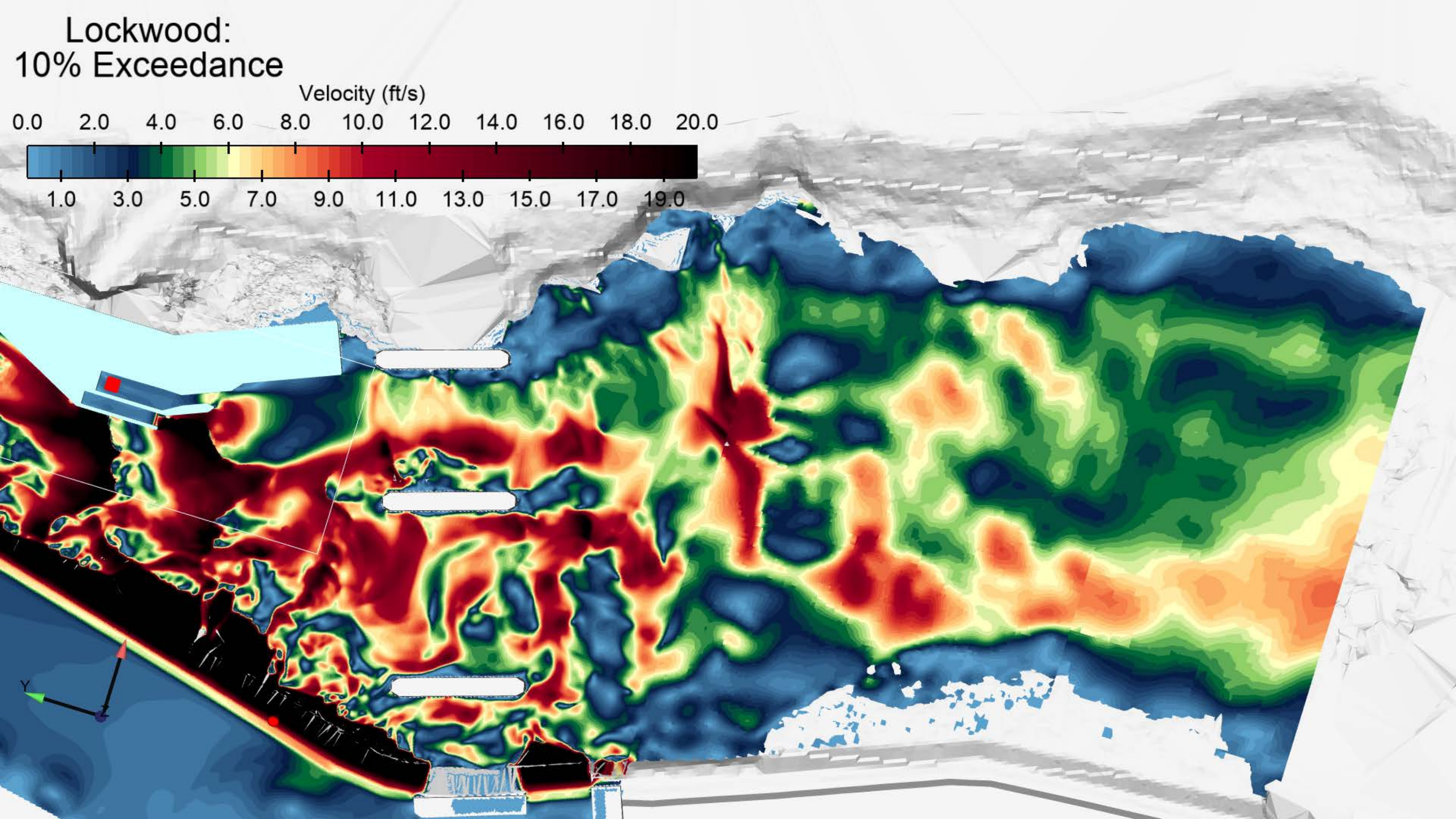
Lockwood Hydroelectric Station CFD Supplemental Information

April 7, 2020

Supplemental information for the CFD study summary results dated 3/23/20. Additional information show velocity conditions downstream of the Route 201 bridge for the optimized fishway entrance configuration (Alternative 2), for river flow exceedance conditions of 40%, 25% and 10%.


Lockwood:
40% Exceedance
Velocity (ft/s)
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0
1.0 3.0 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0
X
Y
Z


Lockwood:
25% Exceedance
Velocity (ft/s)
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0
1.0 3.0 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0
X
Y


Lockwood:
10% Exceedance
Velocity (ft/s)
0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0
1.0 3.0 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0
Y
Z

Gregory Allen

From: Gregory Allen
Sent: Friday, July 10, 2020 12:25 PM
To: 'Bryan Sojkowski'; 'Pocquette, Kayla'; 'Reny, Melissa'; 'Matt Buhyoff - NOAA Federal'; 'Donald Dow - NOAA Affiliate'; 'Mitchell, Gerry'; 'Wippelhauser, Gail'; 'Seyfried, Jason'; 'Dill, Richard'; 'Brown, Adam'; 'Anna Harris'; 'Baker, Nathan'; 'Maloney, Kelly'; 'Seiders, Dwayne J'; 'Christman, Paul'; 'Bentivoglio, Antonio'
Cc: Mark Graeser; Amy Mengert; Brian McMahon
Subject: Lockwood 30% design submittal
Attachments: Lockwood Fish Passage 30% design.pdf

Good afternoon,
See attached 30% design drawings for the proposed vertical slot fish ladder at Lockwood. Please review and let us know if you have comments. We would like to discuss both Weston and Lockwood 30% design on July 23rd from 9 to noon. Hopefully, this time works for everyone. If not, please suggest alternative dates.

Thank you and have a great weekend,
Greg

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Meeting Notes
Lockwood and Weston 30% Design Submittal Review Meeting
Thursday, July 23, 2020
10:00 AM – 12:00 PM

Attendees:

Gail Wippelhauser, (MEDMR)
Donald Dow (NOAA)
Jason Seiders (IF&W)
Bryan Sojkowski, (USFWS)
Antonio, Bentivoglio (USFWS)
Kelly Maloney (Brookfield)
Richard Dill (Brookfield)
Nathan Baker (Brookfield)
Gerry Mitchell (Brookfield)
Jason Seyfried (Brookfield)
Gregory Allen (Alden)
Steve Amaral (Alden)
Amy Mengert (Alden)
Abbie Knaub (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/teleconference on July 23, 2020. The primary topic was the review of the recently submitted 30% design drawings for each project. Each drawing set was presented, questions, concerns and answers followed.

Lockwood 30% Design Drawing Review

The 30% design submittal was transmitted to resource agencies for comment on July 10, 2020.

Greg Allen presented the 30% design drawings for Lockwood.

Comments and Discussion:

Bryan – asked how much flow can be pulled off from the attraction flow channel to supply the fish ladder floor diffuser?

Greg – explained that the supplemental attraction water system is designed to provide up to 100 cfs through the fish ladder floor diffuser to supplement the fish ladder flow for attraction.

Bryan – requested that this be clarified in the design drawing notes.

Greg – explained that additional survey data was gathered at the site yesterday (July 22, 2020). Information collected includes the as-built lengths of the existing spillways, bathymetry data upstream of the dam between the rock island and shore and bathymetry data in the tailrace upstream of the Route 201 Bridge. This information is needed to inform the design and for a flood impact study.

Don – Will fish be attracted to entrance of fish passage with attraction channel not adjacent to entrance?

Greg – explained that the configuration was developed based on CFD results. The CFD results showed high velocities and shallow depth leading up to the AWS channel which would be difficult and impede ability of herring and shad to navigate.

Gail – asked where could salmon go besides fishway?

Don – if salmon missed the entrance they may be able to reach the AWS channel. No problem if salmon do get into the AWS channel, they should be able to all the way up (to the head pond).

Bryan – states preference for wood baffles for the vertical slot ladder instead of concrete because of easier modification despite higher maintenance and shorter lasting.

Greg – explained that concrete is preferable because it is more durable and will last longer. The baffles have a unique geometry and should not require any adjustments.

Don – asked how the intake screen in the AWS channel would be cleaned.

Greg – explained that intake flow to the floor diffuser would be temporarily stopped and any debris impinged on the screen would then be sweep down the AWS channel.

Don – Is the intent of 10-ft wide channel to be used for DS passage as well?

Greg – replied yes it could be, would be safe, but need to take a closer look at the end and plunge pool depth.

Don – replied that fish will get into it anyway, so need to look at plunge pool.

Greg – explained the AWS channel system design and operation. Alden is using CFD as a tool to design the AWS system from the intake screen to the floor diffuser. The CFD results will be used to optimize the design so that there is even flow distribution through the wedgewire intake screen and at the fish ladder floor diffuser. The CFD model will also be used to confirm flow capacity and to size the AWS flow control gate.

A flood impact study is also underway so that the project does not impact the 100 yr flood elevation. This study will inform the design of the crest gates. Preliminary results indicate the crest gates will need to be larger than shown on the 30% design drawings.

Greg – mentioned the trash rack for the fishway and AWS channel would be 8 to 12 inches.

Bryan – mentioned they typically recommend at least 12 inches.

Don – suggests 16 inches and will get back to Greg.

Don – explained that the new crest gates could be used as first line of defense for controlling head pond levels/ high river flows, do we want that?

Greg – mentioned that the crest gate is also intended to enhance attraction to fishway entrance which would be a benefit.

Antonio – mentioned passing of dam by non-native species is a concern to be addressed.

Several agree this is a concern.

Kelly – mentioned bypassing dams/volitional fishway will give all fish access all the way to the Sandy.

Jason Seiders – mentioned that this needs to be addressed sooner than later, has observed invasive species – northern pike and white catfish – downstream below Benton Falls, above old Fort Halifax in the Sabasticook. Native bullheads would be impacted.

Weston 30% Design Drawing Review

The 30% design submittal was transmitted to resource agencies for comment on June 23, 2020.

Greg Allen presented the 30% drawings for Weston.

Comments and Discussion:

Greg – explained that additional survey data collection is underway today. Information being collected includes bathymetry in the tailrace in the vicinity of the proposed fish lift as well as the shallow areas near shore. This information is needed to inform the design and site access.

Greg – explained that the fish lift design was modified to increase the structures width providing an additional 2 ft in width for the entrance gate (now 10 ft wide) and the fish lift flume (now 14 ft wide). These changes were implemented in response to comments received at the last meeting.

Bryan – asked why no staging pool?

Greg – explained that the area between the Vee gate and the entrance gate will serve as the staging pool.

Bryan – said that he thinks that is sufficient.

Greg – explained that the entrance hinged gate is much larger than that designed for the Shawmut project due to the wider fluctuation in tailwater elevation, which is about 8 feet.

Don – mentioned because of holding pool size, 15 min cycle time for the fish lift will be critical. He asked if there are cutouts in the flow dissipation baffles for men to access both sides?

Amy – mentioned we can make it removable.

Greg – explained the hopper design is similar to Shawmut, but wider to maximize attraction water discharge through the fish lift.

Don and Bryan – mentioned that they were pleased with the 30% design submittals.

Gregory Allen

From: Seyfried, Jason <Jason.Seyfried@brookfieldrenewable.com> on behalf of Seyfried, Jason
Sent: Thursday, November 05, 2020 2:50 PM
To: Mitchell, Gerry; Baker, Nathan; Maloney, Kelly; Pocquette, Kayla; Reny, Melissa; Brown, Adam; bryan_sojkowski@fws.gov; matt.buhyoff@noaa.gov; Donald.Dow@noaa.gov; Antonio_Bentivoglio@fws.gov; anna_harris@fws.gov; Gail.Wippelhauser@maine.gov; paul.christman@maine.gov; Dwayne.J.Seiders@maine.gov; Dill, Richard
Cc: Gregory Allen
Subject: Lockwood and Weston 60% Design Drawings

Good afternoon, I'm emailing the Lockwood and Weston 60% design drawings in preparation for our Microsoft Teams review meeting next Tuesday, November 10th at 9:00a.m. Please let me know if you have any questions or issues with the links.

Lockwood link - https://we.tl/t-A727b3W5N3

Weston link - https://we.tl/t-0gpUpg9o5C (also distributed to you on Oct. 23rd)

Talk to you then, thank you.

Jay Seyfried
Compliance Specialist

Brookfield Renewable
150 Main Street, Lewiston, Maine, 04240
Office (207) 755-5615 Mobile (207) 312-8323
jason.seyfried@brookfieldrenewable.com
www.brookfieldrenewable.com

Meeting Notes
Lockwood and Weston 60% Design Submittal Review Meeting
Tuesday, November 10, 2020
9:00 – 11:30 AM

Attendees:

Gail Wippelhauser, (MEDMR)
Donald Dow (NOAA)
Matt Buhyoff (NOAA)
Jason Seiders (IF&W)
Bryan Sojkowski, (USFWS)
Kelly Maloney (Brookfield)
Adam Brown (Brookfield)
Nathan Baker (Brookfield)
Gerry Mitchell (Brookfield)
Jason Seyfried (Brookfield)
Kayla Paquette (Brookfield)
Melissa Reny (Brookfield)
Gregory Allen (Alden)
William Lewis (Alden)
Amy Mengert (Alden)
Abbie Knaub (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/teleconference on November 10, 2020. The primary topic was the review of the recently submitted 60% design drawings for each project. Each drawing set was presented, questions, concerns and answers followed.

Lockwood 60% Design Drawing Review

The 60% design submittal was transmitted to resource agencies for comment on November 5, 2020.

Greg Allen presented the 60% design drawings for Lockwood. The 60% design drawing set consisted of 64 sheets and each sheet was presented for discussion during the meeting.

Page Turn Drawing Review

Sheets 1 to 5 – no comments

Sheet 6

Question – any change to the length of the entrance or angle?

Greg – responded that no changes have been made to the entrance configuration. The entrance configuration is based on CFD modeling of the entrance conditions completed in the spring. The turning pool near the bridge was moved so that the fish ladder is further away from the bridge. This required moving two pools to the impoundment adding approximately 30 ft of length into the impoundment.

Sheet 7 & 8 – No comments

Sheet 9

Comment – fish will need to be evacuated from pools between the fish ladder and shore, is that happening?

Greg – explained that fill will be added so that there are no isolated pools between the fish ladder and shore. Water will drain from this area to the tailwater.

Sheet 10 thru 16 – no comments

Sheet 17

Question – has analysis been done to determine submergence on the entrance gate?

Greg – explained that hydraulic calculations have been completed showing at least 3 ft of water depth over entrance gate. Greg will follow up and submit more information on entrance gate hydraulics.

Sheet 18 – no comments

Sheet 19

Greg – explained that Alden conducted a CFD analysis of the AWS intake and flow conveyance to the floor diffuser. The results of the CFD showed good flow distribution through the floor diffuser. The CFD results also showed good flow distribution through the AWS intake screen. Design changes were implemented to the flow conveyance conduit and turning vanes to optimize the flow distribution. Greg offered to share the CFD results to the group in a follow up email.

Question – are the turning vanes standard timber or something else.

Greg – explained that the turning vanes are concrete, 12 inches thick.

Question – what is the target velocity through the floor diffuser?

Greg – explained that the floor diffuser was designed for a 0.5 ft/sec velocity.

Sheet 20 thru 28 – no comments

Sheet 29

Question – are you comfortable with getting enough flow through the AWS flow control gate to provide 100 cfs to the floor diffuser?

Greg – responded that based on hydraulic calculations and subsequent CFD analysis the AWS flow control gate would be about 50% open to provide 100 cfs. The weir crest elevation downstream of the intake is critical to provide the required head to attain 100 cfs. We are confident with the current design providing at least 100 cfs capacity to the fish ladder floor diffuser.

Question – what is proposed for a screen?

Greg – explained that the AWS intake screen will be a wedgewire type screen with 0.25 inch clear opening. A wedgewire screen should be easier to maintain than perforated plate. The screen would be cleaned by shutting off the AWS flow control gate and allowing flow to sweep debris off the screen.

Comment – I don't like the idea of having to shut down the flow to clean the screen. Leaves are a big problem.

Greg – explained that there is a good sweeping flow past the screen to carry debris away. CFD analysis showed good flow distribution across the screen as well.

Comment – stop logs in the AWS channel should not be used to vary flow on a weekly basis.

Greg – explained that stop logs provide the head required to provide flow to the fish ladder floor diffuser. The flow to the floor diffuser is controlled with the AWS flow control gate downstream of the intake screen and not the stop logs.

Sheet 30 thru 40 – no comments

Sheet 41

Comment – access needs to be provided through the baffle located below the floor diffuser grating. Access needs to be big enough for equipment like ladders.

Greg – agreed, and will address to be sure there is access through the baffle.

Question – Are you comfortable with turning vanes being concrete, because they can't be changed?

Greg – replied that he's comfortable with concrete. The concrete turning vanes will last longer than wood or steel. One issue at fish ladders is a poorly designed floor diffuser, which we want to avoid. The turning vanes were designed with the aid of CFD modeling to provide good flow distribution at the floor diffuser.

Sheet 42 – no comments

Sheet 43

Question – how will the screens be raised and lowered?

Greg – explained that the screens would be permanently installed. They are large screens and wouldn't be easily removed. A hoist could be set up to pull them out, but the intent would be to have them stay in.

A couple seasons of experience will give us a better idea of maintenance requirements, but flow sweeping by AWS intake screen should keep it clear. The screen may need to be manually cleaned once a season.

Question – what if we get a couple seasons in and it is getting too clogged with leaves, how big of a problem would it be to go back in and add a hoist or other cleaning system?

Greg – replied that a cleaning system could be added. An air burst cleaning system is also a possibility.

Sheet 44 – no comments

Sheet 45

Question – Will there be access when spilling on north side of fishway?

Greg – responded, yes the top of walls are designed above the 50-year flood elevation and a pedestrian bridge is planned to access the fishway.

Comment – The turn pool being moved upstream. We just had a river herring telemetry study done for a vertical slot fish ladder on the Merrimac River that found that 24% of fish made it to first turn pool and then backed out. At the Brunswick fish ladder modifications were made to the upper pool to remove eddies. I'm thinking about ways

we can integrate easily added panels in case there is a problem here. We don't want pockets of eddies that turn fish around.

Greg – commented that he's been thinking about this issue as well. He reviewed similar issues at a vertical slot fish ladder on the Richelieu River in Quebec. That fishway was designed with smaller than standard pool dimensions, so maybe we have lower velocity and less turbulence, but it is still something to think about.

Sheet 46 thru 51 – no comments

Sheet 52

Question – will the gate be automated?

Greg – replied yes.

Sheet 53 thru 64 – no comments

End of page turn drawing review for Lockwood

Comments and Discussion:

Comment – good design

No red flags.

Question – Do we know the velocity at fishway entrance?

Greg – responded, yes the velocity is controlled by the automated entrance flap gate.

Question – What is velocity at individual slots of the fish ladder?

Greg – responded that the baffle design of the vertical slot fish ladder is based on US Fish and Wildlife Service guidelines. Alden's CFD analysis shows velocity through the vertical slot to be less than 6 feet per second.

Question – How does entrance velocity here compare with velocity at fish lift?

Greg – responded that the velocity should be the same; 4-6 feet/second controlled by the automated entrance gate.

Weston 60% Design Drawing Review

The 60% design submittal was transmitted to resource agencies for comment on October 23, 2020.

Greg Allen presented the 60% design drawings for Weston. The 60% design drawing set consisted of 65 sheets and each sheet was presented for discussion during the meeting.

Page Turn Drawing Review

Sheets 1 to 14 – no comments

Sheet 15

Question – How accessible are the access ports to the exit pipe?

Greg – replied that Alden is working on the design to provide access to the ports.

William – added that providing access is challenging, but we are working on a design that will provide good access to everything.

Don – commented that he doesn't love the exit pipe but doesn't see another option.

Greg – explained that the timing of the release of water from the tank is key, to be sure all fish are flushed from the exit pipe.

Don – commented that some time could go by before you realize fish may be stuck in the pipe. What if we moved the hopper higher with a steeper slide down?

Greg – responded that in his opinion the exit pipe is already fairly steep at 5%. There is a concern that going steeper will create a situation where water is moving faster than the fish.

Sheet 16 thru 50 – No comments

Sheet 51

Question – are you using the AWS spillway for downstream fish passage?

Greg – replied that the AWS spillway could be used for downstream fish passage.

Sheet 52 thru 63 – No comments

Sheet 64

Question – Why do we need this orifice weir panel?

Greg – replied that the orifice panel is intended to reduce air entrainment. Using the overflow weir just upstream of the orifice panel will allow us to dial in the flow rate for the fish lift. Flow over the weir will then be forced through submerged the openings to reduce air entrainment.

Don – commented that it comes down to our level of confidence in getting the air out of the water. It worked at Milford. Is there an equation that led you to this orifice panel?

Greg – replied that the orifice panel was designed to provide an open area of about 50% with submerged openings.

Don – commented that he likes that this is being addressed now.

Sheet 65 – No comments

End of page turn drawing review for Weston

Comments and Discussion:

Don – commented, great job. Only concern left is the exit pipe and I don't have an answer for that.

Greg – commented to please let him know if anyone has any other comments soon, as we would like to continue to move ahead toward 90% design.

Don – responded we'll get any additional comments to you in the next week or so after he talks with Bryan.

Action items

Greg – will send out the CFD results of the Lockwood AWS flow conveyance system and the hydraulic conditions for the fish ladder entrance.

Gregory Allen

From: Gregory Allen
Sent: Thursday, November 19, 2020 10:13 AM
To: 'Mitchell, Gerry'; 'Baker, Nathan'; 'Maloney, Kelly'; 'Pocquette, Kayla'; 'Reny, Melissa'; 'Brown, Adam'; 'bryan_sojkowski@fws.gov'; 'matt.buhyoff@noaa.gov'; 'Donald.Dow@noaa.gov'; 'Antonio_Bentivoglio@fws.gov'; 'anna_harris@fws.gov'; 'Gail.Wippelhauser@maine.gov'; 'paul.christman@maine.gov'; 'Dwayne.J.Seiders@maine.gov'; 'Seyfried, Jason'
Cc: Ben Mater; Mark Graeser; 'Amy Mengert'
Subject: Lockwood 60% design follow up information
Attachments: Alden Lockwood memo 11-18-2020.pdf; LockwoodCFDDesignSupport_Results_2020-11-13.pdf

Good morning All,
As a follow up to our meeting last week for Lockwood and Weston I have attached hydraulic information for the Lockwood entrance conditions and a CFD analysis of the AWS flow conveyance to the floor diffuser. Note that the CFD was completed to aid in the design process to optimize the AWS intake screen, forebay geometry, AWS flow control gate and geometry leading to the floor diffuser.
Let me know if you have any questions regarding this information.
Also, please let us know if there are any additional comments regarding the 60% design submittals for Weston and Lockwood as we are moving ahead to develop the 90% design.

Thank you,
Greg

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Technical Memorandum

To: Mr. Gerry Mitchell, Brookfield Renewable

From: Gregory Allen, P.E.

Date: November 17, 2020

Re: **Hydraulic Conditions of Lockwood Vertical Slot Ladder Entrance. Supplemental information requested from 60% Design Review Meeting for the Lockwood Fish Passage Project**

A design review meeting was held on November 10, 2020 for the Lockwood and Weston Fish Passage Projects' 60% design submittals. The Design Review Team[1] (DRT) requested that Alden provide hydraulic characteristics of the vertical slot fish ladder entrance gate conditions. The attached table provides flow conditions over the hinged flap gate for flow conditions of 150 cfs, 200 cfs and 220 cfs over a range of tailwater elevations. Depth over the entrance gate ranges from 3.3 ft at 150 cfs flow to 4.8 ft at 220 cfs flow.

Alden also agreed to share computation fluid dynamic (CFD) results showing the hydraulic conditions of the attraction water system's (AWS) flow conveyance to the fish ladder floor diffuser. As part of the design process, Alden used CFD modeling to optimize the conveyance system and flow distribution from the AWS wedge wire intake screen to the floor diffuser. The attached CFD results represent the final iteration of the CFD design process.

[1] The Design Review Team includes members from the following resource agencies; US Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), Maine Department of Marine Resources (MDMR) and Maine Department of Inland Fisheries and Wildlife (IF&W)

Hydraulic Conditions of Lockwood Fish Ladder Entrance

Fish ladder entrance flow (cfs)	Tailwater El. (ft)	Entrance invert El. (ft)	Entrance depth (ft)	Entrance target differential (ft)	Target entrance velocity (ft/sec)	Entrance width (ft)	Target flow area (ft2)	Depth over entrance gate (ft)	Gate crest El. (ft)
150	30.5	25.75	4.8	0.5	5.7	8	26	3.3	27.2
150	32.0	25.75	6.3	0.5	5.7	8	26	3.3	28.7
150	34.0	25.75	8.3	0.5	5.7	8	26	3.3	30.7
150	36.5	25.75	10.8	0.5	5.7	8	26	3.3	33.2
200	30.5	25.75	4.8	0.5	5.7	8	35	4.4	26.1
200	32.0	25.75	6.3	0.5	5.7	8	35	4.4	27.6
200	34.0	25.75	8.3	0.5	5.7	8	35	4.4	29.6
200	36.5	25.75	10.8	0.5	5.7	8	35	4.4	32.1
220	30.5	25.75	4.8	0.5	5.7	8	39	4.8	25.7
220	32.0	25.75	6.3	0.5	5.7	8	39	4.8	27.2
220	34.0	25.75	8.3	0.5	5.7	8	39	4.8	29.2
220	36.5	25.75	10.8	0.5	5.7	8	39	4.8	31.7

ALDEN

MASSACHUSETTS | COLORADO | WASHINGTON | OREGON

Lockwood Fishway:
CFD Design Support:
60% Design

Prepared For

Brookfield

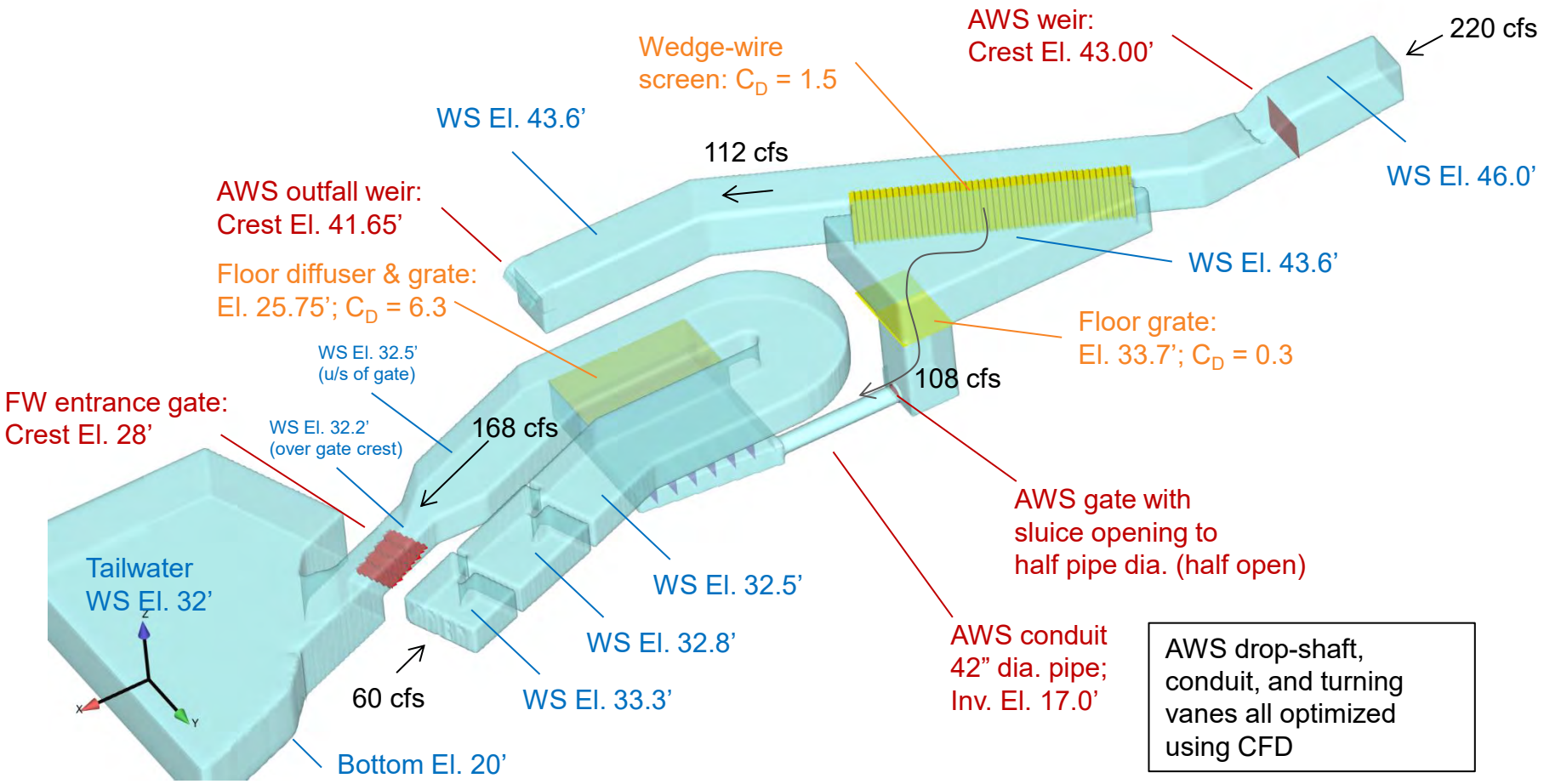
Prepared By

Ben Mater

Date

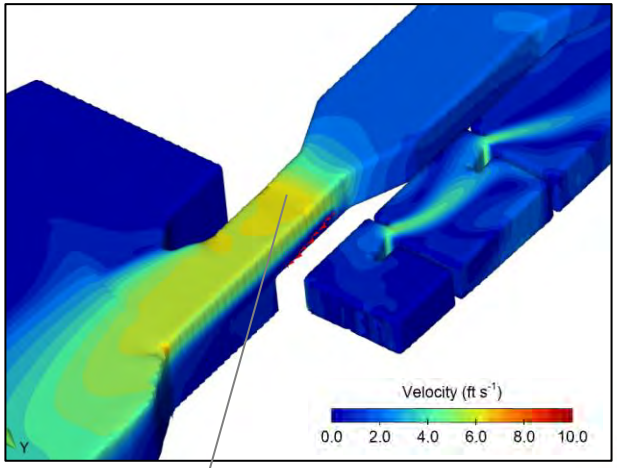
November 13, 2020

Model Setup & Simulated Flow Splits

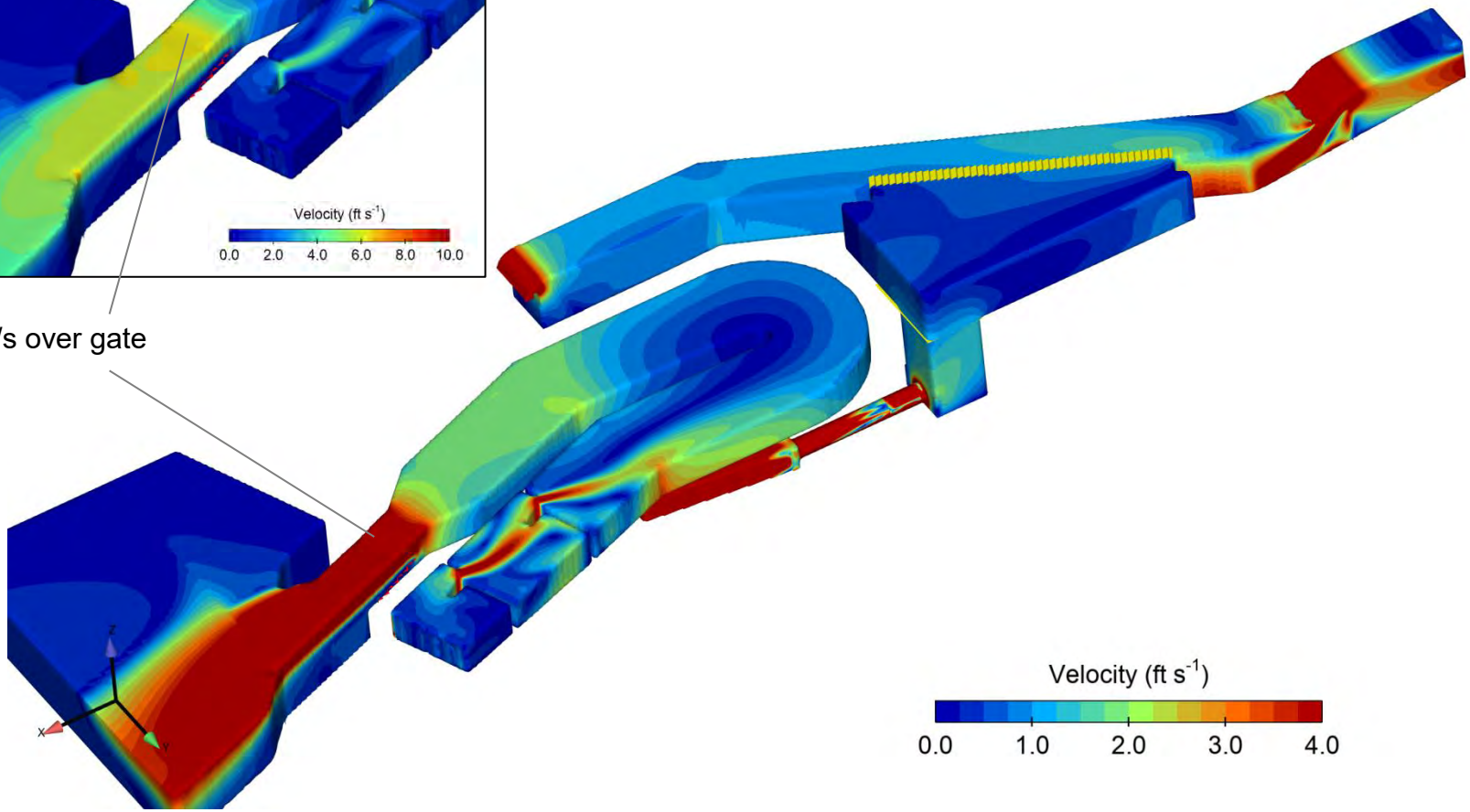


AWS drop-shaft, conduit, and turning vanes all optimized using CFD

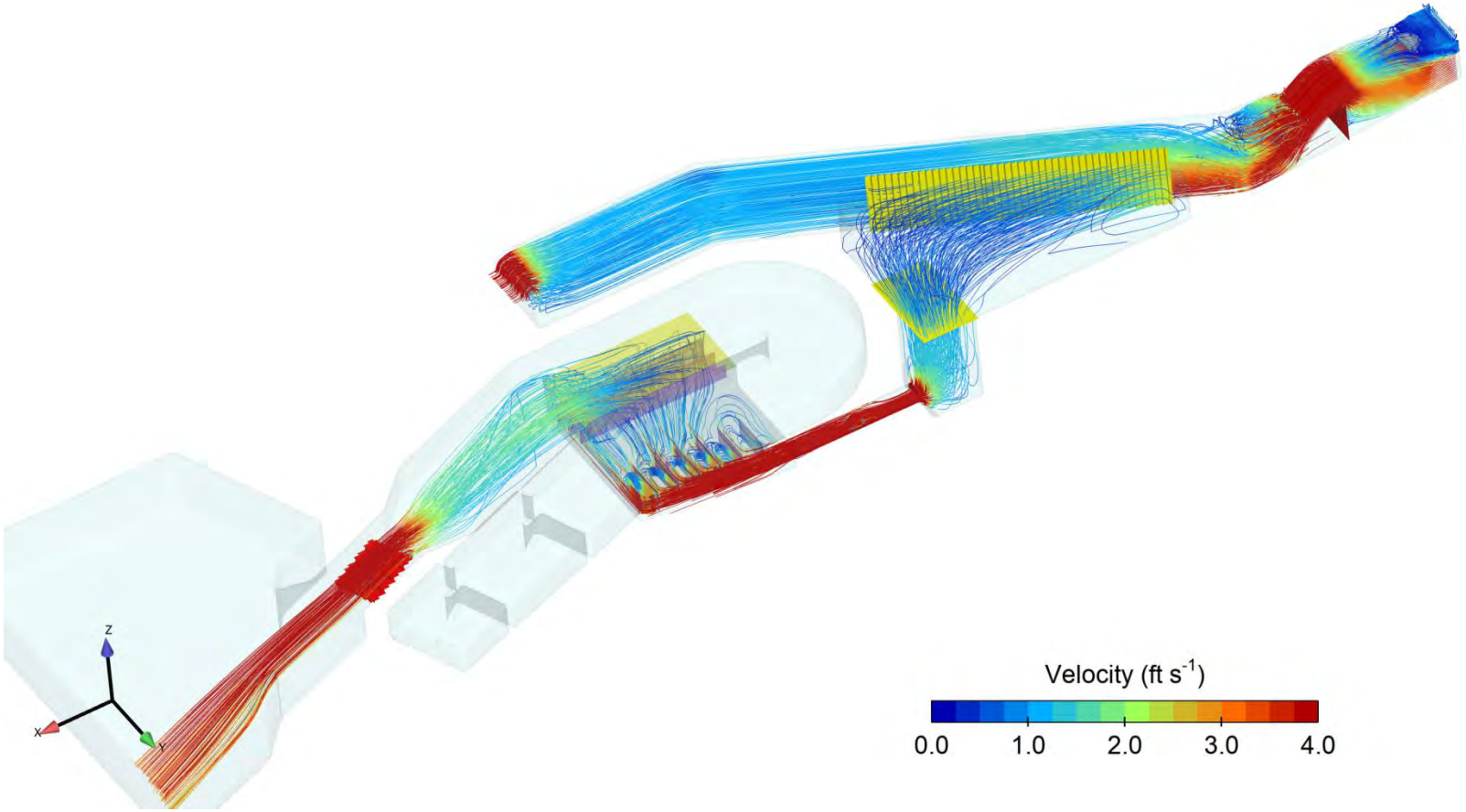
Results: Velocity Magnitude



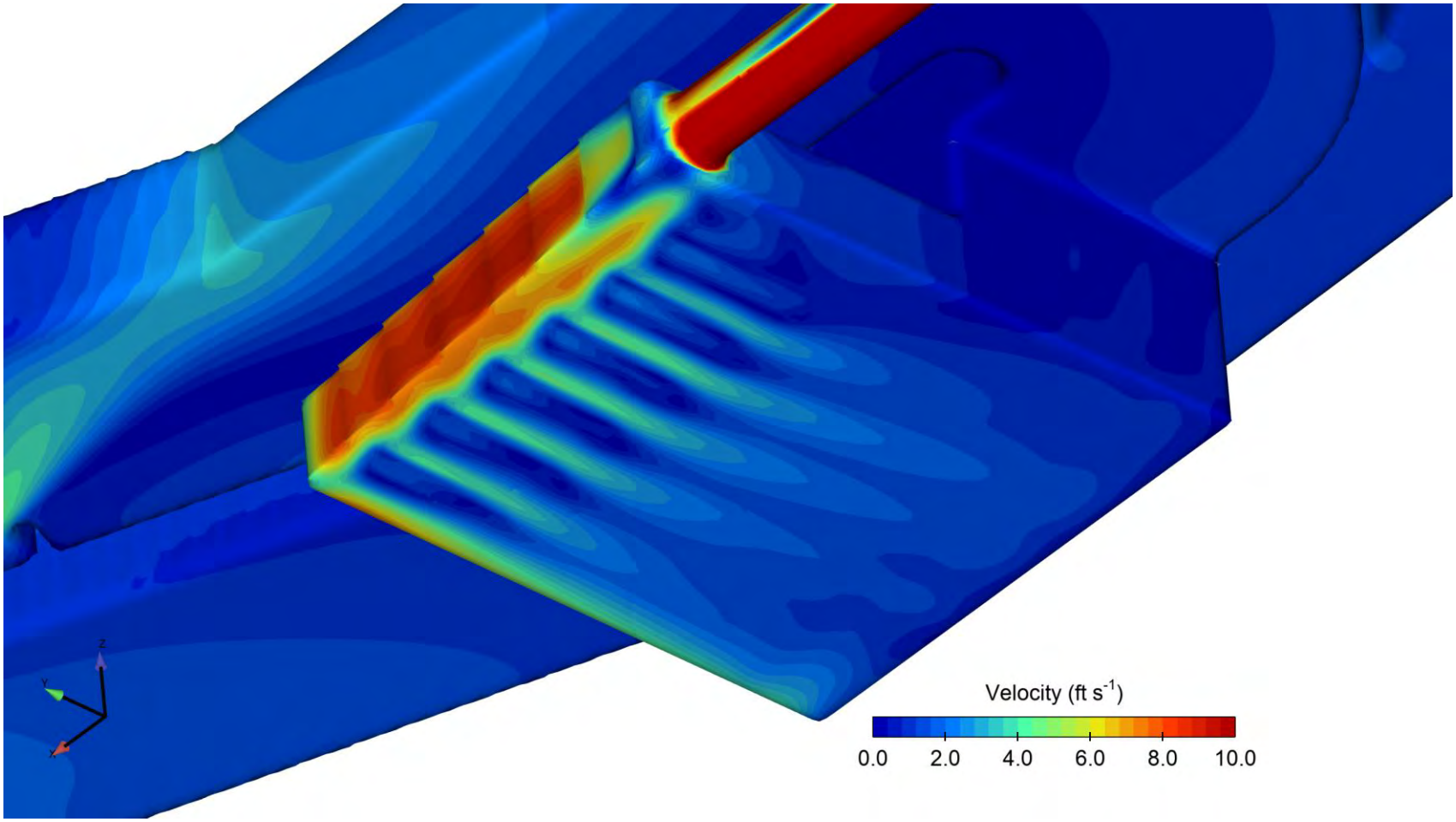
~6 ft/s over gate



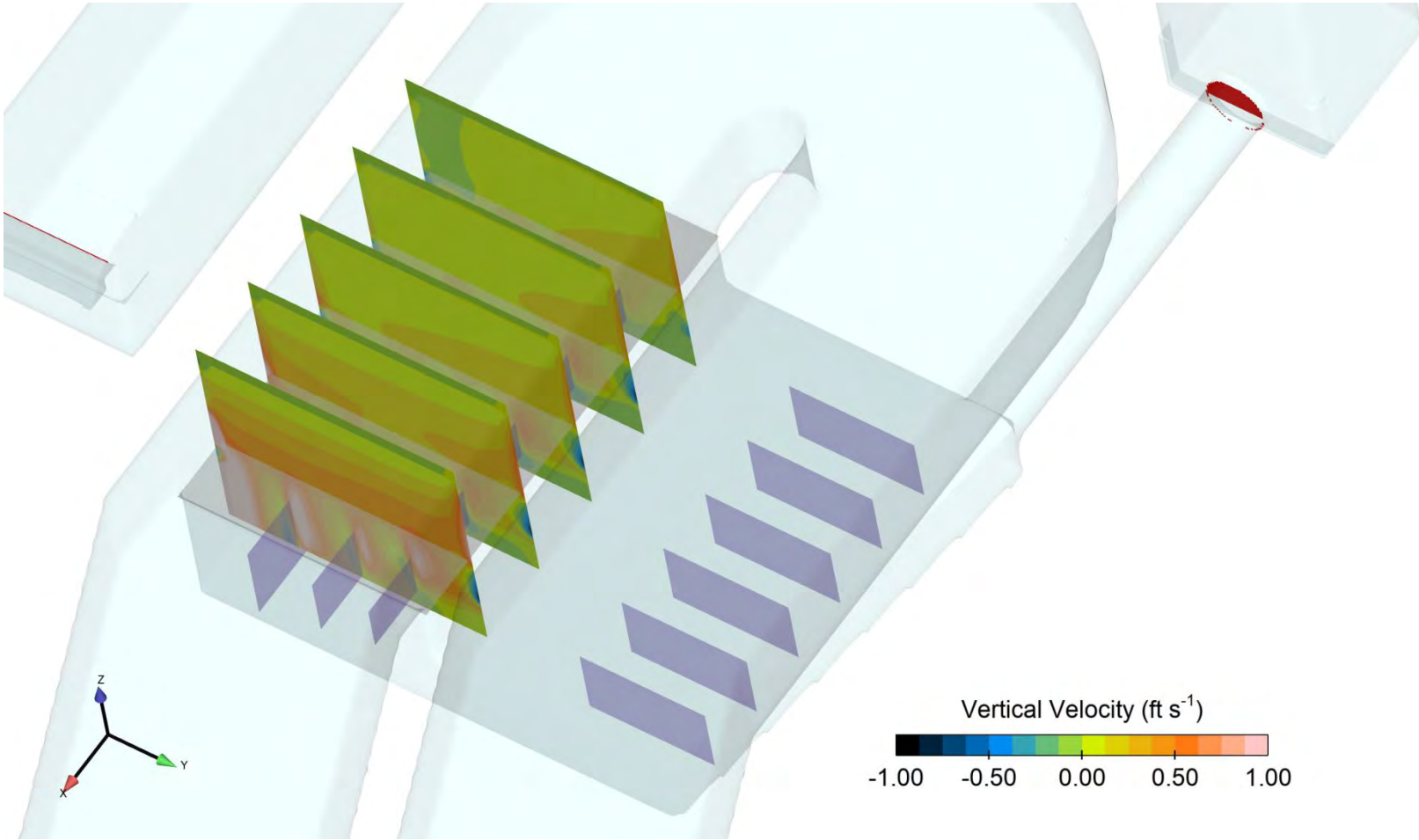
Results: AWS Streamlines



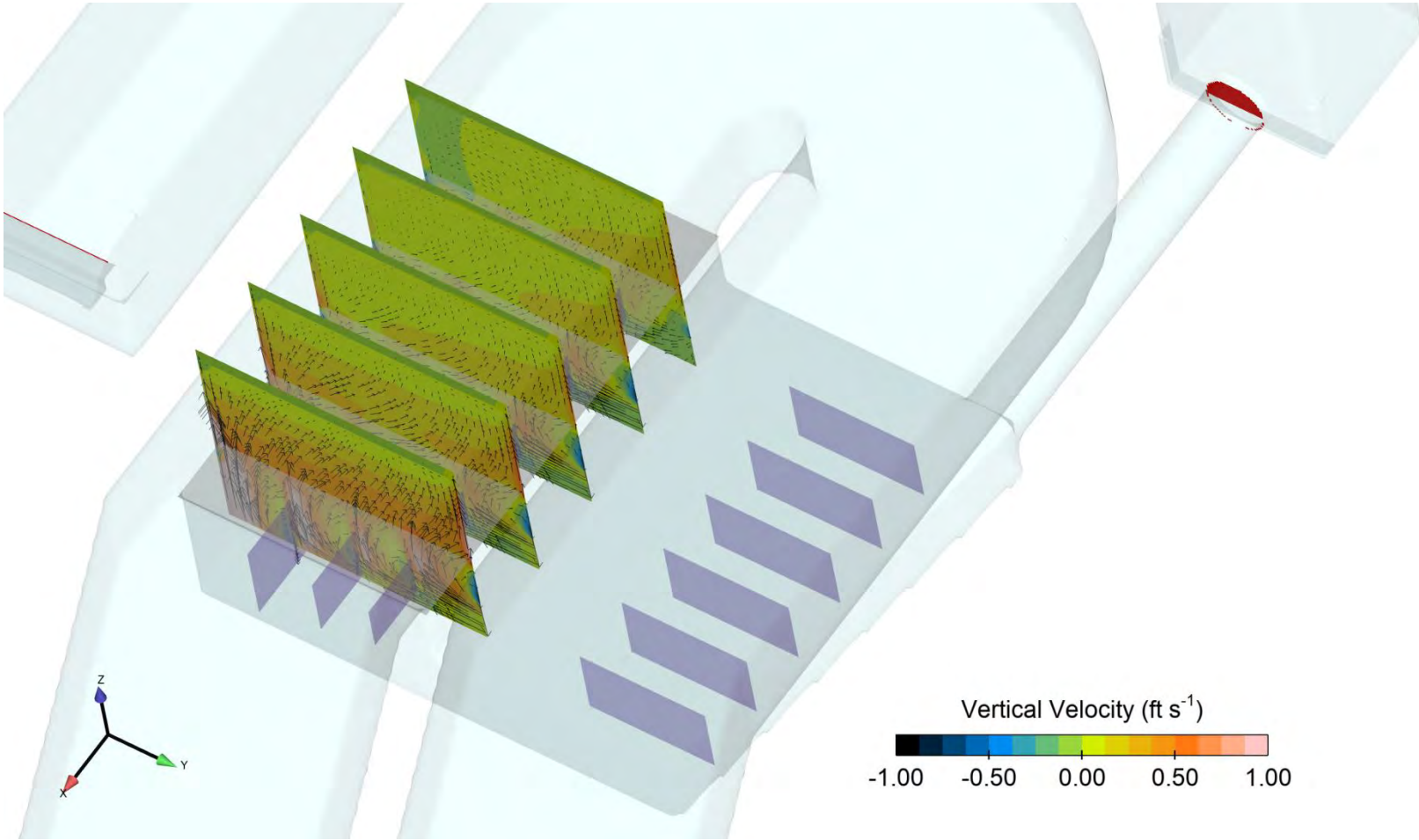
Results: AWS Horizontal Turning Vanes



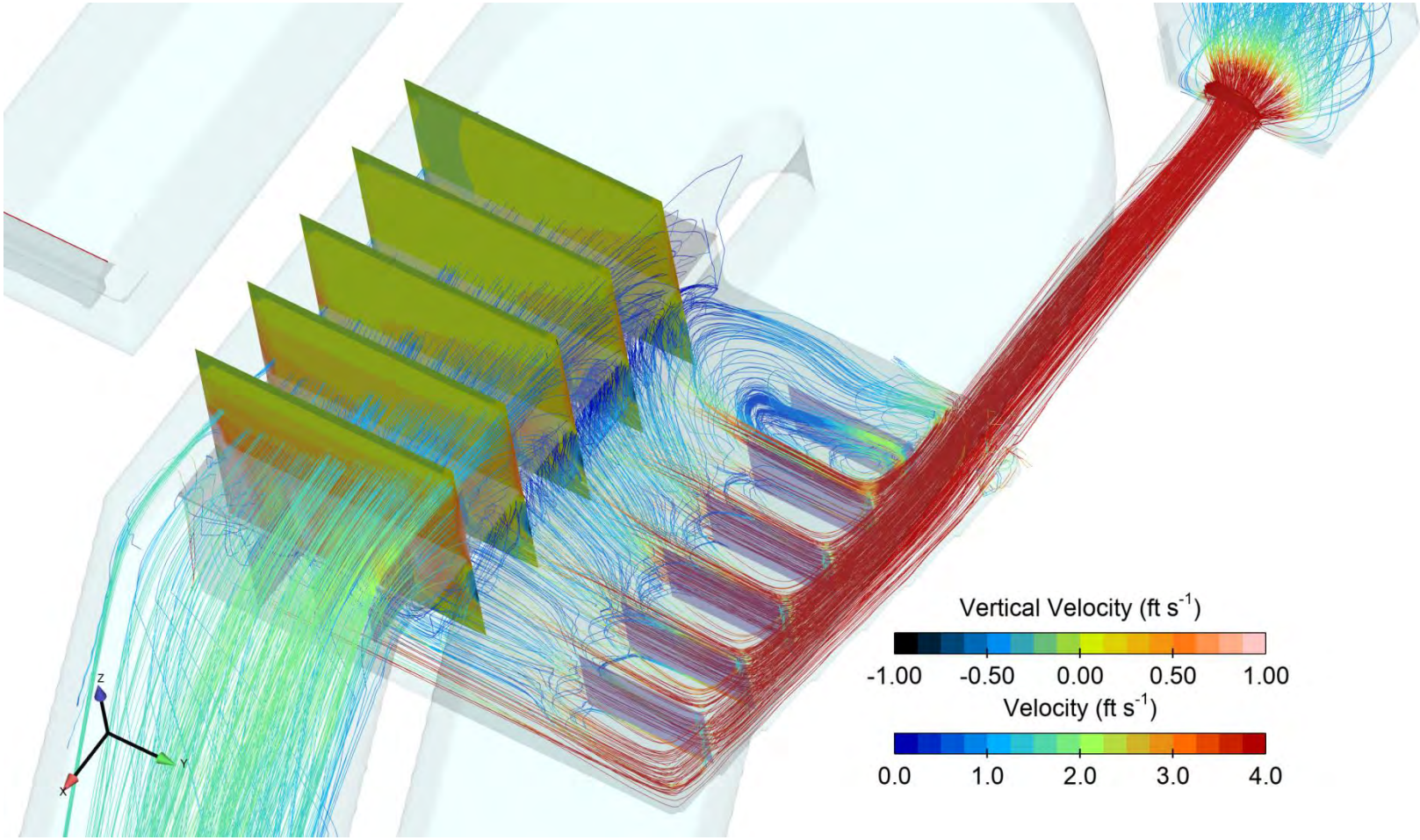
Results: AWS Floor Diffuser



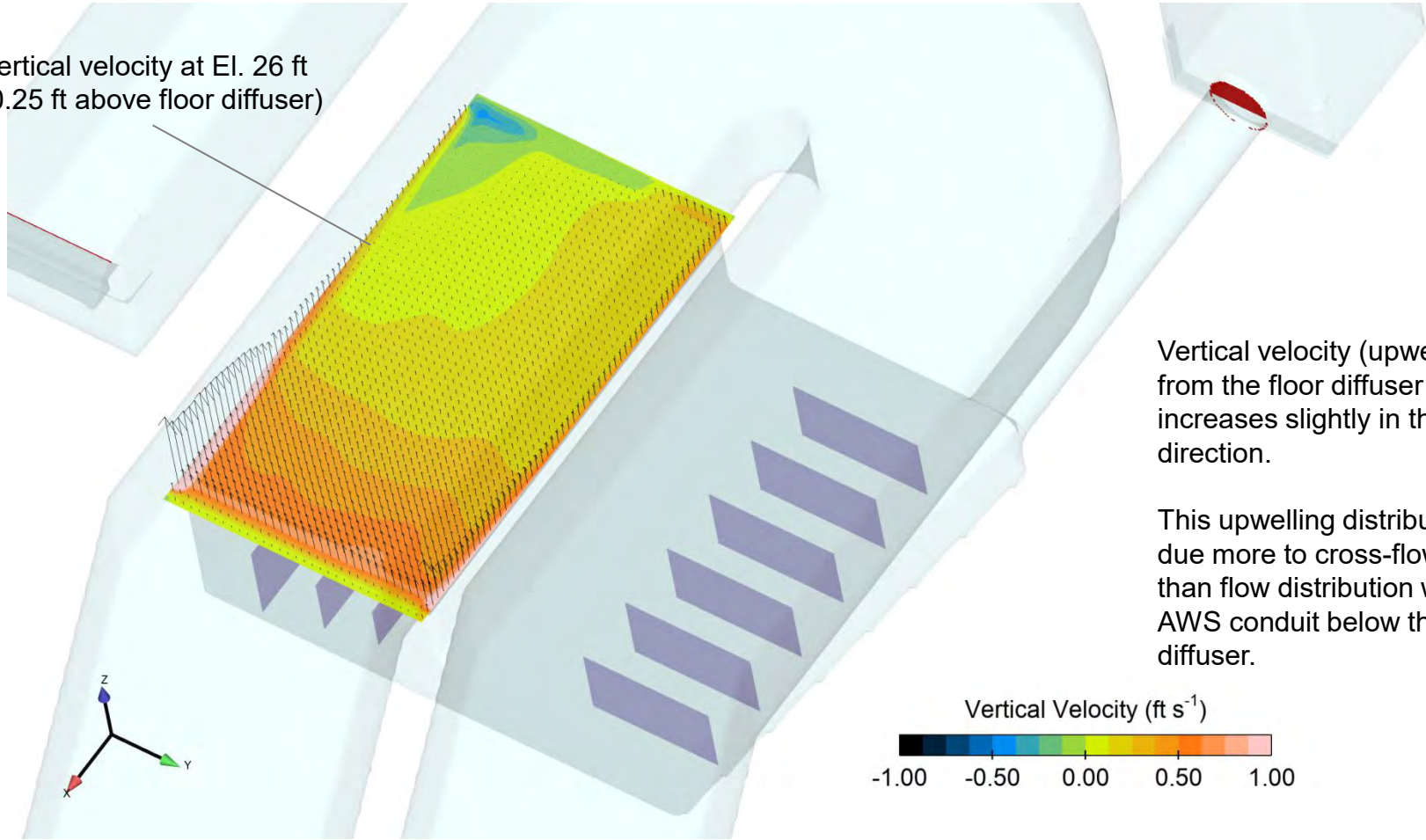
Results: AWS Floor Diffuser



Results: AWS Floor Diffuser



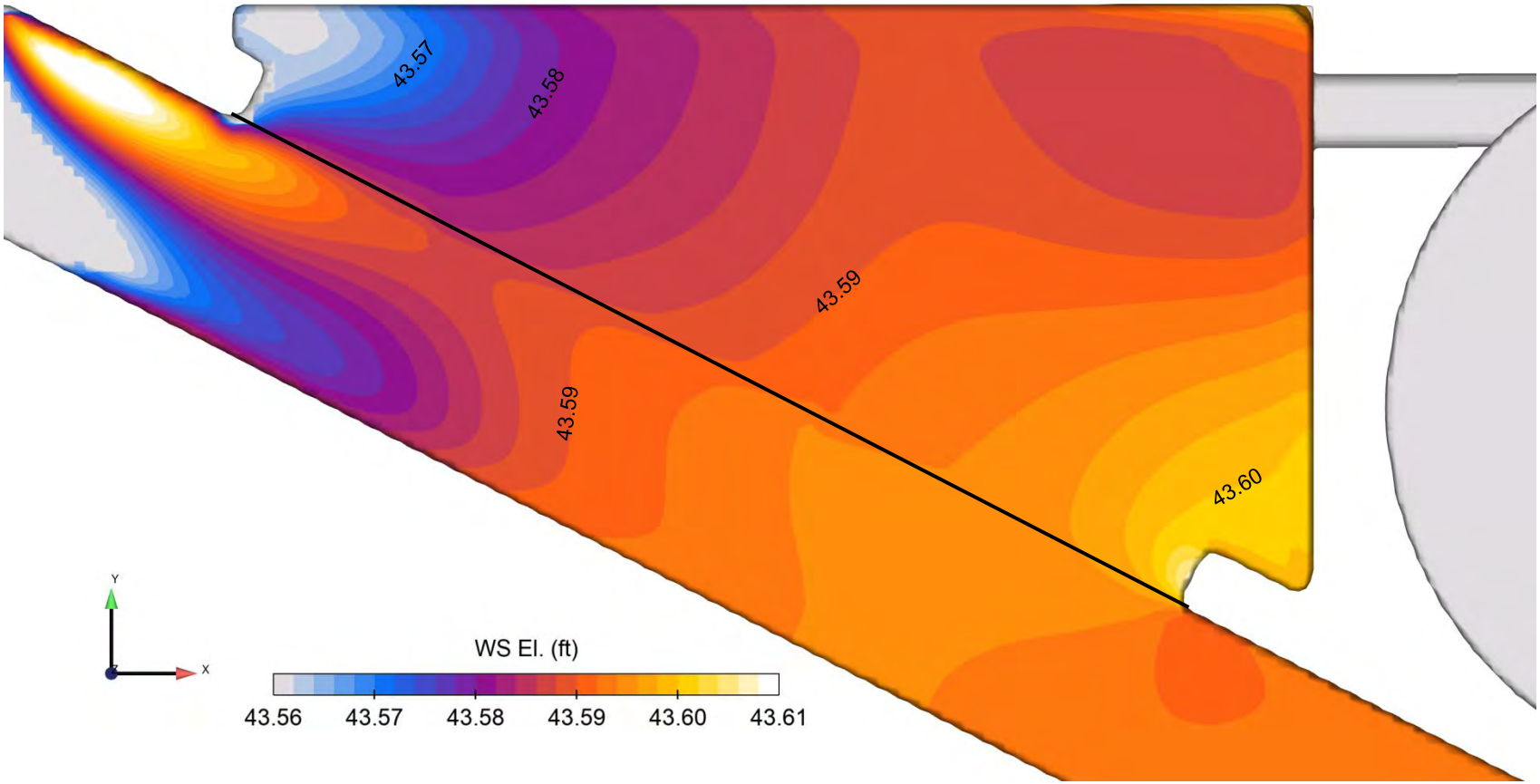
Results: AWS Floor Diffuser



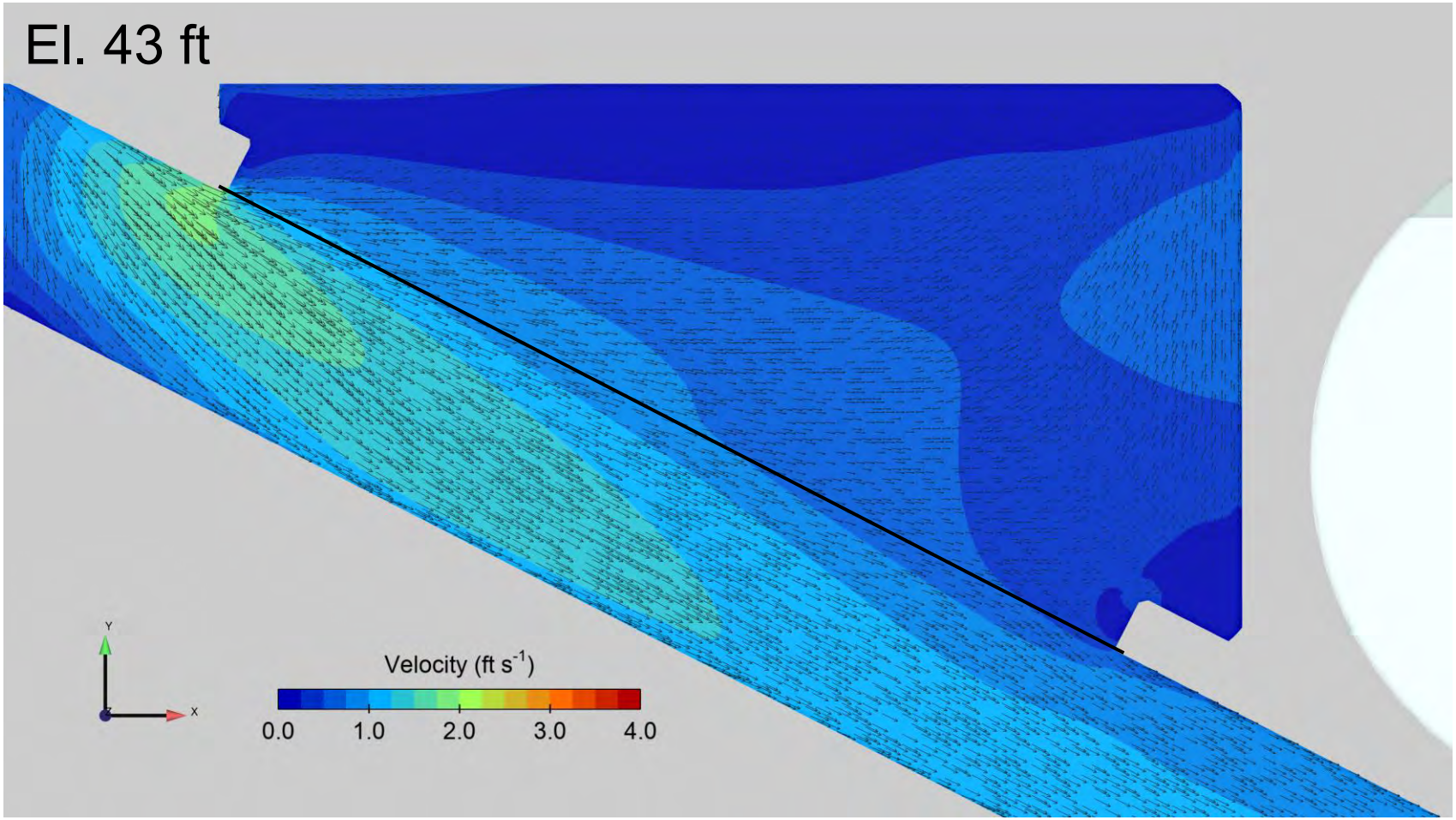
Vertical velocity (upwelling) from the floor diffuser increases slightly in the D/S direction.

This upwelling distribution is due more to cross-flow shear than flow distribution within the AWS conduit below the diffuser.

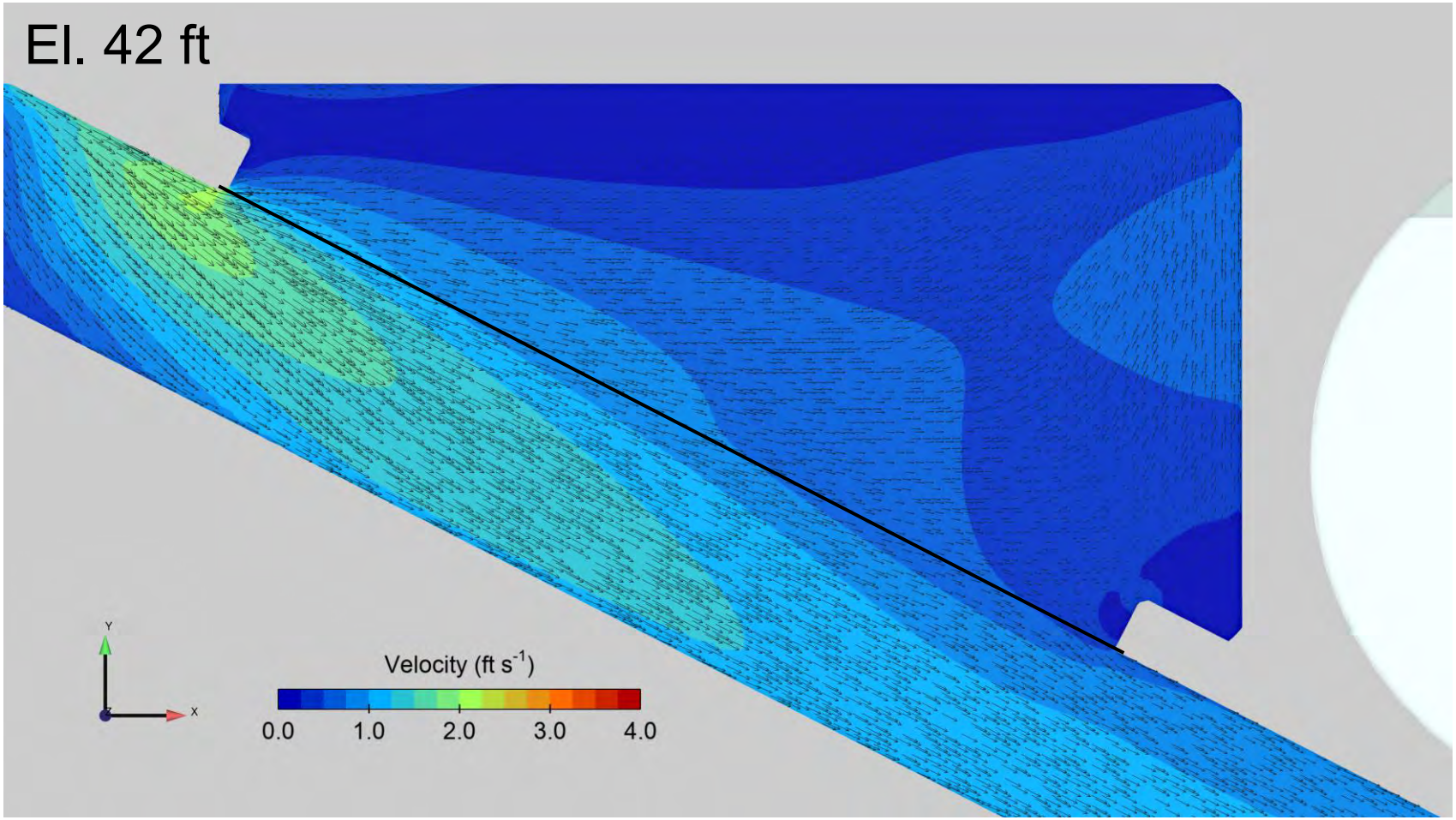
Results: AWS Forebay (Water Surf. El.)



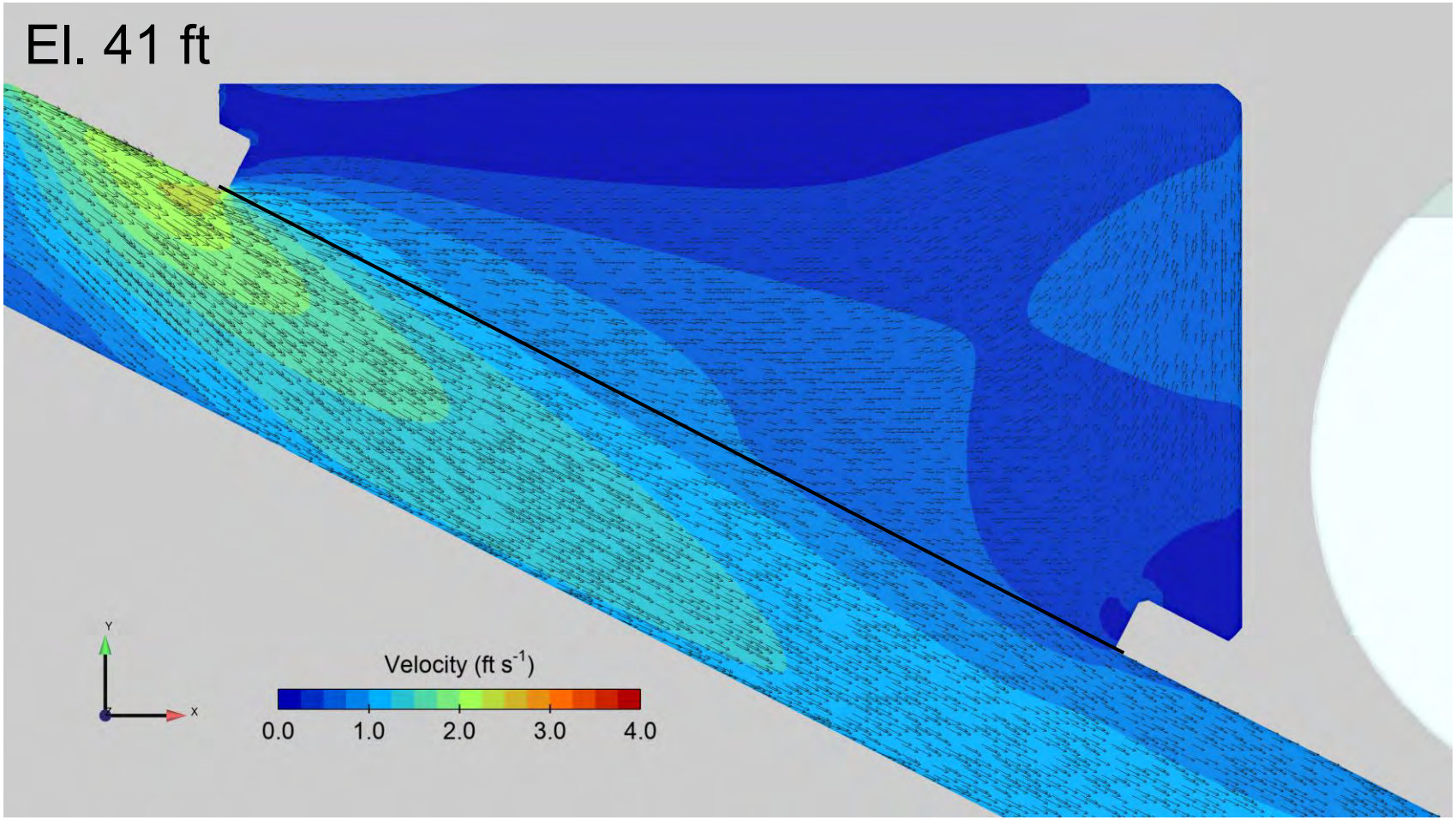
Results: AWS Forebay (Velocity at Depth)



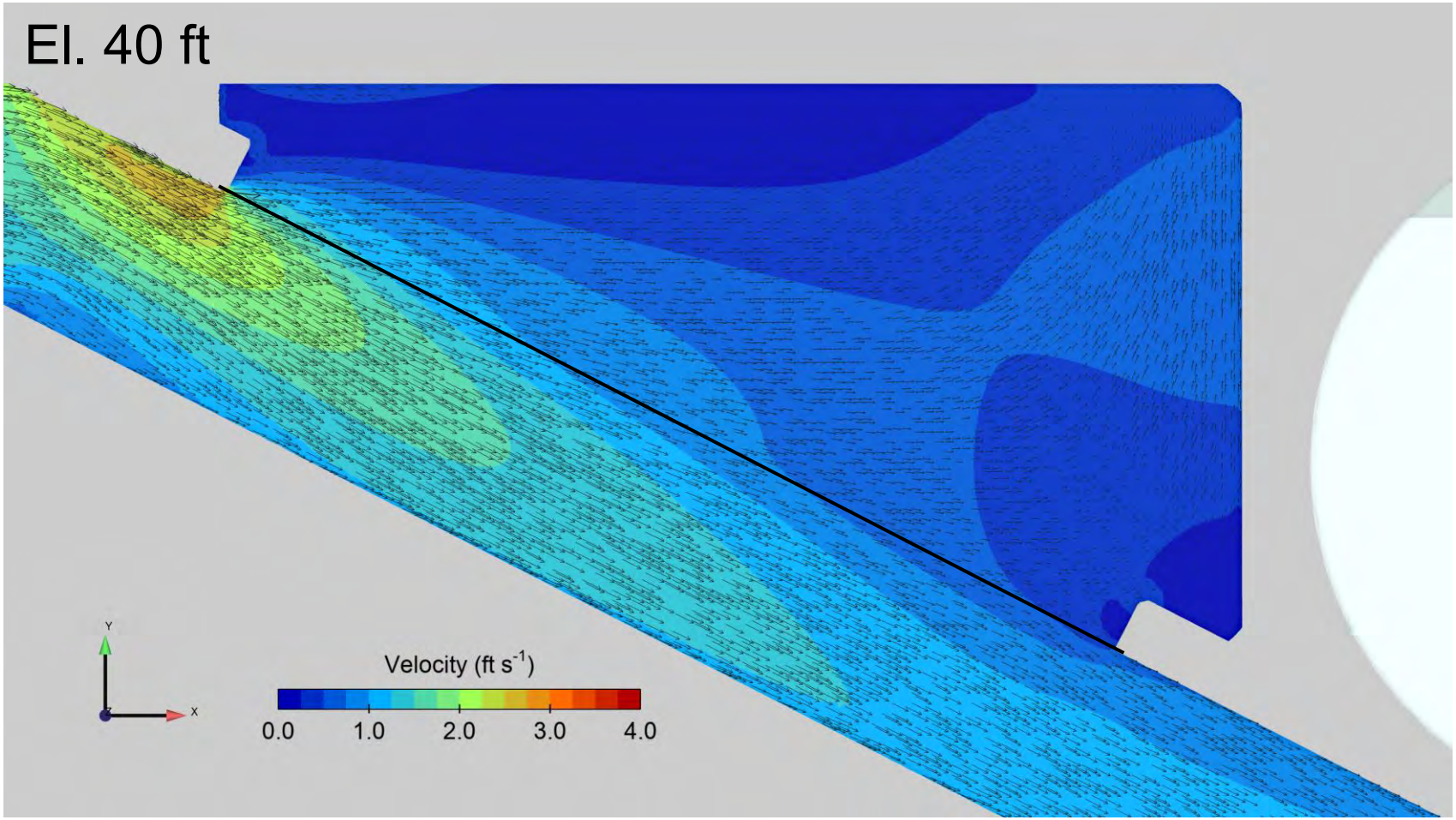
Results: AWS Forebay (Velocity at Depth)



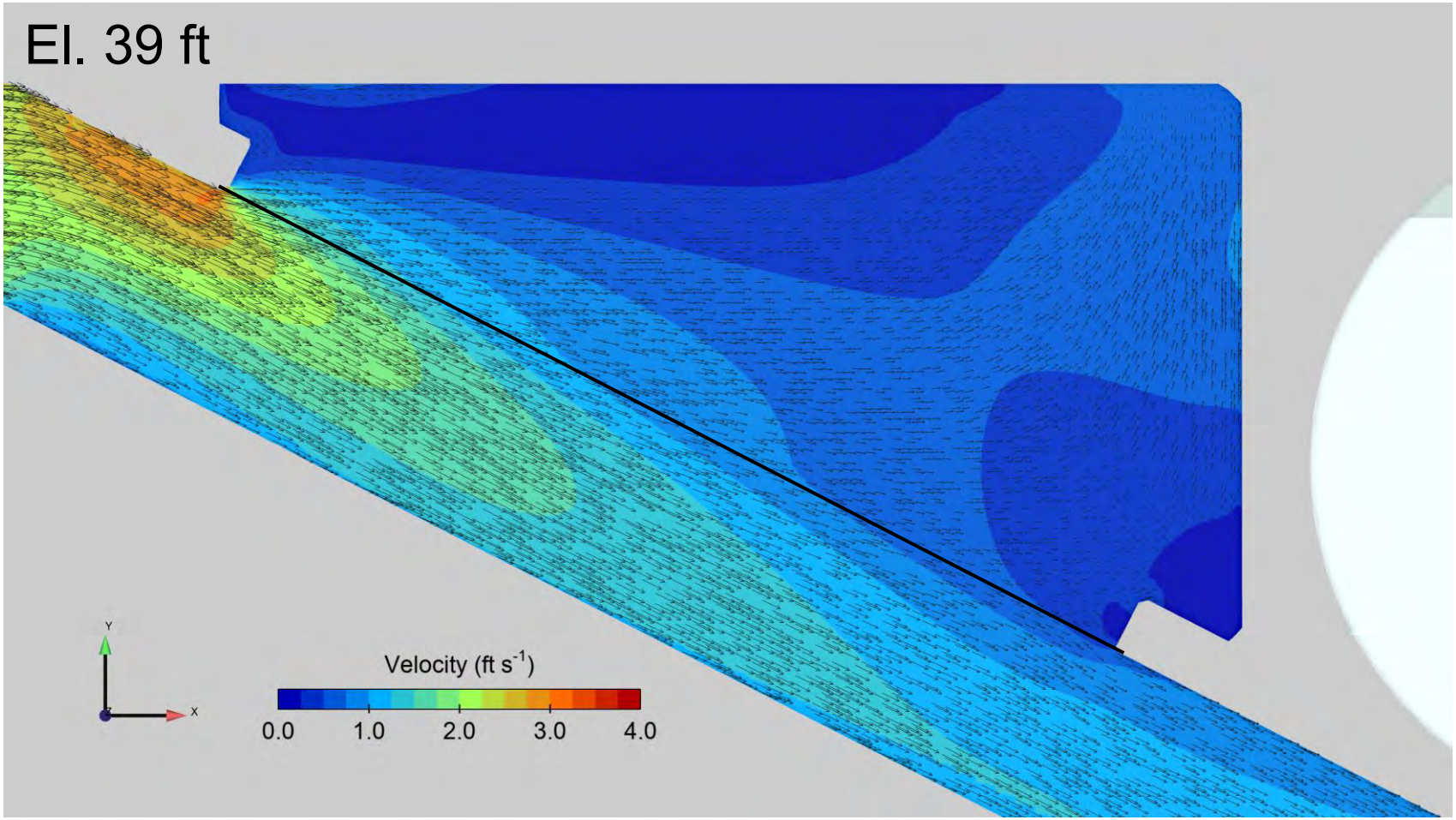
Results: AWS Forebay (Velocity at Depth)



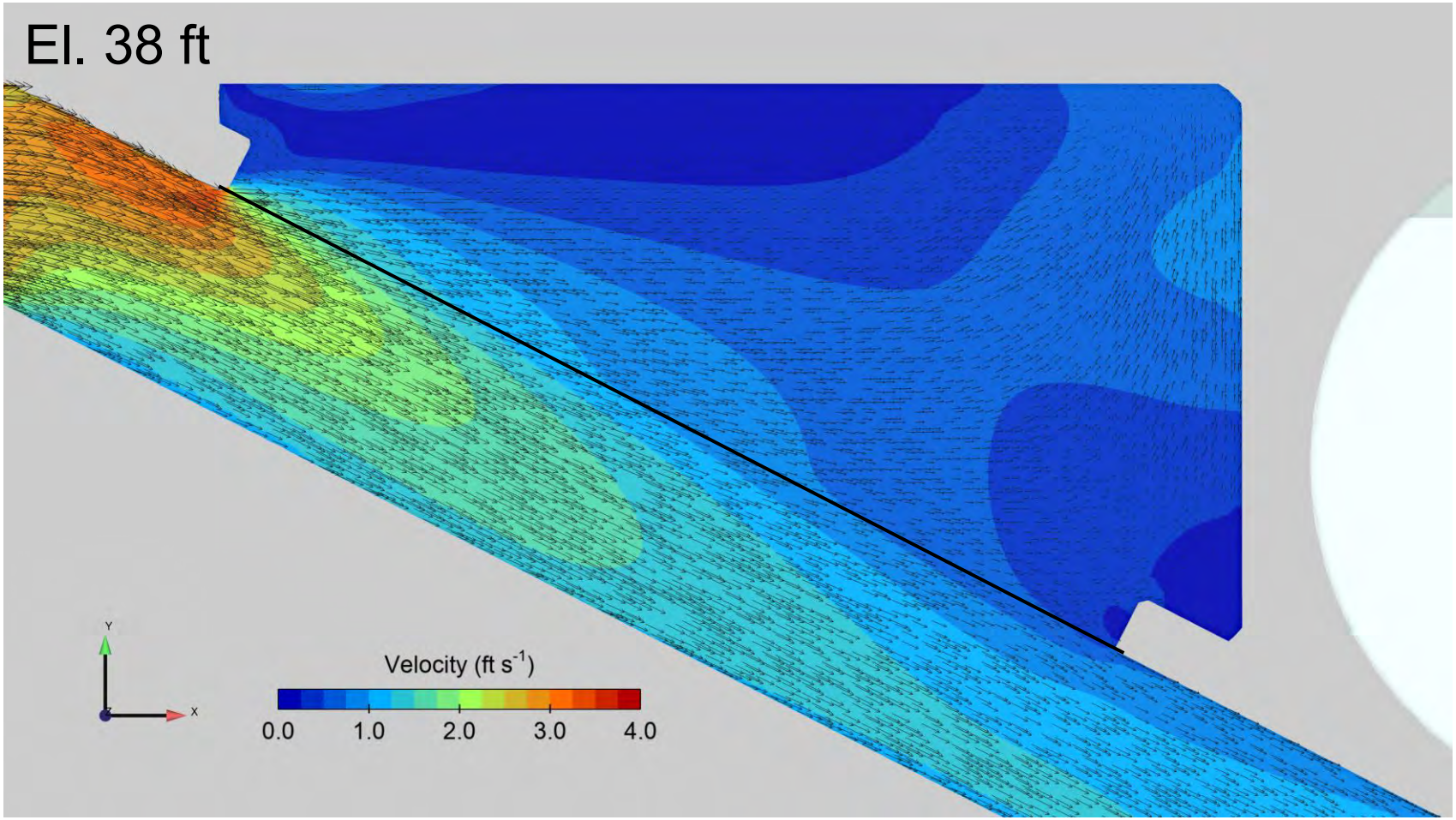
Results: AWS Forebay (Velocity at Depth)



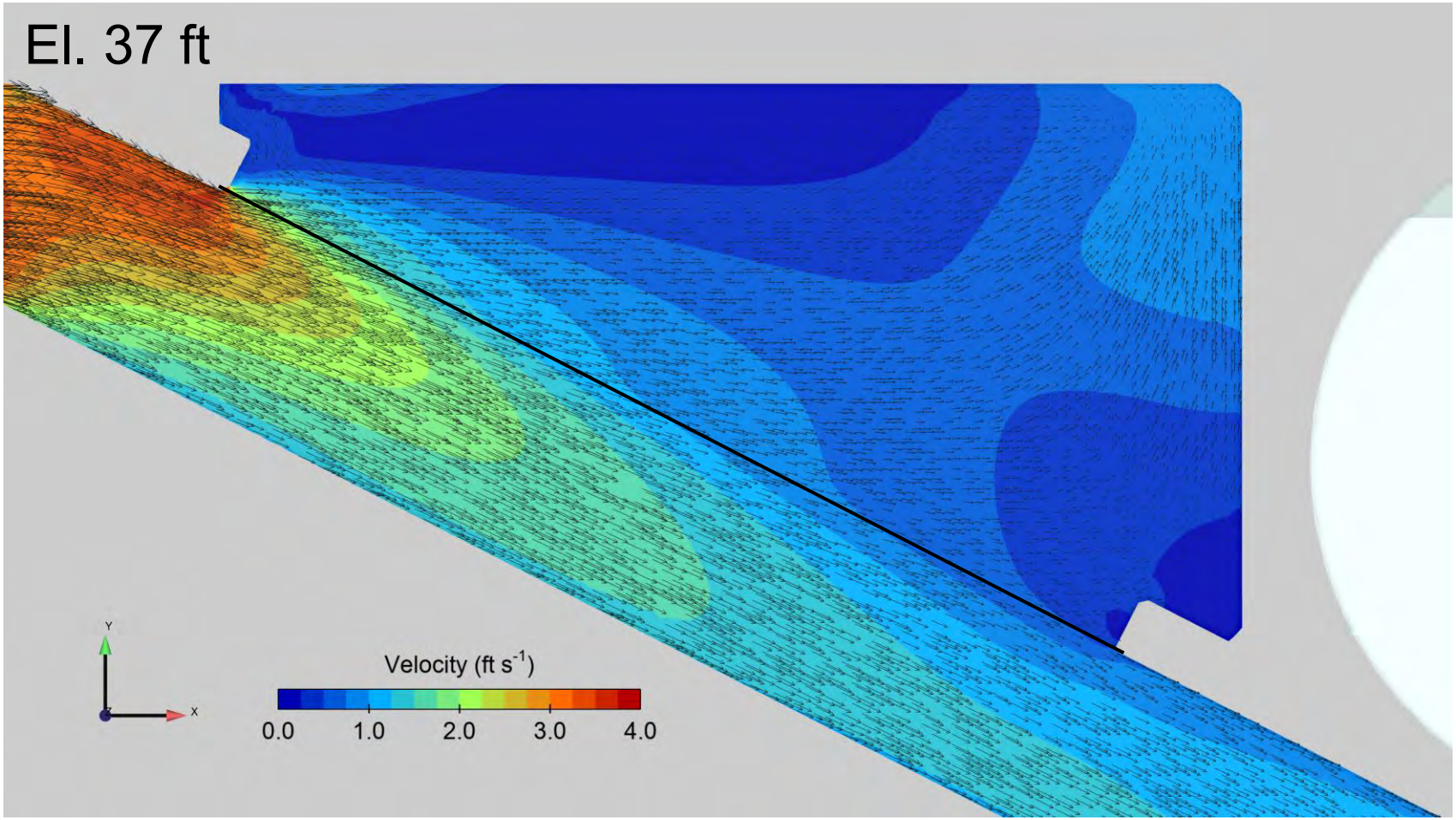
Results: AWS Forebay (Velocity at Depth)



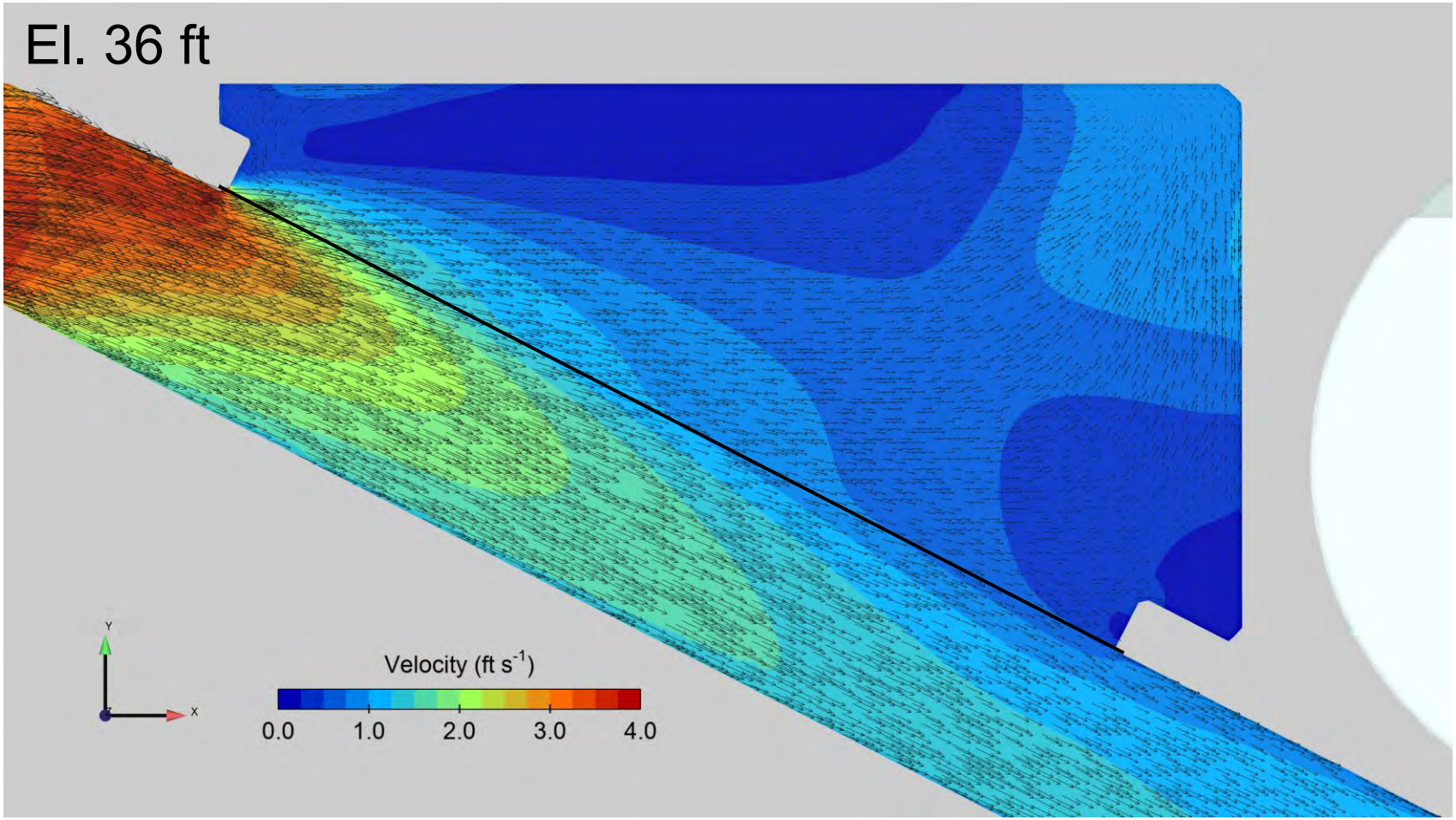
Results: AWS Forebay (Velocity at Depth)



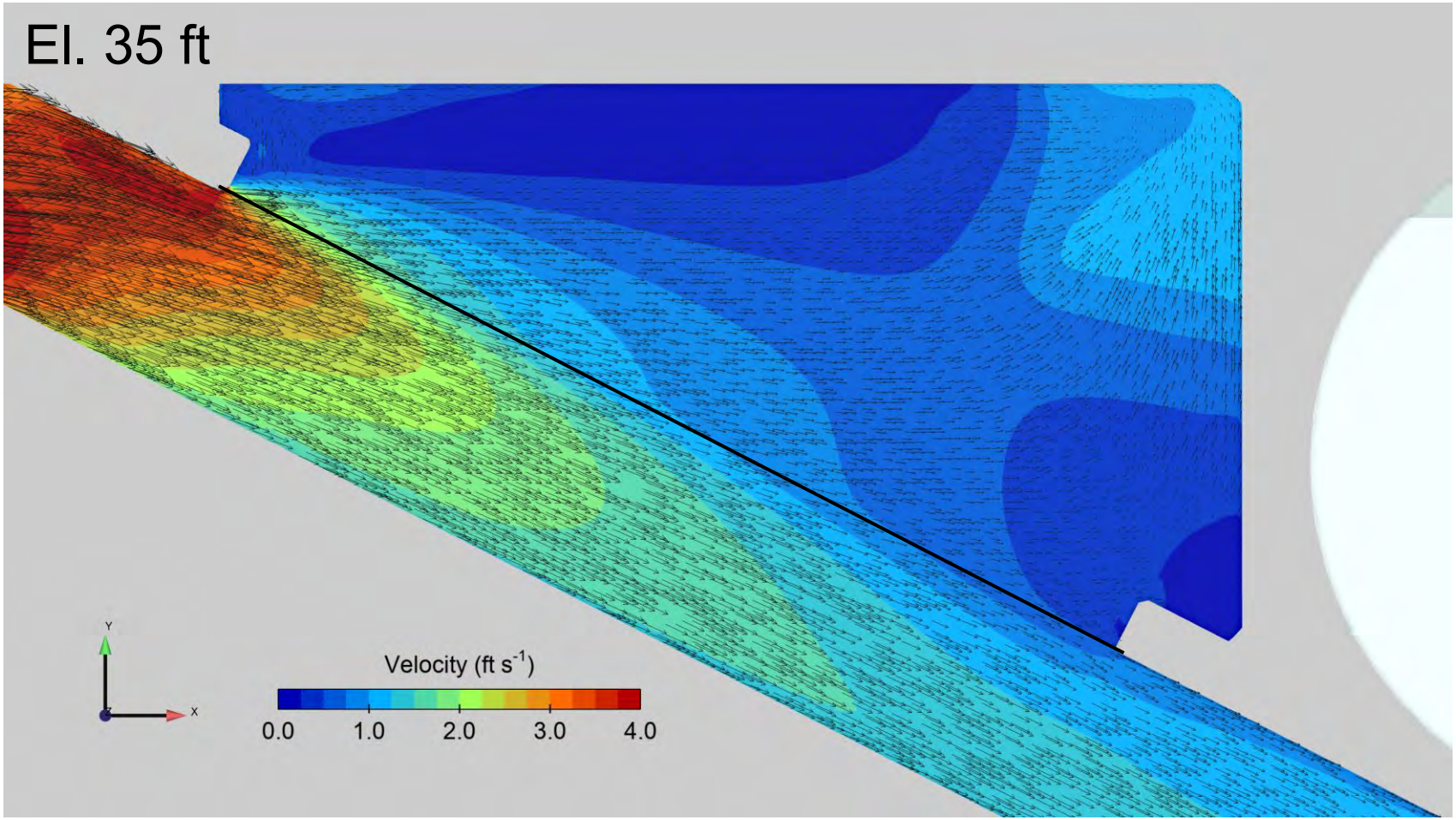
Results: AWS Forebay (Velocity at Depth)



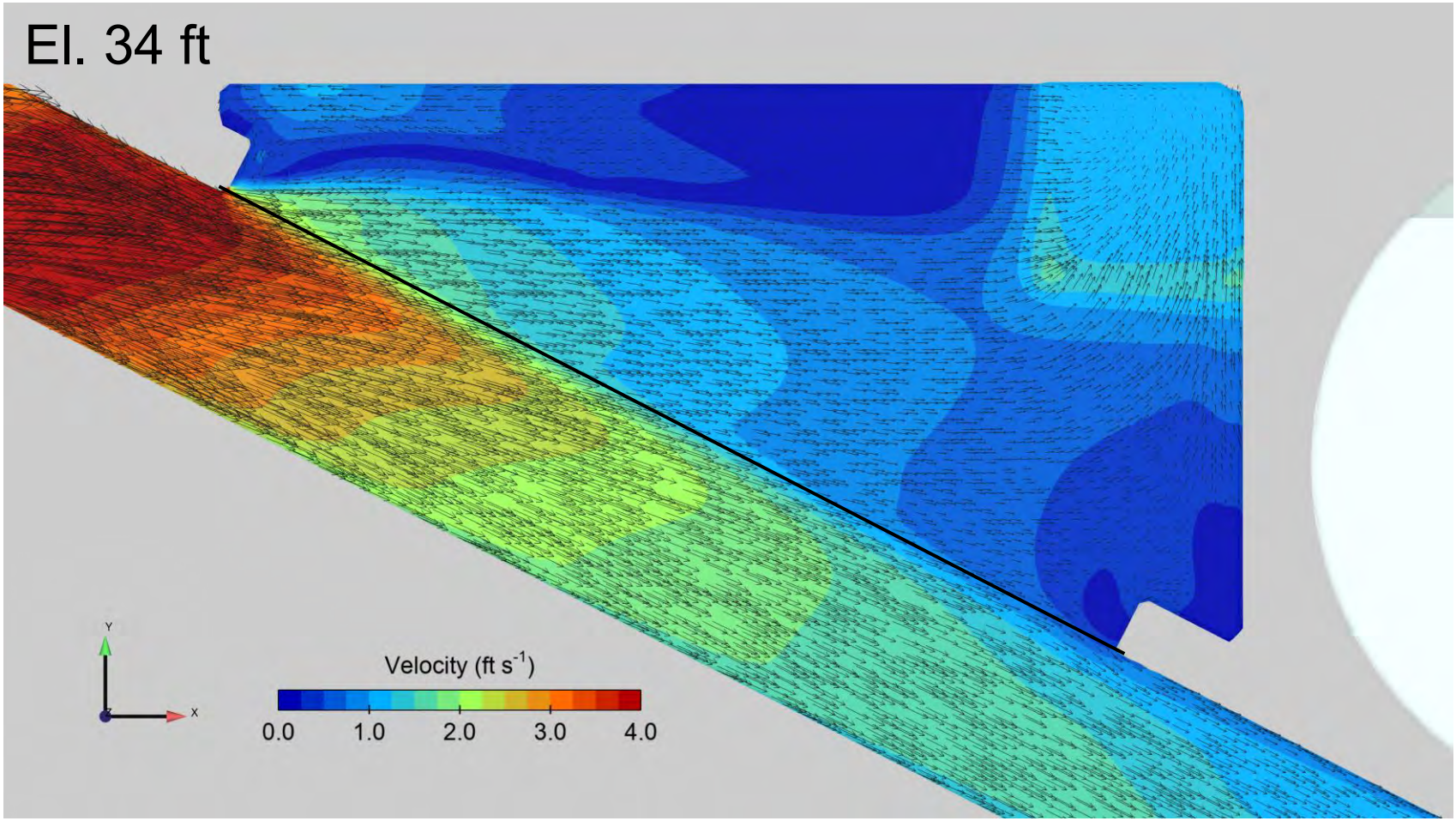
Results: AWS Forebay (Velocity at Depth)



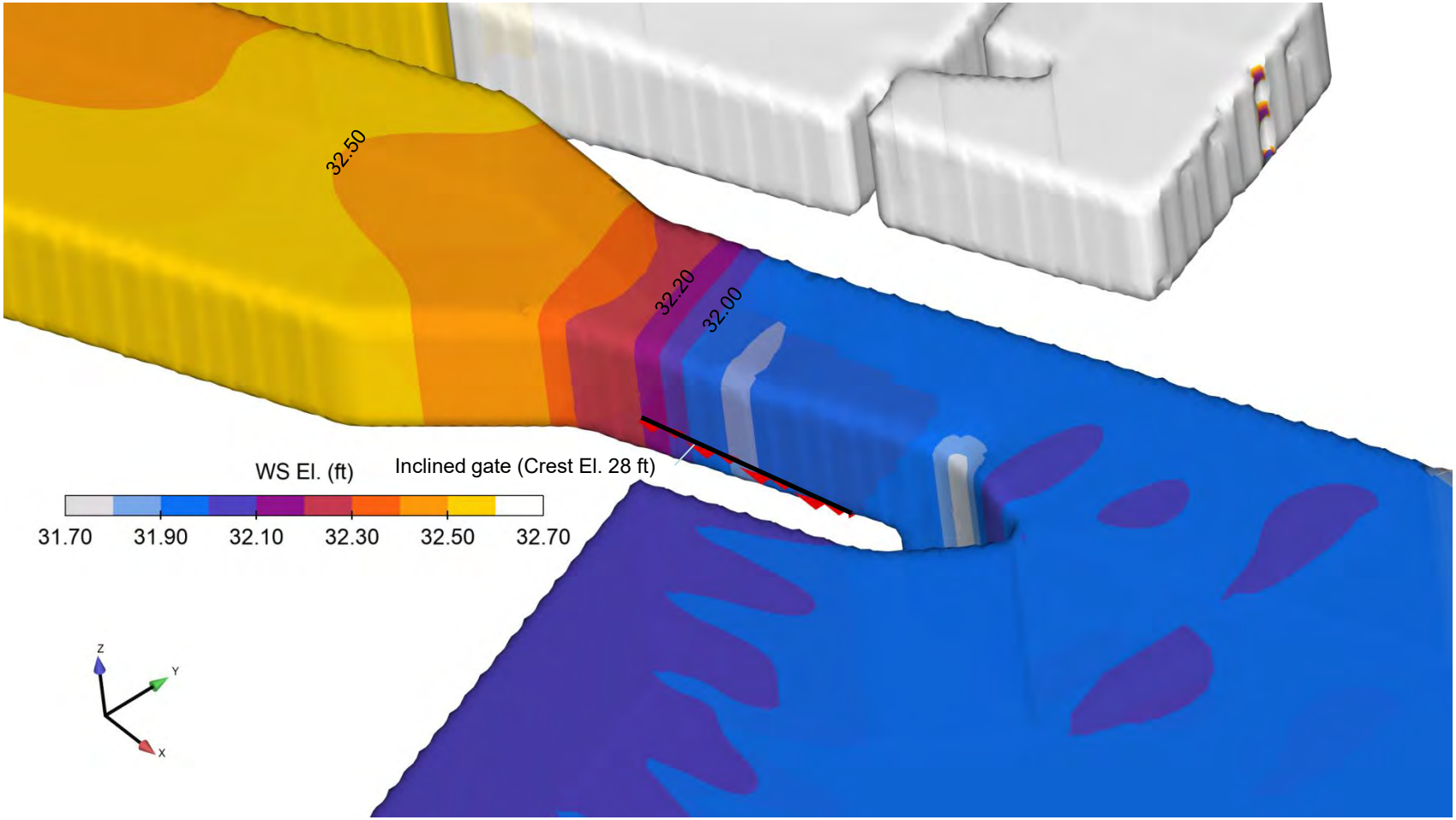
Results: AWS Forebay (Velocity at Depth)



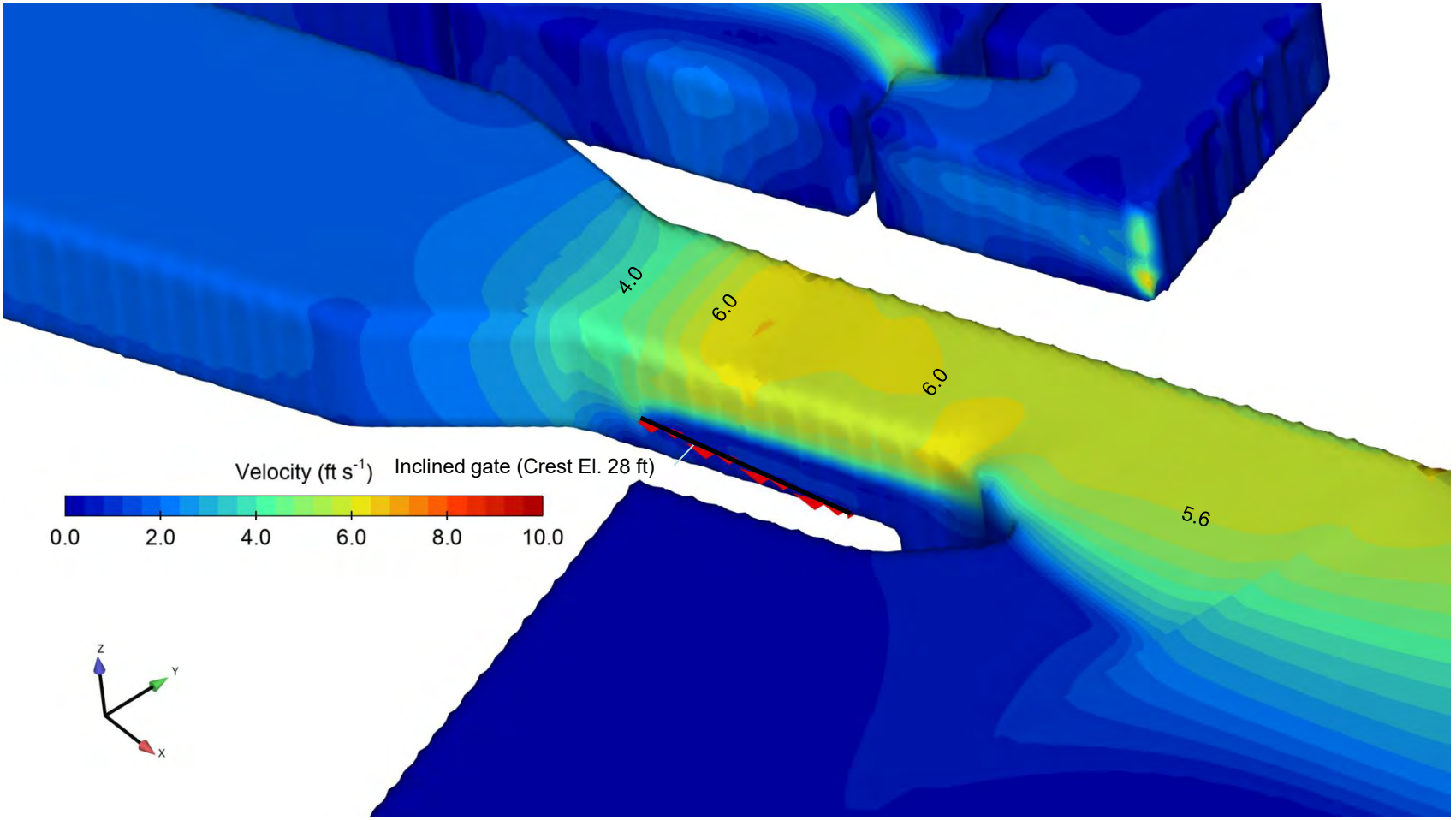
Results: AWS Forebay (Velocity at Depth)



Results: Fishway Entrance (Water Surf. El.)



Results: Fishway Entrance (Velocity)



Gregory Allen

From: Sojkowski, Bryan <Bryan_Sojkowski@fws.gov> on behalf of Sojkowski, Bryan
Sent: Monday, November 30, 2020 9:34 AM
To: Gregory Allen
Cc: Rosset, Julianne
Subject: Re: [EXTERNAL] Lockwood 60% design follow up information

Good Morning Greg,

Apologies for not sending an email out in regards to Lockwood & Weston, I unfortunately had a loss in the family so was out most of last week. I do not see any red flags at this point for either project and am good moving forward towards the 90%. Thanks for all your time and effort on these designs, talk soon.

From: Gregory Allen <gallen@aldenlab.com>
Sent: Thursday, November 19, 2020 1:45 PM
To: Bentivoglio, Antonio <antonio_bentivoglio@fws.gov>
Cc: Rosset, Julianne <julianne_rosset@fws.gov>; Sojkowski, Bryan <Bryan_Sojkowski@fws.gov>
Subject: RE: [EXTERNAL] Lockwood 60% design follow up information

Will do,

Gregory Allen, P.E.
(508) 829-6000 ext. 6409

From: Bentivoglio, Antonio [mailto:antonio_bentivoglio@fws.gov]
Sent: Thursday, November 19, 2020 12:47 PM
To: Gregory Allen
Cc: Rosset, Julianne; Sojkowski, Bryan
Subject: Re: [EXTERNAL] Lockwood 60% design follow up information

Greg,
can you take me off this list but add Julianne Rosset. Thanks. Between Julianne and Bryan they will have it covered.

Cheers.

Antonio

From: Gregory Allen <gallen@aldenlab.com>
Sent: Thursday, November 19, 2020 10:13 AM
To: Mitchell, Gerry <Gerry.Mitchell@brookfieldrenewable.com>; Baker, Nathan <Nathan.Baker@brookfieldrenewable.com>; Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>; Pocquette, Kayla <Kayla.Pocquette@brookfieldrenewable.com>; Reny, Melissa <Melissa.Reny@brookfieldrenewable.com>; Brown, Adam <Adam.Brown@brookfieldrenewable.com>; Sojkowski, Bryan <Bryan_Sojkowski@fws.gov>; matt.buhyoff <matt.buhyoff@noaa.gov>; donald.dow@noaa.gov <donald.dow@noaa.gov>; Bentivoglio, Antonio <antonio_bentivoglio@fws.gov>; Harris, Anna <anna_harris@fws.gov>; Gail.Wippelhauser@maine.gov <Gail.Wippelhauser@maine.gov>; Paul Christman <Paul.Christman@maine.gov>; Dwayne.J.Seiders@maine.gov <Dwayne.J.Seiders@maine.gov>; Seyfried, Jason <Jason.Seyfried@brookfieldrenewable.com>
Cc: Ben Mater <bmater@aldenlab.com>; Mark Graeser <mgraeser@aldenlab.com>; Amy Mengert <amengert@aldenlab.com>
Subject: [EXTERNAL] Lockwood 60% design follow up information

Good morning All,
As a follow up to our meeting last week for Lockwood and Weston I have attached hydraulic information for the Lockwood entrance conditions and a CFD analysis of the AWS flow conveyance to the floor diffuser. Note that the CFD was completed to aid in the design process to optimize the AWS intake screen, forebay geometry, AWS flow control gate and geometry leading to the floor diffuser.
Let me know if you have any questions regarding this information.
Also, please let us know if there are any additional comments regarding the 60% design submittals for Weston and Lockwood as we are moving ahead to develop the 90% design.

Thank you,
Greg

Gregory Allen, P.E.
Director, Environmental and Engineering Services
ALDEN Solving flow problems since 1894
30 Shrewsbury St., Holden, MA 01520
(508) 829-6000 ext. 6409
gallen@aldenlab.com | www.aldenlab.com

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Gregory Allen

From: Gregory Allen
Sent: Wednesday, February 03, 2021 4:23 PM
To: 'matt.buhyoff@noaa.gov'; 'donald.dow@noaa.gov'; 'gail.wippelhauser@maine.gov'; 'dwayne.j.seiders@maine.gov'; 'paul.christman@maine.gov'; 'bryan_sojkowski@fws.gov'; 'julianne_rosset@fws.gov'
Cc: 'Baker, Nathan'; 'Mitchell, Gerry'; 'Maloney, Kelly'; 'Pocquette, Kayla'; 'Brown, Adam'; 'Dill, Richard'; 'Seyfried, Jason'
Subject: Lockwood design drawings

Good afternoon Everyone,
Please see the link below to download the final design drawings for Lockwood. The file size is about 30 MB and let me know if anyone has trouble accessing the file.

Lockwood design drawings: https://we.tl/t-zfmyV2V4vZ

Please review in preparation for our planned meeting next Tuesday, February 9.
I will send a separate email for the Weston design drawings.

Thank you,
Greg

Gregory Allen, P.E.
Director, Environmental and Engineering Services
ALDEN Solving flow problems since 1894
30 Shrewsbury St., Holden, MA 01520
(508) 829-6000 ext. 6409
gallen@aldenlab.com | www.aldenlab.com

Meeting Notes
Lockwood and Weston Fish Passage Meeting
Tuesday, February 9, 2021
9:00 AM – 11:00 AM

Attendees:

Gail Wippelhauser, (MEDMR)
Kathy Howatt (MEDEP)
Chris Sferra (MEDEP)
Donald Dow (NOAA)
Bryan Sojkowski, (USFWS)
Julianne Rosett (USFWS)
Corbin Hilling (USFWS)
Kelly Maloney (Brookfield)
Kayla Pocquette (Brookfield)
Gerry Mitchell (Brookfield)
Nathan Baker (Brookfield)
Jason Seyfried (Brookfield)
Richard Dill (Brookfield)
Adam Brown (Brookfield)
Gregory Allen (Alden)
Amy Mengert (Alden)
William Lewis (Alden)
Jenna Rackovan (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/ teleconference on February 9, 2021. The primary topic was to discuss the final design drawings for each project.

Lockwood Final Design Drawing Review

The final design drawings were transmitted to resource agencies for comment on February 3, 2021.

Greg Allen presented an overview of the drawings for the Lockwood fish passage facilities, specifically pointing out the changes since the 60% design.

Comments and Discussion:

- Don- complimented Alden on a good well done drawing package

- Sheet 8 – the plan shows a different crest gate arrangement and the addition of a concrete flood wall between the shore and the fishway replacing the existing spillway in this area. Flood modeling showed an issue with allowing flood flows to pass between the fishway and shore. The flood wall prevents flood flows from this area and necessitates the need for more crest gate length (142 ft) for the project to pass flood flows. The fishway also now has a walkway with hand rails on both walls.
    - Gail– Do you need to build a new spillway in the pointed shape instead of across? Do you still leave the original spillway in place? Greg responded, no, the existing spillway will need to be removed entirely at the crest gate location.
- Bryan Sojkowski – The Lowell vertical slot fish ladder at 180degree turn pool was found to lose a little over 20% of the herring, meaning they fell back. We need to be cautious on the 180 degree turn. The Brunswick vertical slot fish ladder installed a wooden training wall at the turning pool and a similar modification was installed for the Vernon ladder.
    - In between stub wall and center wall (where there is a dead area), would we need to block it off?
    - Lowell meets the FWS criteria – (16 inch slot width at Lowell), however, FWS is finding more issues at turn pools causing delays at fish ladders which creates increase risk of fish falling back.
    - Bryan has no recommendations, just wanted to bring it up for discussion with the group.
    - Greg – the design includes stop log slots at the mid-point of the 180 degree bend to provide a means to install flow modifications, if the turning pool is found to be an issue. Greg mentioned a CFD study of a vertical slot fishway in Canada investigating a 180 degree turning pool hydraulics. Greg will send that study to those that are interested.
    - Gail Whippelhauser – asked if the Lowell fish ladder had similar data for shad or if it was just river herring? – Bryan responded that it was only data for river herring.
- Greg pointed out the height of the fish ladder walls (tall). There will be more shadows rather than direct sunlight within the ladder.
    - Don – at what flows will allow the wall to over top?
        - Above the 50yr flood (Don was ok with that)
        - What point does the baffles over top?
    - Amy – mentioned there is about 2 ft of freeboard above the top of the fish ladder baffles for the design high fish ladder flow condition.
- AWS Screen – the screen is wedge wire with a clear opening of 0.25 inches
    - The screen is flush and smooth

  - Maintenance would require the channel be drained and the screens lifted with a jib crane for repairs or service.
  - Don – at Hydro Kennebec – they don't have to close down the attraction water system. They pick up one screen and pressure wash it while the other one is in place
  - Greg – to clean the proposed AWS screen at Lockwood, the AWS flow to the floor diffuser would be shut down so that there is 100% sweeping flow along the AWS screen face to clean it.
  - Gerry Mitchell – Biggest debris issues would be late in the season with the oak leaves but he thinks it will be okay.
  - Don – what is the alternative if sweeping velocity is not enough to clean it off?
    - Greg – cleaning systems such as air bursts, but should see it action before determining what issues may occur and what would be the best solutions
    - Don – just be aware this could be an issue
  - Bryan – If you shut off flow and only have sweeping velocity, what would the velocity be?
    - In excess of 2 ft/s
- Bar rack for AWS channel (16 inch clear horizontal spacing and 3 ft – 7 inch vertical)
  - Bryan S. thinks this makes sense
  - Don – that would allow any salmon to go through
- Bar rack for fish ladder (16 inch horizontal clear spacing and 2 ft – 11 inch vertical)
  - Does Hydro Kennebec have multiple horizontal supports? – They are pretty sure it does
- Grating at floor diffuser –
  - Don asked about the spacing
  - Amy responded grating is 1 inch by 4 inches.
  - Don – worried about Alewives getting their noses into it
  - Could always change if it is an issue
- Walkways
  - Bryan- What type of access into the fishway?
    - Need ladders
  - Don- Would need to go through tie off procedures
- Bryan – asked Don if he was worried about salmon going through the bar rack with 16 inch clear horizontal and ~ 3 ft vertical spacing.
  - Salmon will go through it
  - Shad may be hesitant
  - Don – we can always make adjustments
- Bryan – what is proposed for post construction studies? Will it include all species?

- Gail – will include all species since it will be a permanent upstream fish passage per 1998 Settlement Agreement.
- Kelley Maloney – yes, but some species may be easier than others. We have to wait until we have a certain number of salmon through before we can study them.
- Only video counts (if we decide to add them), no actual counts since it is a volitional passage
    - Will know based on counts further upstream (HK) – but there are no counting facilities there either
- Julianne Rosset – Are there no counts on the system currently
    - Kelly responded that there is a trap and truck facility at Lockwood currently (only place to get counts)

Weston Final Design Drawing Review

The final design drawings were transmitted to resource agencies for comment on February 4, 2021.

Greg Allen presented an overview of the drawings for the Weston fish passage facilities, specifically pointing out the changes since the 60% design.

Comments and Discussion

- Don – still has two concerns
    - the distance between entrance gate and hopper (wish there was more space)
    - the discharge pipe – not happy with everything the fish have to go through to get out
        - however, he does not have a better solution
    - Greg – the exit pipe layout has changed since the 60% design drawings. It used to run parallel to the electrical enclosure and then made (2) 90 degree turns. We removed those bends and made it straight which is better hydraulically and better for the fish.
- Bryan – What will access to the entrance channel be?
    - Stairs down to platform closer to the hinged entrance gate
- Bryan – The hopper will releases flow. Is there a supplemental water source as well, if necessary?
    - Yes, from a 600 gal tank above exit transition flume – this will help to flush out any stragglers within the exit pipe.

- Is there a certain amount of free board?
  - The conditions in the pipe vary as the hopper and supplemental tank drain.
- Will the supplemental tank be automated? Could be a potential mode of failure, so is there a plan B to flush if the tank fails?
  - The tank is automated and timed with the fish lift cycle
  - It's designed similar to the Scotland fish lift setup, in Connecticut
    - During startup via trial and error the timing of the supplemental tank discharge was determined
  - Consider how to supply water manually if there is a failure
  - Richard Dill – the controls could be set up to cause an alarm if there is no water in the tank and it would be good idea to have a manual water supply
    - Make sure there is an alarm set up for when a lift cycle is missed or when there is not water in the supplemental tank

Schedule

- Shawmut – have Army Corp permit and ready to go but depends on the outcome of relicensing
  - 2024 is a good guess if they get there license in 2022
- Lockwood and Weston – supposed to be built by May 2022
  - Initiate construction by May 2021
  - Greg can send Issued for Construction drawings to Bryan and Don. These IFC drawings would be completed once a contractor has been selected and any changes necessitated from the bid phase are incorporated.
  - Don will look through everything again and send any final comments by the end of the month

Gregory Allen

From: Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>
Sent: Wednesday, March 10, 2021 4:09 PM
To: Seyfried, Jason
Subject: Fwd: Weston and Lockwood Design Review - 90+%

Kelly Maloney

Manager, Compliance - Northeast

Brookfield Renewable US
150 Main Street, Lewiston, Maine 04240
T 207.755.5606
C 207.233.1995
Kelly.Maloney@brookfieldrenewable.com

Sent from my iPhone

From: Donald Dow - NOAA Federal <donald.dow@noaa.gov>
Sent: Wednesday, March 10, 2021 4:07:09 PM
To: Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>
Cc: Matt Buhyoff - NOAA Federal <matt.buhyoff@noaa.gov>
Subject: Weston and Lockwood Design Review - 90+%

Good Afternoon Kelly -

I would like to thank you for the opportunity to review the 90% Weston and Lockwood Upstream Fish Passage Designs.

This review has been completed by NOAA Fisheries and there are no comments as concerns have all been worked out in prior iterations of the designs. The current design represents what has been through NOAA Fisheries review and cooperative efforts with Brookfield and their consultants. It is our understanding that you will be sending us the project technical specifications and bidding drawings once you go out to bid.

This review was done considering the biological and engineering hydraulic principles to design an effective upstream fishway considering NMFS design standards as well as engineering and biological judgments if necessary. This review was not done considering Life Safety Codes, Building Codes, Allowable Stress Design, or Load Resistance Factor Design, or any other typical engineering design codes for concrete, steel, structures, or building. We have assumed that the consulting engineer has taken those codes and practices into consideration.

We look forward to continuing working with you and your team on this important project for endangered Atlantic salmon and other diadromous fish species.

Regards,

Don

--
Donald A. Dow III, PE
Hydro/Fish Passage Engineer

Protected Resources Division
Greater Atlantic Regional Fisheries Office
(formerly Northeast Regional Office)
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Maine Field Station
17 Godfrey Drive, Suite 1
Orono, ME 04473

Office: 207-866-8563
Cell: 207-416-7510
Donald.Dow@noaa.gov

Brookfield Renewable

CUI//CEII

March 10, 2021

Lockwood Project
FERC No. 2574-ME

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Via eFiling

CUI//CEII and Non-Internet Public Materials

Subject: Lockwood Project (FERC No. 2574-ME)
Upstream Bypass Fish Passage Construction Schedule and Drawings

Dear Mr. Spain:

Brookfield White Pine Hydro LLC (BWPH) and on behalf of the Lockwood Project Licensee, Merimil Limited Partnership (MLP), submits the attached construction drawings and schedule for the Lockwood Upstream Bypass Fish Passage project.

MLP proposes to install a permanent upstream fish passage facility at the Lockwood Project to augment the existing fish lift by adding a volitional (swim-through) route for upstream migration of salmon and other anadromous species, while maintaining the existing trap and transport capability. Fishway construction work is scheduled to begin in July 2021, immediately after construction of the separately permitted access road. In accordance with FERC's letter dated July 13, 2020, the upstream fish passage facility is required to be operational by May 31, 2022.

Ordering Paragraph D of the May 19, 2016 Order Approving the ISPP states:

> "*Prior to the start of construction, the licensee must file, for Commission approval, final plans and a schedule for construction of upstream fish passage facilities at the Lockwood, Shawmut, and Weston Projects. The plans and schedule shall be accompanied by evidence that the National Marine Fisheries Service has approved them. The filing shall include copies of comments and recommendations from the U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife, or evidence that these agencies were given at least 30 days to provide comments and chose not to do so. If the licensee does not adopt an agency recommendation, the plan should include the licensee's reasons, based on site-specific information."*

The attached documents for the upstream fish passage facility provided herein include:

- Lockwood Upstream Fish Passage Ready for Construction Drawings and Addendums
- Lockwood Upstream Fish Passage Construction Schedule
- Resource Agency Consultation Package

150 Main Street
Lewiston, ME 04240
www.brookfieldrenewable.com
Tell: 207.755.5600
Fax: 207.755.5655

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BWPH is currently reviewing contractor bids. The cofferdam design specifications, Quality Control and Inspection Program (QCIP) and Temporary Construction Emergency Action Plan (TCEAP) will follow to FERC-NYRO once the contractor is selected.

If you have any questions, please contact Jason Seyfried at (207) 755-5615 or jason.seyfried@brookfieldrenewable.com.

Sincerely,

Kelly Maloney
Manager Compliance - Northeast

Attachments: Lockwood Upstream Fish Passage Ready for Construction Drawings
Lockwood Upstream Fish Passage Construction Schedule
Resource Agency Consultation Package

Cc: S. Michaud, G. Mitchell, D. Watson, J. Rancourt, J. Seyfried, A. Brown, N. Stevens; BWPH

G. Allen; Alden Labs

FERC-NYRO

K. Howatt; MDEP
J. Rosset; USFWS
G. Wippelhauser; MDMR
D. Dow, M. Buhyoff; NMFS
J. Seiders, J. Perry; MDIFW

HSSE Managed System: 2574|01

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Lockwood Upstream Fish Passage Construction Schedule

Construction Phase	Construction Schedule
Contractor Mobilization and Access Road Construction	May 2021 – June 2021
Construct Temporary In-Water Access and Water Control Structures	July 2021
North Spillway Demolition and Bedrock Removal	August 2021 – September 2021
Fish Passage, Crest Gates, and Floodwall Construction	October 2021 – February 2022
Remove Temporary Access and Water Control Structures, Contractor Demobilization	February 2022 – March 2022
Fishway Commissioning	April 2022 – May 2022

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Lockwood Upstream Fish Passage Ready for Construction Drawings and Addendums

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APPENDIX D

LOCKWOOD HYDROELECTRIC PROJECT UPSTREAM FISH PASSAGE DESIGN DRAWINGS

LOCKWOOD HYDROELECTRIC PROJECT

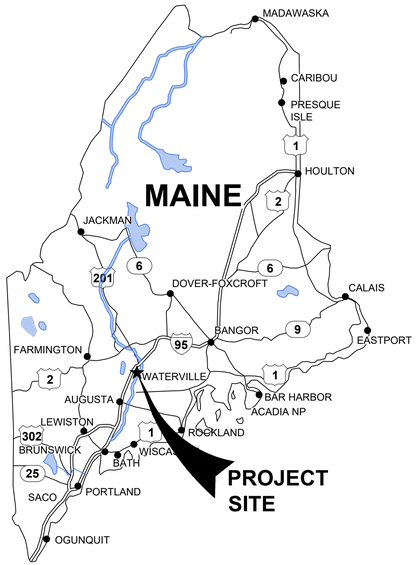
FERC NO. 2574

BYPASS REACH SPILLWAY

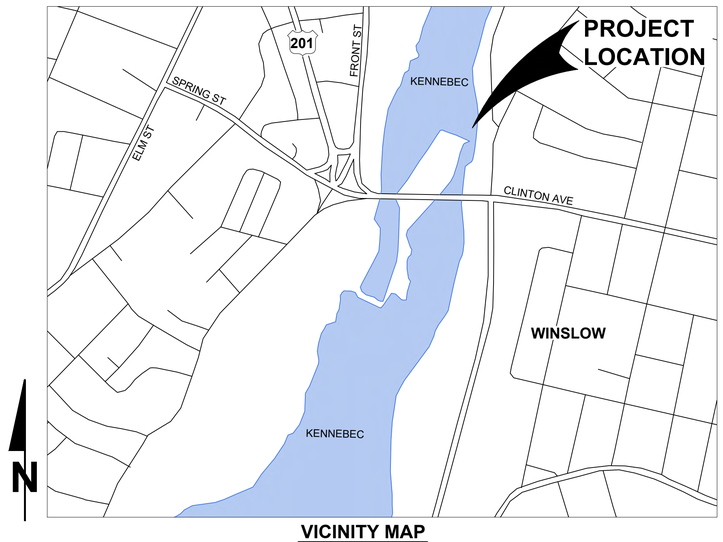
UPSTREAM FISH PASSAGE

PREPARED FOR

BROOKFIELD



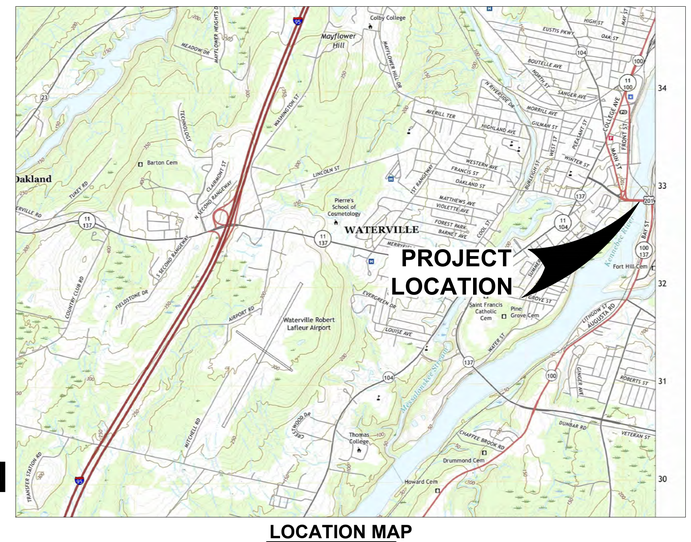
LOCATION MAP
SCALE: NTS



VICINITY MAP
SCALE: 1"=500'

PREPARED BY

ALDEN RESEARCH LABORATORY, INC



LOCATION MAP
SCALE: NTS

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VERIFY SCALE
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

COVER SHEET, LOCATION MAP, AND VICINITY MAP

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	1 OF 94
DRAWING:	G-001

DWG: S:\13\09\Hdn\Lockwood\900 CAD\02-sheets\GIG-001.dwg USER: MK400989
DATE: Feb 03, 2021 8:49am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES: ME_Waterville_20180623_TM.jpg Mosaic-1-part0x0.jpg

DRAWING LIST

SHEET	DRAWING	DESCRIPTION
		GENERAL
1	G-001	COVER SHEET, LOCATION MAP, AND VICINITY MAP
2	G-002	DRAWING LIST
3	G-003	GENERAL NOTES
4	G-101	EXISTING CONDITIONS - OVERALL SITE PLAN
5	G-102	GEOTECHNICAL BORINGS, & SURVEY CONTROL
6	G-103	SITE ACCESS, CONSTRUCTION LIMITS, EROSION CONTROL & DEWATERING PLAN
7	G-104	EROSION CONTROL & DEWATERING PLAN DETAILS
		CIVIL
8	C-001	OVERALL SITE PLAN
9	C-002	FINAL GRADING PLAN
10	C-003	SITE GRADING SECTIONS
11	C-004	SURFACE GRADING PROFILE ALONG EAST FISH LADDER WALL
12	C-101	DEMOLITION & EXCAVATION PLAN
13	C-102	EXCAVATION SECTIONS
14	C-103	EXCAVATION SECTIONS
15	C-104	DEMOLITION SECTIONS
16	C-105	GENERAL ARRANGEMENT PLAN
17	C-106	FISH LADDER PLAN & PROFILE
18	C-107	FISH LADDER PLAN & PROFILE
19	C-108	AWS CHANNEL PLAN & PROFILE
20	C-109	FISH LADDER AND AWS CHANNEL SECTIONS
21	C-110	FISH LADDER AND AWS CHANNEL SECTIONS
22	C-111	MISCELLANEOUS SECTIONS
23	C-112	AWS FLOOR DIFFUSER PLANS
24	C-113	AWS FLOOR DIFFUSER SECTIONS
25	C-114	MISCELLANEOUS DETAILS
26	C-115	FENCE AND GATE DETAILS
		STRUCTURAL
27	S-001	STRUCTURAL NOTES & DESIGN CRITERIA
28	S-002	STRUCTURAL NOTES & DESIGN CRITERIA
29	S-100	FISH LADDER OVERALL PLAN
30	S-101	FISH LADDER PLAN AND PROFILE 1
31	S-102	FISH LADDER PLAN AND PROFILE 2
32	S-103	FISH LADDER PLAN AND PROFILE 3
33	S-104	FISH LADDER PLAN AND PROFILE 4
34	S-105	AWS CHANNEL PLAN AND PROFILE 5
35	S-106	AWS CHANNEL PLAN AND PROFILE 6
36	S-107	FISH LADDER REINFORCEMENT PLANS
37	S-108	FISH LADDER REINFORCEMENT PLAN AND SECTIONS
38	S-109	FISH LADDER REINFORCEMENT PLANS
39	S-110	FISH LADDER AND AWS CHANNEL SECTIONS
40	S-111	FISH LADDER AND AWS CHANNEL SECTIONS
41	S-112	FISH LADDER AND AWS CHANNEL SECTIONS
42	S-113	FISH LADDER AND AWS CHANNEL SECTIONS
43	S-114	FISH LADDER AND AWS CHANNEL SECTIONS
44	S-115	ATTRACTION WATER CHANNEL PLAN
45	S-116	FLOOR DIFFUSER SECTIONS AND DETAILS
46	S-117	FLOOR DIFFUSER SECTION AND DETAILS
47	S-118	FLOOR DIFFUSER GRATING AND SECTIONS
48	S-119	FLOOR DIFFUSER BAFFLE AND EMBEDMENT
49	S-120	AWS INTAKE SCREEN PLANS, SECTIONS AND DETAILS
50	S-121	AWS INTAKE SCREEN DETAILS
51	S-122	FISH LADDER BAFFLE DETAILS
52	S-123	STOP LOG PLAN AND SECTION
53	S-124	FISH LADDER BAR RACK ELEVATION AND DETAILS
54	S-125	AWS BAR RACK ELEVATION AND DETAILS
55	S-201	MISC. PLATFORMS AND ACCESS PLAN
56	S-202	MISC. PLATFORMS AND ACCESS PLAN
57	S-203	MISC. PLATFORMS AND ACCESS PLAN
58	S-204	ENLARGED PLANS MISC. PLATFORMS
59	S-205	ENLARGED PLANS AND MISC. PLATFORMS
60	S-206	ELEVATED WALKWAY
61	S-207	STAIRS PLAN AND DETAILS
62	S-300	ACCESS AND FLOOD WALL PLAN
63	S-301	FLOOD WALL SECTION AND PROFILE
64	S-310	CREST GATE PLAN
65	S-311	CREST GATE SECTION
66	S-312	PIER PLAN AND SECTIONS
67	S-313	ABUTMENTS PLAN AND SECTIONS
68	S-314	ABUTMENTS PLAN AND SECTIONS
69	S-315	CREST GATE POST-TENSION ANCHOR DETAIL
70	S-316	CREST GATE POST-TENSION ANCHOR DETAILS
71	S-317	ELECTRICAL ENCLOSURE PLAN
72	S-318	ELECTRICAL SLAB PLAN, SECTION AND DETAILS
73	S-501	STRUCTURAL STANDARD DETAILS
74	S-502	STRUCTURAL STANDARD DETAILS
75	S-503	STRUCTURAL STANDARD DETAILS
76	S-504	STRUCTURAL STANDARD DETAILS
77	S-505	STRUCTURAL STANDARD DETAILS
		MECHANICAL
78	M-100	GENERAL MECHANICAL LAYOUT
79	M-101	WATER SENSOR AND STAFF GAGE DETAILS
80	M-102	AWS ENTRANCE GATE (GATE 1) REQUIREMENTS
81	M-103	AWS HINGED FLOW CONTROL GATE (GATE 2) REQUIREMENTS
82	M-104	AWS HINGED FLOW CONTROL (GATE 2) DETAILS
83	M-105	AWS HINGED FLOW CONTROL GATE DETAILS
84	M-106	AWS HINGED FLOW CONTROL (GATE 2) DETAILS
85	M-107	AWS FLOW CONTROL (GATE 3) REQUIREMENTS
86	M-108	FISHWAY ENTRANCE GATE (GATE 4) REQUIREMENTS
87	M-109	FISHWAY ENTRANCE GATE (GATE 4) REQUIREMENTS
88	M-110	FISHWAY ENTRANCE GATE DETAILS
89	M-111	FISHWAY ENTRANCE (GATE 4) DETAILS
90	M-112	FISHWAY ENTRANCE (GATE 4) DETAILS
91	M-113	FISHWAY ISOLATION GATE (GATE 5) REQUIREMENTS
92	M-114	FISHWAY ISOLATION GATE (GATE 6) REQUIREMENTS
93	M-115	CREST GATE (GATE 7) REQUIREMENTS
94	M-116	AWS ISOLATION GATE (GATE 8) REQUIREMENTS

REFERENCE DRAWINGS

File Drawing No.,	Date	Description
713-22-1R	April 1913	Dam-Headgates-Canal Wall and Iceway
713-0-3		Daily Flow Duration Curve
713-0-4		Daily Flow Duration Curve January
713-0-5		Daily Flow Duration Curve February
713-0-6		Daily Flow Duration Curve March
713-1-1	October 2002	FPLE Metering & Relay One Line Diagram Unit No. 7
713-1-3	March 1984	General Map Powerhouse Area
713-1-4	March 1984	General Map Reservoir
713-1-5	March 1985	General Map Reservoir
713-12-1	Feburary 1989	Repair to Canal Wall at the Penetration of the Old Wood Flume
713-12-1R	April 1913	Dam-Headgates-Canal Wall and Iceway
713-27-7	May 2005	General Map Powerhouse Area
202-LF-001	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Site Plan
202-LF-002	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Erosion & Sedimentation Plan
202-LF-003	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Erosion Control & Site Details
202-LF-004	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Proposed Fishway Access Road Site Cross Sections
202-LF-005	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Proposed Fishway Access Road Elevation, Sections & Details
202-LF-006	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Top of Wall Fence & Gate Details
202-LF-007	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Entrance Gate Details
202-LF-008	May 2020	Brookfield Renewable Energy Group Lockwood Hydro-Electric Dam Fishway Access Road Railroad Spur Gate Details

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

DRAWING LIST

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	2 OF 94
DRAWING:	G-002

DWG: S:\131009Holden\Lockwood\900 CAD\02-sheets\GIG-002.dwg USER: MK400889
DATE: Feb 03, 2021 8:49am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

GENERAL NOTES:

1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR ACCURATE. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING THE WORK. SHOULD THE CONTRACTOR IDENTIFY ANY UTILITIES, STRUCTURES OR FEATURES NOT SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY.

2. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE UTILITY OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES. ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.

3. REMOVE, REPLACE OR RELOCATE ALL OVERHEAD INTERFERENCE WHICH MAY AFFECT OPERATION DURING CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER, GAS OR OTHER UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.

4. COORDINATE UNDERGROUND UTILITY MARKING WITH THE EXISTING UTILITIES BY CONTACTING DIGSAFE AT 1-888-344-7233 OR 811. DIGSAFE MUST BE CONTACTED A MINIMUM OF 72 HOURS PRIOR TO CONSTRUCTION OR GROUND DISTURBANCE.

5. THE CONTRACTOR SHALL REVIEW THE SITE TO DETERMINE EXISTING CONDITIONS. ANYTHING NOT SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA, UNLESS RECOMMENDED BY THE ENGINEER AND APPROVED BY THE OWNER.

6. CONTACT THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS ARISING DURING THE CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.

7. PRESERVE ALL SURVEY MARKERS AND MONUMENTATION WHEREVER POSSIBLE. THOSE REQUIRING REMOVAL SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE LOCAL, STATE, OR FEDERAL GOVERNING AUTHORITY.

8. ALL DRAWINGS AND DETAILS INCLUDED IN THE CONTRACT DOCUMENTS SHALL FULLY APPLY TO THE WORK WHETHER SPECIFICALLY REFERENCED OR NOT.

9. LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY, EASEMENTS, AND DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES OUTSIDE THE DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.

10. RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REFER TO RECLAMATION OF DISTURBED AREAS IN SPECIFICATIONS.

11. THE CONTRACTOR SHALL REPLACE ALL ROADS, STABILIZED EARTH, AND DRIVEWAYS, ETC., WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION.

12. DIMENSIONS OF OPERATORS, FITTINGS AND OTHER EQUIPMENT MAY VARY DEPENDING UPON MANUFACTURER. CONTRACTOR SHALL REVIEW SHOP DRAWINGS BEFORE SETTING BASES, SUPPORTS, ETC.

13. EXISTING FENCING DISTURBED OR REMOVED SHALL BE REPLACED IN-KIND.

14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A SECURE PROJECT SITE. BROOKFIELD WILL NOT BE RESPONSIBLE FOR STOLEN OR VANDALIZED PROPERTY.

15. AT THE CLOSE OF EACH WORKING SHIFT, WHERE THE NEXT SHIFT WILL NOT IMMEDIATELY FOLLOW, PROTECT AND SECURE OPEN EXCAVATION.

16. THE CONTRACTOR SHALL NOTIFY MAINE DOT WITH WORK TO BE COMPLETED.

17. THE CONTRACTOR SHALL COORDINATE ACCESS WITH MAINE CENTRAL RAILROAD COMPANY. 1700 IRON HORSE PARK NORTH BILLERICA, MA, 01862.

18. VERTICAL DATUM IS BASED ON NGVD29.

20. UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED AREAS SHALL BE STABILIZED WITH A SEED MIX CONTAINING ONLY PLANT SPECIES NATIVE TO NEW ENGLAND. THE INTRODUCTION OR SPREAD OF INVASIVE PLANT SPECIES IN DISTURBED AREAS SHALL BE CONTROLLED. IN AREAS OF AUTHORIZED TEMPORARY DISTURBANCE, IF TREES ARE CUT THEY SHALL BE CUT AT GROUND LEVEL AND NOT UPROOTED IN ORDER TO PREVENT DISRUPTION TO THE SOIL STRUCTURE AND TO ALLOW STUMP SPROUTS TO REVEGETATE THE WORK AREA, UNLESS OTHERWISE AUTHORIZED. AREAS WHERE PERMANENT DISTURBANCE IS NOT AUTHORIZED SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND ELEVATION, WHICH UNDER NO CIRCUMSTANCES SHALL BE HIGHER THAN THE PRE-CONSTRUCTION ELEVATION. ORIGINAL CONDITIONS MEANS CAREFUL PROTECTION AND/OR REMOVAL OF EXISTING SOIL AND VEGETATION, AND REPLACEMENT BACK TO THE ORIGINAL LOCATIONS SUCH THAT THE ORIGINAL SOIL LAYERING AND VEGETATION SCHEMES ARE APPROXIMATELY THE SAME, UNLESS OTHERWISE AUTHORIZED.

FISH PASSAGE NOTES:

1. POWERHOUSE
   6,915 kW,
   5,660 CFS CAPACITY

2. RIVER FLOW

DESIGN LOW	2,690 CFS
DESIGN HIGH	21,100 CFS

3. WATER LEVELS
   HEAD POND ELEVATIONS:

-DESIGN LOW	50.9 FT
-NORMAL	52.2 FT
-DESIGN HIGH	55.5 FT
-50 YR FLOOD	65.3 FT
-100 YR FLOOD	66.8 FT
-DAM CREST	50.9 FT
-FLASH BOARD EL.	52.16 FT

   TAILWATER ELEVATIONS:

-DESIGN LOW	30.5 FT
-NORMAL	32.0 FT
-DESIGN HIGH	36.5 FT
-50 YR FLOOD	60.3 FT
-100 YR FLOOD	62.7 FT

4. TARGET SPECIES AND FISHWAY DESIGN POPULATIONS

ATLANTIC SALMON:	12,000
AMERICAN SHAD:	210,000
ALEWIVES:	150,000
BLUEBACK HERRING	1,200,000

5. FISH PASSAGE FACILITIES WILL BE OPERATIONAL FROM MAY 1ST TO OCT 31ST

6. VERTICAL SLOT LADDER DESIGN FEATURES

DROP PER POOL	9 INCHES
SLOT WIDTH	24 INCHES
POOL DIMENSIONS	16 FT WIDE BY 20 FT LONG
28 POOLS	
SLOPE	3.75%
ENTRANCE INVERT	EL. 25.75 FT
EXIT INVERT	EL. 47.0 FT
4 FT MINIMUM DEPTH	
TOTAL HEAD	21.7 FT MAX
LADDER FLOW	50 TO 100 CFS (FOR RANGE OF HEAD POND)

7. ATTRACTION FLOW CHANNEL
   10 FT WIDE

CHANNEL FLOW	100 TO 250 CFS
AWS WEDGE WIRE	
INTAKE SCREEN	UP TO 120 CFS
OPERATING FLOW TO FISH	
LADDER FLOOR DIFFUSER	UP TO 120 CFS

LEDEND & SYMBOLS

- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- CONSTRUCTION LIMITS
- SF — SF — SILT FENCE
- TC — TC — TURBIDITY CURTAIN
- COFFERDAM / BULKHEAD / DEWATERING STRUCTURE
- OHW — ORDINARY HIGH WATER LINE
- SEWER — SEWER LINE
- B-X — GEOTECHNICAL BORING
- FLOW
- UTILITY POLE
- SURVEY POINT
- WATER SENSOR
- STAFF GAGE
- RAILROAD
- UNDISTURBED SOIL
- CONCRETE
- GRATING
- BEDROCK
- CONCRETE DEMOLITION
- EXCAVATE BEDROCK
- WET ROAD
- APPROXIMATE COFFERDAM FOOTPRINT

ABBREVIATIONS:

'	FEET
"	INCHES
&	AND
@	AT
Ø	DIAMETER
#	NUMBER
ACI	AMERICAN CONCRETE INSTITUTE
ACSE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ADD'L	ADDITIONAL
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
AWS	ATTRACTION WATER SYSTEM/AMERICAN WELDING SOCIETY
B/O	BOTTOM OF
BOC	BOTTOM OF CONCRETE
BTWN	BETWEEN
C/C	CENTER TO CENTER
C/L	CENTER LINE
CFS	CUBIC FEET PER SECOND
CL	CENTER LINE
CLR	CLEAR
CONC	CONCRETE
CONSTR	CONSTRUCTION
CONT	CONTINUOUS
COORD	COORDINATED
CY	CUBIC YARDS
D	DEPTH
DEG	DEGREE
DIA	DIAMETER
DWG	DRAWING
EA	EACH
EF	EACH FACE
EL, ELEV	ELEVATION
EM	ENGINEER MANUAL
EMBED	EMBEDMENT
EQ	EQUAL
ETC	ETCETERA
EW	EACH WAY
f'c	COMPRESSIVE STRENGTH OF CONCRETE
FERC	FEDERAL ENERGY REGULATORY COMMISSION
FLG	FLANGE
FLGS	FLANGES
FT	FOOT/FEET
fy	YIELD STRENGTH
GA	GAUGE
GALV	GALVANIZED
GR	GRADE
HAS	HEADED ANCHOR STUDS
HORIZ	HORIZONTAL
HSS	HOLLOW STRUCTURE SECTION
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
I.E.	EXAMPLE
IF	INSIDE FACE
IN	INCH
JT	JOINT
KSI	KIPS PER SQUARE INCHES
KW	KILOWATT
L	ANGLE/LENGTH
LBS	POUNDS
Ld	DEVELOPMENT LENGTH
LH	LEFT HAND
LOC	LOCATIONS
MAX	MAXIMUM
MFR	MANUFACTURE/MANUFACTURER
MIN	MINIMUM
MIN.	MINIMUM
MISC	MISCELLANEOUS
N&F	NEAR AND FAR
NHW	NORMAL HIGH WATER
NTS	NOT TO SCALE
OC	ON CENTERS
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OHW	ORDINARY HIGH WATER LINE
OPNG	OPENING
OPP	OPPOSITE
PC	POINT OF CURVATURE
PCL	POWER CONTROL LIST
PI	POINT OF INTERSECTION
PL	PLATE
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
R	RISERS/RADIUS
REINF	REINFORCING
REQ'D	REQUIRED
RH	RIGHT HAND
SCH	SCHEDULE
SF	SILT FENCE/SQUARE FEET
SIM	SIMILAR
SPEC	SPECIFICATION
SS	STAINLESS STEEL
SST	STAINLESS STEEL
SSD	SATURATED SURFACE DRY
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STRUC	STRUCTURE
SYM	SYMMETRICAL
T&B	TOP AND BOTTOM
T.O.	TOP OF
T/O	TOP OF
TC	TURBIDITY CURTAIN
THK	THICK
THRU	THROUGH
TOC	TOP OF CONCRETE
TOG	TOP OF GRATING
TOS	TOP OF STEEL
TOW	TOP OF WALL
TPI	THREADS PER INCH
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
US	UNITED STATES
VERT	VERTICAL
W	WIDTH/WIDE FLANGE SECTION
W/	WITH
WLS	WATER LEVEL SENSOR
WP	WORKING POINT
WS	WATERSTOP
WSL	WATER SURFACE LEVEL
XXS	EXTRA EXTRA STRONG
YR	YEAR

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GENERAL NOTES

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	3 OF 94
DRAWING:	G-003

DWG: S:\131\009\Holden\Lockwood\900 CAD\02-sheets\G\G-003.dwg USER: MK400889
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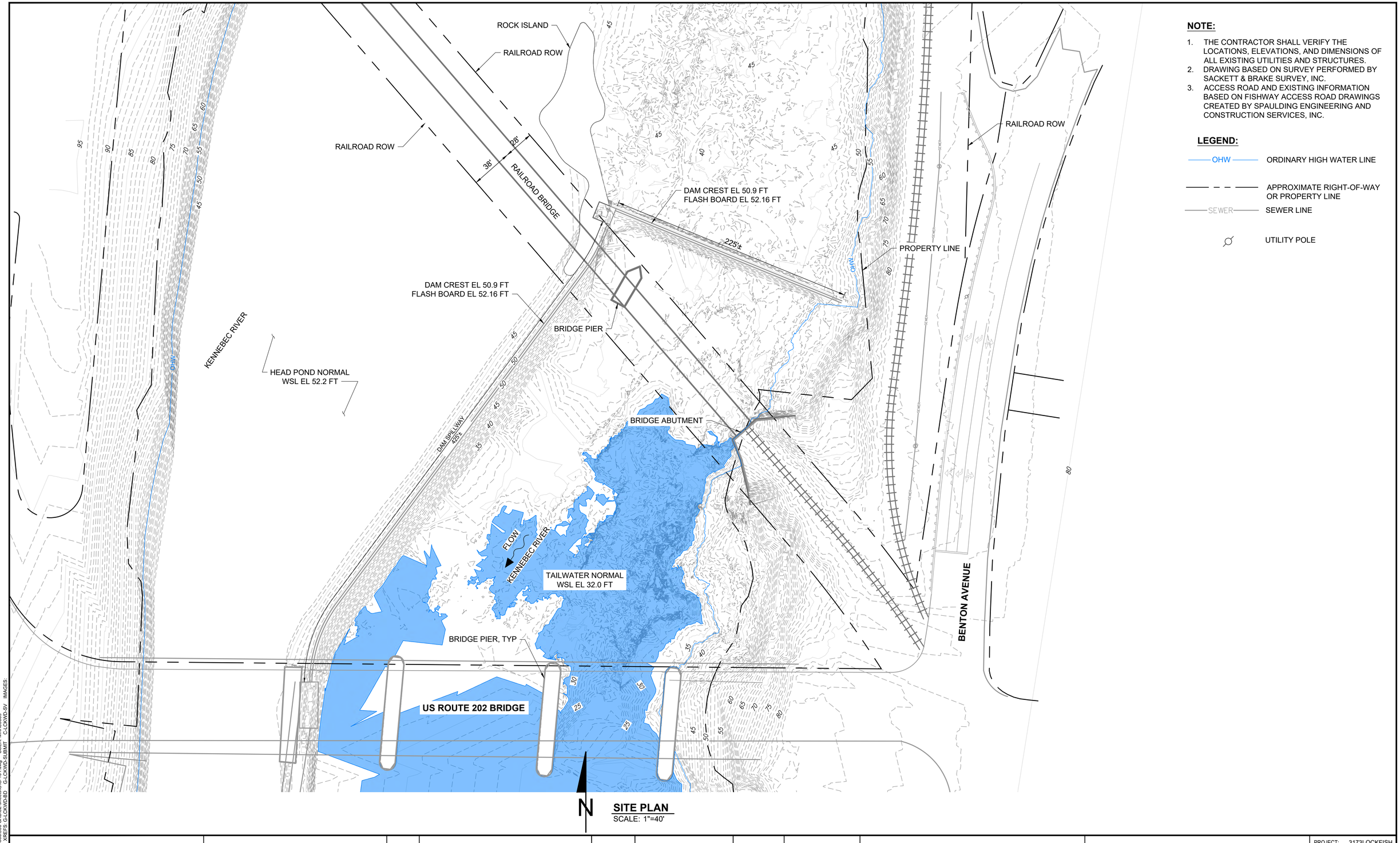

SITE PLAN
SCALE: 1"=40'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. DRAWING BASED ON SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC.
3. ACCESS ROAD AND EXISTING INFORMATION BASED ON FISHWAY ACCESS ROAD DRAWINGS CREATED BY SPAULDING ENGINEERING AND CONSTRUCTION SERVICES, INC.

LEGEND:

- OHW — ORDINARY HIGH WATER LINE
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- SEWER — SEWER LINE
- UTILITY POLE

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

EXISTING CONDITIONS - OVERALL SITE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	4 OF 94
DRAWING:	G-101

DWG: S:\131\09\Holden\Lockwood\900 CAD\02-sheets\G\G-101.dwg USER: MKA0089
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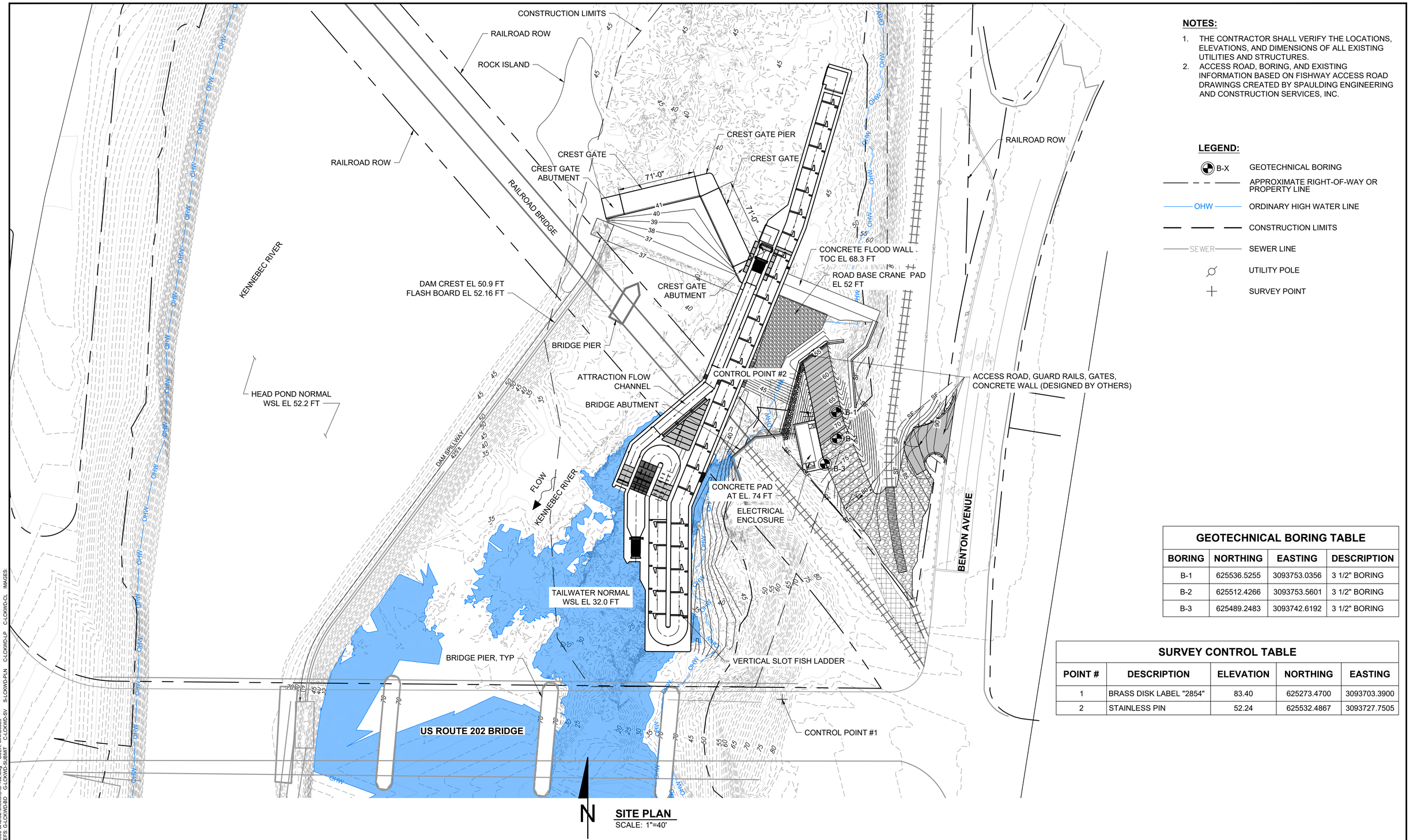

SITE PLAN
SCALE: 1"=40'

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. ACCESS ROAD, BORING, AND EXISTING INFORMATION BASED ON FISHWAY ACCESS ROAD DRAWINGS CREATED BY SPAULDING ENGINEERING AND CONSTRUCTION SERVICES, INC.

LEGEND:

- B-X — GEOTECHNICAL BORING
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- OHW — ORDINARY HIGH WATER LINE
- CONSTRUCTION LIMITS
- SEWER — SEWER LINE
- UTILITY POLE
- SURVEY POINT

GEOTECHNICAL BORING TABLE

BORING	NORTHING	EASTING	DESCRIPTION
B-1	625536.5255	3093753.0356	3 1/2" BORING
B-2	625512.4266	3093753.5601	3 1/2" BORING
B-3	625489.2483	3093742.6192	3 1/2" BORING

SURVEY CONTROL TABLE

POINT #	DESCRIPTION	ELEVATION	NORTHING	EASTING
1	BRASS DISK LABEL "2854"	83.40	625273.4700	3093703.3900
2	STAINLESS PIN	52.24	625532.4867	3093727.7505

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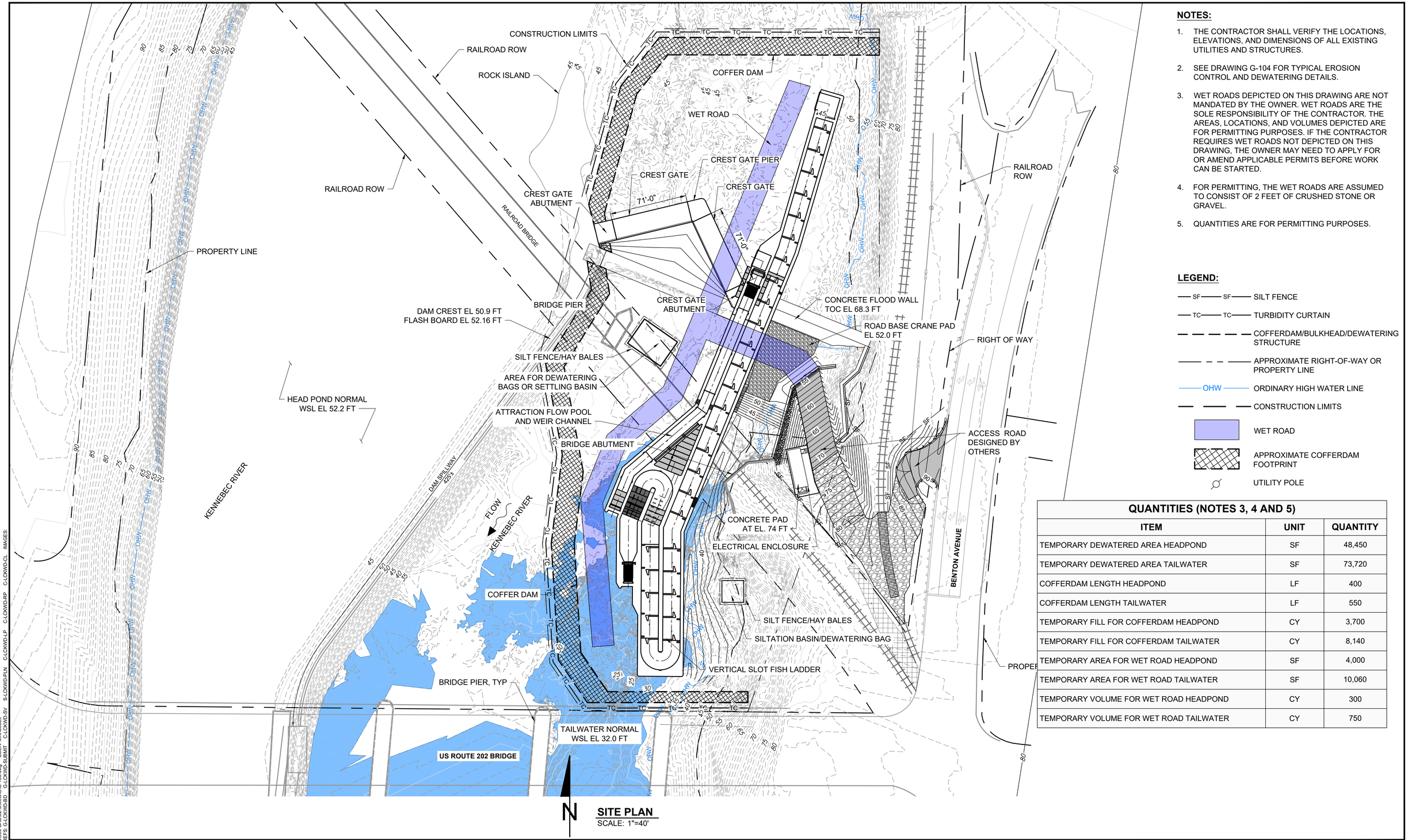
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GEOTECHNICAL BORINGS, & SURVEY CONTROL

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	5 OF 94
DRAWING:	G-102

DWG: S:\13100\9\alden\Lockwood\900 CAD\02-sheets\G\G-102.dwg USER: MKA00889
DATE: Feb 03, 2021 8:50am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT C-LCKWD-SV S-LCKWD-PLN C-LCKWD-LP C-LCKWD-CL IMAGES:



SITE PLAN
SCALE: 1"=40'

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. SEE DRAWING G-104 FOR TYPICAL EROSION CONTROL AND DEWATERING DETAILS.
3. WET ROADS DEPICTED ON THIS DRAWING ARE NOT MANDATED BY THE OWNER. WET ROADS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE AREAS, LOCATIONS, AND VOLUMES DEPICTED ARE FOR PERMITTING PURPOSES. IF THE CONTRACTOR REQUIRES WET ROADS NOT DEPICTED ON THIS DRAWING, THE OWNER MAY NEED TO APPLY FOR OR AMEND APPLICABLE PERMITS BEFORE WORK CAN BE STARTED.
4. FOR PERMITTING, THE WET ROADS ARE ASSUMED TO CONSIST OF 2 FEET OF CRUSHED STONE OR GRAVEL.
5. QUANTITIES ARE FOR PERMITTING PURPOSES.

LEGEND:

- SF SF — SILT FENCE
- TC TC — TURBIDITY CURTAIN
- COFFERDAM/BULKHEAD/DEWATERING STRUCTURE
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- OHW — ORDINARY HIGH WATER LINE
- CONSTRUCTION LIMITS
- WET ROAD
- APPROXIMATE COFFERDAM FOOTPRINT
- UTILITY POLE

QUANTITIES (NOTES 3, 4 AND 5)

ITEM	UNIT	QUANTITY
TEMPORARY DEWATERED AREA HEADPOND	SF	48,450
TEMPORARY DEWATERED AREA TAILWATER	SF	73,720
COFFERDAM LENGTH HEADPOND	LF	400
COFFERDAM LENGTH TAILWATER	LF	550
TEMPORARY FILL FOR COFFERDAM HEADPOND	CY	3,700
TEMPORARY FILL FOR COFFERDAM TAILWATER	CY	8,140
TEMPORARY AREA FOR WET ROAD HEADPOND	SF	4,000
TEMPORARY AREA FOR WET ROAD TAILWATER	SF	10,060
TEMPORARY VOLUME FOR WET ROAD HEADPOND	CY	300
TEMPORARY VOLUME FOR WET ROAD TAILWATER	CY	750

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

SITE ACCESS, CONSTRUCTION LIMITS, EROSION CONTROL & DEWATERING PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	6 OF 94
DRAWING:	G-103

DWG: S:\13100\Holden\Lockwood\000 CAD\02-sheets\GIG-103.dwg USER: MKA00889
DATE: Feb 03, 2021 8:50am G-LCKWD-SUBMIT C-LCKWD-SV
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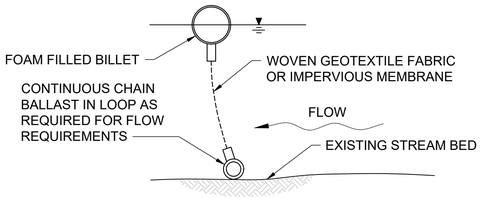
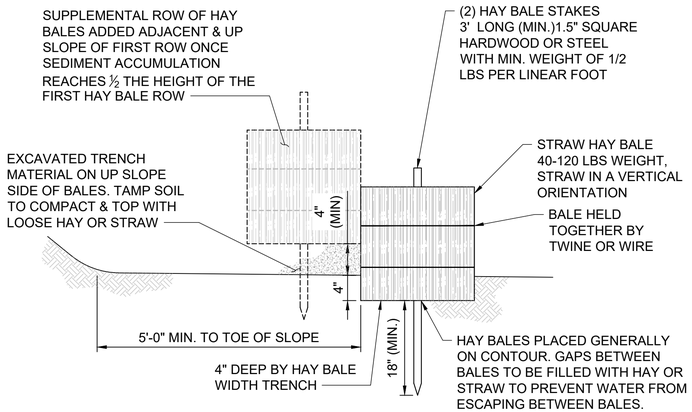
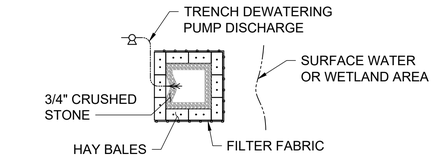


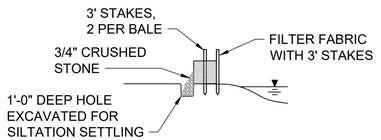
1 TURBIDITY CURTAIN
SCALE: NTS



2 HAY BALE BARRIER
SCALE: NTS



PLAN

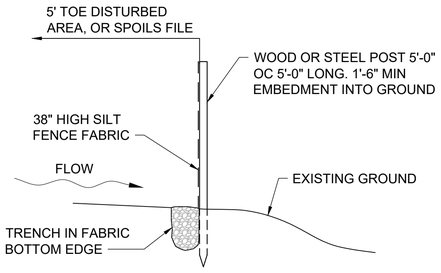


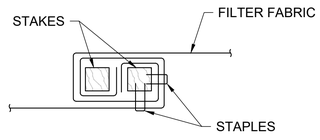
SECTION

3 DEWATERING/SETTLING BASIN
SCALE: NTS

SOIL EROSION & SEDIMENT CONTROL NOTES:

1. SEDIMENTATION/SETTLING BASIN: SEDIMENT LADEN WATER SHALL NOT BE RELEASED INTO ANY WATERWAY. CONTRACTOR SHALL PROVIDE APPROPRIATE SIZED SEDIMENTATION BASIN, WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES FOR ALL DEWATERING OR WATER DIVERSION ACTIVITIES.
2. SILT FENCE: IF NEEDED TO CONTROL WATER CONTAMINATION. PROVIDE SILT FENCE CONFORMING TO THE FOLLOWING:
   - EQUIVALENT OPENING - SIZE OF A US STANDARD SIEVE SIZED 40 (MAX), 70 (MIN).
   - MULLEN BURST STRENGTH - 200 PSI.
   - GRAB STRENGTH - 120 LBS MIN.
   - SPUN-BONDED NYLON FABRIC - REINFORCED WITH POLYESTER NETTING, OR POLYPROPYLENE FABRIC WITH 2" x 4" 12 GA WOVEN WIRE BACKING FENCE.
3. SEDIMENTATION/SETTLING BASINS OR WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES ON SHORE SHALL HAVE A VEGETATIVE BUFFER FOR THE DISCHARGE. BASINS NEED TO BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF THE WAY OF LAYDOWN AND CONSTRUCTION ACTIVITIES.





JOINING FENCE DETAIL

NOTES:

1. PROVIDE SILT FENCE ON DOWNSLOPE SIDE OF SOIL DISTURBANCES OR ALL STOCKPILES UNTIL PERMANENT VEGETATION IS ESTABLISHED.
2. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
3. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH ⅓ THE ABOVE GROUND HEIGHT OF THE FENCE.
4. SILT FENCE TO BE INSPECTED AFTER EACH RUNOFF EVENT AND AT LEAST WEEKLY.

4 SILT FENCE
SCALE: NTS

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

EROSION CONTROL & DEWATERING PLAN DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	7 OF 94
DRAWING:	G-104

DWG: S:\131009\Hdclem\Lockwood\900 CAD\02-sheets\G\G-104.dwg USER: MKA00589
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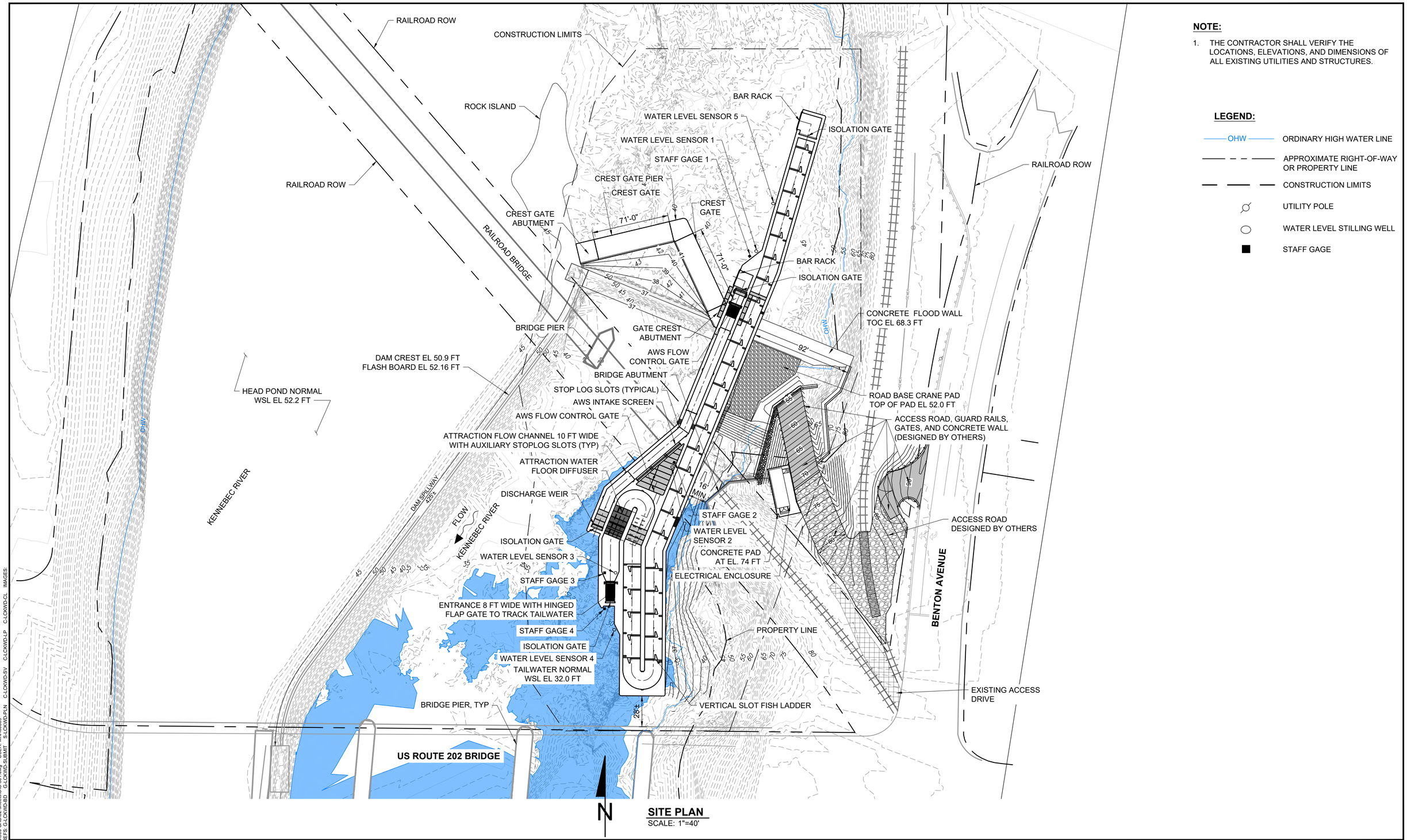

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

LEGEND:

- OHW — ORDINARY HIGH WATER LINE
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- CONSTRUCTION LIMITS
- UTILITY POLE
- WATER LEVEL STILLING WELL
- STAFF GAGE

N

SITE PLAN
SCALE: 1"=40'

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

OVERALL SITE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	8 OF 94
DRAWING:	C-001

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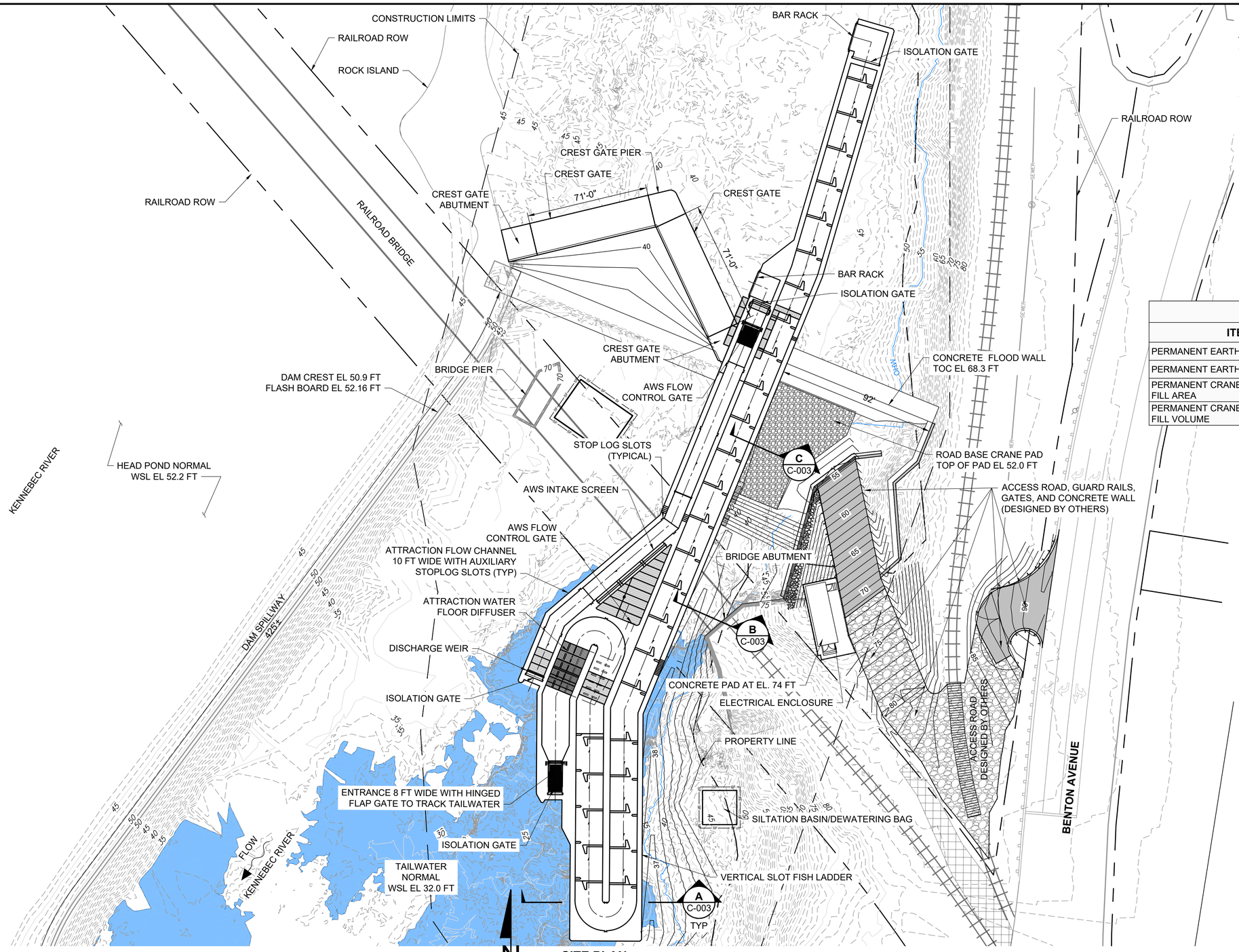

SITE PLAN
SCALE: 1"=30'

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. QUANTITIES ARE PROVIDED FOR PERMITTING PURPOSES.

OHW — ORDINARY HIGH WATER LINE

APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE

CONSTRUCTION LIMITS

UTILITY POLE

QUANTITIES (NOTE 2)

ITEM	UNIT	QUANTITY
PERMANENT EARTH FILL AREA	SF	9,090
PERMANENT EARTH FILL VOLUME	CY	2,330
PERMANENT CRANE PAD ROAD BASE FILL AREA	SF	2,550
PERMANENT CRANE PAD ROAD BASE FILL VOLUME	CY	950

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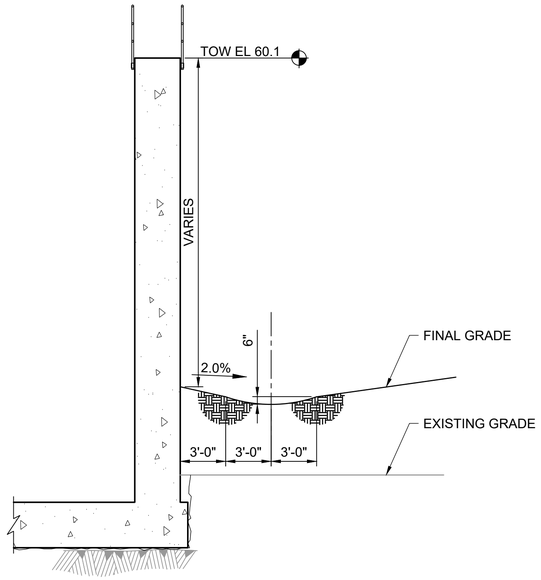
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

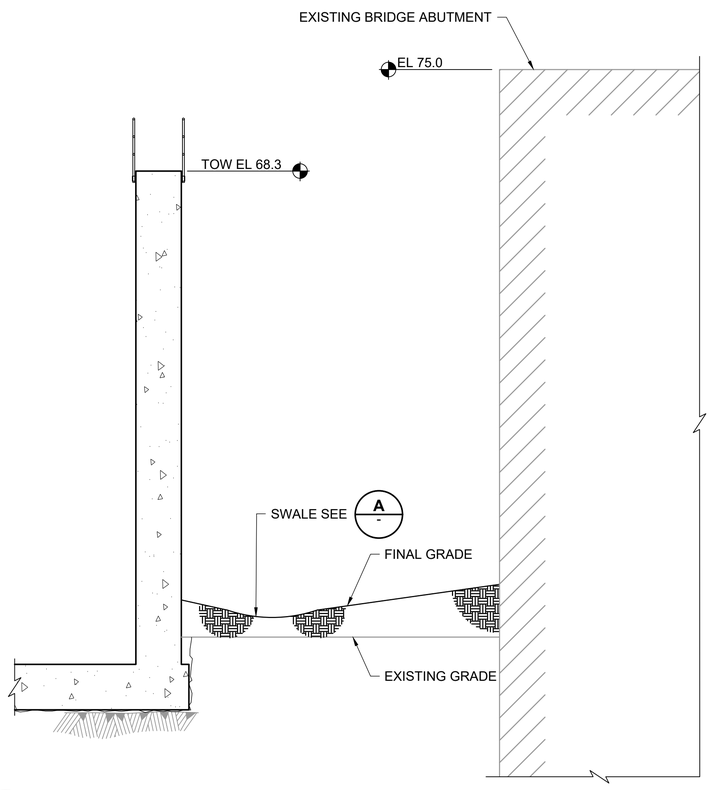
FINAL GRADING PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	9 OF 94
DRAWING:	C-002

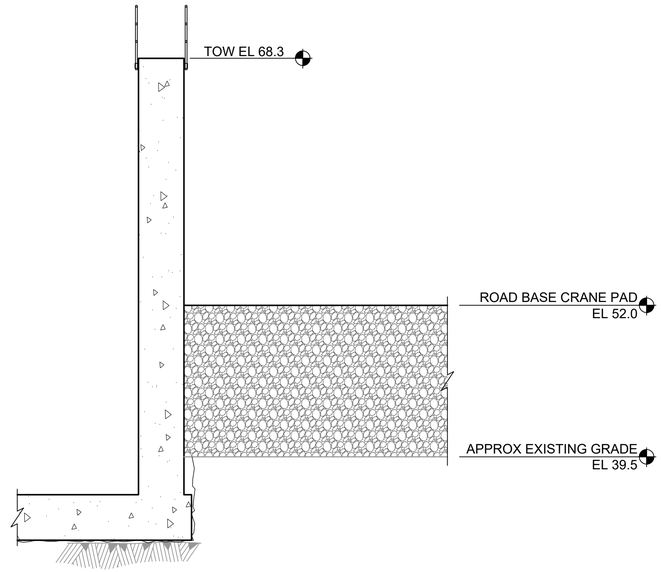
DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C\C-002.dwg USER: MKA0089
DATE: Feb 03, 2021 9:00am XREFS: G-LCKWD-BID G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-SV C-LCKWD-LP C-LCKWD-CL IMAGES:



A C-002 TYPICAL SECTION
SCALE: 1"=5'



B C-002 SECTION AT BRIDGE ABUTMENT
SCALE: 1"=5'



C C-002 SECTION AT CRANE PAD
SCALE: 1"=5'

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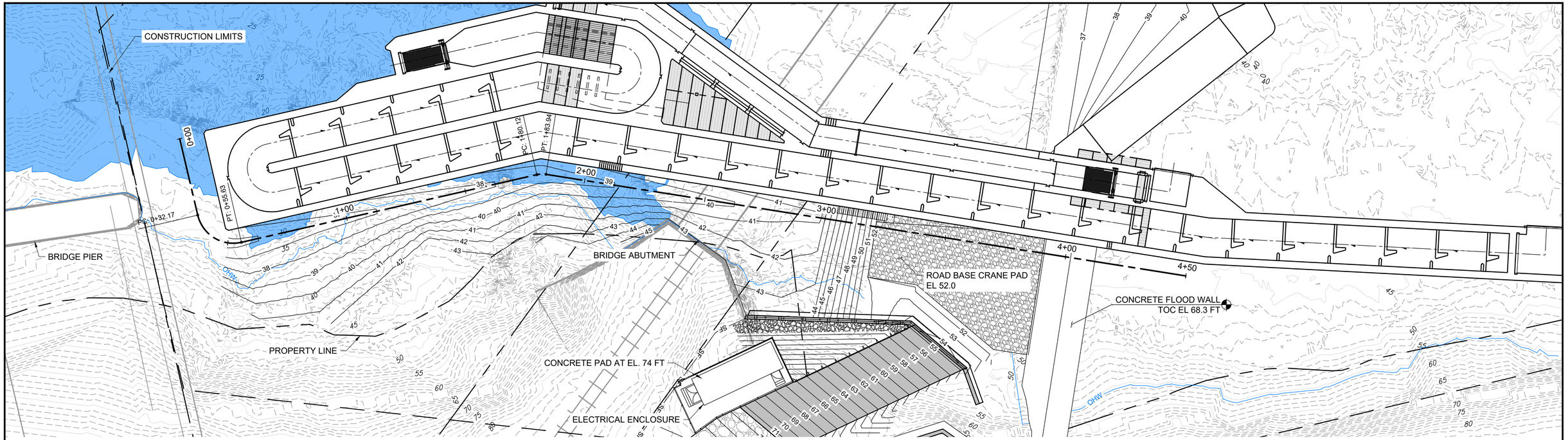
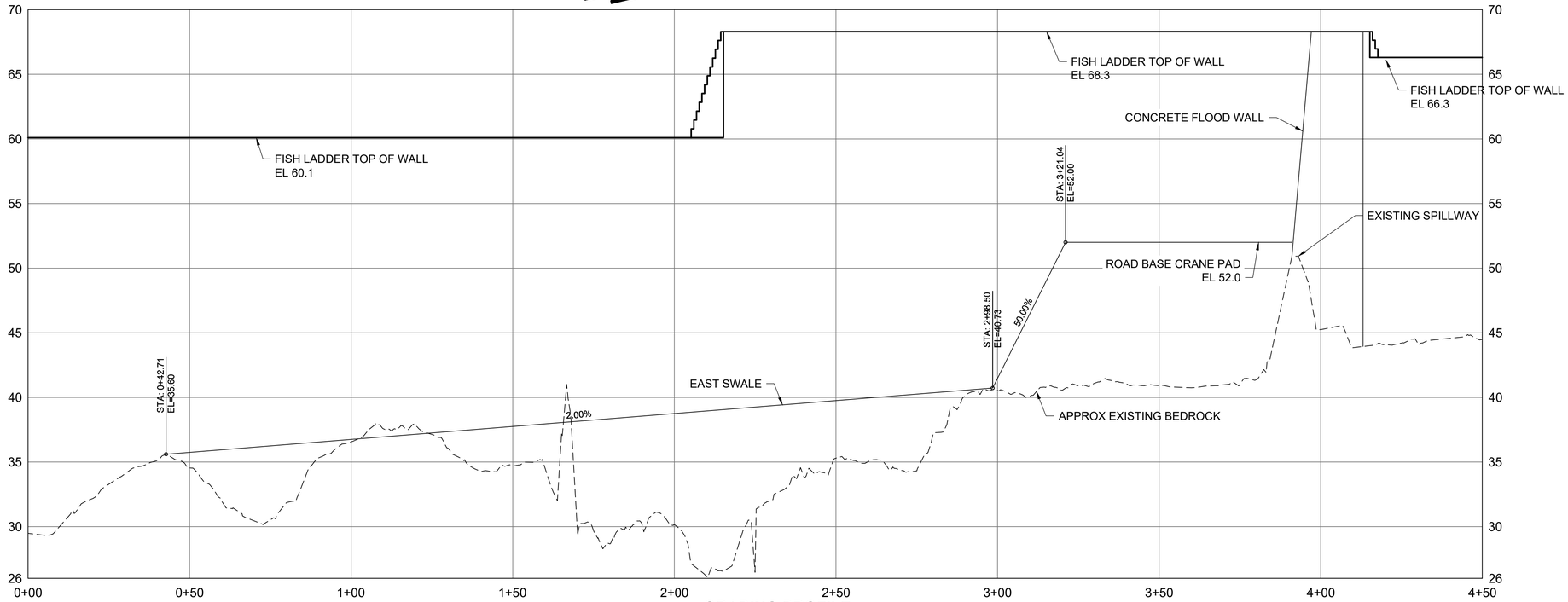
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

SITE GRADING SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	10 OF 94
DRAWING:	C-003



GRADING PLAN
SCALE: 1"=20'



GRADING PROFILE
SCALE: HORIZ 1"=20' VERT 1"=5'

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C\C-004.dwg USER: MKA00889
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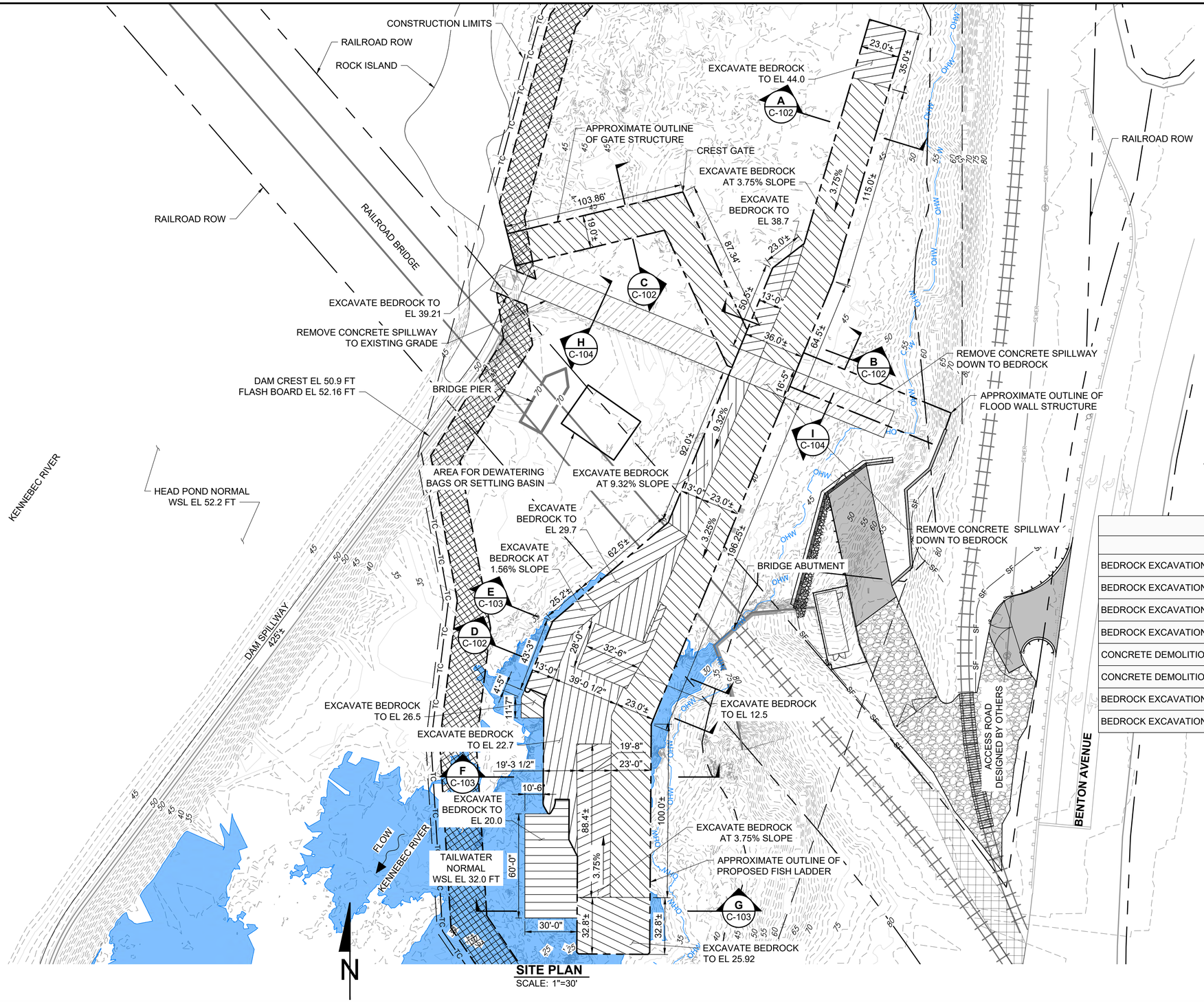
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

SURFACE GRADING PROFILE ALONG EAST FISH LADDER WALL

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	11 OF 94
DRAWING:	C-004



SITE PLAN
SCALE: 1"=30'

NOTES:

1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.
2. QUANTITIES ARE ONLY PROVIDED FOR PERMITTING PURPOSES.

LEGEND:

- CONCRETE DEMOLITION
- EXCAVATE BEDROCK (SEE PLAN FOR ELEVATION)
- APPROX OUTLINE OF NEW STRUCTURES
- TC — TURBIDITY CURTAIN
- COFFERDAM/BULKHEAD/DEWATERING STRUCTURE
- OHW — ORDINARY HIGH WATER LINE
- CONSTRUCTION LIMITS
- APPROXIMATE COFFERDAM FOOTPRINT

QUANTITIES (NOTE 2)

ITEM	UNIT	QUANTITY
BEDROCK EXCAVATION AREA HEADPOND	SF	5,710
BEDROCK EXCAVATION VOLUME HEADPOND	CY	590
BEDROCK EXCAVATION AREA TAILRACE	SF	19,570
BEDROCK EXCAVATION VOLUME TAILRACE	CY	2,310
CONCRETE DEMOLITION AREA	SF	3,700
CONCRETE DEMOLITION VOLUME	CY	1,340
BEDROCK EXCAVATION AREA CREST GATE	SF	3,580
BEDROCK EXCAVATION VOLUME CREST GATE	CY	335

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

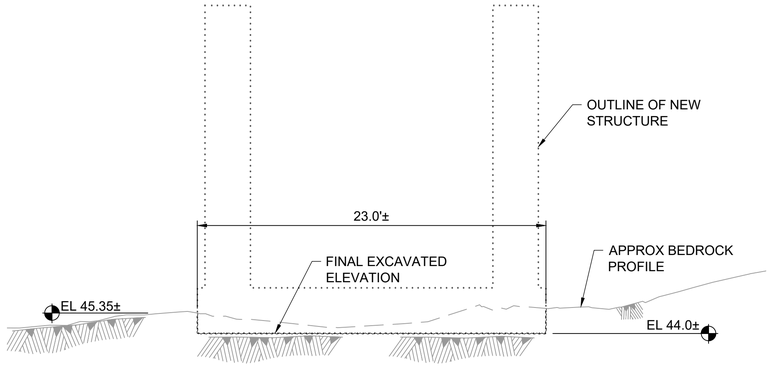
DEMOLITION & EXCAVATION PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	12 OF 94
DRAWING:	C-101

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\C-101.dwg USER: MKA00889
DATE: Feb 03, 2021 9:01am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT C-LCKWD-SV S-LCKWD-PLN C-LCKWD-LP S-LCKWD-SEC IMAGES:

NOTE:

1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.



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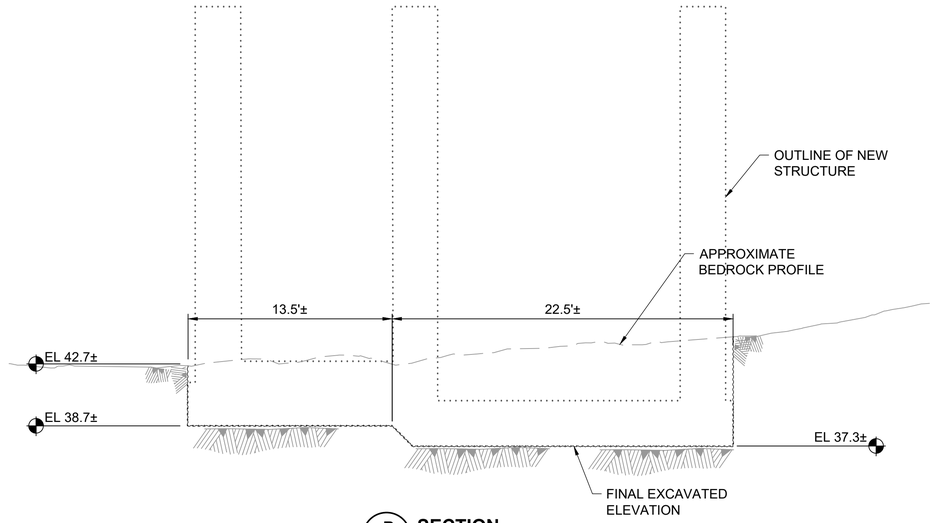
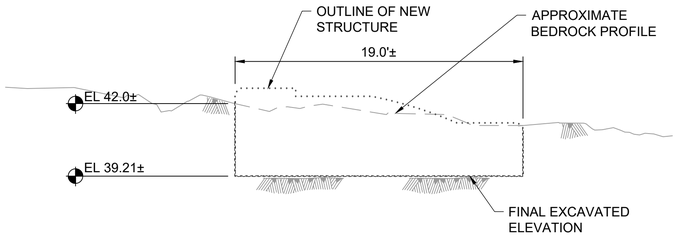
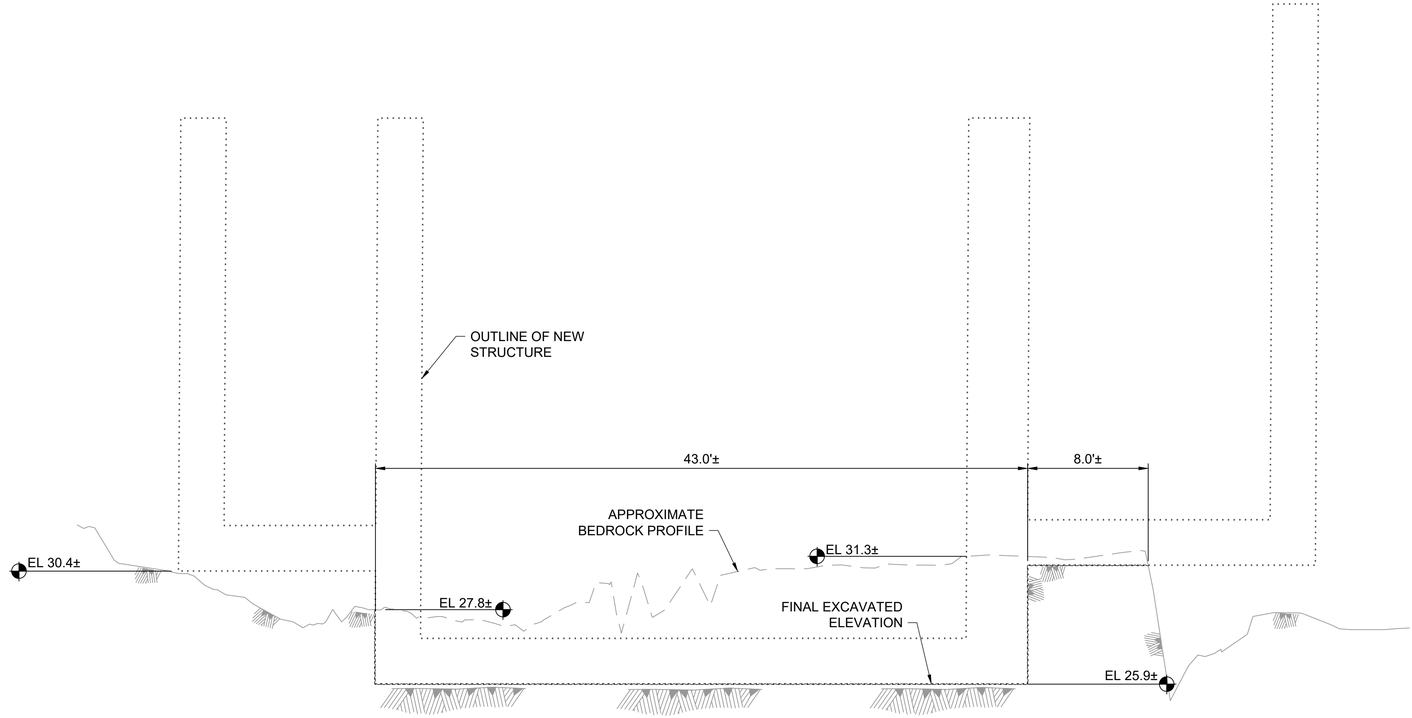


B C-101 **SECTION** SCALE: 1"=5'



C C-101 **SECTION** SCALE: 1"=5'



D C-101 **SECTION** SCALE: 1"=5'

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

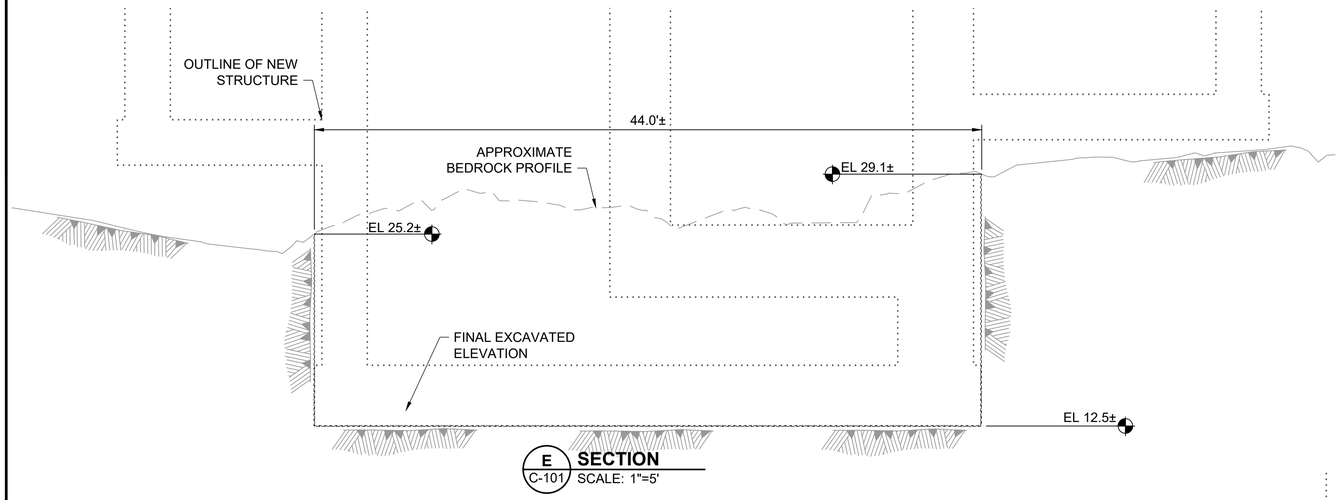
EXCAVATION SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	13 OF 94
DRAWING:	C-102

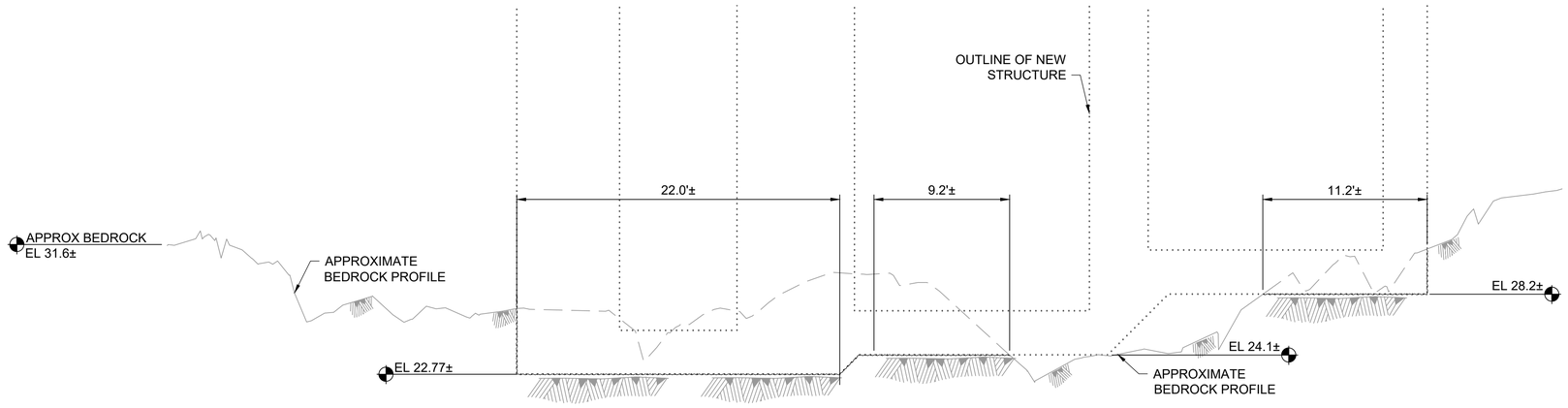
DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\C-102.dwg USER: MK400889
DATE: Feb 03, 2021 9:02am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:

NOTE:

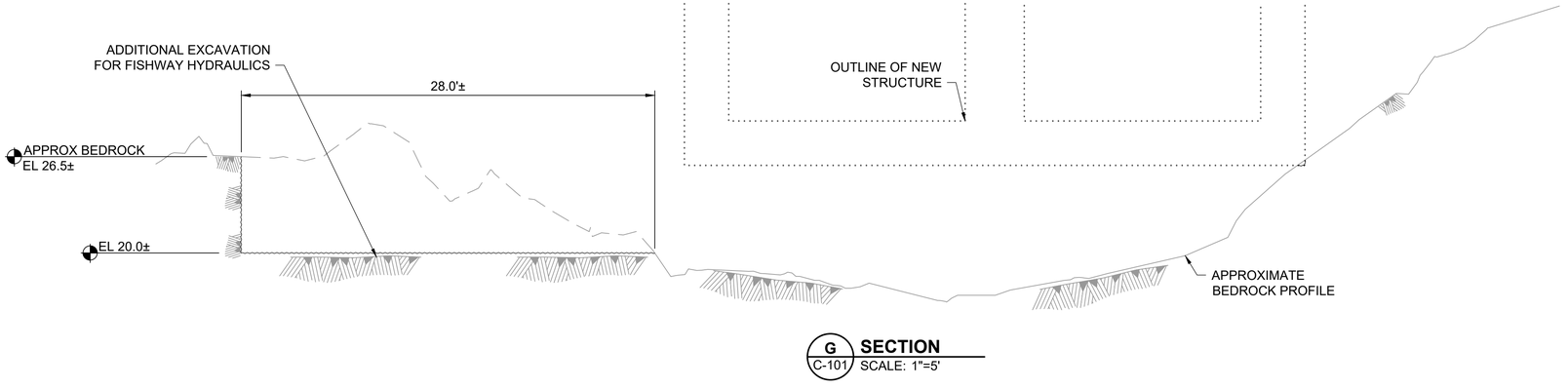
1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.



E C-101 **SECTION**
SCALE: 1"=5'



F C-101 **SECTION**
SCALE: 1"=5'



G C-101 **SECTION**
SCALE: 1"=5'

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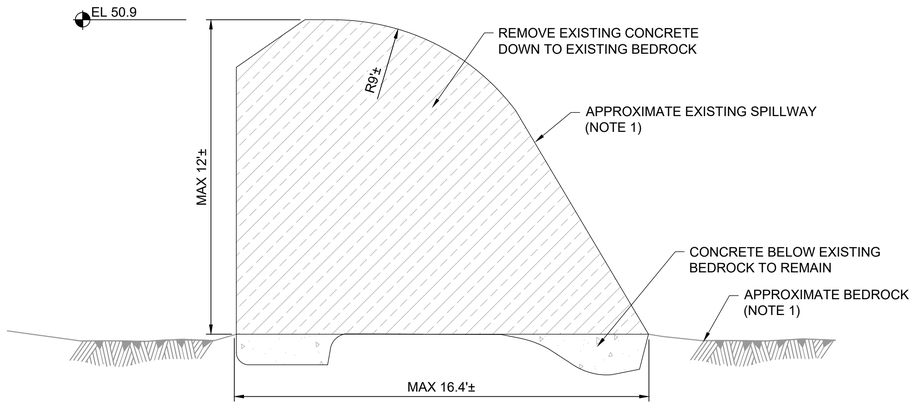
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

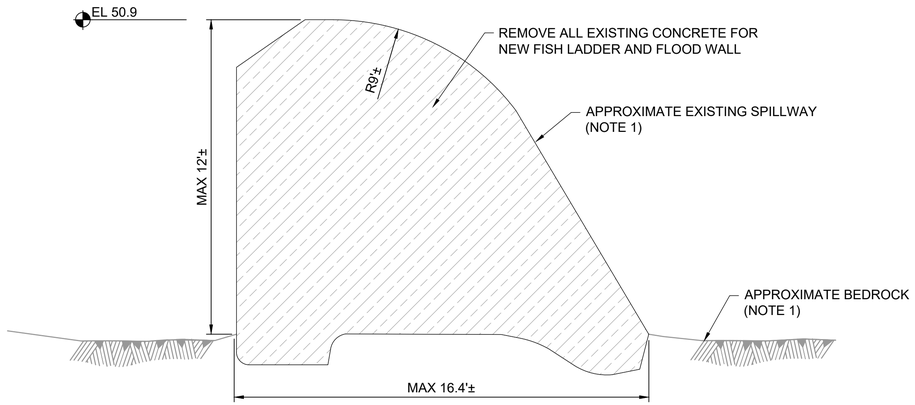
EXCAVATION SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	14 OF 94
DRAWING:	C-103

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C\C-103.dwg USER: MKA00889
DATE: Feb 03, 2021 9:02am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:



H C-101 **CONCRETE DEMOLITION SECTION AT NEW CREST GATE**
SCALE: 1"=3'



I C-101 **CONCRETE DEMOLITION SECTION AT NEW FISH LADDER AND FLOOD WALL**
SCALE: 1"=3'

NOTE:

1. REMOVE EXISTING CONCRETE SPILLWAY TO THE LIMITS SHOW IN PLAN (C-101). EXISTING CONCRETE SPILLWAY CROSS SECTIONS SHOWN IS APPROXIMATE. CROSS SECTION VARIES DUE TO VARIATION, IN THE BEDROCK ELEVATION.

LEGEND:

CONCRETE DEMOLITION

DWG: S:\131009\Hdrm\Lockwood\900 CAD\02-sheets\C-104.dwg USER: NKA00889
DATE: Feb 03, 2021 9:02am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:

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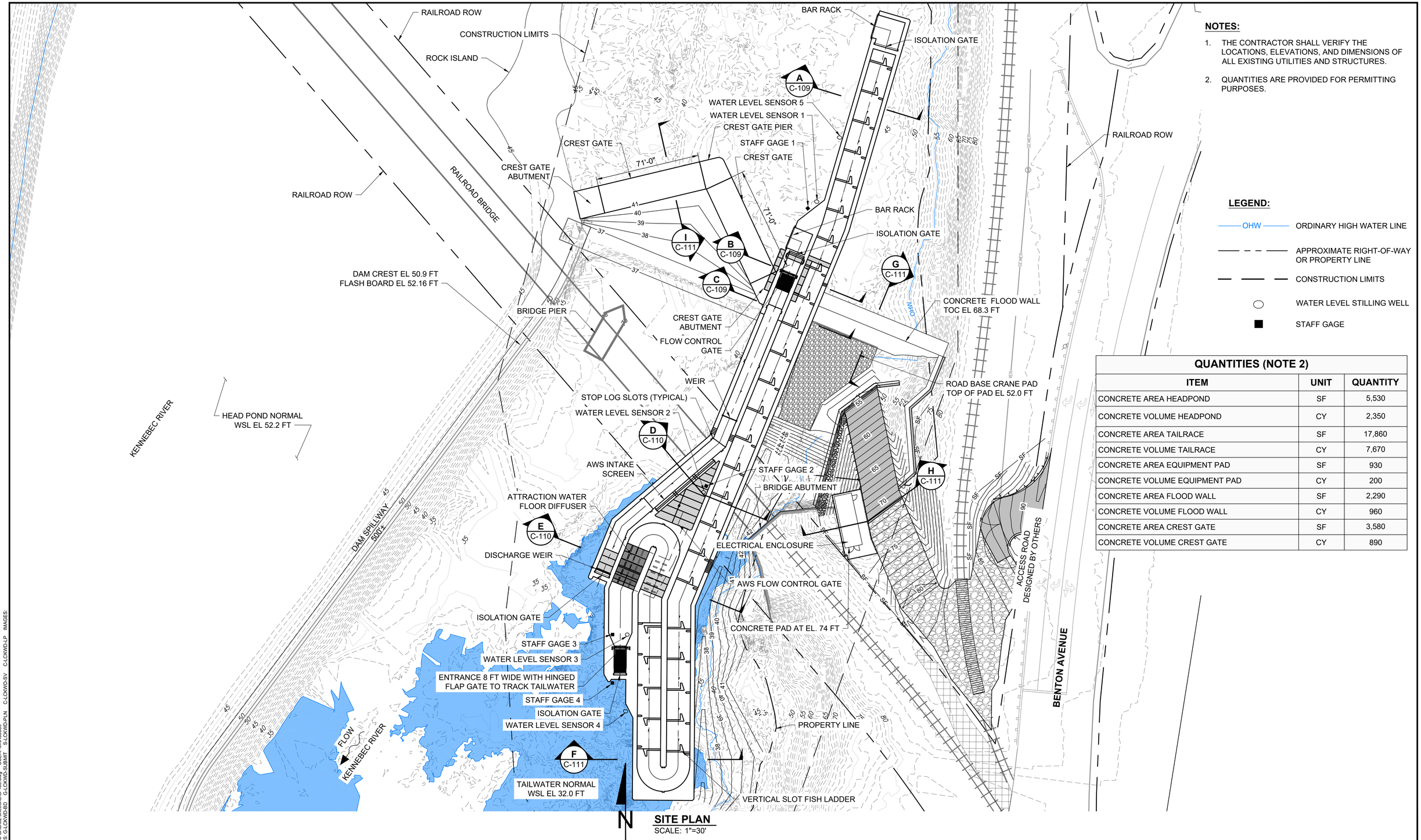
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

DEMOLITION SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	15 OF 94
DRAWING:	C-104



SITE PLAN
SCALE: 1"=30'

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. QUANTITIES ARE PROVIDED FOR PERMITTING PURPOSES.

LEGEND:

- OHW — ORDINARY HIGH WATER LINE
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- CONSTRUCTION LIMITS
- WATER LEVEL STILLING WELL
- STAFF GAGE

QUANTITIES (NOTE 2)

ITEM	UNIT	QUANTITY
CONCRETE AREA HEADPOND	SF	5,530
CONCRETE VOLUME HEADPOND	CY	2,350
CONCRETE AREA TAILRACE	SF	17,860
CONCRETE VOLUME TAILRACE	CY	7,670
CONCRETE AREA EQUIPMENT PAD	SF	930
CONCRETE VOLUME EQUIPMENT PAD	CY	200
CONCRETE AREA FLOOD WALL	SF	2,290
CONCRETE VOLUME FLOOD WALL	CY	960
CONCRETE AREA CREST GATE	SF	3,580
CONCRETE VOLUME CREST GATE	CY	890

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GENERAL ARRANGEMENT PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	16 OF 94
DRAWING:	C-105

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C-105.dwg USER: MKA00889
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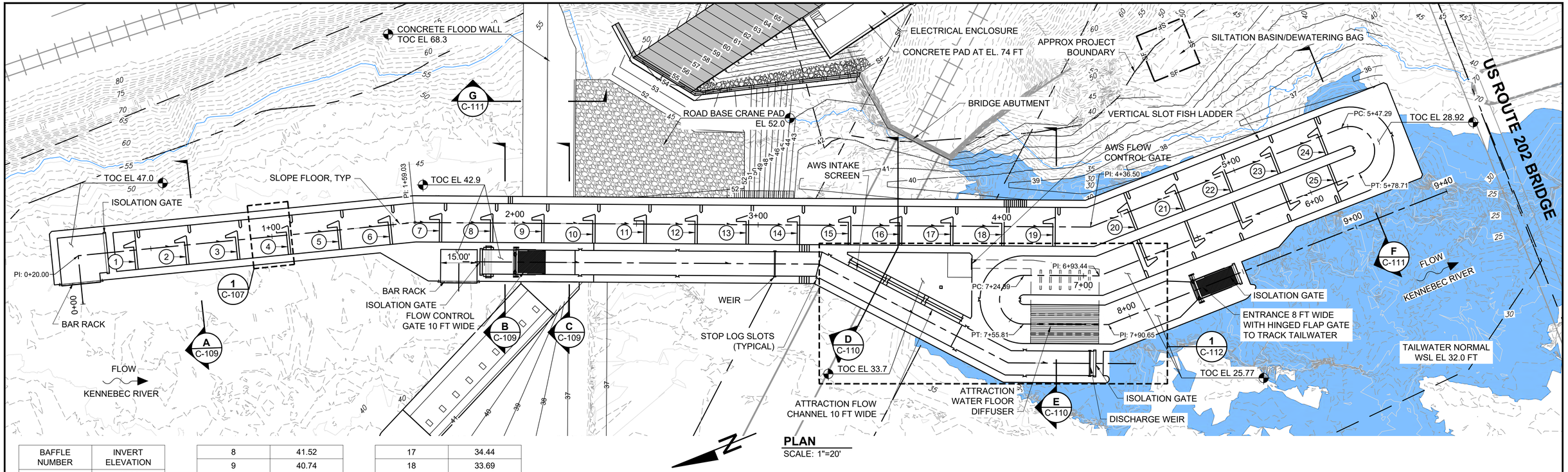
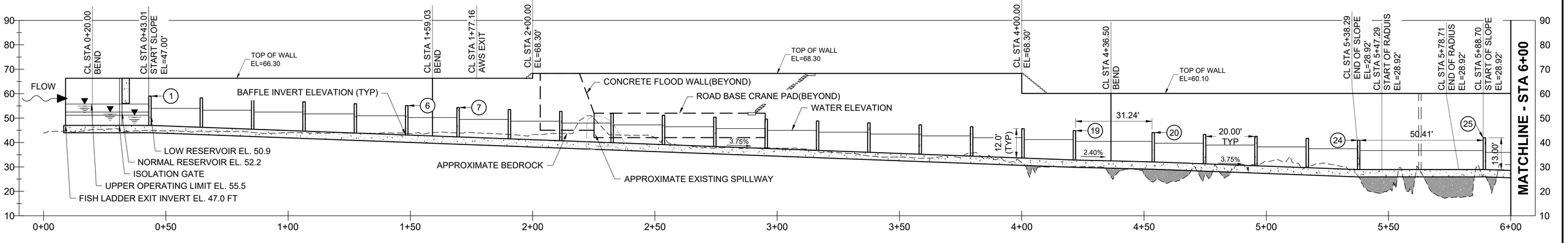


PLAN
SCALE: 1"=20'

BAFFLE NUMBER	INVERT ELEVATION
1	47.00
2	46.25
3	45.46
4	44.67
5	43.89
6	43.10
7	42.31
8	41.52
9	40.74
10	39.95
11	39.16
12	38.37
13	37.59
14	36.80
15	36.01
16	35.22
17	34.44
18	33.69
19	32.86
20	32.07
21	31.29
22	30.50
23	29.71
24	28.92
25	28.92



CENTERLINE PROFILE
SCALE: 1"=20'

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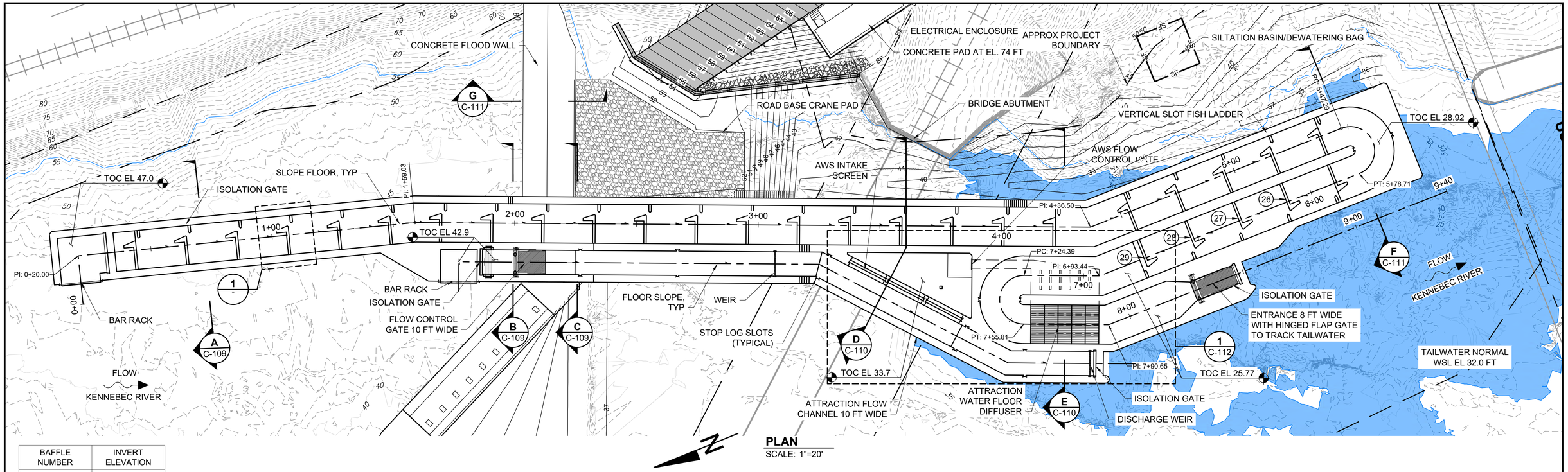
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

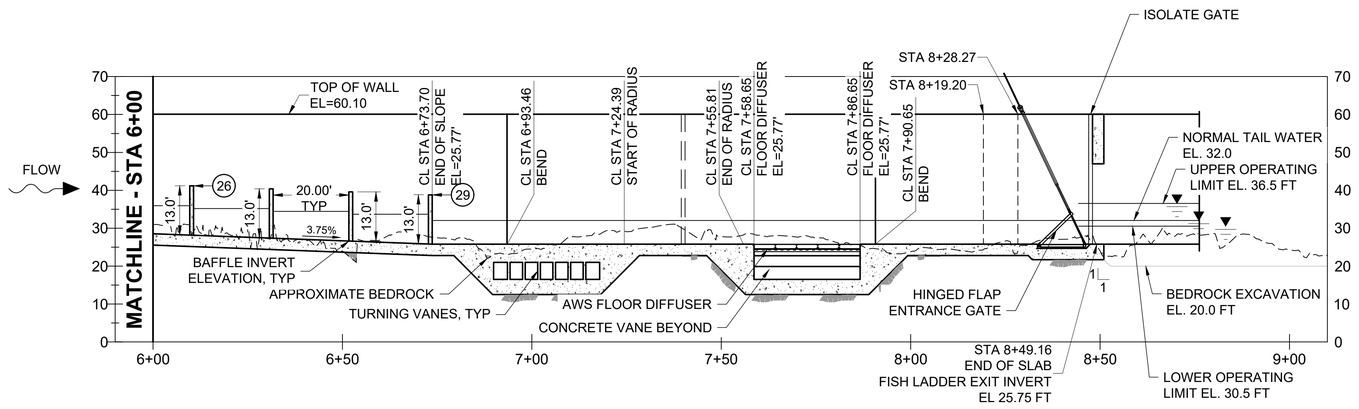
FISH LADDER PLAN & PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	17 OF 94
DRAWING:	C-106

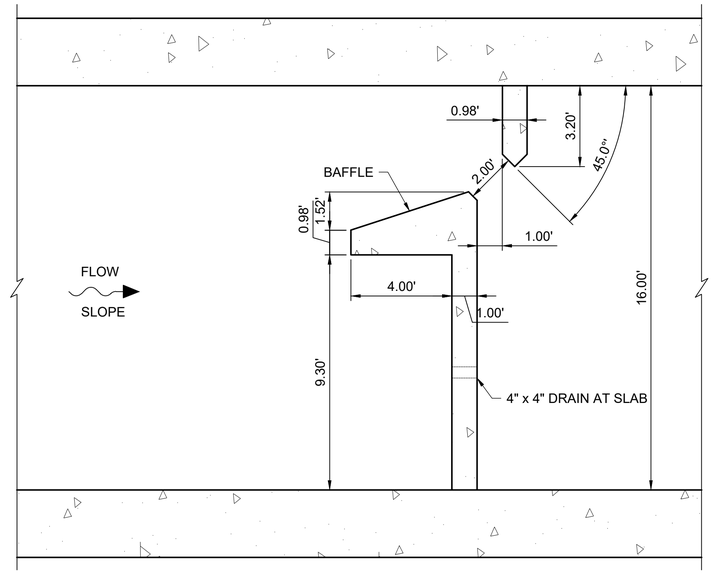


PLAN
SCALE: 1"=20'

BAFFLE NUMBER	INVERT ELEVATION
26	28.25
27	27.50
28	26.75
29	26.00



CENTERLINE PROFILE
SCALE: 1"=20'



1 C-106 VERTICAL SLOT TYPICAL POOL PLAN
SCALE: 1"=3'
C-107

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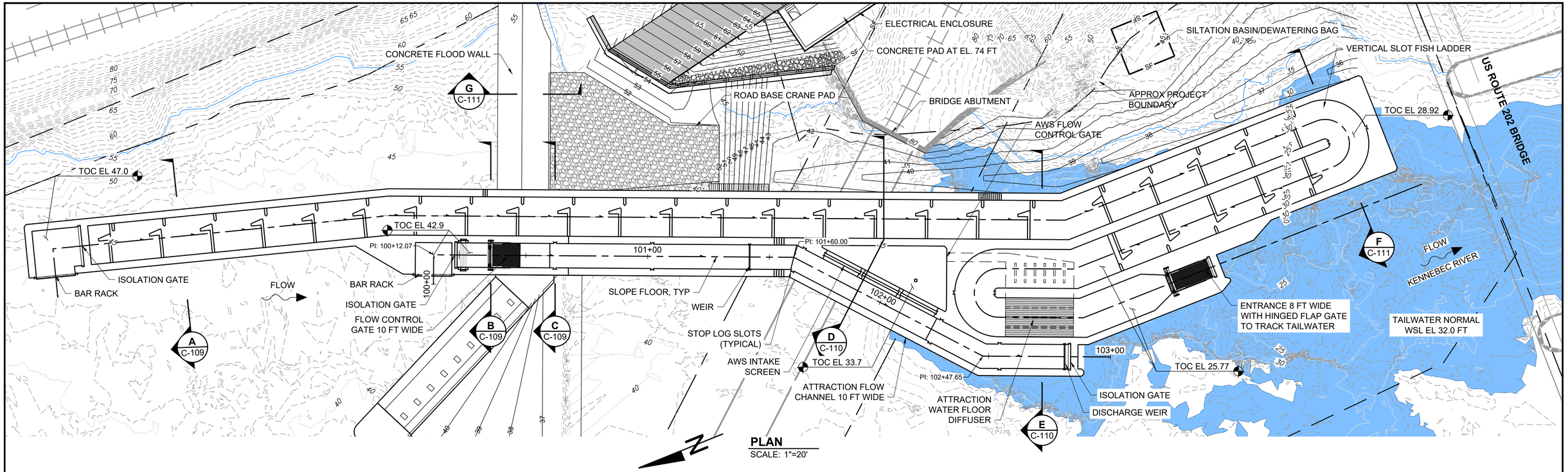
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

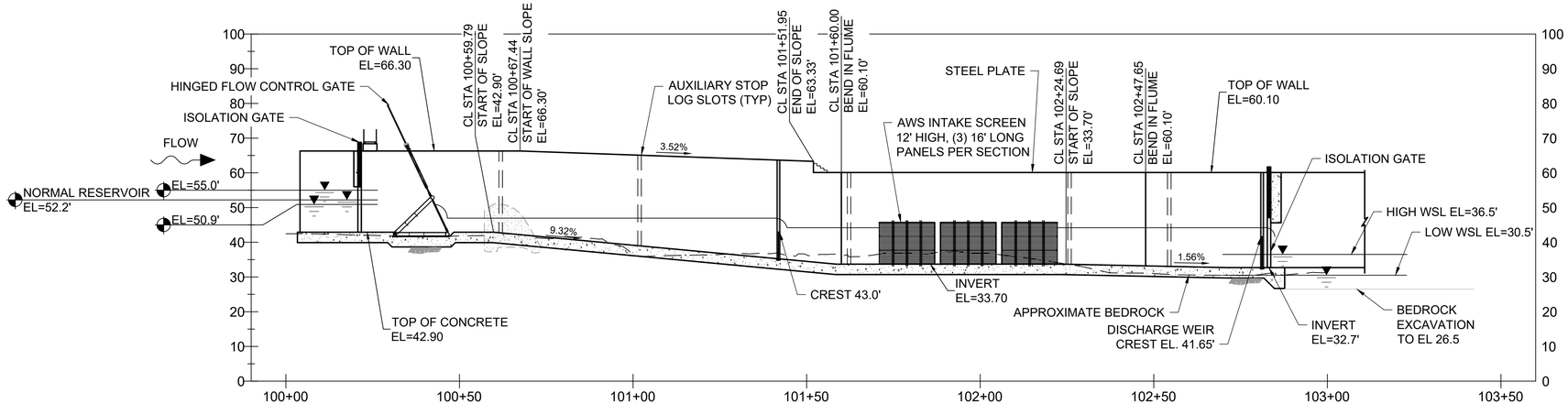
FISH LADDER PLAN & PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	18 OF 94
DRAWING:	C-107

DWG: S:\131\09\Holden\Lockwood\900 CAD\02-SHEETS\C\C-107.dwg USER: MKA00889
DATE: Feb 03, 2021 9:44am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP C-LCKWD-SV S-LCKWD-SEC IMAGES:



PLAN
SCALE: 1"=20'



CENTERLINE PROFILE
SCALE: 1"=20'

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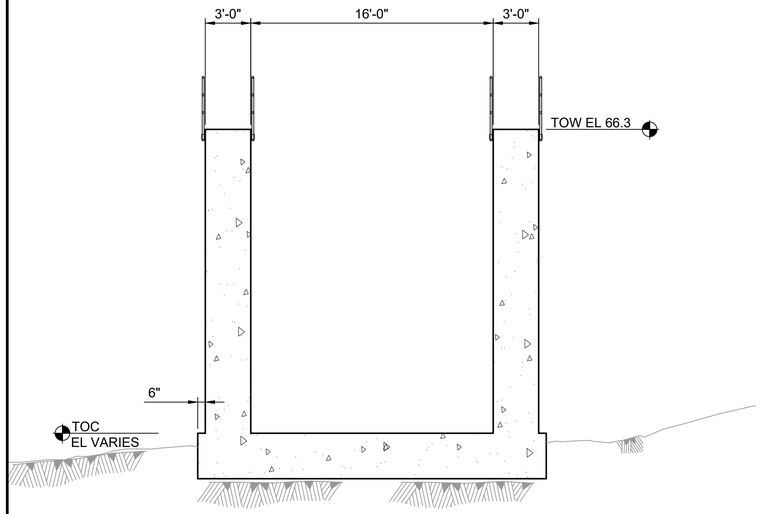
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS CHANNEL PLAN & PROFILE

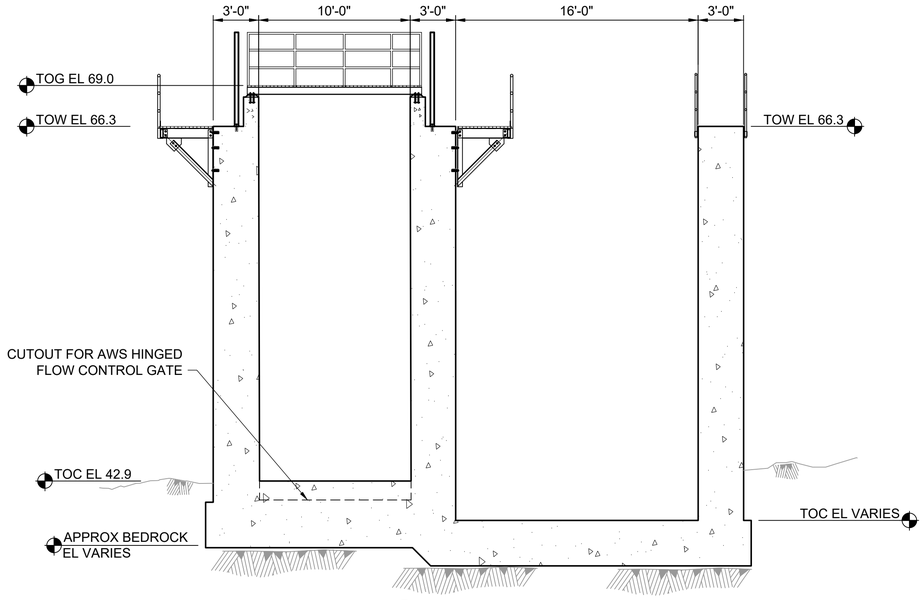
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	19 OF 94
DRAWING:	C-108

DWG: S:\13\1009\Hdd\en\Lockwood\900 CAD\02-sheets\C\C-108.dwg USER: NKA00869
DATE: Feb 03, 2021 9:04am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-SV C-LCKWD-LP IMAGES:



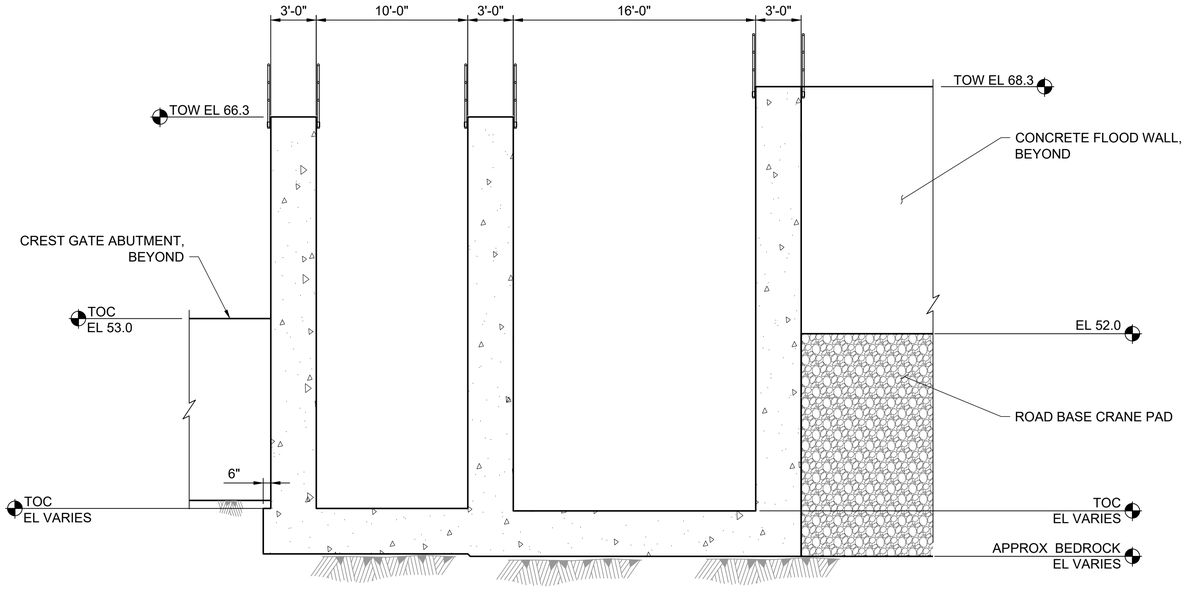
A C-105 **SECTION**
SCALE: 1"=5'

C-106
C-107
C-108



B C-105 **SECTION**
SCALE: 1"=5'

C-106
C-107
C-108



C C-105 **SECTION**
SCALE: 1"=5'

C-106
C-107
C-108

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DATE: Feb 03, 2021 9:05am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:

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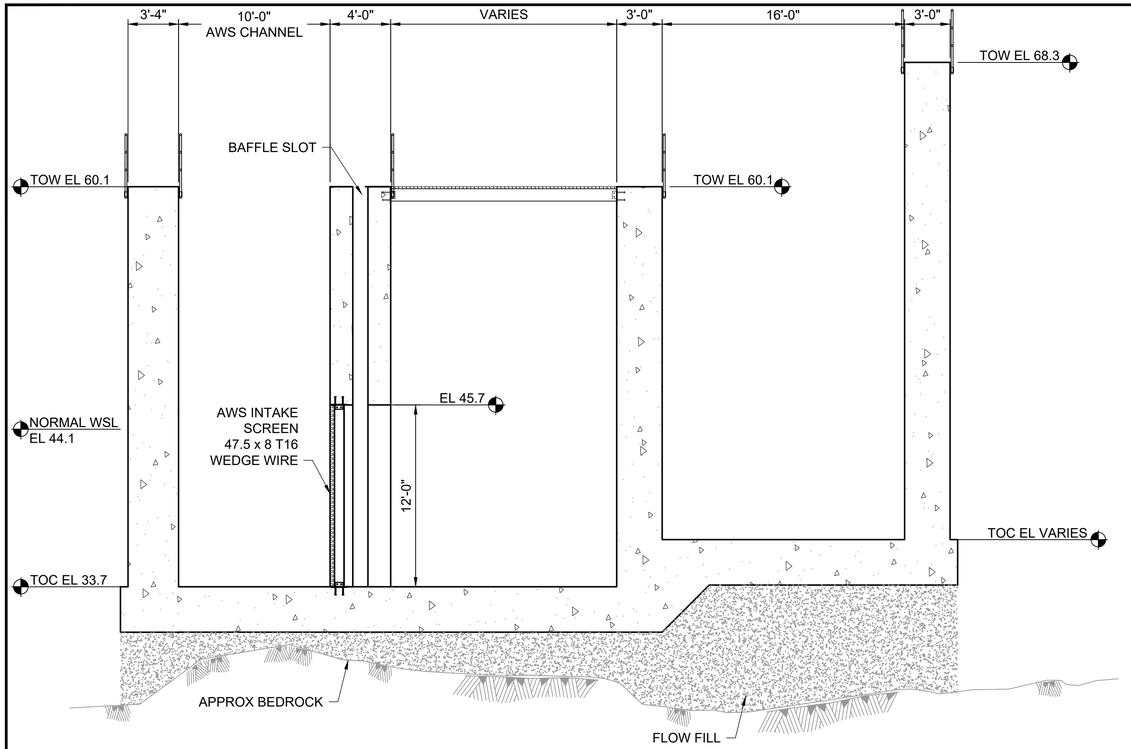
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

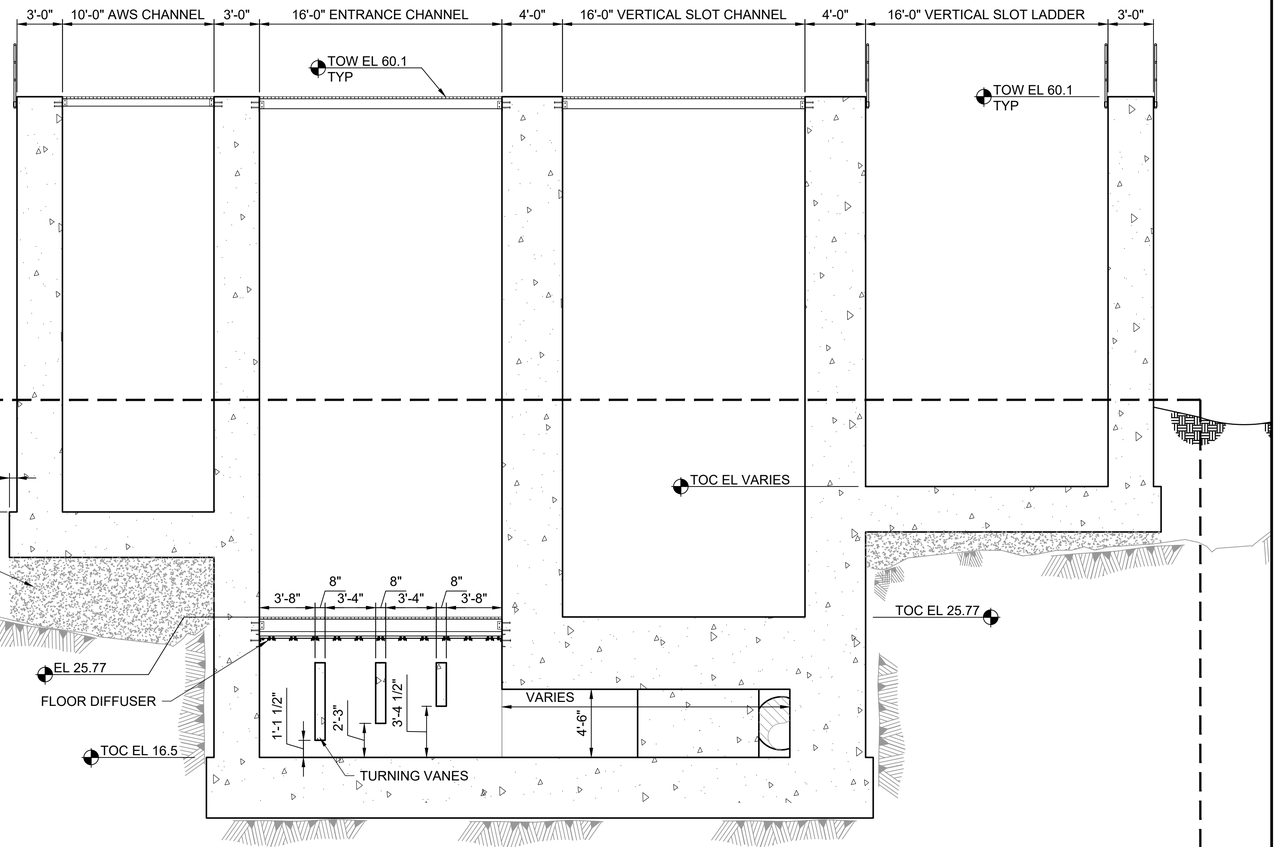
FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	20 OF 94
DRAWING:	C-109



D C-105 **SECTION**
SCALE: 1"=5'

C-106
C-107
C-108



E C-105 **SECTION**
SCALE: 1"=5'

C-106
C-107
C-108

DWG: S:\13100\99\Alden\Lockwood\00 CAD\02-sheets\C-110.dwg USER: MKA00889
DATE: Feb 03, 2021 9:05am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:

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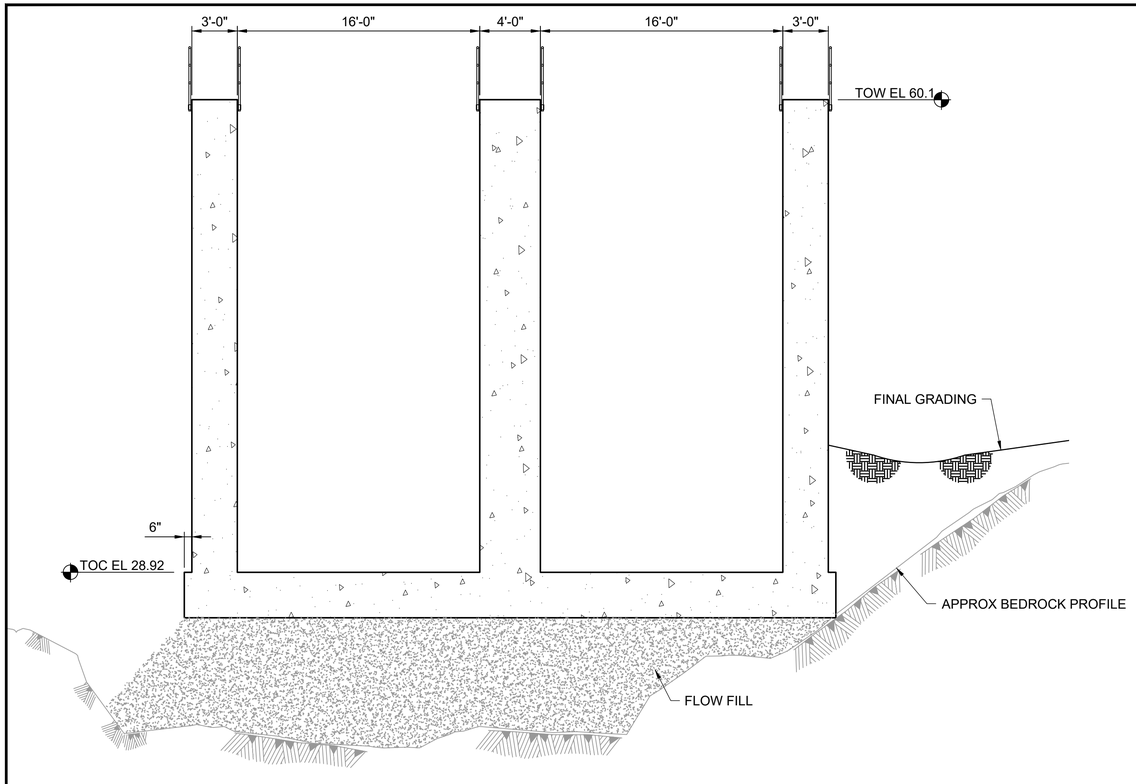
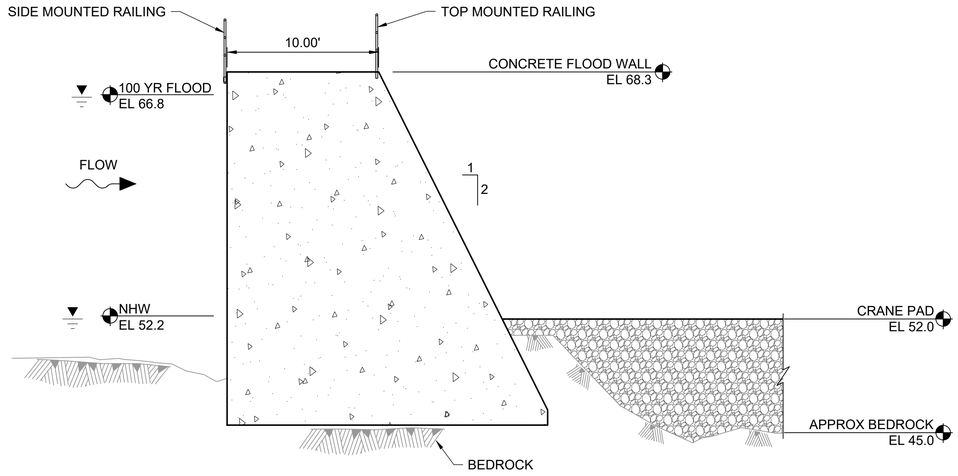
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

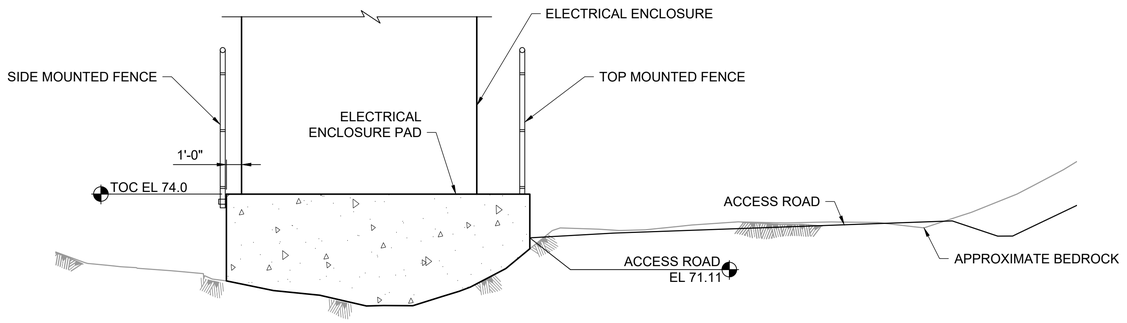
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	21 OF 94
DRAWING:	C-110



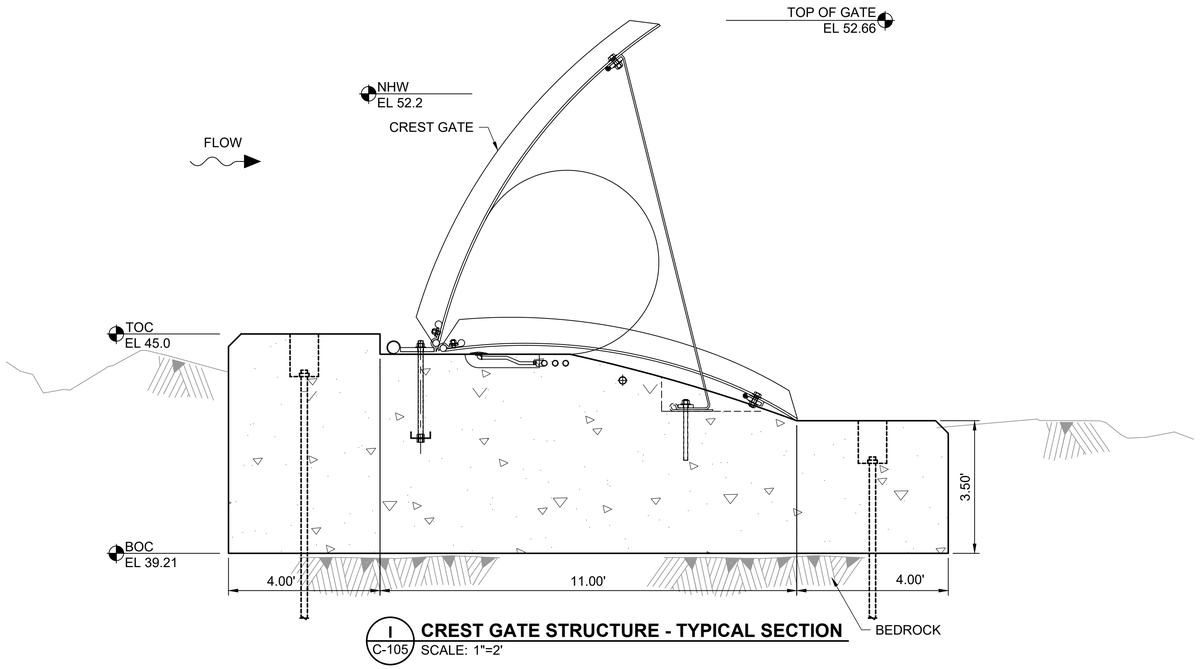
F C-105 **SECTION**
SCALE: 1"=5'
C-106
C-107
C-108



G C-105 **CONCRETE FLOOD WALL - TYPICAL SECTION**
SCALE: 1"=5'
C-106
C-107
C-108



H C-105 **SECTION**
SCALE: 1"=5'



I C-105 **CREST GATE STRUCTURE - TYPICAL SECTION**
SCALE: 1"=2'

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30 SHREWSBURY ST, HOLDEN, MA 01520
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FOR AGENCY REVIEW
NOT FOR CONSTRUCTION
DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

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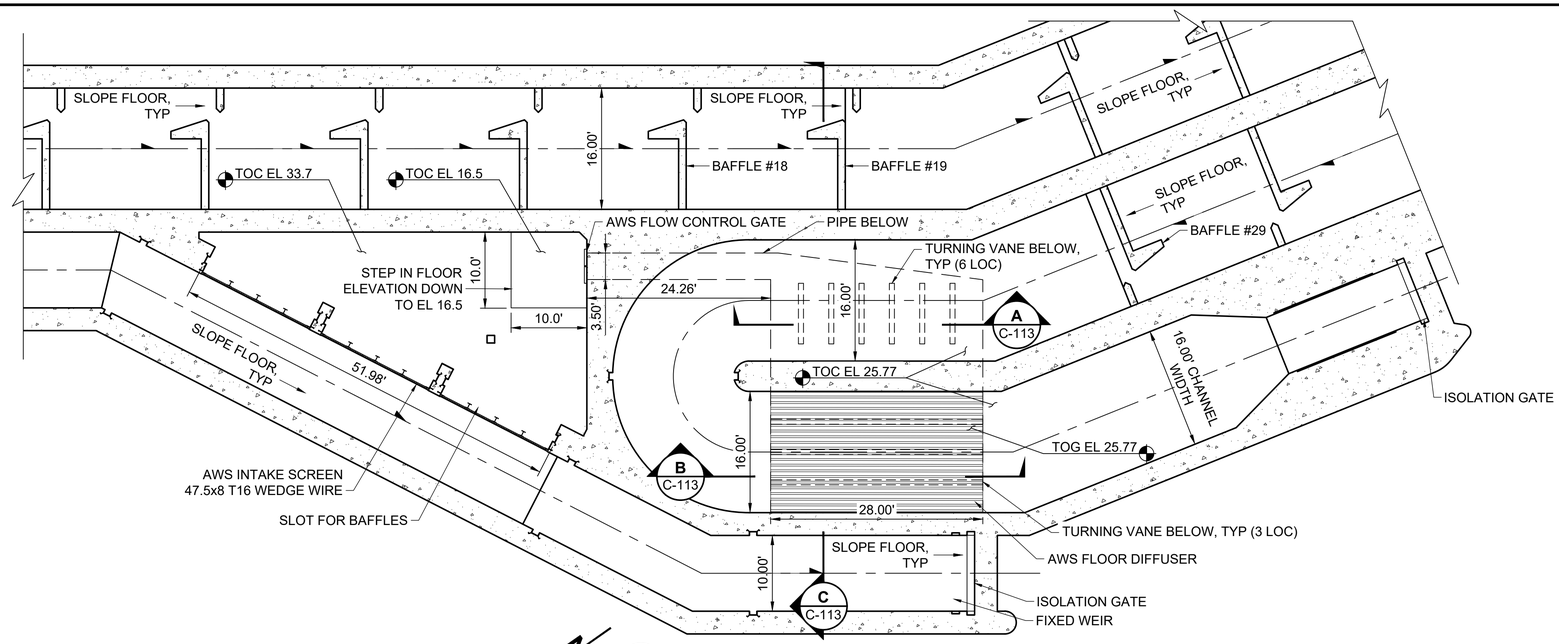
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

MISCELLANEOUS SECTIONS

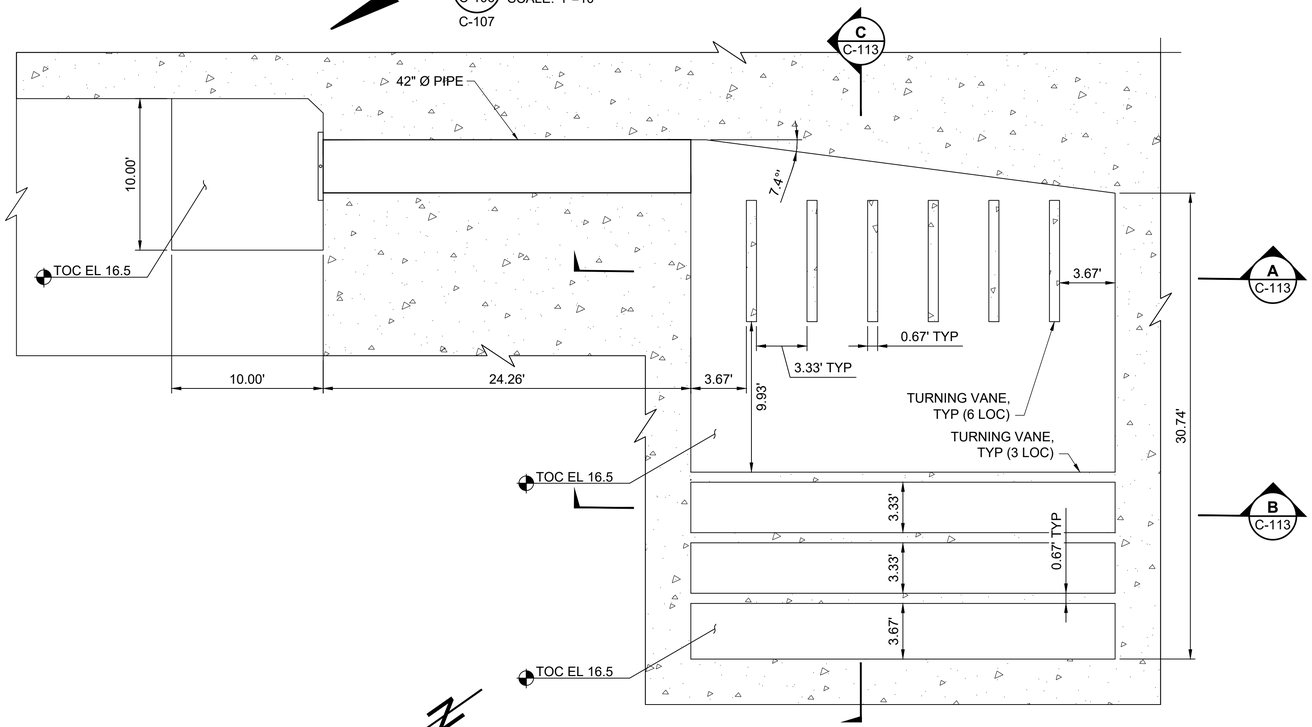
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	22 OF 94
DRAWING:	C-111

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C-111.dwg USER: MKA00889
DATE: Feb 03, 2021 9:05am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:



1 C-106 C-107 **ENLARGED PLAN (SECTION AT EL 35.0)**

SCALE: 1"=10'



ENLARGED PLAN (SECTION AT EL 17.0)

SCALE: 1"=5'

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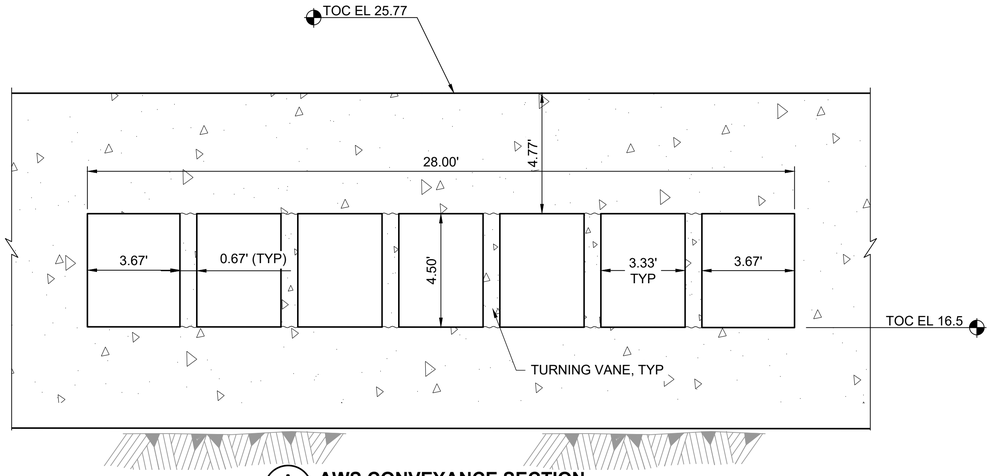
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

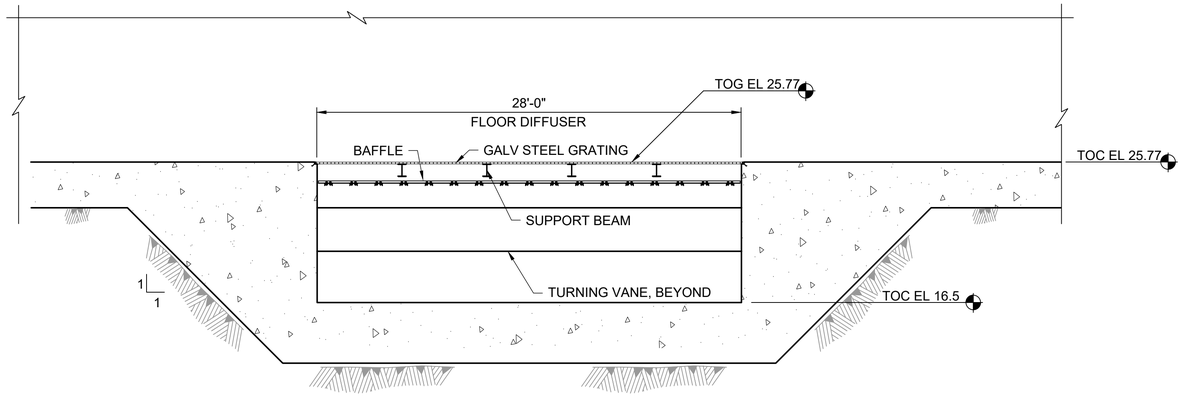
AWS FLOOR DIFFUSER PLANS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	23 OF 94
DRAWING:	C-112

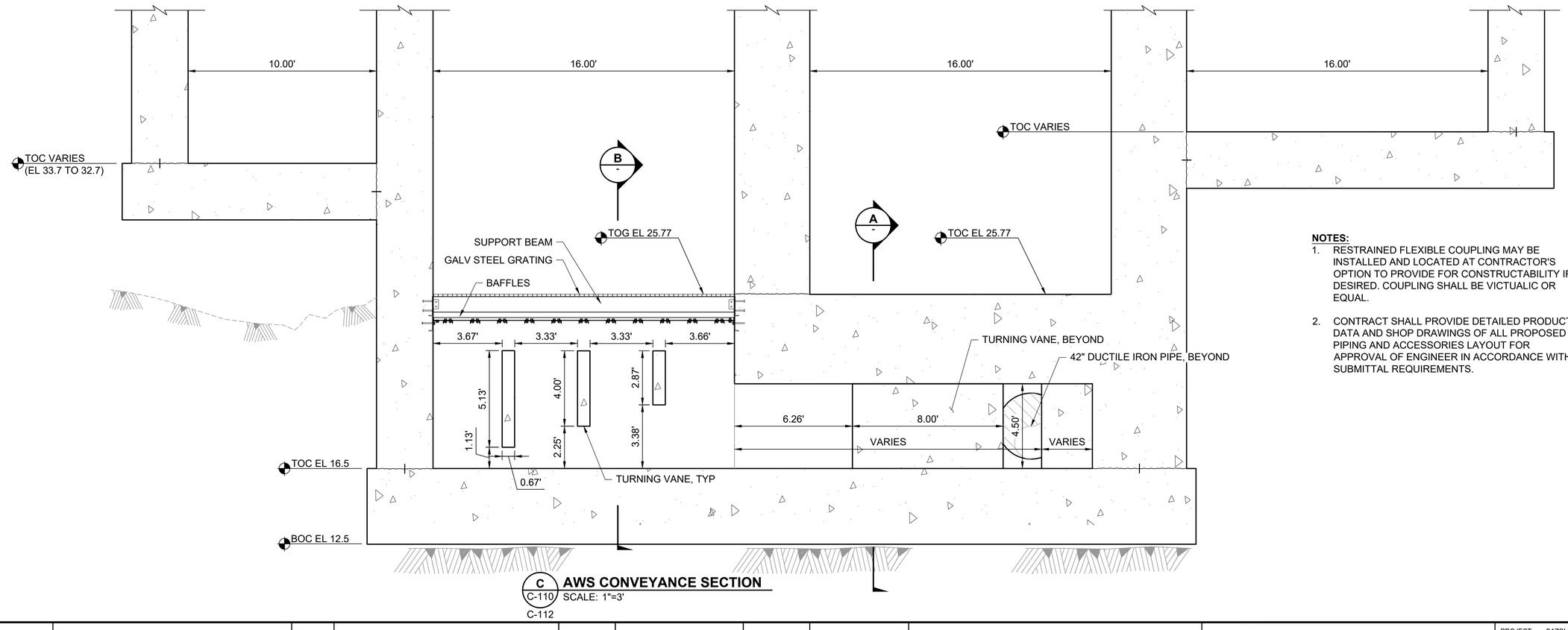
DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\C\C-112.dwg USER: MKA00889
DATE: Feb 03, 2021 9:05am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PLN S-LCKWD-PP IMAGES:



A C-112 C-113 **AWS CONVEYANCE SECTION**
SCALE: 1"=3'



B C-112 C-113 **VERTICAL SLOT ENTRANCE SECTION**
SCALE: 1"=5'



C C-110 C-112 **AWS CONVEYANCE SECTION**
SCALE: 1"=3'

NOTES:

1. RESTRAINED FLEXIBLE COUPLING MAY BE INSTALLED AND LOCATED AT CONTRACTOR'S OPTION TO PROVIDE FOR CONSTRUCTABILITY IF DESIRED. COUPLING SHALL BE VICTUALIC OR EQUAL.
2. CONTRACT SHALL PROVIDE DETAILED PRODUCT DATA AND SHOP DRAWINGS OF ALL PROPOSED PIPING AND ACCESSORIES LAYOUT FOR APPROVAL OF ENGINEER IN ACCORDANCE WITH SUBMITTAL REQUIREMENTS.

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

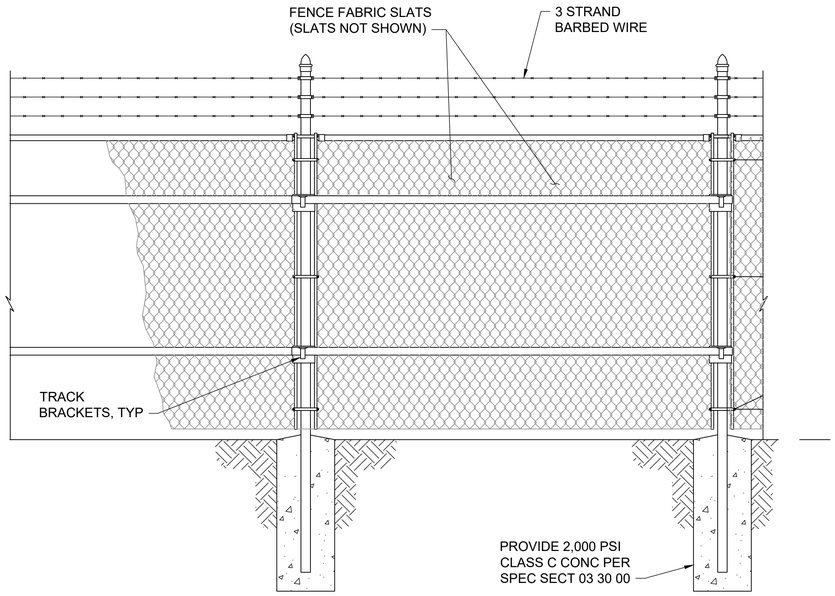
AWS FLOOR DIFFUSER SECTIONS

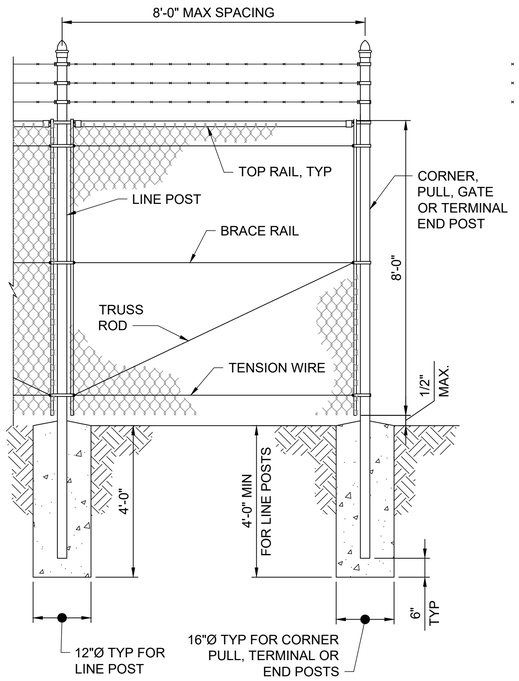
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	24 OF 94
DRAWING:	C-113

DWG: S:\131\09\Hdd\en\Lockwood\900 CAD\02-sheets\C\C-113.dwg USER: NKA00889
DATE: Feb 03, 2021 9:06am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-DTLS S-LCKWD-SEC S-LCKWD-PP IMAGES:

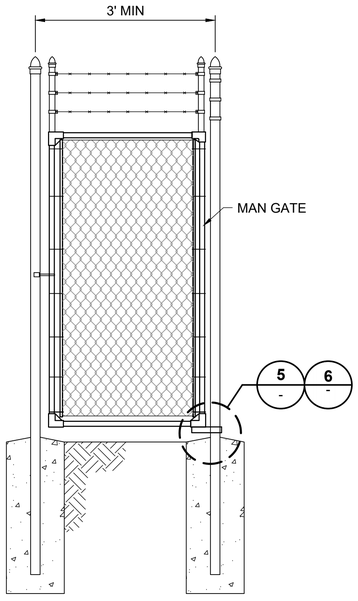
NOTE:

TERMINAL PANELS SHALL BE PLACED AT INTERVALS NOT TO EXCEED 150'.

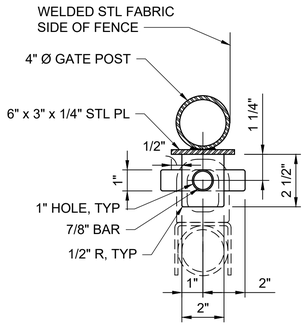




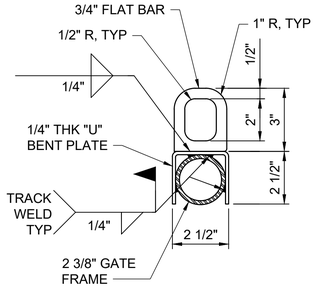
2 - TERMINAL PANEL
SCALE: NTS



4 - MAN GATE DETAIL
SCALE: NTS



5 - GATE POST PLAN
SCALE: NTS



6 - GATE FRAME PLAN
SCALE: NTS

POST & MATERIALS TABLE

LINE POSTS	2-3/8" OD SCH 40 PIPE
CORNER & END POSTS	2-7/8" OD SCH 40 PIPE
TOP RAIL	1-5/8" OD SCH 40 PIPE
DRIVE GATE POSTS	4-1/2" OD SCH 40 PIPE
CHAIN LINK FABRIC	9 GA WIRE 2" DIAMOND WIRE, KNUCKLED TOP & BOTTOM, TWISTED & BARBED
GATE FRAMES	1-7/8" OD SCH 40 PIPE
TENSION WIRE	7 GA GALV COIL SPRING STEEL
TRUSS RODS	3/8" GALV STEEL
BRACE RAIL	1-5/8" OD SCH 40 PIPE
SLATS	1-3/32" DOUBLE WALL HDPE W/ BOTTOM LOCKING CHANNEL

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FENCE AND GATE DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	26 OF 94
DRAWING:	C-115

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\C\C-115.dwg USER: MKA00889
DATE: Feb 03, 2021 9:06am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

GENERAL NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS.
2. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE OTHER PROJECT DRAWINGS AND SPECIFICATIONS.
3. REFER TO CIVIL, MECHANICAL, ELECTRICAL, AND OTHER DISCIPLINES DRAWINGS FOR ANCHORS, PIPE SLEEVES, CONDUITS OR OTHER ITEMS TO BE EMBEDDED IN OR THAT PASS THROUGH THE STRUCTURE. IN GENERAL, EMBEDMENTS AND PENETRATIONS LESS THAN 12 INCHES IN DIAMETER ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS.
4. STANDARD DETAILS SHALL BE USED AT ALL APPLICABLE LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
5. PLANS ON THESE DRAWINGS ARE TREATED AS HORIZONTAL SECTIONS (I.E. “PLANS AT ELEVATION 100.00" SHOW ITEMS BELOW 100.00).
6. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
7. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO CONSTRUCTION. NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS.
8. SHOP DRAWINGS SHALL BE FURNISHED FOR REVIEW BEFORE ANY FABRICATION AND ERECTION IS STARTED. POORLY EXECUTED SHOP DRAWINGS SHALL BE REJECTED AND RESUBMITTED.

CONCRETE NOTES:

1. SPECIFIED MINIMUM COMPRESSIVE STRENGTH OF CLASS A STRUCTURAL CONCRETE SHALL BE 4500 PSI AT 28 DAYS UNLESS OTHERWISE NOTED. REFER TO THE SPECIFICATIONS.
2. CONCRETE WORK SHALL CONFORM TO ACI 301 AND ACI 318.
3. REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615 OR A706, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60.
4. ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI-315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION.
5. REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH PIPE, PIPE FLANGE OR METAL PARTS EMBEDDED IN CONCRETE, A MINIMUM OF 2 INCHES CLEARANCE SHALL BE PROVIDED AT ALL TIMES.
6. UNLESS OTHERWISE SHOWN ON THE DRAWINGS CONCRETE COVER FOR REINFORCING BARS SHALL BE 4" UNO.
7. UNLESS OTHERWISE NOTED, WALLS AND SLABS SHOWN WITH A SINGLE LAYER OF REINFORCEMENT SHALL HAVE THAT REINFORCEMENT CENTERED.
8. CHAMFER EDGES OF PERMANENTLY EXPOSED CONCRETE SURFACES WITH A 45 DEGREE BEVEL AS SHOWN IN THE STANDARD DETAILS.
9. ALL REINFORCEMENT BENDS, LAPS AND SPLICES UNLESS OTHERWISE NOTED, SHALL SATISFY THE MINIMUM REQUIREMENTS SHOWN IN THE STANDARD DETAILS.
10. DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS SHOWN OTHERWISE.
11. BARS SHOWN WITH BENDS NOT DIMENSIONED SHALL BE ASSUMED TO END WITH A STANDARD HOOK AS SHOWN IN THE STANDARD DETAILS.
12. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1-1/3 TIMES THE MAXIMUM AGGREGATE SIZE.
13. THE FIRST AND LAST BARS IN STRUCTURAL MEMBERS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING.
14. CONTRACTOR SHALL NOT BACKFILL AGAINST STRUCTURAL CONCRETE UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER. SEE SPECIFICATIONS.
15. PLACE BACKFILL EQUALLY ON ALL SIDES OF STRUCTURES. SEE SPECIFICATIONS.
16. LOCATE CONSTRUCTION JOINTS WHERE SHOWN OR NOTED ON DRAWINGS. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL THE LOCATION OF PROPOSED CONSTRUCTION JOINTS.
17. MAXIMUM JOINT SPACING SHALL BE NO MORE THAN 30'.
18. MINIMUM TIME BETWEEN ADJACENT POURS SHALL BE 5 DAYS.

STRUCTURAL STEEL AND STAINLESS STEEL NOTES:

1. MATERIALS SHALL CONFORM TO THE STANDARDS LISTED:

- STEEL PLATE	ASTM A36
- STEEL ANGLES	ASTM A36
- STEEL BEAMS	ASTM A992
- STEEL BOLTS	ASTM A325
- STEEL CHANNELS	ASTM A36
- STEEL HEADED ANCHOR STUDS (HAS)	TYPE A108

2. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE AWS AND AISC. INSPECT ALL WELDING IN ACCORDANCE WITH THE SPECIFICATIONS.
3. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT ENGINEER'S WRITTEN APPROVAL.
4. ALL STRUCTURAL STEEL MEMBERS AND MISCELLANEOUS ITEMS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

STRUCTURAL STEEL AND STAINLESS STEEL NOTES:

1. MATERIALS SHALL CONFORM TO THE STANDARDS LISTED:

- STEEL HSS	ASTM A500, GRADE C
- STEEL CHANNELS	ASTM A36 (UNO)
- STEEL PLATE	ASTM A36 (UNO)
- STEEL ANGLES	ASTM A36
- STEEL BEAMS	ASTM A992
- STEEL BOLTS	ASTM A325
- STEEL ANCHOR BOLTS	ASTM F1554, GR 36
- STEEL HEADED ANCHOR STUDS (HAS)	TYPE A108
- STEEL TENDON	ASTM A722, GRADE 150
- HEAVY DUTY STEEL HEX NUT	ASTM A29, GRADE C (150 KSI)
- STEEL BEARING PLATE	ASTM A572, GRADE 50
- STAINLESS STEEL ANGLES	ASTM A276, TYPE 304L
- STAINLESS STEEL PLATE	ASTM A240, TYPE 304L
- STAINLESS STEEL HEADED ANCHOR STUDS (HAS)	TYPE 304L
- STAINLESS STEEL BOLTS	ASTM F593
- STAINLESS STEEL ANCHOR BOLTS	ASTM A193
- STAINLESS STEEL NUTS	ASTM F594

2. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE AWS AND AISC. INSPECT ALL WELDING IN ACCORDANCE WITH THE SPECIFICATIONS.
3. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT ENGINEER'S WRITTEN APPROVAL.
4. ALL STRUCTURAL STEEL MEMBERS AND MISCELLANEOUS ITEMS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

POST-TENSION ANCHORS:

1. SEE INSTALLATION NOTES AND POST TENSIONING REQUIREMENTS ON SHEET C07.
2. SUBMIT AN ANCHOR INSTALLATION PLAN FOR REVIEW. PLAN SHALL INCLUDE DRILLING AND GROUTING PROCEDURES.
3. DRILL HOLES USING DRILLING EQUIPMENT SUITABLE FOR THE INTENDED PURPOSE. DIAMETER AND DEPTH OF HOLES SHALL BE AS SHOWN ON THE DRAWINGS.
4. CLEAN THE DRILLED HOLES AND REMOVE DEBRIS PRIOR TO ANCHOR PLACEMENT.
5. GROUT:
   a. GROUT FOR GROUTING ANCHORS INTO ROCK SHALL CONSIST OF A HOMOGENOUS, STABLE MIXTURE OF PORTLAND CEMENT AND WATER WITH A MINIMUM COMPRESSIVE STRENGTH OF 6,000 PSI AT 28 DAYS. TARGET MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 4 DAYS. SUBMIT THE PROPOSED MIX DESIGN FOR REVIEW.
   b. THE WATER CONTENT SHALL BE THE MINIMUM NECESSARY FOR PROPER PLACEMENT BUT THE WATER-CEMENT RATIO SHALL NOT EXCEED 0.45 BY WEIGHT. DO NOT USE ACCELERATORS.
   c. THE OWNER'S INDEPENDENT TESTING AGENCY WILL PERFORM COMPRESSION TESTS PER ASTM C109. A SET OF THREE SPECIMENS WILL BE MADE FOR TESTING AT FOUR, SEVEN AND 28 DAYS.
7. ANCHORS SHALL BE THREADED BARS CONFORMING TO ASTM A722, GRADE 150, WITH CLASS I DOUBLE CORROSION PROTECTION. REFER TO SPECIFICATION SECTION 03 23 11.
8. CONTRACTOR SHALL NOT POST-TENSION THE CREST GATE FOUNDATION ANCHORS UNTIL THE GROUT AND THE NEW CONCRETE HAS REACHED 100% OF DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY THE ENGINEER.

EXCAVATION AND ROCK TRIMMING:

1. PROVIDE ADEQUATE SURVEY CONTROL TO AVOID UNAUTHORIZED OVEREXCAVATION.
2. REMOVE THE ORGANIC AND LOOSE/WEATHERED MATERIAL DOWN TO SOUND ROCK.
3. EXCAVATE TO LINES, GRADES, AND DIMENSIONS SHOWN AND AS NECESSARY TO ACCOMPLISH WORK.
4. TRIM TO NEAT LINES WHERE CONCRETE IS TO BE PLACED AGAINST FOUNDATION MATERIAL.
5. EXCAVATION MATERIALS SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS AND AT A LOCATION DETERMINED BY THE CONTRACTOR.

ROCK SURFACE PREPARATION:

1. SUBMIT A ROCK SURFACE PREPARATION PLAN FOR REVIEW.
2. PREPARE A TEST SECTION FOR REVIEW BY THE ENGINEER PRIOR TO COMMENCEMENT OF PRODUCTION ROCK SURFACE PREPARATION.
3. ROCK SHALL BE PREPARED BY A COMBINATION OF ROCK TRIMMING AND CONCRETE FILL TO A SMOOTHNESS AND UNIFORMITY SUITABLE FOR CONCRETE PLACEMENT. REFER TO STANDARD DETAIL 5 ON DRAWING S-501.
4. ROCK SURFACES AGAINST WHICH CONCRETE ARE TO BE PLACED SHALL BE CLEAN, FREE OF LOOSE MATERIAL, AND FREE FROM STANDING OR RUNNING WATER.
5. ROCK SURFACES SHALL BE CLEAN AND SATURATED SURFACE DRY (SSD) DURING CONCRETE PLACEMENT.
6. ROCK SURFACES TO BE IN CONTACT WITH NEW CONCRETE SHALL BE REVIEWED BY THE ENGINEER PRIOR TO CONCRETE PLACEMENT.

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL NOTES & DESIGN CRITERIA

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	27 OF 94
DRAWING:	S-001

DWG: S:\13\009\Holden\Lockwood\900 CAD\02-sheets\SIS-001.dwg USER: MKA00889
DATE: Feb 03, 2021 10:00am XREFS: G-LCKWD-BD G-LCKWD-SUBMT IMAGES:

GENERAL DESIGN CRITERIA:

1. THE FOLLOWING, DESIGN CODES, DESIGN CRITERIA AND STRUCTURE LOADS WERE USED TO COMPLETE THE STRUCTURAL DESIGN.

   - 2012 INTERNATIONAL BUILDING CODE
   - 2016 ASCE7 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
   - 2016 STRENGTH DESIGN FOR REINFORCED CONCRETE HYDRAULIC STRUCTURES, US ARMY CORPS OF ENGINEERS.
   - AISC MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
   - ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, BY THE AMERICAN CONCRETE INSTITUTE.
   - EM 1110-2-2104, STRENGTH DESIGN FOR REINFORCED CONCRETE HYDRAULIC STRUCTURES.
   - EM 1110-2-2100, STABILITY ANALYSIS OF CONCRETE STRUCTURES.
   - FERC ENGINEERING GUIDELINES FOR THE EVALUATION OF HYDROPOWER PROJECTS, CHAPTER 3 GRAVITY DAMS, 2016.
   - PTI DC35.1-14 RECOMMENDATIONS FOR PRESTRESSED ROCK AND SOIL ANCHORS

LOAD	DETAIL	MAGNITUDE	UNITS	NOTES
LIVE LOADS	FLOOR	150	PSF	
	WALKWAYS/PLATFORMS	150	PSF	
WIND	BASIC WIND SPEED	108	MPH	NOMINAL DESIGN 3-SECOND GUST
	IMPORTANCE FACTOR (Iw)	1.0		
	BUILDING OCCUPANCY CATEGORY	II		
	EXPOSURE	C		
EARTHQUAKE	IMPORTANCE FACTOR (Ie)	1.0		REINFORCED CONCRETE STRUCTURE
	BUILDING OCCUPANCY CATEGORY	II		
	Ss	32.9	%g	
	S1	8.0	%g	
	SITE CLASS	C		
	SDS	28.5	%g	
	SD1	8.0	%g	
	SEISMIC DESIGN CATEGORY	B		
	BASIC FORCE RESISTING SYSTEM			REINFORCED CONCRETE DISTRIBUTED MASS CANTILEVER STRUCTURES
	BASE SHEAR			
	CS	0.1425		
	R	2.0		
		Ω_0	2.0	
		C_d	2.0	
		HL	NL	
	ANALYSIS PROCEDURE	ELF		EQUIVALENT LATERAL FORCE

GEOTECHNICAL DESIGN CRITERIA:

REFERENCE GEOTECHNICAL REPORT BY GZA GEO ENVIRONMENTAL, INC. DATED FEBRUARY 1, 2021 REGARDING GEOTECHNICAL DATA.

INSPECTION TESTING AND QUALITY ASSURANCE NOTES:

1. SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH CHAPTER 17 OF THE IBC ARE REQUIRED AS PART OF THIS PROJECT. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE COMPLIANCE WITH THESE OVERSIGHT AND QUALITY ASSURANCE REQUIREMENTS.
2. THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE, ACTING AS THE OWNERS AGENT WILL BE PROVIDING SPECIAL INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE IBC. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING ADEQUATE TIME AND ACCESS FOR COMPLETION OF SPECIAL INSPECTIONS BY THE OWNER OR OWNER'S AGENT PRIOR TO COVERING THE WORK TO BE INSPECTED WITH NEW WORK.
3. AS A MINIMUM, SPECIAL INSPECTIONS ARE TO BE COMPLETED FOR THE FOLLOWING AREAS OF CONSTRUCTION.

CONSTRUCTION TYPE	APPLICABLE CODE TABLE(S)
SOILS / FOUNDATIONS	IBC 1705.6
CONCRETE	IBC 1705.3
STRUCTURAL STEEL	AISC 360
STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL	IBC 1705.2.2

4. THE CONTRACTOR SHALL PROVIDE A “STATEMENT OF RESPONSIBILITY” TO THE OWNER OR OWNER'S AGENT, IN ACCORDANCE WITH SECTION 1706 OF THE IBC.
5. SPECIAL INSPECTORS SHALL SUBMIT THEIR QUALIFICATIONS TO THE BUILDING OFFICIAL AND BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO BEGINNING WORK.

DEFERRED SUBMITTAL ITEMS:

1. THE FOLLOWING PORTIONS OF THE PROJECT ARE DEFERRED SUBMITTAL ITEMS AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD.

   ANCHORAGE OF EQUIPMENT AND APPURTENANCES
   DIFFUSER AND FISH SCREENS
   GRATING
   HYDRAULIC GATES
   RAILING
   PRE-ENGINEERED BUILDING (ELECTRICAL ENCLOSURE)

2. DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE ENGINEER OF RECORD HAS REVIEWED THE SUBMITTAL DOCUMENTS AND INDICATED AS A MINIMUM THAT THEY HAVE BEEN REVIEWED AND FOUND TO BE IN GENERAL CONFORMANCE WITH THE DESIGN OF THE STRUCTURE.
3. DEFERRED SUBMITTAL ITEMS SHALL BE PREPARED AND STAMPED BY A LICENSED CIVIL OR STRUCTURAL PROFESSIONAL ENGINEER UNLESS OTHERWISE NOTED ELSEWHERE IN THESE DOCUMENTS.

ALDEN RESEARCH LABORATORY
30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

FOR AGENCY REVIEW
NOT FOR CONSTRUCTION
DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

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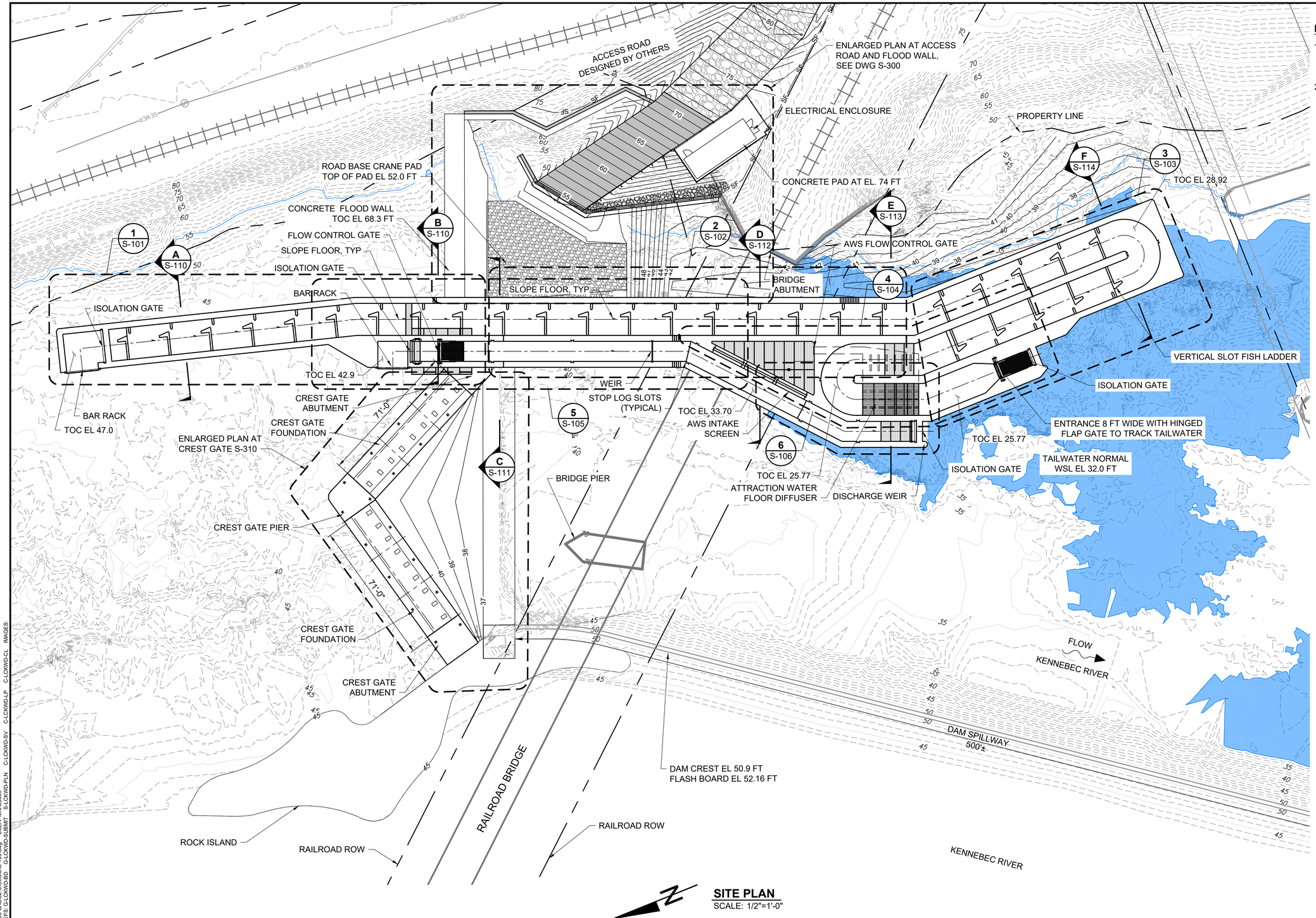
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL NOTES & DESIGN CRITERIA

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	28 OF 94
DRAWING:	S-002

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\S\S-002.dwg USER: MKA00889
DATE: Feb 03, 2021 10:00am XREFS: G-LCKWD-BD G-LCKWD-SUBMT IMAGES:



SITE PLAN
SCALE: 1/2"=1'-0"

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. QUANTITIES ARE PROVIDED FOR PERMITTING PURPOSES.

LEGEND:

OHW — ORDINARY HIGH WATER LINE

APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

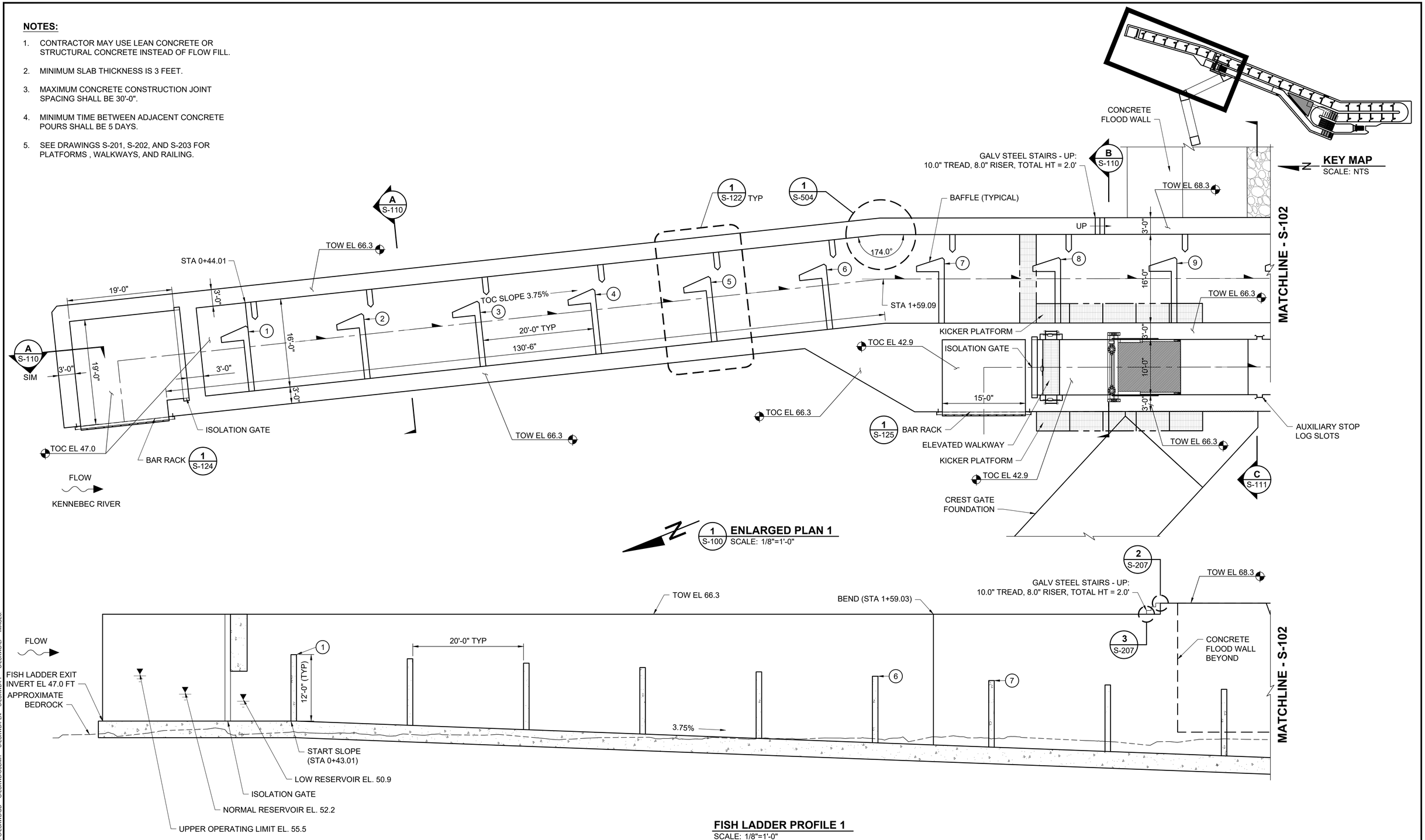
FISH LADDER OVERALL PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	29 OF 94
DRAWING:	S-100

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\SIS-100.dwg USER: MKA00989
DATE: Feb 03, 2021 10:00am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-SV C-LCKWD-LP C-LCKWD-CL IMAGES:

NOTES:

1. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
2. MINIMUM SLAB THICKNESS IS 3 FEET.
3. MAXIMUM CONCRETE CONSTRUCTION JOINT SPACING SHALL BE 30'-0".
4. MINIMUM TIME BETWEEN ADJACENT CONCRETE POURS SHALL BE 5 DAYS.
5. SEE DRAWINGS S-201, S-202, AND S-203 FOR PLATFORMS , WALKWAYS, AND RAILING.



FISH LADDER PROFILE 1
SCALE: 1/8"=1'-0"

DWG: S:\13100\9\Alden\Lockwood\000 CAD\02-sheets\SIS-101.dwg USER: MKA00889
DATE: Feb 03, 2021 10:00am XREFS: G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP IMAGES:

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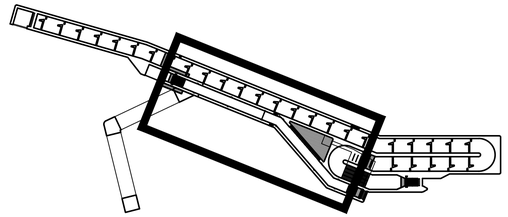
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE 1

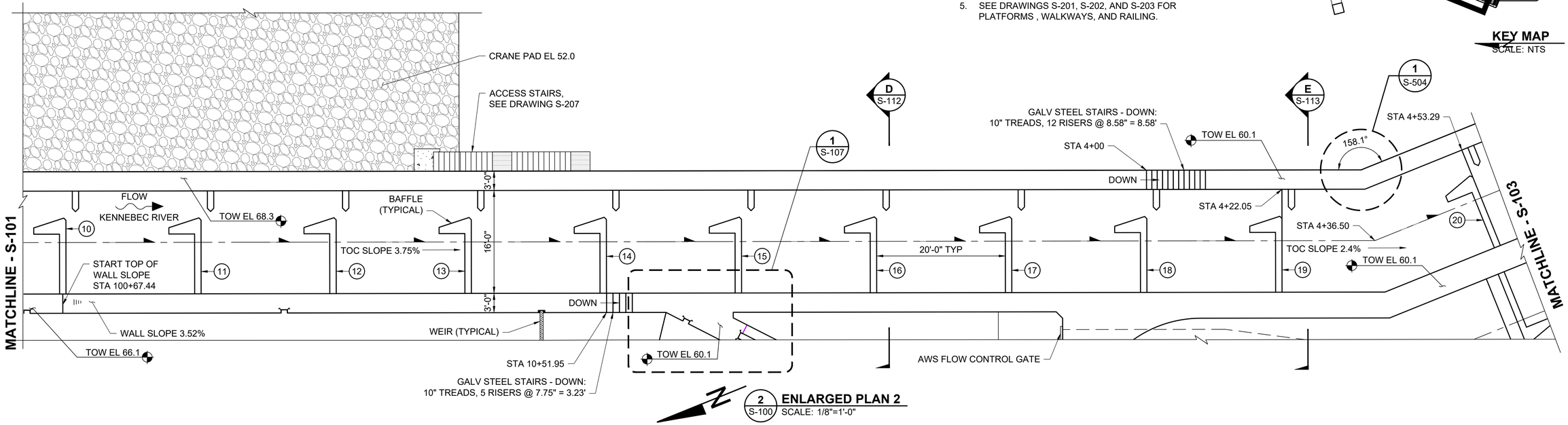
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	30 OF 94
DRAWING:	S-101

NOTES:

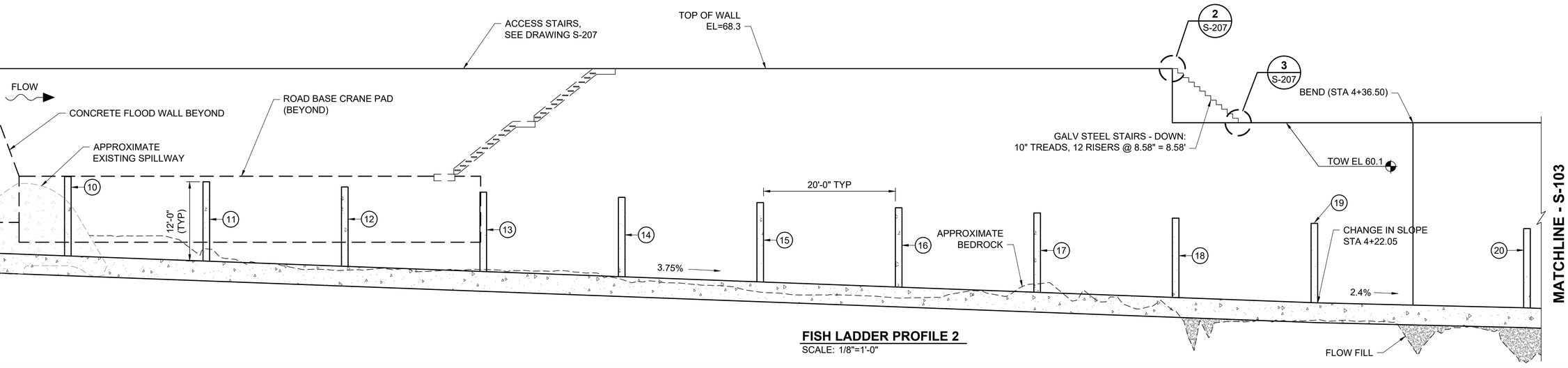
1. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
2. MINIMUM SLAB THICKNESS IS 3 FEET.
3. MAXIMUM CONCRETE CONSTRUCTION JOINT SPACING SHALL BE 30'-0".
4. MINIMUM TIME BETWEEN ADJACENT CONCRETE POURS SHALL BE 5 DAYS.
5. SEE DRAWINGS S-201, S-202, AND S-203 FOR PLATFORMS , WALKWAYS, AND RAILING.



KEY MAP
SCALE: NTS



2 S-100 ENLARGED PLAN 2
SCALE: 1/8"=1'-0"



FISH LADDER PROFILE 2
SCALE: 1/8"=1'-0"

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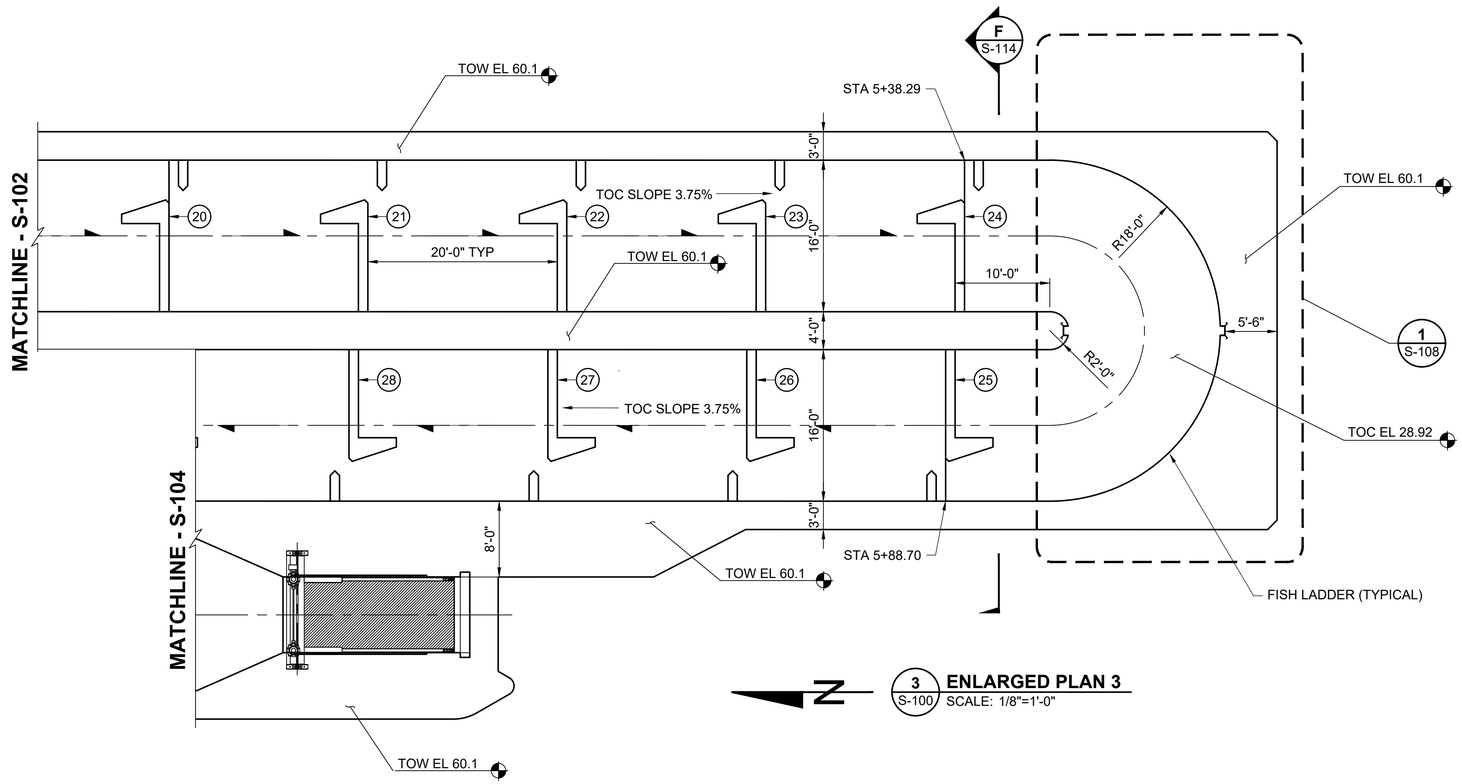
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

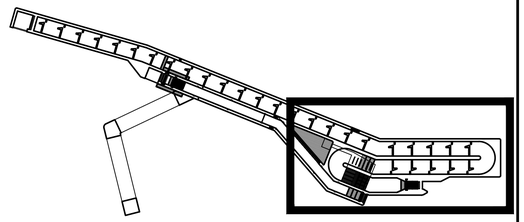
FISH LADDER PLAN AND PROFILE 2

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	31 OF 94
DRAWING:	S-102

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\SIS-102.dwg USER: MKA00889
DATE: Feb 03, 2021 10:01am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP IMAGES:



3 S-100 **ENLARGED PLAN 3**
SCALE: 1/8"=1'-0"

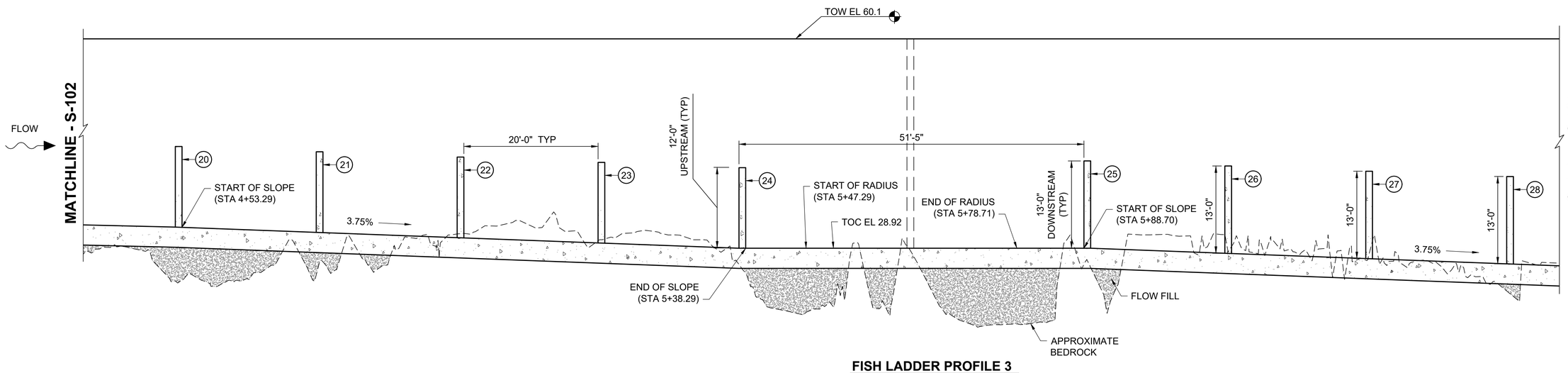


KEY MAP
SCALE: NTS

FLOW
KENNEBEC RIVER

NOTES:

1. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
2. MINIMUM SLAB THICKNESS IS 3 FEET.
3. MAXIMUM CONCRETE CONSTRUCTION JOINT SPACING SHALL BE 30'-0".
4. MINIMUM TIME BETWEEN ADJACENT CONCRETE POURS SHALL BE 5 DAYS.
5. SEE DRAWINGS S-201, S-202, AND S-203 FOR PLATFORMS , WALKWAYS, AND RAILING.



FISH LADDER PROFILE 3
SCALE: 1/8"=1'-0"

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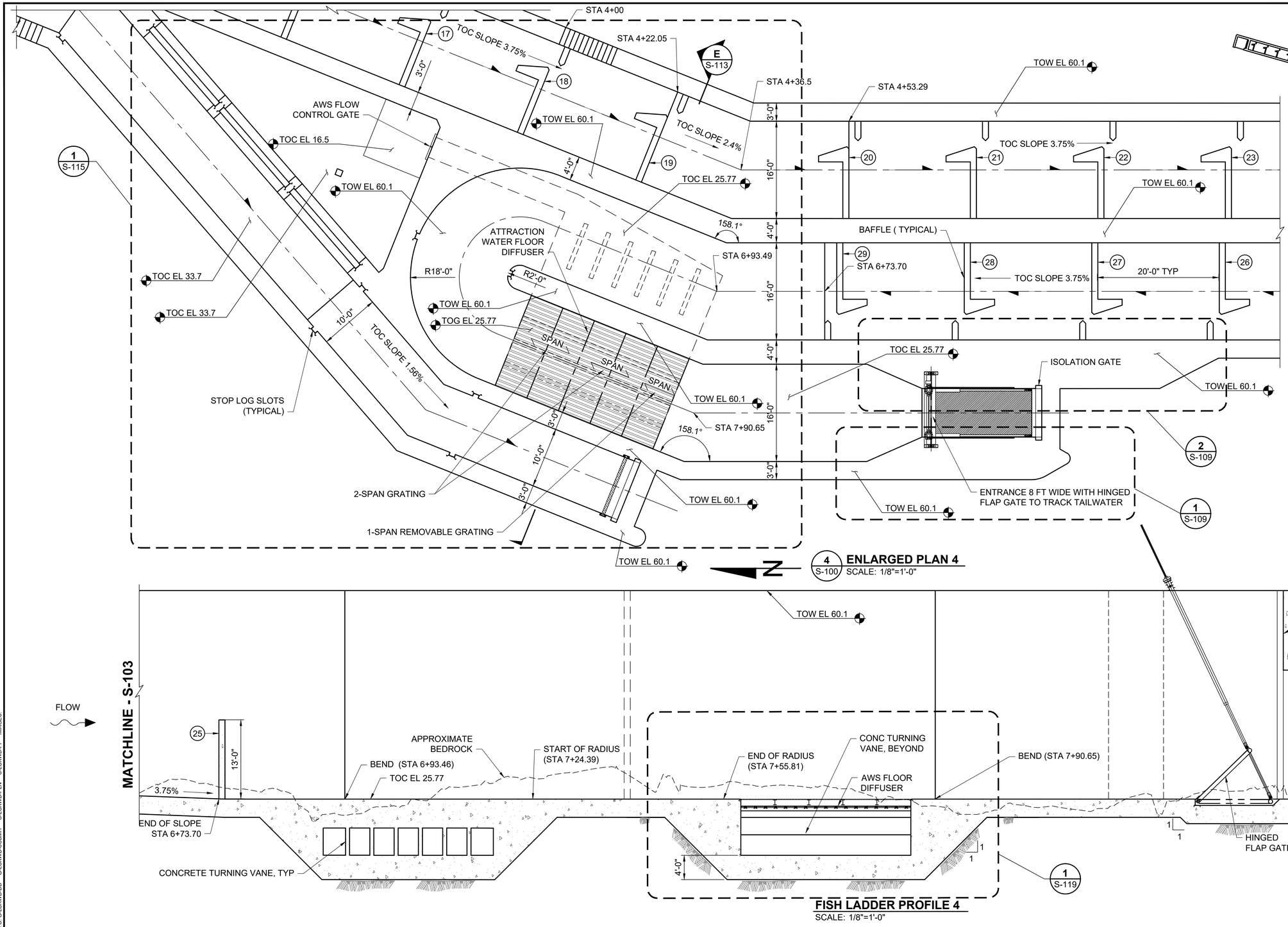
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE 3

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	32 OF 94
DRAWING:	S-103

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\S103.dwg USER: MKA00889
DATE: Feb 03, 2021 10:01am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP IMAGES:



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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE 4

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	33 OF 94
DRAWING:	S-104

DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\S-104.dwg USER: MKA00889
DATE: Feb 03, 2021 10:42am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP IMAGES:

NOTES:

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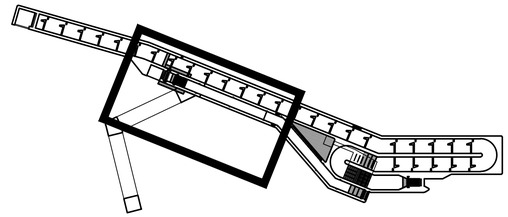
2. MINIMUM SLAB THICKNESS IS 3 FEET.
3. MAXIMUM CONCRETE CONSTRUCTION JOINT SPACING SHALL BE 30'-0".
4. MINIMUM TIME BETWEEN ADJACENT CONCRETE POURS SHALL BE 5 DAYS.
5. SEE DRAWINGS S-201, S-202, AND S-203 FOR PLATFORMS , WALKWAYS, AND RAILING.



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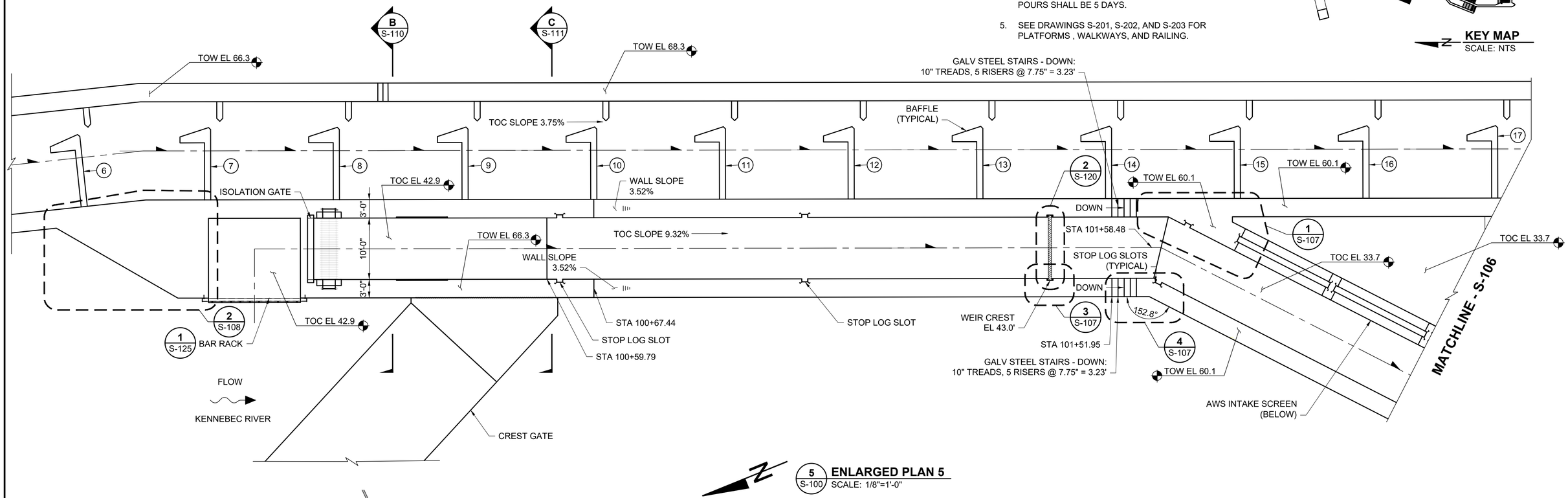
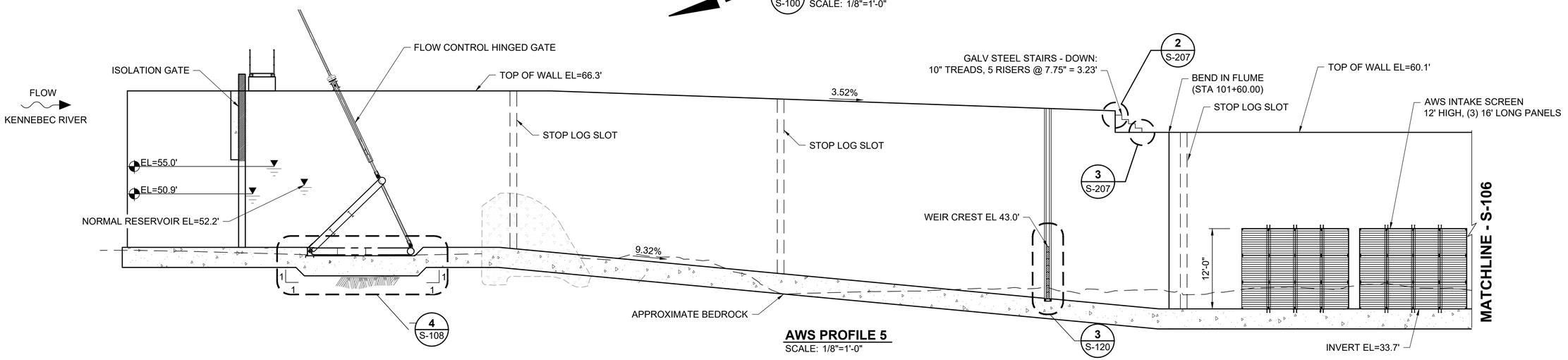
KEY MAP
SCALE: NTS



5 S-100 **ENLARGED PLAN 5**
SCALE: 1/8"=1'-0"



AWS PROFILE 5
SCALE: 1/8"=1'-0"

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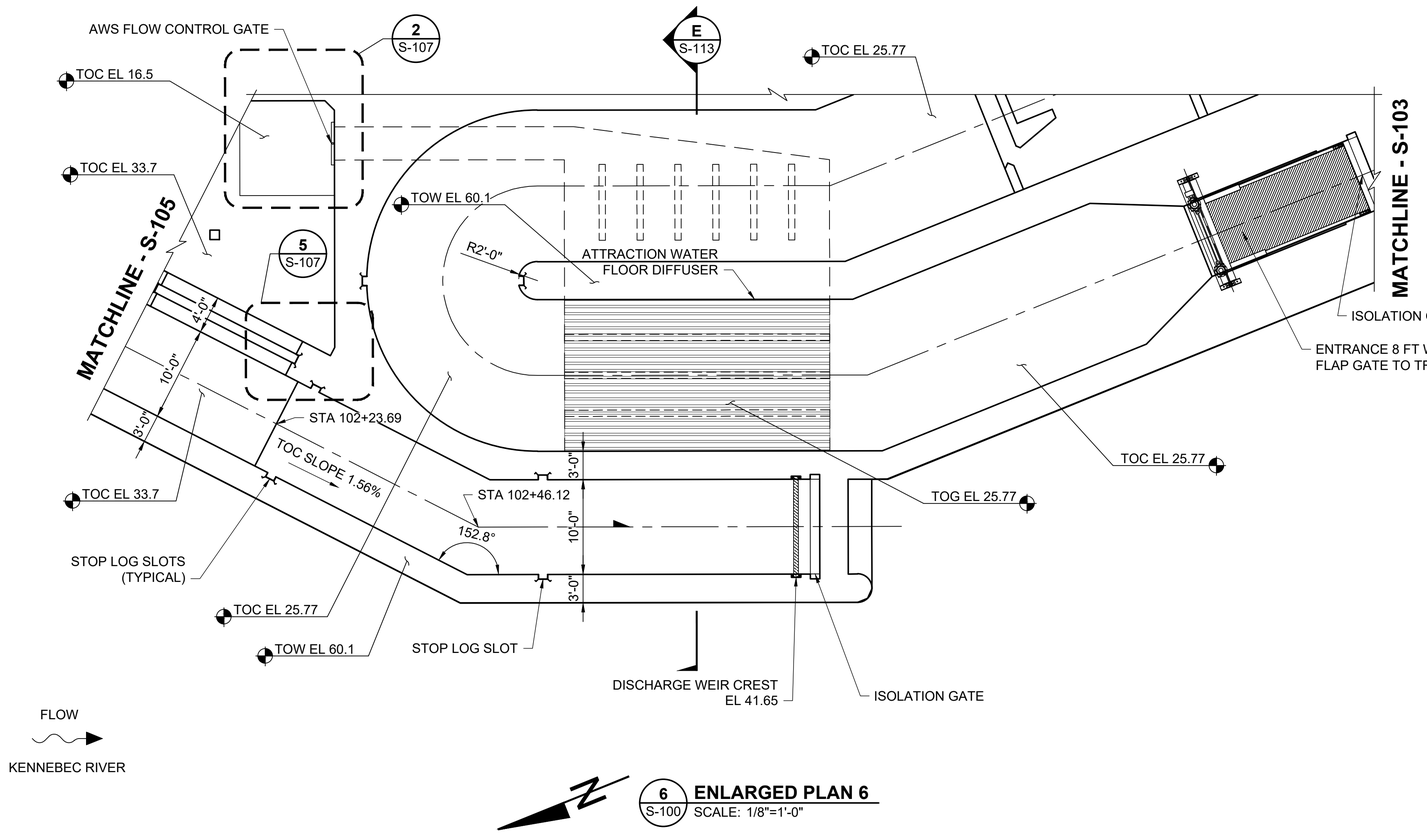
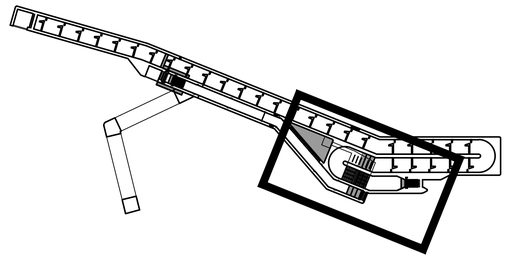
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS CHANNEL PLAN AND PROFILE 5

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	34 OF 94
DRAWING:	S-105

DWG: S:\131009\Hydro\Lockwood\000 CAD\03 SHEETS\S-105.dwg USER: MKA00989
DATE: Feb 03, 2021 10:20am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP IMAGES:



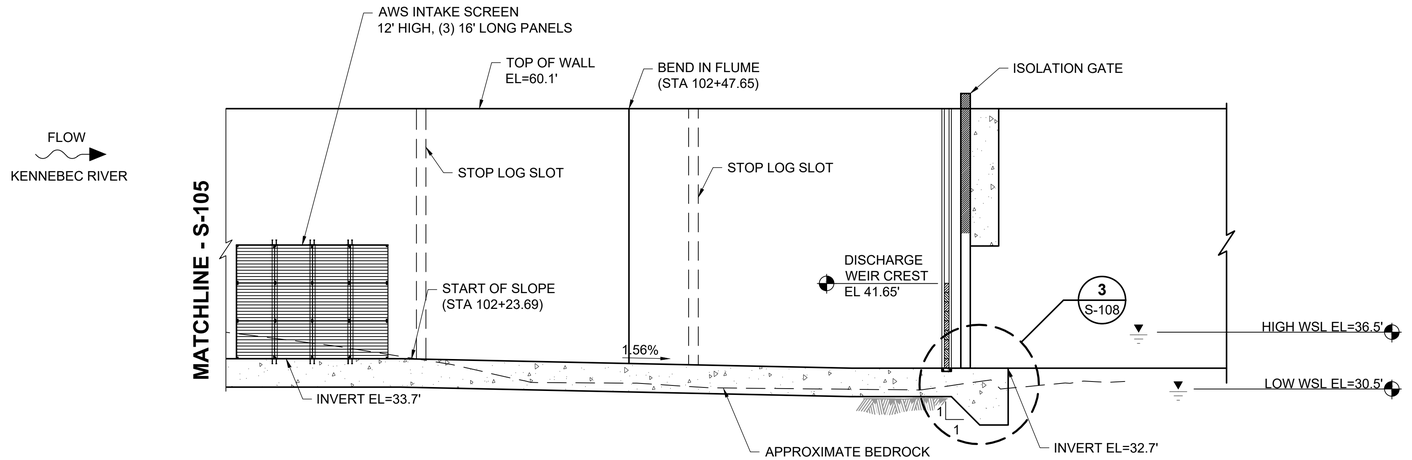


KEY MAP
SCALE: NTS

NOTES:

1. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
2. MINIMUM SLAB THICKNESS IS 3 FEET.
3. MAXIMUM CONCRETE CONSTRUCTION JOINT SPACING SHALL BE 30'-0".
4. MINIMUM TIME BETWEEN ADJACENT CONCRETE POURS SHALL BE 5 DAYS.
5. SEE DRAWINGS S-201, S-202, AND S-203 FOR PLATFORMS , WALKWAYS, AND RAILING.

6 S-100 **ENLARGED PLAN 6**
SCALE: 1/8"=1'-0"



AWS PROFILE 6
SCALE: 1/8"=1'-0"

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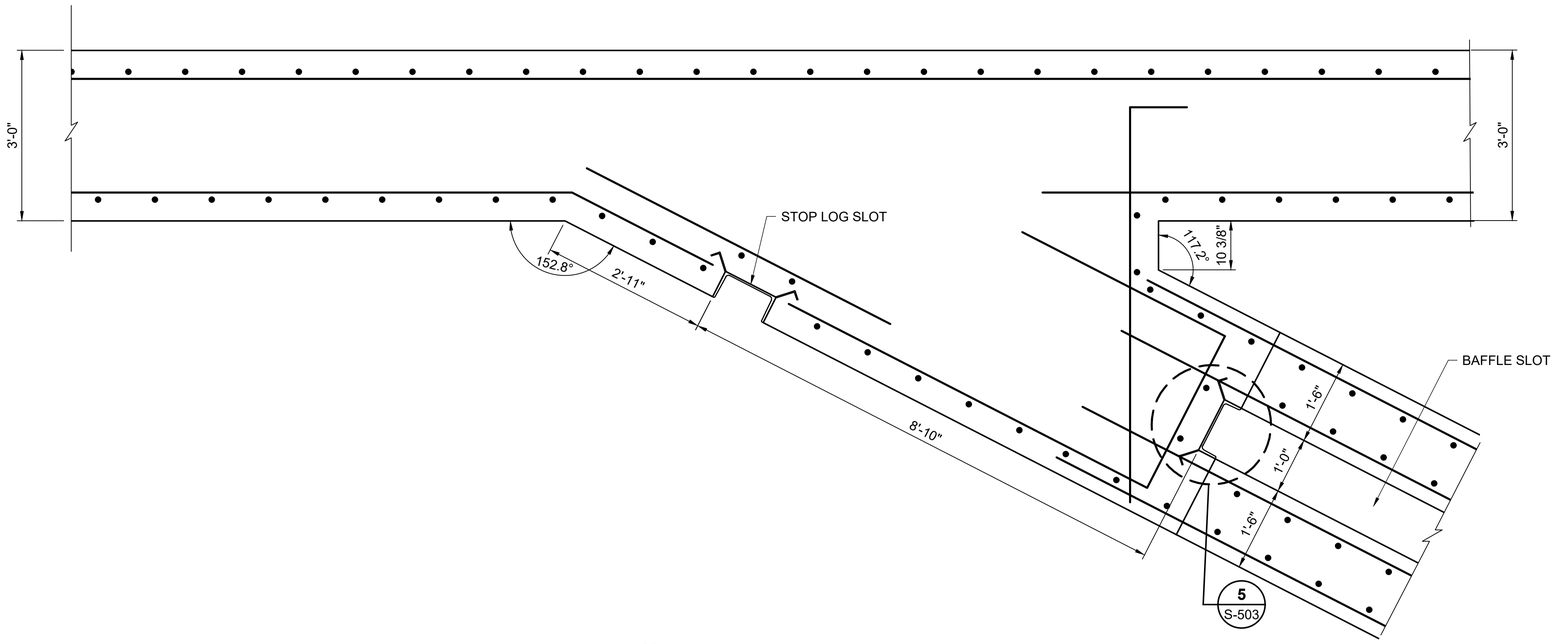
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

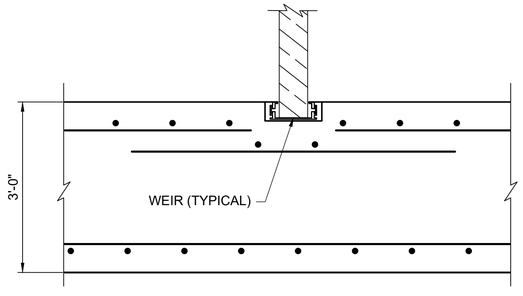
AWS CHANNEL PLAN AND PROFILE 6

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	35 OF 94
DRAWING:	S-106

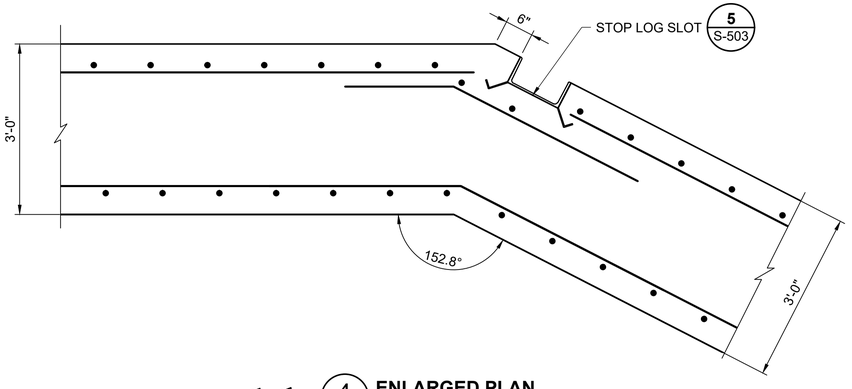
DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-SHEETS\S-106.dwg USER: MKA00889
DATE: Feb 03, 2021 10:22am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP IMAGES:



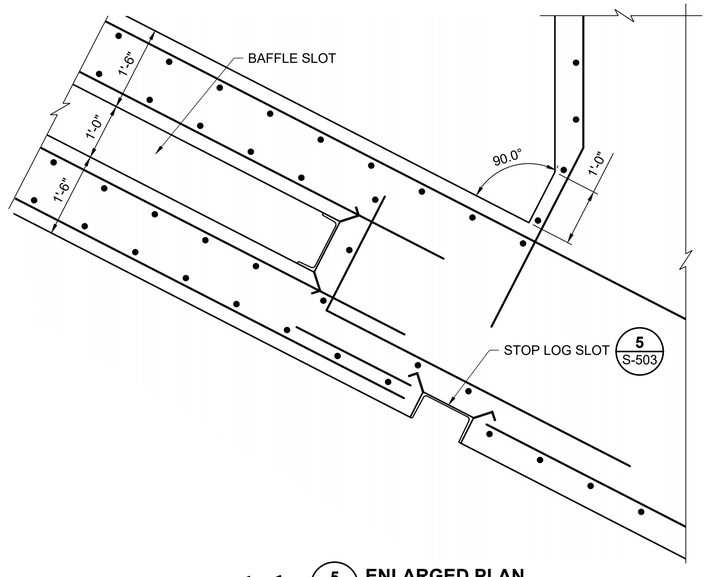
1 S-102 **ENLARGED PLAN**
SCALE: 3/4"=1'-0"



3 S-105 **ENLARGED PLAN**
SCALE: 3/4"=1'-0"



4 S-105 **ENLARGED PLAN**
SCALE: 3/4"=1'-0"



5 S-106 **ENLARGED PLAN**
SCALE: 3/4"=1'-0"

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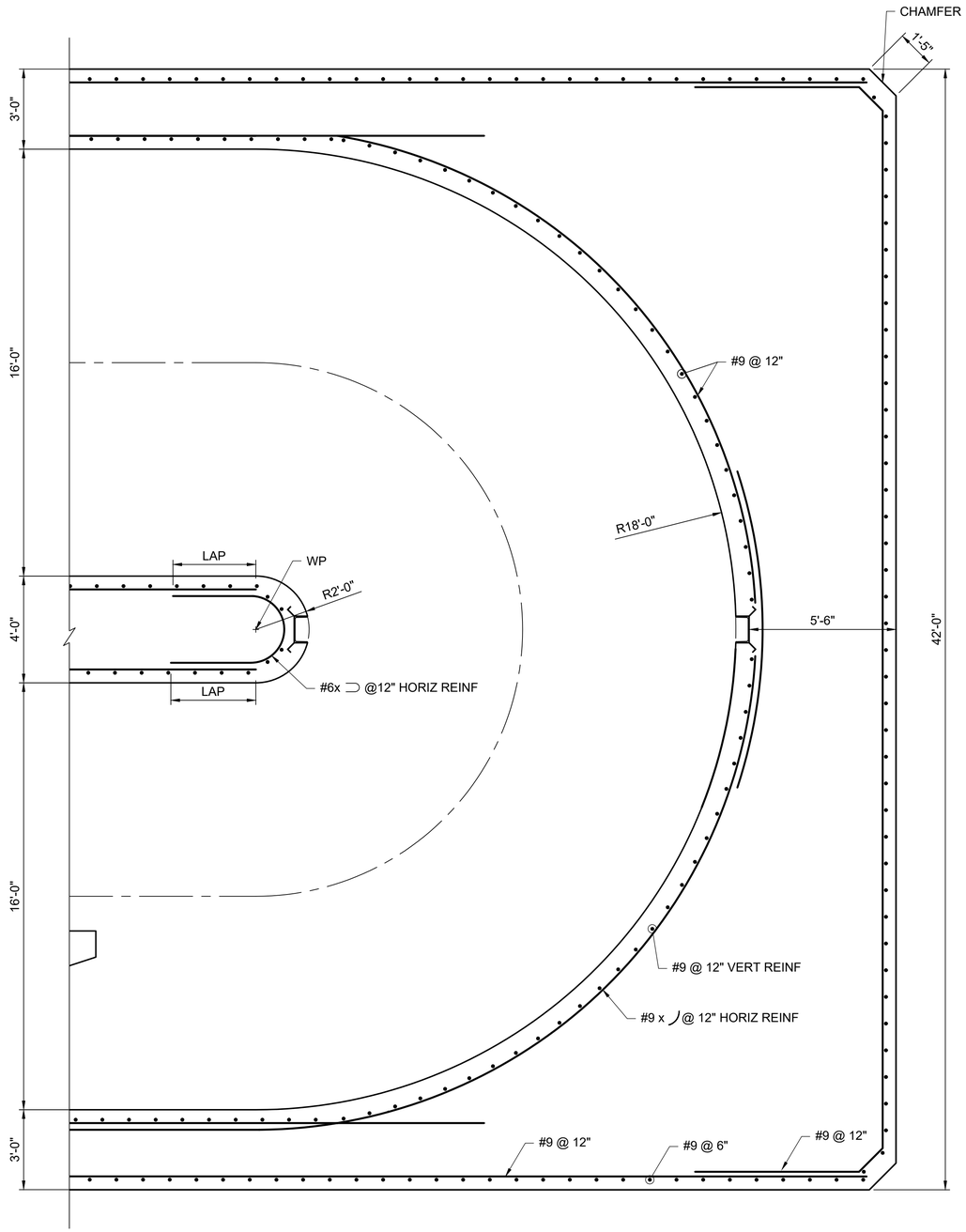
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER REINFORCEMENT PLANS

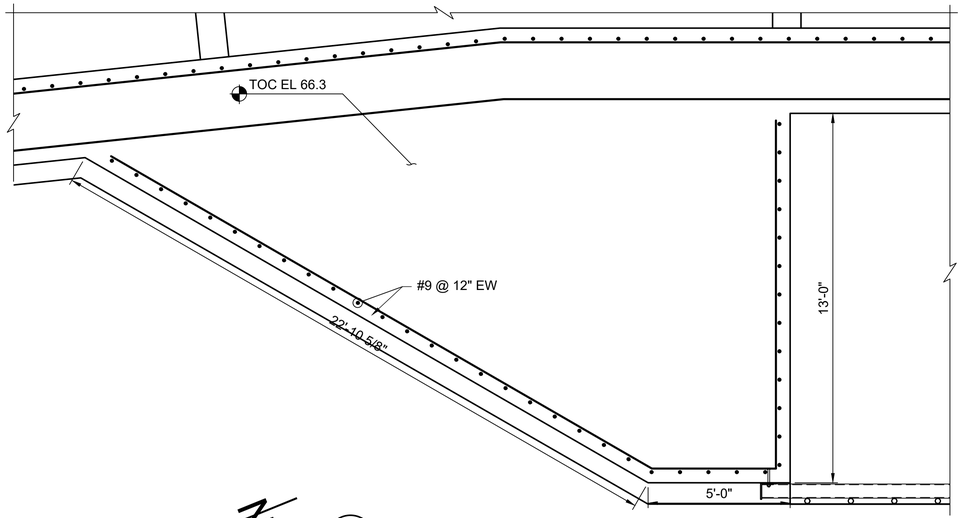
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	36 OF 94
DRAWING:	S-107

DWG: S:\13100\Holden\Lockwood\000 CAD\02-SHEETS\SS-107.dwg USER: MKA00689
DATE: Feb 03, 2021 10:24am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN IMAGES:



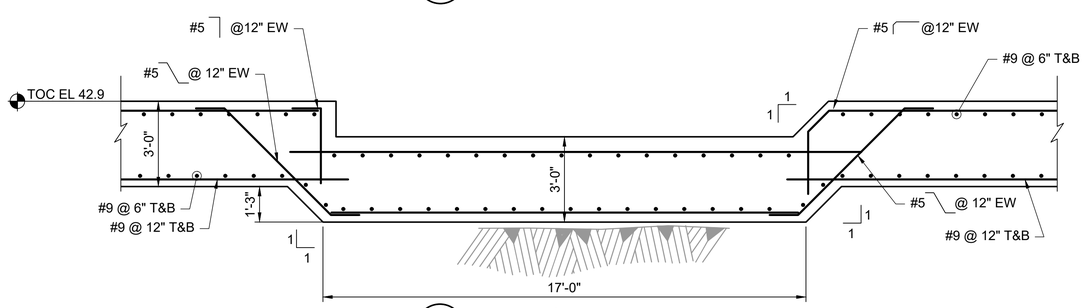
N

1 ENLARGED PLAN
S-103 SCALE: 3/8"=1'-0"

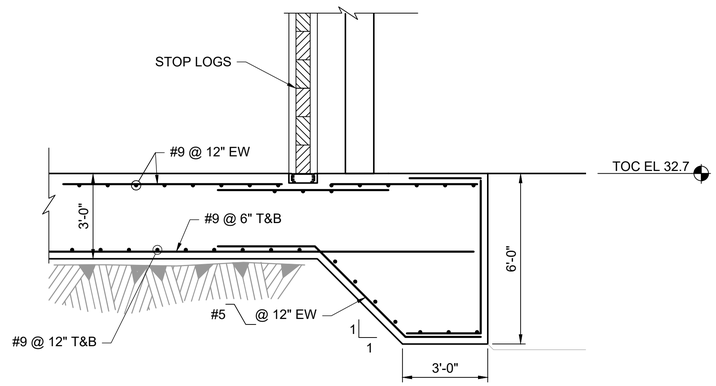


N

2 ENLARGED PLAN
S-105 SCALE: 3/8"=1'-0"



4 ELEVATION VIEW
S-105 SCALE: 3/8"=1'-0"



3 ELEVATION VIEW
S-106 SCALE: 3/8"=1'-0"

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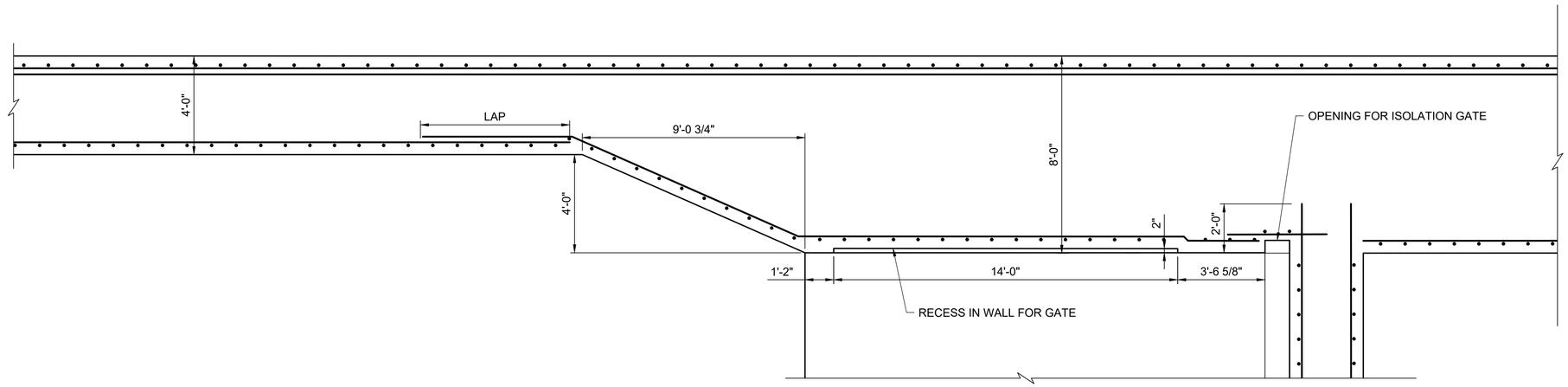
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER REINFORCEMENT PLAN AND SECTIONS

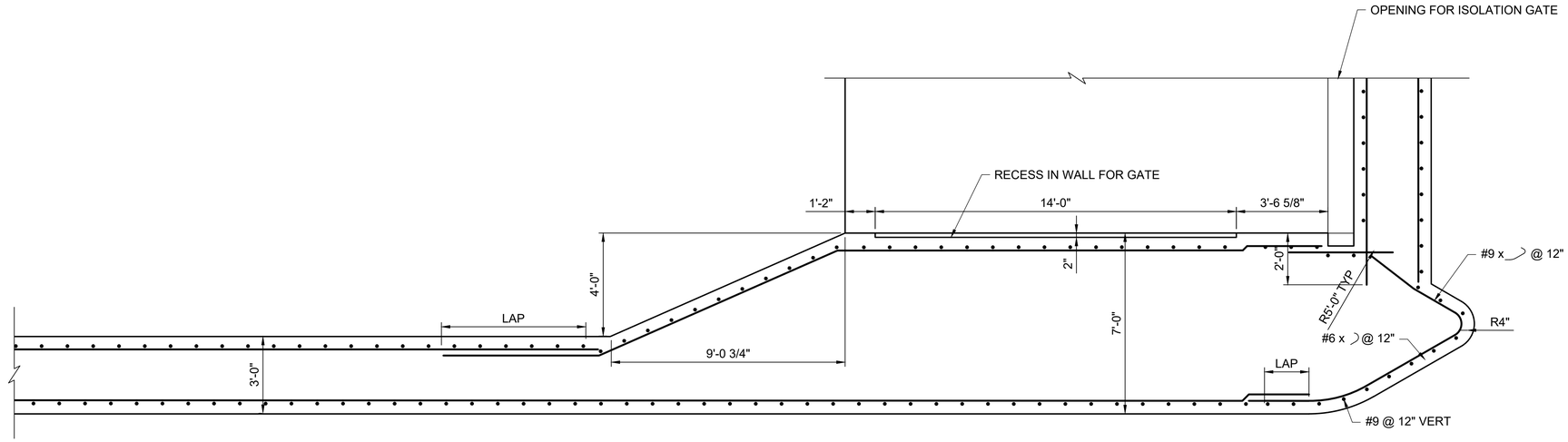
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	37 OF 94
DRAWING:	S-108

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\S\S-108.dwg USER: MKA00889
DATE: Feb 03, 2021 10:02am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP IMAGES:



N

1 ENLARGED PLAN
S-104 SCALE: 3/8"=1'-0"



N

2 ENLARGED PLAN
S-104 SCALE: 3/8"=1'-0"

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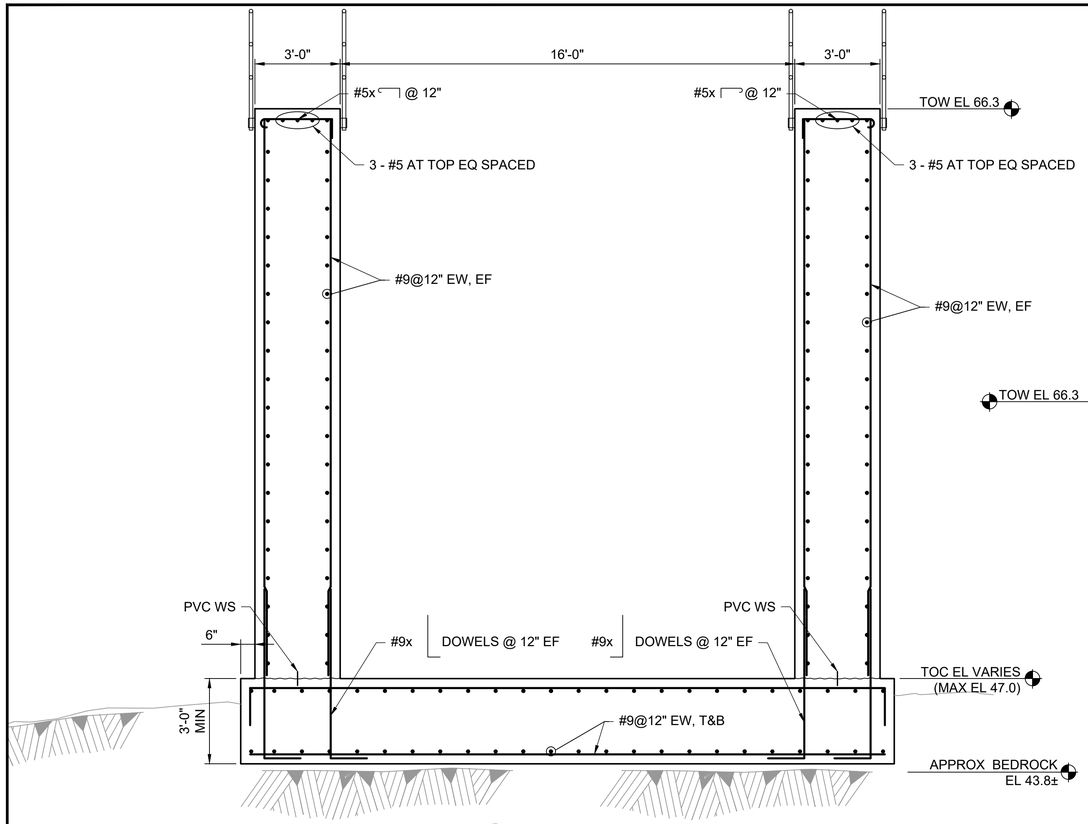
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER REINFORCEMENT PLANS

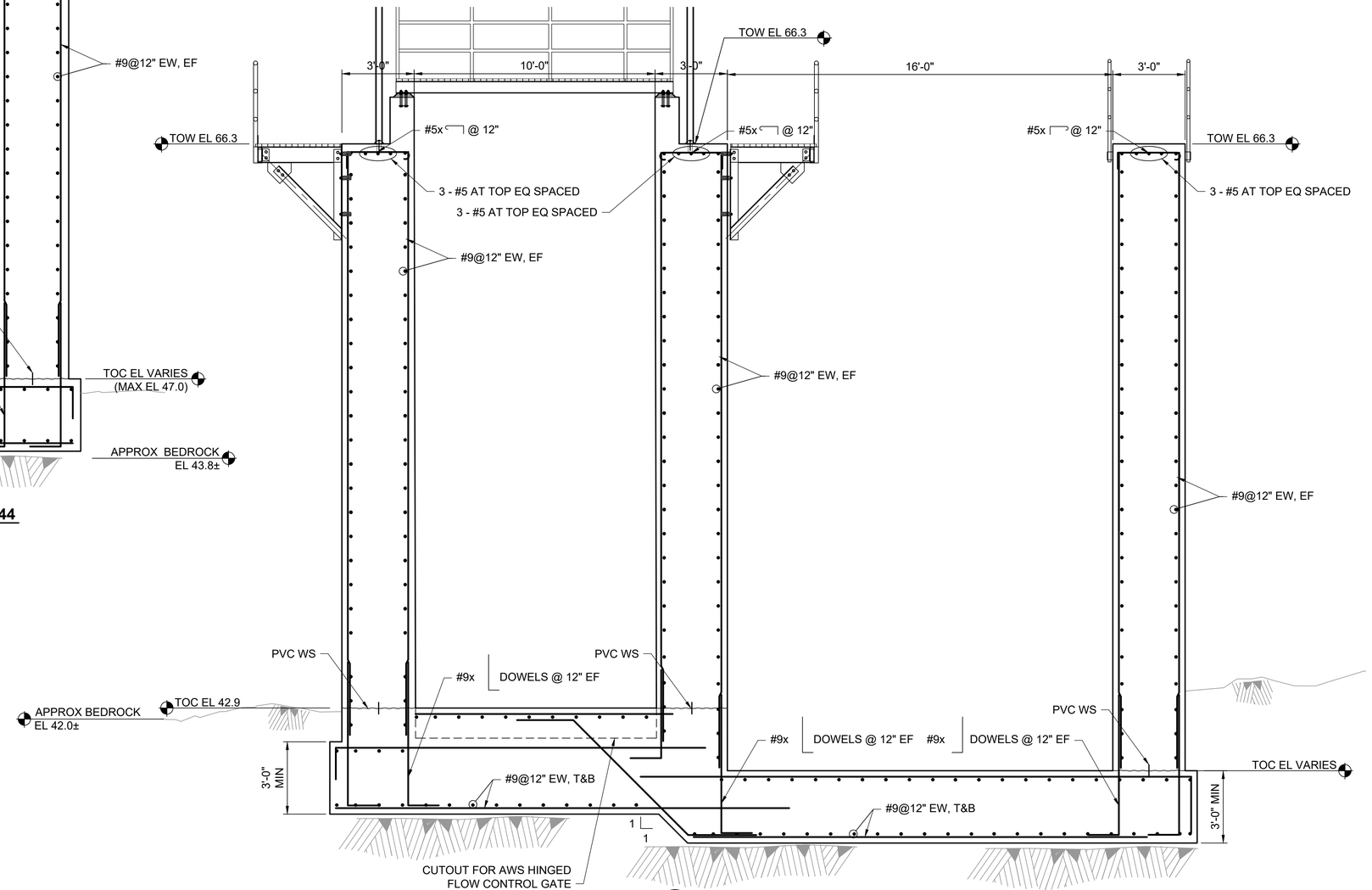
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	38 OF 94
DRAWING:	S-109

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\SS-109.dwg USER: MKA0089
DATE: Feb 03, 2021 10:03am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN IMAGES:

NOTES:
1. CONCRETE BASE SLAB MUST HAVE MINIMUM THICKNESS OF 3'-0".



A S-101 **SECTION STA 0+00 TO STA 1+44**
SCALE: 3/8"=1'-0"
S-100



B S-101 **SECTION STA 1+70 TO STA 2+00**
SCALE: 3/8"=1'-0"
S-100
S-105

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

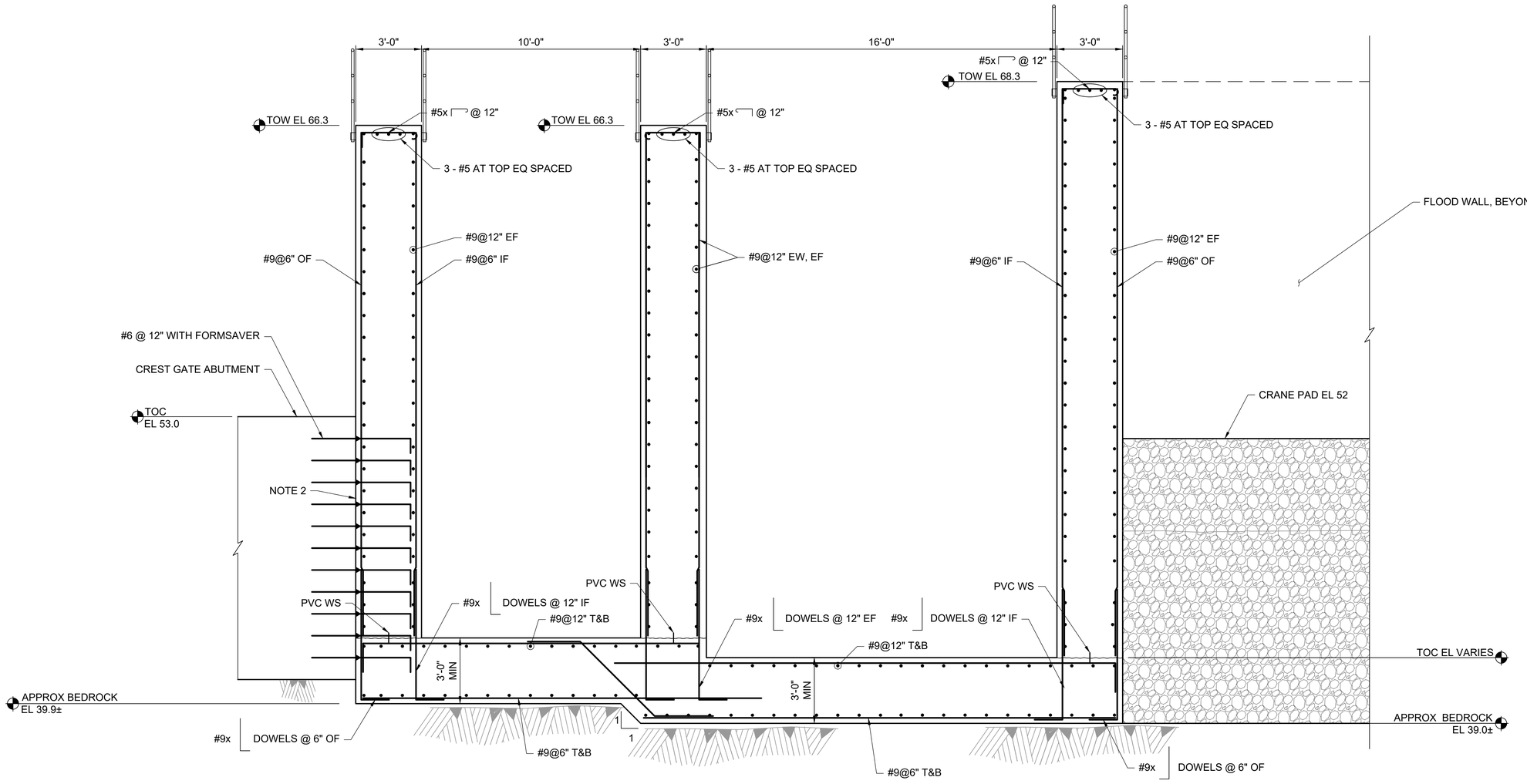
FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	39 OF 94
DRAWING:	S-110

DWG: S:\13100\99\HydroLockwood\000 CAD\02-sheets\SIS-110.dwg USER: MKA00889
DATE: Feb 03, 2021 10:03am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:

NOTES:

1. CONCRETE BASE SLAB MUST HAVE MINIMUM THICKNESS OF 3'-0".
2. MECHANICALLY ROUGHEN EXISTING CONCRETE SURFACE TO 1/4" AMPLITUDE.



C S-101 **SECTION**
SCALE: 3/8"=1'-0"

S-100
S-105

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S-111.dwg USER: MKA00589
DATE: Feb 03, 2021 10:03am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:

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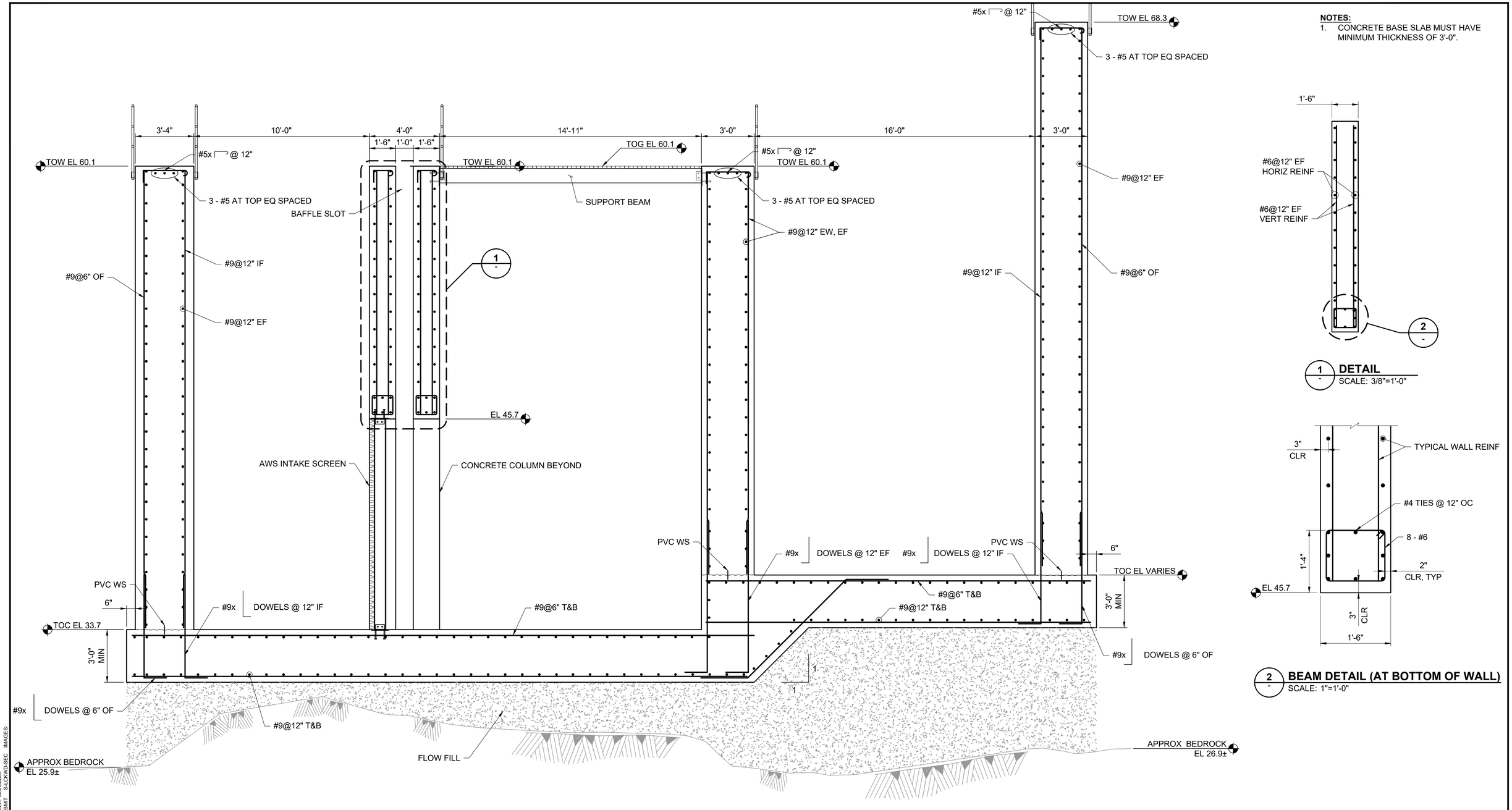
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	40 OF 94
DRAWING:	S-111

NOTES:
1. CONCRETE BASE SLAB MUST HAVE MINIMUM THICKNESS OF 3'-0".



D / S-102 **SECTION**
SCALE: 3/8"=1'-0"

S-100
S-202

1 / - **DETAIL**
SCALE: 3/8"=1'-0"

2 / - **BEAM DETAIL (AT BOTTOM OF WALL)**
SCALE: 1"=1'-0"

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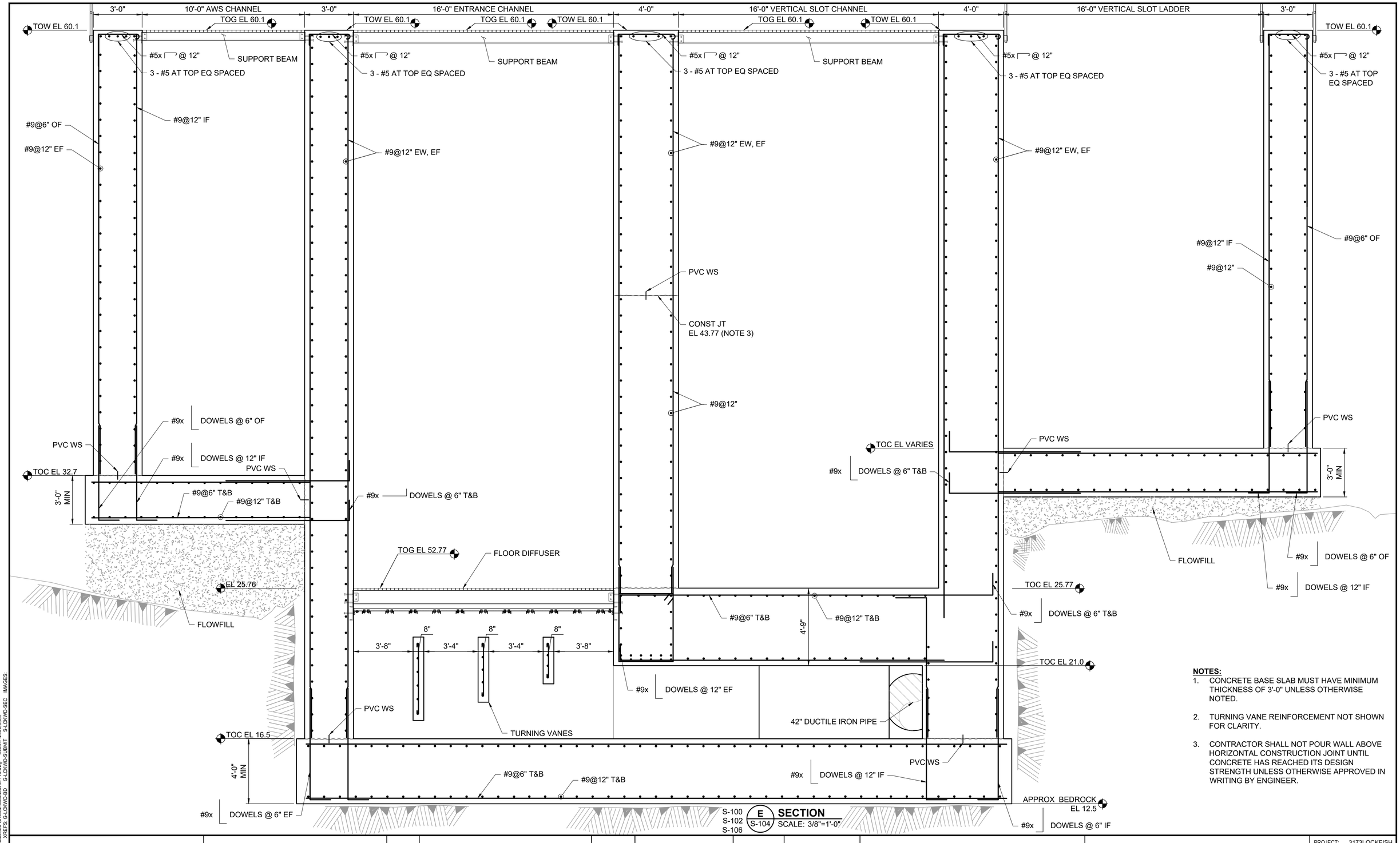
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	41 OF 94
DRAWING:	S-112

DWG: S:\131009\Hdr\dwt\Lockwood\900 CAD\02-sheets\S\S-112.dwg USER: MKA00889
DATE: Feb 03, 2021 10:04am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



S-100
S-102
S-106
E
S-104
SECTION
SCALE: 3/8"=1'-0"

NOTES:

1. CONCRETE BASE SLAB MUST HAVE MINIMUM THICKNESS OF 3'-0" UNLESS OTHERWISE NOTED.
2. TURNING VANE REINFORCEMENT NOT SHOWN FOR CLARITY.
3. CONTRACTOR SHALL NOT POUR WALL ABOVE HORIZONTAL CONSTRUCTION JOINT UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER.

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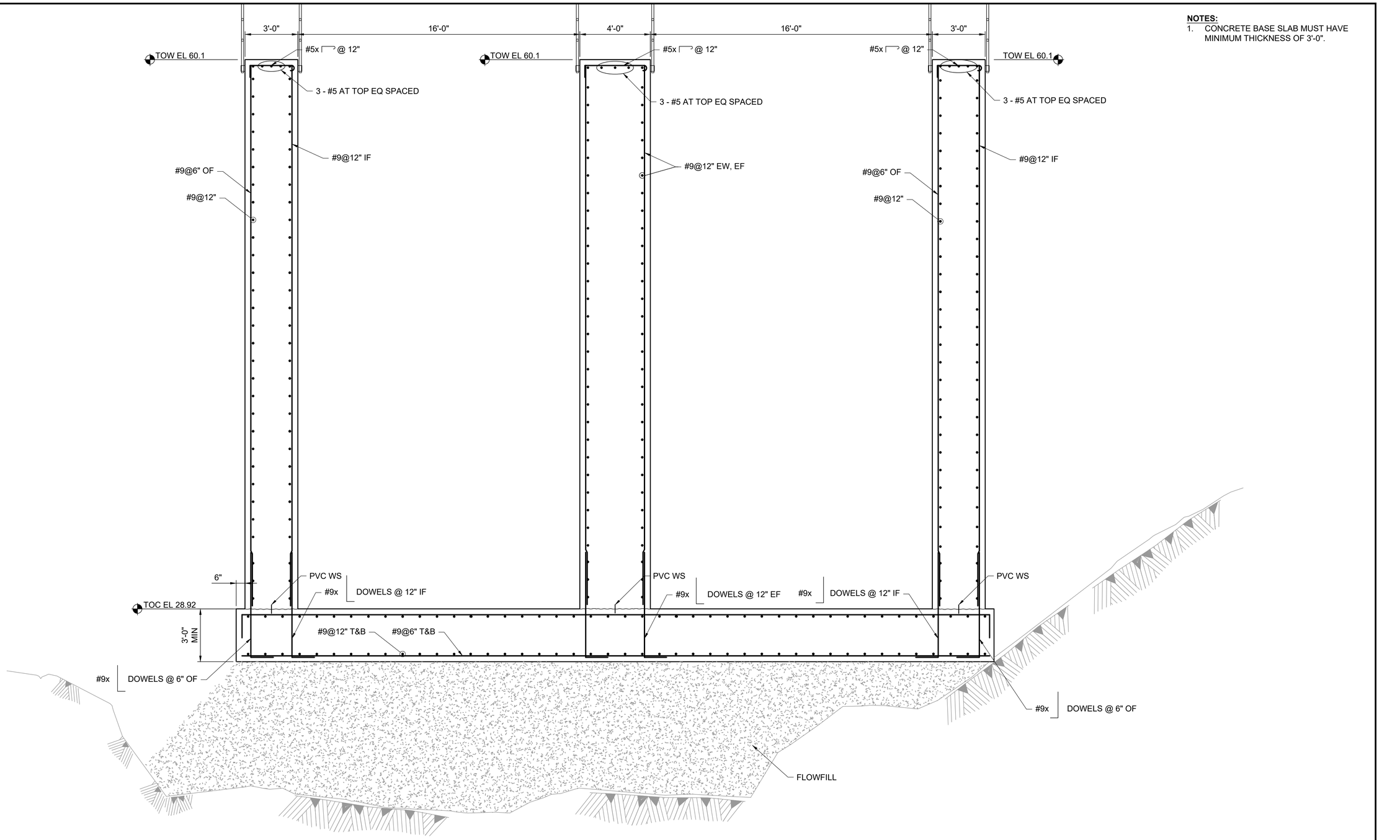
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	42 OF 94
DRAWING:	S-113

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\S1S-113.dwg USER: MKA00889
DATE: Feb 03, 2021 10:04am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



F
S-103

SECTION
SCALE: 3/8"=1'-0"

S-100

NOTES:
1. CONCRETE BASE SLAB MUST HAVE MINIMUM THICKNESS OF 3'-0".

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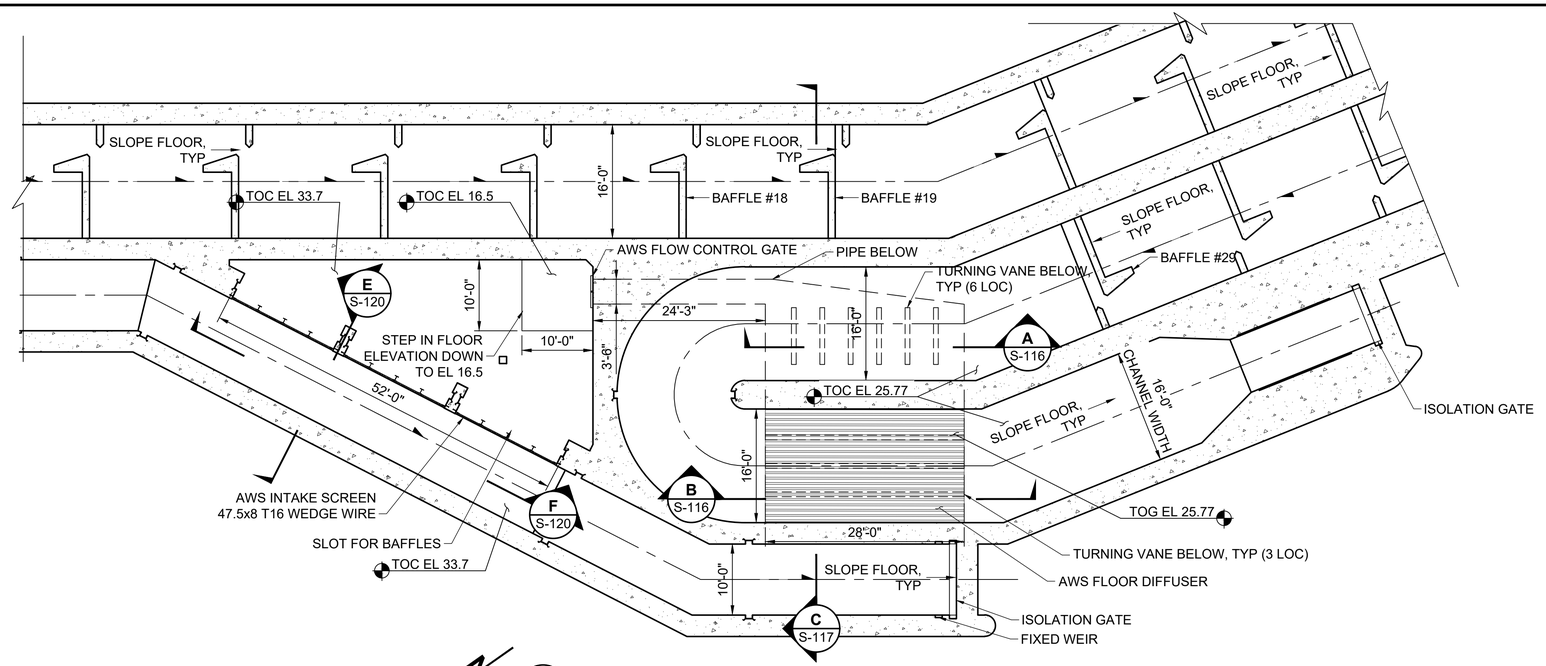
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

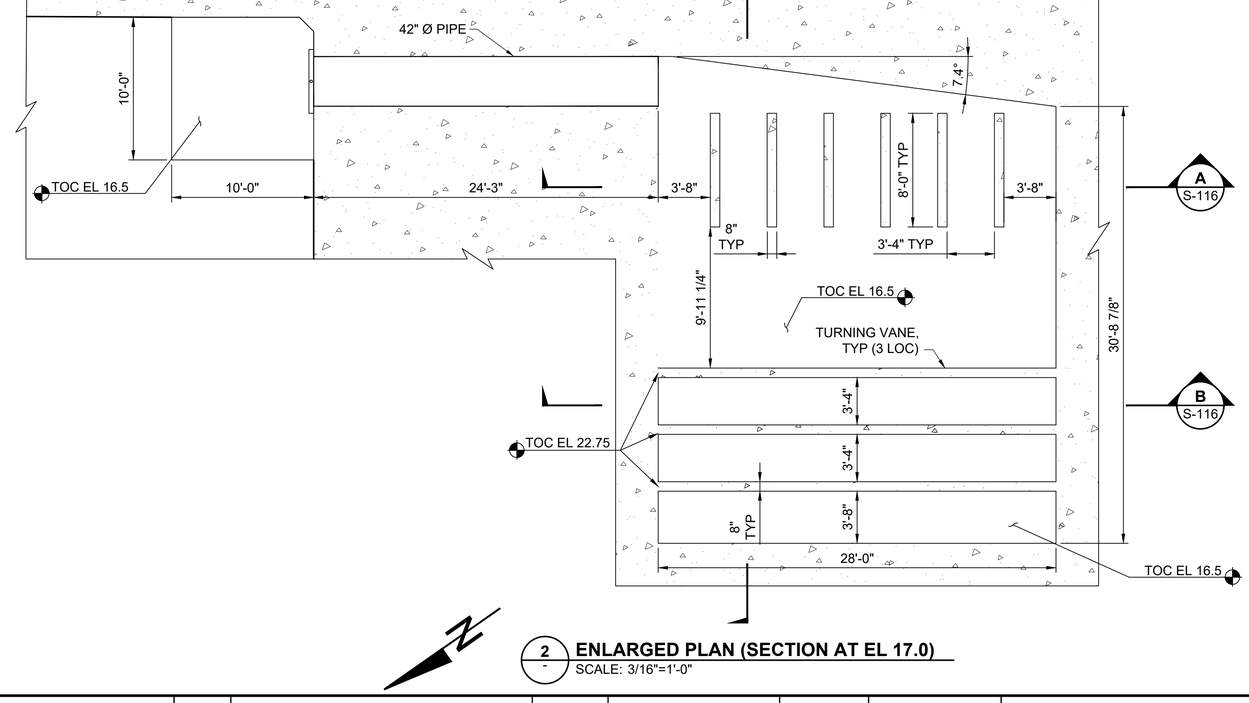
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	43 OF 94
DRAWING:	S-114

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\SS-114.dwg USER: MKA00889
DATE: Feb 03, 2021 10:04am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



1 - ENLARGED PLAN (SECTION AT EL 34.0)

SCALE: 3/32"=1'-0"



2 - ENLARGED PLAN (SECTION AT EL 17.0)

SCALE: 3/16"=1'-0"

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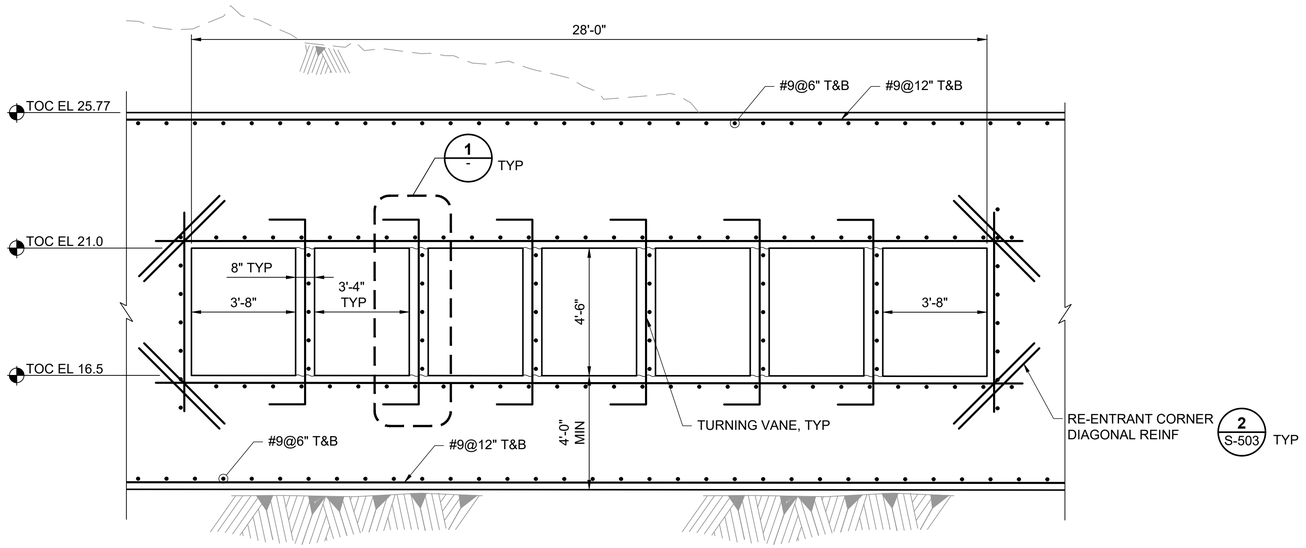
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

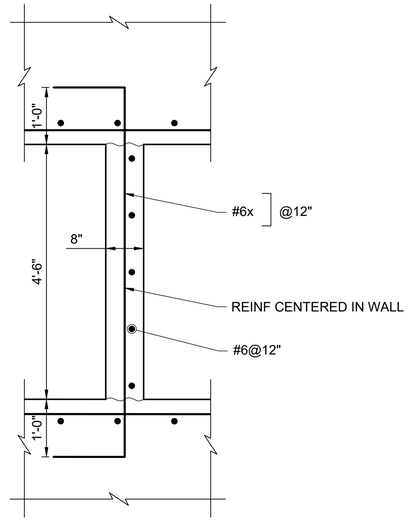
ATTRACTION WATER CHANNEL PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	44 OF 94
DRAWING:	S-115

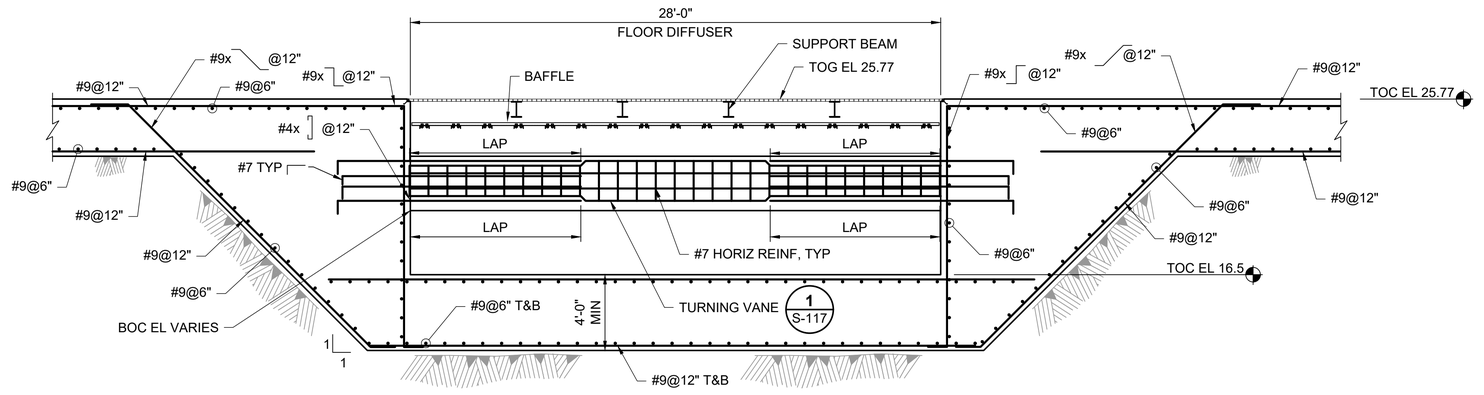
DWG: S:\131\09\Hydro\Lockwood\900 CAD\02-SHEETS\SIS-115.dwg USER: MKA00889
DATE: Feb 03, 2021 11:19am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



A S-115 AWS CONVEYANCE SECTION
SCALE: 3/8"=1'-0"



1 - DETAIL
SCALE: 3/4"=1'-0"



B S-115 VERTICAL SLOT ENTRANCE SECTION
SCALE: 1/4"=1'-0"

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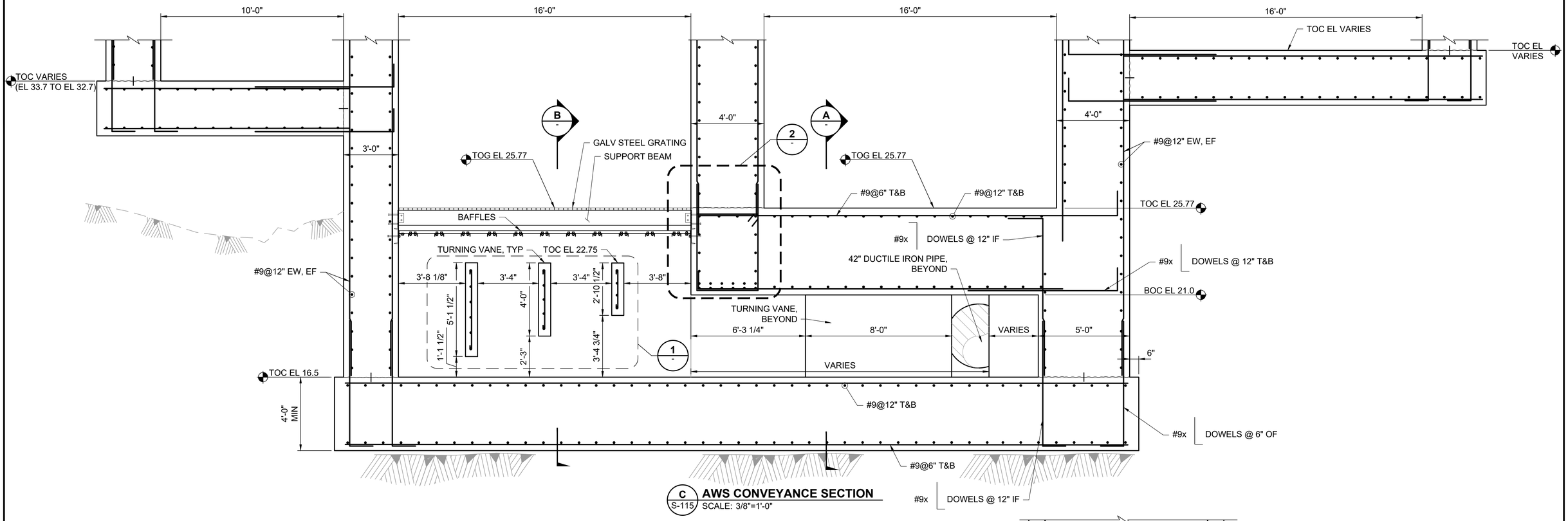
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

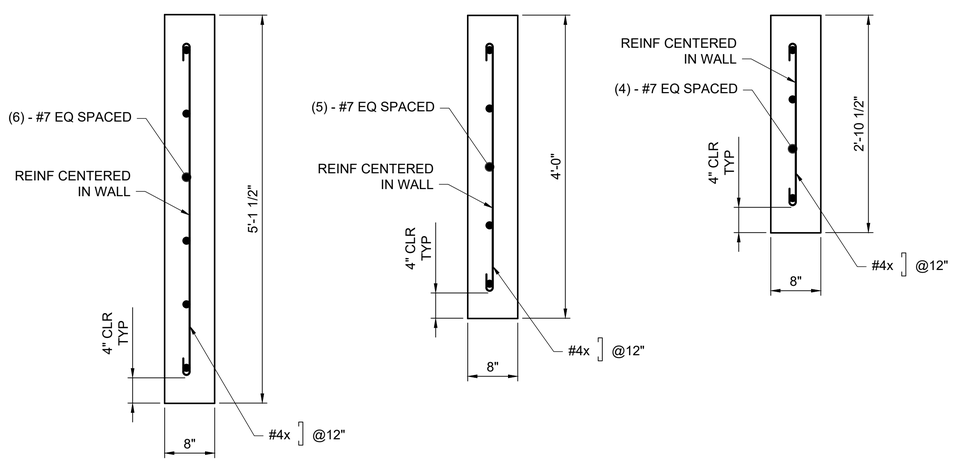
FLOOR DIFFUSER SECTIONS AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	45 OF 94
DRAWING:	S-116

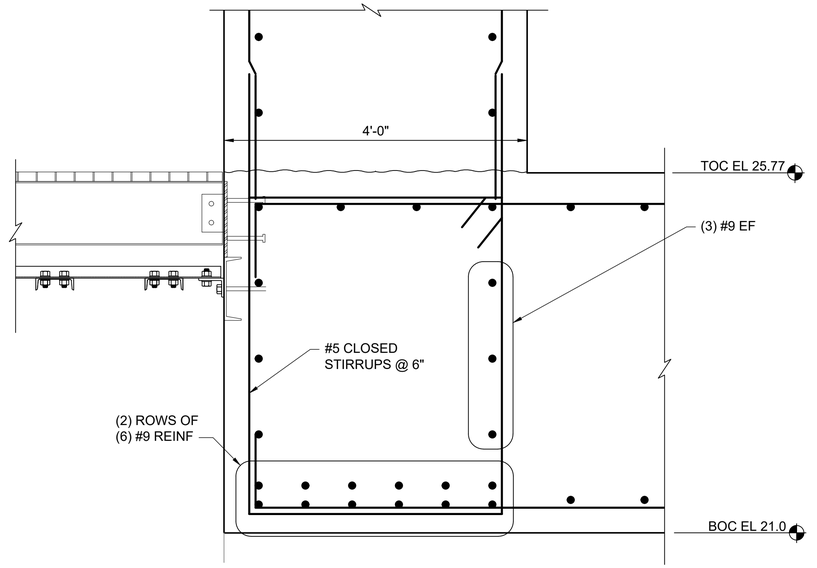
DWG: S:\131009\Hdsm\Lockwood\900 CAD\02-sheets\S\S-116.dwg USER: MKA00889
DATE: Feb 03, 2021 10:05am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-PP IMAGES:



C S-115 **AWS CONVEYANCE SECTION**
SCALE: 3/8"=1'-0"



1 S-116 **DETAIL**
SCALE: 1"=1'-0"
S-117



2 - **DETAIL**
SCALE: 1"=1'-0"

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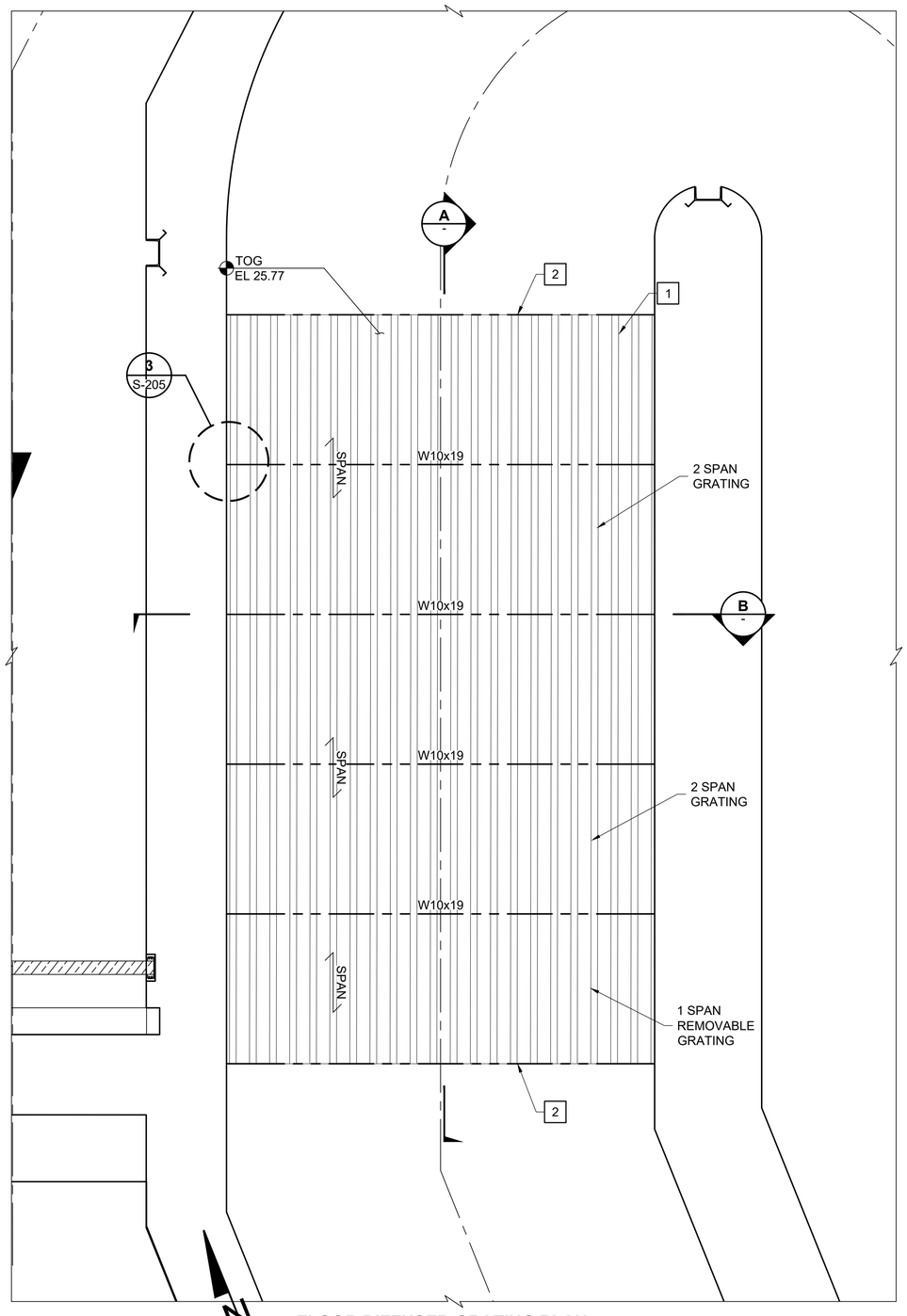
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FLOOR DIFFUSER SECTION AND DETAILS

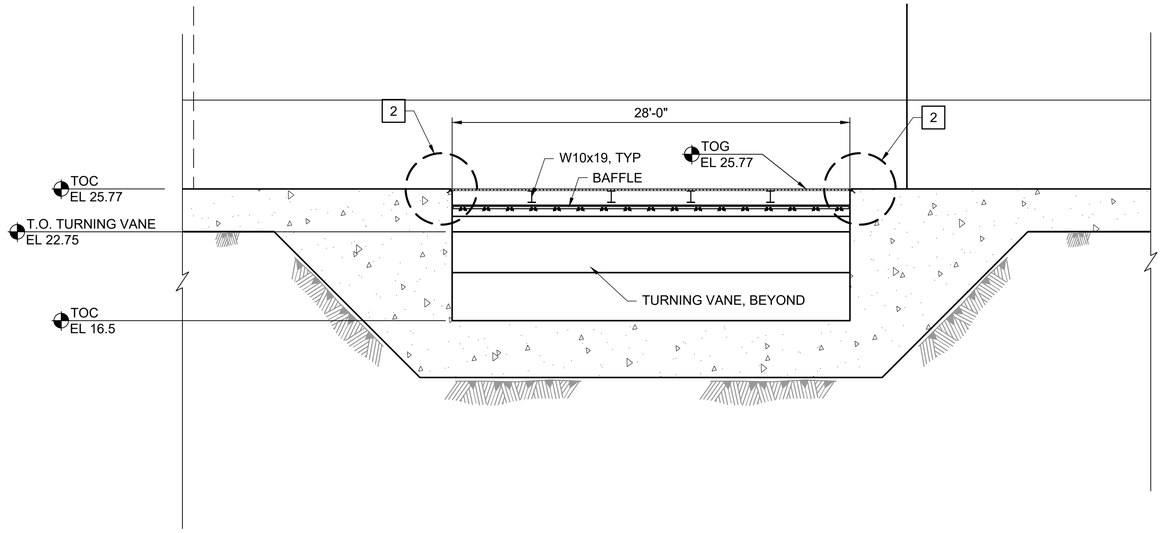
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	46 OF 94
DRAWING:	S-117



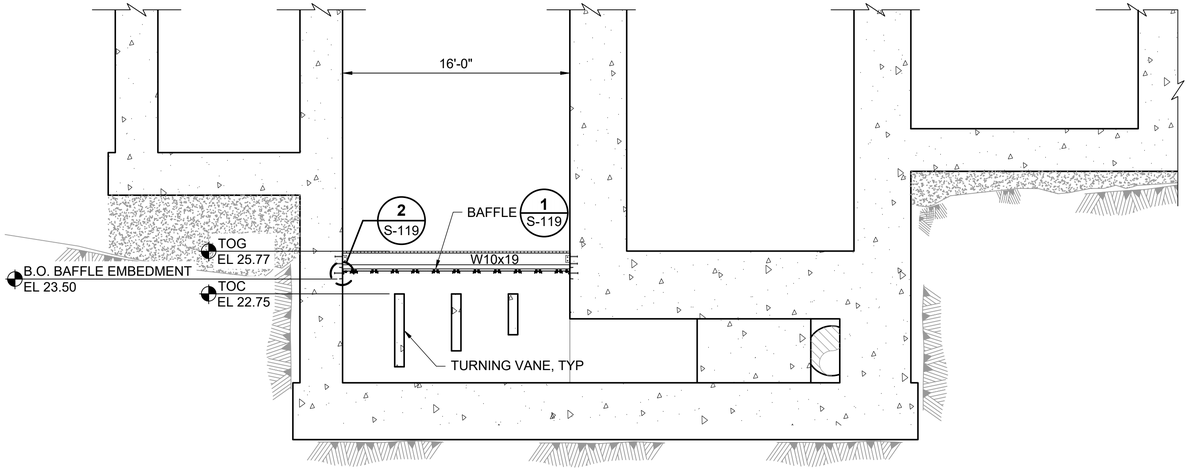
FLOOR DIFFUSER GRATING PLAN
SCALE: 1/2"=1'-0"

KEYED NOTES:

1. GALVANIZED STEEL GRATING, 1 $\frac{1}{2}$" x 3/16" BEARING BARS @ 1 $\frac{3}{16}$" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.
2. GRATING SUPPORT TYPE 1 (1 / S-505)



A SECTION S-118
SCALE: 3/16"=1'-0"



B SECTION S-118
SCALE: 3/16"=1'-0"

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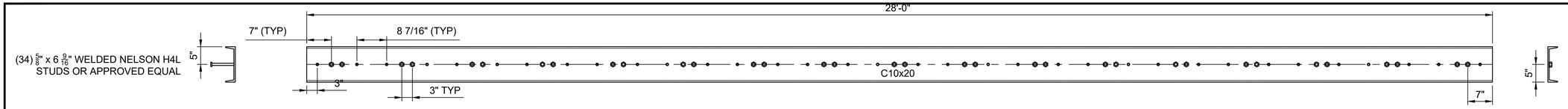
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FLOOR DIFFUSER GRATING AND SECTIONS

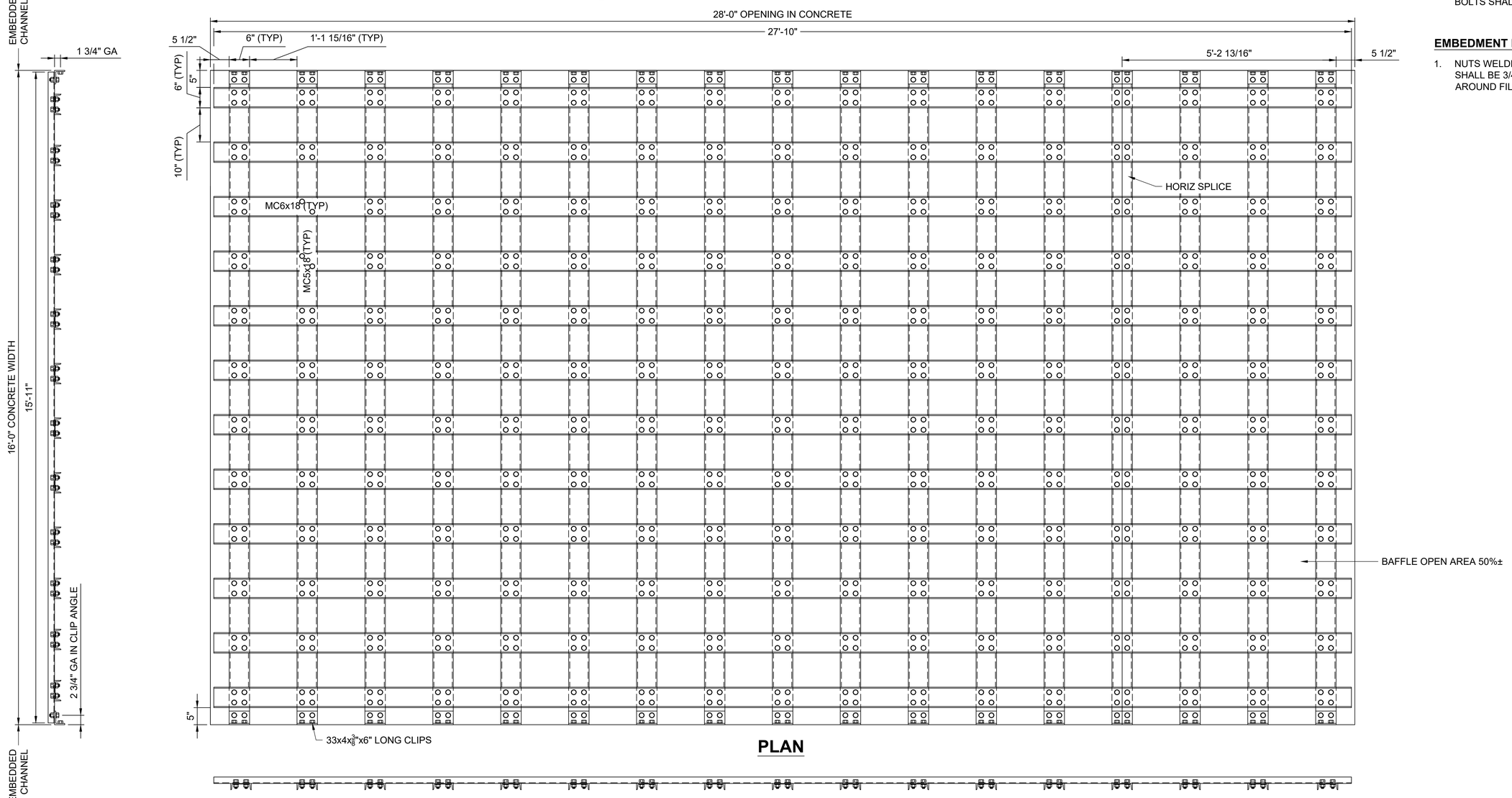
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	47 OF 94
DRAWING:	S-118

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S-118.dwg USER: MKA00589
DATE: Feb 03, 2021 10:05am XREFS: G-LCKWD-BD G-LCKWD-SHMT S-LCKWD-PIP S-LCKWD-PLN S-LCKWD-SEC IMAGES:



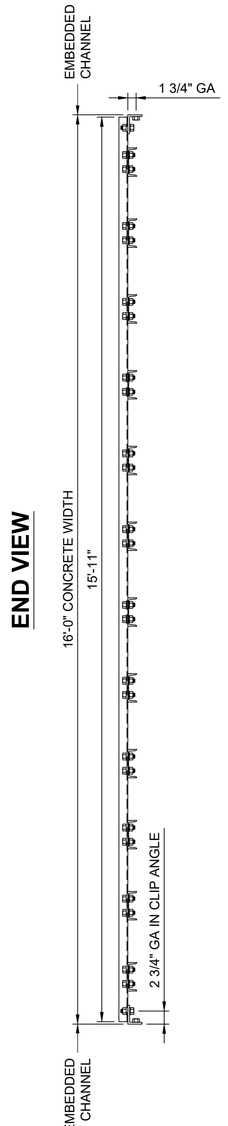
2 EMBEDMENT (2 LOCS, ONE AS SHOWN - ONE OPP HAND)

S-118 SCALE: 3/4"=1'-0"



PLAN

ELEVATION



END VIEW

1 FLOOR DIFFUSER BAFFLE DETAIL

S-118 SCALE: 3/4"=1'-0"

NOTE:

1. BAFFLES, CONNECTIONS, EMBEDS, AND BOLTS SHALL BE GALVANIZED STEEL.

EMBEDMENT NOTE:

1. NUTS WELDED TO STRUCTURAL MEMBERS SHALL BE 3/4" DIAMETER, 10 TPI (UNO)-ALL AROUND FILLET WELD.

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REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

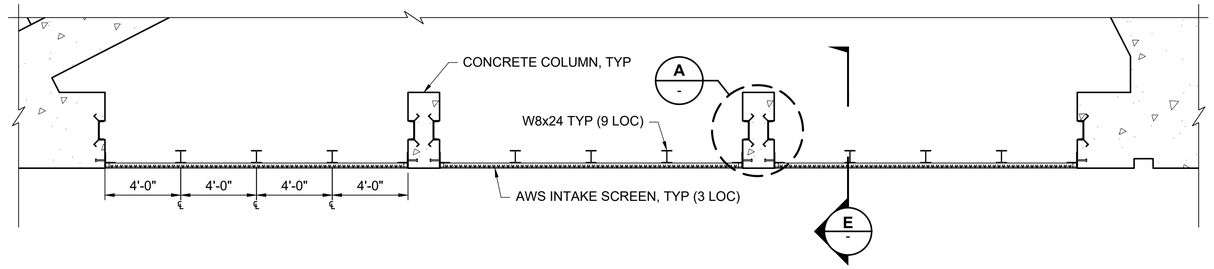
FLOOR DIFFUSER BAFFLE AND EMBEDMENT

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	48 OF 94
DRAWING:	S-119

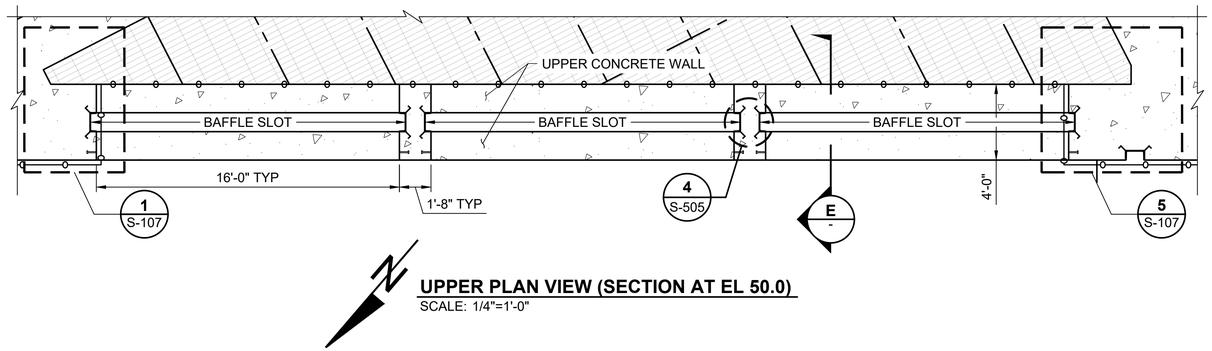
DWG: S:\13100\99\HydroInLockwood\000.CAD\02-sheets\S\S-119.dwg USER: MKA00889
DATE: Feb 03, 2021 10:06am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PP IMAGES:

NOTES:

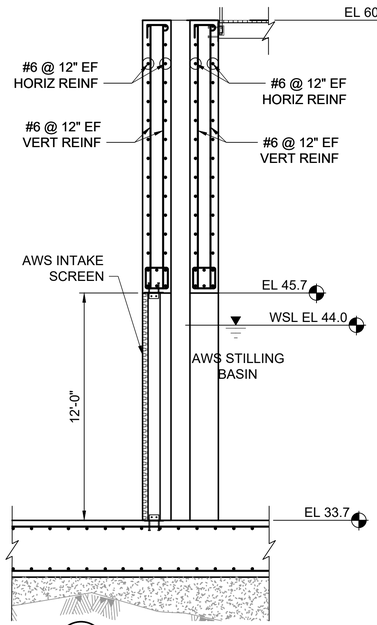
1. WIRE ORIENTATION SHALL BE PARALLEL TO FLOW. THE SCREENS SHALL BE MOUNTED FLUSH AND SMOOTH WITH THE STRUCTURE AND NO GAPS GREATER THAN 1/4 INCH.
2. COORDINATE WITH MANUFACTURE FOR ANY REQUIRED SPACERS BETWEEN THE SCREENS.



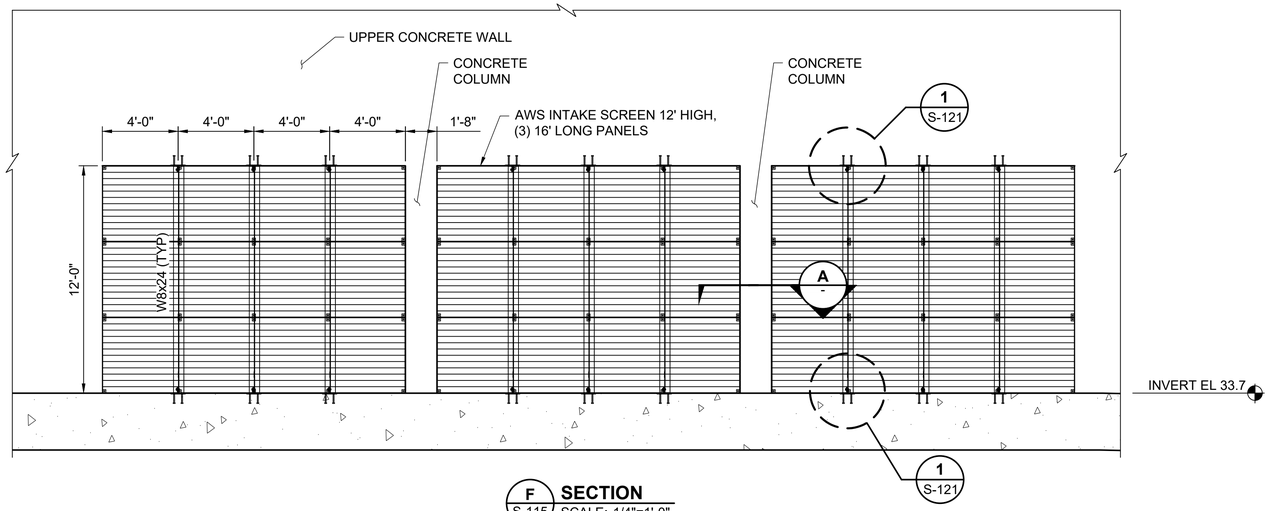
LOWER PLAN VIEW (SECTION AT EL 44.0)
SCALE: 1/4"=1'-0"



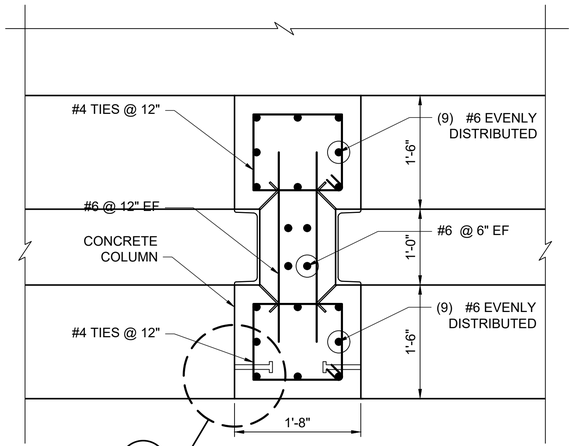
UPPER PLAN VIEW (SECTION AT EL 50.0)
SCALE: 1/4"=1'-0"



E S-115 **SECTION**
SCALE: 1/4"=1'-0"



F S-115 **SECTION**
SCALE: 1/4"=1'-0"



A - **SECTION**
SCALE: 1"=1'-0"

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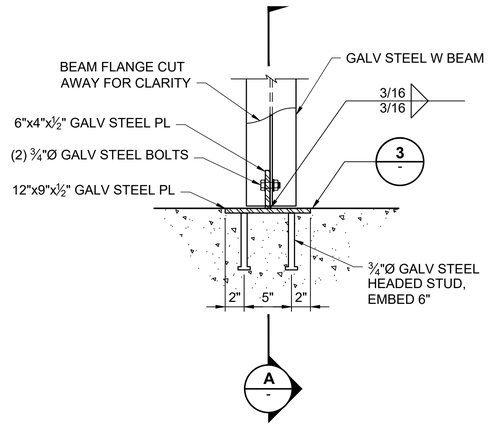
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

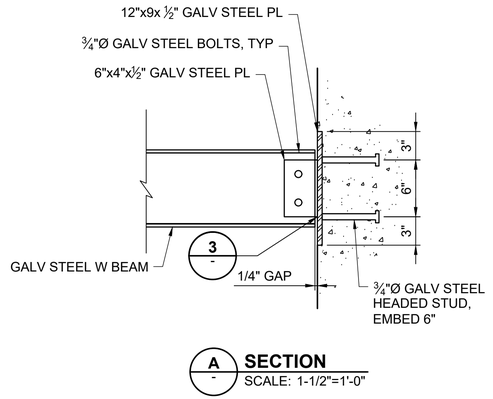
AWS INTAKE SCREEN PLANS, SECTIONS AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	49 OF 94
DRAWING:	S-120

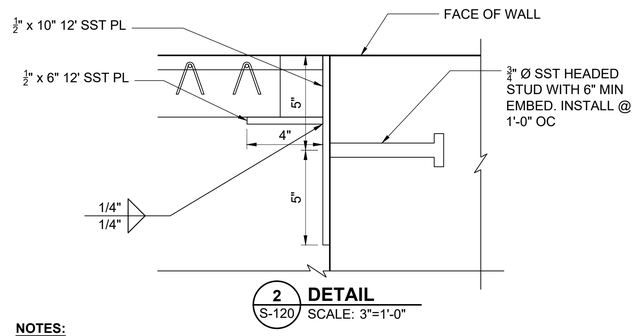
DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\SIS-120.dwg USER: MKA00989
DATE: Feb 03, 2021 10:06am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES:



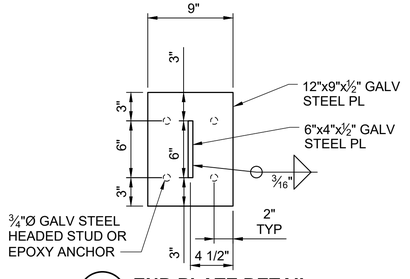
1 / S-120 — CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



A / - — SECTION
SCALE: 1-1/2"=1'-0"



2 / S-120 — DETAIL
SCALE: 3"=1'-0"



3 / - — END PLATE DETAIL
SCALE: 1-1/2"=1'-0"

NOTES:
1. ALL DIMENSIONS ARE TO BE COORDINATED WITH WEDGE WIRE SCREEN MFR.
2. COORDINATE LOCATION OF HOLES TO BOLT THE WEDGE WIRE SCREEN TO THE SUPPORT.
3. COORDINATE LOCATION OF ½" x 6" PLATE SO THAT SCREEN IS FLUSH WITH CONCRETE.

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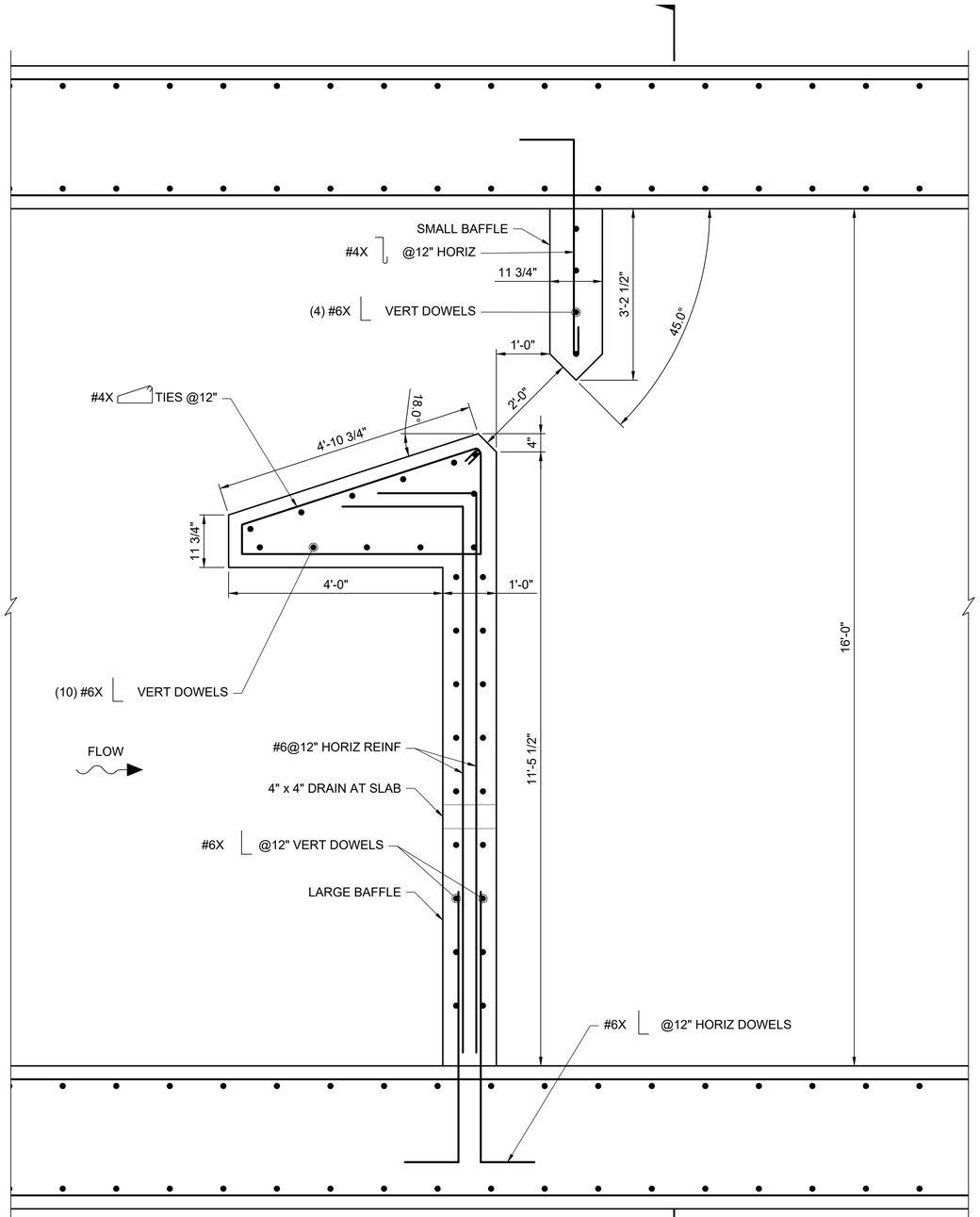
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

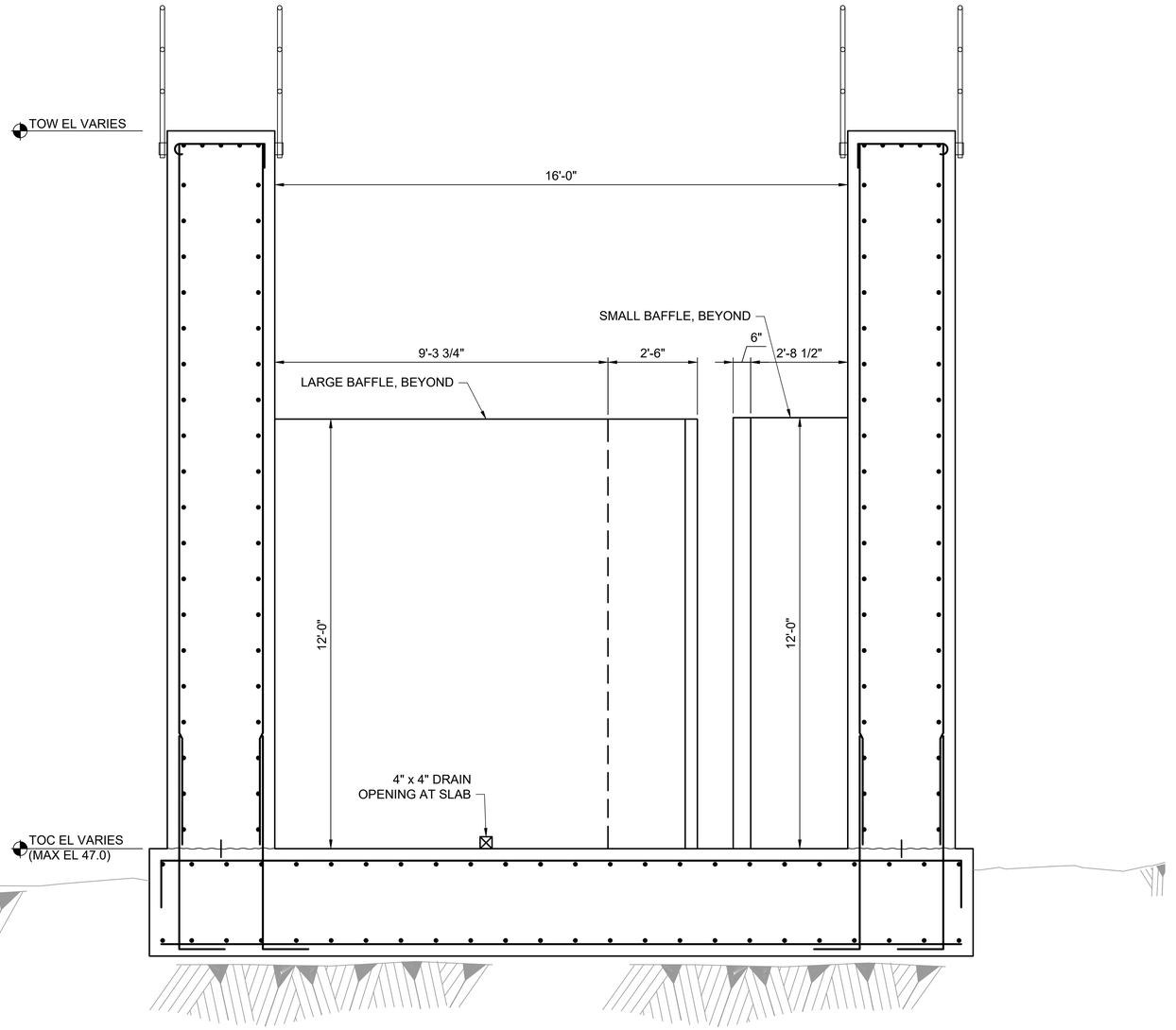
AWS INTAKE SCREEN DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	50 OF 94
DRAWING:	S-121

DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\BIS-121.dwg USER: MKA00889
DATE: Feb 03, 2021 11:22am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES:



1 S-101 **BAFFLE DETAIL (PLAN)**
SCALE: 3/4"=1'-0"



A - **SECTION**
SCALE: 1/2"=1'-0"

DWG: S:\13100\Holden\Lockwood\000 CAD\02-sheets\SIS-122.dwg USER: MKA00889
DATE: Feb 03, 2021 10:07am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES:

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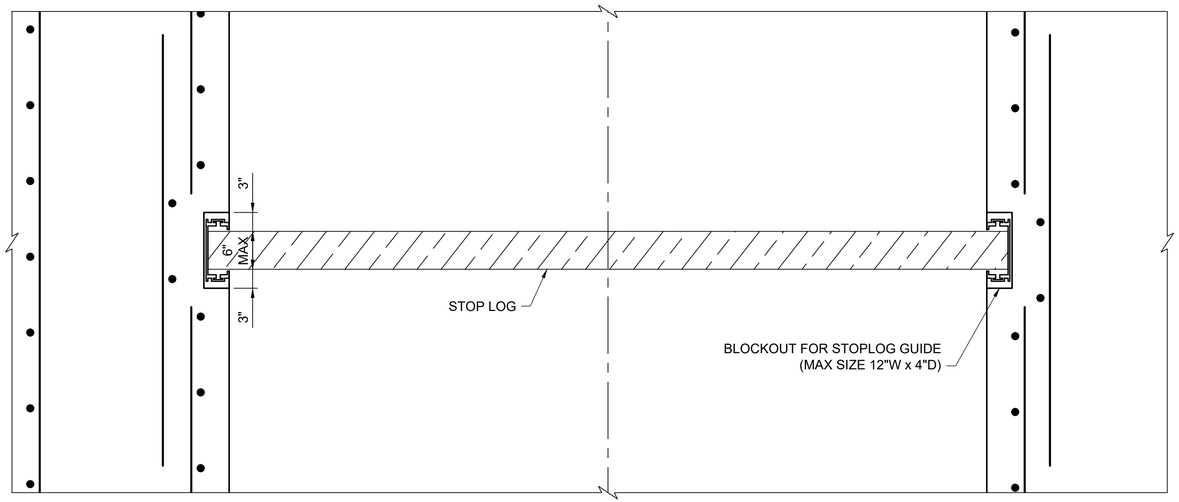
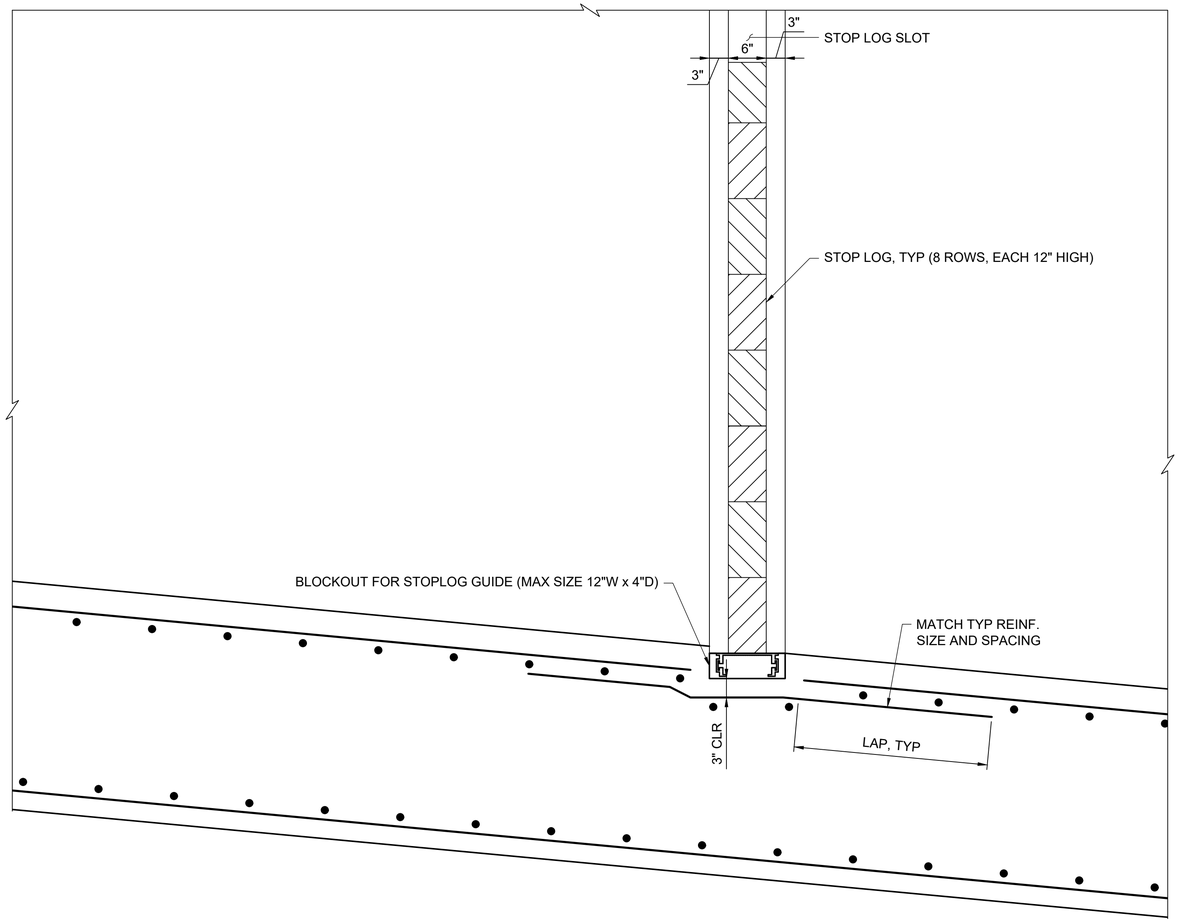
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER BAFFLE DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	51 OF 94
DRAWING:	S-122



1 - **STOP LOG DETAIL**
SCALE: 1"=1'-0"



2 - **STOP LOG SECTION**
SCALE: 1"=1'-0"

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S-123.dwg USER: MKA00589
DATE: Feb 03, 2021 10:07am XREFS: G-LCKWD-BID G-LCKWD-SIBMIT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES:

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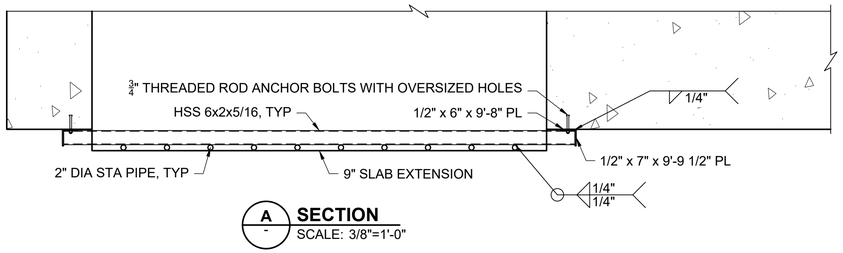
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STOP LOG PLAN AND SECTION

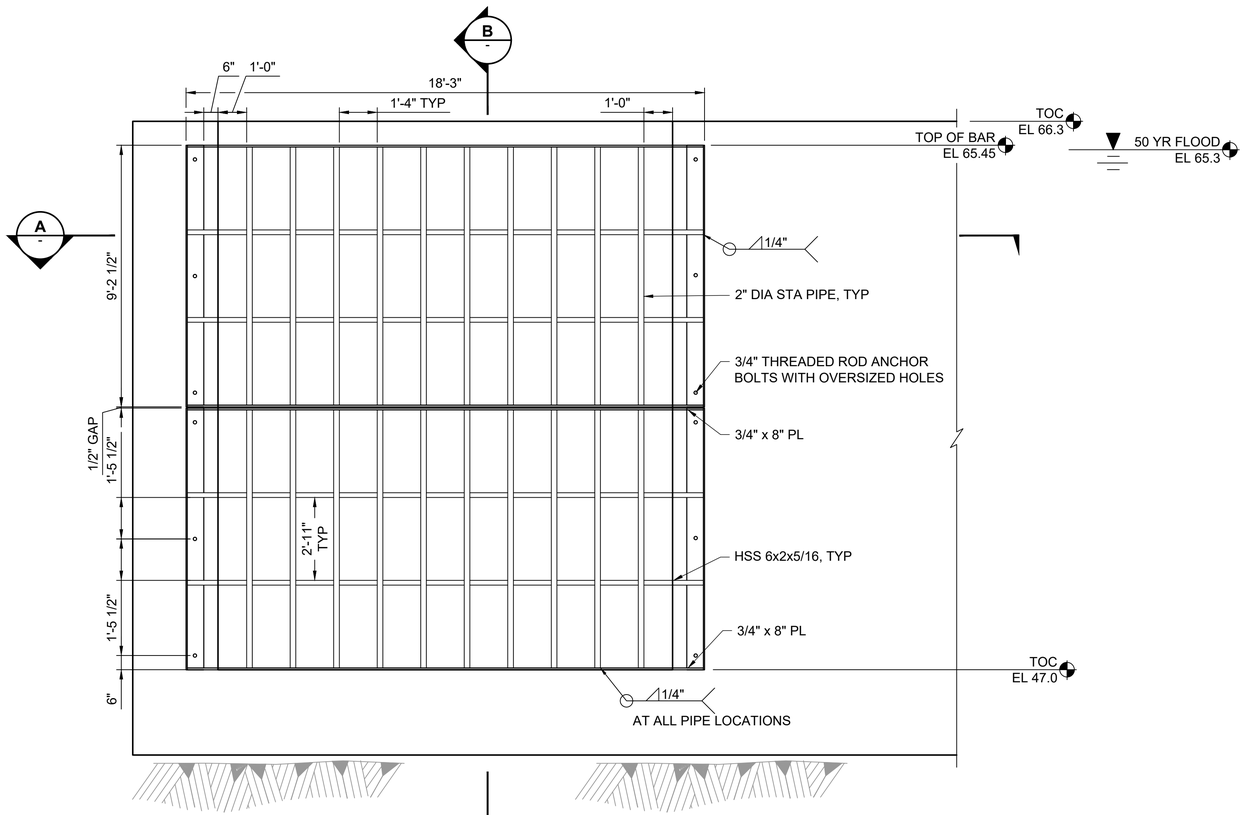
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	52 OF 94
DRAWING:	S-123

NOTE:

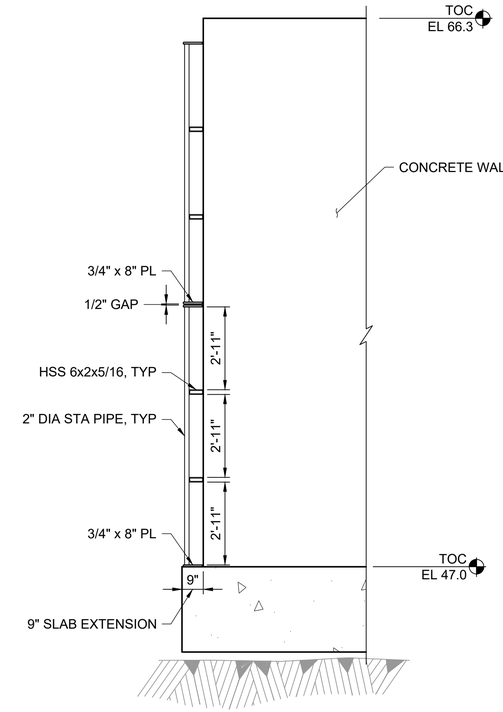
1. PANELS ARE IDENTICAL



A - **SECTION**
SCALE: 3/8"=1'-0"



1 - **FISH LADDER BAR RACK ELEVATION**
SCALE: 3/8"=1'-0"



B - **SECTION**
SCALE: 3/8"=1'-0"

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S-124.dwg USER: MKA00589
DATE: Feb 03, 2021 10:07am XREFS: G-LCKWD-BID G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES:

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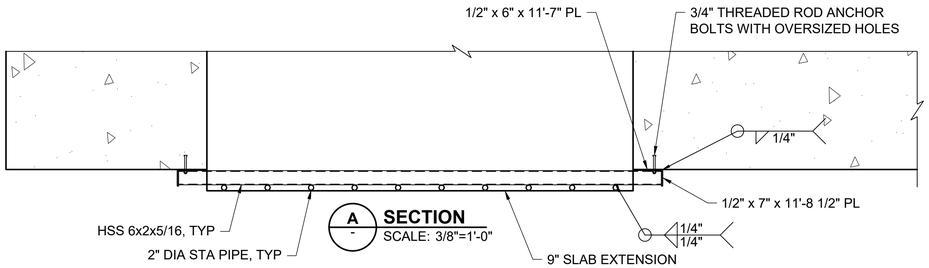
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER BAR RACK ELEVATION AND DETAILS

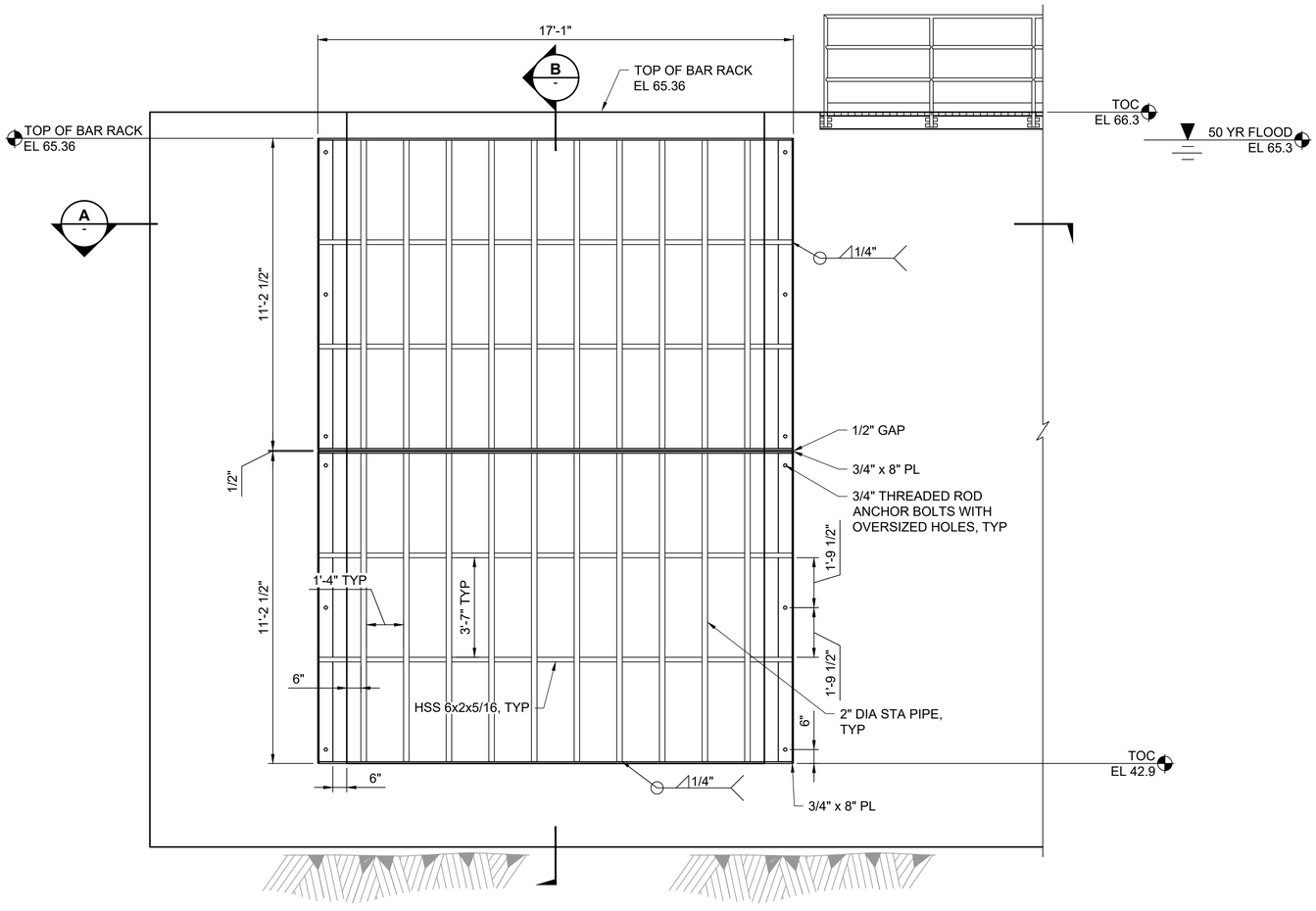
PROJECT: 3173LOCKFISH
DRAWN BY: M. ATWELL
DESIGNER: A. MENGERT
APPROVED BY: M. GRAESER
SHEET: 53 OF 94
DRAWING: S-124

NOTE:

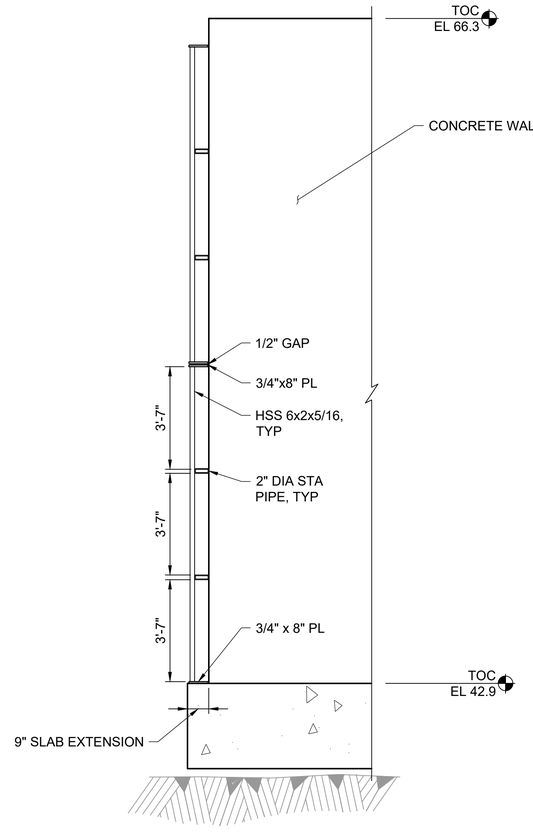
1. PANELS ARE IDENTICAL.



A - SECTION
SCALE: 3/8"=1'-0"



1 - AWS BAR RACK ELEVATION
SCALE: 3/8"=1'-0"



B - SECTION
SCALE: 3/8"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

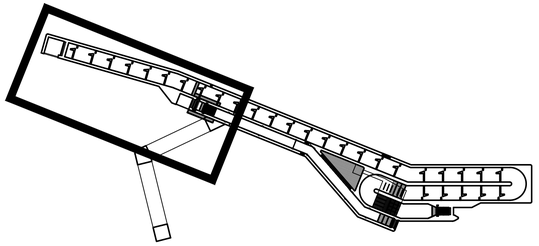
AWS BAR RACK ELEVATION AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	54 OF 94
DRAWING:	S-125

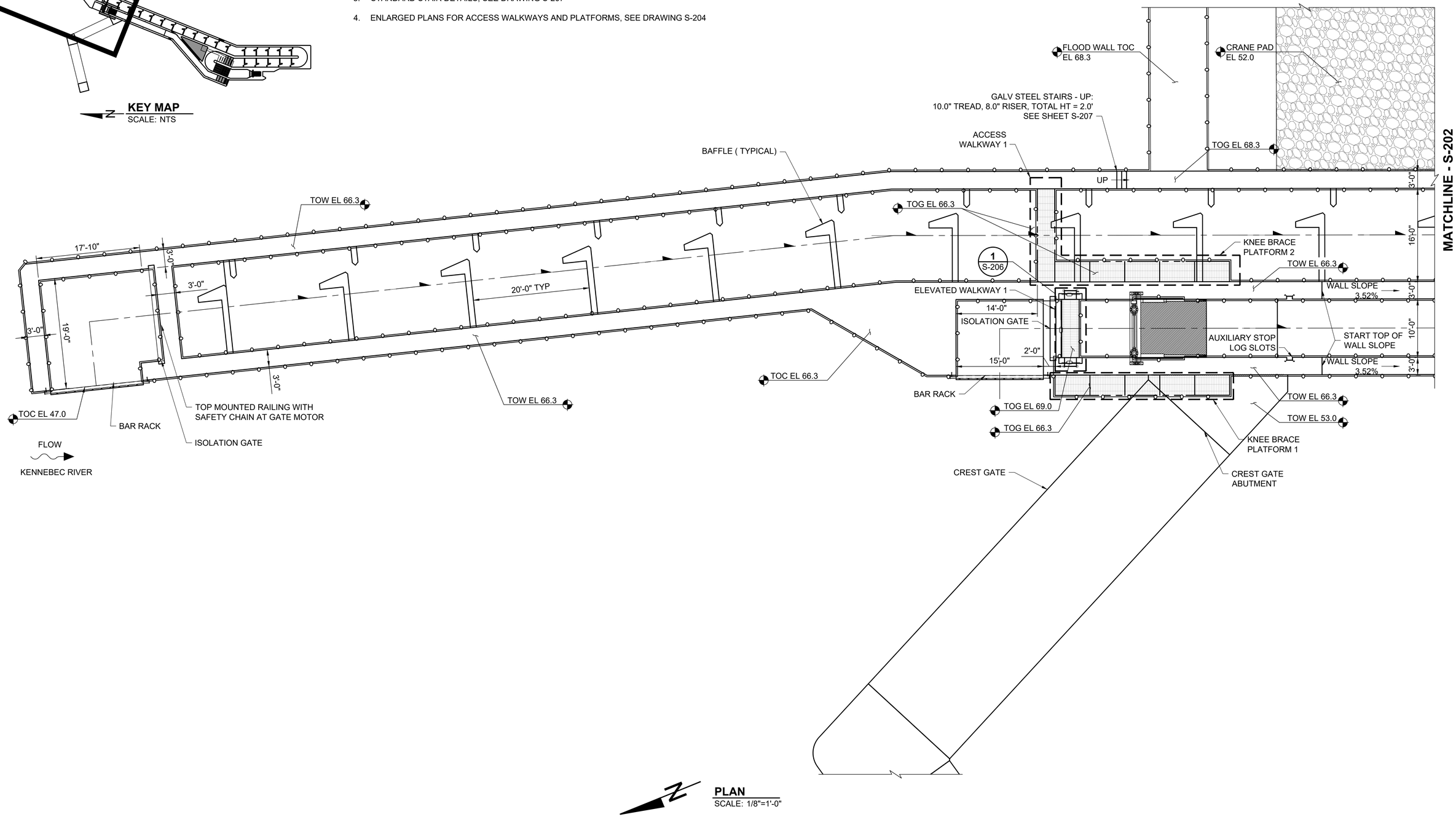
DWG: S:\131009\Hdr\dem\Lockwood\900 CAD\02-sheets\SIS-125.dwg USER: MKA00889
DATE: Feb 03, 2021 10:08am XREFS: G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PP S-LCKWD-PLN IMAGES: G-LCKWD-BD

NOTES:

1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.
2. STANDARD RAILING DETAILS, SEE 1/S-504
3. STANDARD STAIR DETAILS, SEE DRAWING S-207
4. ENLARGED PLANS FOR ACCESS WALKWAYS AND PLATFORMS, SEE DRAWING S-204



KEY MAP
SCALE: NTS



PLAN
SCALE: 1/8"=1'-0"

MATCHLINE - S-202

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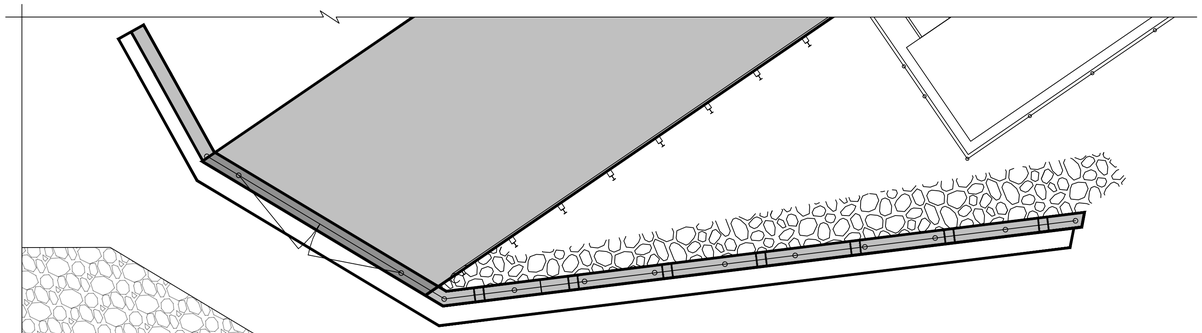
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

MISC. PLATFORMS AND ACCESS PLAN

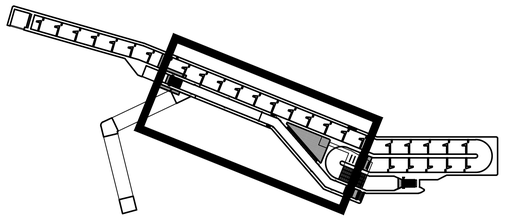
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	55 OF 94
DRAWING:	S-201

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\S-201.dwg USER: MKA00889
DATE: Feb 03, 2021 10:08am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP IMAGES:

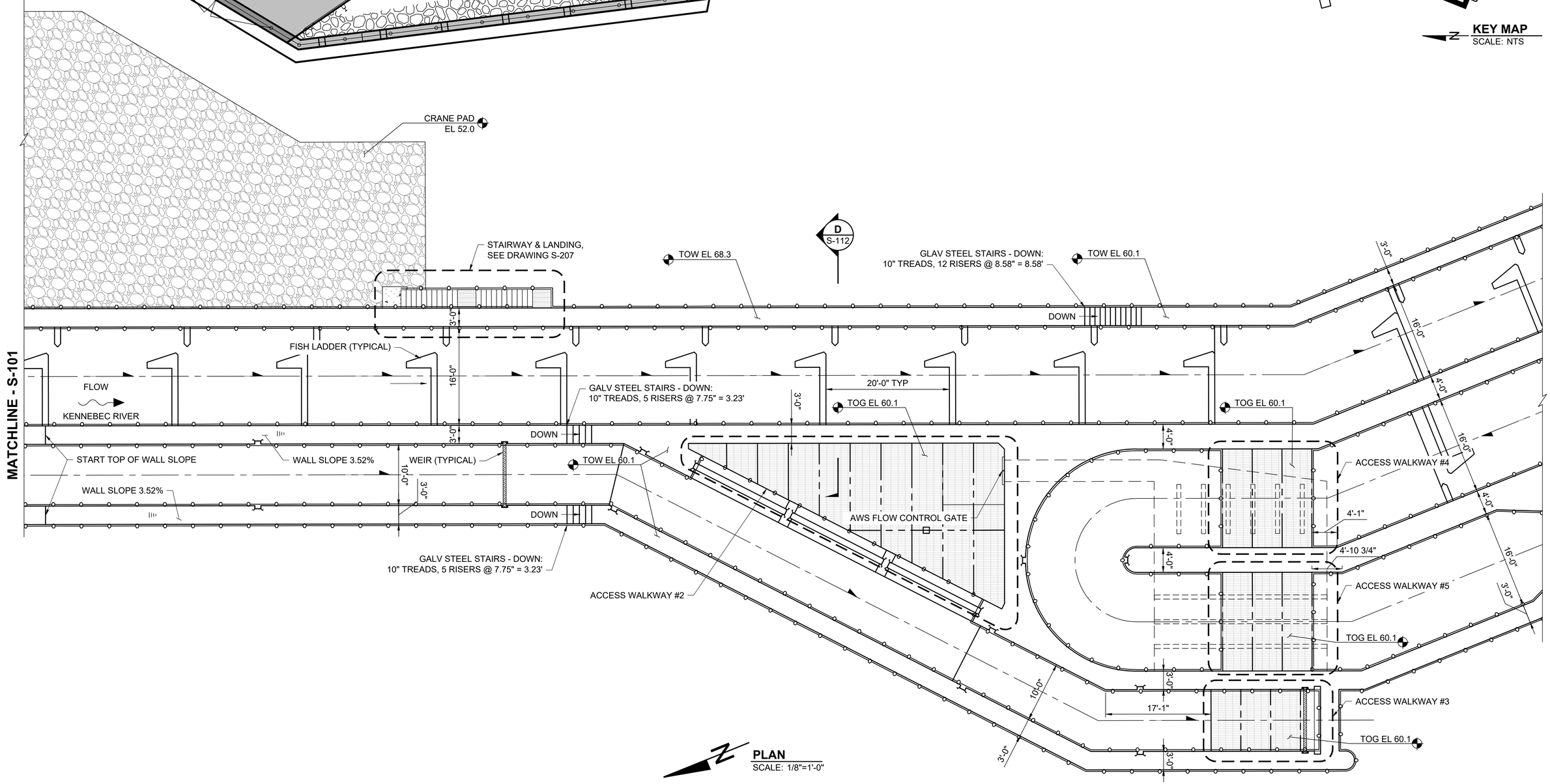


NOTES:

1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.
2. STANDARD RAILING DETAILS, SEE (1 / S-504)
3. STANDARD STAIR DETAILS, SEE DRAWING S-207
4. ENLARGED PLANS FOR ACCESS WALKWAYS AND PLATFORMS, SEE DRAWING S-204



KEY MAP
SCALE: NTS



PLAN
SCALE: 1/8"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

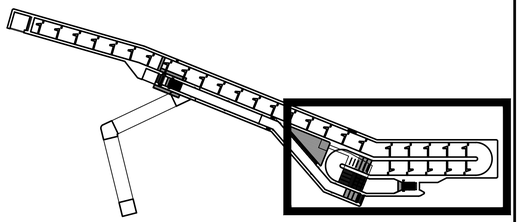
MISC. PLATFORMS AND ACCESS PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	56 OF 94
DRAWING:	S-202

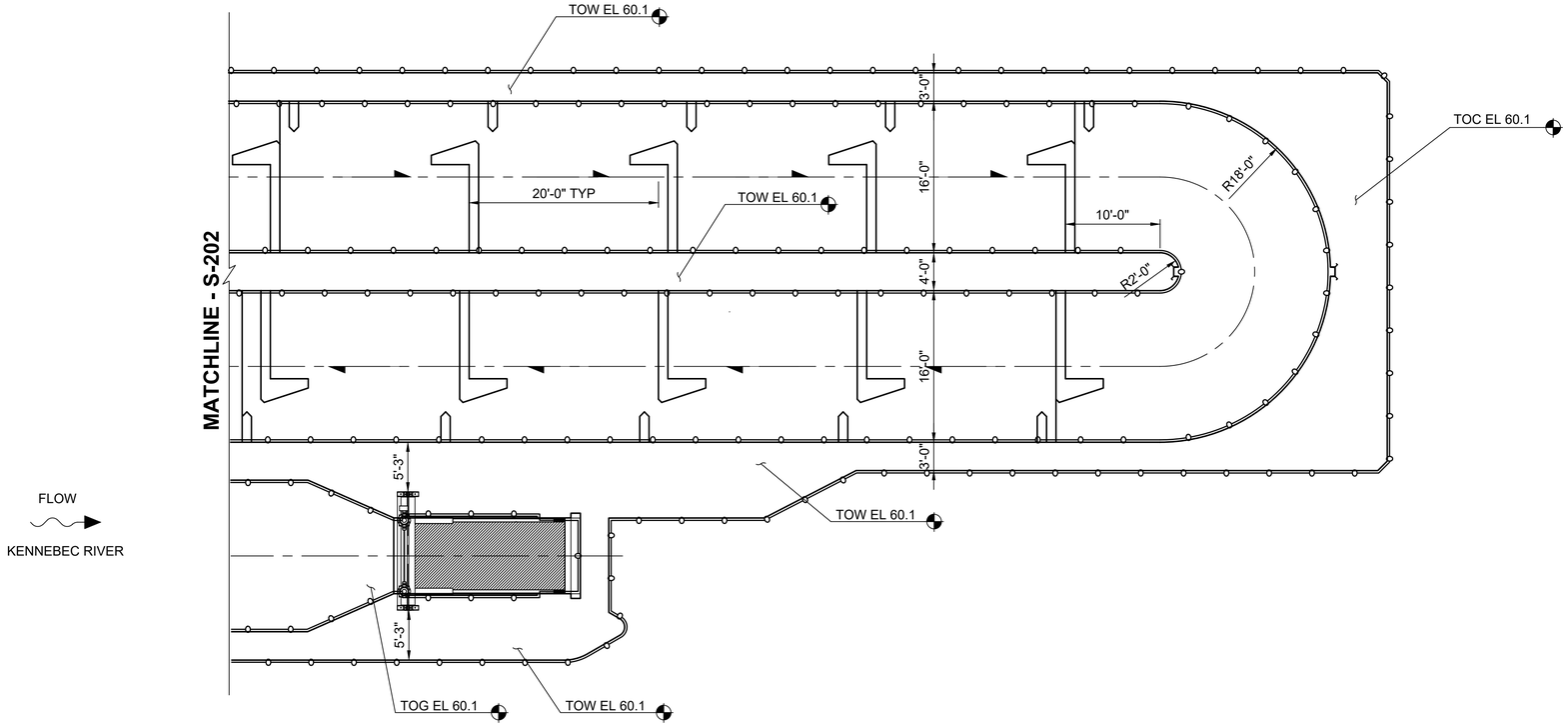
DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\S-202.dwg USER: MKA00889
DATE: Feb 03, 2021 10:29am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP IMAGES:

NOTES:

1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.
2. STANDARD RAILING DETAILS, SEE 1/S-504
3. STANDARD STAIR DETAILS, SEE DRAWING S-207
4. ENLARGED PLANS FOR ACCESS WALKWAYS AND PLATFORMS, SEE DRAWING S-204



N **KEY MAP**
SCALE: NTS



N **PLAN**
SCALE: 1/8"=1'-0"

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30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

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DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
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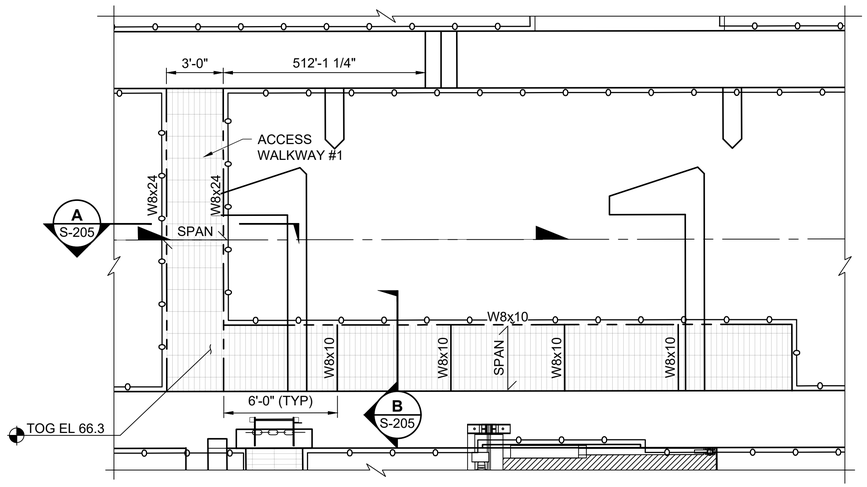
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

MISC. PLATFORMS AND ACCESS PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	57 OF 94
DRAWING:	S-203

DWG: S:\13100\99\Holden\Lockwood\00 CAD\02-sheets\SIS-203.dwg USER: MKA00889
DATE: Feb 03, 2021 10:08am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP IMAGES:

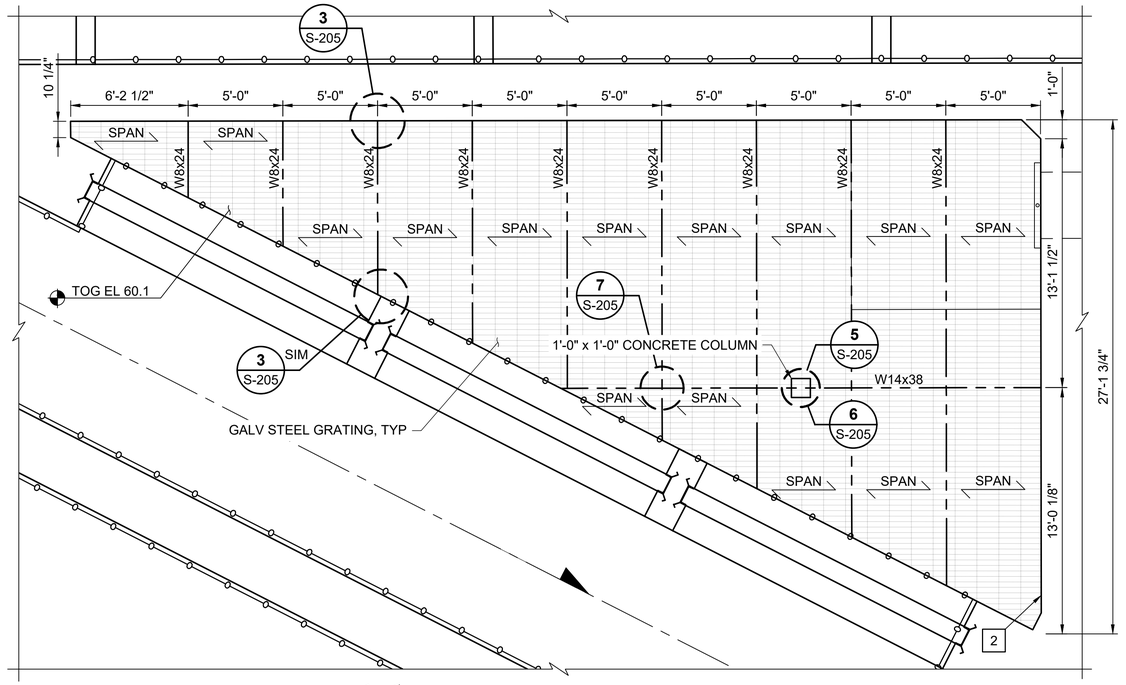


ACCESS WALKWAY #1 PLAN AND KNEE BRACE PLATFORM #2

SCALE: 1/4"=1'-0"

NOTE:

1. KNEE BRACE PLATFORM #1 HAS SAME BEAM SPACING AND SIZE AS KNEE BRACE PLATFORM #2.



ACCESS WALKWAY #2 PLAN

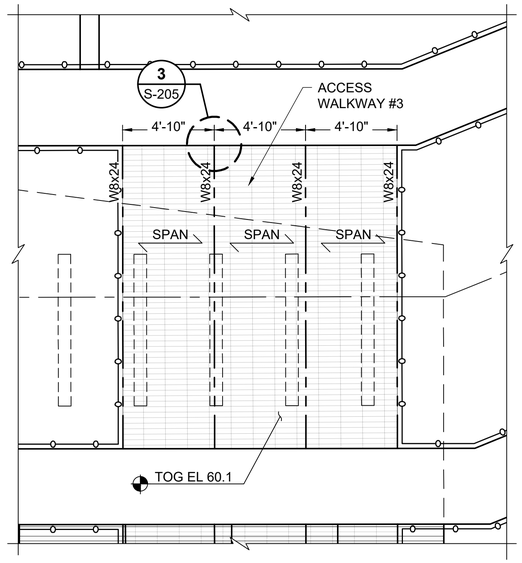
SCALE: 1/4"=1'-0"

NOTE:

1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.

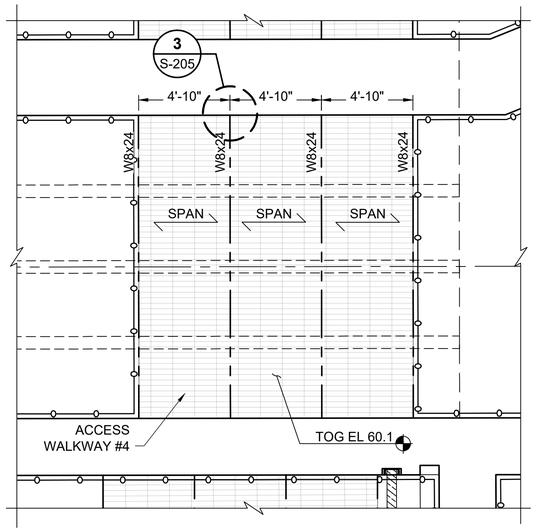
KEYED NOTES:

1. GALVANIZED STEEL GRATING, 1 ½" x 3⁄16" BEARING BARS @ 1 3⁄16" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.
2. GRATING SUPPORT TYPE 1 (1 / S-505)



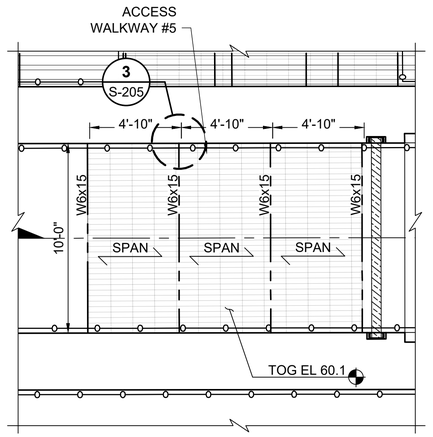
ACCESS WALKWAY #3 PLAN

SCALE: 1/4"=1'-0"



ACCESS WALKWAY #4 PLAN

SCALE: 1/4"=1'-0"



ACCESS WALKWAY #5 PLAN

SCALE: 1/4"=1'-0"

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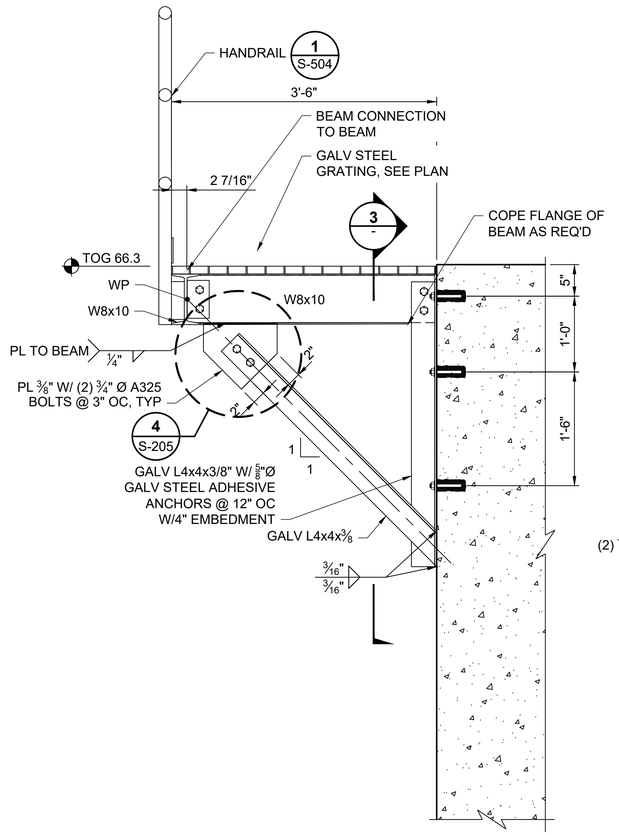
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

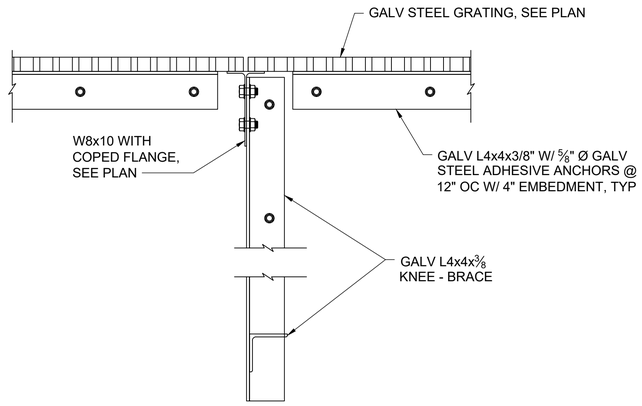
ENLARGED PLANS MISC. PLATFORMS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	58 OF 94
DRAWING:	S-204

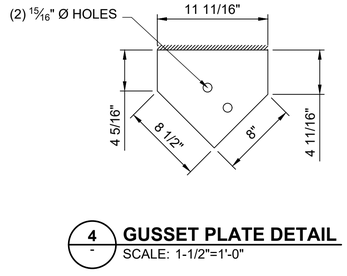
DWG: S:\131009HydenLockwood\900 CAD\02-SHEETS\S-204.dwg USER: MKA00869
DATE: Feb 03, 2021 11:24am XREFS: C-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP IMAGES:



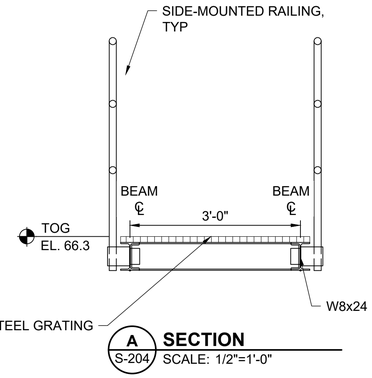
B S-204 TYPICAL KNEE-BRACE PLATFORM
SCALE: 1"=1'-0"



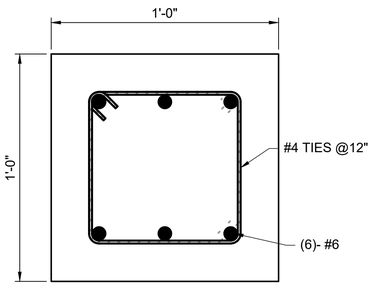
3 - SECTION
SCALE: 1 1/2"=1'-0"



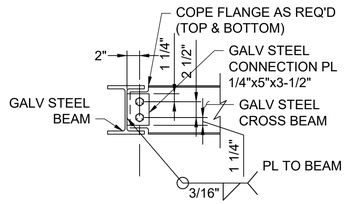
4 - GUSSET PLATE DETAIL
SCALE: 1-1/2"=1'-0"



A S-204 SECTION
SCALE: 1/2"=1'-0"



C - SECTION
SCALE: 3"=1'-0"

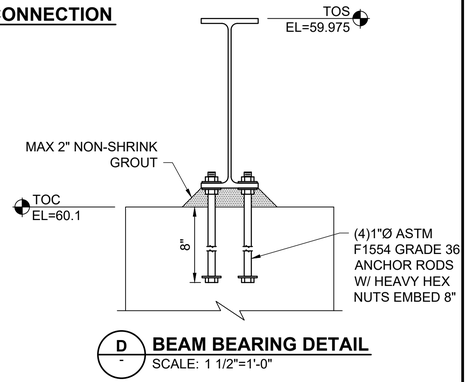


7 S-205 BEAM TO BEAM CONNECTION
SCALE: 1"=1'-0"

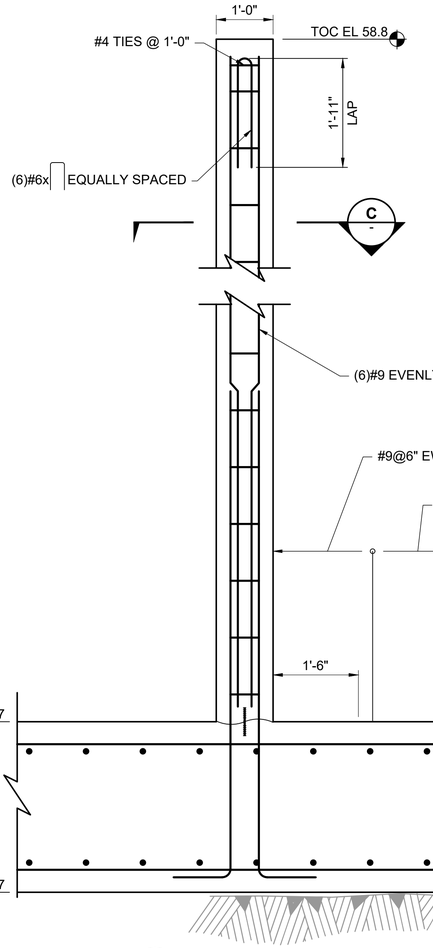
NOTES:
1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.
2. ACCESS WALKWAY FRAMING, CONNECTIONS, RAILING, AND GRATING SHALL BE GALVANIZED STEEL.

KEYED NOTE:

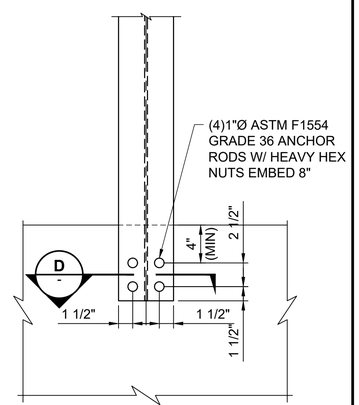
1 GALVANIZED STEEL GRATING, 1 ¼" X ⅜" BEARING BARS @ 1 3/16" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.



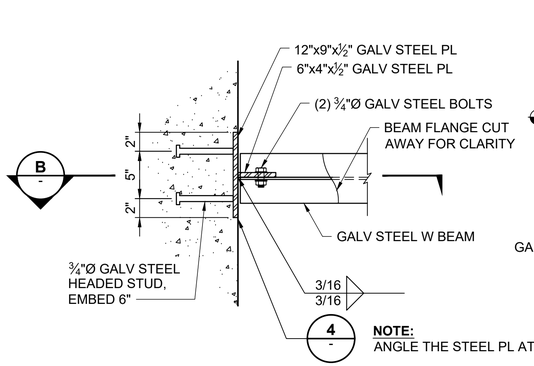
D - BEAM BEARING DETAIL
SCALE: 1 1/2"=1'-0"



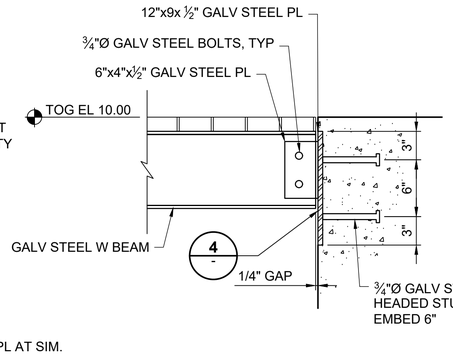
5 S-205 COLUMN
SCALE: 3/4"=1'-0"



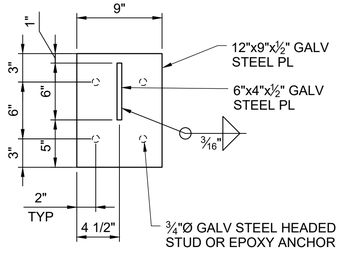
6 S-205 BEAM BEARING DETAIL
SCALE: 1 1/2"=1'-0"



3 - CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



B - SECTION
SCALE: 1-1/2"=1'-0"



4 - END PLATE DETAIL
SCALE: 1-1/2"=1'-0"

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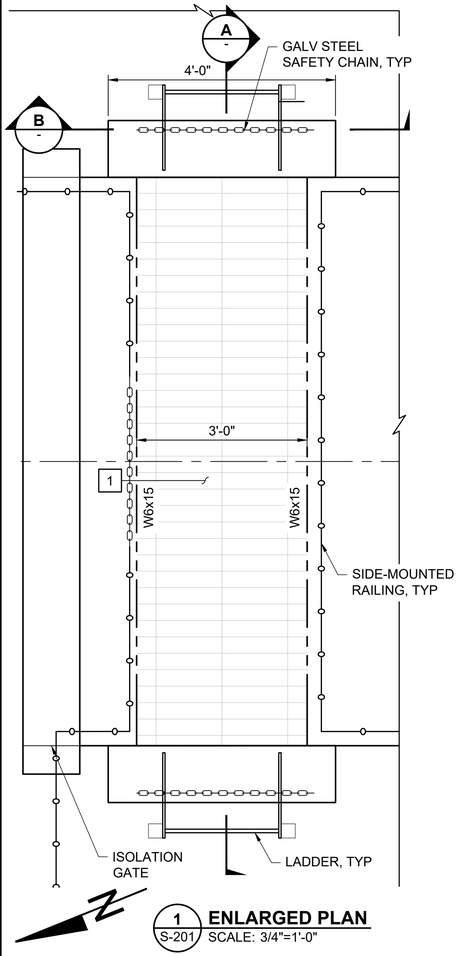
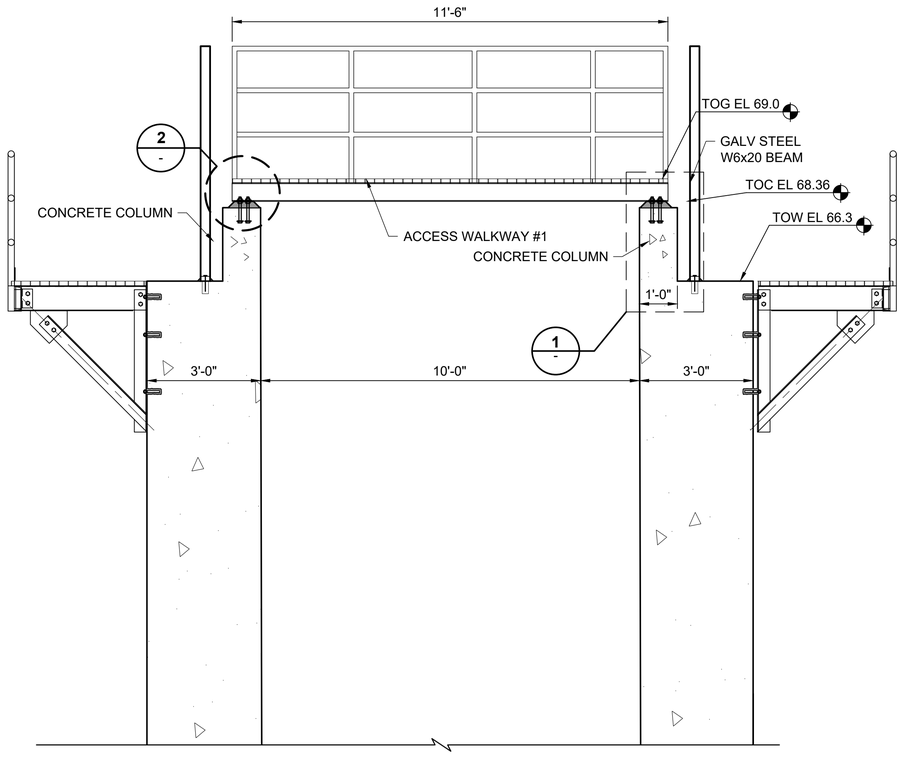
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

ENLARGED PLANS AND MISC. PLATFORMS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	59 OF 94
DRAWING:	S-205



1 / S-201 ENLARGED PLAN
SCALE: 3/4"=1'-0"



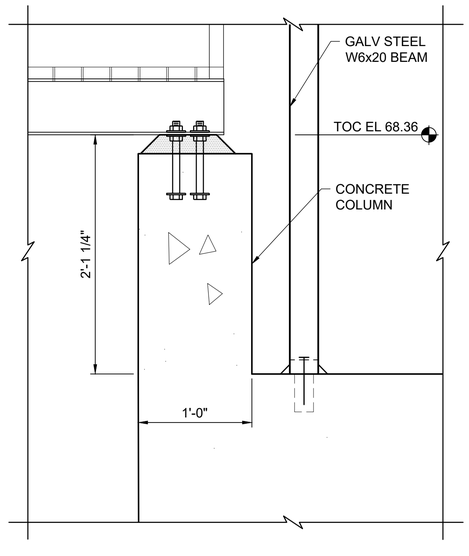
A / - SECTION
SCALE: 1/2"=1'-0"

NOTES:

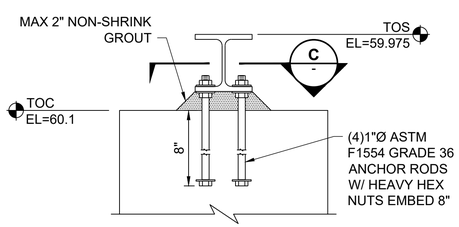
1. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.
2. ACCESS WALKWAY FRAMING, CONNECTIONS, RAILING, AND GRATING SHALL BE GALVANIZED STEEL.
3. FIELD DRILL BOLT HOLES TO ALIGN WITH X-BRACING MEMBERS. REPAIR DRILLED HOLES WITH COLD GALVANIZING COMPUND.

KEYED NOTE:

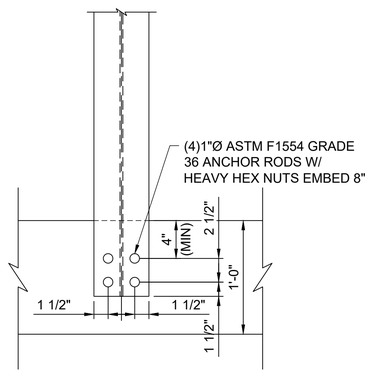
1 GALVANIZED STEEL GRATING, 1 ½" x 3⁄16" BEARING BARS @ 1 3⁄16" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.



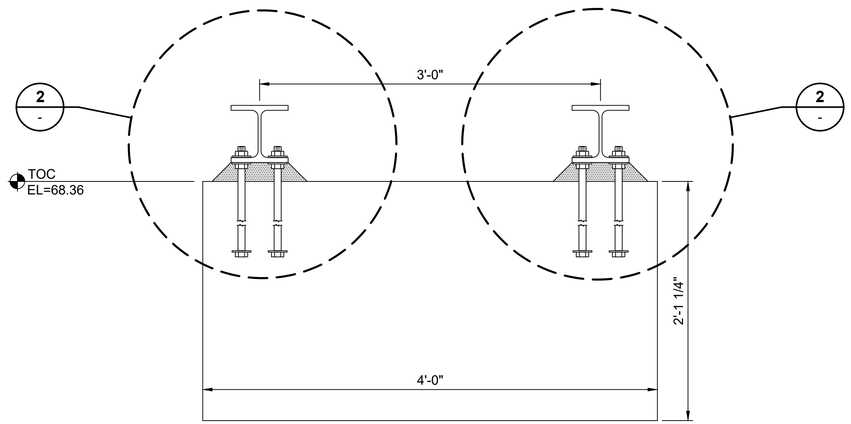
1 / - CONCRETE COLUMN DETAIL
SCALE: 1 1/2"=1'-0"



2 / - BEAM BEARING DETAIL
SCALE: 1 1/2"=1'-0"



C / - BEAM BEARING SECTION
SCALE: 1 1/2"=1'-0"



B / - SECTION
SCALE: 1 1/2"=1'-0"

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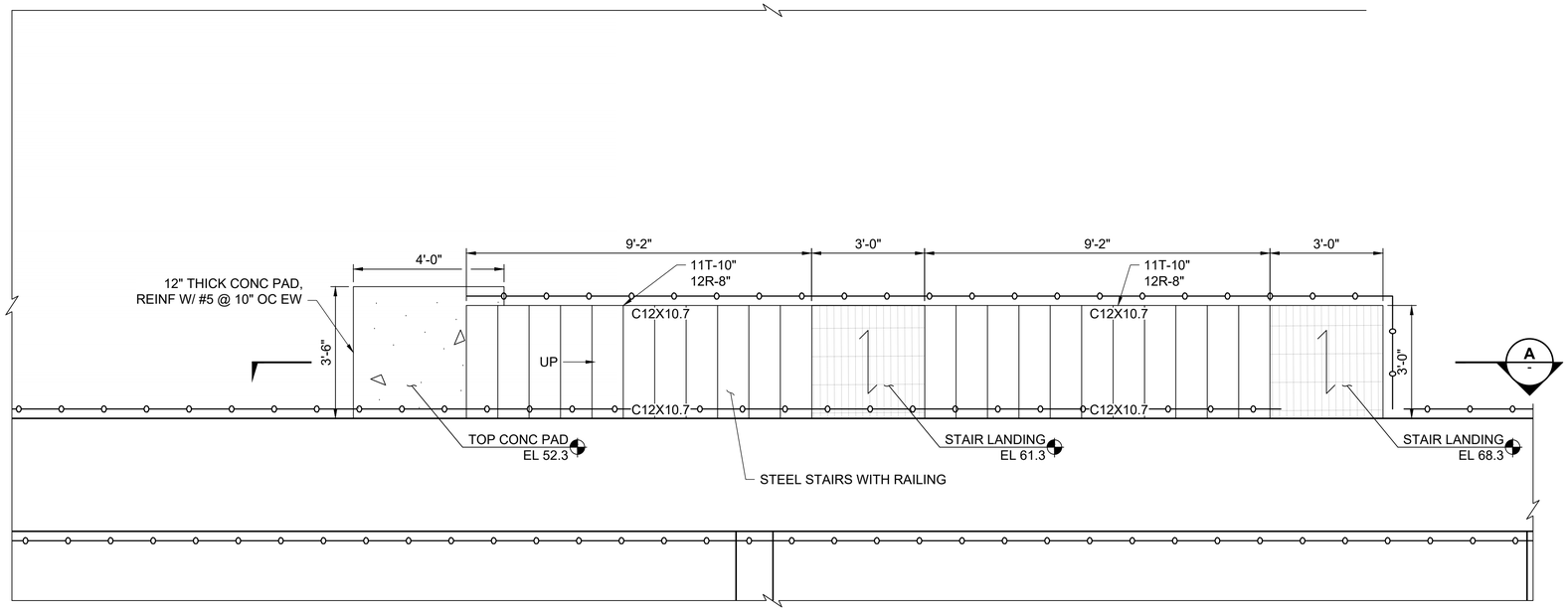
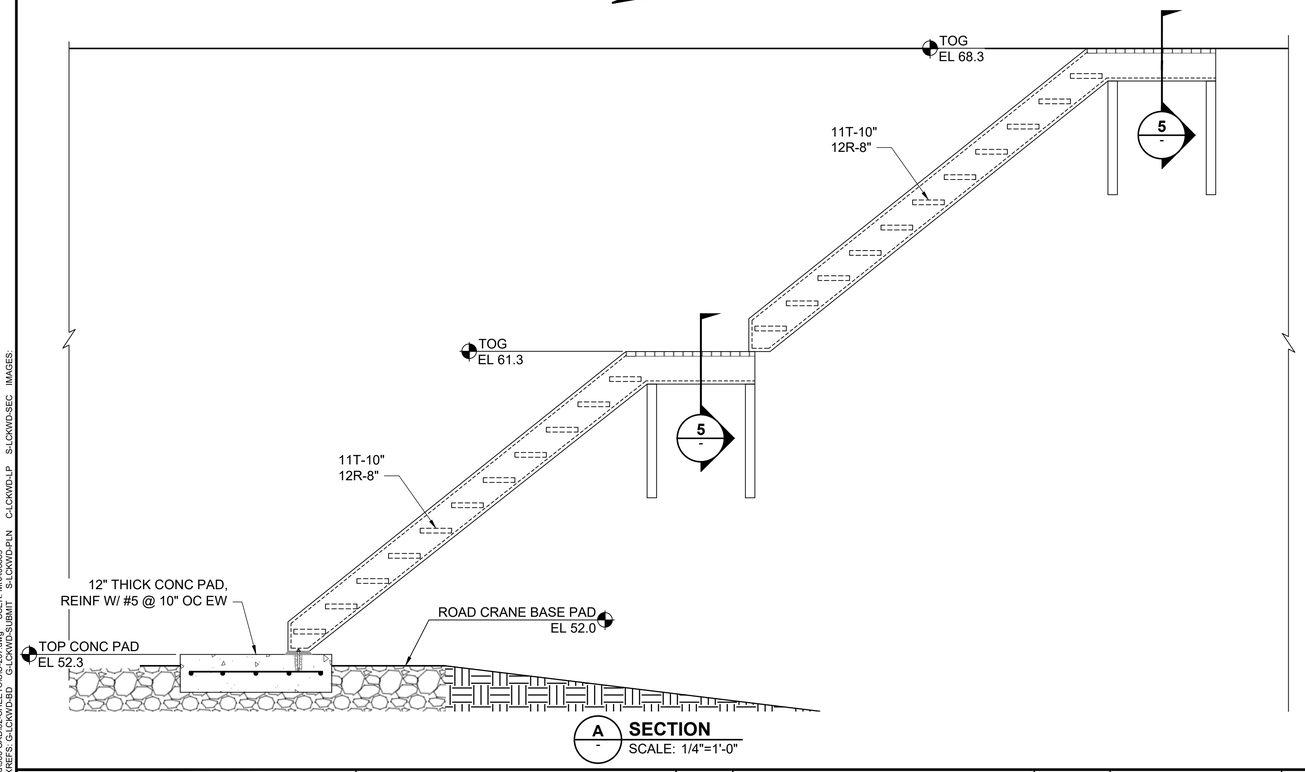
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

ELEVATED WALKWAY

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	60 OF 94
DRAWING:	S-206



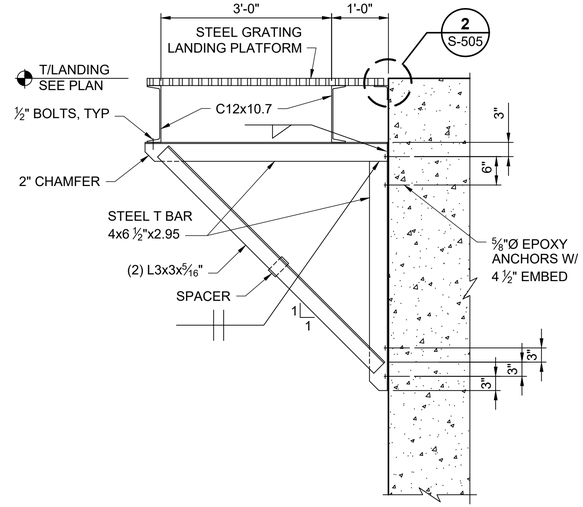
SITE PLAN
SCALE: 1/2"=1'-0"



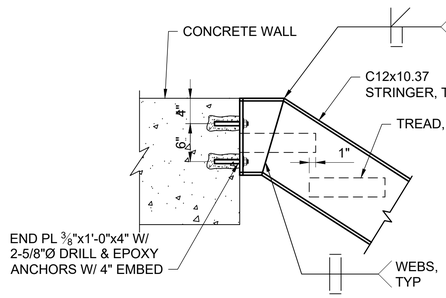
A - SECTION
SCALE: 1/4"=1'-0"

NOTES:

1. GALVANIZED STEEL GRATING, 1 ½"x3/16" BEARING BARS @ 1 3/16" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.
2. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.



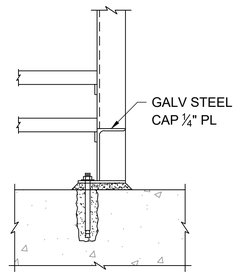
1 - DETAIL
SCALE: 3/4"=1'-0"

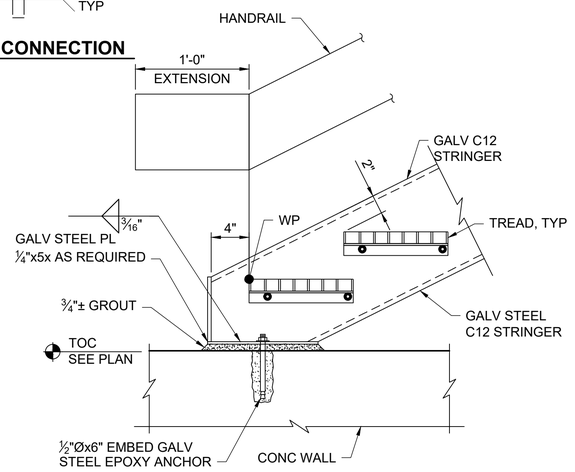


NOTE:

1. SEE PLAN FOR RISE AND RUN FOR STAIRS LOCATED ON FISH LADDER AND AWS WALLS.

2 - STAIR TO CONCRETE CONNECTION
SCALE: 1"=1'-0"
S-101
S-102
S-105





S-102
S-103
3 - LANDING ON CONCRETE PAD
SCALE: 1-1/2"=1'-0"
S-101

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STAIRS PLAN AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	61 OF 94
DRAWING:	S-207

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\SS-207.dwg USER: MKA00889
DATE: Feb 03, 2021 10:33am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-LP S-LCKWD-SEC IMAGES:

B S-301

C S-301

10'-0"

CONCRETE FLOOD WALL
TOC EL 68.3'

BATTER 1H:2V

3'-0" WIDE
ACCESS WALKWAY

ACCESS ROAD
(BY OTHERS)

CONCRETE PAD AT EL. 74 FT

EQUIPMENT SHELTER

SEE SHEET S-315

91'-10"

ROAD BASE CRANE PAD
EL 52.0 FT

A S-301

21'-7 3/4"

FISH LADDER

ACCESS AND FLOOD WALL PLAN

SCALE: 1"=6'

DWG: S:\13\109\Holden\Lockwood\900 CAD\02-sheets\S-300.dwg USER: MK400889
DATE: Feb 03, 2021 10:11am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP S-LCKWD-SEC C-LCKWD-SV IMAGES:

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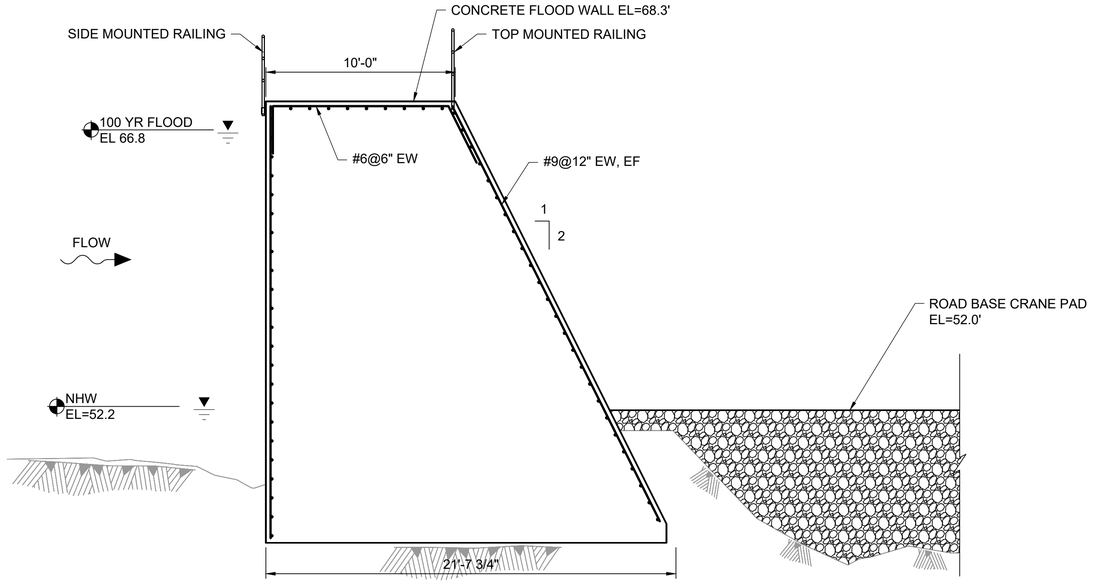
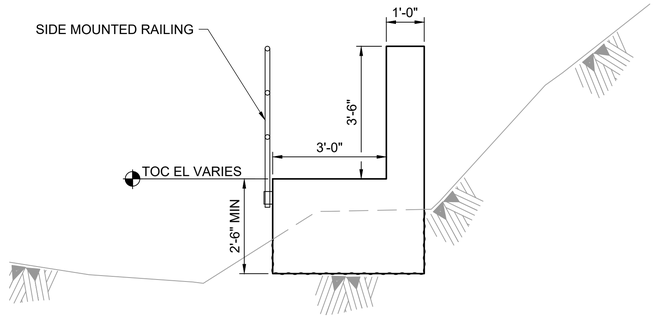
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

ACCESS AND FLOOD WALL PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	62 OF 94
DRAWING:	S-300



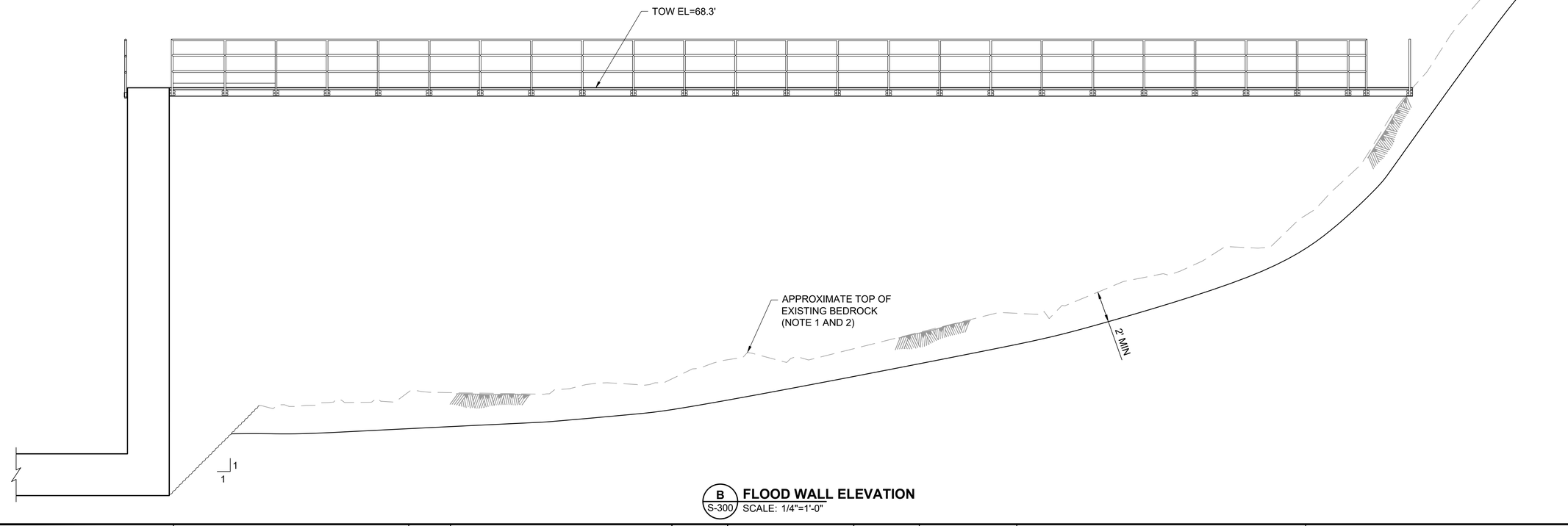
A S-300 **SECTION**
SCALE: 1/4"=1'-0"



C S-300 **ACCESS WALKWAY SECTION**
SCALE: 1/4"=1'-0"

NOTES:

1. SURVEY EXISTING ROCK PROFILE PRIOR TO FLOOD WALL CONSTRUCTION.
2. PREPARE ROCK SURFACE PER 5/S-501 PRIOR TO MINIMUM 2' EXCAVATION FOR CONSTRUCTION OF FLOOD WALL.



B S-300 **FLOOD WALL ELEVATION**
SCALE: 1/4"=1'-0"

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DATE: 2/3/2021

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2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

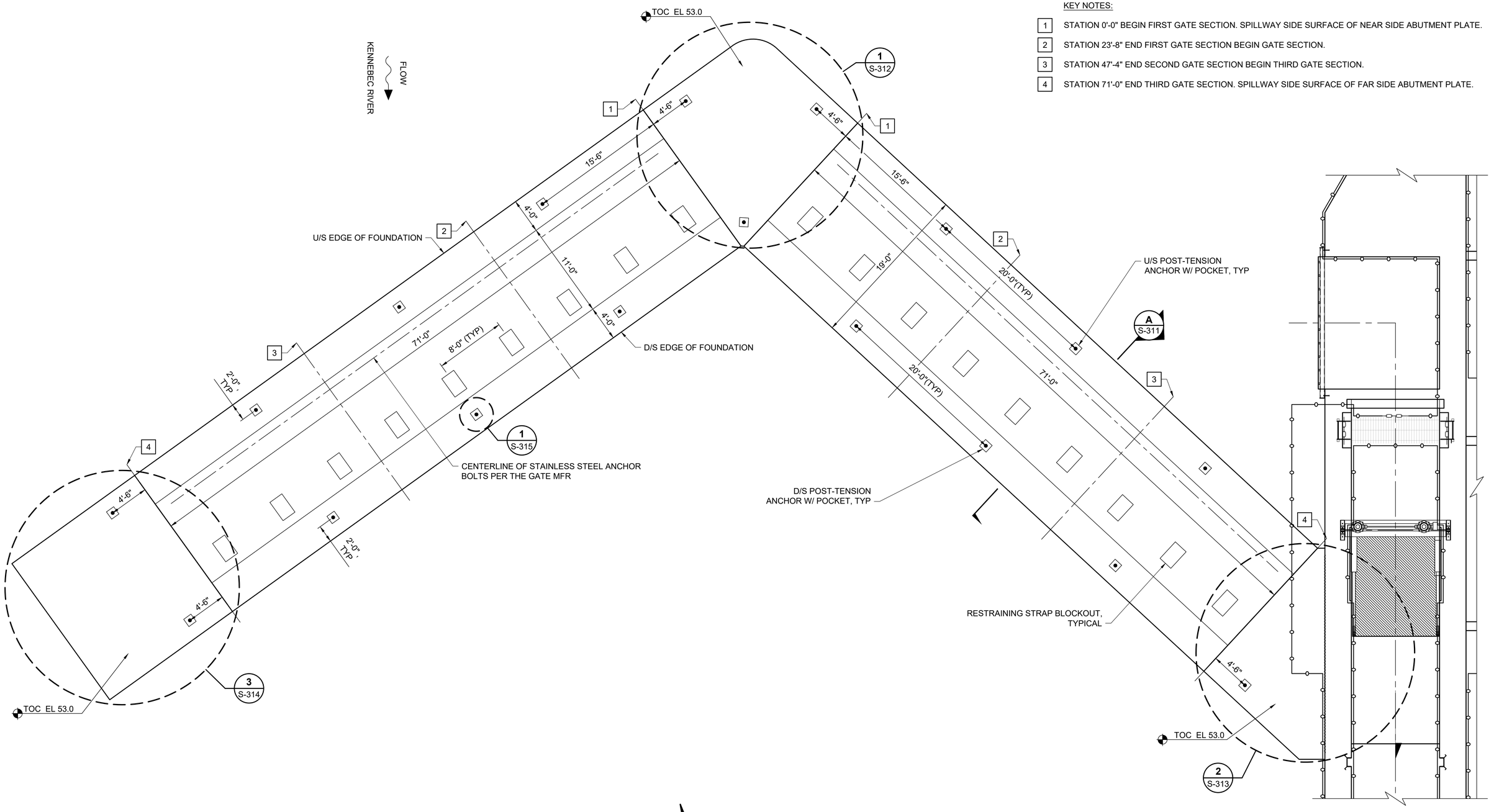
FLOOD WALL SECTION AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	63 OF 94
DRAWING:	S-301

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S\S-301.dwg USER: MKA00889
DATE: Feb 03, 2021 10:11am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP S-LCKWD-SEC IMAGES:

KEY NOTES:

1. STATION 0'-0" BEGIN FIRST GATE SECTION. SPILLWAY SIDE SURFACE OF NEAR SIDE ABUTMENT PLATE.
2. STATION 23'-8" END FIRST GATE SECTION BEGIN GATE SECTION.
3. STATION 47'-4" END SECOND GATE SECTION BEGIN THIRD GATE SECTION.
4. STATION 71'-0" END THIRD GATE SECTION. SPILLWAY SIDE SURFACE OF FAR SIDE ABUTMENT PLATE.



CREST GATE ENLARGED PLAN

SCALE: 3/16"=1'-0"

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30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

CREST GATE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	64 OF 94
DRAWING:	S-310

DWG: S:\13\009\Holden\Lockwood\900 CAD\02-sheets\SIS-310.dwg USER: MKA00889
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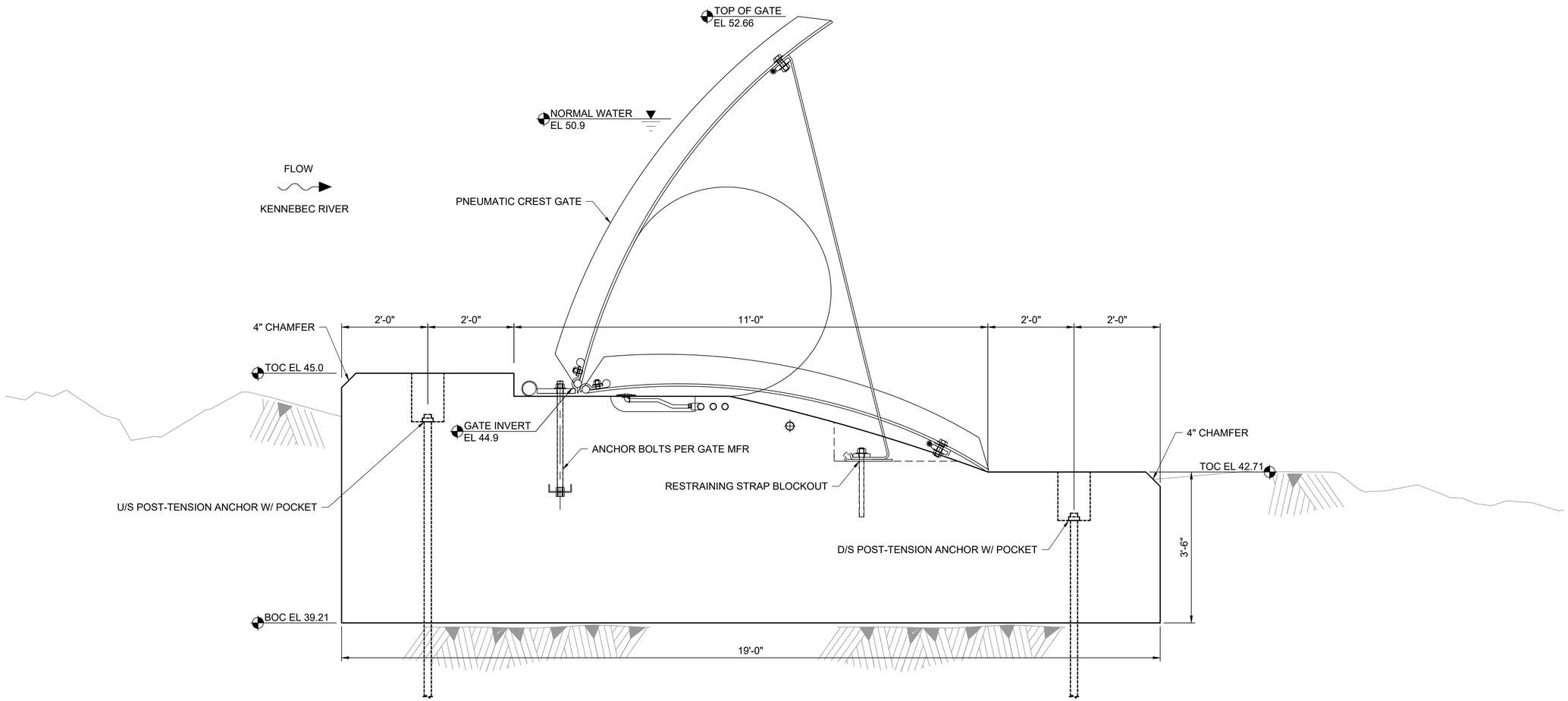

A - **ELEVATION GATE 7 (SPILLWAY)**
SCALE: 3/4"=1'-0"

DWG: S:\131009\Hdr\en\Lockwood\900 CAD\02-sheets\S\S-311.dwg USER: NKA40089
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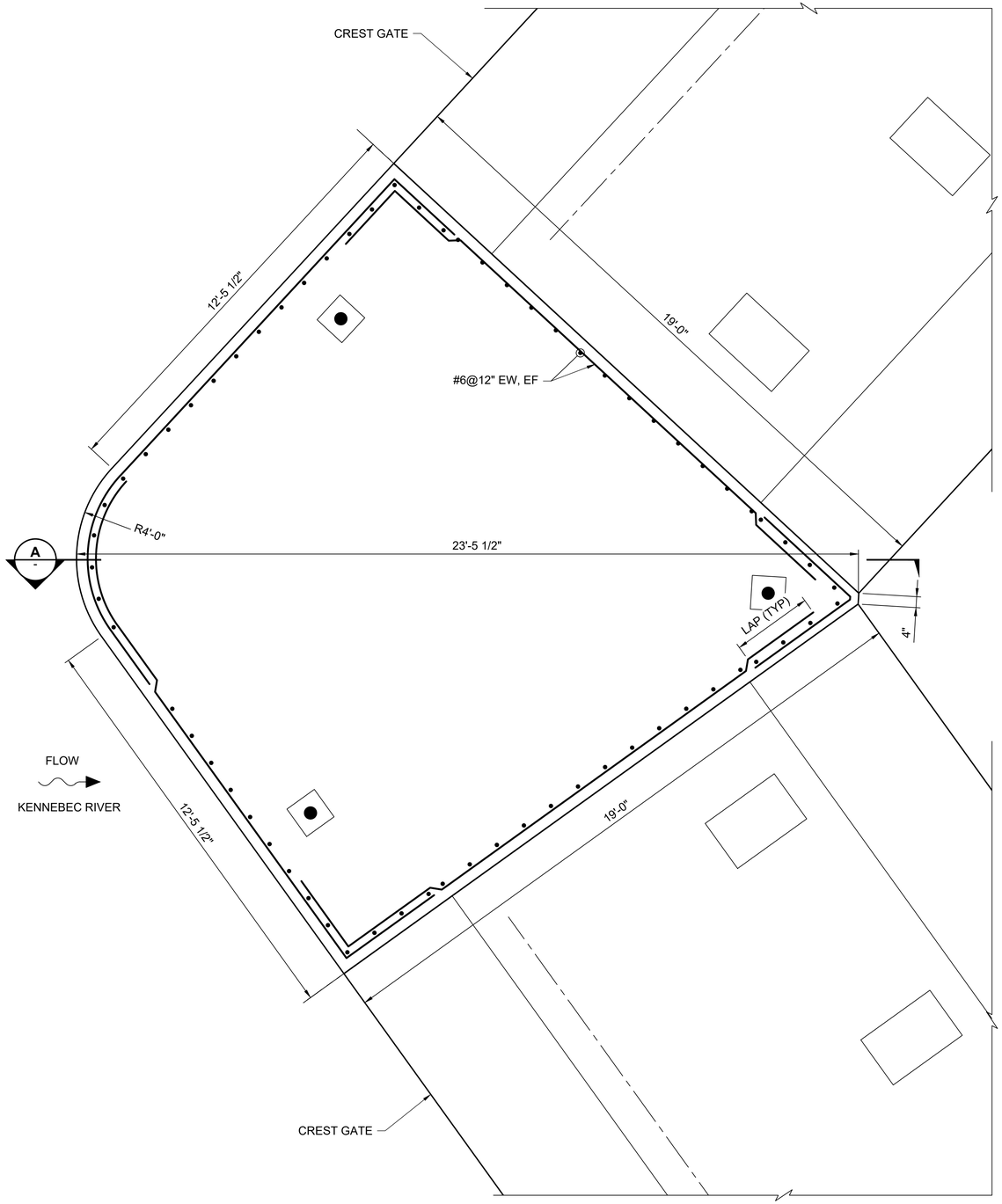
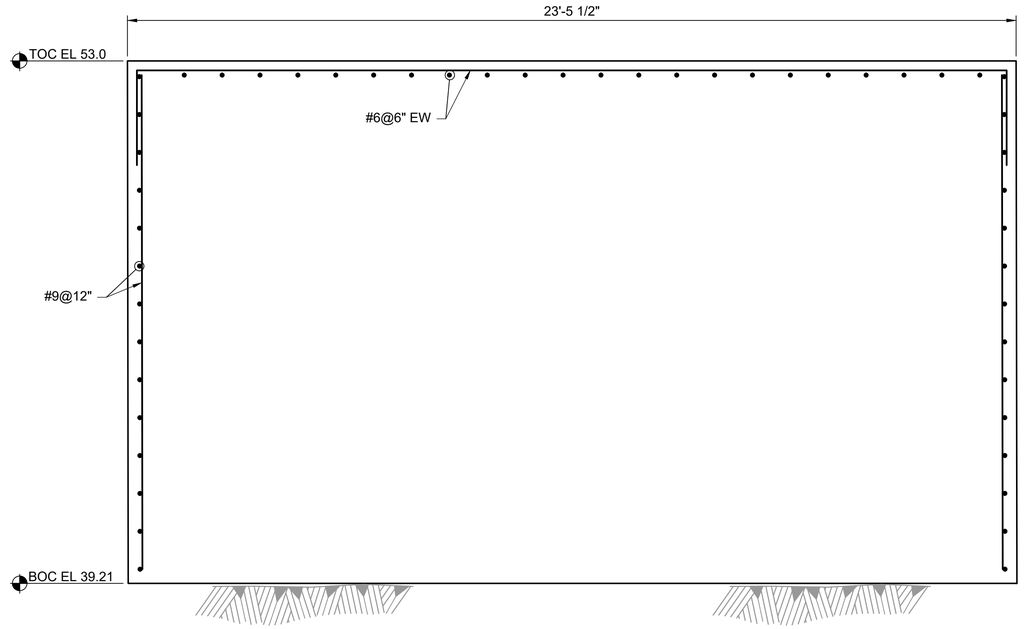
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

CREST GATE SECTION

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	65 OF 94
DRAWING:	S-311



PIER PLAN
SCALE: 1/2"=1'-0"



A - PIER SECTION
SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

PIER PLAN AND SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	66 OF 94
DRAWING:	S-312

DWG: S:\13100\Holden\Lockwood\000 CAD\02-sheets\S\S-312.dwg USER: MK400889
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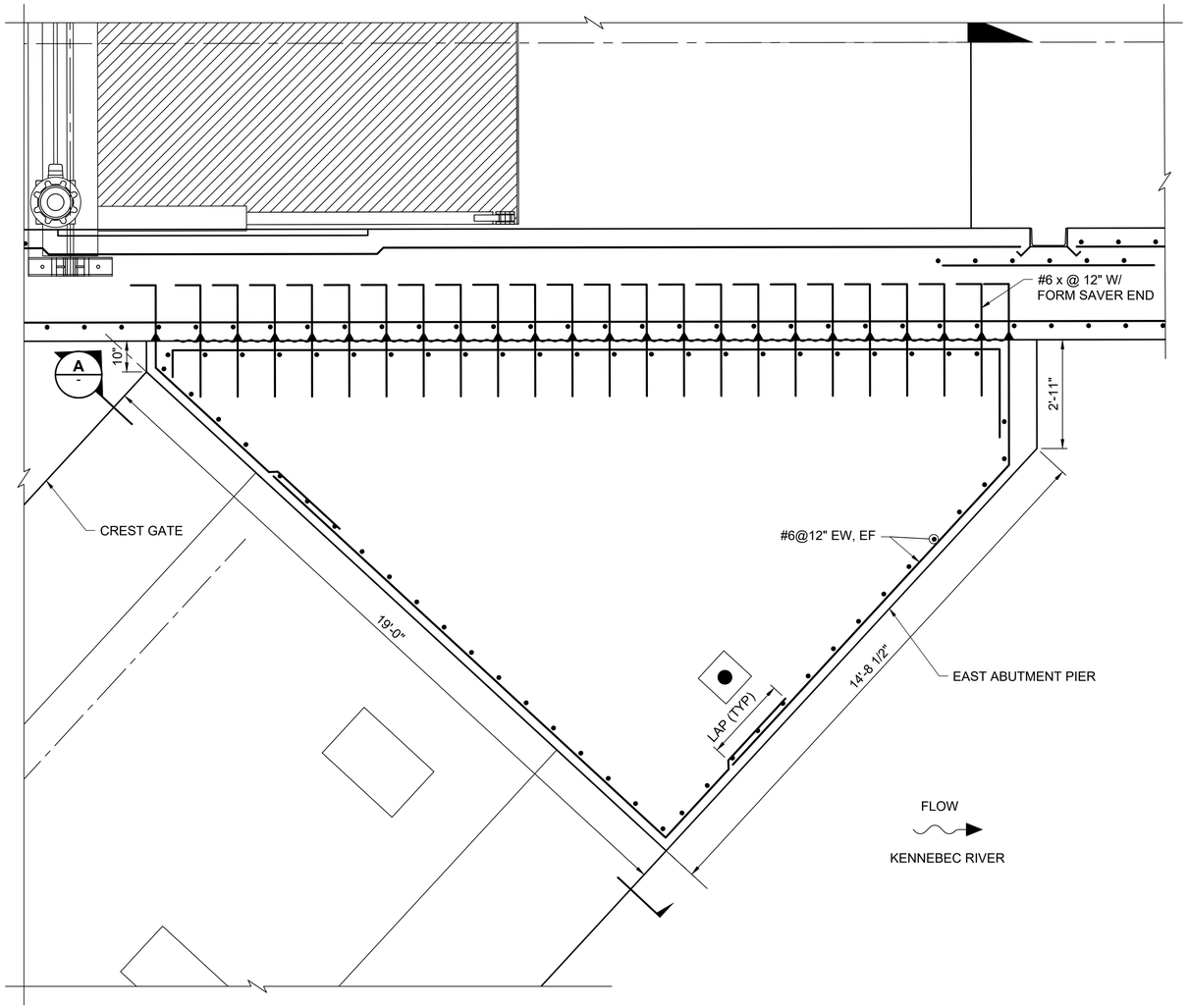
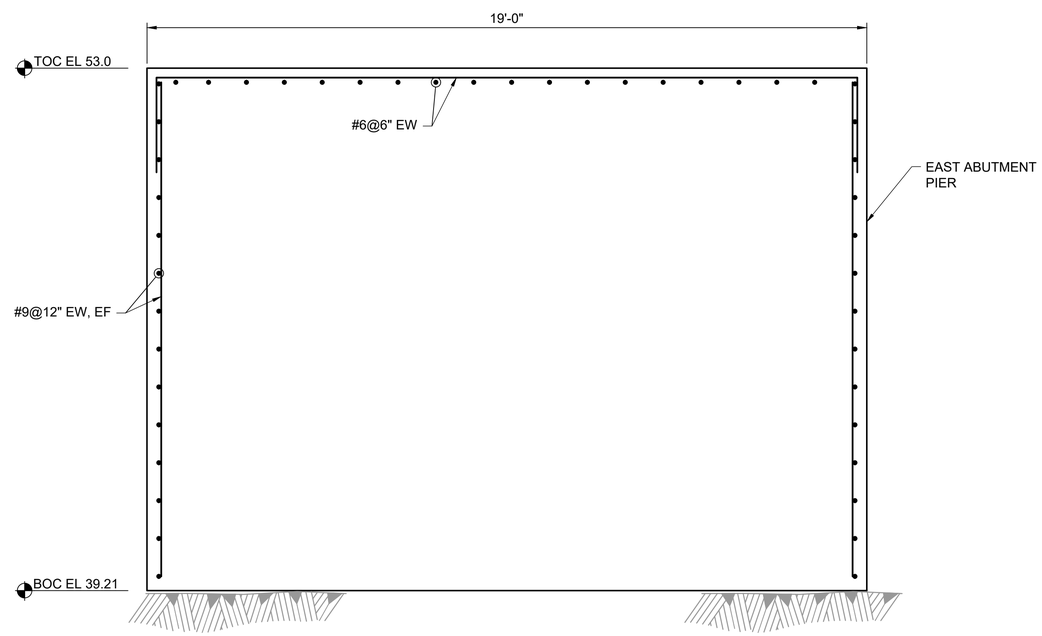


EAST ABUTMENT PLAN

SCALE: 1/2"=1'-0"



A - EAST PIER SECTION

SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

ABUTMENTS PLAN AND SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	67 OF 94
DRAWING:	S-313

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S3S-313.dwg USER: MK400889
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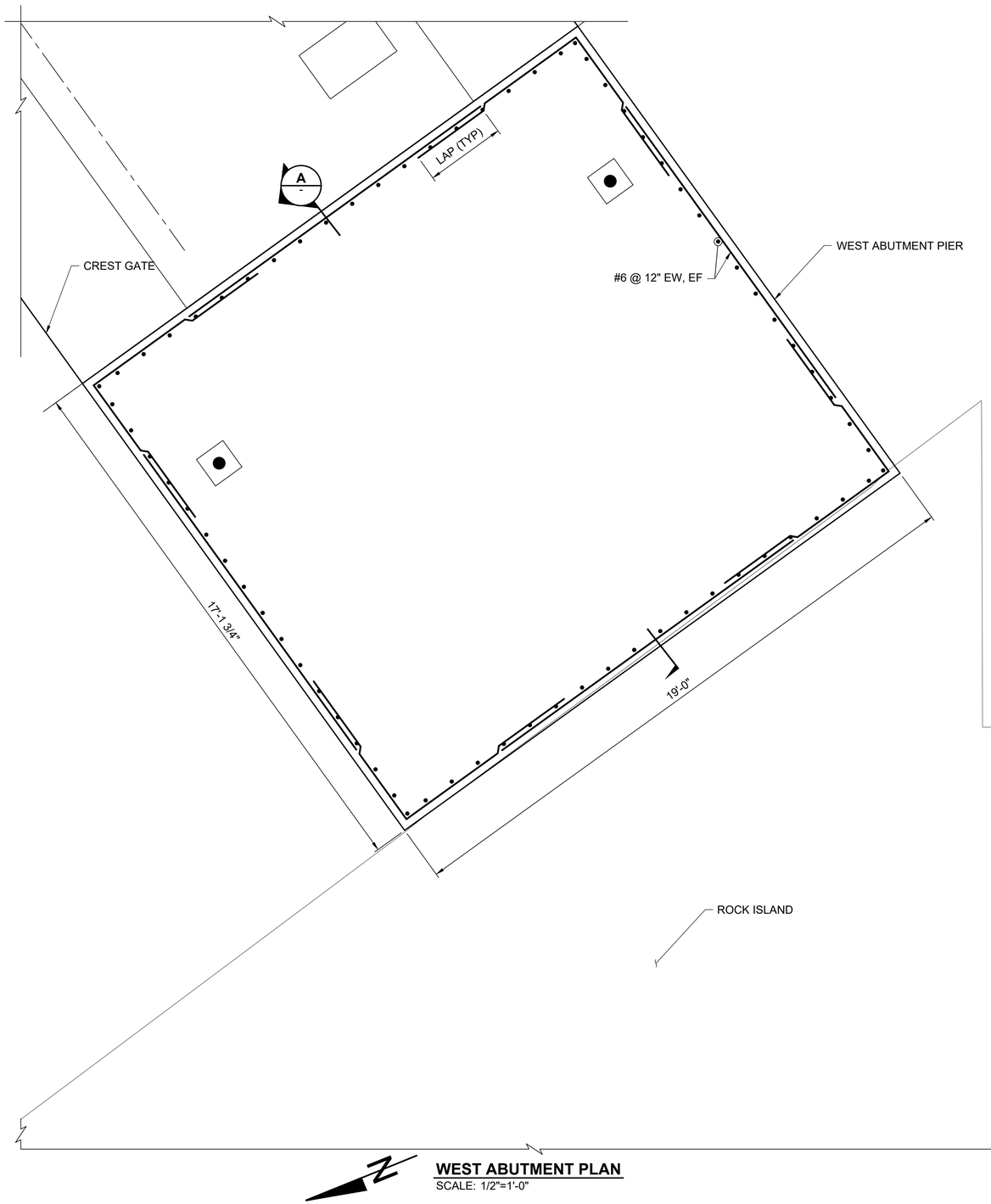
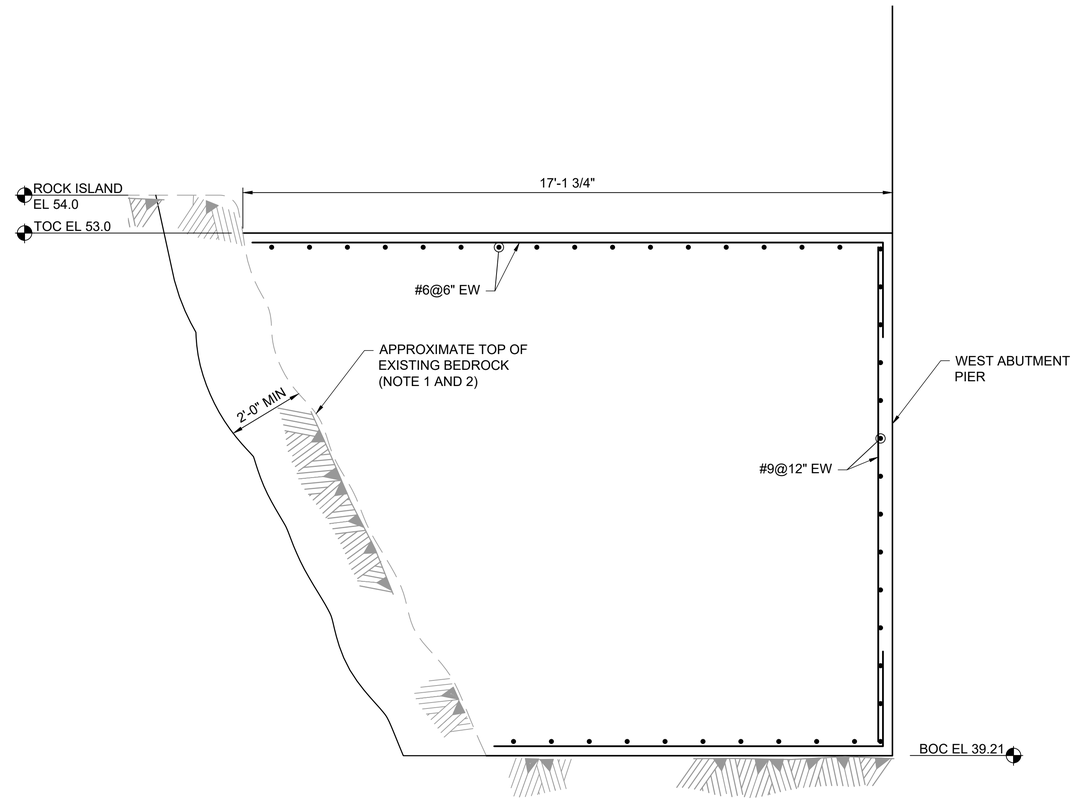


WEST ABUTMENT PLAN
SCALE: 1/2"=1'-0"

NOTES:

1. SURVEY EXISTING ROCK PROFILE PRIOR TO WEST ABUTMENT CONSTRUCTION.
2. PREPARE ROCK SURFACE PER 5/S-501 PRIOR TO MINIMUM 2' EXCAVATION FOR CONSTRUCTION OF WEST ABUTMENT.



A - WEST ABUTMENT SECTION
SCALE: 1/2"=1'-0"

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UPSTREAM FISH PASSAGE

ABUTMENTS PLAN AND SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	68 OF 94
DRAWING:	S-314

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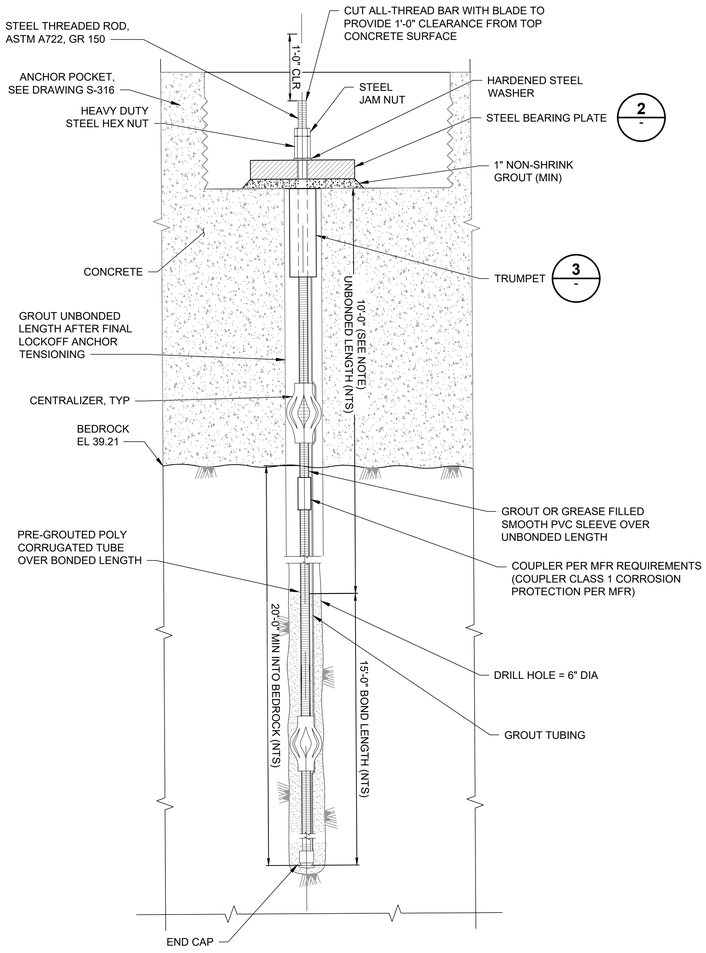
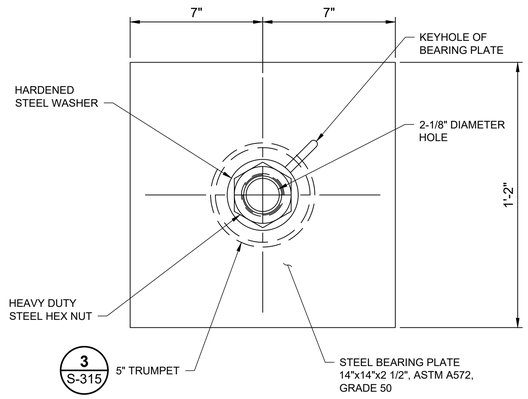
VERTICAL PT ANCHOR

TENDON:	1-3/4" NOMINAL DIAMETER, 150 KSI BAR
ALIGNMENT LOAD:	= 20 KIPS
DESIGN LOAD:	= 200 KIPS
LOCKOFF LOAD	= 233 KIPS
TEST LOAD	= 267 KIPS
UNBONDED LENGTH:	= 10.0 FT± (SEE NOTE)
BOND LENGTH:	= 15.0 FT

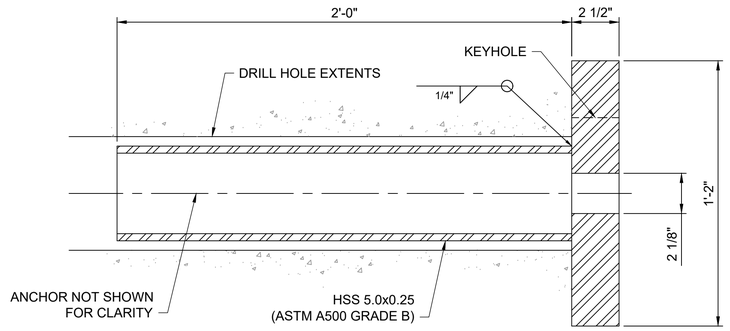
ANGLE = 0 DEGREES FROM VERTICAL
DO NOT EXCEED THE TEST LOAD
CLASS 1 DOUBLE CORROSION PROTECTION REQUIRED



1 S-310 **ANCHOR DETAIL**
SCALE: NTS



2 - **BEARING PLATE DETAIL**
SCALE: 3"=1'-0"



3 - **TRUMPET DETAIL**
SCALE: 3"=1'-0"

GENERAL ANCHOR INSTALLATION:

1. DRILL ANCHOR HOLE TO PRESCRIBED DEPTH, DIAMETER, ELEVATION, AND ANGLE SHOWN ON THE DRAWINGS.
2. FLUSH ALL CUTTINGS FROM HOLE.
3. PREPARE BEARING SURFACE FOR BEARING PLATE. ENSURE THERE IS NO LOOSE OR UNSOUND CONCRETE BELOW THE BEARING PLATE.
4. INSTALL ANCHOR BAR FULLY ASSEMBLED WITH END CAP, CENTRALIZERS, COUPLERS, AND GROUT TUBING. INSTALL ANCHOR BEARING PLATE AND GROUT BETWEEN BEARING PLATE AND CONCRETE BEARING SURFACE.
5. GROUT THE BOND LENGTH. THE CONTRACTOR SHALL SUBMIT A PLAN FOR APPROVAL DESCRIBING HOW THE BOND LENGTH WILL BE VERIFIED.
6. AFTER GROUT HAS CURED FOR 4 DAYS MINIMUM AND REACHED THE TARGET GROUT STRENGTH (4,000 PSI), TENSION THE ANCHORS PER THE PRESCRIBED STEP LOAD AND SEQUENCING PROVIDED.
7. GROUT THE UNBONDED ZONE ONCE LOCKOUT LOAD IS ACHIEVED. FILL THE TRUMPET WITH CORROSION INHIBITING COMPOUND.
8. FILL THE ANCHOR POCKET WITH STRUCTURAL CONCRETE.

POST-TENSIONING REQUIREMENTS:

1. THE POST-TENSIONING REQUIREMENTS PROVIDED HEREIN SHALL BE COMBINED WITH THE POST-TENSION ANCHOR SPECIFICATION 03 23 11.
2. ANCHOR IDENTIFICATION NUMBERS ARE DESIGNATED ON THE PLAN (DRAWING S-310).
3. THE FOLLOWING POST-TENSIONING PARAMETERS SHALL BE USED:
   a. STEP INCREMENT TENSIONING LOAD — 58,333 LBS/ANCHOR
   b. ESTIMATED ELONGATION, EACH STEP LOAD UNBONDED LENGTH) — 0.24-INCHES/STEP LOAD (ASSUMES 26'
   c. FINAL LOCKOFF LOAD — 233 KIPS/ANCHOR
   d. ESTIMATED ELONGATION AT FINAL LOCKOFF LOAD LENGTH) — 0.97-INCHES (TOTAL) (ASSUMES 26' UNBONDED
4. THE STEP INCREMENT AND FINAL LOCKOFF LOADS SHALL NOT BE CHANGED OR MODIFIED WITHOUT PRIOR WRITTEN APPROVAL OF THE ENGINEER.
5. THE ENGINEER SHALL BE PRESENT DURING ALL POST-TENSIONING ACTIVITIES.

POST-TENSIONING SEQUENCE NOTES:

1. USING THE GENERAL PROCESS DESCRIBED BELOW AND THE TABLE PROVIDED, INCREMENTALLY TENSION EACH ANCHOR IN THE SEQUENCE SHOWN.
2. ALL (18) ANCHORS SHALL BE INCREMENTALLY TENSIONED TO THE SAME MAGNITUDE OF LOAD, PRIOR TO INCREMENTALLY TENSIONING ANY ANCHOR TO A HIGHER LOAD.
3. TEMPORARILY LOCKOFF EACH ANCHOR AFTER EACH STEP INCREMENT LOAD IS APPLIED, BEFORE UNLOADING THE TENSIONING EQUIPMENT AND MOVING TO THE NEXT ANCHOR.

POST-TENSIONING ACTIVITY SEQUENCE

STEP	ACTIVITY	APPLIED LOAD	NOTES
1	STEP TENSION EACH POST-TENSIONING ANCHOR	25% LOCKOFF	ORDER OF POST-TENSIONING SEQUENCE:
2	STEP TENSION EACH POST-TENSIONING ANCHOR	50% LOCKOFF	ORDER OF POST-TENSIONING SEQUENCE:
3	STEP TENSION EACH POST-TENSIONING ANCHOR	75% LOCKOFF	ORDER OF POST-TENSIONING SEQUENCE:
4	STEP TENSION EACH POST-TENSIONING ANCHOR	100% LOCKOFF	ORDER OF POST-TENSIONING SEQUENCE:
5	TEMPORARILY LOCKOFF ALL POST-TENSIONING ANCHORS		
6	SUBMIT POST-TENSIONING RECORDS TO THE ENGINEER FOR REVIEW AND APPROVAL		
7	UPON RECEIPT OF THE ENGINEER'S WRITTEN APPROVAL OF POST-TENSIONING RECORDS SUBMITTAL, PERMANENTLY LOCKOFF ALL POST-TENSIONING ANCHORS		
8	GROUT THE UNBONDED LENGTH FOR EACH POST-TENSIONING ANCHOR		
9	FILL THE ANCHOR POCKETS WITH CONCRETE. SEE DRAWING S-316.		

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

CREST GATE POST-TENSION ANCHOR DETAIL

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	69 OF 94
DRAWING:	S-315

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\S-315.dwg USER: MKA00889
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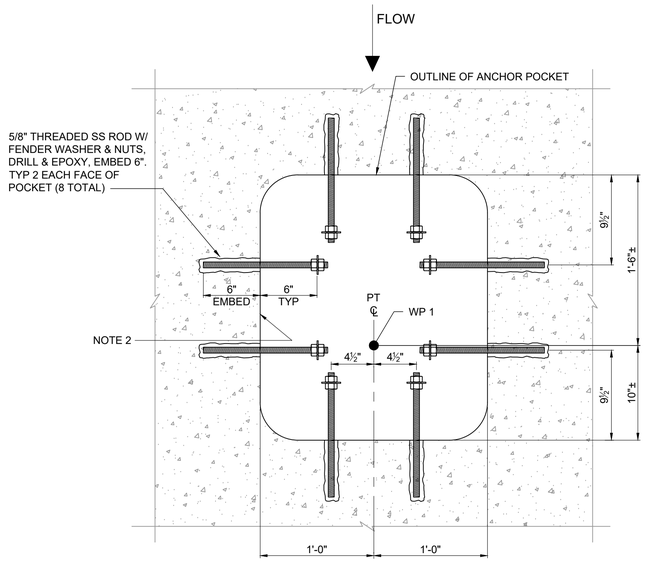
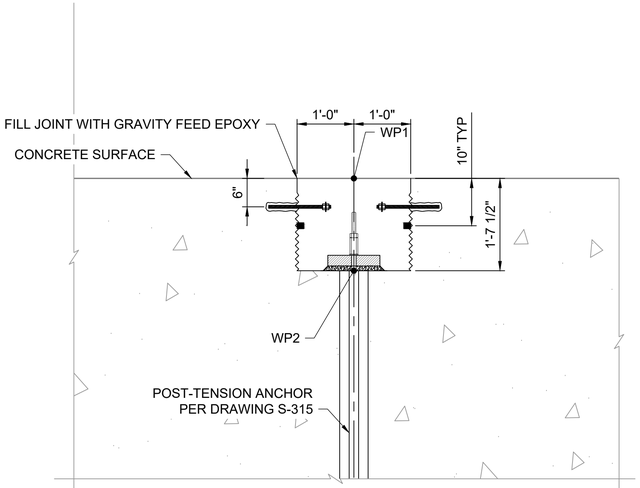


1 / - **ANCHOR POCKET (ENLARGED PLAN)**
SCALE: 1 1/2"=1'-0"



2 / - **ANCHOR POCKET DETAIL**
SCALE: 3/4"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
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UPSTREAM FISH PASSAGE

CREST GATE POST-TENSION ANCHOR DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	70 OF 94
DRAWING:	S-316

DWG: S:\131009\Hdoc\Lockwood\900 CAD\02-sheets\S\S-316.dwg USER: MKA0089
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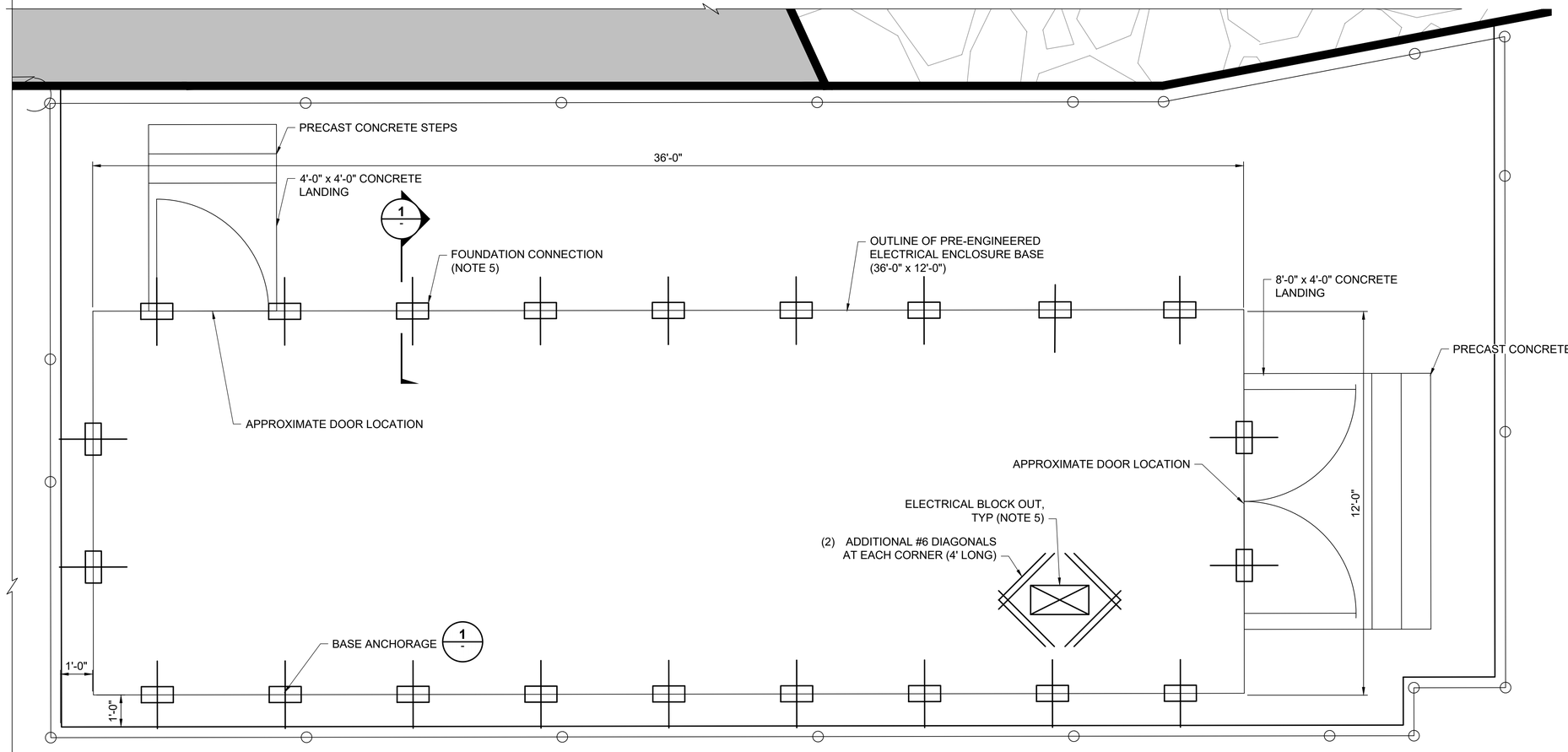


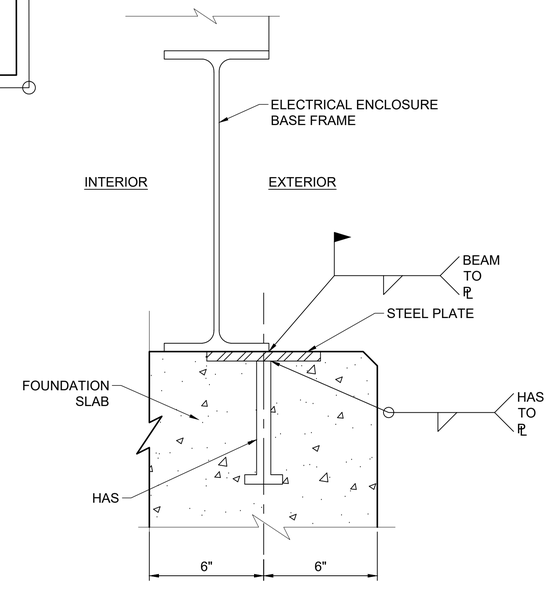
ELECTRICAL ENCLOSURE PLAN
SCALE: 1/2"=1'-0"

NOTES:

1. SEE SPECIFICATION SECTION 01 81 10 FOR STRUCTURAL DESIGN CRITERIA.
2. SEE SPECIFICATIONS 26 27 16 FOR PRE-ENGINEERED ELECTRICAL ENCLOSURE.
3. FOUNDATION DIMENSIONS ARE BASED ON 36'-0" x 12'-0" ELECTRICAL ENCLOSURE. FOUNDATION DIMENSIONS SHALL BE VERIFIED WITH THE ACTUAL ELECTRICAL ENCLOSURE SUPPLIED.
4. ELECTRICAL ENCLOSURE ANCHORAGE TO THE CONCRETE FOUNDATION SHALL BE DESIGNED AND DETAILED BY THE ELECTRICAL ENCLOSURE MFR. CONNECTION LOCATIONS SHALL BE DETERMINED BY ELECTRICAL ENCLOSURE MFR.
5. PROPOSED OPENINGS IN CONCRETE FOUNDATION SLAB FOR CONDUIT AND ELECTRICAL DUCTS SHALL BE REVIEWED BY THE ENGINEER AND COORDINATED WITH ELECTRICAL PRIOR TO CONSTRUCTION.

CONNECTION NOTES:

1. EXAMPLE WELDED CONNECTION DETAIL IS PROVIDED FOR REFERENCE ONLY. CONNECTION DETAIL INSTALLED SHALL BE DESIGNED AND DETAILED BY THE ELECTRICAL ENCLOSURE MFR. CONNECTION LOCATIONS SHALL BE DETERMINED BY ELECTRICAL ENCLOSURE MFR.
2. FIELD PAINT AFTER WELDING W/ SYSTEM NO. 10 (SPECIFICATION SECTION 09 90 00)



1 - BASE ANCHORAGE DETAIL
SCALE: 3"=1'-0"

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FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

ELECTRICAL ENCLOSURE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	71 OF 94
DRAWING:	S-317

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\S\S-317.dwg USER: MKA00889
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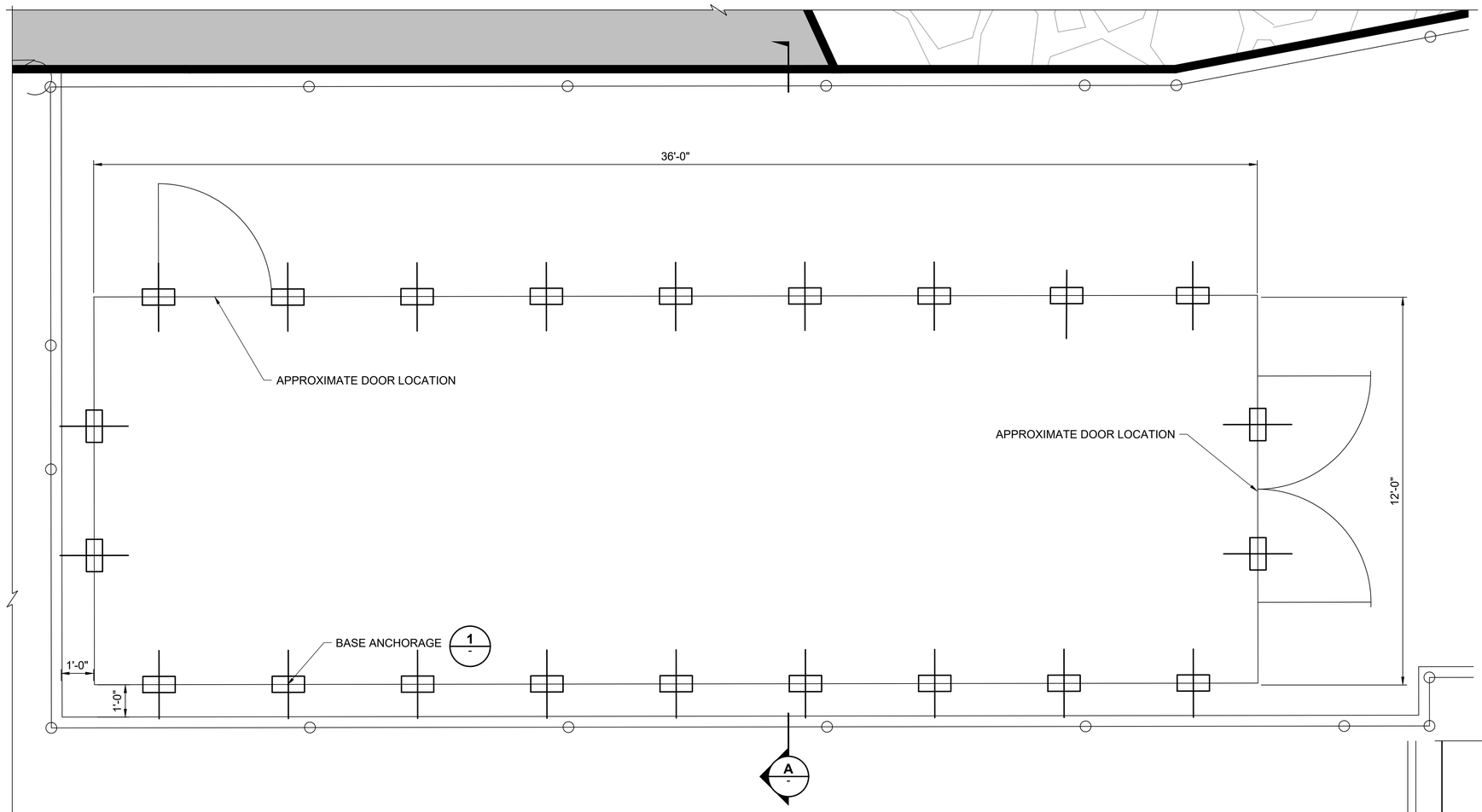
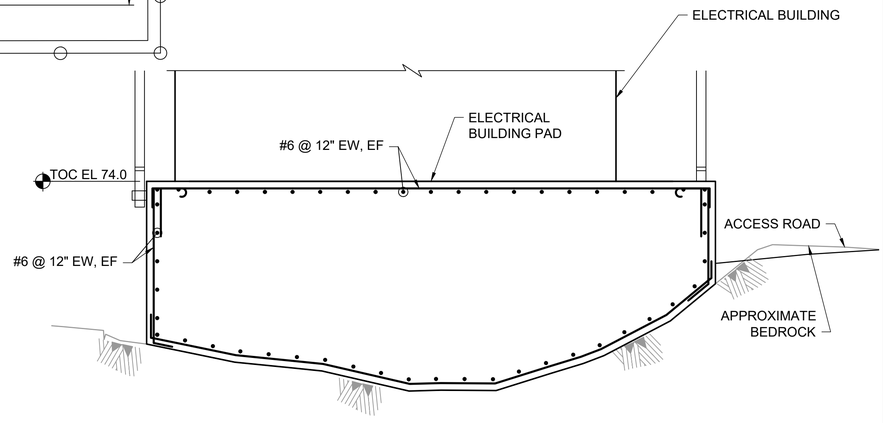


ELECTRICAL ENCLOSURE PLAN
SCALE: 1/2"=1'-0"

BASE ANCHORAGE NOTES:

1. EXAMPLE BASE ANCHORAGE DETAIL PROVIDED FOR REFERENCE ONLY. BASE ANCHORAGE DETAIL INSTALLED SHALL BE DESIGNED BY THE ELECTRICAL ENCLOSURE MFR.
2. ANCHOR SIZE AND LOCATION SHALL BE PER THE ELECTRICAL ENCLOSURE MFR.



A
-
SECTION
SCALE: 3/8"=1'-0"

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UPSTREAM FISH PASSAGE

ELECTRICAL SLAB PLAN, SECTION AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	72 OF 94
DRAWING:	S-318

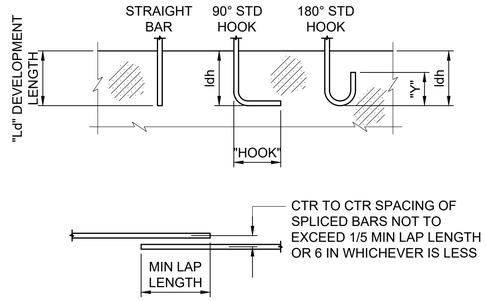
DWG: S:\131009\Hdr\en\Lockwood\900 CAD\02-sheets\S\S-318.dwg USER: MKA00589
DATE: Feb 03, 2021 10:14am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-PP C-LCKWD-LP S-LCKWD-SEC C-LCKWD-SV IMAGES:

f'c = 4500 psi		fy = 60,000 psi		bar spacing = 6" min				
BAR SIZE	DIAMETER (d_b) (INCHES)	DEVELOPMENT LENGTH (l_d) (INCHES)		CLASS B LAP SPLICE (INCHES)		90° STD HOOK (INCHES)		180° STD HOOK "Y"
		"TOP" BARS	OTHER	"TOP" BARS	OTHER	HOOK	l_{dh}	
		REINFORCING BARS IN TENSION						
#3	0.375	12	12	16	16	6	6	4
#4	0.5	14	12	19	16	8	7	5
#5	0.625	18	14	24	19	10	8	5
#6	0.75	21	17	28	23	12	10	6
#7	0.875	31	24	41	32	14	11	7
#8	1.0	35	27	46	36	16	13	8
#9	1.128	44	34	58	45	20	15	11
#10	1.270	52	40	68	52	22	16	12
#11	1.375	62	48	81	63	24	18	13
REINFORCING BARS IN COMPRESSION								
#3	0.375	8		12		HOOKED BARS SHALL NOT BE USED IN COMPRESSION		
#4	0.5	9		15				
#5	0.625	12		19				
#6	0.75	14		23				
#7	0.875	16		27				
#8	1.0	18		30				
#9	1.125	21		34				
#10	1.270	23		38				
#11	1.375	25		42				

f'c = 4500 psi		fy = 60,000 psi		bar spacing = 2*d_b min				
BAR SIZE	DIAMETER (d_b) (INCHES)	DEVELOPMENT LENGTH (L_d) (INCHES)		CLASS B LAP SPLICE (INCHES)		90° STD HOOK (INCHES)		180° STD HOOK "Y"
		"TOP" BARS	OTHER	"TOP" BARS	OTHER	HOOK	l_{dh}	
		REINFORCING BARS IN TENSION						
#3	0.375	27	21	36	28	6	6	4
#4	0.5	35	27	46	36	8	7	5
#5	0.625	44	34	58	45	10	8	6
#6	0.75	53	41	69	54	12	10	6
#7	0.875	77	59	101	77	14	11	7
#8	1.0	88	68	115	89	16	13	8
#9	1.128	98	76	128	99	20	15	11
#10	1.270	108	83	141	108	22	16	12
#11	1.375	147	113	192	147	24	18	13
REINFORCING BARS IN COMPRESSION								
#3	0.375	8		12		HOOKED BARS SHALL NOT BE USED IN COMPRESSION		
#4	0.5	9		15				
#5	0.625	12		19				
#6	0.75	14		23				
#7	0.875	16		27				
#8	1.0	18		30				
#9	1.125	21		34				
#10	1.270	23		38				
#11	1.375	25		42				

NOTES:

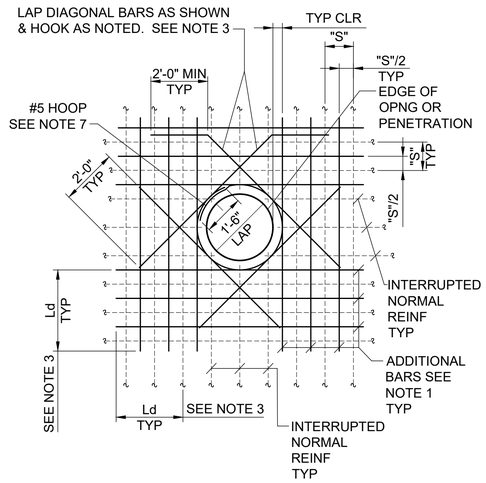
1. "TOP" BARS SHALL BE HORIZONTAL REINFORCEMENT PLACED SO THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE DEVELOPMENT LENGTH OR SPLICE.
2. ALL LAP SPLICES SHALL BE CLASS B UNLESS NOTED OTHERWISE.
3. SPLICES ARE TO BE MADE SO THAT THE GIVEN DISTANCES TO FACE OF CONCRETE WILL BE MAINTAINED.

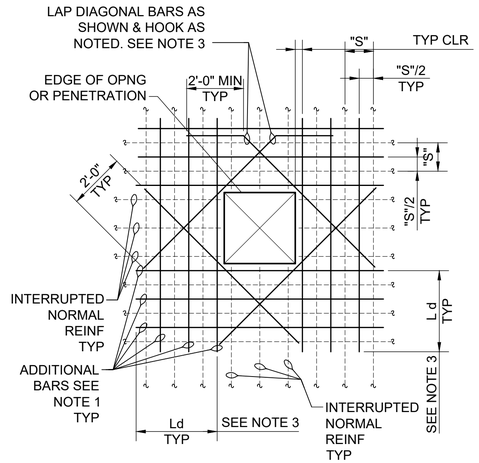


1 - STANDARD HOOK AND REINF LAP SPLICE
SCALE: NTS

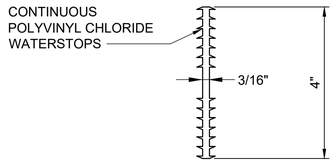
NOTES:

1. NUMBER OF ADD'L REINF BARS AT EA SIDE OF OPNG SHALL EQUAL HALF THE NUMBER OF INTERRUPTED BARS IN EACH LAYER OF REINF, 2 MIN.
2. SIZE OF ADD'L REINF BARS TO EQUAL SIZE OF INTERRUPTED REINF BARS.
3. PROVIDE STD HOOKS FOR BARS IF LAP LENGTH EXTENSION CANNOT BE OBTAINED AT JOINTS OR OTHER OBSTRUCTIONS. PLACE ADDITIONAL BARS IN SAME PLANES AS INTERRUPTED REINF.
4. SIZE OF DIAGONAL BARS SHALL BE THE SIZE OF THE LARGEST NORMAL REINF BAR CUT, UON. LOCATE DIAGONALS IN EACH LAYER OF REINF.
5. PLACE DIAGONAL BARS INSIDE NORMAL REINF.
6. ALL REINF TO CLEAR OPNG OR FLANGE COLLARS BY 2".
7. PROVIDE ADD'L HOOP @ EACH LAYER OF REINF.



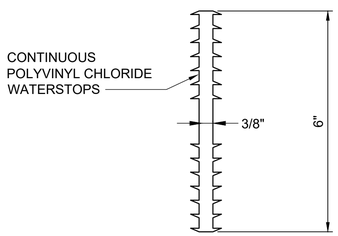


2 - ADDITIONAL REINF BAR DETAILS
SCALE: NTS



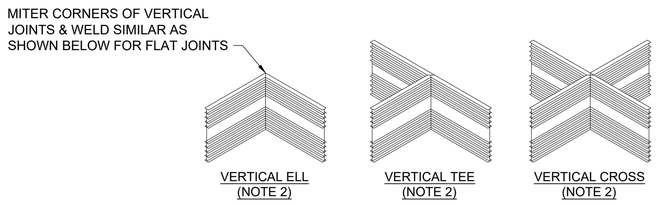
SEE JT NOTES & SPECIFICATIONS FOR REQD LOCATIONS

4" PVC FLAT WATERSTOP

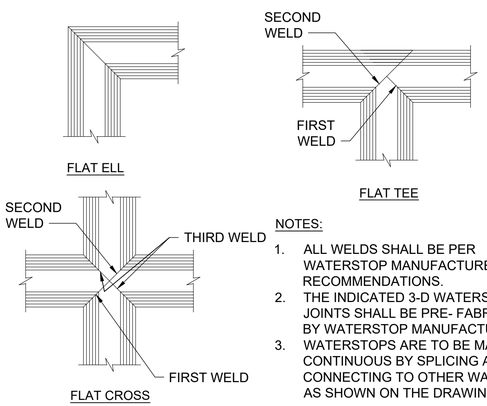


SEE JT NOTES & SPECIFICATIONS FOR REQD LOCATIONS

6" PVC FLAT WATERSTOP



WATERSTOP 3-D JOINTS

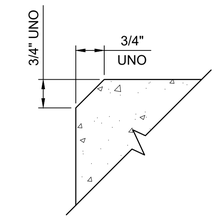


NOTES:

1. ALL WELDS SHALL BE PER WATERSTOP MANUFACTURER'S RECOMMENDATIONS.
2. THE INDICATED 3-D WATERSTOP JOINTS SHALL BE PRE- FABRICATED BY WATERSTOP MANUFACTURER.
3. WATERSTOPS ARE TO BE MADE CONTINUOUS BY SPLICING AND CONNECTING TO OTHER WATERSTOPS AS SHOWN ON THE DRAWINGS.

WATERSTOP SPLICE DETAILS

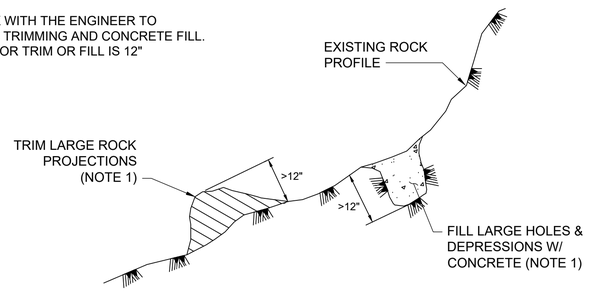
3 - PVC WATERSTOPS
SCALE: NTS



4 - CHAMFER DETAIL
SCALE: NTS

NOTES:

1. THE CONTRACTOR SHALL WORK WITH THE ENGINEER TO IDENTIFY LOCATIONS FOR ROCK TRIMMING AND CONCRETE FILL.
2. MINIMUM LENGTH OF SECTION FOR TRIM OR FILL IS 12"



5 - ROCK SURFACE PREPARATION DETAIL
SCALE: NTS

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FOR AGENCY REVIEW
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DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
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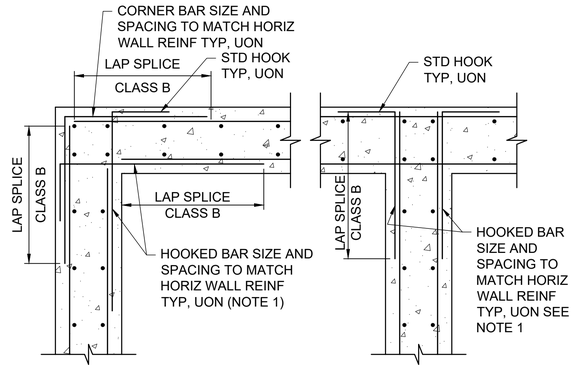
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

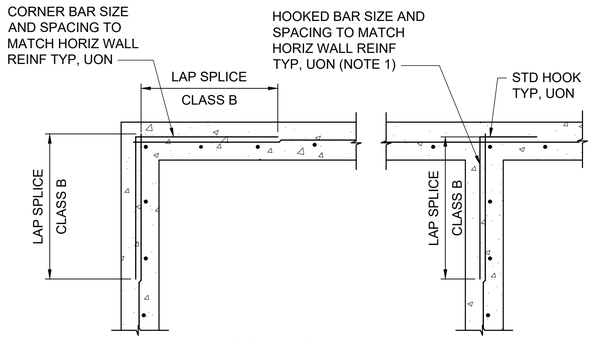
STRUCTURAL STANDARD DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	73 OF 94
DRAWING:	S-501

DWG: S:\13\09\Holden\Lockwood\900 CAD\02-sheets\S\S-501.dwg USER: MK400889
DATE: Feb 03, 2021 10:14am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



TYPICAL PLAN
REINFORCING EACH FACE

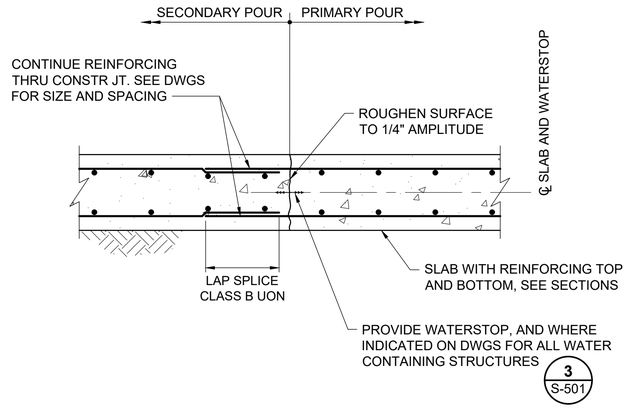


TYPICAL PLAN
SINGLE LAYER REINFORCING

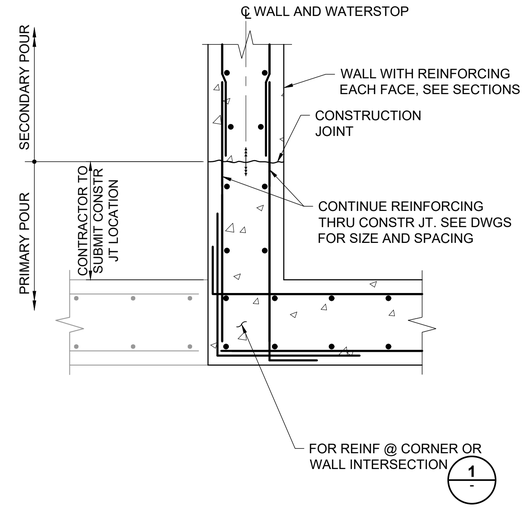
NOTE:

IN LIEU OF SEPARATE HOOKED BAR, CONTRACTOR OPTION TO USE HORIZ REINF WITH STD HOOK EA END.

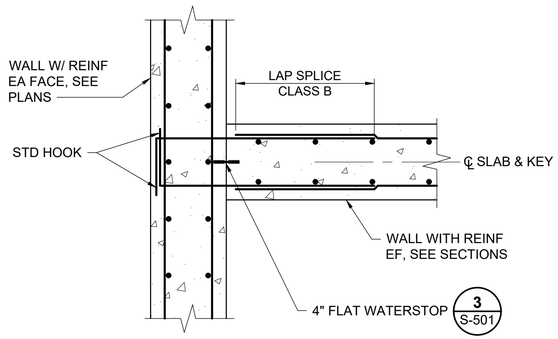
1 / - WALL INTERSECTION / CORNER REINF
SCALE: NTS



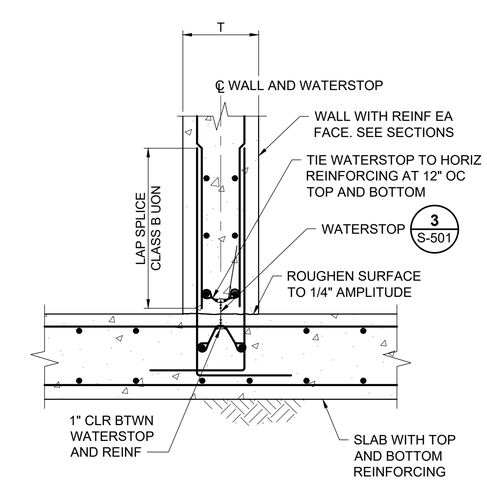
2 / - CONSTRUCTION JOINT (CJ)
SCALE: NTS



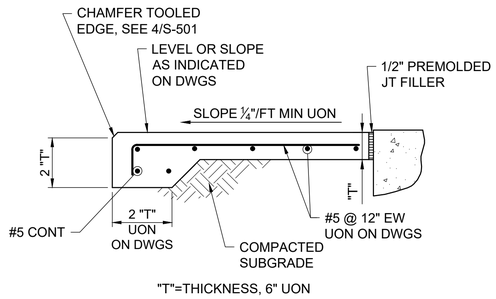
3 / - CONSTRUCTION JOINT-WALL TO WALL
SCALE: NTS



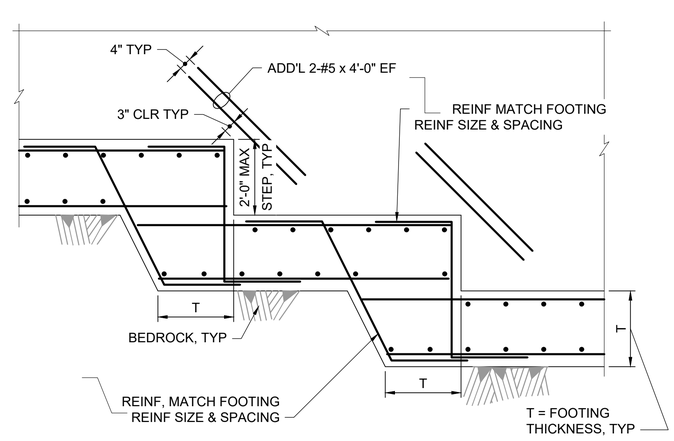
4 / - CONSTRUCTION JOINT-WALL TO WALL
SCALE: NTS



5 / - CONSTRUCTION JOINT-WALL TO SLAB
SCALE: NTS



6 / - TYP THIICKENED SLAB ON GRADE
SCALE: NTS



7 / - STEPPED FOOTING
SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL STANDARD DETAILS

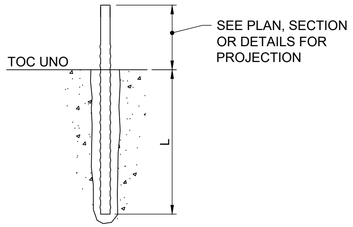
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	74 OF 94
DRAWING:	S-502

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S5-502.dwg USER: MKA00689
DATE: Feb 03, 2021 10:15am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES

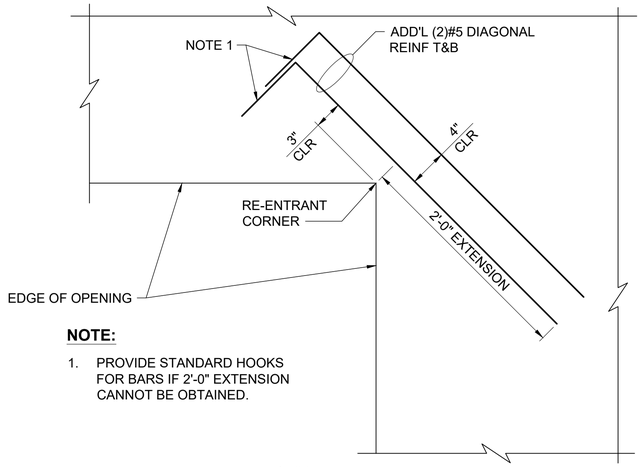
NOTES:

1. DOWEL EDGE DISTANCE SHALL BE A MINIMUM OF 1.5 X L, UNO ON THE DRAWINGS. SMALLER EDGE DISTANCES SHALL BE APPROVED BY THE ENGINEER OF RECORD.
2. MINIMUM CENTER TO CENTER SPACING OF DOWELS SHALL BE 3 X L, UNO ON THE DRAWINGS. SMALLER BOLT SPACINGS SHALL BE APPROVED BY THE ENGINEER OF RECORD.
3. HOLES SHALL BE DRILLED USING A HAMMER DRILL AND CARBIDE BIT, OR EQUAL.
4. REINFORCEMENT SHALL BE ASTM A615 GRADE 60.

BAR SIZE	"L" MIN (IN)
4	6
5	8
6	10
7	13.5
8	16
9	18.5
10	21



1 REBAR ADHESIVE ANCHOR DEAIL
SCALE: NTS



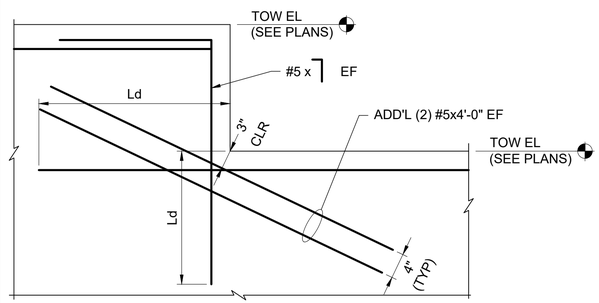
NOTE:

1. PROVIDE STANDARD HOOKS FOR BARS IF 2'-0" EXTENSION CANNOT BE OBTAINED.

PLAN

2 RE-ENTRANT CORNER DETAIL
SCALE: 1-1/2"=1'-0"

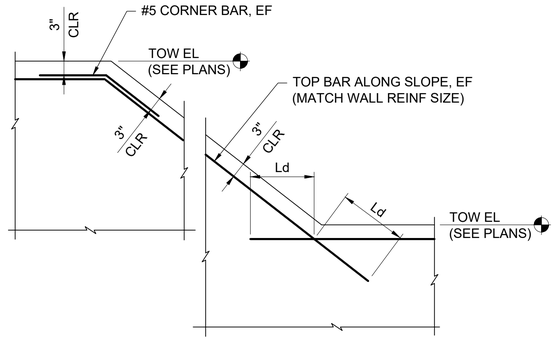
NOTE:
Ld SHALL BE DEVELOPMENT LENGTH PER DETAIL 1/S-501



ELEVATION

3 STEP IN TOP OF WALL DETAIL
SCALE: 1"=1'-0"

NOTE:
Ld SHALL BE DEVELOPMENT LENGTH PER DETAIL 1/S-501

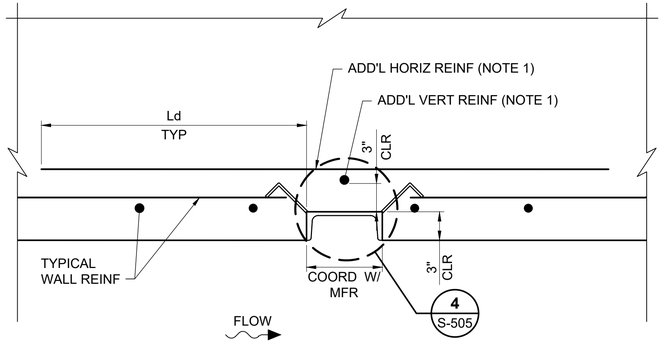


ELEVATION

4 SLOPING TOP OF WALL DETAIL
SCALE: 1/4"=1'-0"

NOTES:

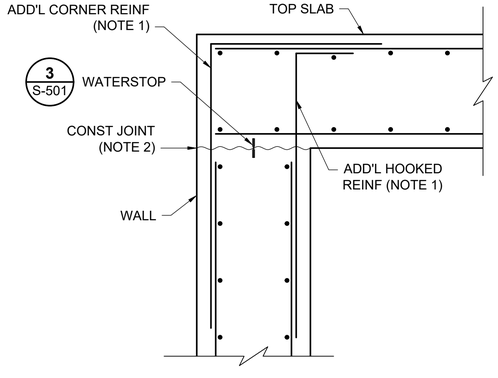
1. ADD'L REINF SIZE AND SPACING SHALL MATCH WALL REINF.
2. Ld SHALL BE DEVELOPMENT LENGTH PER DETAIL 1/S-503.



5 BULKHEAD/STOPLOG SLOT REINF DETAIL
SCALE: 1-1/2"=1'-0"

NOTES:

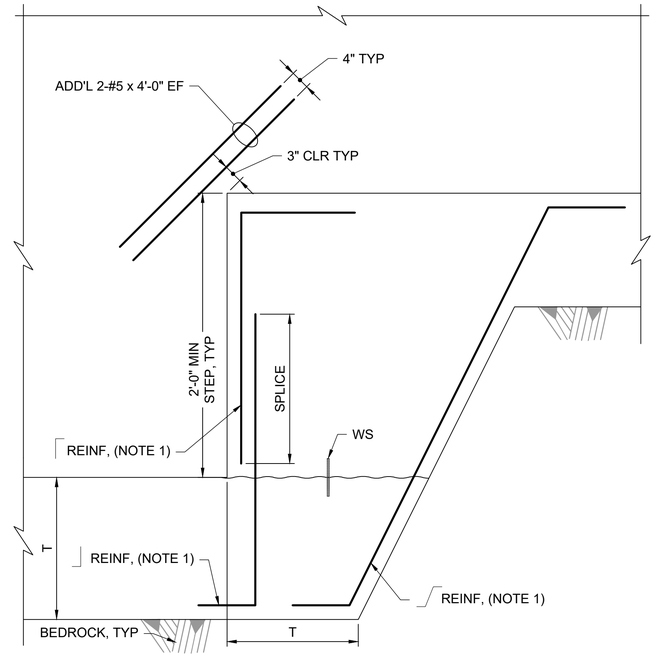
1. ADD'L REINF SIZE & SPACING SHALL MATCH WALL REINF.
2. ROUGHEN SURFACE TO 1/4" AMPLITUDE.



6 TOP SLAB TO WALL DETAIL
SCALE: NTS

NOTE:

1. MATCH BASE SLAB REINF SIZE & SPACING.



7 LARGE STEP IN FOUNDATION/BASE SLAB
SCALE: NTS

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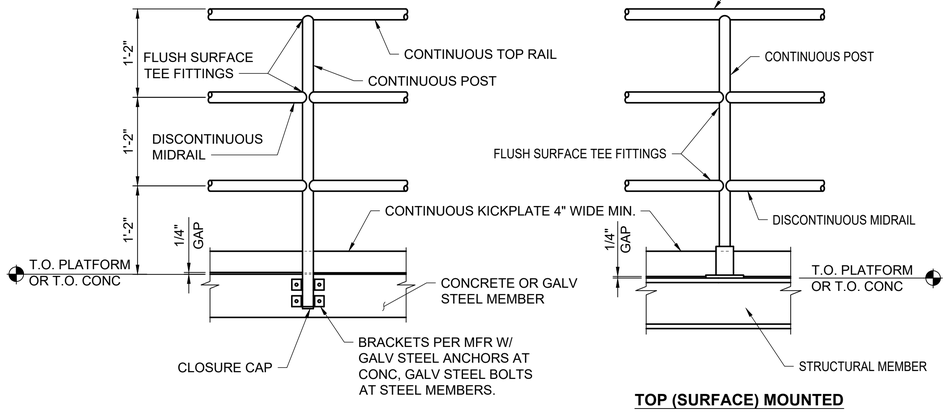
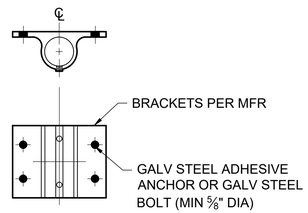
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	75 OF 94
DRAWING:	S-503

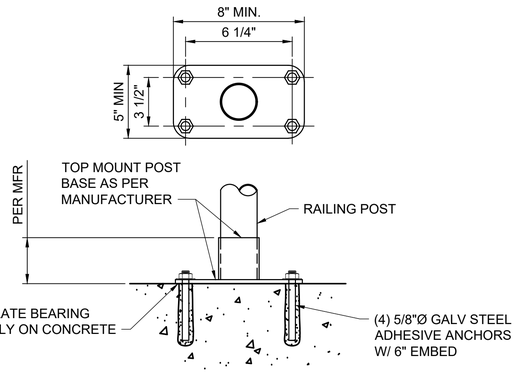


SIDE MOUNTED POST DETAIL

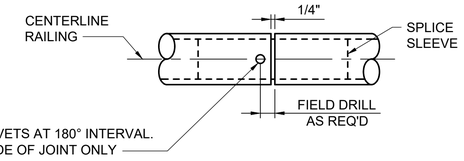
TOP (SURFACE) MOUNTED



SIDE MOUNTED



TOP (SURFACE) POST DETAIL

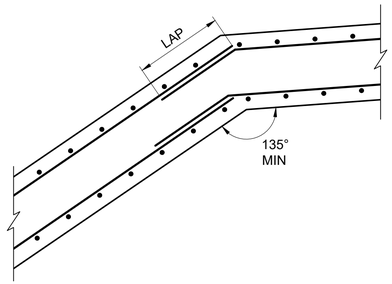


RAIL SPLICE DETAIL

RAILING NOTES

1. ALL RAILING, KICKPLATES, AND ACCESSORIES SHALL BE GALVANIZED STEEL, PER SPECIFICATIONS.
2. ALL RAILS AND POSTS MUST BE SIZED AND SPACED TO SATISFY ALL APPLICABLE CODES AND STANDARDS. MAX POST SPACING = 4'-0".
3. MAXIMUM RAIL SPLICE LENGTH = 24'-0".
4. ALL RAILING SHALL BE SIDE MOUNTED UNLESS OTHERWISE NOTES.

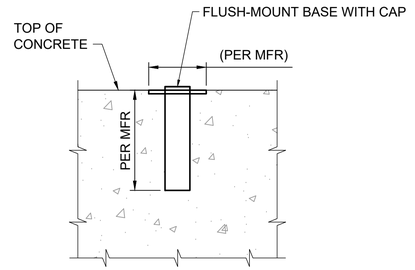
1 - HANDRAIL DETAIL
SCALE: NTS



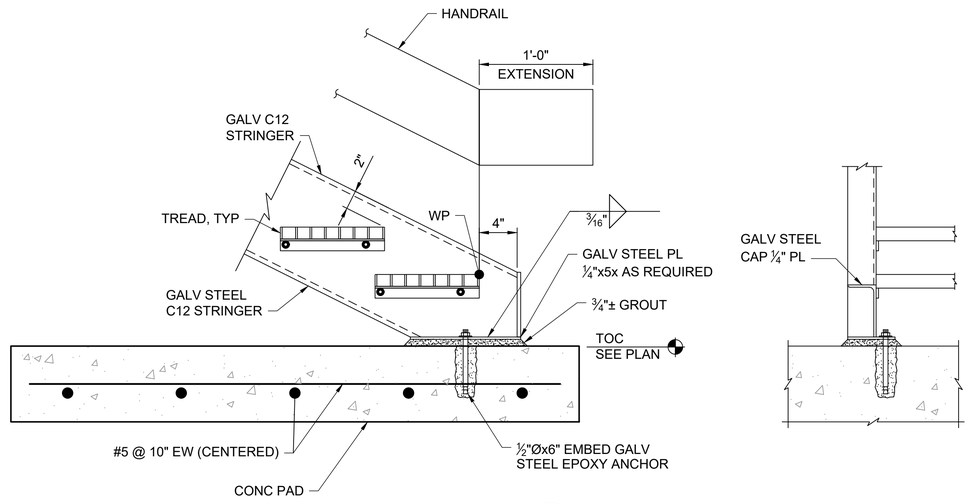
2 - CORNER DETAIL
SCALE: 1/2" = 1'-0"

NOTES:

1. FLUSH FLOOR MOUNT SLEEVE SHALL BE MADE OF STURCTURAL STEEL.
2. LOCATE SLEEVE AT DIRECTION OF OWNER.
3. EACH MOUNT SHALL HAVE A CAP TO KEEP WATER AND DEBRIS OUT OF BASE.



3 - SAFETY ANCHORAGE BASE
SCALE: 3/4"=1'-0"



4 - LANDING DETAIL
SCALE: 1 1/2"=1'-0"

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NOT FOR CONSTRUCTION
DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
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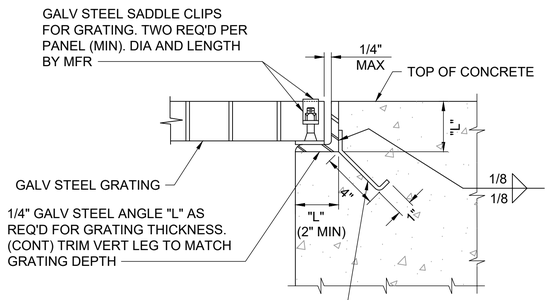
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL STANDARD DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	76 OF 94
DRAWING:	S-504

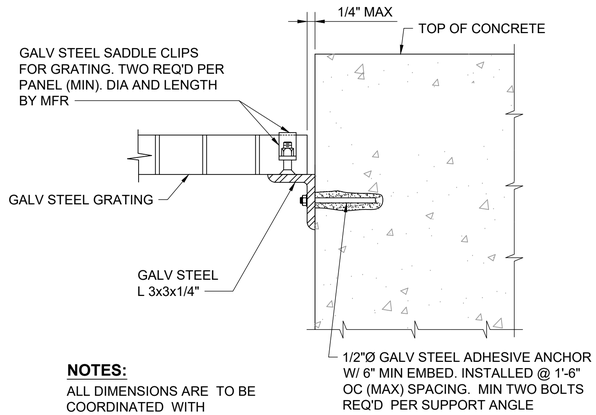
DWG: S:\131009\Hdlen\Lockwood\900 CAD\02-sheets\S5-504.dwg USER: MKA00689
DATE: Feb 03, 2021 10:15am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES



NOTES:

ALL DIMENSIONS ARE TO BE COORDINATED WITH GRATING MFR.

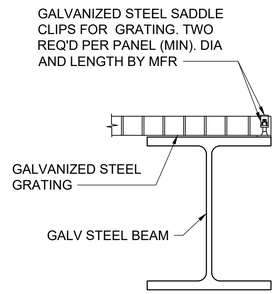
1 - GRATING SUPPORT TYPE 1
SCALE: NTS



NOTES:

ALL DIMENSIONS ARE TO BE COORDINATED WITH GRATING MFR.

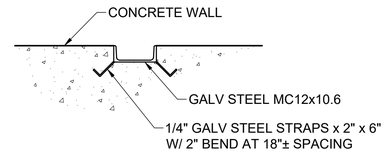
2 - GRATING SUPPORT TYPE 2
SCALE: NTS



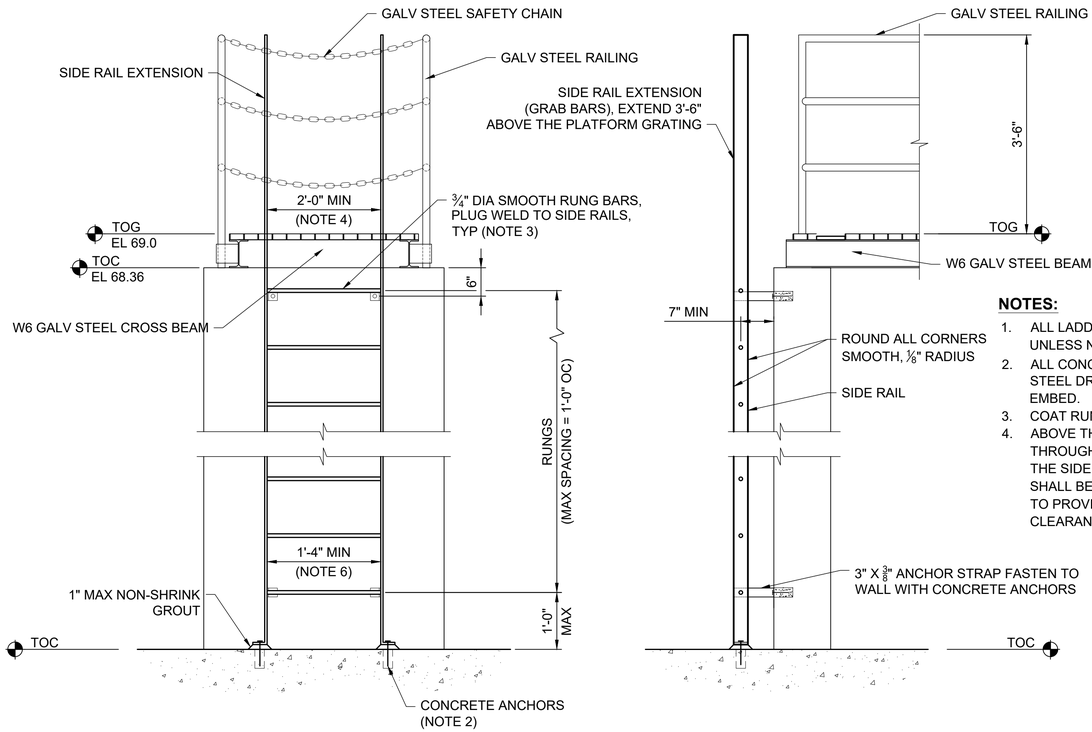
NOTES:

ALL DIMENSIONS ARE TO BE COORDINATED WITH GRATING MFR.

3 - GRATING SUPPORT (AT PLATFORM)
SCALE: 3"=1'-0"



4 - EMBEDMENT FOR SLOT
SCALE: 3/4"=1'-0"



NOTES:

1. ALL LADDER MATERIALS GALVANIZED STEEL, UNLESS NOTED OTHERWISE.
2. ALL CONCRETE ANCHORS: ⅝" DIA GALVANIZED STEEL DRILL & EPOXY ANCHORS W/ 6" MIN EMBED.
3. COAT RUNGS WITH NON-SKID EPOXY COATING.
4. ABOVE THE PLATFORM LEVEL, PROVIDE THROUGH LADDER WITH RUNGS OMITTED FROM THE SIDE RAIL EXTENSIONS. THE SIDE RAILS SHALL BE SPACED FURTHER APART OR FLARED TO PROVIDE NOT LESS THAN 24" OF CLEARANCE.

5 - GALVANIZED STEEL FIXED LADDER DETAIL
SCALE: 3/4"=1'-0"

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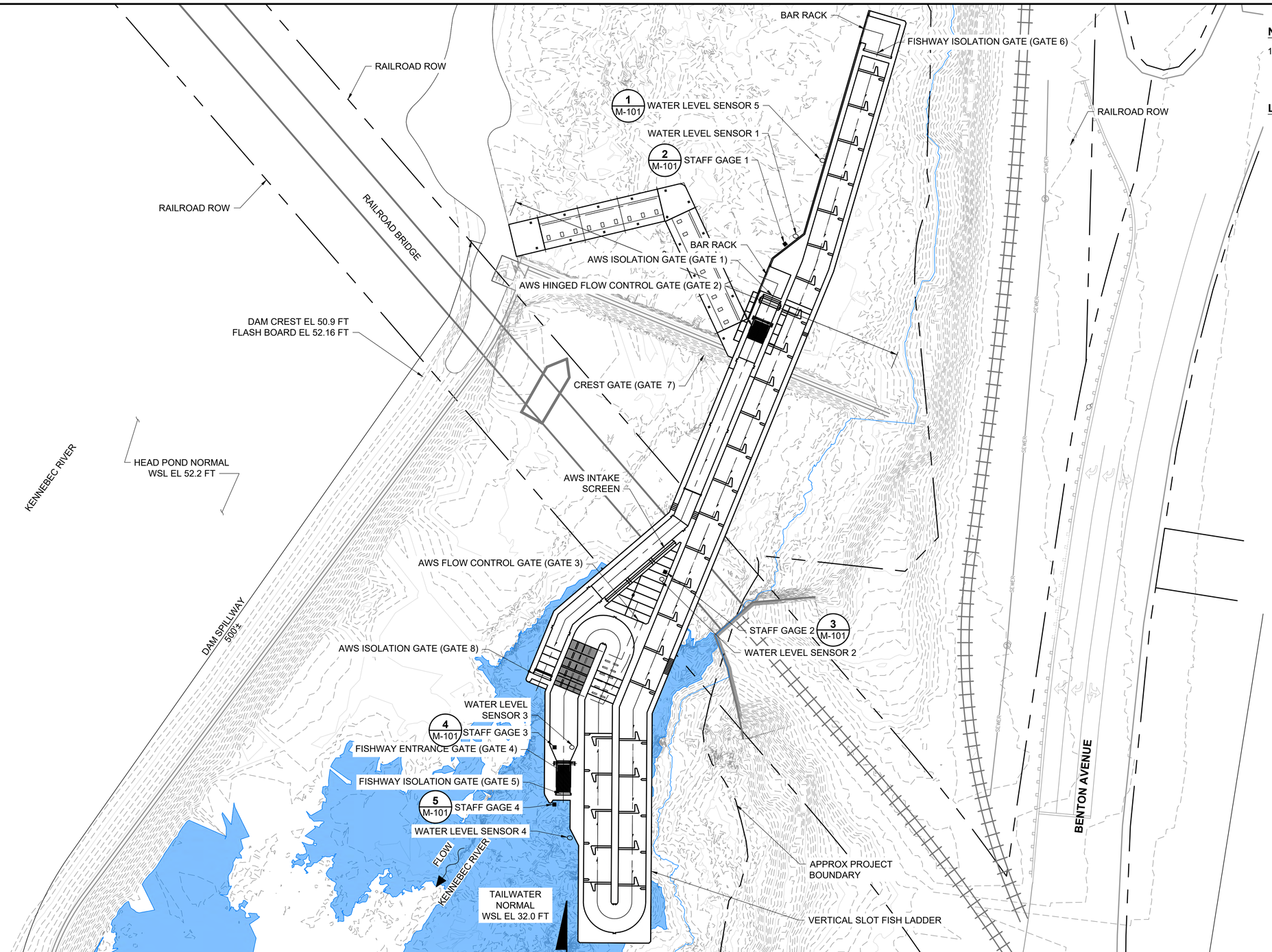
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL STANDARD DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	77 OF 94
DRAWING:	S-505

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\S5-505.dwg USER: MKA00089
DATE: Feb 03, 2021 10:15am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN IMAGES:



SITE PLAN
SCALE: 1"=30'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

LEGEND:

- WATER LEVEL STILLING WELL
- STAFF GAGE

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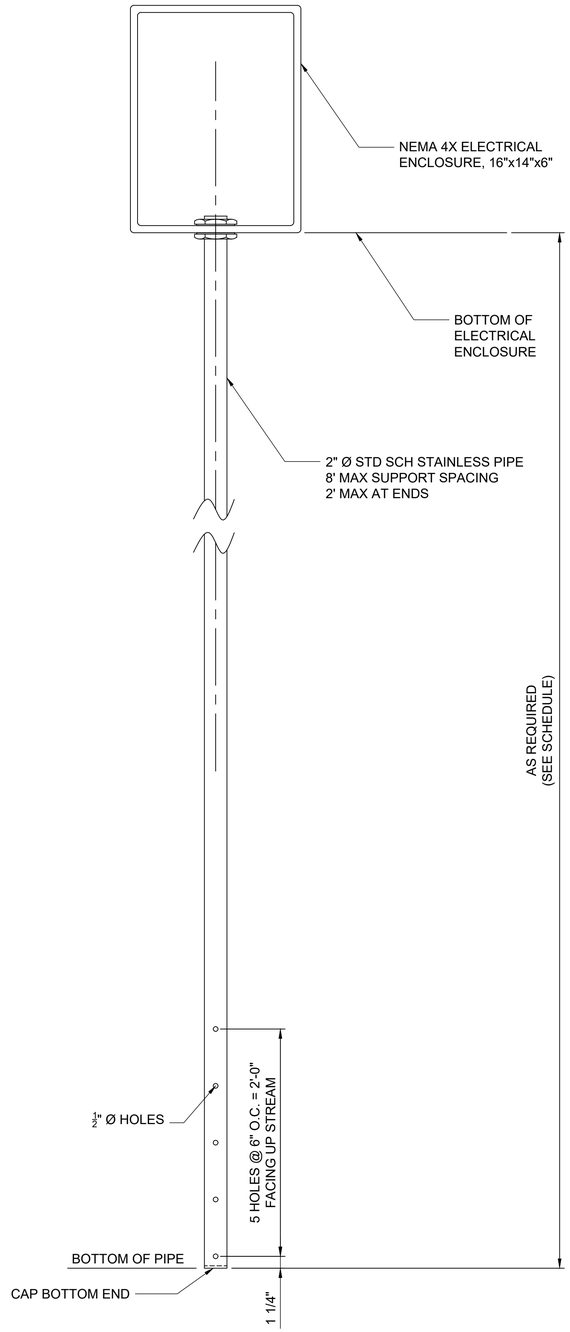
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

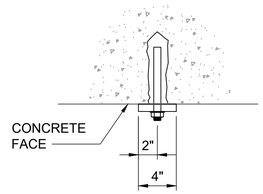
GENERAL MECHANICAL LAYOUT

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	78 OF 94
DRAWING:	M-100

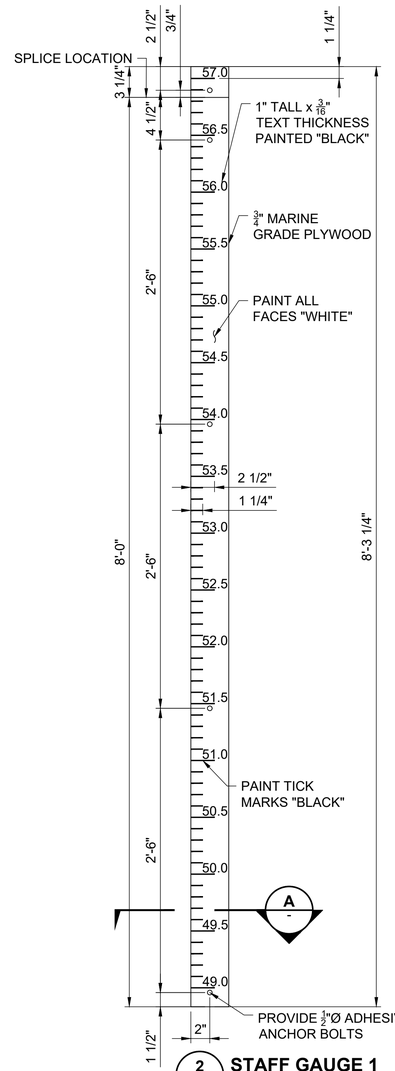
DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\MM-100.dwg USER: MK400889
DATE: Feb 03, 2021 9:19am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-SV IMAGES:



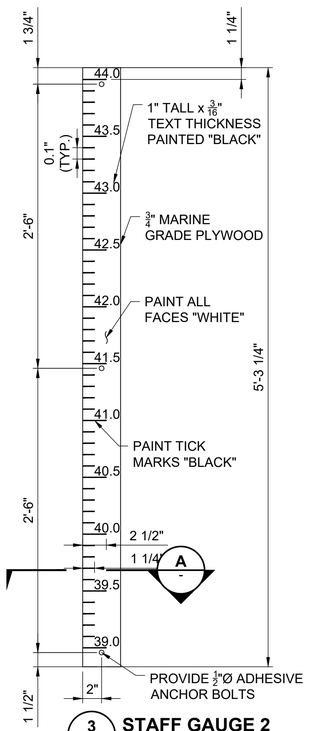
1 M-100 STILL WELL WATER LEVEL PROBE
SCALE: 1-1/2"=1'-0"



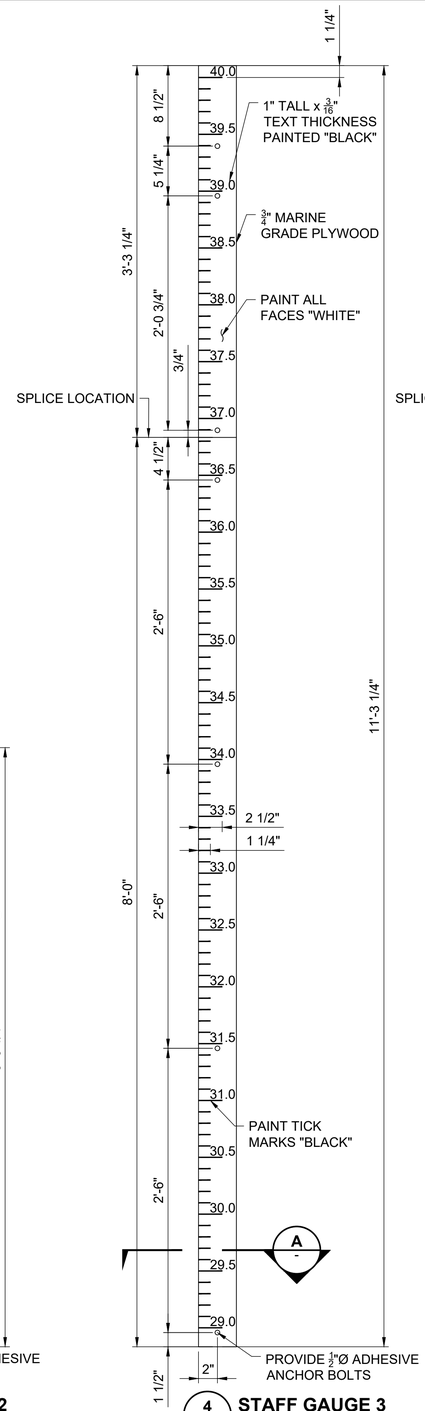
A - SECTION A
SCALE: 1-1/2"=1'-0"



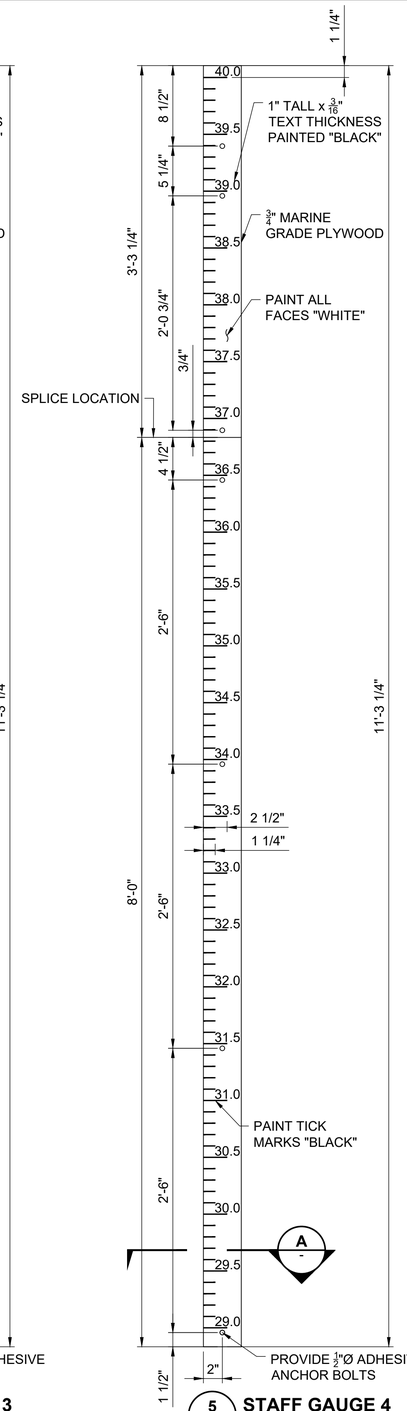
2 M-100 STAFF GAUGE 1
SCALE: 1-1/2"=1'-0"



3 M-100 STAFF GAUGE 2
SCALE: 1-1/2"=1'-0"



4 M-100 STAFF GAUGE 3
SCALE: 1-1/2"=1'-0"



5 M-100 STAFF GAUGE 4
SCALE: 1-1/2"=1'-0"

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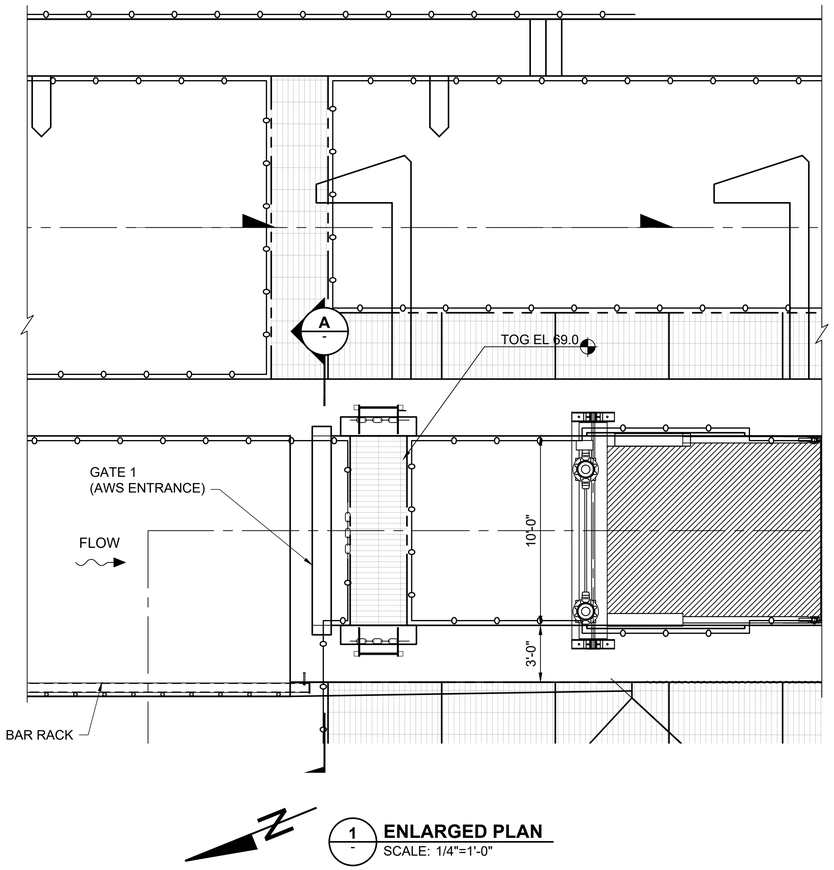
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

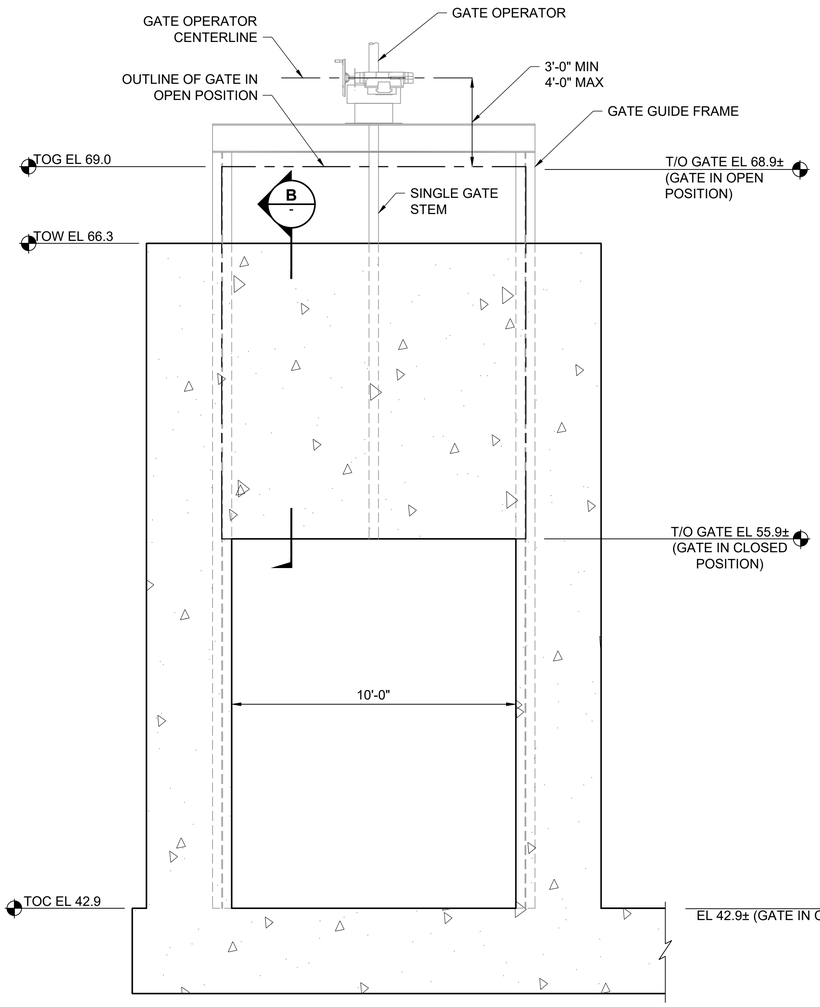
WATER SENSOR AND STAFF GAGE DETAILS

PROJECT:	317 LOCKWOOD
DRAWN BY:	A. MENGERT
DESIGNER:	M. GRAESER
APPROVED BY:	94
SHEET:	OF
DRAWING:	M-101

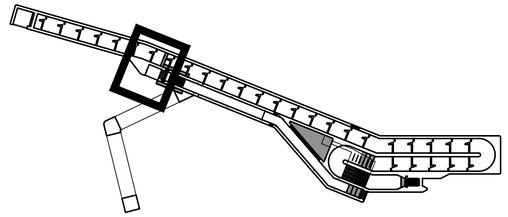
DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\MM-101.dwg USER: MKA00889
DATE: Feb 03, 2021 9:20am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



1 - ENLARGED PLAN
SCALE: 1/4"=1'-0"



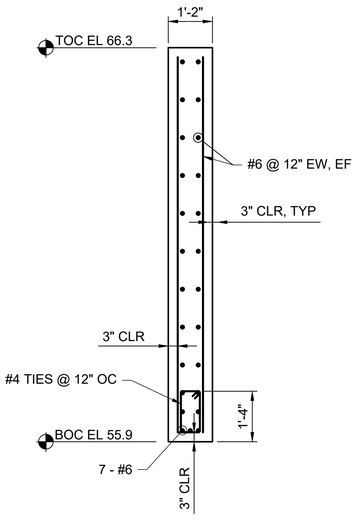
A - ELEVATION GATE 1 (AWS ENTRANCE)
SCALE: 3/8"=1'-0"



KEY MAP
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 1 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 10'W x 13'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 50.9
   - NORMAL 55.2
   - DESIGN HIGH 55.0



B - SECTION
SCALE: 1/2"=1'-0"

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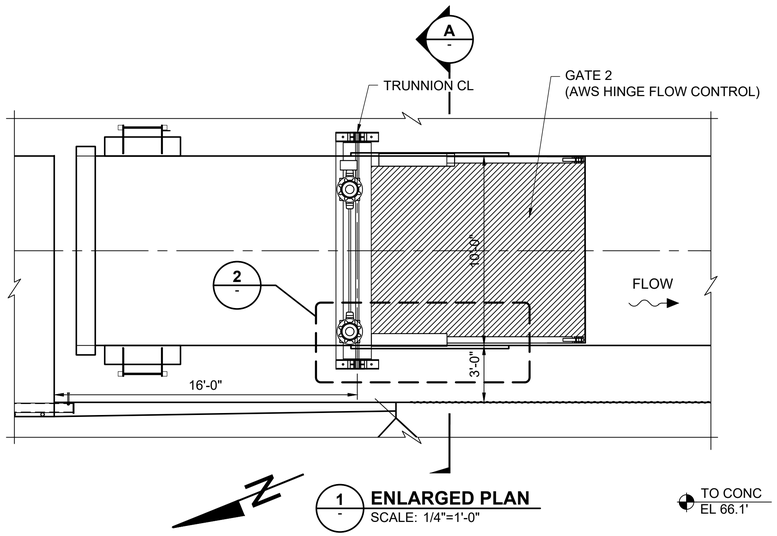
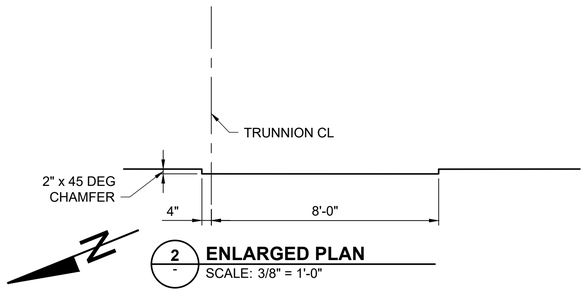
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS ENTRANCE GATE (GATE 1) REQUIREMENTS

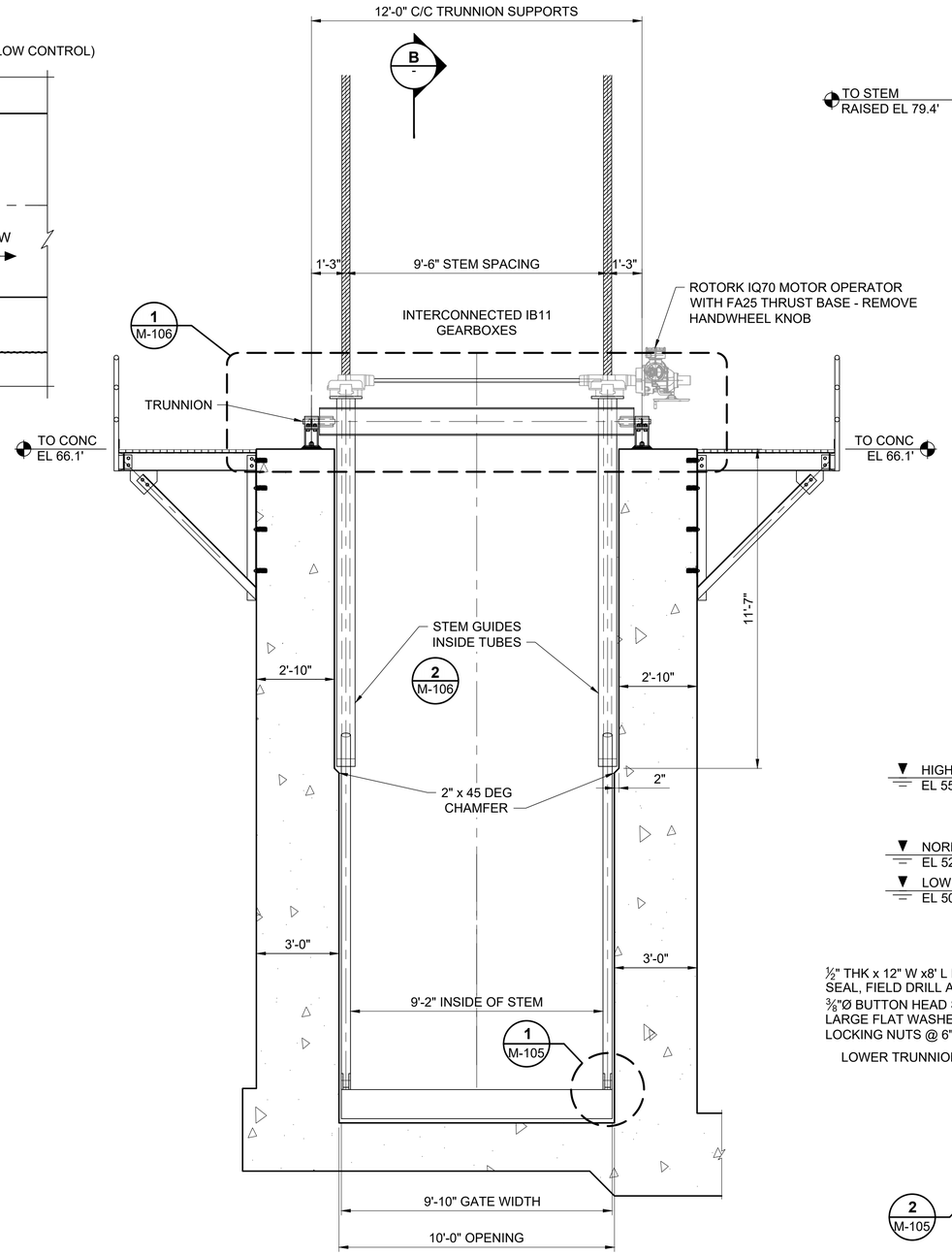
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	80 OF 94
DRAWING:	M-102



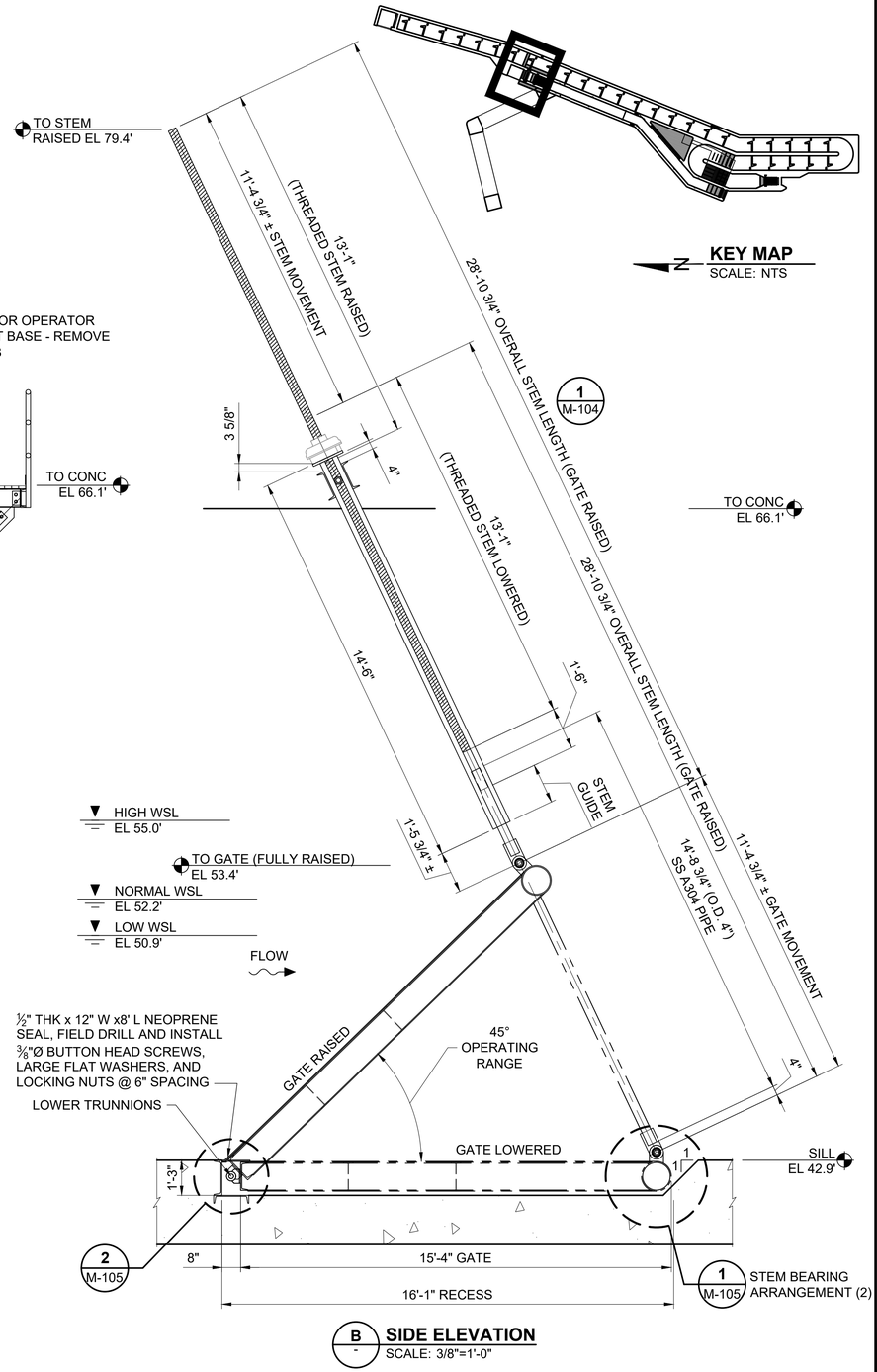
1 **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



2 **ENLARGED PLAN**
SCALE: 3/8" = 1'-0"



A **ELEVATION GATE 2 (AWS HINGE FLOW CONTROL)**
SCALE: 3/8"=1'-0"



B **SIDE ELEVATION**
SCALE: 3/8"=1'-0"

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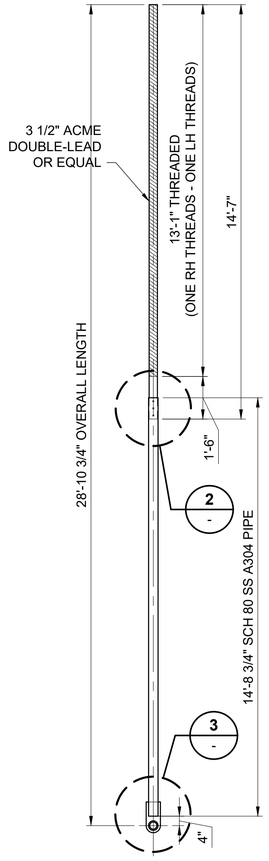
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

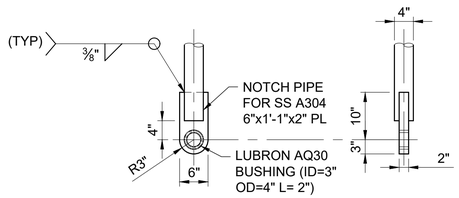
AWS HINGED FLOW CONTROL
GATE (GATE 2) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	81 OF 94
DRAWING:	M-103

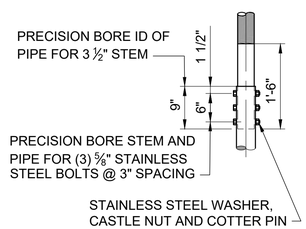
DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\MM-103.dwg USER: MKA00889
DATE: Feb 03, 2021 9:20am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-SEC IMAGES:



1 / M-103 OPERATING STEM (2 REQUIRED)
SCALE: 3/8"=1'-0"



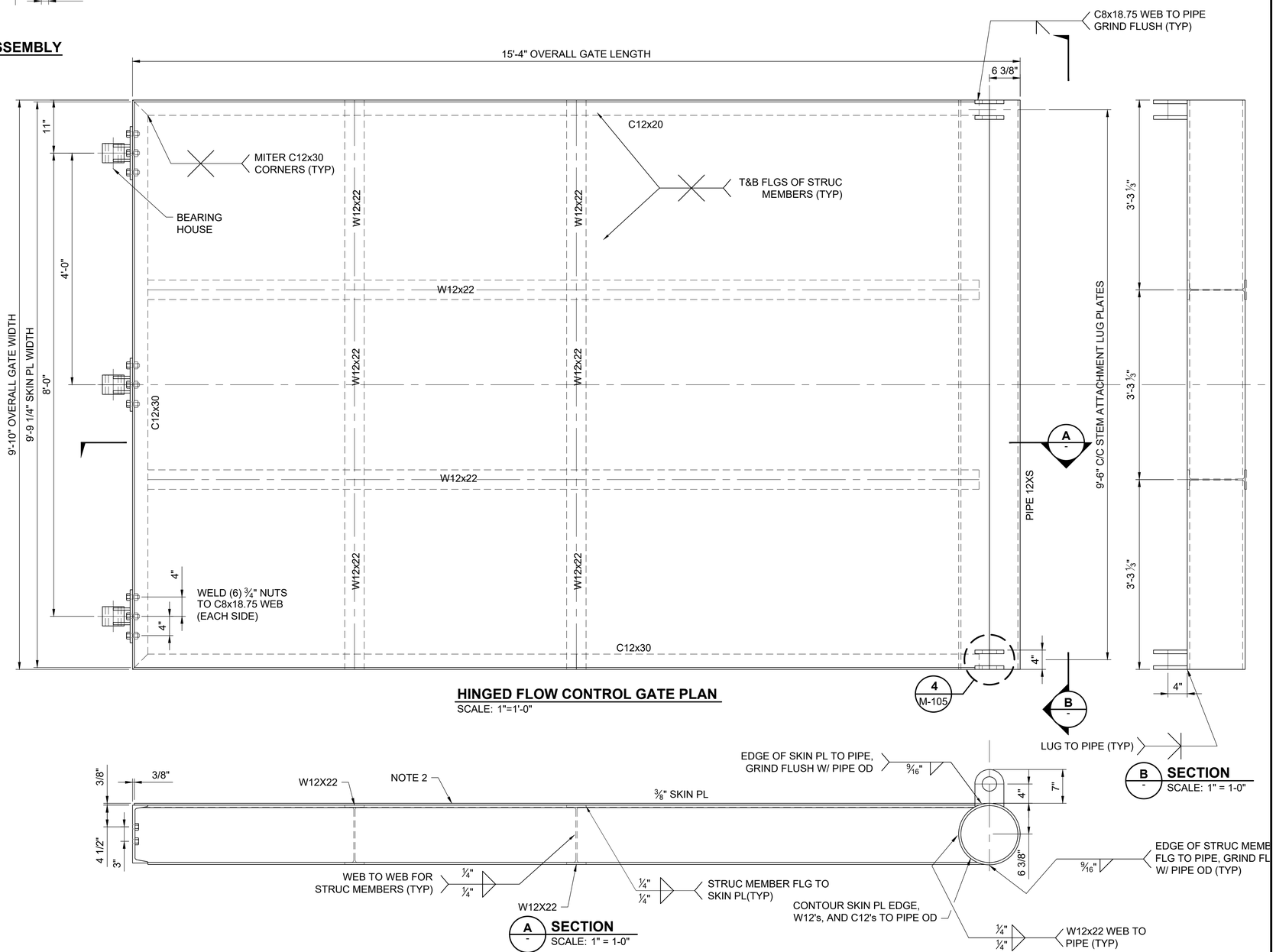
3 / - OPERATING STEM ASSEMBLY
SCALE: 3/4"=1'-0"



2 / - OPERATING STEM CONNECTION
SCALE: 3/4"=1'-0"

NOTES:

1. GATE TO BE WELDED ONE ASSEMBLY WITH CONTINUOUS SEAL WELDS OF THE TYPE SPECIFIED.
2. SKIN PLATE SPLICES SHALL BE AT STRUCTURAL MEMBERS USING CONTINUOUS SLOT WELD. WELD TO BE GROUND FLUSH WITH SKIN PLATE SURFACE.
3. TRIM SKIN PL AND C12x30 AT ¾ " LUGS. SEE 4 / M-105
4. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.
5. GENERAL OVERVIEW OF GATE 2 (AWS CONTROL FLOW GATE IS PROVIDED:
   -SIZE OF OPENING, 10'-0" W x 16'-1" H
   -MOVEMENT OF GATE, UPWARD OPENING
   -OPERATION OF GATE, OPEN/CLOSE
6. HEAD WATER ELEVATIONS
   -DESIGN LOW 50.9'
   -NORMAL 52.2'
   -DESIGN HIGH 55.0'



HINGED FLOW CONTROL GATE PLAN
SCALE: 1"=1'-0"

A / - SECTION
SCALE: 1" = 1-0"

B / - SECTION
SCALE: 1" = 1-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

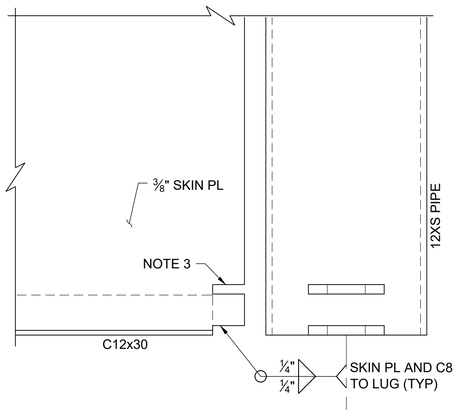
AWS HINGED FLOW CONTROL
(GATE 2) DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	82 OF 94
DRAWING:	M-104

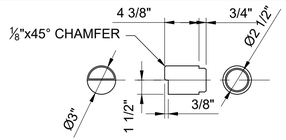
DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\MM-104.dwg USER: MKA00989
DATE: Feb 03, 2021 9:20am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

NOTES:

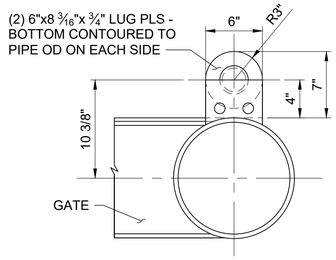
1. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.
2. COORDINATE WITH EQUIPMENT SUPPLIED.

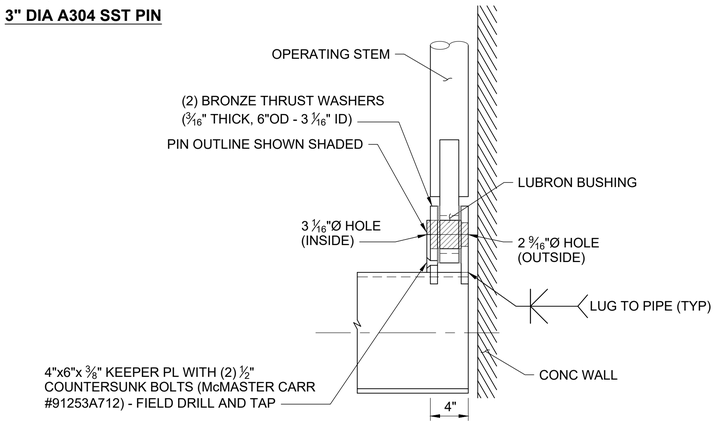


4 M-104 SKIN PL TO LUG CONNECTION DETAIL
SCALE: 3"=1'-0"



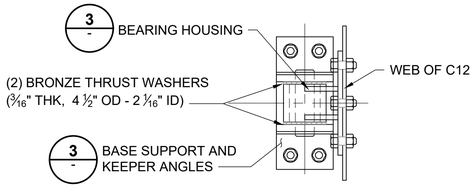
3" DIA A304 SST PIN



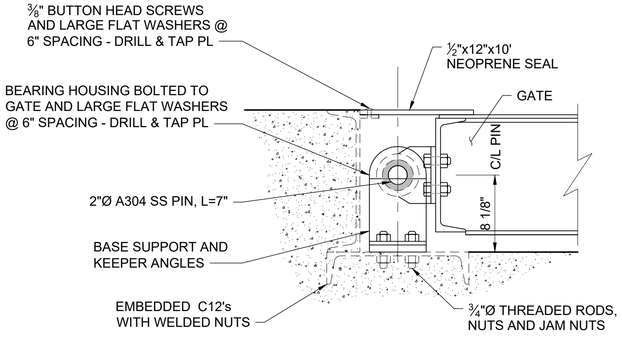


1 M-103 STEM BEARING ARRANGEMENT
SCALE: 1 1/2"=1'-0"

3 - BEARING HOUSING

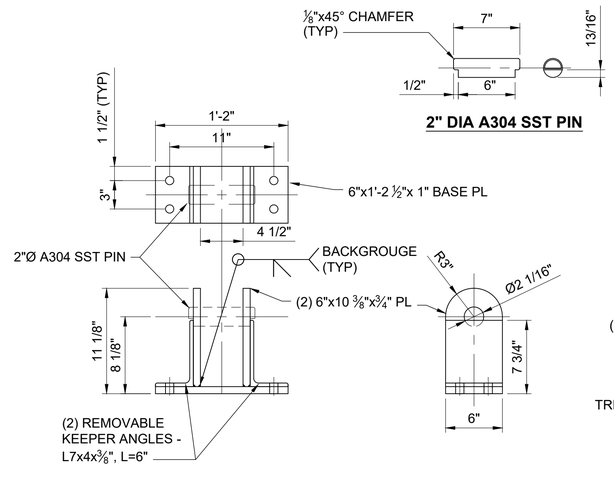


PLAN



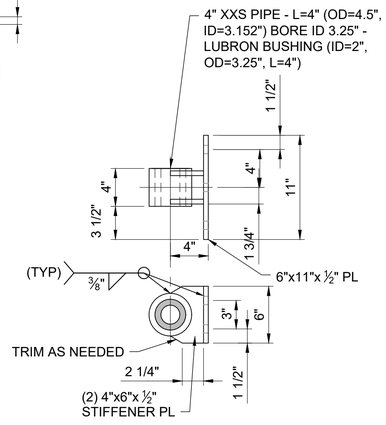
ELEVATION

2 M-103 LOWER ASSEMBLY ARRANGEMENT
SCALE: 1 1/2"=1'-0"



2" DIA A304 SST PIN

BASE SUPPORT & KEEPER ANGLES



BEARING HOUSING

3 - LOWER BEARING COMPONENTS
SCALE: 1 1/2"=1'-0"

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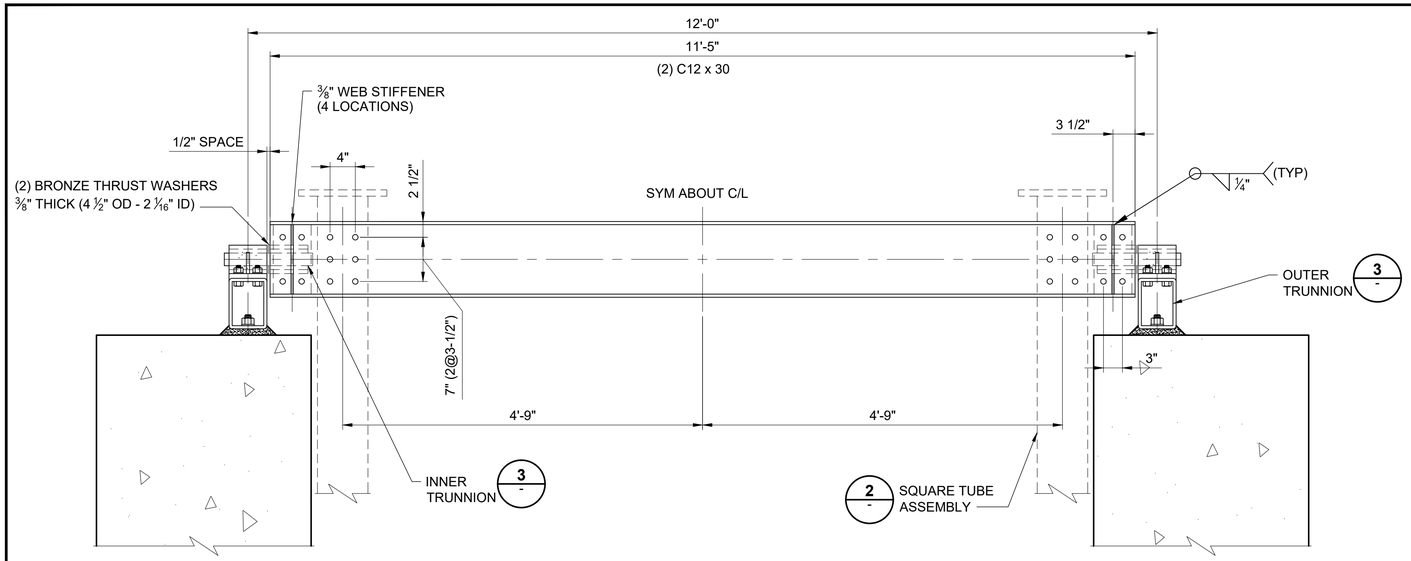
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

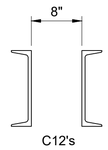
AWS HINGED FLOW CONTROL
GATE DETAILS

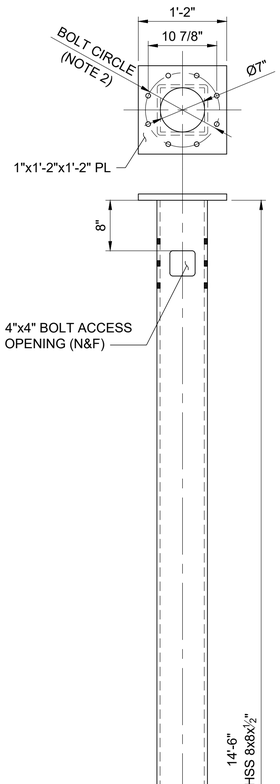
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	83 OF 94
DRAWING:	M-105

DWG: S:\13100\Holden\Lockwood\900 CAD\02-sheets\MM-105.dwg USER: MKA00889
DATE: Feb 03, 2021 9:21am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



1/M-103 OPERATOR SUPPORT ASSEMBLY
SCALE: 1"=1'-0"

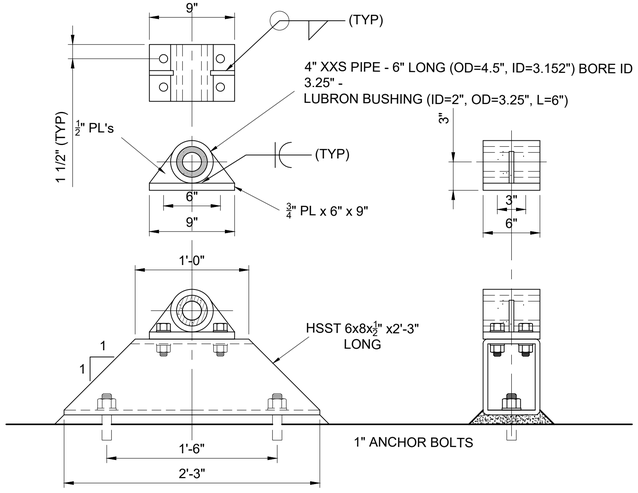




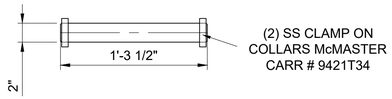
2/M-103 SQUARE TUBE ASSEMBLY (2 REQUIRED)
SCALE: 1"=1'-0"

NOTES:

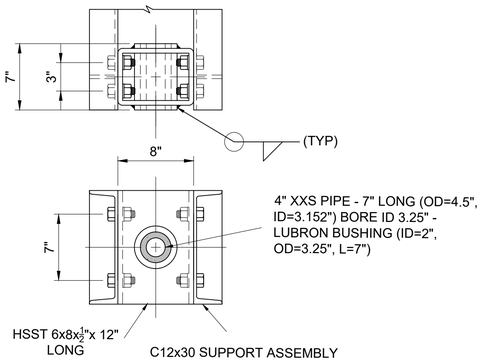
1. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.
2. COORDINATE WITH EQUIPMENT SUPPLIED.



OUTER TRUNNION ASSEMBLY



A304 STAINLESS STEEL PIN



INNER TRUNNION ASSEMBLY

3/- TRUNNION COMPONENTS
SCALE: 1 1/2"=1'-0"

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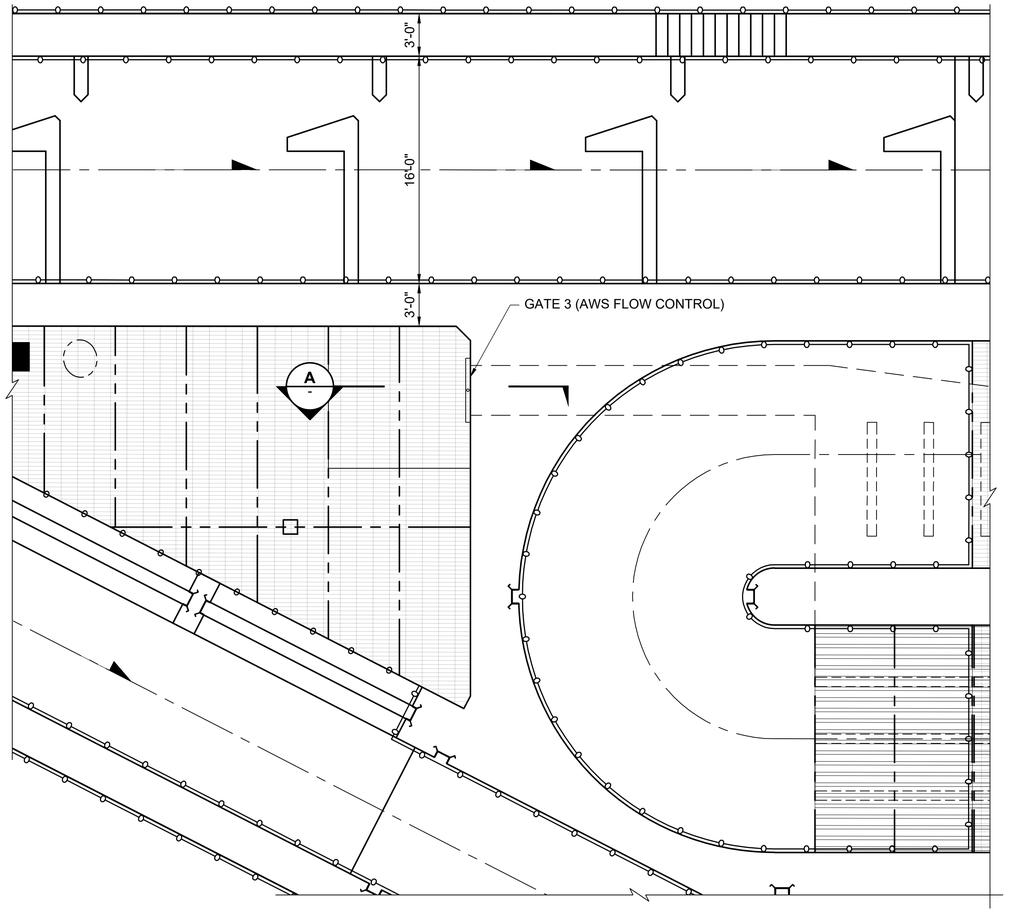
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS HINGED FLOW CONTROL
(GATE 2) DETAILS

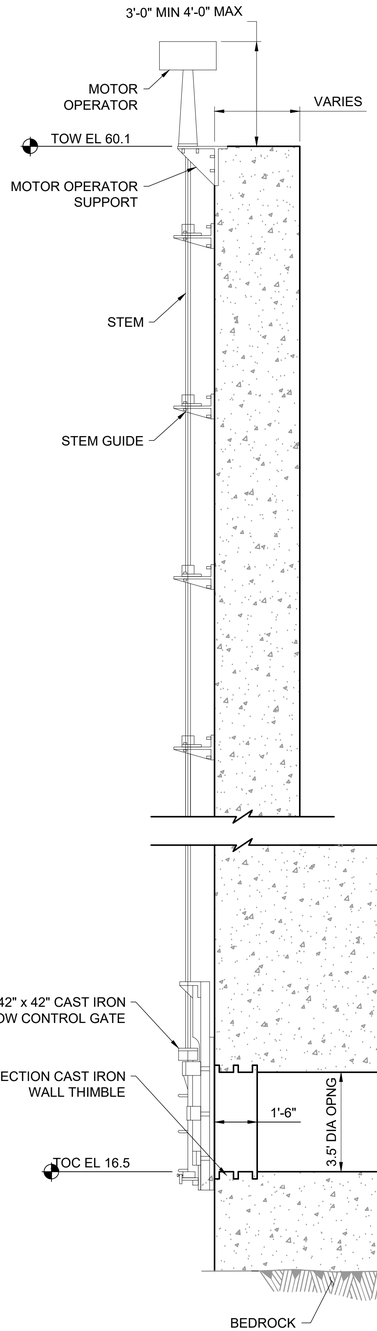
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	84 OF 94
DRAWING:	M-106

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheet\MM-106.dwg USER: MKA00889
DATE: Feb 03, 2021 9:21am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

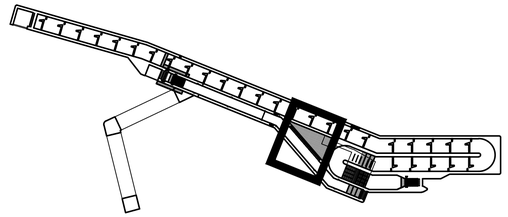


N

1 - **ENLARGED PLAN**
SCALE: 3/16"=1'-0"



A - **ELEVATION GATE 3 (AWS FLOW CONTROL)**
SCALE: 3/8"=1'-0"



N

KEY MAP
SCALE: NTS

NOTES:
1. COORDINATE WITH GATE MANUFACTURE FOR MOTOR OPERATOR SUPPORT AND STEM GUIDES PRIOR TO CONSTRUCTION.

CONTROL GATE NOTES:

AWS FLOW CONTROL:
1. OPERATION: ADJUSTABLE FOR FLOW CONTROL PCL CONTROL POSITION MONITORING.
2. OPENING: 3.5' DIA
3. HEAD: 30'-0"
4. UPWARD OPENING

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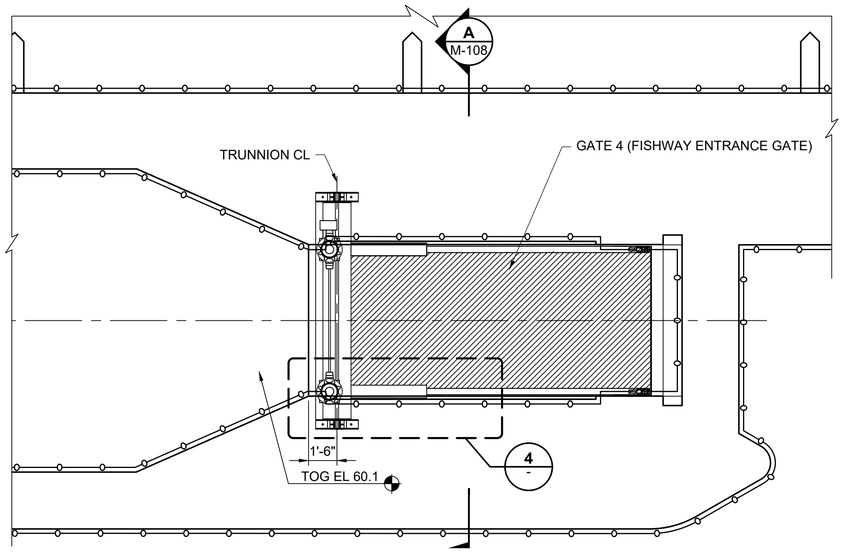
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

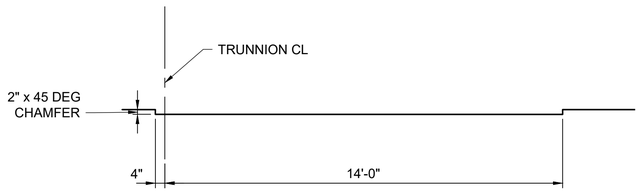
AWS FLOW CONTROL (GATE 3)
REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	85 OF 94
DRAWING:	M-107

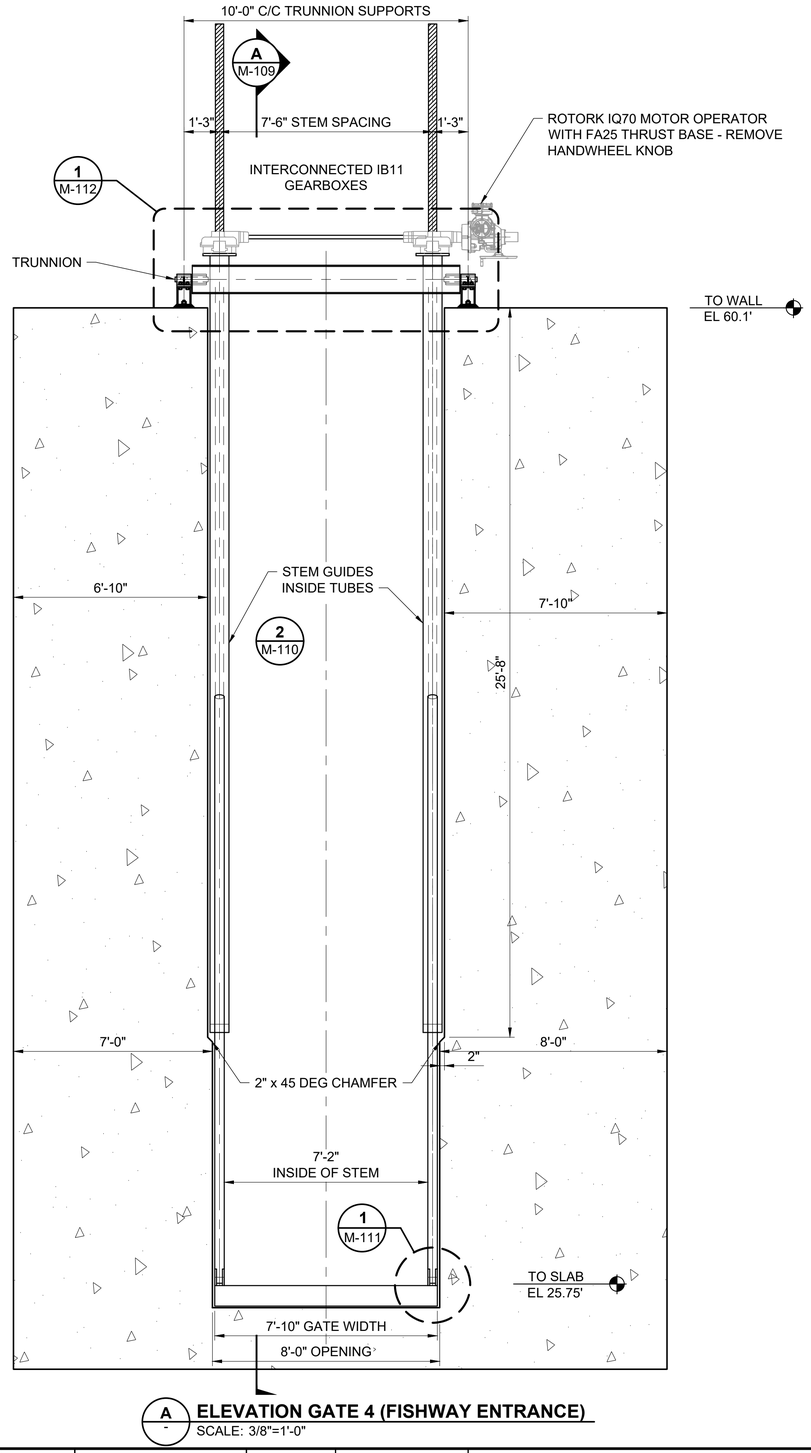
DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\M\M-107.dwg USER: MKA00889
DATE: Feb 03, 2021 10:50am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PLN IMAGES:



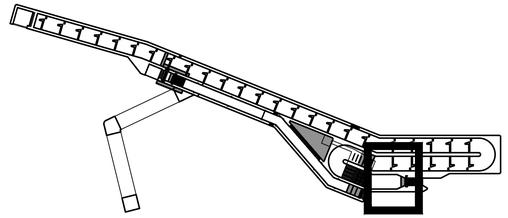
1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



4 - **ENLARGED PLAN**
SCALE: 3/8"=1'-0"



A - **ELEVATION GATE 4 (FISHWAY ENTRANCE)**
SCALE: 3/8"=1'-0"



KEY MAP
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 4 (FISHWAY ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 8'-0" W x 11'-6 1/2" H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 30.5'
   - NORMAL 32.0'
   - DESIGN HIGH 36.5'

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISHWAY ENTRANCE GATE (GATE 4) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	86 OF 94
DRAWING:	M-108

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\MM-108.dwg USER: MKA00589
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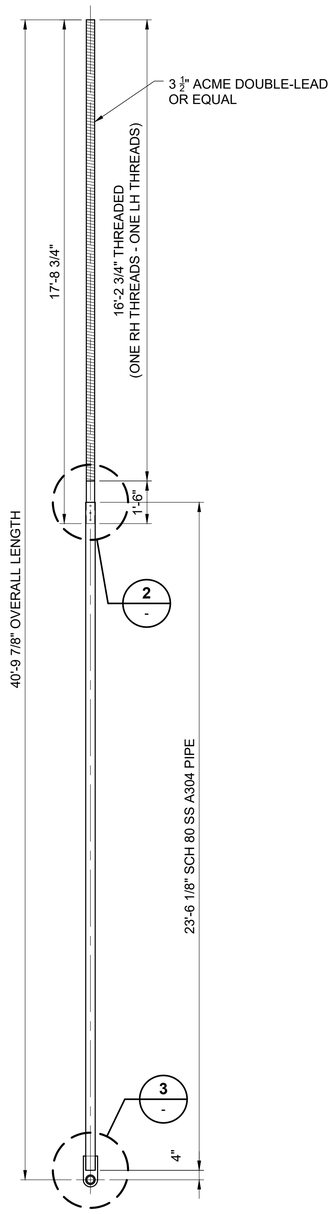
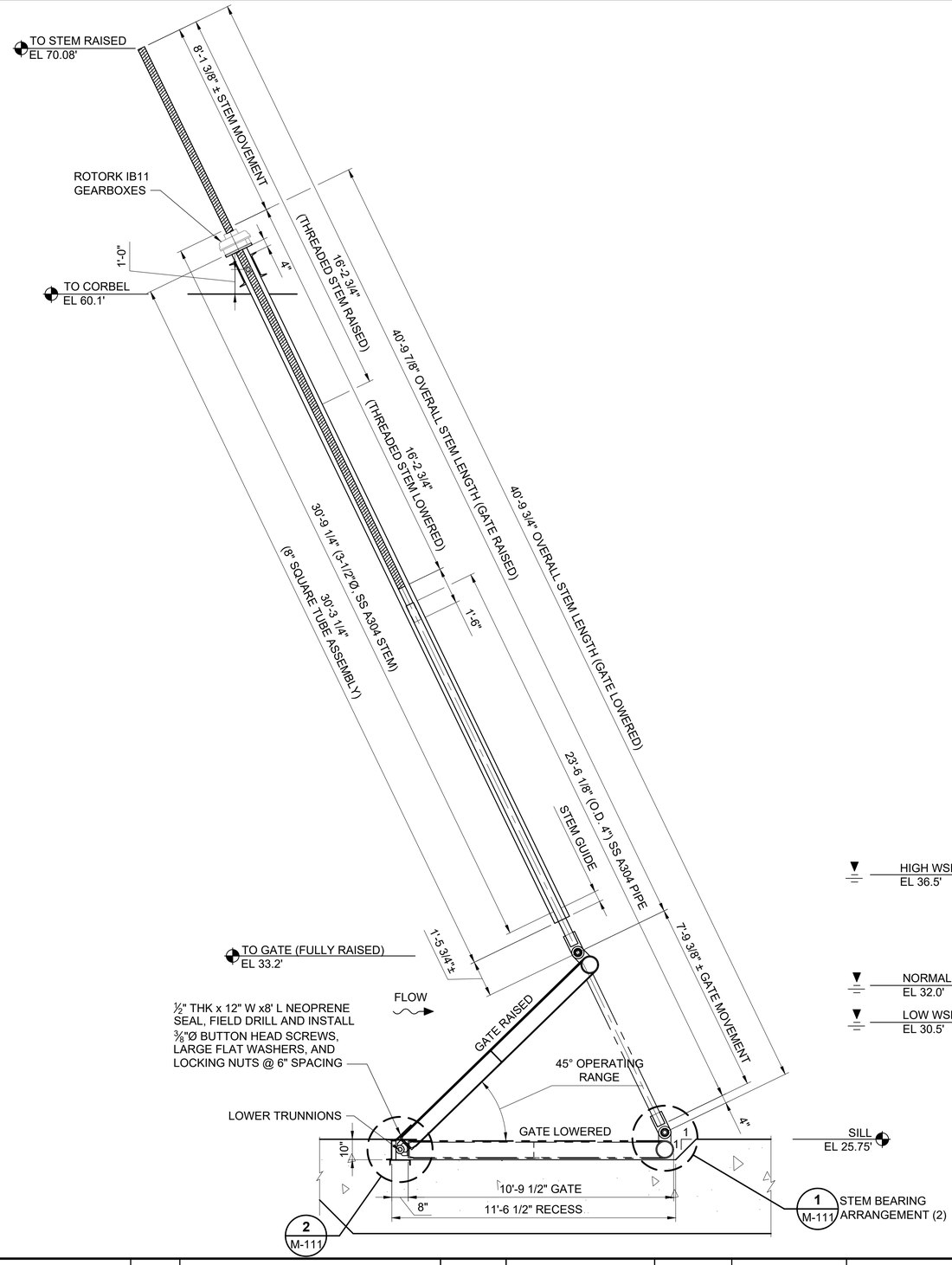
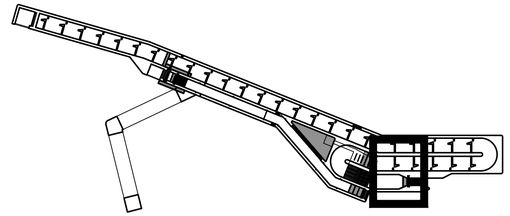


1 - OPERATING STEM (2 REQUIRED)
SCALE: 3/8"=1'-0"

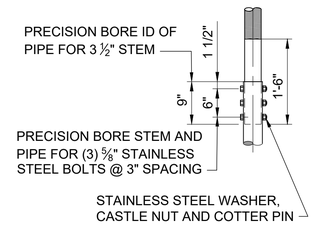




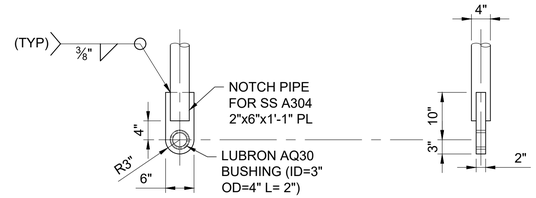
KEY MAP
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 4 (FISHWAY ENTRANCE GATE) IS PROVIDED:
   - SIZE OF OPENING, 8'-0"W x 11'-6 1/2"H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 30.5'
   - NORMAL 32.0'
   - DESIGN HIGH 36.5'



2 - OPERATING STEM CONNECTION
SCALE: 3/4"=1'-0"



3 - OPERATING STEM ASSEMBLY
SCALE: 3/4"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

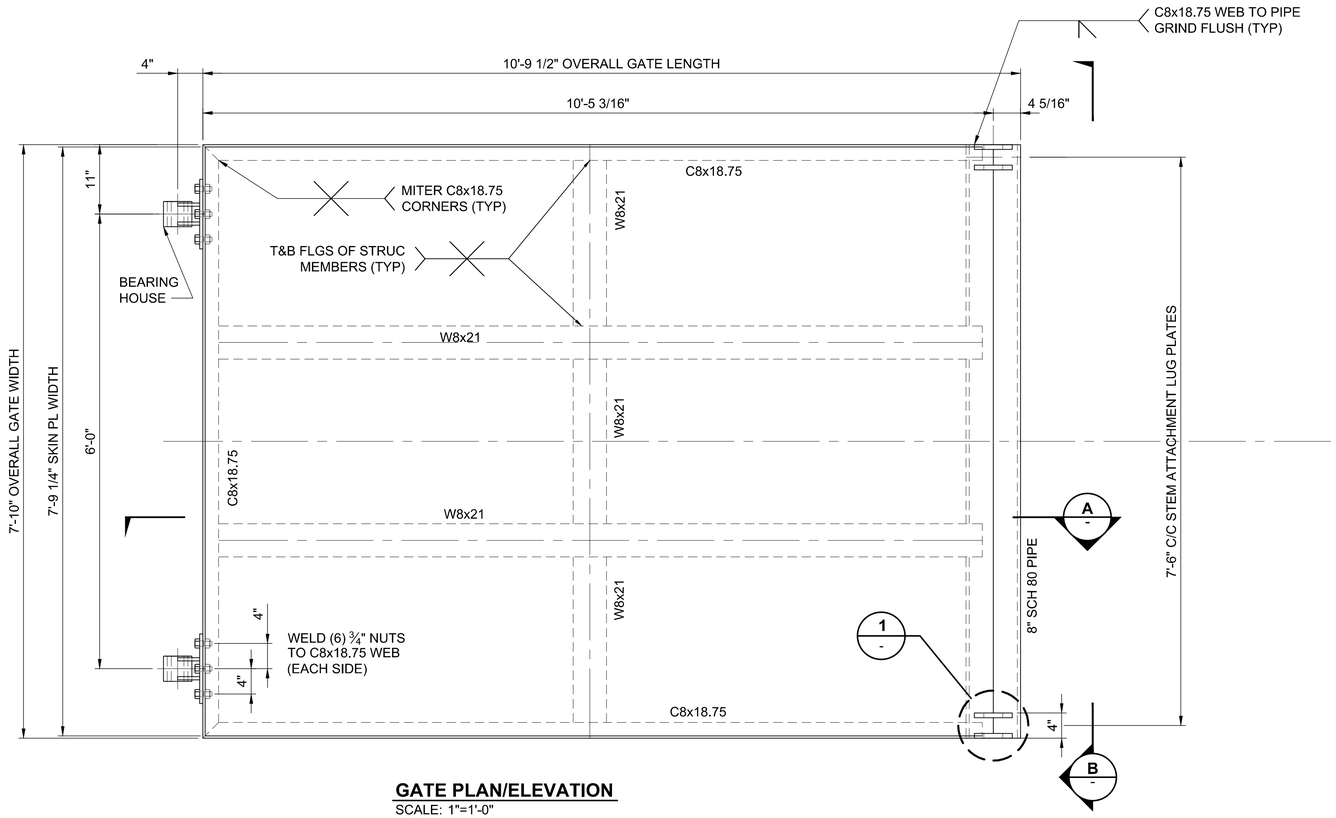
FISHWAY ENTRANCE GATE (GATE 4) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	87 OF 94
DRAWING:	M-109

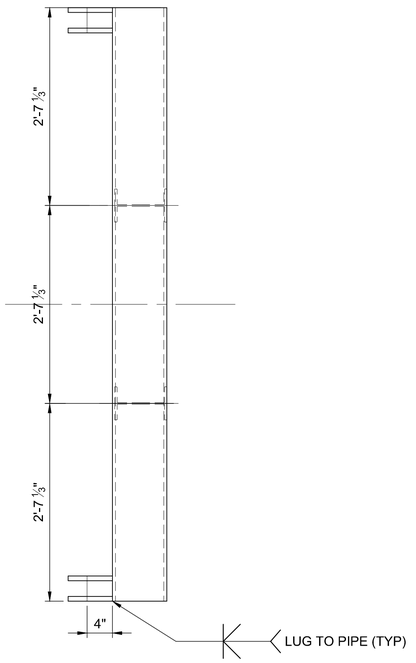
DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\MM-109.dwg USER: MKA00889
DATE: Feb 03, 2021 9:22am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-SEC IMAGES:

NOTES:

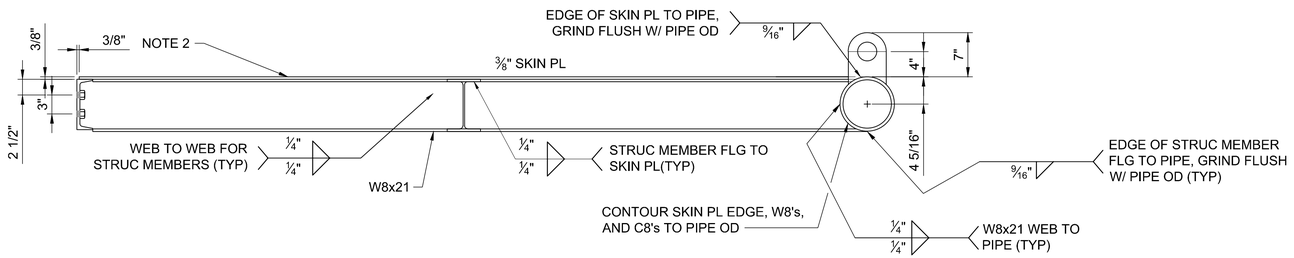
1. GATE TO BE WELDED ONE ASSEMBLY WITH CONTINUOUS SEAL WELDS OF THE TYPE SPECIFIED.
2. SKIN PLATE SPLICES SHALL BE AT STRUCTURAL MEMBERS USING CONTINUOUS SLOT WELD. WELD TO BE GROUND FLUSH WITH SKIN PLATE SURFACE.
3. TRIM SKIN PL AND C8x18.75 AT ¾" LUGS.
4. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.



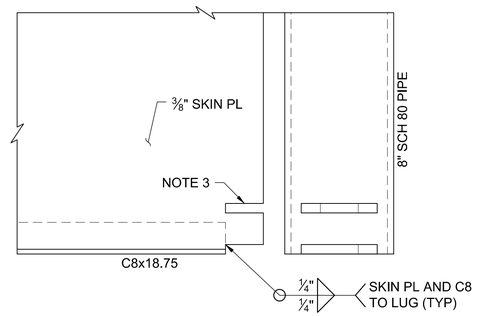
GATE PLAN/ELEVATION
SCALE: 1"=1'-0"



B - GATE SECTION
SCALE: 1"=1'-0"



A - GATE SECTION @ C/L
SCALE: 1"=1'-0"



1 - SKIN PL TO LUG CONNECTION DETAIL
SCALE: NTS

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

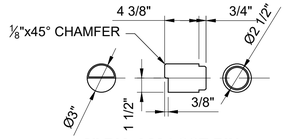
FISHWAY ENTRANCE GATE DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	88 OF 94
DRAWING:	M-110

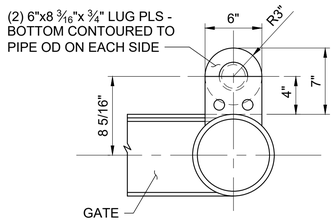
DWG: S:\131009\Holden\Lockwood\500 CAD\02-SHEETS\MM-110.dwg USER: MKA00889
DATE: Feb 03, 2021 9:48am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

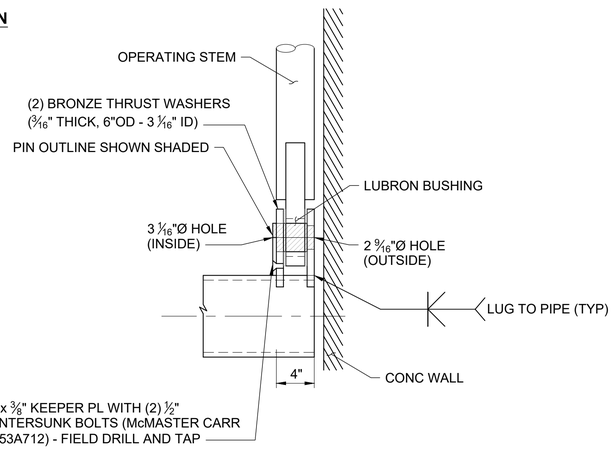
NOTES:

1. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.
2. COORDINATE WITH EQUIPMENT SUPPLIED.

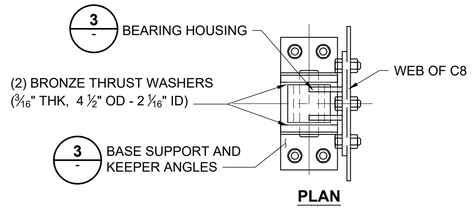


3" DIA A304 SST PIN

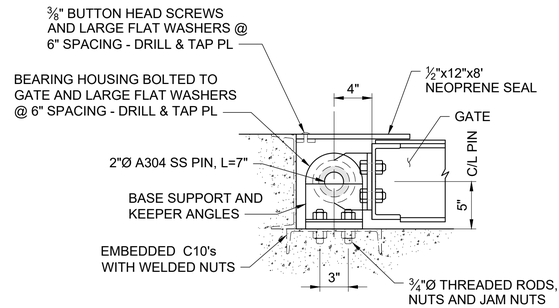




1 STEM BEARING ARRANGEMENT
M-107 SCALE: 1 1/2"=1'-0"

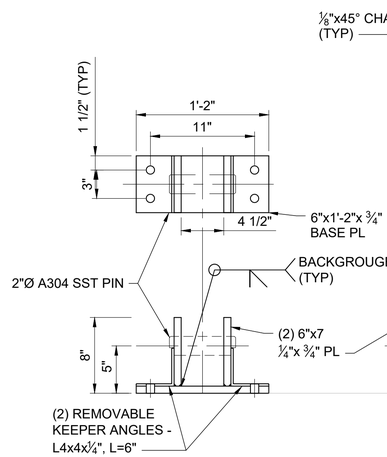


PLAN

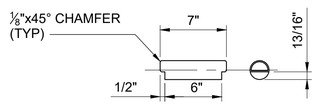


ELEVATION

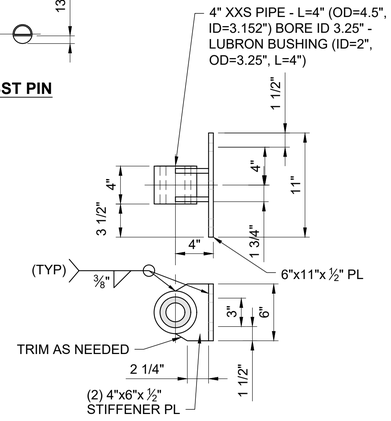
2 LOWER ASSEMBLY ARRANGEMENT
M-107 SCALE: 1 1/2"=1'-0"



BASE SUPPORT & KEEPER ANGLES



2" DIA A304 SST PIN



BEARING HOUSING

3 LOWER BEARING COMPONENTS
- SCALE: 1 1/2"=1'-0"

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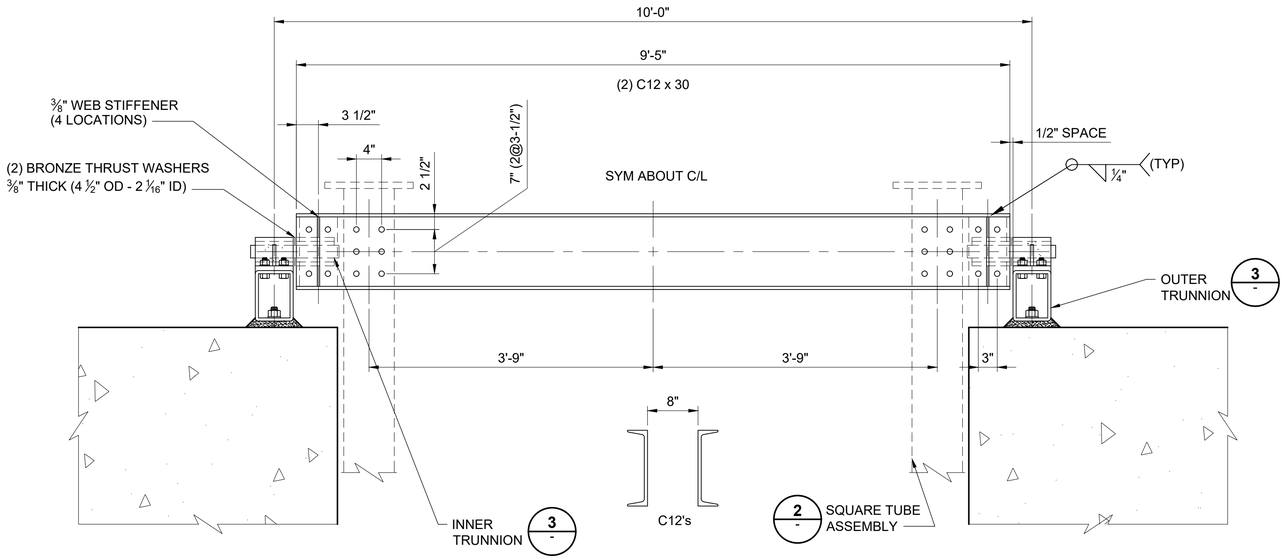
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

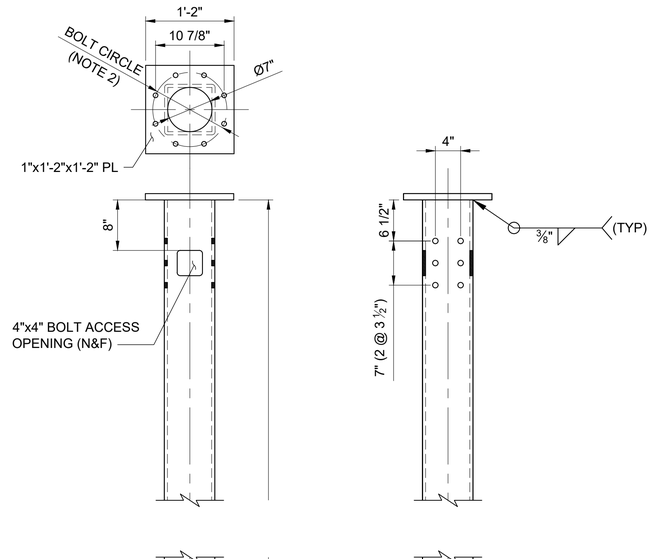
FISHWAY ENTRANCE (GATE 4) DETAILS

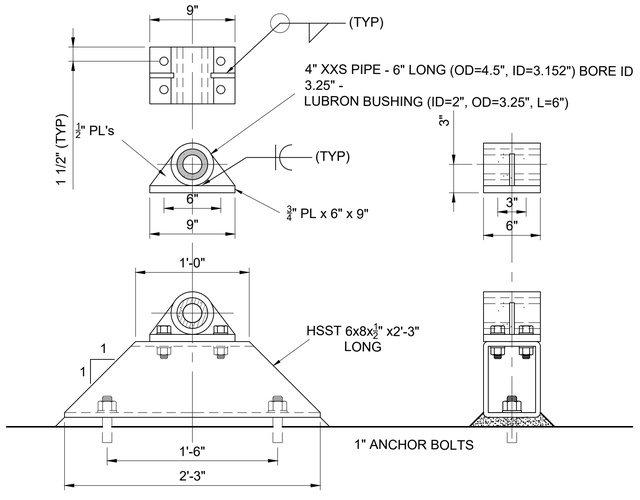
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	89 OF 94
DRAWING:	M-111

DWG: S:\13100\9\HydroniLockwood\900 CAD\02-sheets\M111.dwg USER: MKA00889
DATE: Feb 03, 2021 9:22am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:

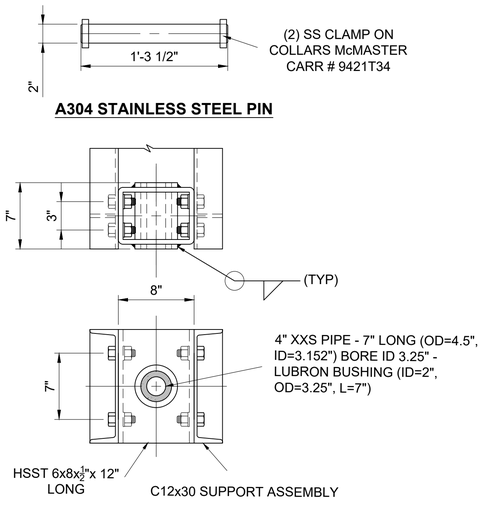


1 / M-108 OPERATOR SUPPORT ASSEMBLY
SCALE: 1"=1'-0"





OUTER TRUNNION ASSEMBLY



INNER TRUNNION ASSEMBLY

3 / - TRUNNION COMPONENTS
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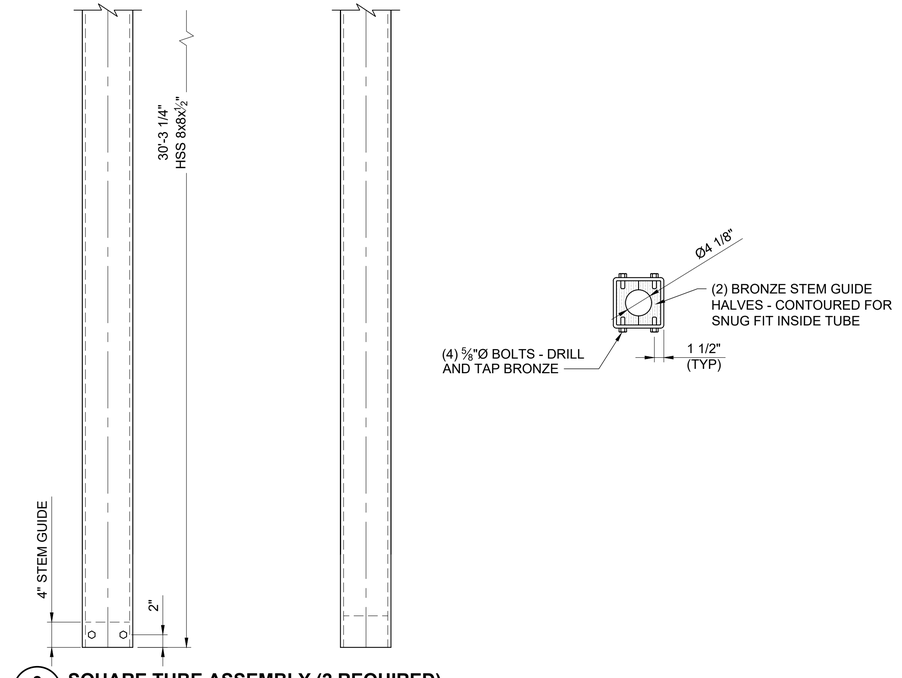

2 / M-107 SQUARE TUBE ASSEMBLY (2 REQUIRED)
SCALE: 1"=1'-0"

NOTES:

1. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.
2. COORDINATE WITH EQUIPMENT SUPPLIED.

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30 SHREWSBURY ST, HOLDEN, MA 01520
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISHWAY ENTRANCE (GATE 4)
DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	90 OF 94
DRAWING:	M-112

DWG: S:\131009\Hdr\dem\Lockwood\900 CAD\02-sheets\MM-112.dwg USER: MK400989
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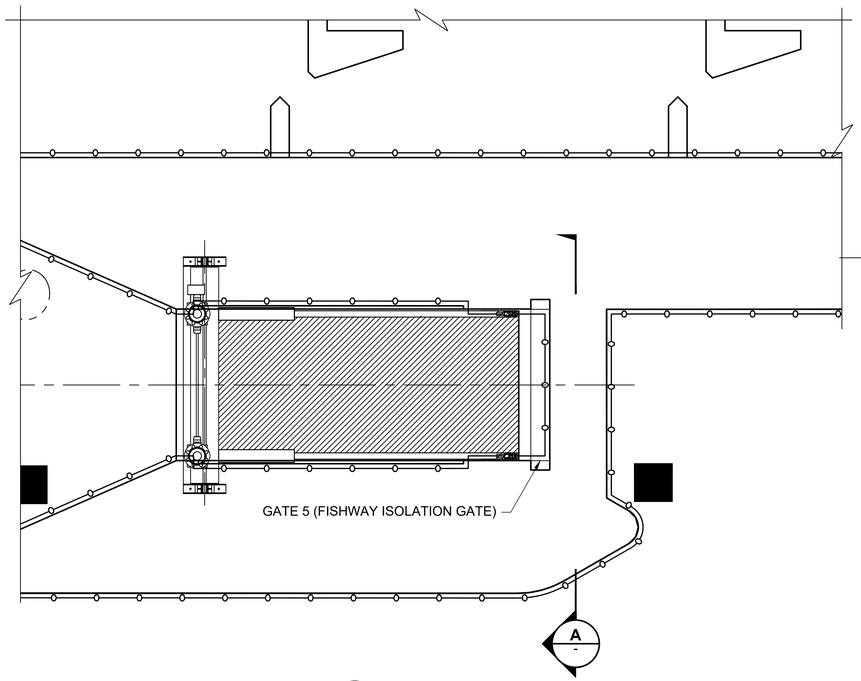
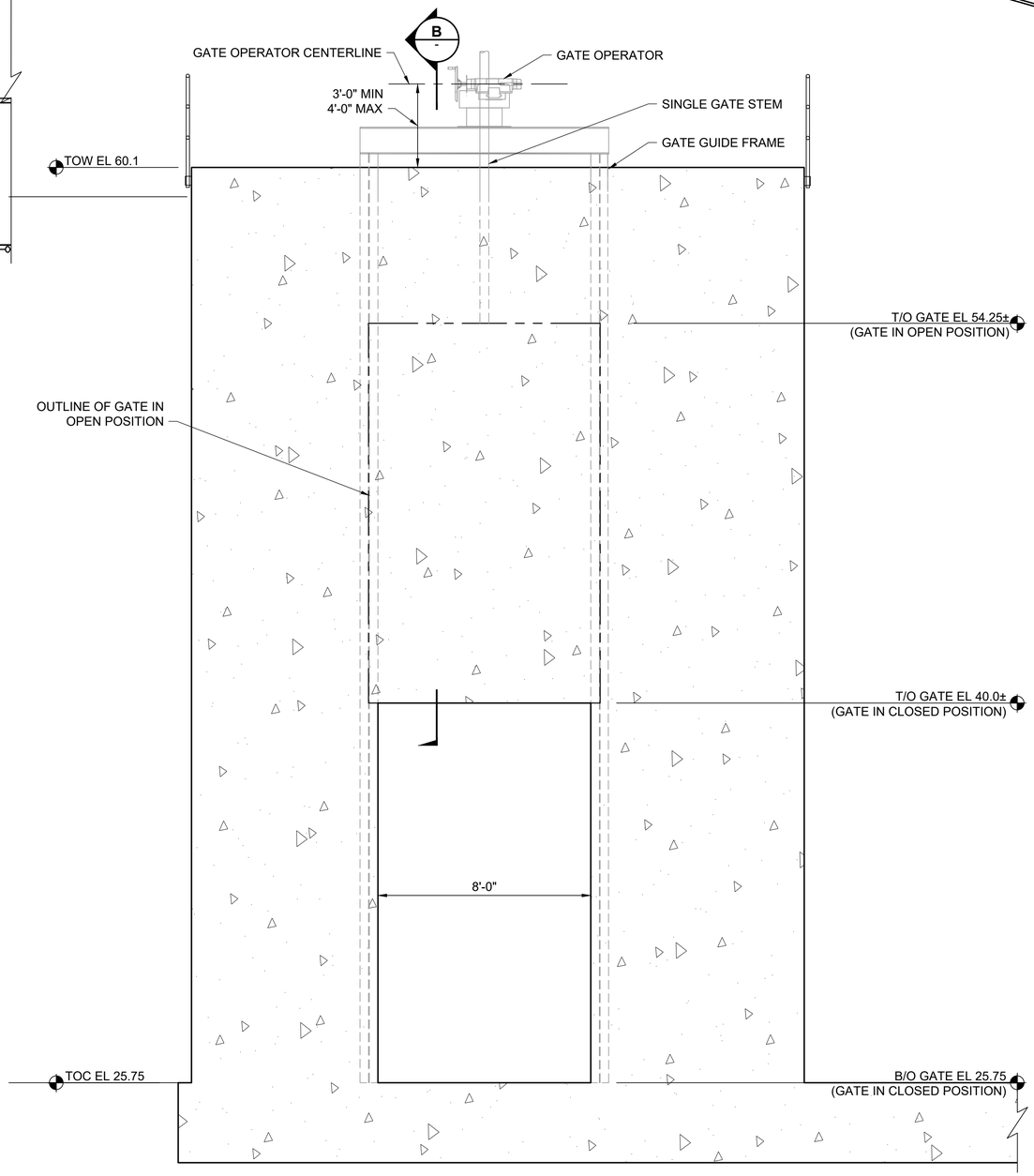
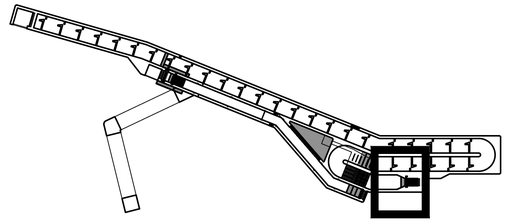


N

1 **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



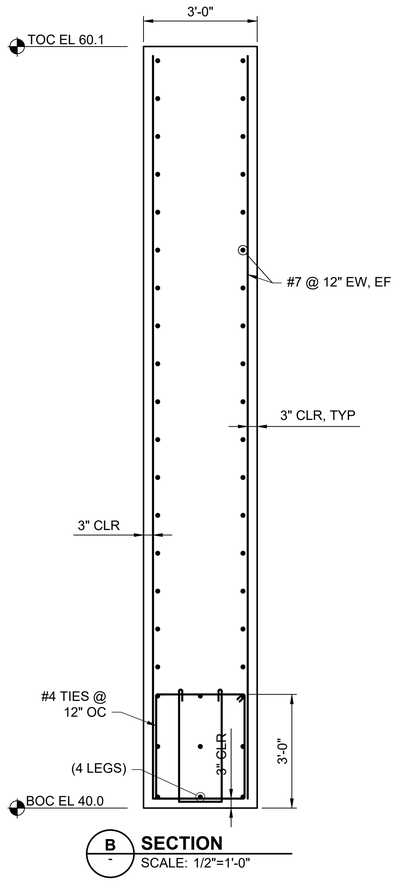
A **ELEVATION GATE 5 (FISHWAY ISOLATION GATE)**
SCALE: 3/8"=1'-0"



N **KEY MAP**
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 5 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 8'W x 14.25'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 30.5
   - NORMAL 32
   - DESIGN HIGH 36.5



B **SECTION**
SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISHWAY ISOLATION GATE (GATE 5) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	91 OF 94
DRAWING:	M-113

DWG: S:\13100\Holden\Lockwood\000 CAD\02-sheets\MM-113.dwg USER: MKA00889
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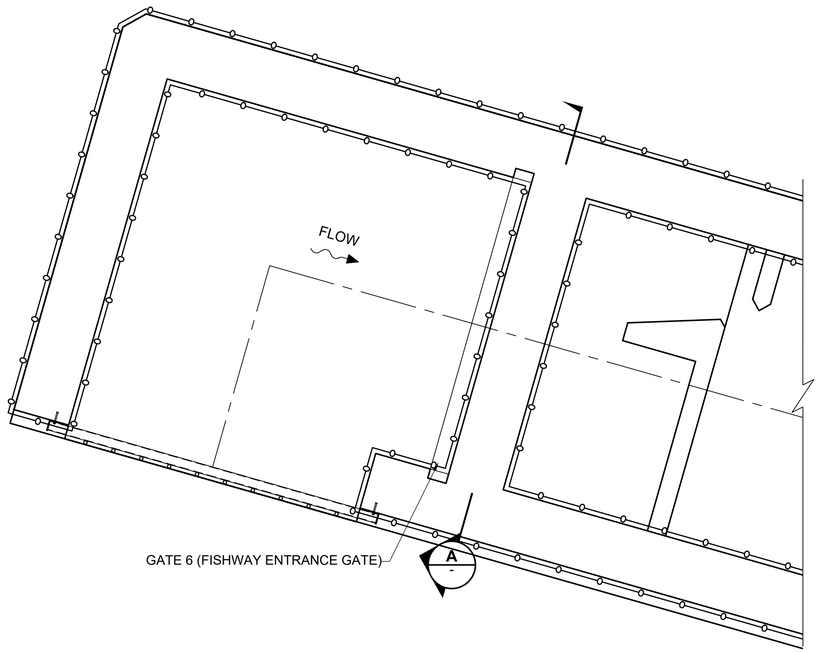

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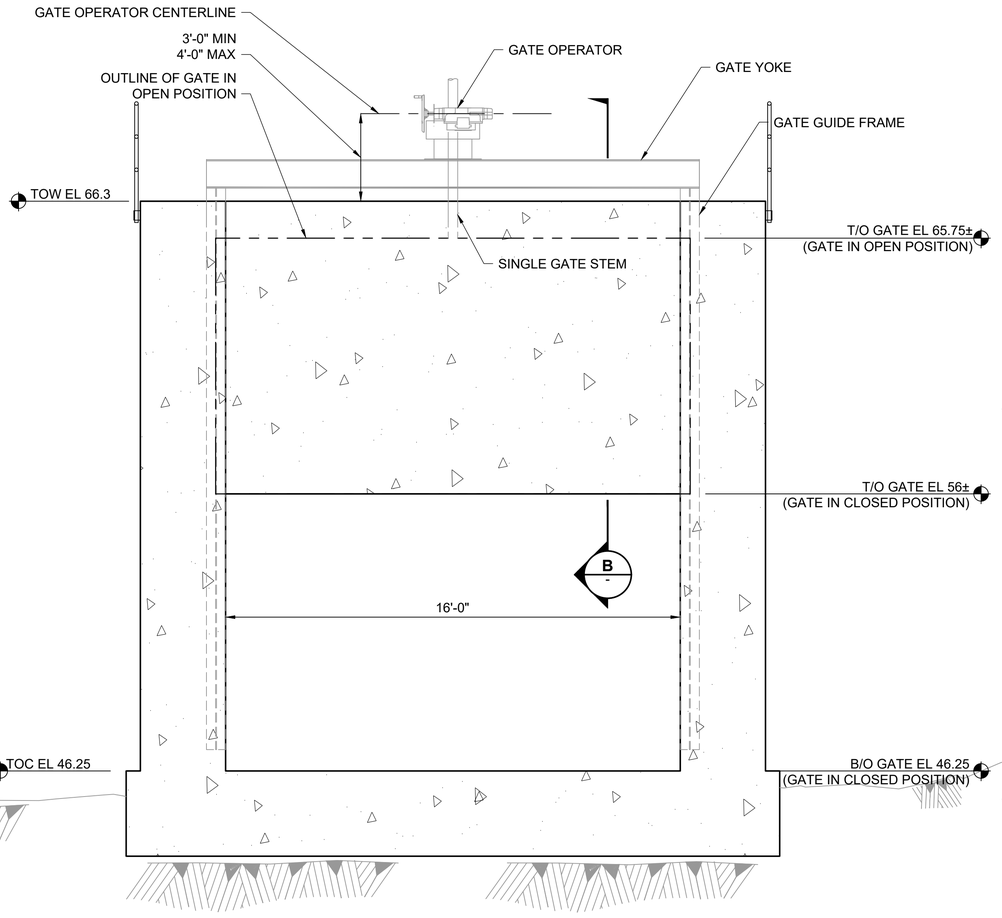
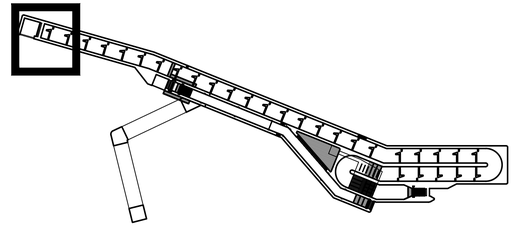
1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



A - **ELEVATION GATE 6 (FISHWAY ENTRANCE)**
SCALE: 3/8"=1'-0"



N **KEY MAP**
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 6 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 16'W x 9.75'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 50.9
   - NORMAL 52.2
   - DESIGN HIGH 55.5

B - **SECTION**
SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISHWAY ISOLATION GATE (GATE 6) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	92 OF 94
DRAWING:	M-114

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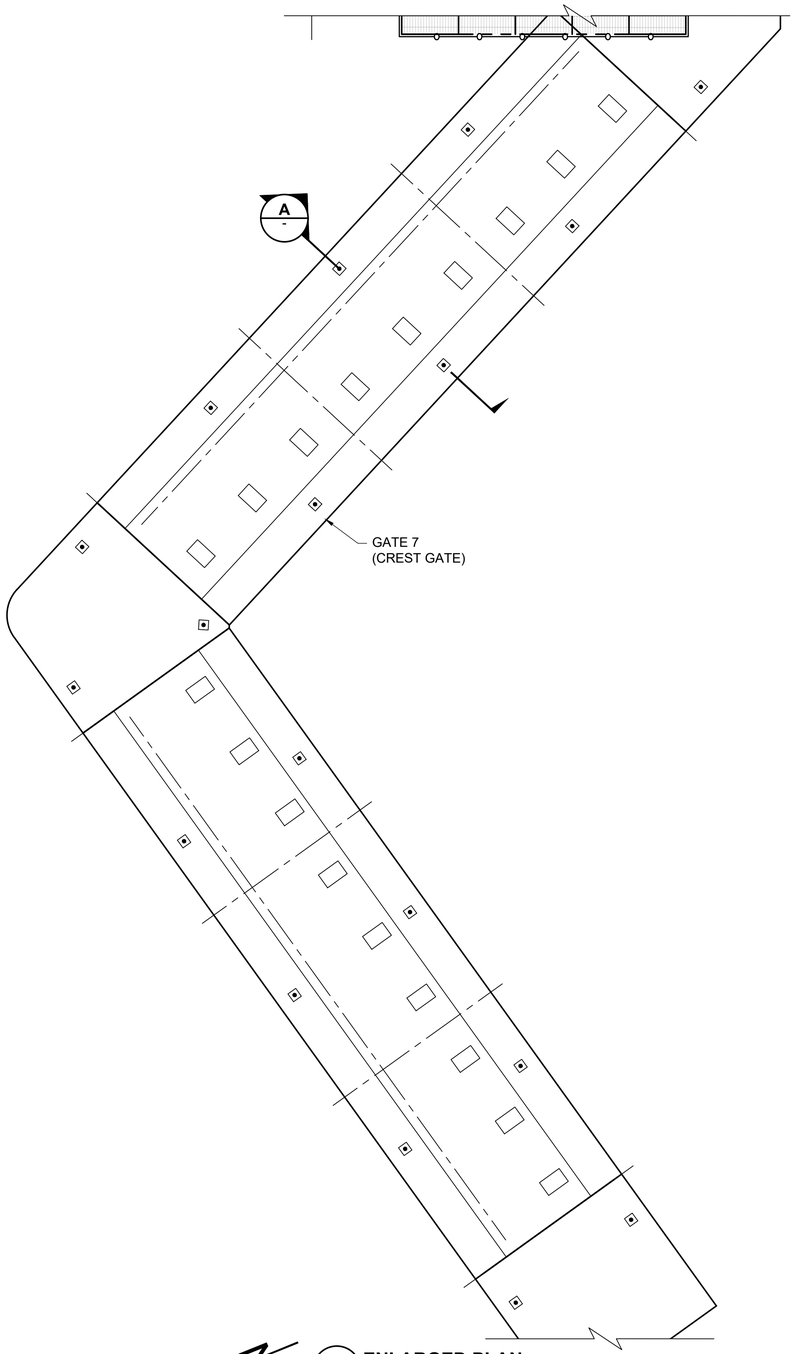
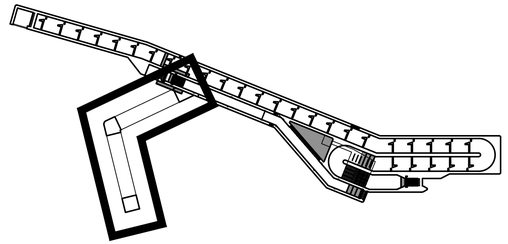


1 / - **ENLARGED PLAN**
SCALE: 3/16"=1'-0"

FLOW

KENNEBEC RIVER

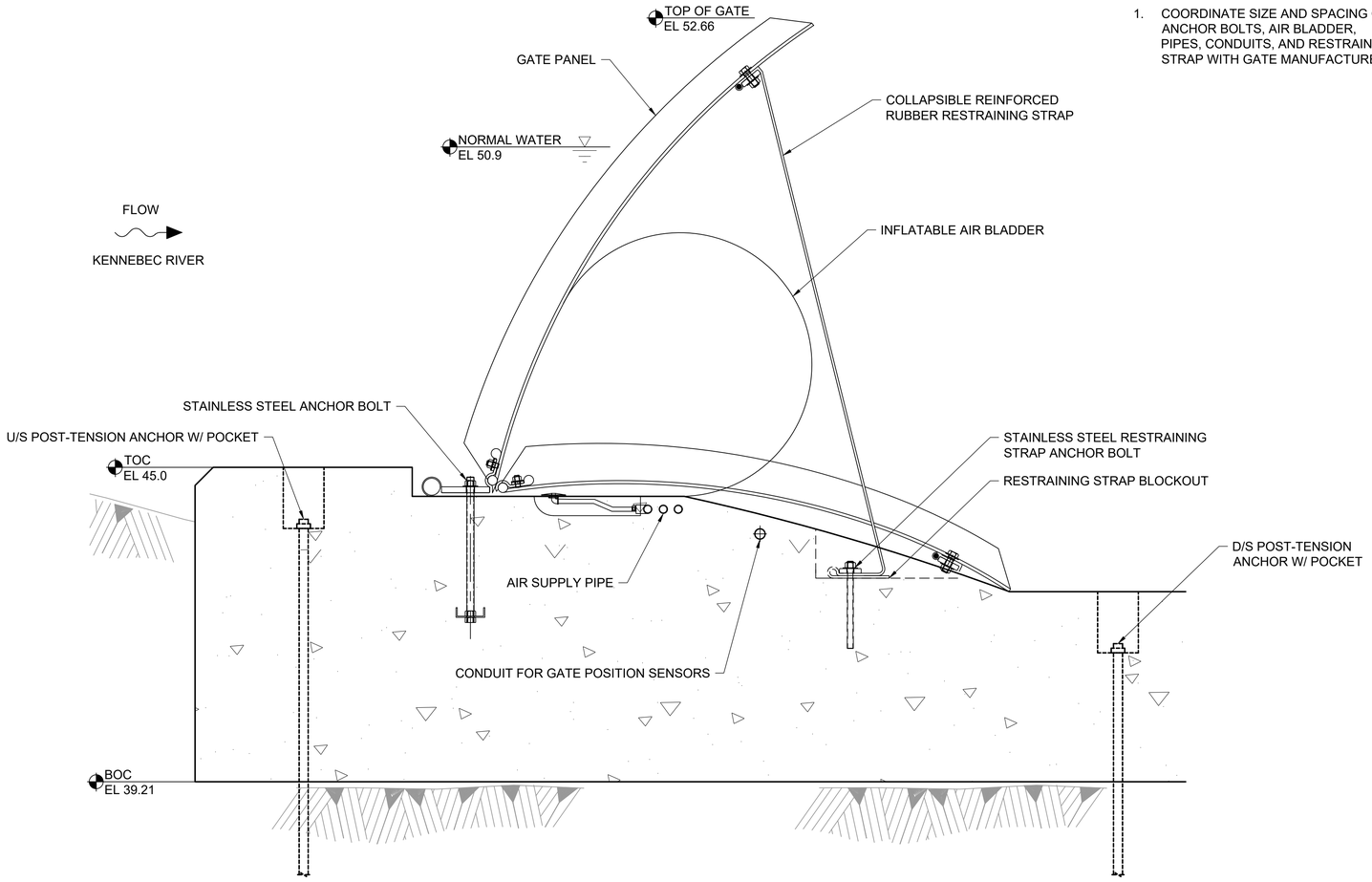


N

KEY MAP
SCALE: NTS

NOTE:

1. COORDINATE SIZE AND SPACING OF ANCHOR BOLTS, AIR BLADDER, PIPES, CONDUITS, AND RESTRAINING STRAP WITH GATE MANUFACTURE.



A / - **ELEVATION GATE 7 (CREST GATE)**
SCALE: 3/4"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

CREST GATE (GATE 7)
REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	93 OF 94
DRAWING:	M-115

DWG: S:\13100\9\Holden\Lockwood\900 CAD\02-sheets\M\M-115.dwg USER: MKA0089
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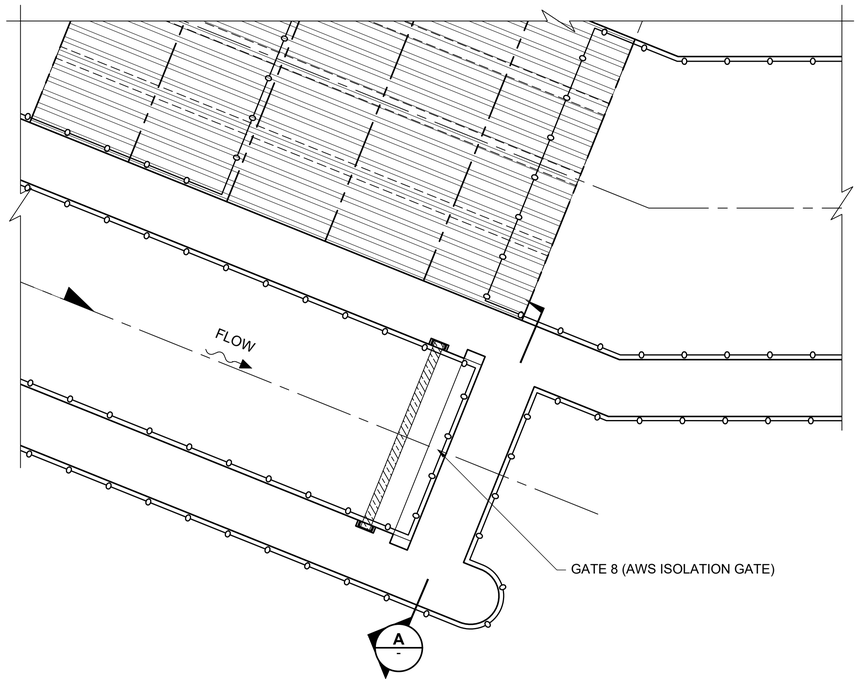
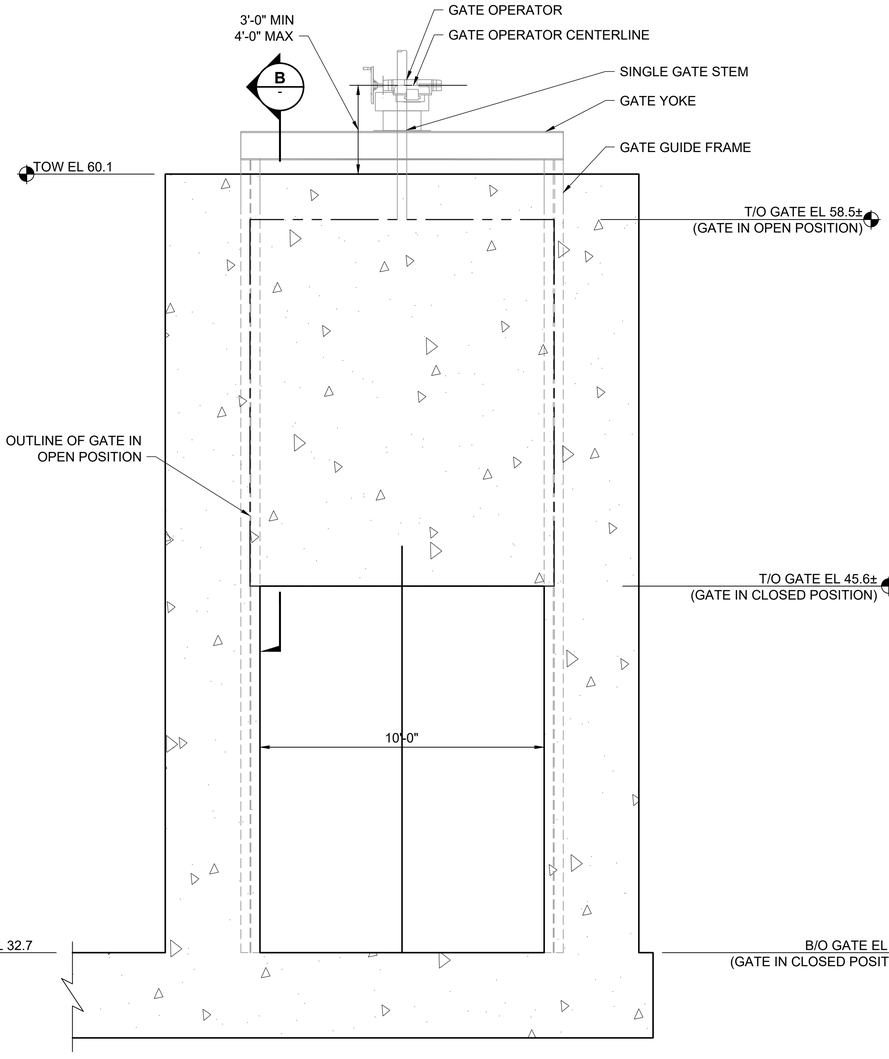


1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



A - **ELEVATION GATE 8 (AWS ISOLATION GATE)**
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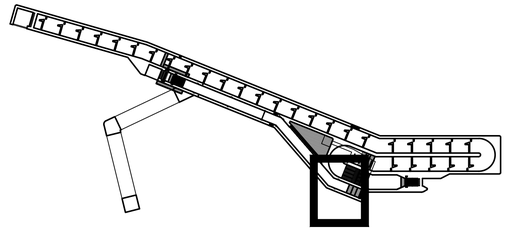
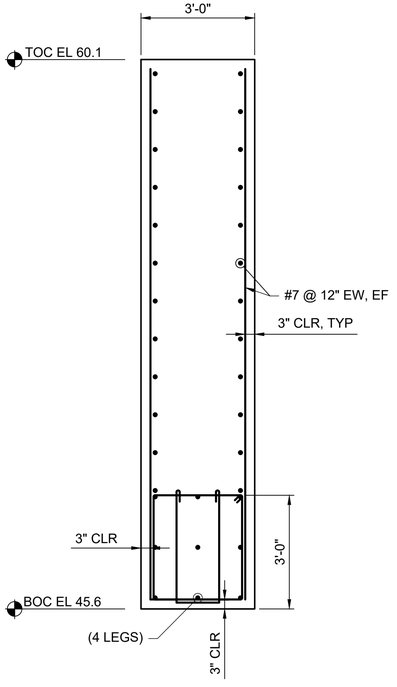


N **KEY MAP**
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 8 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 10'W x 12.9'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW 30.5
   - NORMAL 32
   - DESIGN HIGH 36.5



B - **SECTION**
SCALE: 1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS ISOLATION GATE (GATE 8) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	94 OF 94
DRAWING:	M-116

DWG: S:\131009\Holden\Lockwood\900 CAD\02-sheets\MM-116.dwg USER: MKA0089
DATE: Feb 03, 2021 9:23am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-SEC IMAGES:

APPENDIX E

FISHWAY OPERATIONS & MAINTENANCE PLAN

LOCKWOOD HYDROELECTRIC PROJECT

FERC No. 2574-ME

FISH PASSAGE OPERATIONS & MAINTENANCE PLAN

Version 1.0

March 2021

Operated by:

Brookfield White Pine Hydro, LLC

An indirect subsidiary of

Brookfield Renewable Energy Group

Skowhegan, Maine

Table of Contents

Lockwood Vertical Slot Fish Ladder Operation and Maintenance Plan

1.0 INTRODUCTION

This Fish Passage Operations and Maintenance Plan (the "Plan") is intended to define how Brookfield White Pine Hydro, LLC (an indirect subsidiary of Brookfield Renewable Energy Group) will operate and maintain the vertical slot fish passage facilities at the Lockwood Hydroelectric Project FERC No. 2574 ("Lockwood Project" or the "Project"). This Plan is part of Brookfield's commitment to our environmental principles that are based on the fundamental values of accountability, partnership and open communication. As such, we have accepted the responsibility entrusted to us to manage natural resources in ways to ensure sustainable development.

The Plan will define what fish passage facilities (the "Facilities") are to be constructed at the Lockwood Project, the period in which the existing and new facilities are to be operated, guidance on the annual start-up and shut-down procedures, routine operating guidelines, debris management, and safety rules and procedures that are in place. Along with these defined procedures and guidelines, the Plan includes the necessary supporting information such as contact information, daily inspection forms, drawings, and spare parts on-site. This Plan should be considered a living document, and as such it will be updated annually, as needed.

2.0 BACKGROUND

The Lockwood Project is located on the main stem of the Kennebec River at river mile 63 in Waterville and Winslow Maine and is the first dam on the river. The Project is operated as a run-of-river facility with inflows equaling outflows either through the powerhouse and gates or via spillage over the spillway. The Project is normally operated to provide an instantaneous minimum flow of 2,114 cfs or inflow, if less, below the powerhouse to maintain downstream aquatic habitat in the river. Flow in the approximately 1,300 ft long bypassed reach is currently limited to leakage around and through the flashboards, including through 3 (three feet long by eight inches high) engineered orifices cut into the flash boards (estimated at a total of 50 cfs), or as spill over the flashboards when river flow exceeds about 5,600 cfs. The headworks and intake structures are integral to the dam and the powerhouses, respectively.

The forebay intake section contains eleven head gates measuring 8.5 ft wide by 12 ft high. From the headworks, the forebay canal directs water to two powerhouses located on the west bank of the Kennebec River: the original 1919 powerhouse contains six vertical Francis units and the 1989 powerhouse contains one horizontal Kaplan unit, together resulting in a total installed capacity of 6.8 MW and a combined flow of approximately 5,660 cfs. The powerhouse trash racks are serviced by a track mounted, hydraulically operated trash rake with trash removal capabilities. The trash racks screening the intakes are 2.0 inch clear spacing in front of Units 1-6 and 3.5 inch clear spacing in front of Unit 7. The project's tailrace returns the flow to the Kennebec River about 1,300 ft. downstream from the east spillway section.

The Project is equipped with an interim fish lift, trap, sort and truck facility and a downstream bypass facility that were installed pursuant to the 1998 Lower Kennebec River Settlement Agreement which was incorporated into the Project's FERC license. The fish passage facilities were designed and installed in consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and Maine Department of Marine Resources for passage of American shad, alewife, blueback herring and Atlantic salmon. The facilities are currently operated in cooperation with federal and state fishery resource agencies.

The east channel includes a vertical slot fishway with an attraction water system including a water separation screen, flow control gates and discharge channel covered by this Operation and Maintenance manual below.

3.0 DESCRIPTION OF FISH PASSAGE FACILITIES

3.1 UPSTREAM FISH PASSAGE

The new upstream passage facility at Lockwood's bypassed reach spillway will be provided via a vertical slot fish ladder. The fishway is 800 ft long and consists of 28 pools, designed for a 9 inch hydraulic drop between each. Each pool is 16 ft wide by 20 ft long and the overall slope of the fishway is 3.8%. The fishway will maintain a minimum depth of 4 ft throughout and will maintain a flow between 50 to 100 cfs (range of head pond). The fishway is designed to pass American Shad, River Herring, and Atlantic salmon.

Attraction flow will be provided from the fish ladder flow and supplemental flow from an auxiliary attraction flow (AWS) channel located adjacent to the fish ladder. This channel is 10 ft wide, 280 ft long and provides flow to a floor diffuser in the fish ladder entrance channel, in addition to flow discharged adjacent to the fish ladder entrance. The total attraction flow provided at the fish ladder entrance and adjacent channel would amount to 280 cfs (5% of station capacity). The auxiliary attraction flow channel included weirs to dissipate energy with

a screened intake approximately two thirds down the length to provide water for the fish ladder floor diffuser. This screened intake has a 0.25 inch clear spacing, designed for a through-screen velocity less than 0.5 ft/sec and a sweeping flow varying between 1 and 3 ft/sec. The AWS channel discharges over a weir adjacent to the fish ladder with a plunge pool depth ranging between 4 and 10 ft over the range of tailwater conditions.

3.2 DOWNSTREAM FISH PASSAGE

The AWS channel for the vertical slot fishway, as described above, will be operated to allow downstream fish passage at Lockwood's bypass reach.

4.0 OPERATIONS & MAINTENANCE OF FISH PASSAGE FACILITIES

4.1 UPSTREAM FISH PASSAGE

OPERATIONAL PERIOD

- May 1 to October 31, seven days a week as river conditions allow
- Unit prioritization, Unit 7-1 first on last off during operational period
- 21,100 cfs maximum operational river flow

OPENING METHODS

- LOTO and set up fall arrest/ fall retrieval devices
- Verify isolation gates for the AWS system and fishway are closed and the channels de-watered
- Clear all debris from AWS channel, fishway pools and attraction water diffusion chamber. Inspect for any damaged components and repair as necessary
- Inspect and repair as necessary baffles in fishway and AWS channel
- Clear debris from AWS and fishway intakes
- Inspect and grease exit and entrance isolation gates, AWS flow control gates (2) and test water level sensors and place in auto position
- Open isolation gates in the tailwater and open isolation gates in the headpond
- Set the AWS flow control gates to required settings
- Verify that no vertical slot weirs are overtopping.
- Verify proper water height over the AWS flow control gate at the entrance

SPARE PARTS

- 2 entrance gate actuator drive bushings

- 2 exit gate actuator drive bushings
- 1 exit gate actuator drive bushing
- 2 AWS flow control gate actuator drive bushings
- 2 AWS exit isolation gate drive bushing
- 2 AWS entrance isolation gate drive bushing

WORKFORCE PLANNING AND ROLES AND RESPONSIBILITIES

The fishway will be operated by Brookfield environmental compliance specialists in cooperation with Brookfield hydro technicians. The day to day operation and general cleaning of the fishway will be conducted by Brookfield staff and the hydro technicians will assist as needed for resolution of mechanical, electrical and major debris issues.

- Staffing Requirements
  - Start Up – Crew of 3
  - Routine Operation – Crew of 1
  - Routine Maintenance – Crew of 2 for standard maintenance, crew of 4 for fishway entry for cleaning
  - Shut Down – Crew of 3
- Daily Basis
  - The fishway is inspected for debris accumulation. If debris is found, Brookfield staff will remove debris from fishway. If debris is not manageable by hand, operations crew will de-water fishway if necessary and remove the debris
  - The vertical slot weirs are inspected for proper flow
  - The AWS flow control gates are set as needed
  - The Daily Fishway Inspection Forms are completed by Brookfield using Appendix A form.
  - The fishway daily inspection sheets are completed by Brookfield submitted to the compliance group by Monday morning
- Weekly Basis
  - Facility's lead fishway technician to provide, via email, a completed Fishway Operations Report to resource agencies on a weekly basis
- Fishway Dewatering and Cleaning Process
  - LOTO and set up fall arrest/fall retrieval device, inspect fall harness
  - Fully close attraction water isolation gates and fishway isolation gates and slowly de-water fishway

- Enter upper fishway when it is approximately ½ foot deep and inspect for and collect fish. Use long handle dip net to collect fish from lower fishway pools and return fish to tailrace.

- Preventative Maintenance Process
  - Monthly
    - Grease AWS and Fishway Isolation gates and AWS flow control gate and fishway entrance gate
    - Inspect and repair mechanical components as necessary
    - Dewater fishway on August 1 for annual two week inspection, cleaning and repairs
  - Yearly
    - Inspect the AWS and fishway entrance and exit isolation gates, and AWS flow control gates (2) and all the drive mechanisms

WINTERIZING METHODS

- LOTO and set up fall arrest/fall retrieval devices
- Close fishway isolation gates and slowly de-water fishway, and seal gate if necessary to minimize leakage
- Enter upper fishway when it is approximately ½ foot deep and inspect for and collect fish. Use long handle dip net to collect fish from lower fishway pools and return fish to tailrace
- Install ice eaters in the fishway lower flume sections

NOTICE:

- Contact NMFS within 24 hours of any interactions with Atlantic salmon, Atlantic sturgeon or shortnose sturgeon, including non-lethal and lethal take and follow sturgeon handling plan.
- In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS[1]
- Notify NMFS of any changes in project and fishway operations (including maintenance activities such as flashboard replacement)[2] and follow fish stranding procedure.

[1] This would typically include date collected, species, measurements, photographs, etc…

[2] *This does not include typical operational changes such as generator load swings, putting generators online and offline, normal impoundment and flow fluctuations, and opening/closing gates to control spillage. NMFS should be notified for any fishway dewaterings or maintenance issues, problems meeting fishway operational dates,*

- The first Brookfield point of contact for all fishway related issues is the local Supervisor of Operations.
- Refer to Section 8.0 for contact information

4.2 DOWNSTREAM FISH PASSAGE

OPERATIONAL PERIOD

- Open AWS channel gate isolation gate and set AWS channel flow control gate to target flow rate: April 1 through December 31, as river conditions allow

OPENING METHODS

AWS downstream passage system

1. Grease AWS isolation gates and attraction water flow control gate operator mechanisms
2. Open the AWS downstream isolation gate 100%
3. Open the AWS upstream isolation gate 100%
4. Set the AWS flow control gate to target flow rate/ flow conditions
5. Close attraction water flow control gate at the stilling basin when fish ladder is not in operation

SPARE PARTS

- 1 drive bushing for upstream isolation gate operator
- 1 drive bushing for downstream isolation gate operator
- 2 drive bushings for the AWS flow control gate

WORKFORCE PLANNING

- Staffing Requirements:
  - Start Up – Crew of 1
  - Routine Operations – Crew of 1
  - Routine Maintenance – Crew of 2 for standard maintenance, crew of 3 for AWS entry for cleaning
  - Shut Down – Crew of 1
- Daily basis:

impoundment drawdowns for flashboard or other maintenance, or any other atypical project operations such as dewatering of tunnels, conduits, or penstocks

    - Inspect the AWS downstream fish passage entrances for debris and remove it. If debris can't be easily removed, operations crew will assist. Notify the resource agencies (see Section 8.0) if downstream fish passages can't be cleaned the same day.
    - Verify proper outflow of the downstream fish passages.
    - The fishway log sheets are completed consistent with Appendices A and B. Information within the daily inspection form will be entered into a database for ease of data sharing throughout and at the end of the season
- Weekly basis:
    - Facility's lead fishway technician to distribute a weekly Electronic Fishway Operations Report consistent with Appendix B to the fishery resource agencies
- Cleaning process:
    - De-water the downstream fish passage (AWS) and inspect fishway for stranded fish
    - Set up fall arrest/fall retrieval device, inspect fall harness (Brookfield procedure)
    - Prepare chainsaw for operation, inspect all chainsaw PPE
    - Inspect all rigging for hoisting debris
- Preventative Maintenance process:
    - Yearly:
        - Inspect the isolation gate and AWS flow control gate operators
        - Inspect the wedge wire intake screen and weirs

WINTERIZING METHODS

- LOTO and set up fall arrest/fall retrieval devices
- Close the AWS upstream isolation gate de-energize
- Enter upper AWS channel when it is approximately ½ foot deep and inspect for and collect fish. Use long handle dip net to collect fish from lower fishway pools and return fish to tailrace
- Open AWS flow control gate to drain water and de-energize
- Close the AWS downstream isolation gate, de-energize
- Install ice eaters in the AWS lower flume sections

5.0 FISH STRANDING AND MORTALITY CONTINGENCY PLAN

- To minimize the chance of fish stranding on ledges below the spillway, maintaining the head pond at an elevation of 51.85 ft or greater will provide enough spill to keep the ledges watered.
- If there is a stranding event on the ledges, you can access on the east shore just upstream of the Rt. 201 bridge or by boat from downstream.
- If a stranding event occurs contact the Fisheries Lead or Seasonal Fish Techs along with the local Compliance Specialist and Stakeholder Relations.

5.1 OBSERVATION POINTS

- Vertical slot fish ladder access walkways
- Off the Rt. 201 bridge
- From the Lockwood office windows
- Halifax park in Winslow
- Hand carry launch downstream of the Lockwood Project
- Public boat launch approximately 1.5 mile downstream of the Lockwood Project

5.2 AVAILABLE RESOURCES

- Nets and handle extensions located at the Lockwood fish lift
- Salmon socks, five-gallon buckets and a trash can located at the Lockwood fish lift
- Canoe located in Lockwood power house
- 14-foot motor boat located at Hydro Kennebec

6.0 FISH MORTALITY DISPOSAL PLAN

- Fish mortalities can be picked up by a local bait dealer (Wild things Bait Shop) located in Oakland. Contact is Scott Horne at (207) 313-9741.
- All mortalities are noted on the fish lift daily log sheets

7.0 SAFETY

7.1 SAFETY RULES & PROCEDURES

- Pursuant to Brookfield's Safety Procedure SP9, Job Safety and Environmental Plans are completed prior to, and ideally, well in advance of any work at the various fish ways are started. Job Safety and Environmental Plans are to be completed using the standard form which may be updated from time to time.

Review of prior Job Safety and Environmental Plans for similar work is encouraged to help capture all safety risks that may be present at the site.

8.0 CONTACT INFORMATION

BROOKFIELD CONTACTS

- Dave Watson, Operations Manager, Brookfield
  - (o) 207-474-3921 x 12
  - (c) 207-520-8870
  - David.watson@brookfieldrenewable.com

- Joel Rancourt, Senior Operations Manager, Brookfield
  - (o) 207-474-3921 x 11
  - (c) 207-458-6775
  - joel.rancourt@brookfieldrenewable.com

- Kelly Maloney, Manager of Compliance, Brookfield
  - (o) 207-755-5606
  - (c) 207-233-1995
  - Kelly.maloney@brookfieldrenewable.com

- Adam Brown, Compliance Specialist, Brookfield
  - (c) 207-313-1173
  - Adam.brown@brookfieldrenewable.com

AGENCY CONTACTS

- Matt Buyoff, Atlantic Salmon Recovery Coordinator, NMFS
  - (c) 207-866-4238
  - Matt.buhyoff@noaa.gov

- Don Dow, Hydro Engineer, NMFS
  - (o) 207-866-3758
  - (c) 207-416-7510
  - Donald.dow@noaa.gov

- Julianne Rosset, Migratory Fish/Hydropower, USFWS
  - (c) 603-309-4842
  - Julianne_rosset@fws.gov

- Bryan Sojkowski, Fish Passage Engineer, USFWS
  - (o) 413-253-8645
  - Bryan_sojkowski@fws.gov

- Sean Ledwin, Director Sea Run Fisheries Division, MDMR
  - (o) 207-624-6348
  - Sean.m.ledwin@maine.gov

- Gail Wippelhauser, Marine Resources Scientist, MDMR
  - (o) 207-624-6349
  - Gail.wippelhauser@maine.gov

- Paul Christman, Marine Resources Scientist, MDMR
  - (c) 207-577-5780
  - (o) 624-6352
  - paul.christman@maine.gov

- John Perry, Environmental Coordinator, MDIFW
  - (o) 207-287-5254
  - (c) 207-446-5145
  - John.perry@maine.gov

- Dwayne (Jason) Seiders, Fishery Biologist, MDIFW
  - (o) 207-287-5254
  - Dwayne.j.seiders@maine.gov

- Kathy Howatt, Hydropower Coordinator, MDEP
  - (o) 207-446-2642
  - Kathy.howatt@maine.gov

- Chris Sferra, Hydropower Specialist III, MDEP
  - (o) 207-446-1619
  - Christopher.sferra@maine.gov

NOTICE:

- Contact NMFS within 24 hours of any interactions with Atlantic salmon, Atlantic sturgeon or shortnose sturgeon, including non-lethal and lethal take and follow sturgeon handling plan.
- In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS[3]
- Notify NMFS of any changes in project and fishway operations (including maintenance activities such as flashboard replacement)[4]and follow fish stranding plan
- The first Brookfield point of contact for all Fishway related issues is the local Supervisor of Operations
- Refer to Section 8.0 for contact information

[3] This would typically include date collected, species, measurements, photographs, etc…

[4] *This does not include typical operational changes such as generator load swings, putting generators online and offline, normal impoundment and flow fluctuations, and opening/closing gates to control spillage. NMFS should be notified for any fishway dewatering's or maintenance issues, problems meeting fishway operational dates, impoundment drawdowns for flashboard or other maintenance, or any other atypical project operations such as dewatering of tunnels, conduits, or penstocks*

9.0 APPENDICES

APPENDIX A: Lockwood Daily Fishway Inspection Form

Date: _____ Time: _____ Inspector: _____

Headwater level: _____ Tailwater level: _____

Upstream Fishway

Water depth at entrance _____

Water depth at exit _____

Flow rate in fishway _____

Entrances not blocked by debris _____

Fishway clear of debris _____

AWS / Downstream Passage System

Water depth at entrance _____

Water depth at exit _____

Water Depth over AWS flow control weir _____

AWS Flow control gate setting _____

Flow rate in AWS _____

Entrances not blocked by debris _____

AWS screen and channel clear of debris _____

Comments

_____

_____

Please provide completed inspection forms to the Compliance Group every Monday morning.

APPENDIX B: Fishway Operations Weekly Report

Lockwood Fishway Operation Weekly Report Form

Project Name _____

Fishway Facility _____

Date _____

Species	#'s Detected (Weekly)	Total For Season
Atlantic Salmon (MSW):		
Atlantic Salmon (1SW):		
River Herring:		
American Shad:		
Striped Bass:		
Sea Lamprey:		

Weekly Operational Status: _____

_____

_____

_____

_____

_____

Note:

Weekly Fishway Operations report to be provided to the resource agencies.

APPENDIX C: Fishway PLC Operations (placeholder)

APPENDIX D: Fishway Attraction Water Curve (placeholder)

APPENDIX E: Handling Plan for Shortnose and Atlantic Sturgeon (placeholder)

APPENDIX F: Fishway Design Drawings (placeholder)

APPENDIX F

DECEMBER 3, 2020, USFWS INFORMATION FOR PLANNING AND CONSULTATION (IPAC) REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588
http://www.fws.gov/mainefieldoffice/index.html

In Reply Refer To: December 03, 2020
Consultation Code: 05E1ME00-2021-SLI-0273
Event Code: 05E1ME00-2021-E-00811
Project Name: Lockwood Fishway

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies the threatened, endangered, candidate, and proposed species and designated or proposed critical habitat that may occur within the boundary of your proposed project or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC Web site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the Endangered Species Consultation Handbook at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

This species list also identifies candidate species under review for listing and those species that the Service considers species of concern. Candidate species have no protection under the Act but are included for consideration because they could be listed prior to completion of your project. Species of concern are those taxa whose conservation status is of concern to the Service (i.e., species previously known as Category 2 candidates), but for which further information is needed.

If a proposed project may affect only candidate species or species of concern, you are not required to prepare a Biological Assessment or biological evaluation or to consult with the Service. However, the Service recommends minimizing effects to these species to prevent future conflicts. Therefore, if early evaluation indicates that a project will affect a candidate species or species of concern, you may wish to request technical assistance from this office to identify appropriate minimization measures.

Please be aware that bald and golden eagles are not protected under the Endangered Species Act but are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Projects affecting these species may require development of an eagle conservation plan: http://www.fws.gov/windenergy/eagle_guidance.html Information on the location of bald eagle nests in Maine can be found on the Maine Field Office Web site: http://www.fws.gov/mainefieldoffice/Project%20review4.html

Additionally, wind energy projects should follow the wind energy guidelines: http://www.fws.gov/windenergy/ for minimizing impacts to migratory birds and bats. Projects may require development of an avian and bat protection plan.

Migratory birds are also a Service trust resource. Under the Migratory Bird Treaty Act, construction activities in grassland, wetland, stream, woodland, and other habitats that would result in the take of migratory birds, eggs, young, or active nests should be avoided. Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g.,

cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm and at: http://www.towerkill.com; and at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

Project Summary

Consultation Code: 05E1ME00-2021-SLI-0273

Event Code: 05E1ME00-2021-E-00811

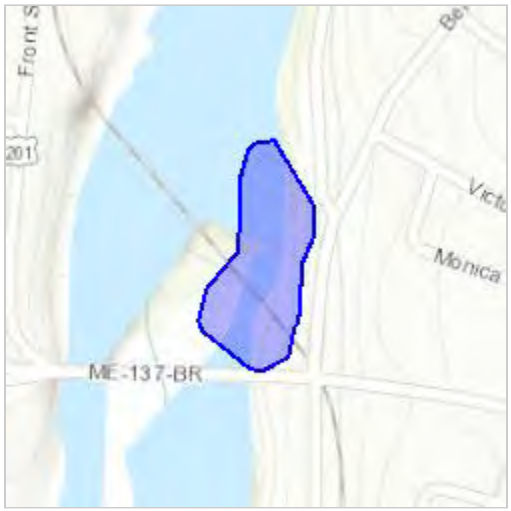
Project Name: Lockwood Fishway

Project Type: DAM

Project Description: Lockwood Fishway

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/44.54830709468396N69.62589978917894W



Counties: Kennebec, ME

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Fishes

NAME	STATUS
Atlantic Salmon *Salmo salar* Population: Gulf of Maine DPS There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2097	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Atlantic Salmon *Salmo salar* https://ecos.fws.gov/ecp/species/2097#crithab	Final

APPENDIX G

CULTURAL AND TRIBAL CONSULTATION

October 23, 2020

VIA EMAIL

Kirk F. Mohney, Director
Megan Rideout
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065
Kirk.Mohney@maine.gov
megan.m.rideout@maine.gov

Re: Lockwood Hydroelectric Project (FERC No. 2574)
Project Review Submittal – Upstream Fish Passage Facility

Dear Mr. Mohney and Ms. Rideout:

On behalf of Merimil Limited Partnership, a subsidiary of Brookfield Renewable Energy (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates submits Project Review information for the construction of an upstream fish passage facility at the Project on the east side of the Kennebec River. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine.

Project Background

The Project is located on the Kennebec River in Kennebec County, Maine (See location map in Attachment A). The Lockwood Project is operated in a run-of-river mode and consists of an 875-foot-long by 17-foot-high dam with two spillway sections equipped with 1.25-foot-high pinned flashboards and a 160-foot-long forebay headworks section; a 450-foot-long forebay canal; two powerhouses containing a total of 7 generating units with a total installed capacity of 6.915 MW; an approximately 1,300-foot-long bypass reach; and an 81.5-acre reservoir. An interim fish trap, lift, and transfer facility is located along the west side of the Kennebec River, on the east side of the Project powerhouse. The Project releases a minimum flow of 50 cubic feet per second (cfs), or inflow, whichever is less, into the bypass reach and a minimum downstream flow of 2,114 cfs, or inflow, whichever is less, downstream of the project powerhouse for protection of aquatic species.

On March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) issued a new license for the Project. The license and corresponding August 26, 2004 Water Quality Certificate (WQC) (L-20218-33-C-N) included fish passage requirements. As stipulated by WQC Condition 3C, MLP installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided via a trap and truck program where migrants are transported upstream to spawning habitat. Both the License and WQC stipulate that installation of permanent upstream fish passage at the Project will be triggered by a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, lift and transfer facility at the Lockwood powerhouse or b) development of an alternate trigger for fishway installation based on the biological assessment process for the Atlantic Salmon, alewife, and blueback herring, whichever comes first.

Since the FERC License was issued, Atlantic Salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with FERC an Interim Species Protection Plan for Atlantic Salmon (Interim SPP). On May 19, 2016, FERC amended the Lockwood License to include the Interim SPP that requires a volitional (swim through) upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC prescribed the required operational date for the volitional upstream fish passage to be May 31, 2022.

In accordance with the Interim SPP, FERC license, and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Lockwood Project to provide volitional passage for upstream migration of salmon and other anadromous species.

The facility has been designed in consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MDIFW) to determine an appropriate fish passage technology for the Lockwood Project.

Proposed Construction Project

Brookfield proposes to construct a concrete vertical slot fish ladder system (fishway). The fishway will be built on the east side of the Kennebec River, under the railroad bridge, and over the north dam spillway. The fish passage facility will be approximately 530-feet-long by approximately 60-feet-wide at its widest point (Attachment C). An attraction flow channel will be constructed on the western side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide. To allow for fish passage system construction, in-river bedrock removal will occur and an approximately 105-foot-wide section of the concrete spillway will

be removed. The fishway and attraction flow channel will be installed within the removed spillway section along with a 60-foot-wide crest gate to replace spillway capacity. A permanent concrete access pad will additionally be constructed within and along the river's edge in connection with the access road, to allow for enhanced access during construction and to provide an access area for continued facility maintenance.

A contractor designed temporary cofferdam system will be constructed around the in-river work area to provide a de-watered workspace. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown area. Pumps will be utilized during construction to control water in the construction area and a dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

The work and laydown areas for the Project will be accessed via an access road, discussed below. The access road will be gated and secured. Construction work is scheduled to begin in 2021, after spring river flows recede and allows for safe access.

Separate Access Road Project Submittal

Please note, this Project Review submittal is specific only to the proposed upstream fishway. A separate project, the fishway access road, is proposed to be constructed this fall/winter of 2020. The access road will facilitate fishway construction access and eventual maintenance of the proposed upstream fishway. A separate Project Review package for construction of the proposed access road was submitted to MHPC on May 19, 2020, and found by MHPC not to adversely affect historic properties on May 28, 2020.

MHPC Review Request

In accordance with Section 106 of the National Historic Preservation Act (NHPA), we are requesting the Maine Historic Preservation Commission's (MHPC) review of the upstream fish passage facility. The proposed project area is located in a previously disturbed area. As referenced in the 2005 FERC Project license, cultural resource surveys of the project area were conducted during the last licensing process. No National Register Eligible properties were identified within the Lockwood Project's area of potential effect. The Maine State Historic Preservation Office concurred with this finding in a letter dated May 8, 2002.[1] FERC staff additionally contacted federally recognized Indian tribes within the state and none identified any properties to which they attach religious or cultural significance that would be affected by ongoing hydroelectric project operations. However, in accordance with Article 412 of the Project license, if previously unidentified archeological or historic structures are discovered during construction or any other phase of this project's development, the licensee shall stop all land-disturbing activities in the vicinity of the property and consult with the MHPC.

[1] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10433836

Attached please find a USGS topographic map and Project Location Map depicting the proposed project area (Attachment A), photos of the proposed area of project effect (Attachment B), and engineering drawings depicting the proposed project (Attachment C). As required by the U.S. Army Corps of Engineers (USACE), a request for project review is also being provided to the appropriate federally recognized Indian tribes.

Should you have any questions upon review, please contact me at 207.416.1218 or at Katie.Sellers@kleinschmidtgroup.com. Due to COVID-19 related work from home restrictions, please forward any project related responses via email.

Sincerely,

KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds
Regulatory Coordinator

KSR:TMJ
Attachments: Attachment A – USGS Topographic and Project Location Map
Attachment B – Project Area Photos
Attachment C – 30% Design Drawings
cc: Gerry Mitchell and Kelly Maloney, Brookfield Renewable
Fatima Oswald, Kleinschmidt Associates

ATTACHMENT A

USGS TOPOGRAPHIC AND GOOGLE EARTH MAPS

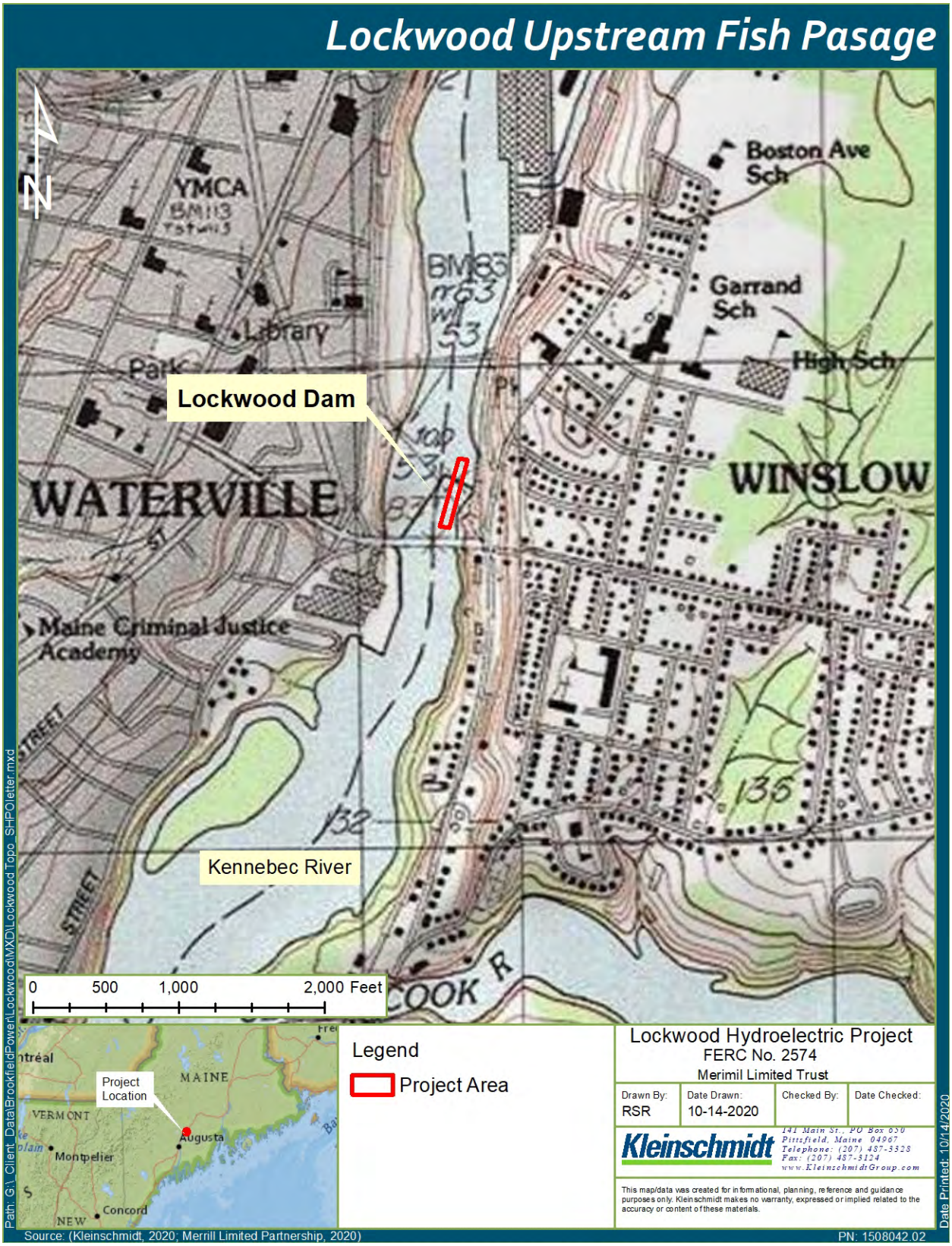


FIGURE 1 LOCKWOOD UPSTREAM FISH PASSAGE PROJECT AREA - PROPOSED WORK LOCATION (TOPO MAP)

FIGURE 2 LOCKWOOD UPSTREAM FISH PASSAGE - PROPOSED WORK AREA

ATTACHMENT B

PHOTOS

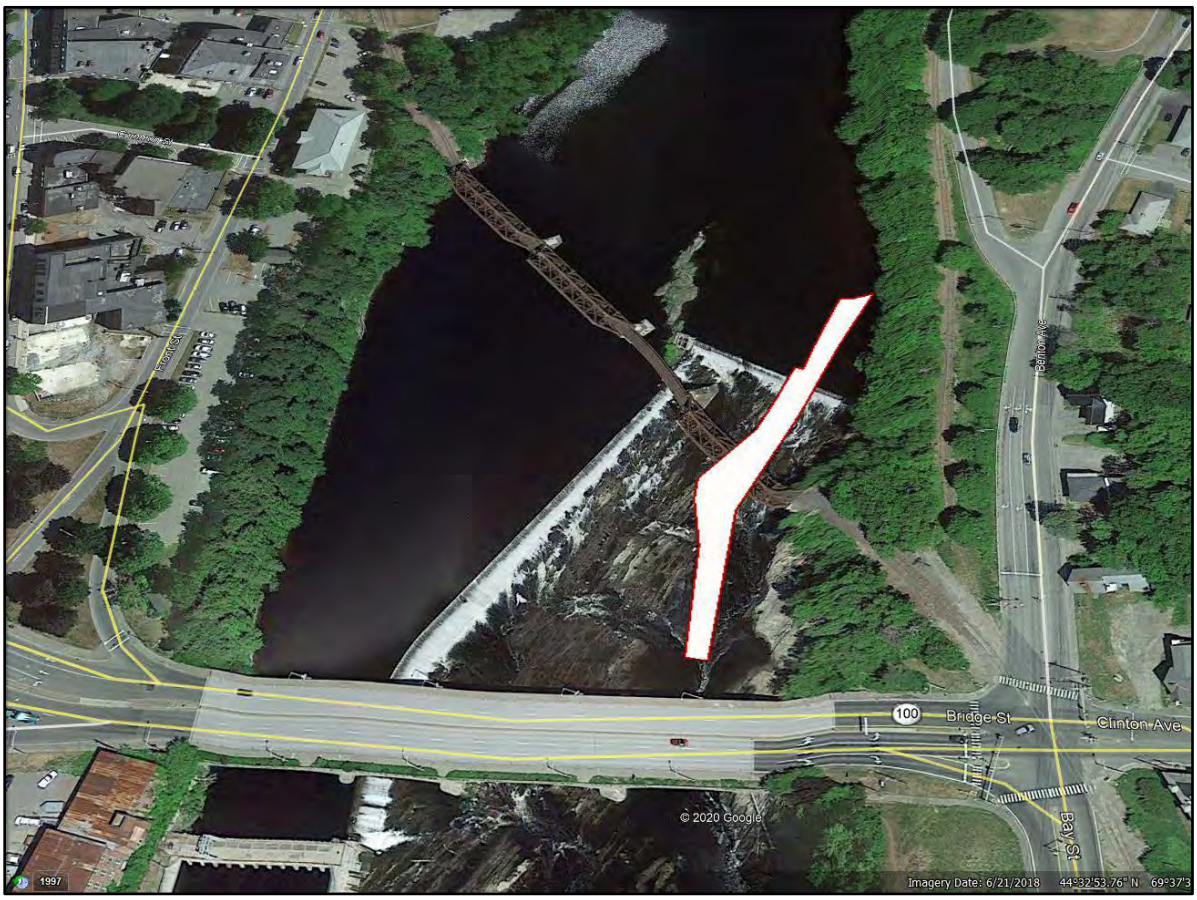


PHOTO 1 **APPROXIMATE PROPOSED FISH LADDER PLACEMENT, ALONG THE EAST SIDE OF THE KENNEBEC RIVER, UNDER THE RAILROAD BRIDGE, OVER THE NORTH SECTION OF THE DAM**

PHOTO 2 **VIEW FACING WEST OVERLOOKING PROPOSED FISH LADDER PLACEMENT AREA (AND RAILROAD BRIDGE) TO BE LOCATED IN THE LOCKWOOD DAM BYPASS REACH. VIEW FACING WEST TOWARDS LOCKWOOD DAM. PHOTO DATE: 2/28/2020. PHOTOGRAPHER LOCATION: ALONG KENNEBEC RIVER SHORELINE.**

PHOTO 3 **VIEW FACING WEST OVERLOOKING PROPOSED FISH LADDER PLACEMENT AREA (AND RAILROAD BRIDGE) TO BE LOCATED IN THE LOCKWOOD DAM BYPASS REACH. PHOTO DATE: 2/28/2020. PHOTOGRAPHER LOCATION: ALONG KENNEBEC RIVER SHORELINE.**

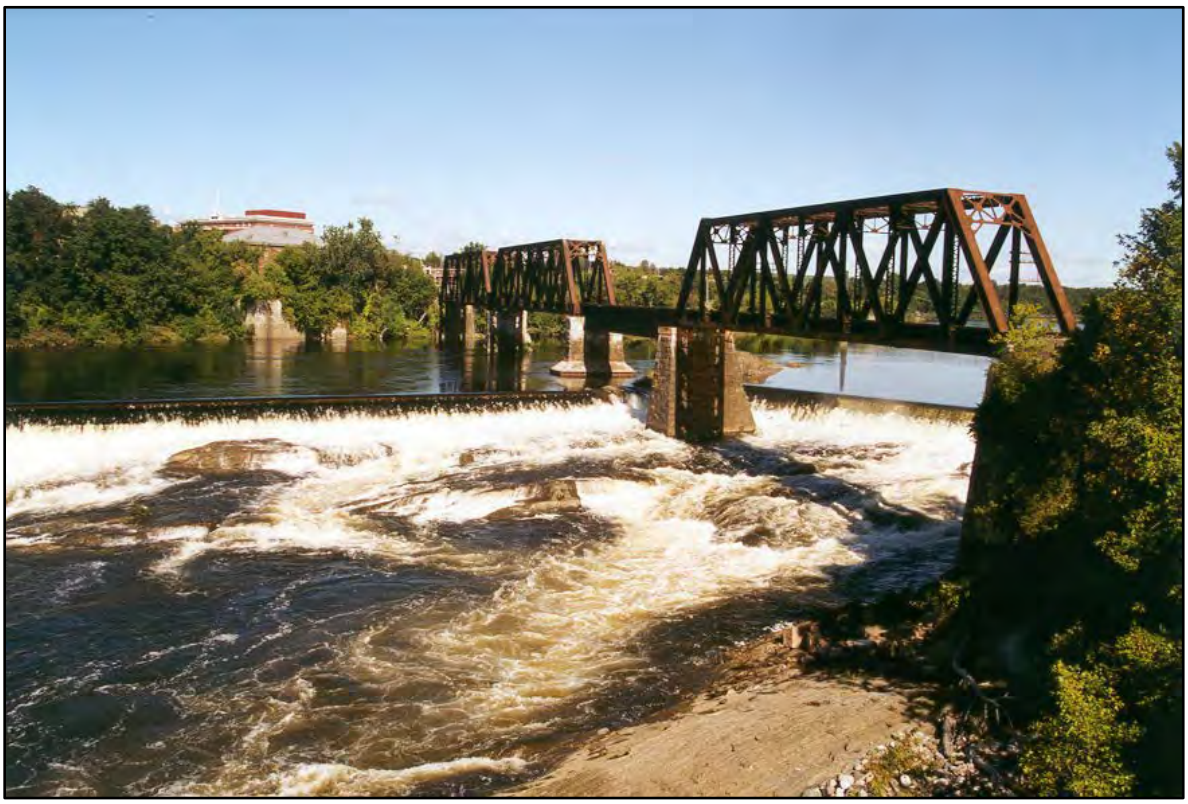


PHOTO 4 **BYPASS AREA LOOKING NORTH, PROPOSED FISH LADDER PLACEMENT AREA. APPROXIMATE PHOTO DATE: 2000.**

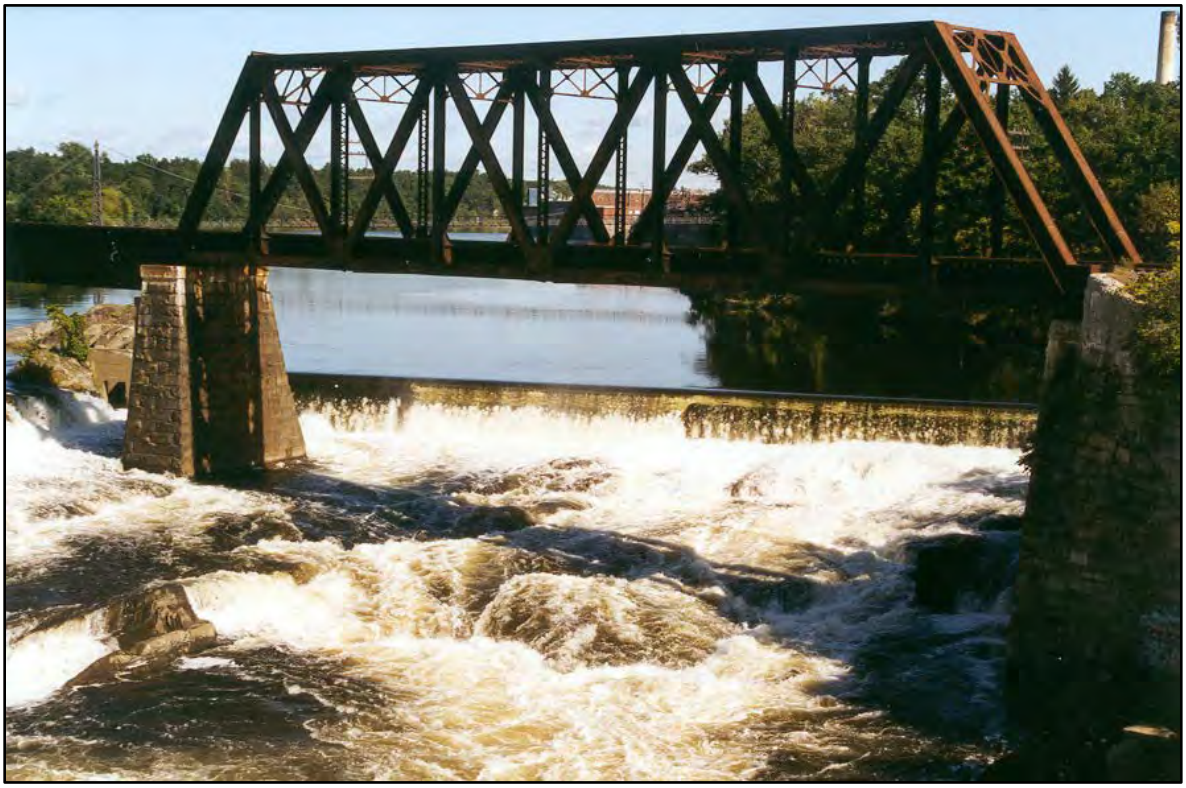


PHOTO 5 **PROPOSED FISH LADDER PLACEMENT AREA. APPROXIMATE PHOTO DATE: 2000.**

PHOTO 6 PROPOSED FISH LADDER PLACEMENT AREA. APPROXIMATE PHOTO DATE: 2000.

PHOTO 7 PROPOSED FISH LADDER PLACEMENT AREA. APPROXIMATE PHOTO DATE: 2000.

ATTACHMENT C

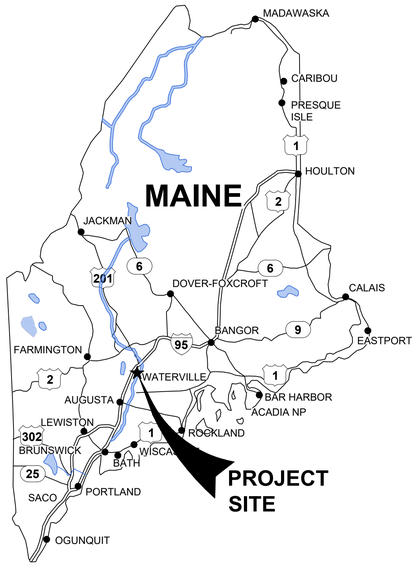
ENGINEERING DRAWINGS

LOCKWOOD HYDROELECTRIC PROJECT

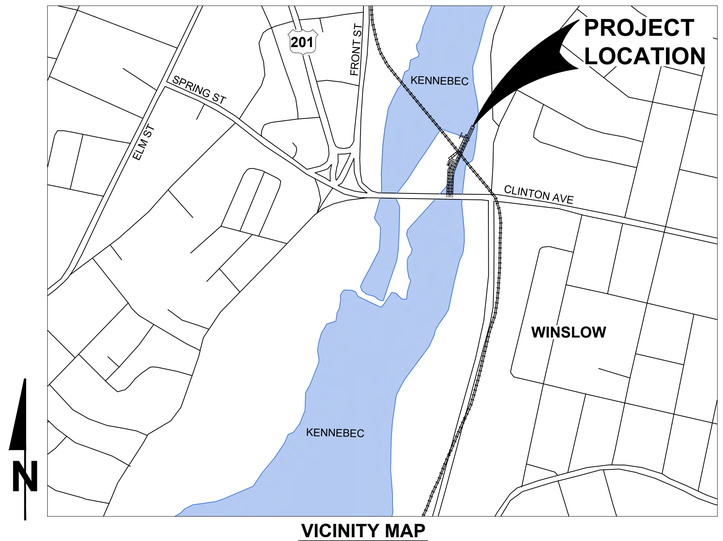
FERC NO. 2574

BYPASS REACH SPILLWAY

UPSTREAM FISH PASSAGE



LOCATION MAP
SCALE: NTS



VICINITY MAP
SCALE: 1"=500'

PREPARED FOR

BROOKFIELD WHITE PINE HYDRO, LLC

PREPARED BY

ALDEN RESEARCH LABORATORY, INC

ALDEN RESEARCH LABORATORY
30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

30% DESIGN
NOT FOR CONSTRUCTION
DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

COVER SHEET, LOCATION MAP, AND VICINITY MAP

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	1 OF 53
DRAWING:	G-001

DWG: S:\131009\Holden\Lockwood\900 CAD\03-SHEETS\G\G-001.dwg USER: MKA00889
DATE: Jul 02, 2020 7:42am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES: Mosaic-1-sand0x0.jpg

DRAWING LIST

SHEET	DRAWING	DESCRIPTION
GENERAL		
1	G-001	COVER SHEET, LOCATION MAP, AND VICINITY MAP
2	G-002	DRAWING LIST
3	G-003	GENERAL NOTES & ABBREVIATIONS
4	G-101	EXISTING CONDITIONS - OVERALL SITE PLAN
5	G-102	SITE ACCESS, CONSTRUCTION LIMITS, GEOTECHNICAL BORINGS, & SURVEY CONTROL
6	G-103	EROSION CONTROL & DEWATERING PLAN
7	G-104	EROSION CONTROL & DEWATERING PLAN DETAILS
CIVIL		
8	C-001	OVERALL SITE PLAN
9	C-101	DEMOLITION & EXCAVATION PLAN
10	C-103	DEMOLITION & EXCAVATION SECTIONS
11	C-104	GENERAL ARRANGEMENT PLAN
12	C-105	GENERAL ARRANGEMENT - ELEVATION 1
13	C-106	GENERAL ARRANGEMENT - ELEVATION 2
14	C-107	FISH LADDER PLAN & PROFILE
15	C-108	FISH LADDER PLAN & PROFILE
16	C-109	AWS CHANNEL PLAN & PROFILE
17	C-110	FISH LADDER AND AWS CHANNEL SECTIONS
18	C-111	FISH LADDER AND AWS CHANNEL SECTIONS
19	C-112	FISH LADDER DETAILS
20	C-113	AWS CHANNEL DETAILS
21	C-114	MISCELLANEOUS DETAILS
STRUCTURAL		
22	S-001	STRUCTURAL NOTES & DESIGN CRITERIA
23	S-101	FISH LADDER PLAN AND PROFILE
24	S-102	FISH LADDER PLAN AND PROFILE
25	S-103	FISH LADDER PLAN AND PROFILE
26	S-104	FISH LADDER PLAN AND PROFILE
27	S-105	AWS CHANNEL PLAN AND PROFILE
28	S-106	AWS CHANNEL PLAN AND PROFILE
29	S-107	FISH LADDER AND AWS CHANNEL SECTIONS
30	S-108	FISH LADDER AND AWS CHANNEL SECTIONS
31	S-109	FISH LADDER AND AWS CHANNEL SECTIONS
32	S-110	FISH LADDER AND AWS CHANNEL SECTIONS
33	S-111	FISH LADDER AND AWS CHANNEL SECTIONS
34	S-112	FISH LADDER AND AWS CHANNEL DETAILS
35	S-113	CONCRETE EMBEDMENT PLAN & SECTIONS
36	S-114	CONCRETE EMBEDMENTS DETAILS
37	S-115	SPILLWAY MODIFICATIONS
38	S-116	SPILLWAY DETAILS
39	S-117	AWS CHANNEL PLAN AND SECTIONS
40	S-118	AWS SECTIONS AND DETAILS
41	S-119	MISC. PLATFORMS AND ACCESS
42	S-201	STRUCTURAL STANDARD DETAILS
43	S-202	STRUCTURAL STANDARD DETAILS
44	S-203	STRUCTURAL STANDARD DETAILS
MECHANICAL		
45	M-100	GENERAL MECHANICAL LAYOUT
46	M-101	AWS ISOLATION GATE (GATE 1) REQUIREMENTS
47	M-102	AWS FLOW CONTROL (GATE 2) REQUIREMENTS
48	M-103	AWS FLOW CONTROL (GATE 3) REQUIREMENTS
49	M-104	FISHWAY ENTRANCE GATE (GATE 4) REQUIREMENTS
50	M-105	FISHWAY ISOLATION GATE (GATE 5) REQUIREMENTS
51	M-106	FISHWAY ISOLATION GATE (GATE 6) REQUIREMENTS
52	M-107	CREST GATE (GATE 7) REQUIREMENTS
53	M-108	AWS ISOLATION GATE (GATE 8) REQUIREMENTS

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

DRAWING LIST

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	2 OF 53
DRAWING:	G-002

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\GIG-002.dwg USER: MKA00889
DATE: Jul 02, 2020 8:10pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT IMAGES:

GENERAL NOTES:

1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR ACCURATE. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING THE WORK. SHOULD THE CONTRACTOR IDENTIFY ANY UTILITIES, STRUCTURES OR FEATURES NOT SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY.

2. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE UTILITY OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES. ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.

3. REMOVE, REPLACE OR RELOCATE ALL OVERHEAD INTERFERENCE WHICH MAY AFFECT OPERATION DURING CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER, GAS OR OTHER UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.

4. COORDINATE UNDERGROUND UTILITY MARKING WITH THE EXISTING UTILITIES BY CONTACTING DIGSAFE AT 1-888-344-7233 OR 811. DIGSAFE MUST BE CONTACTED A MINIMUM OF 72 HOURS PRIOR TO CONSTRUCTION OR GROUND DISTURBANCE.

5. THE CONTRACTOR SHALL REVIEW THE SITE TO DETERMINE EXISTING CONDITIONS. ANYTHING NOT SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA, UNLESS RECOMMENDED BY THE ENGINEER AND APPROVED BY THE OWNER.

6. CONTACT THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS ARISING DURING THE CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.

7. PRESERVE ALL SURVEY MARKERS AND MONUMENTATION WHEREVER POSSIBLE. THOSE REQUIRING REMOVAL SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE LOCAL, STATE, OR FEDERAL GOVERNING AUTHORITY.

8. ALL DRAWINGS AND DETAILS INCLUDED IN THE CONTRACT DOCUMENTS SHALL FULLY APPLY TO THE WORK WHETHER SPECIFICALLY REFERENCED OR NOT.

9. LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY, EASEMENTS, AND DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES OUTSIDE THE DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.

10. RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REFER TO RECLAMATION OF DISTURBED AREAS IN SPECIFICATIONS.

11. THE CONTRACTOR SHALL REPLACE ALL ROADS, STABILIZED EARTH, FENCES, AND DRIVEWAYS, ETC., WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION.

12. SHORING REQUIRED FOR THE STABILITY OF THE UNCOMPLETED STRUCTURE OR FOR INSTALLATION OR MODIFICATION OF STRUCTURAL MEMBERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

13. DIMENSIONS OF VALVES, FITTINGS AND OTHER EQUIPMENT MAY VARY DEPENDING UPON MANUFACTURER. CONTRACTOR SHALL REVIEW SHOP DRAWINGS BEFORE SETTING BASES, SUPPORTS, ETC.

14. EXISTING FENCING DISTURBED OR REMOVED SHALL BE REPLACED IN-KIND.

15. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A SECURE PROJECT SITE. BROOKFIELD WHITE PINE HYDRO, LLC. WILL NOT BE RESPONSIBLE FOR STOLEN OR VANDALIZED PROPERTY.

16. AT THE CLOSE OF EACH WORKING SHIFT, WHERE THE NEXT SHIFT WILL NOT IMMEDIATELY FOLLOW, PROTECT AND SECURE OPEN EXCAVATION.

17. THE CONTRACTOR SHALL NOTIFY MAINE DOT WITH WORK TO BE COMPLETED.

18. THE CONTRACTOR SHALL COORDINATE ACCESS WITH MAINE CENTRAL RAILROAD COMPANY. 1700 IRON HORSE PARK NORTH BILLERICA, MA, 01862.

FISH PASSAGE NOTES:

1. POWERHOUSE

   6,915 kW,
   5,660 CFS CAPACITY

2. RIVER FLOW

DESIGN LOW	2,690 CFS
DESIGN HIGH	21,100 CFS

3. WATER LEVELS

HEAD POND ELEVATIONS	
DESIGN LOW	50.9 FT
NORMAL	52.2 FT
DESIGN HIGH	55.5 FT
DAM CREST	50.9 FT
FLASH BOARD EL.	52.16 FT
50 YR FLOOD	64.5 FT

TAILWATER ELEVATIONS	
DESIGN LOW	30.5 FT
NORMAL	32.0 FT
DESIGN HIGH	36.5 FT

4. TARGET SPECIES AND FISHWAY DESIGN POPULATIONS (SAME AS HYDRO KENNEBEC)

ATLANTIC SALMON:	12,000
AMERICAN SHAD:	210,000
ALEWIVES:	150,000
BLUEBACK HERRING	1,200,000

5. FISH PASSAGE FACILITIES WILL BE OPERATIONAL FROM MAY 1ST TO OCT 31ST

6. VERTICAL SLOT LADDER DESIGN FEATURES

DROP PER POOL	9 INCHES
SLOT WIDTH	24 INCHES
POOL DIMENSIONS	16 FT WIDE BY 20 FT LONG
28 POOLS	
SLOPE	3.75%
ENTRANCE INVERT EL.	25.75 FT
EXIT INVERT EL.	47.0 FT
4 FT MINIMUM DEPTH	
TOTAL HEAD	21.7 FT MAX
LADDER FLOW	50 TO 100 CFS (FOR RANGE OF HEAD POND)

7. ATTRACTION FLOW CHANNEL

   10 FT WIDE

CHANNEL FLOW	100 TO 250 CFS

LEDEND & SYMBOLS

- APPROXIMATE PROPERTY LINE
- NHW — NORMAL HIGH WATER LINE
- 100 FP — 100 YEAR FLOOD PLAIN
- SF SF — SILT FENCE
- TC TC — TURBIDITY CURTAIN
- COFFERDAM / BULKHEAD / DEWATERING STRUCTURE
- GRATING SPAN DIRECTION
- RAILING
- CHAIN
- B-X — GEOTECHNICAL BORING (3 ½" BORING)
- GEOTECHNICAL BORING (2 ½" BORING)
- 45° ANGLED BORING DRILLED IN DIRECTION INDICATED
- FLOW
- UNDISTURBED SOIL
- FLOW FILL
- GROUT
- CONCRETE
- GRATING
- BEDROCK
- CONCRETE DEMOLITION
- EXCAVATE BEDROCK

ABBREVIATIONS:

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GENERAL NOTES & ABBREVIATIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	3 OF 53
DRAWING:	G-003

DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\G\G-003.dwg USER: MKA00889
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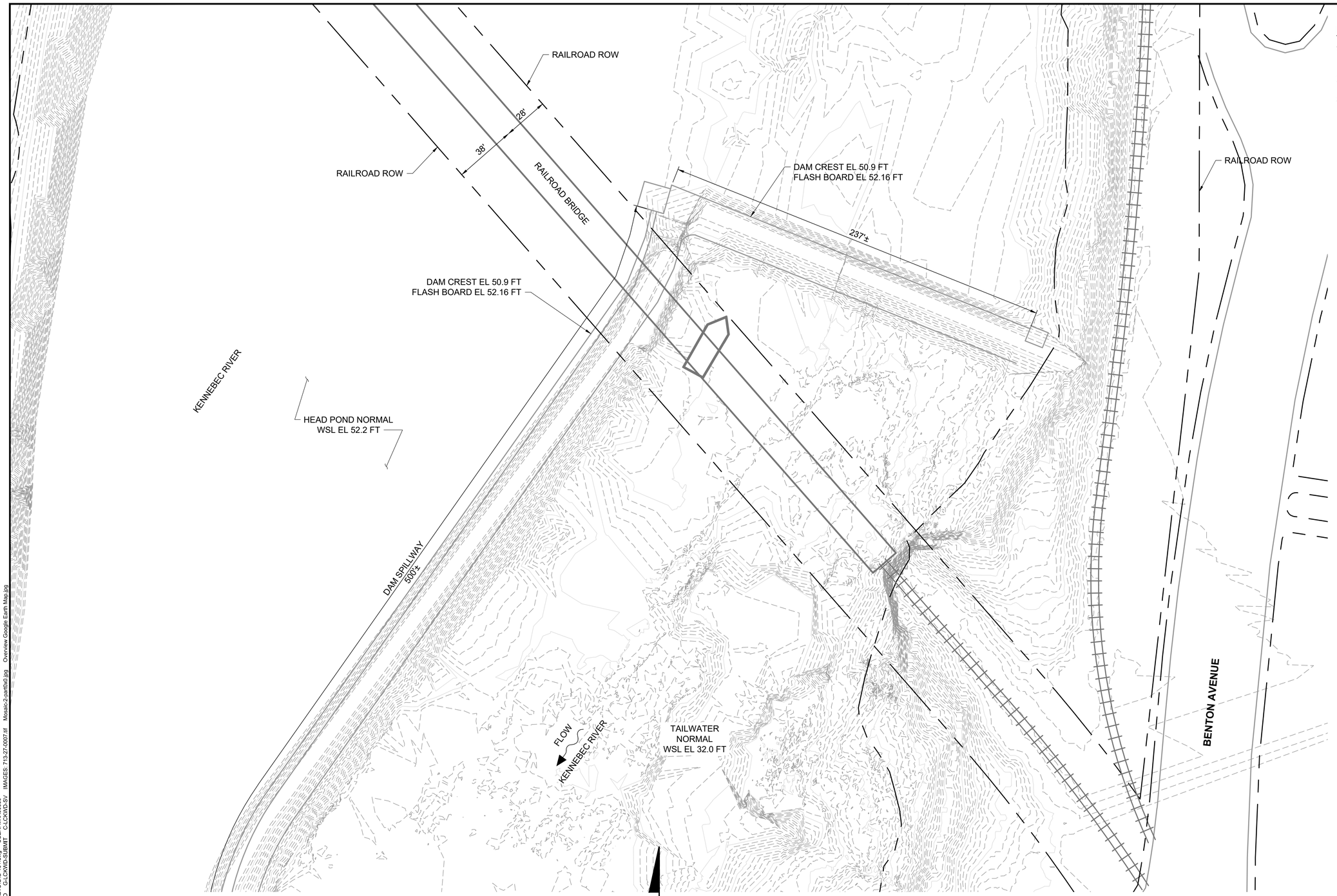

SITE PLAN
SCALE: 1"=30'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. DRAWING BASED ON SURVEY PERFORMED BY SACKETT & BRAKE SURVEY, INC.
3. ACCESS ROAD AND EXISTING INFORMATION BASED ON FISHWAY ACCESS ROAD DRAWINGS CREATED BY SPAULDING ENGINEERING AND CONSTRUCTION SERVICES, INC.

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

EXISTING CONDITIONS - OVERALL
SITE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	4 OF 53
DRAWING:	G-101

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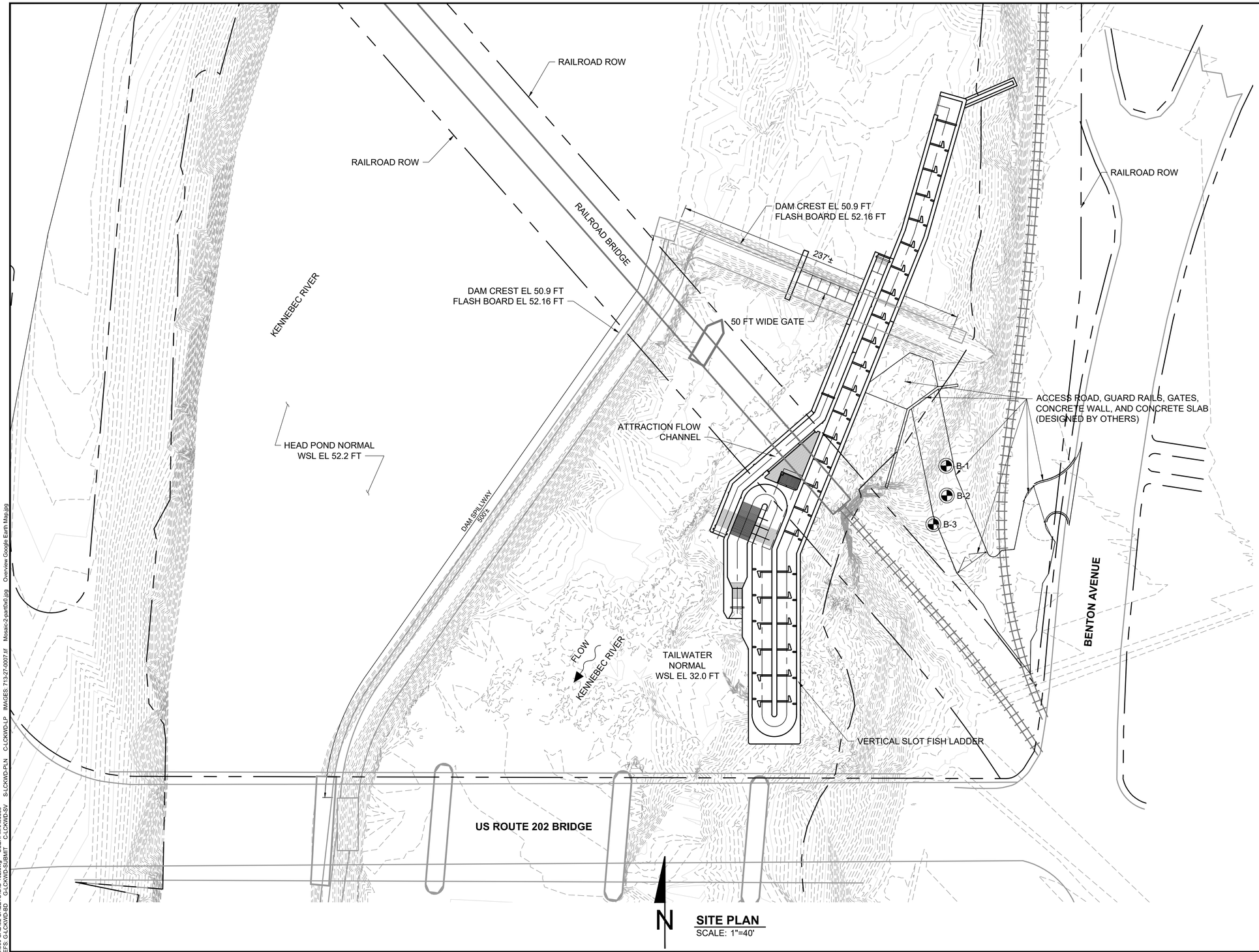

SITE PLAN
SCALE: 1"=40'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. ACCESS ROAD, BORING, AND EXISTING INFORMATION BASED ON FISHWAY ACCESS ROAD DRAWINGS CREATED BY SPAULDING ENGINEERING AND CONSTRUCTION SERVICES, INC.

LEGEND:

- B-X — GEOTECHNICAL BORING
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE

BORING TABLE			
BORING	**NORTHING**	**EASTING**	**DESCRIPTION**
B-1	625536.5255	3093753.0356	3 1/2" BORING
B-2	625512.4266	3093753.5601	3 1/2" BORING
B-3	625489.2483	3093742.6192	3 1/2" BORING

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

SITE ACCESS, CONSTRUCTION LIMITS, GEOTECHNICAL BORINGS, & SURVEY CONTROL

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	5 OF 53
DRAWING:	G-102

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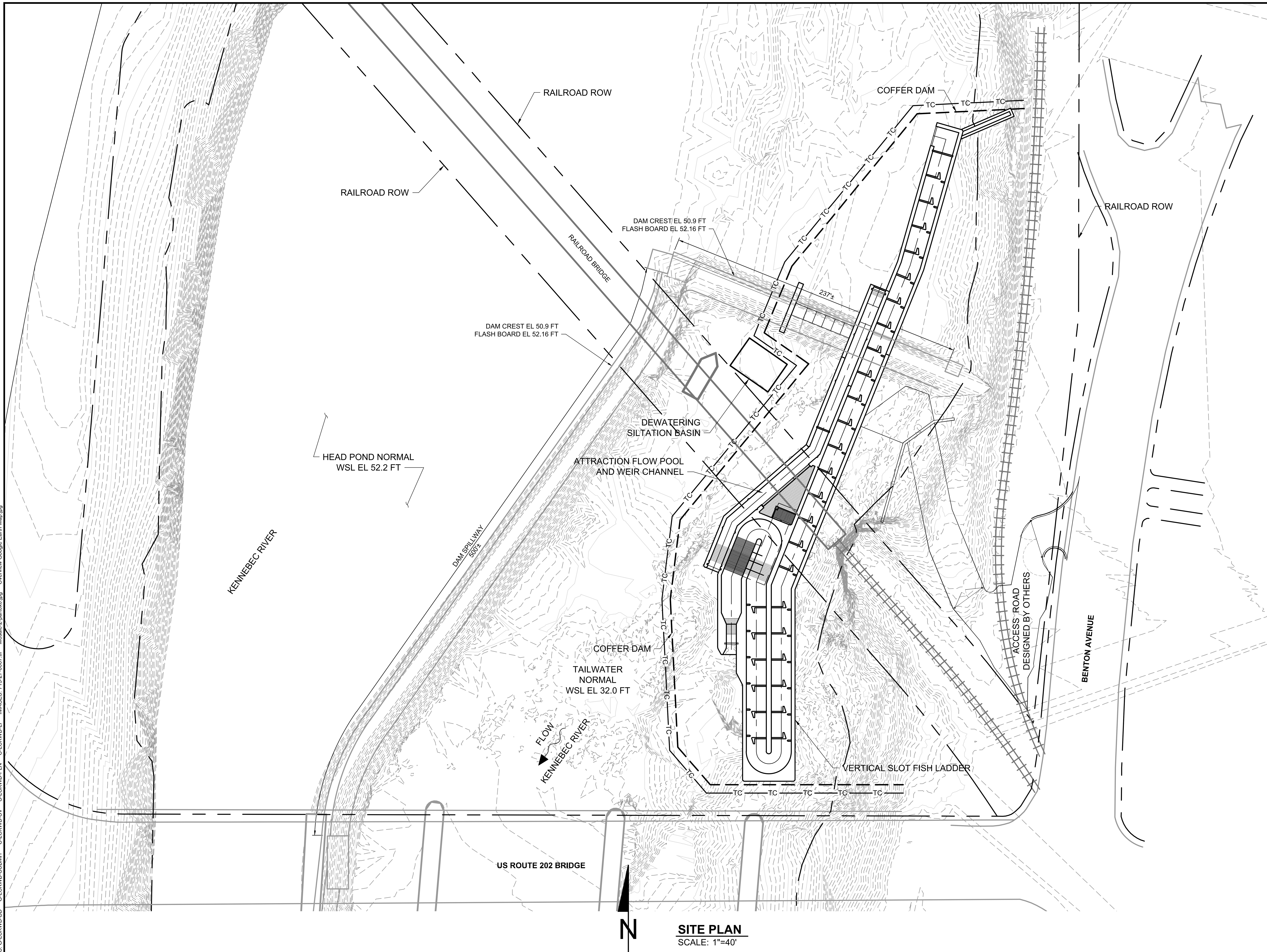

SITE PLAN
SCALE: 1"=40'

NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
2. SEE DRAWING G-104 FOR TYPICAL DETAILS.

LEGEND:

- SF — SF — SILT FENCE
- TC — TC — TURBIDITY CURTAIN
- — — — COFFERDAM/BULKHEAD/DEWATERING STRUCTURE
- NHW — NORMAL HIGH WATER LINE
- —— – – —— APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

EROSION CONTROL & DEWATERING PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	6 OF 53
DRAWING:	G-103

DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\G\G-103.dwg USER: MKA00889
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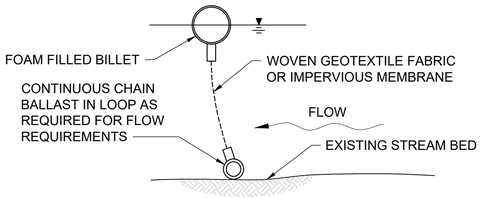
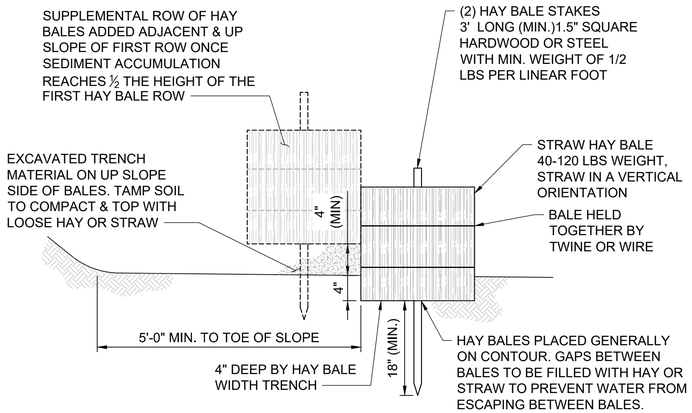
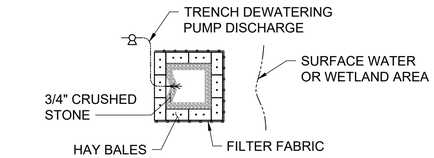


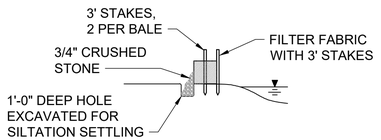
1 TURBIDITY CURTAIN
SCALE: NTS



2 HAY BALE BARRIER
SCALE: NTS



PLAN

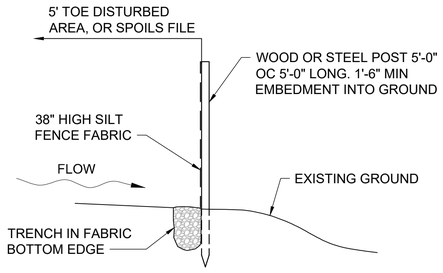


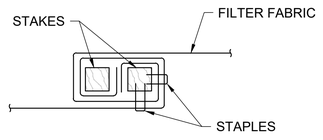
SECTION

3 DEWATERING/SETTLING BASIN
SCALE: NTS

SOIL EROSION & SEDIMENT CONTROL NOTES:

1. SEDIMENTATION BASIN: SEDIMENT LADEN WATER SHALL NOT BE RELEASED INTO ANY WATERWAY. CONTRACTOR SHALL PROVIDE APPROPRIATE SIZED SEDIMENTATION BASIN, WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES FOR ALL DEWATERING OR WATER DIVERSION ACTIVITIES.
2. SILT FENCE: IF NEEDED TO CONTROL WATER CONTAMINATION. PROVIDE SILT FENCE CONFORMING TO THE FOLOWING:
   - EQUIVALENT OPENING - SIZE OF A US STANDARD SIEVE SIZED 40 (MAX), 70 (MIN).
   - MULLEN BURST STRENGTH - 200 PSI.
   - GRAB STRENGTH - 120 LBS MIN.
   - SPUN-BONDED NYLON FABRIC - REINFORCED WITH POLYESTER NETTING, OR POLYPROPYLENE FABRIC WITH 2" x 4" 12 GA WOVEN WIRE BACKING FENCE.
3. DE-SILTING BASINS OR WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES ON SHORE SHALL HAVE A VEGETATIVE BUFFER FOR THE DISCHARGE. BASINS NEED TO BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF THE WAY OF LAYDOWN AND CONSTRUCTION ACTIVITIES.





JOINING FENCE DETAIL

NOTES:

1. PROVIDE SILT FENCE ON DOWNSLOPE SIDE OF SOIL DISTURBANCES OR ALL STOCKPILES UNTIL PERMANENT VEGETATION IS ESTABLISHED.
2. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
3. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH ⅓ THE ABOVE GROUND HEIGHT OF THE FENCE.
4. SILT FENCE TO BE INSPECTED AFTER EACH RUNOFF EVENT AND AT LEAST WEEKLY.

4 SILT FENCE
SCALE: NTS

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

EROSION CONTROL & DEWATERING PLAN DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	7 OF 53
DRAWING:	G-104

DWG: S:\1310\09\Holden\Lockwood\900 CAD\02-SHEETS\GG-104.dwg USER: MKA00889
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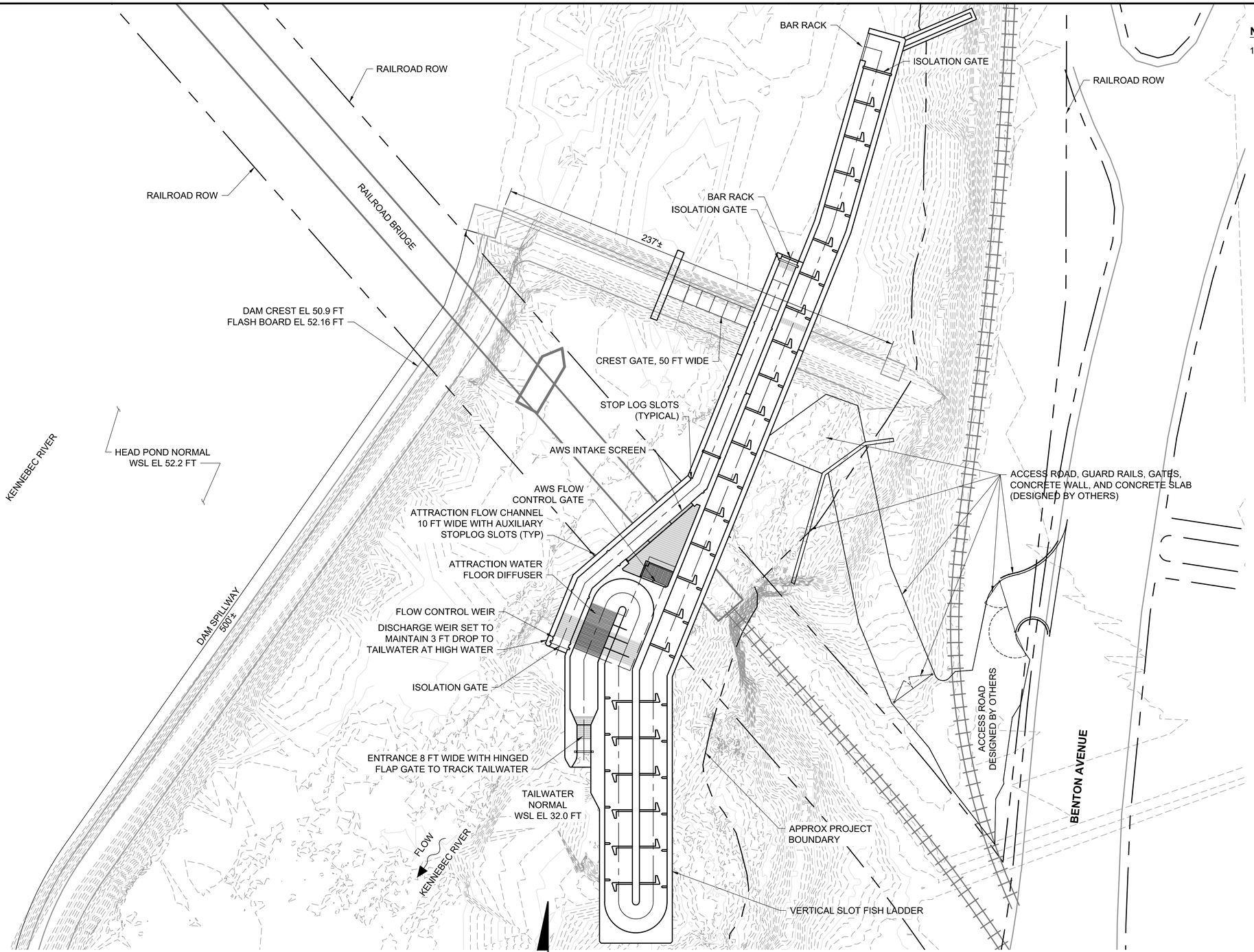

SITE PLAN
SCALE: 1"=30'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

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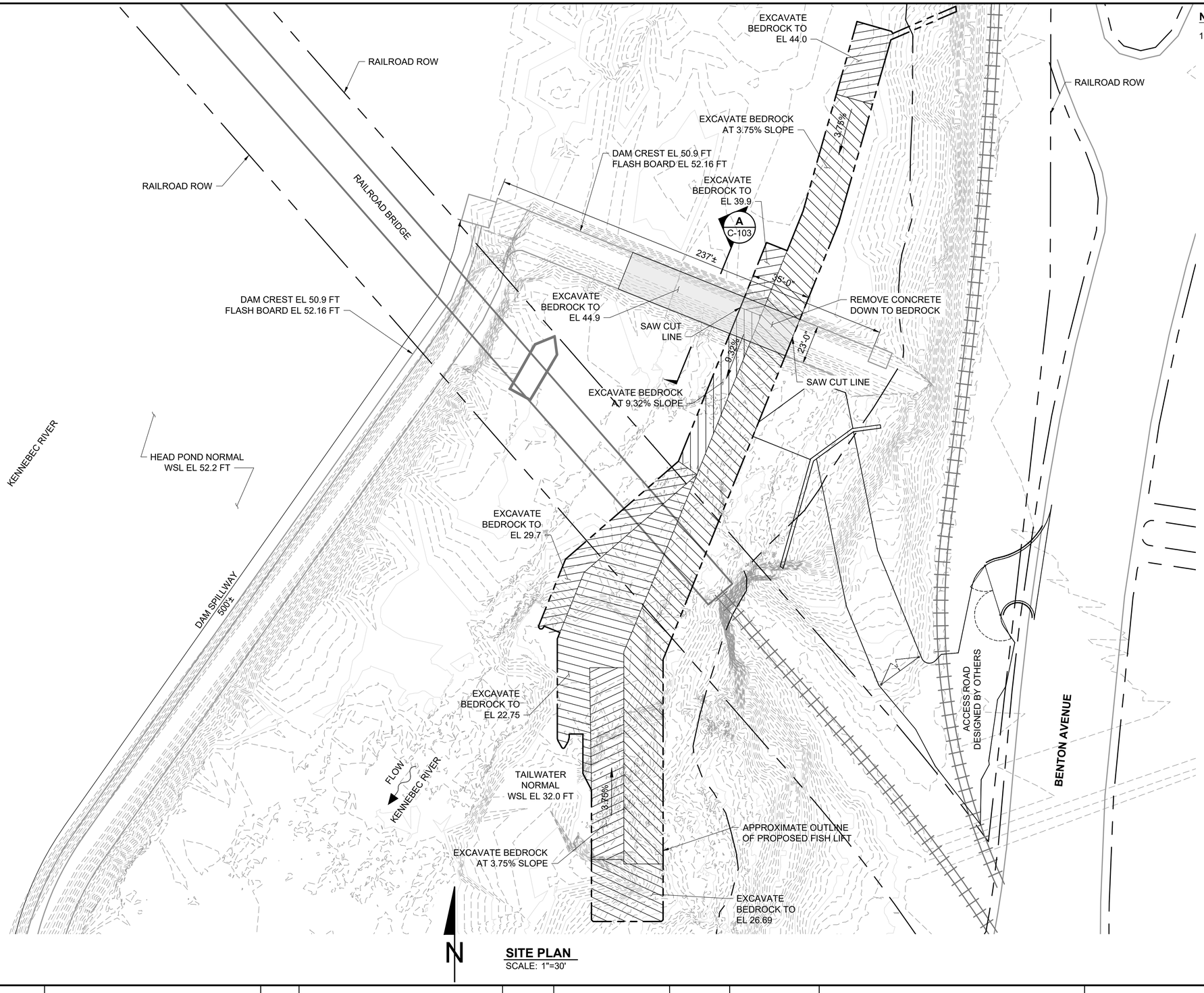
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

OVERALL SITE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	8 OF 53
DRAWING:	C-001



SITE PLAN
SCALE: 1"=30'

NOTE:

1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.

LEGEND:

- CONCRETE DEMOLITION
- EXCAVATE BEDROCK (SEE PLAN FOR ELEVATION)
- APPROX OUTLINE OF NEW STRUCTURES

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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

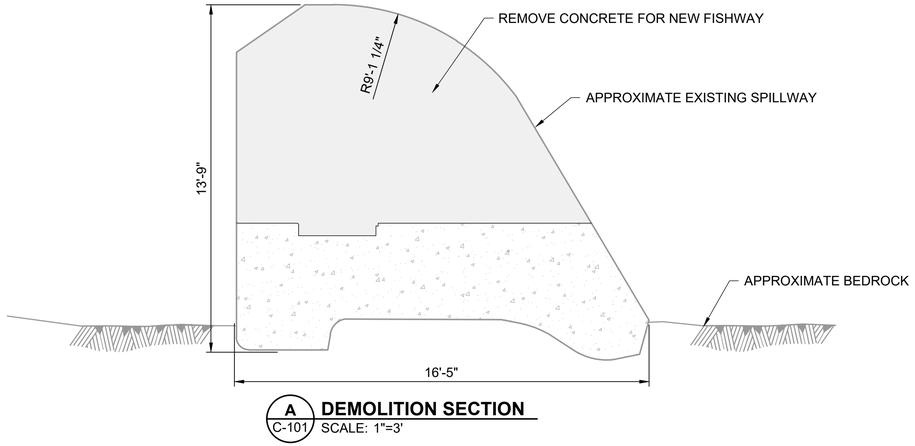
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

DEMOLITION & EXCAVATION PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	9 OF 53
DRAWING:	C-101

DWG: S:\1310\09\Holden\Lockwood\900 CAD\02-SHEETS\C\C-101.dwg USER: MKA00889
DATE: Jul 02, 2020 8:13pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT C-LCKWD-SV S-LCKWD-PLN C-LCKWD-LP IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg



A / C-101 **DEMOLITION SECTION**
SCALE: 1"=3'

NOTE:

1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.

LEGEND:

CONCRETE DEMOLITION

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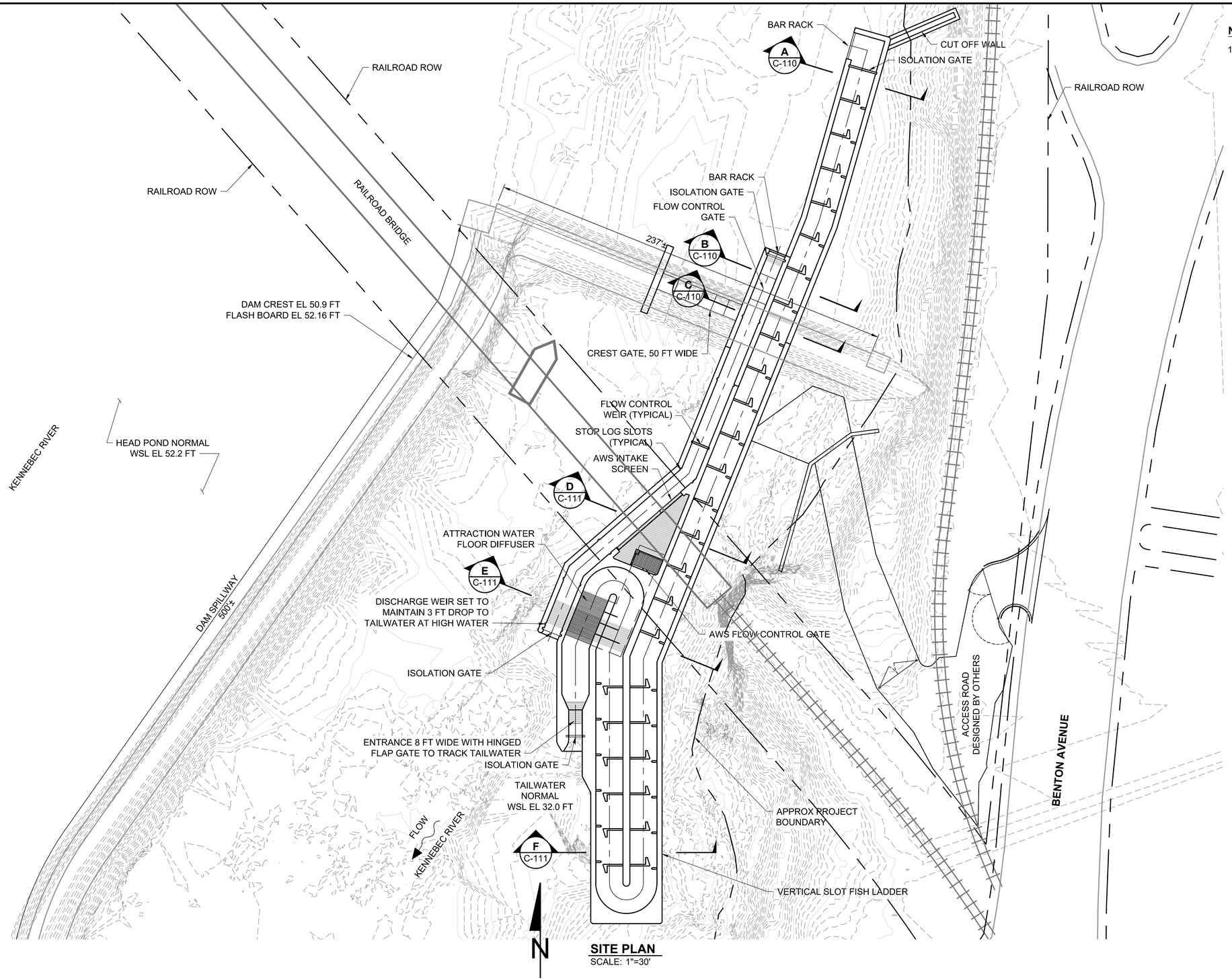
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

DEMOLITION & EXCAVATION SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	10 OF 53
DRAWING:	C-103

DWG: S:\1310\09\Hydro\Lockwood\900 CAD\02-SHEETS\C\C-103.dwg USER: MKA00889
DATE: Jul 02, 2020 3:26pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:



SITE PLAN
SCALE: 1"=30'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

DWG S:\13\109\Holden\Lockwood\90\CAD\02-SHEETS\C\C-104.dwg USER: MKA0089
DATE Jul 02, 2020 11:39am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN C-LCKWD-SV C-LCKWD-LP IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg

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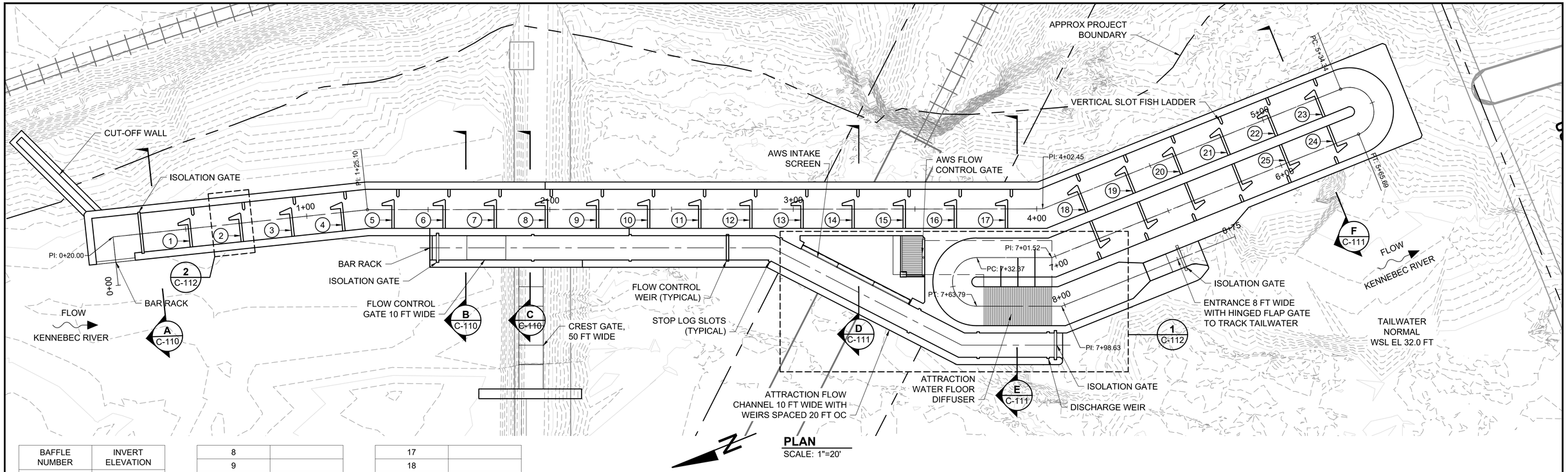
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GENERAL ARRANGEMENT PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	11 OF 53
DRAWING:	C-104



PLAN
SCALE: 1"=20'

BAFFLE NUMBER	INVERT ELEVATION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
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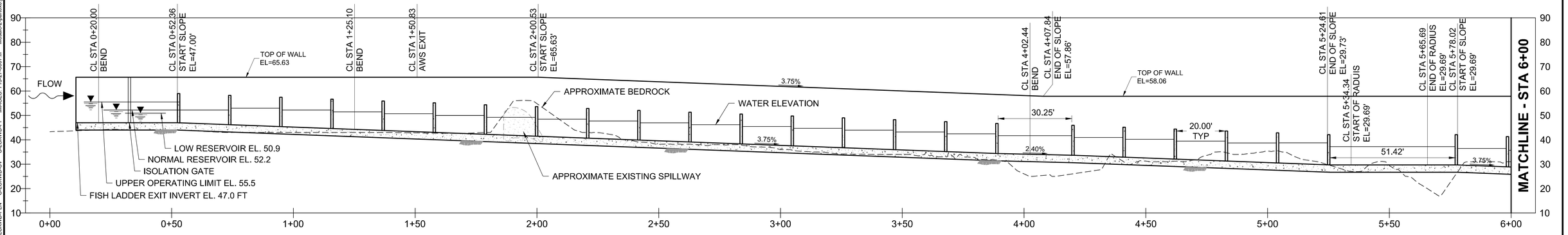
23	
24	
25	



CENTERLINE PROFILE
SCALE: 1"=20'

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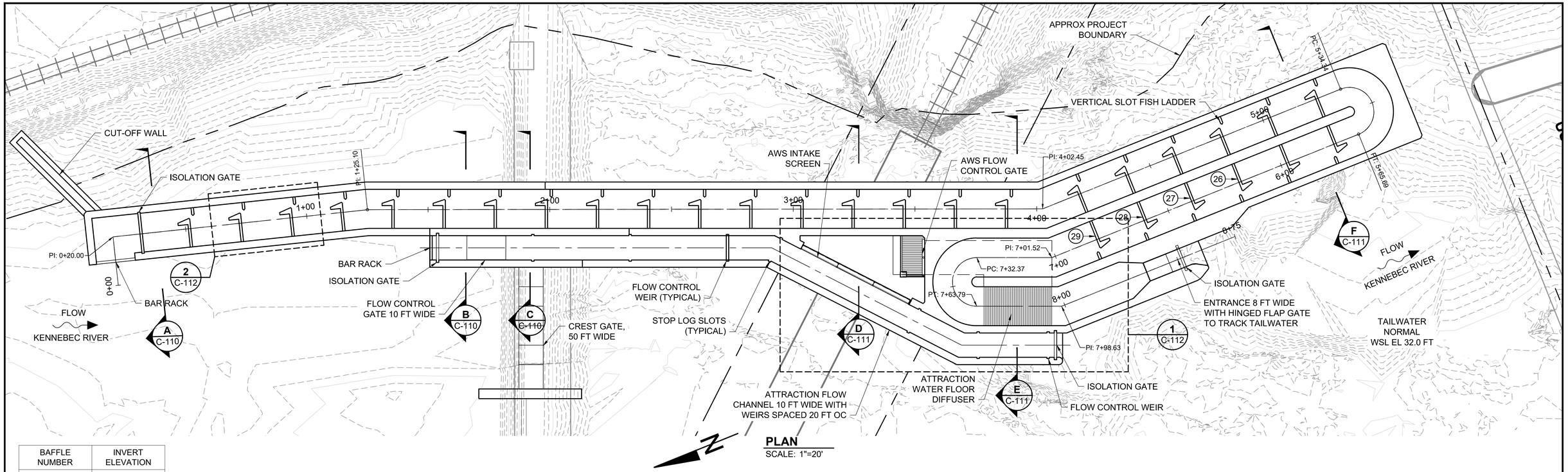
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN & PROFILE

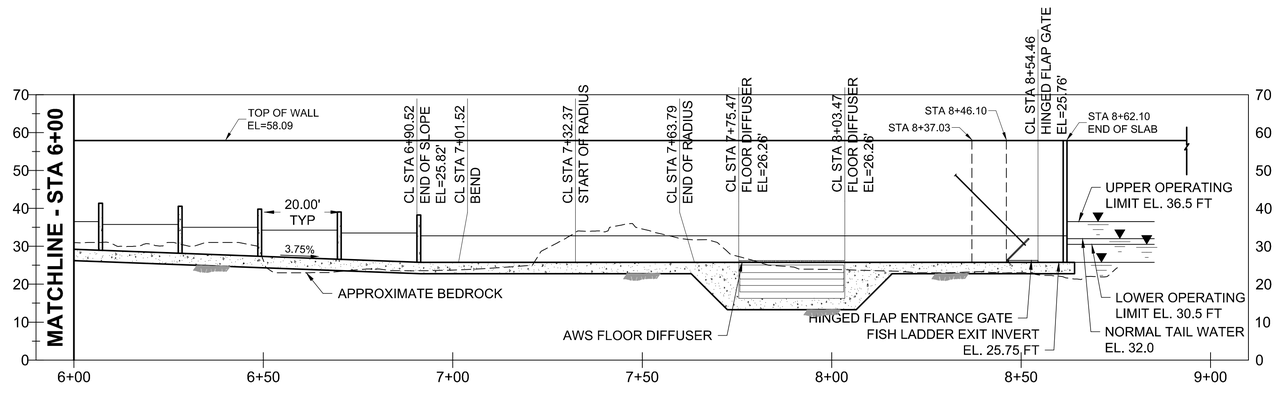
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	14 OF 53
DRAWING:	C-107

DWG: S:\131909\Holden\Lockwood\900 CAD\02-SHEETS\C\C-107.dwg USER: JMG01318
DATE: Jul 02, 2020 7:23pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN C-LCKWD-SV S-LCKWD-PP IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg



BAFFLE NUMBER	INVERT ELEVATION
26	
27	
28	
29	

PLAN
SCALE: 1"=20'



CENTERLINE PROFILE
SCALE: 1"=20'

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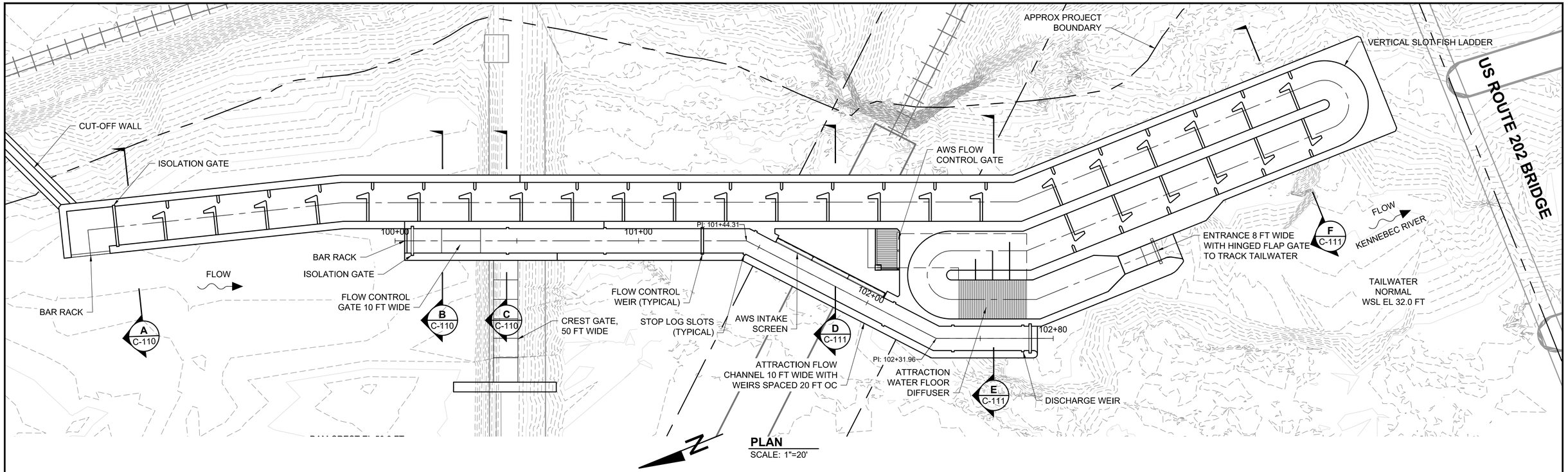
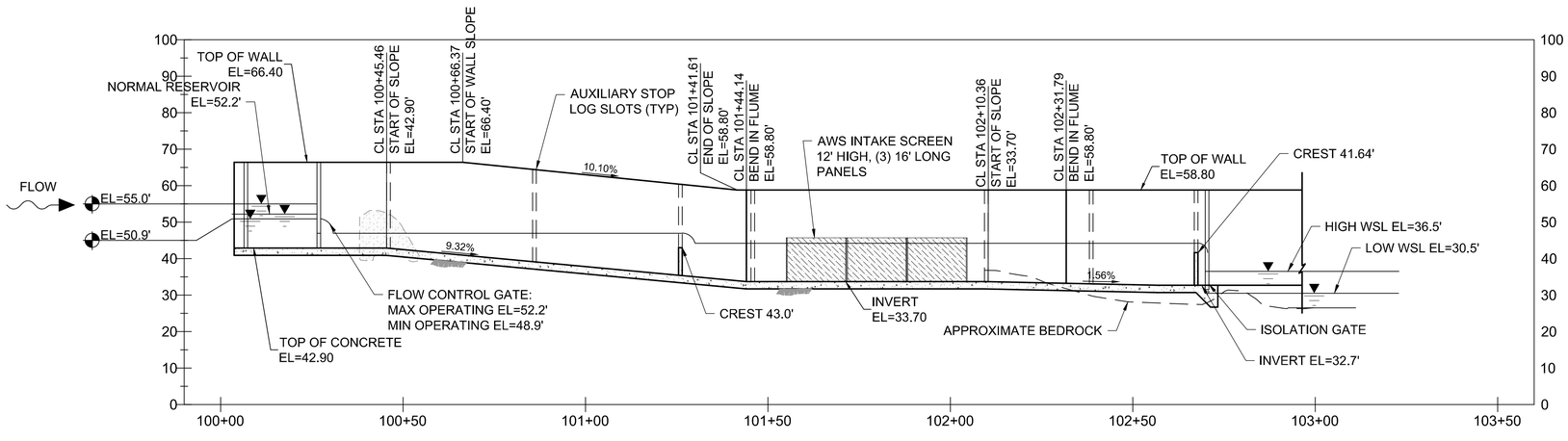
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN & PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	15 OF 53
DRAWING:	C-108



PLAN
SCALE: 1"=20'



CENTERLINE PROFILE
SCALE: 1"=20'

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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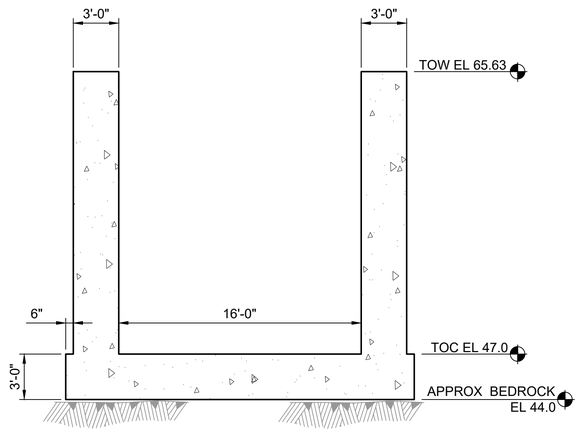
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

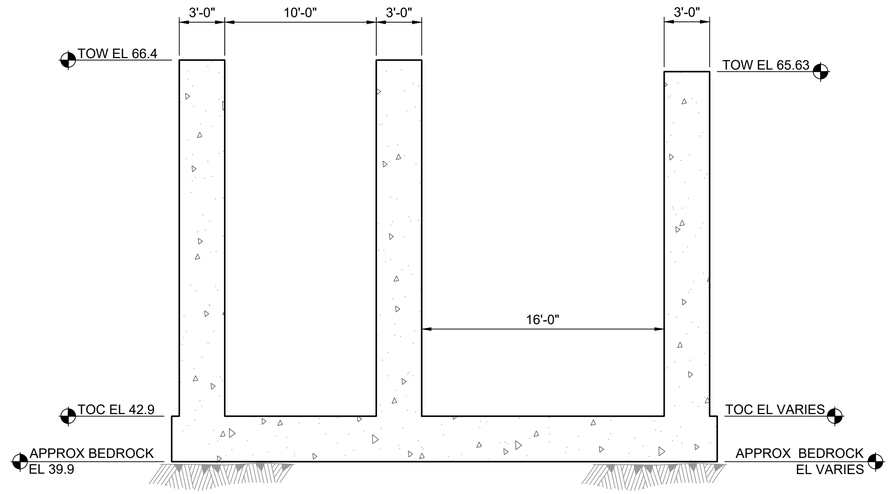
AWS CHANNEL PLAN & PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	16 OF 53
DRAWING:	C-109

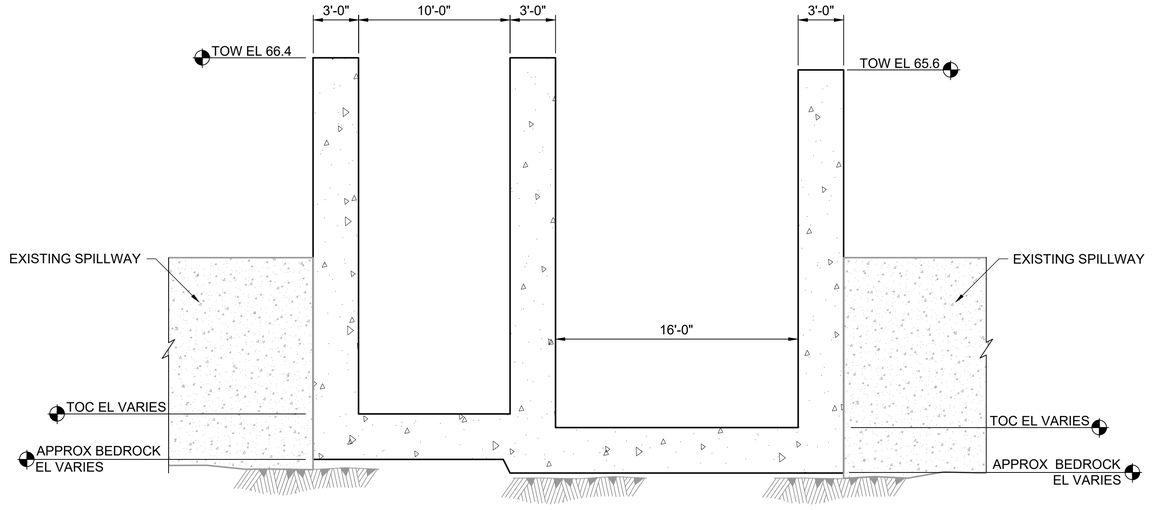
DWG: S:\131009Holden\Lockwood\900 CAD\02-SHEETS\C/C-109.dwg USER: JMG01318
DATE: Jul 02, 2020 7:20pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN C-LCKWD-SV S-LCKWD-PP IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg



A C-104 **SECTION**
SCALE: 1"=5'



B C-104 **SECTION**
SCALE: 1"=5'



C C-104 **SECTION**
SCALE: 1"=5'

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VERIFY SCALE
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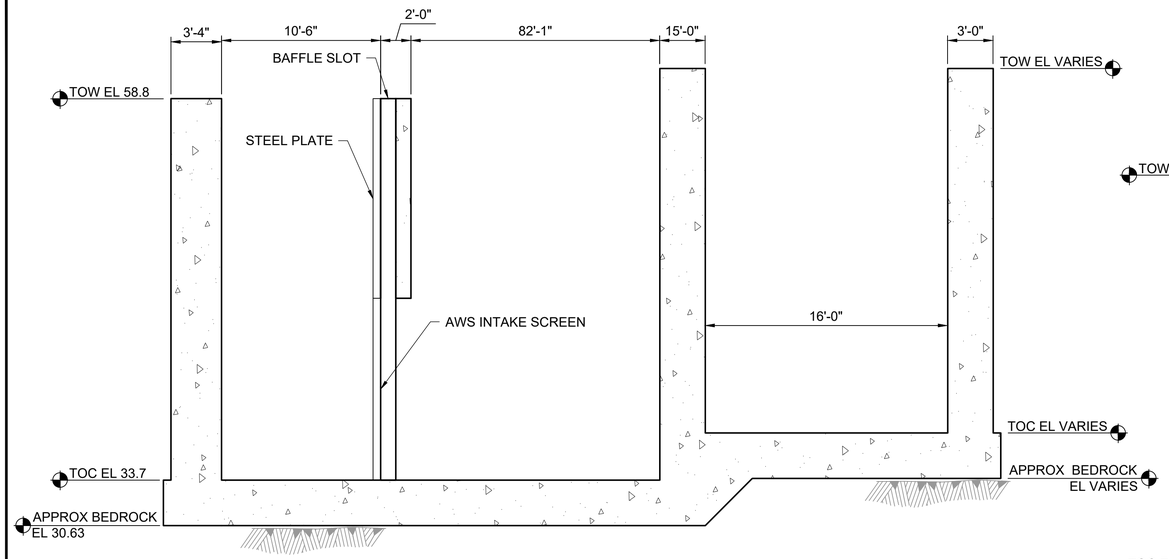
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

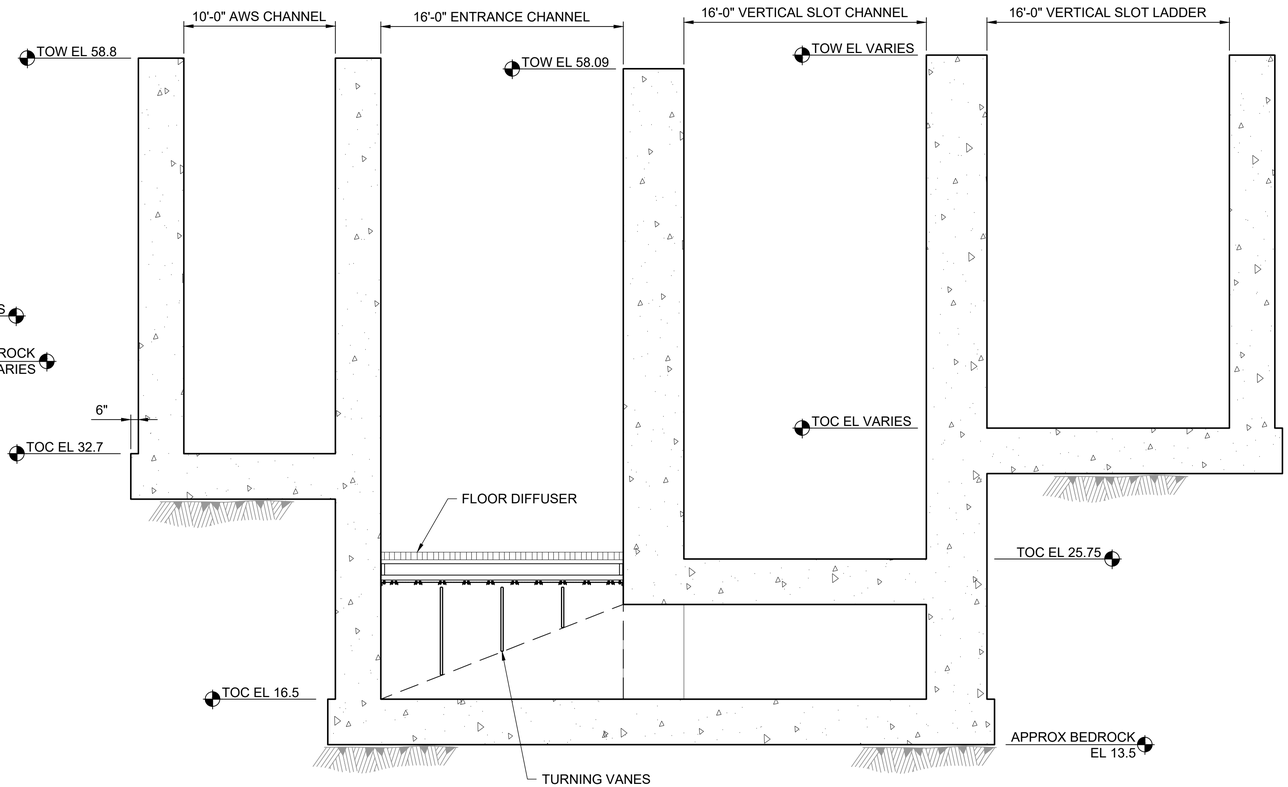
FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	17 OF 53
DRAWING:	C-110

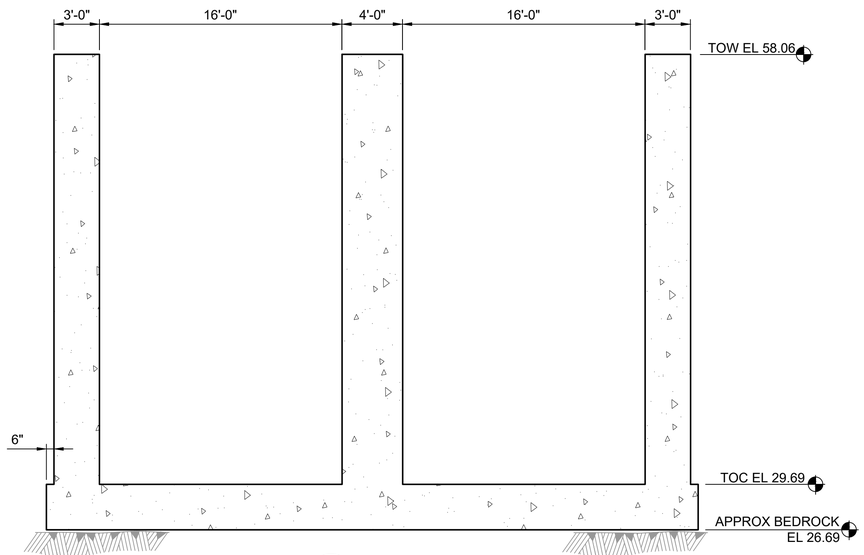
DWG: S:\1310\09\Holden\Lockwood\900 CAD\02-SHEETS\C\C-110.dwg USER: JMG01318
DATE: Jul 02, 2020 7:13pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:



D C-104 **SECTION**
SCALE: 1"=5'



E C-104 **SECTION**
SCALE: 1"=5'



F C-104 **SECTION**
SCALE: 1"=5'

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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
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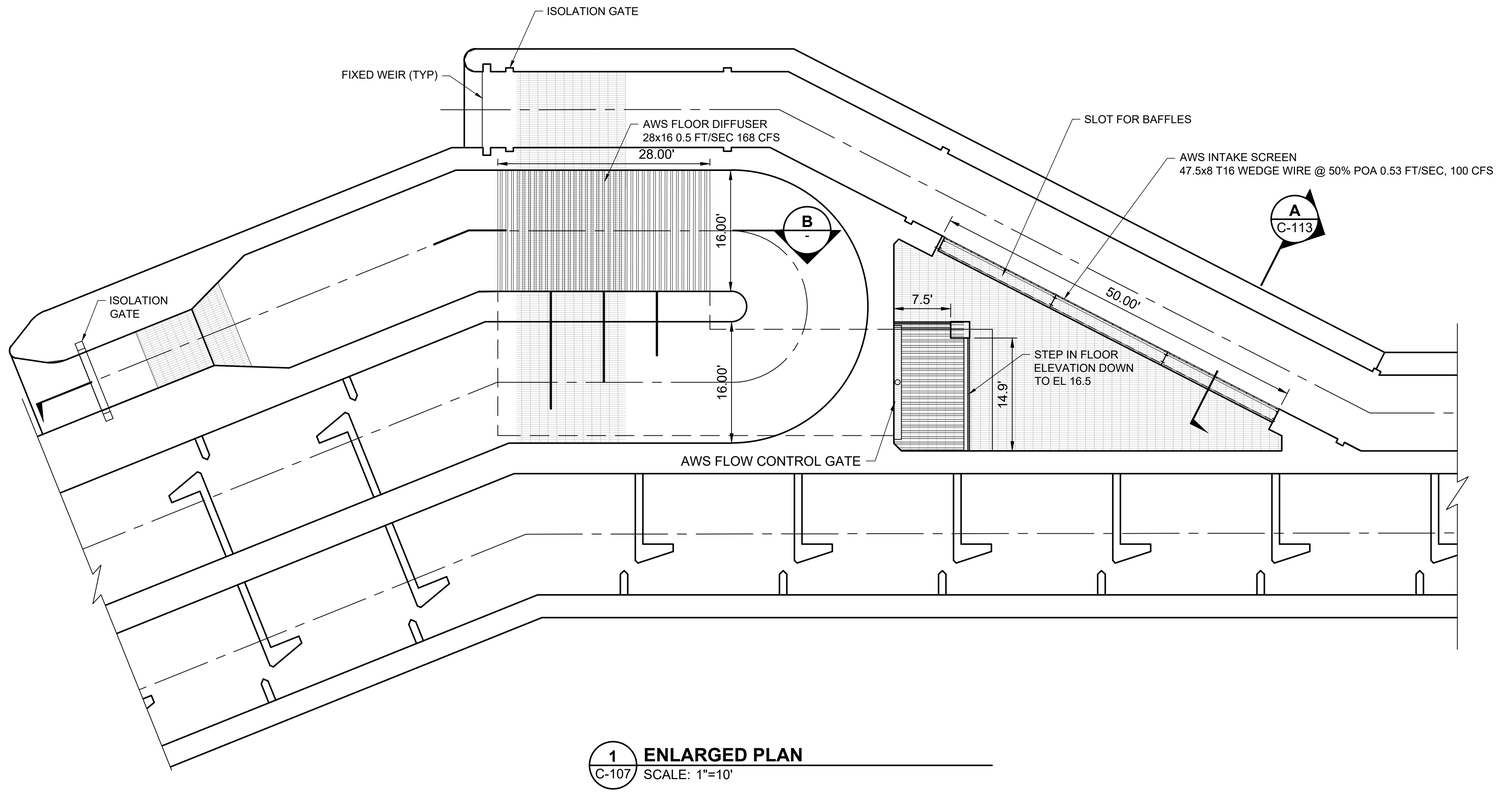
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

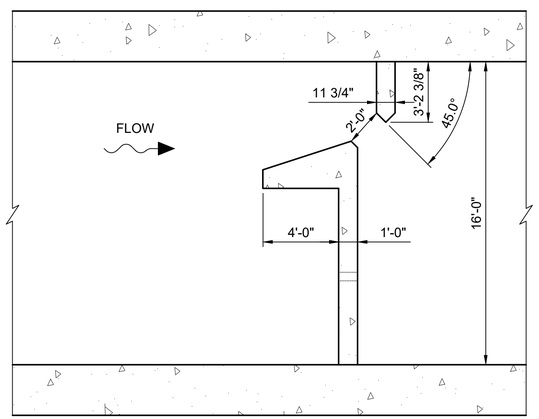
FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	18 OF 53
DRAWING:	C-111

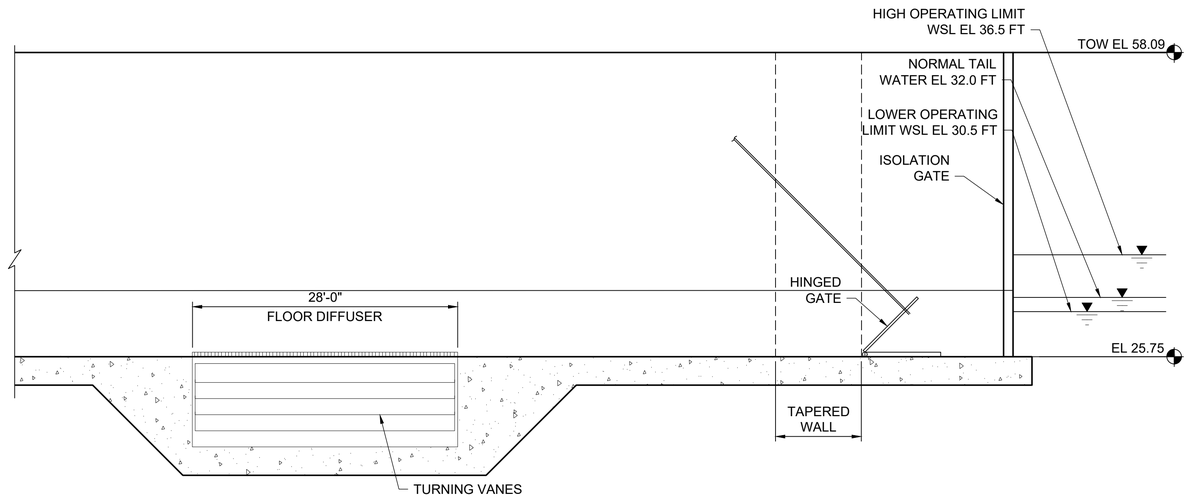
DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\C-111.dwg USER: JMG01318
DATE: Jul 02, 2020 7:12pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



1 / C-107 ENLARGED PLAN
SCALE: 1"=10'



2 / C-107 VERTICAL SLOT TYPICAL POOL PLAN
SCALE: 1/4"=1'-0"



B / - VERTICAL SLOT ENTRANCE SECTION
SCALE: 1/8"=1'-0"

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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
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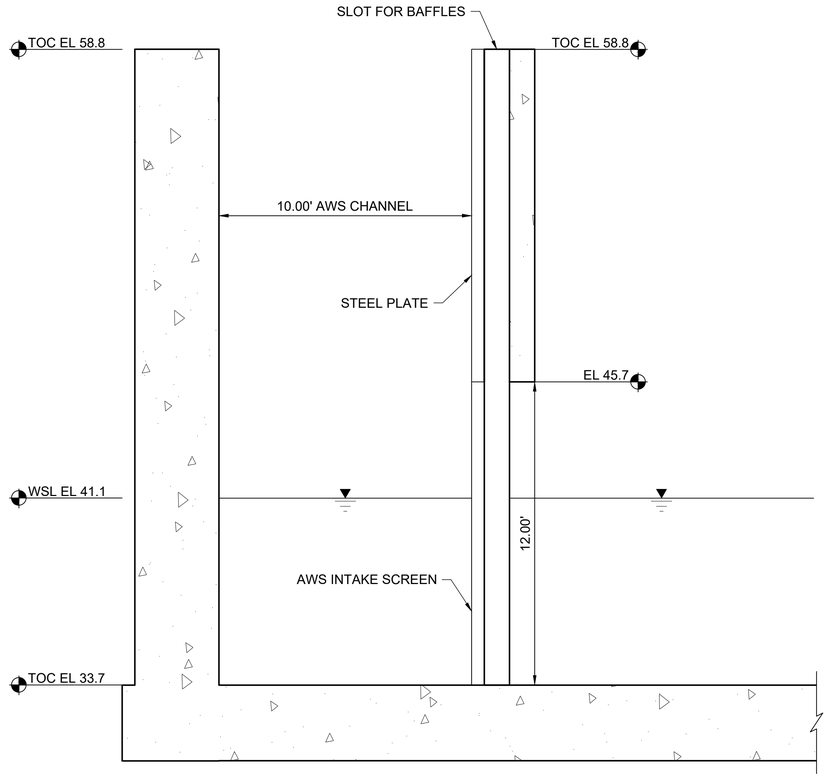
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	19 OF 53
DRAWING:	C-112

DWG: S:\13100\99\Holden\Lockwood\900 CAD\02-SHEETS\C-112.dwg USER: MK400889
DATE: Jul 02, 2020 11:44am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC S-LCKWD-PLN S-LCKWD-PP IMAGES:

NOTES:
1. XX



A C-112 **AWS CONVEYANCE SECTION**
SCALE: 1"=4'

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TEL: (508) 829-6000 www.aldenlab.com

30% DESIGN
NOT FOR CONSTRUCTION
DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS CHANNEL DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	20 OF 53
DRAWING:	C-113

GENERAL NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS.
2. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE OTHER PROJECT DRAWINGS AND SPECIFICATIONS.
3. REFER TO CIVIL, MECHANICAL, ELECTRICAL, AND OTHER DISCIPLINES DRAWINGS FOR ANCHORS, PIPE SLEEVES, CONDUITS OR OTHER ITEMS TO BE EMBEDDED IN OR THAT PASS THROUGH THE STRUCTURE. IN GENERAL, EMBEDMENTS AND PENETRATIONS LESS THAN 12 INCHES IN DIAMETER ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS.
4. STANDARD DETAILS SHALL BE USED AT ALL APPLICABLE LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
5. PLANS ON THESE DRAWINGS ARE TREATED AS HORIZONTAL SECTIONS (I.E. “PLANS AT ELEVATION 100.00” SHOW ITEMS BELOW 100.00).
6. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
7. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO CONSTRUCTION. NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS.
8. SHOP DRAWINGS SHALL BE FURNISHED FOR REVIEW BEFORE ANY FABRICATION AND ERECTION IS STARTED. POORLY EXECUTED SHOP DRAWINGS SHALL BE REJECTED AND RESUBMITTED.

CONCRETE NOTES:

1. SPECIFIED MINIMUM COMPRESSIVE STRENGTH OF CLASS A STRUCTURAL CONCRETE SHALL BE 4500 PSI AT 28 DAYS UNLESS OTHERWISE NOTED. REFER TO THE SPECIFICATIONS.
2. CONCRETE WORK SHALL CONFORM TO ACI 301 AND ACI 318.
3. REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615 OR A706, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60.
4. ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI-315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION.
5. REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH PIPE, PIPE FLANGE OR METAL PARTS EMBEDDED IN CONCRETE, A MINIMUM OF 2 INCHES CLEARANCE SHALL BE PROVIDED AT ALL TIMES.
6. UNLESS OTHERWISE SHOWN ON THE DRAWINGS CONCRETE COVER FOR REINFORCING BARS SHALL BE 4" UNO.
7. UNLESS OTHERWISE NOTED, WALLS AND SLABS SHOWN WITH A SINGLE LAYER OF REINFORCEMENT SHALL HAVE THAT REINFORCEMENT CENTERED.
8. CHAMFER EDGES OF PERMANENTLY EXPOSED CONCRETE SURFACES WITH A 45 DEGREE BEVEL AS SHOWN IN THE STANDARD DETAILS.
9. ALL REINFORCEMENT BENDS, LAPS AND SPLICES UNLESS OTHERWISE NOTED, SHALL SATISFY THE MINIMUM REQUIREMENTS SHOWN IN THE STANDARD DETAILS.
10. DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS SHOWN OTHERWISE.
11. BARS SHOWN WITH BENDS NOT DIMENSIONED SHALL BE ASSUMED TO END WITH A STANDARD HOOK AS SHOWN IN THE STANDARD DETAILS.
12. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1-1/3 TIMES THE MAXIMUM AGGREGATE SIZE.
13. THE FIRST AND LAST BARS IN STRUCTURAL MEMBERS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING.
14. CONTRACTOR SHALL NOT BACKFILL AGAINST STRUCTURAL CONCRETE UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER. SEE SPECIFICATIONS.
15. PLACE BACKFILL EQUALLY ON ALL SIDES OF STRUCTURES. SEE SPECIFICATIONS.
16. LOCATE CONSTRUCTION JOINTS WHERE SHOWN OR NOTED ON DRAWINGS. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL THE LOCATION OF PROPOSED CONSTRUCTION JOINTS.
17. MAXIMUM JOINT SPACING SHALL BE NO MORE THAN 30'.
18. MINIMUM TIME BETWEEN ADJACENT POURS SHALL BE 5 DAYS.

INSPECTION TESTING AND QUALITY ASSURANCE NOTES:

1. SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH CHAPTER 17 OF THE IBC ARE REQUIRED AS PART OF THIS PROJECT. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE COMPLIANCE WITH THESE OVERSIGHT AND QUALITY ASSURANCE REQUIREMENTS.
2. THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE, ACTING AS THE OWNERS AGENT WILL BE PROVIDING SPECIAL INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE IBC. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING ADEQUATE TIME AND ACCESS FOR COMPLETION OF SPECIAL INSPECTIONS BY THE OWNER OR OWNER'S AGENT PRIOR TO COVERING THE WORK TO BE INSPECTED WITH NEW WORK.
3. AS A MINIMUM, SPECIAL INSPECTIONS ARE TO BE COMPLETED FOR THE FOLLOWING AREAS OF CONSTRUCTION.

CONSTRUCTION TYPE	APPLICABLE CODE TABLE(S)
SOILS / FOUNDATIONS	IBC 1705.6
CONCRETE	IBC 1705.3
STRUCTURAL STEEL	AISC 360
STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL	IBC 1705.2.2

4. THE CONTRACTOR SHALL PROVIDE A “STATEMENT OF RESPONSIBILITY” TO THE OWNER OR OWNER'S AGENT, IN ACCORDANCE WITH SECTION 1706 OF THE IBC.
5. SPECIAL INSPECTORS SHALL SUBMIT THEIR QUALIFICATIONS TO THE BUILDING OFFICIAL AND BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO BEGINNING WORK.

DEFERRED SUBMITTAL ITEMS:

1. THE FOLLOWING PORTIONS OF THE PROJECT ARE DEFERRED SUBMITTAL ITEMS AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD.

   ANCHORAGE OF EQUIPMENT AND APPURTENANCES
   DIFFUSER AND FISH SCREENS
   GRATING
   HYDRAULIC GATES
   RAILING

2. DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE ENGINEER OF RECORD HAS REVIEWED THE SUBMITTAL DOCUMENTS AND INDICATED AS A MINIMUM THAT THEY HAVE BEEN REVIEWED AND FOUND TO BE IN GENERAL CONFORMANCE WITH THE DESIGN OF THE STRUCTURE.
3. DEFERRED SUBMITTAL ITEMS SHALL BE PREPARED AND STAMPED BY A LICENSED CIVIL OR STRUCTURAL PROFESSIONAL ENGINEER UNLESS OTHERWISE NOTED ELSEWHERE IN THESE DOCUMENTS.

STRUCTURAL STEEL AND STAINLESS STEEL NOTES:

1. MATERIALS SHALL CONFORM TO THE STANDARDS LISTED:

- STEEL PLATE	ASTM A36
- STEEL ANGLES	ASTM A36
- STEEL BEAMS	ASTM A992
- STEEL BOLTS	ASTM A325
- STEEL CHANNELS	ASTM A36
- STEEL HEADED ANCHOR STUDS (HAS)	TYPE A108

2. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE AWS AND AISC. INSPECT ALL WELDING IN ACCORDANCE WITH THE SPECIFICATIONS.
3. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT ENGINEER'S WRITTEN APPROVAL.
4. ALL STRUCTURAL STEEL MEMBERS AND MISCELLANEOUS ITEMS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

EXCAVATION AND ROCK TRIMMING:

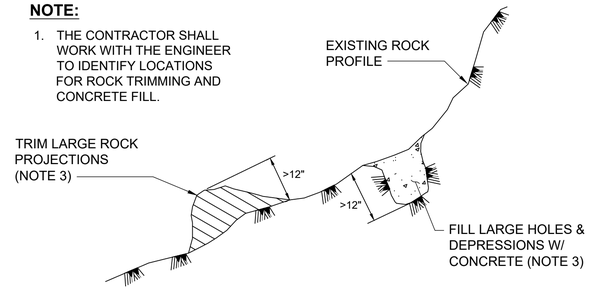
1. PROVIDE ADEQUATE SURVEY CONTROL TO AVOID UNAUTHORIZED OVEREXCAVATION.
2. REMOVE THE ORGANIC AND LOOSE/WEATHERED MATERIAL DOWN TO SOUND ROCK.
3. EXCAVATE TO LINES, GRADES, AND DIMENSIONS SHOWN AND AS NECESSARY TO ACCOMPLISH WORK.
4. TRIM TO NEAT LINES WHERE CONCRETE IS TO BE PLACED AGAINST FOUNDATION MATERIAL.
5. EXCAVATION MATERIALS SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS AND AT A LOCATION DETERMINED BY THE CONTRACTOR.

ROCK SURFACE PREPARATION:

1. SUBMIT A ROCK SURFACE PREPARATION PLAN FOR REVIEW.
2. PREPARE A TEST SECTION FOR REVIEW BY THE ENGINEER PRIOR TO COMMENCEMENT OF PRODUCTION ROCK SURFACE PREPARATION.
3. ROCK SHALL BE PREPARED BY A COMBINATION OF ROCK TRIMMING AND CONCRETE FILL TO A SMOOTHNESS AND UNIFORMITY SUITABLE FOR CONCRETE PLACEMENT. REFER TO STANDARD DETAIL 1.
4. ROCK SURFACES AGAINST WHICH CONCRETE ARE TO BE PLACED SHALL BE CLEAN, FREE OF LOOSE MATERIAL, AND FREE FROM STANDING OR RUNNING WATER.
5. ROCK SURFACES SHALL BE CLEAN AND SATURATED SURFACE DRY (SSD) DURING CONCRETE PLACEMENT.
6. ROCK SURFACES TO BE IN CONTACT WITH NEW CONCRETE SHALL BE REVIEWED BY THE ENGINEER PRIOR TO CONCRETE PLACEMENT.

NOTE:

1. THE CONTRACTOR SHALL WORK WITH THE ENGINEER TO IDENTIFY LOCATIONS FOR ROCK TRIMMING AND CONCRETE FILL.



1 - **ROCK SURFACE PREPARATION DETAIL**
SCALE: NTS

GENERAL DESIGN CRITERIA:

1. THE FOLLOWING, DESIGN CODES, DESIGN CRITERIA AND STRUCTURE LOADS WERE USED TO COMPLETE THE STRUCTURAL DESIGN.
   - 2012 INTERNATIONAL BUILDING CODE
   - 2016 ASCE7 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
   - 2016 STRENGTH DESIGN FOR REINFORCED CONCRETE HYDRAULIC STRUCTURES, US ARMY CORPS OF ENGINEERS.
   - AISC MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
   - ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, BY THE AMERICAN CONCRETE INSTITUTE.

GEOTECHNICAL DESIGN CRITERIA:

ALDEN RESEARCH LABORATORY
30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

30% DESIGN
NOT FOR CONSTRUCTION
DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL NOTES & DESIGN CRITERIA

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	22 OF 53
DRAWING:	S-001

DWG: S:\1310\09\Holden\Lockwood\500 CAD\02-SHEETS\SIS-001.dwg USER: JMG01318
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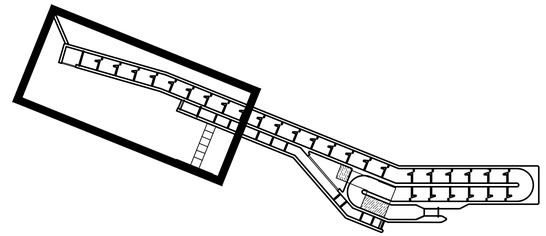

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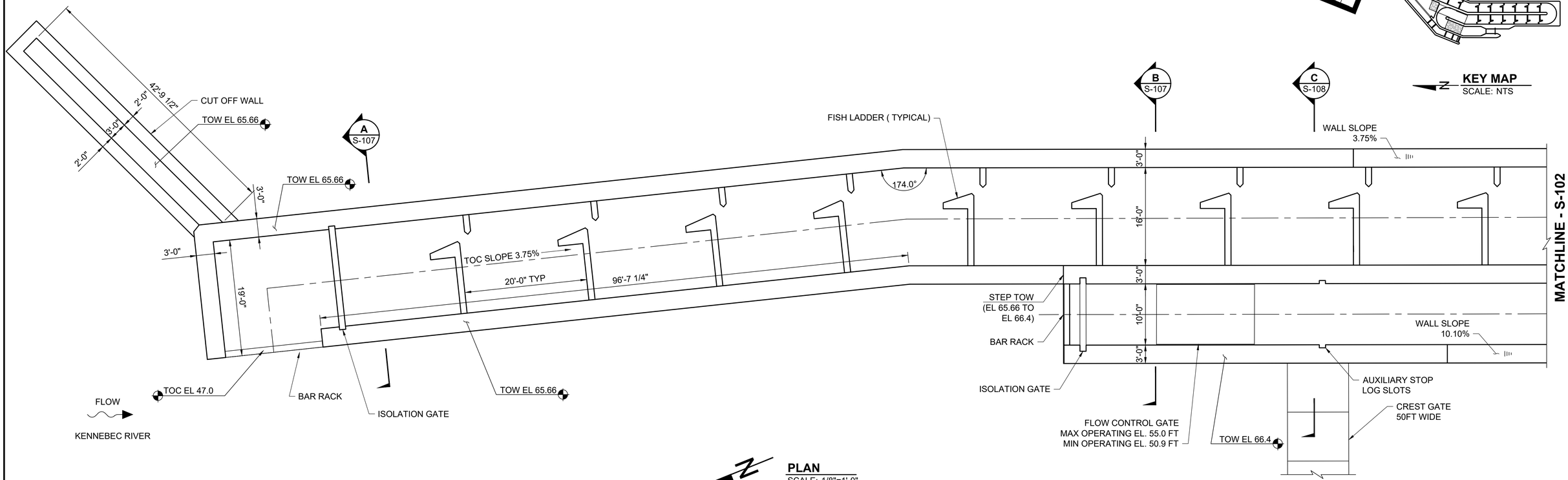

PLAN
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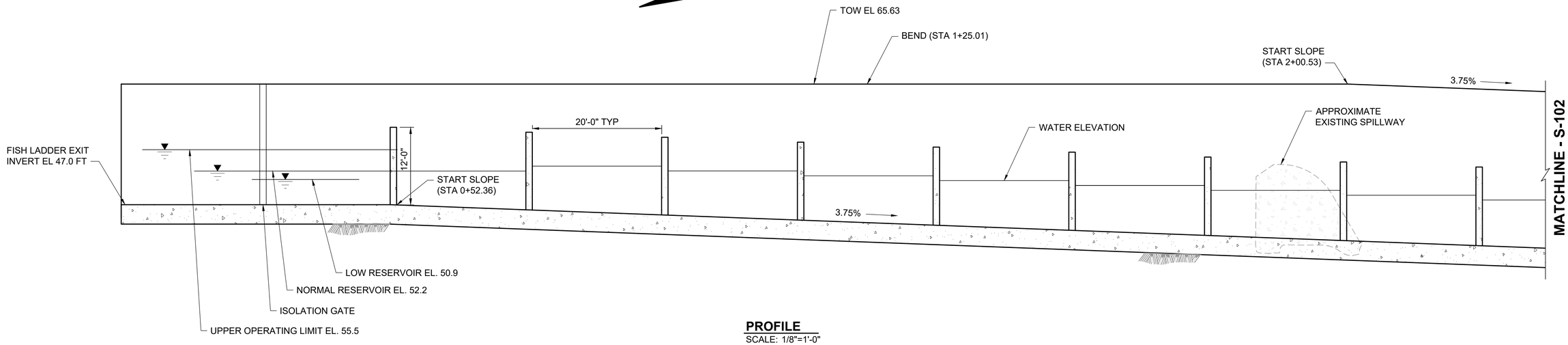

PROFILE
SCALE: 1/8"=1'-0"

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	23 OF 53
DRAWING:	S-101

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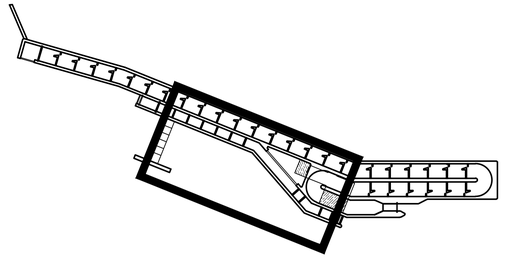

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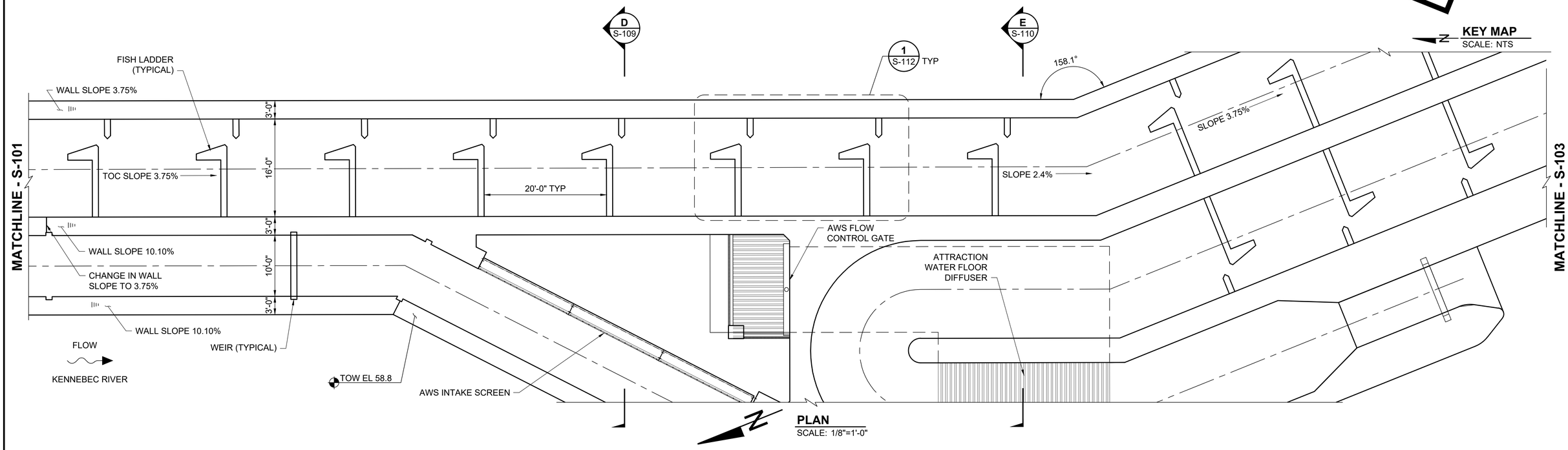

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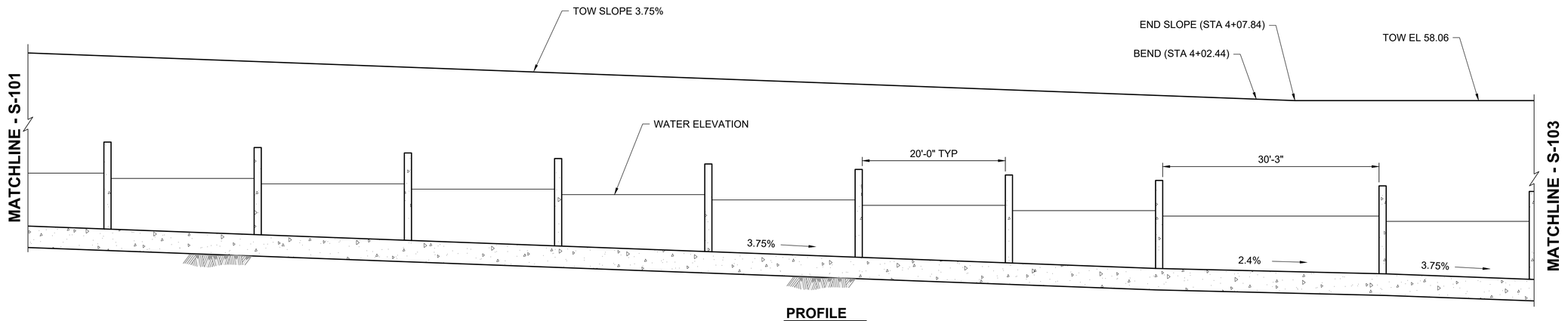

PROFILE
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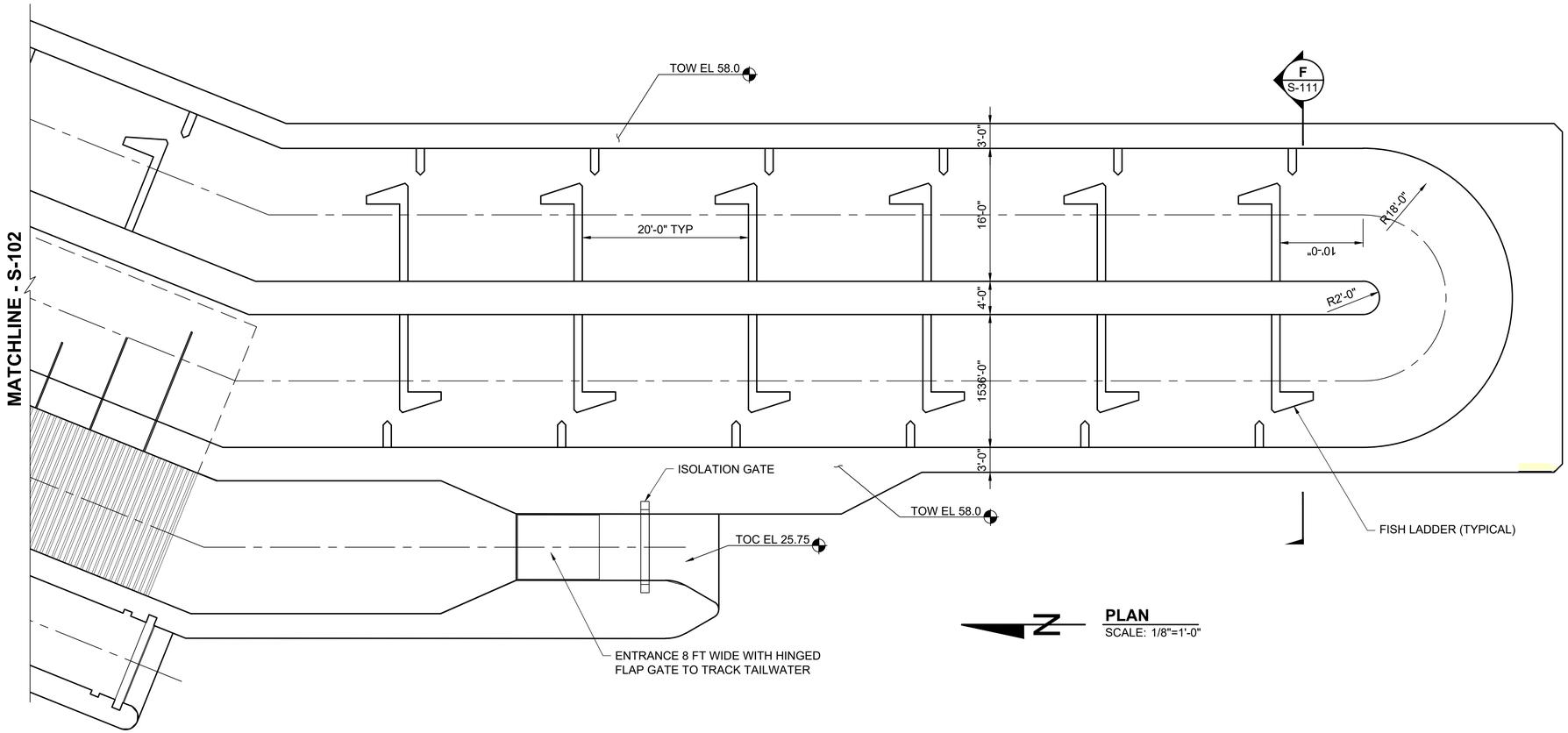
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	24 OF 53
DRAWING:	S-102



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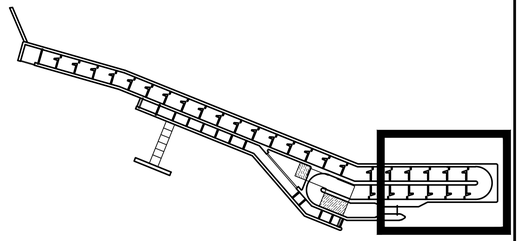

KEY MAP
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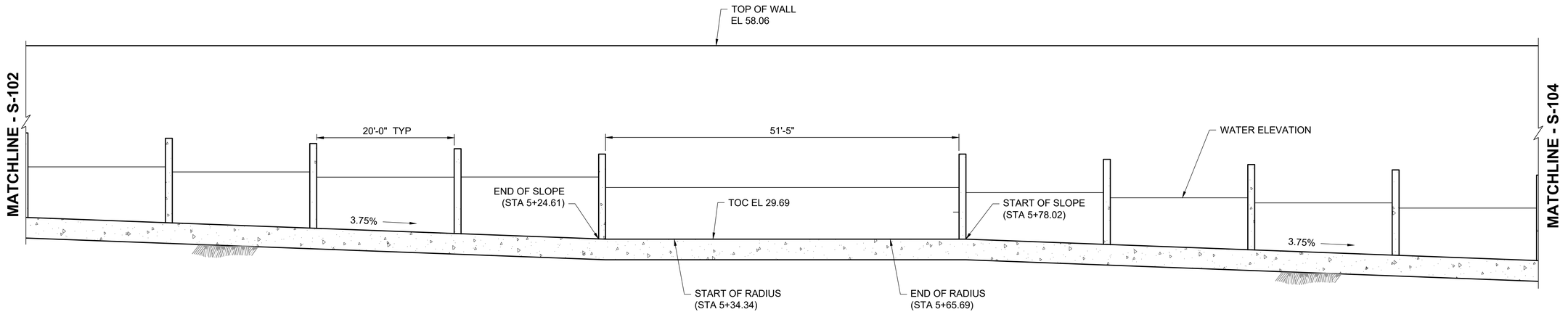
FLOW

KENNEBEC RIVER



PROFILE
SCALE: 1/8"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	25 OF 53
DRAWING:	S-103

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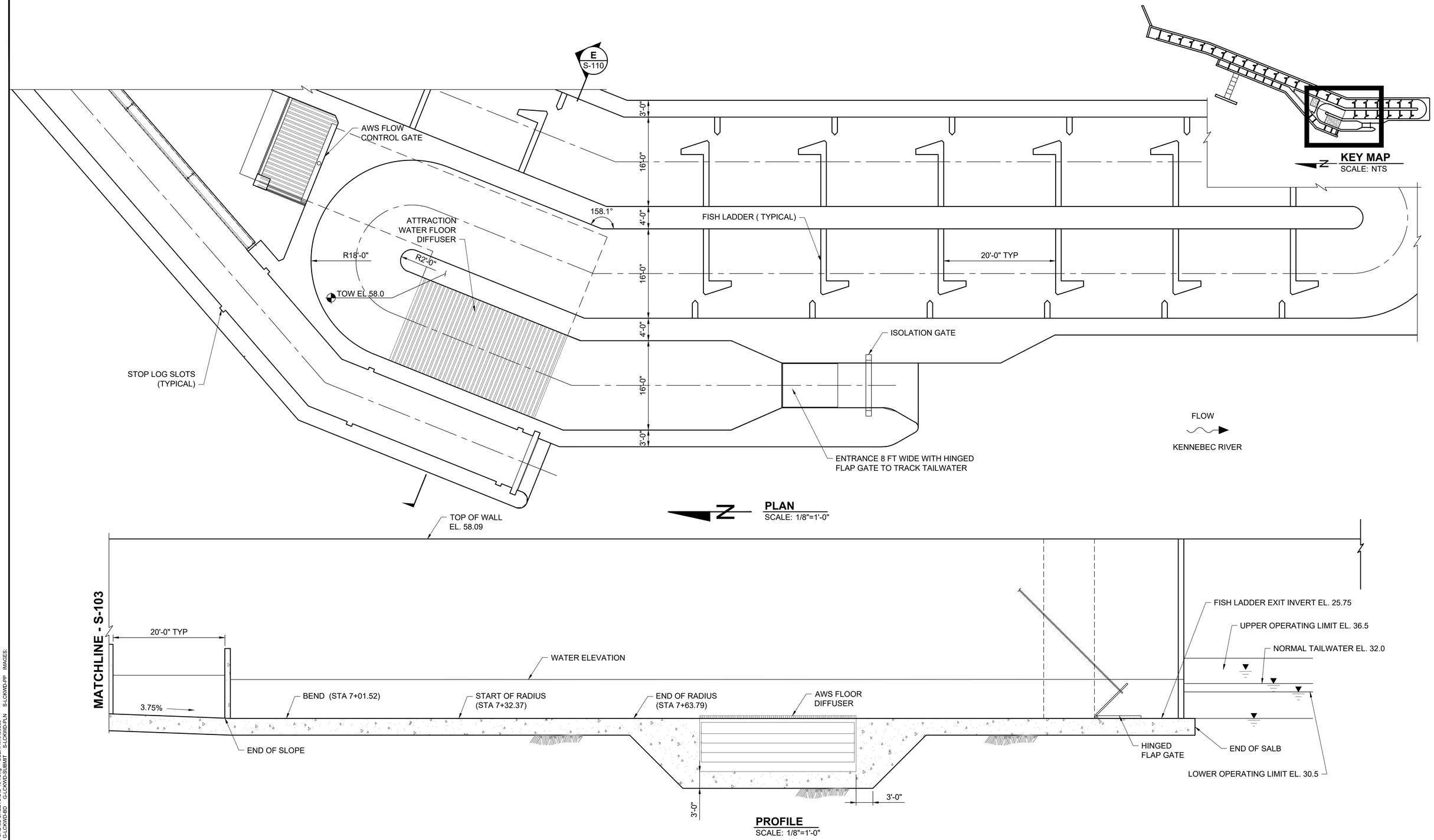

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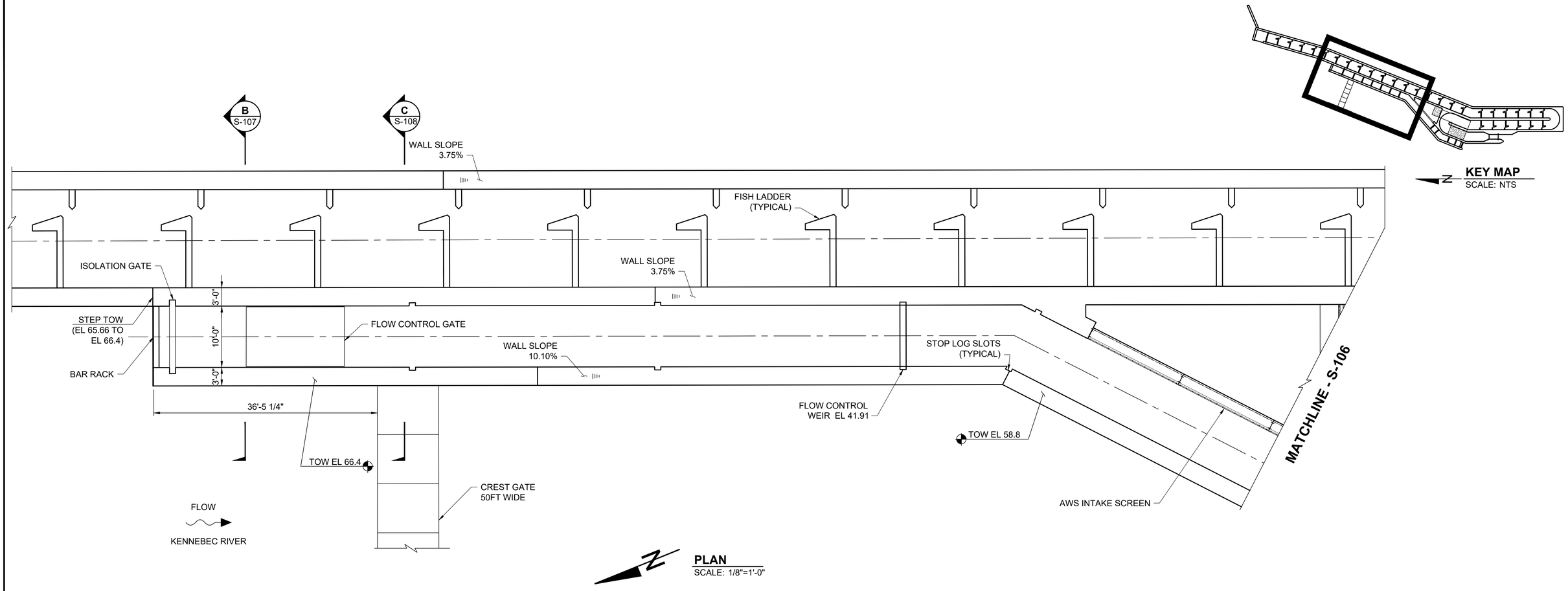
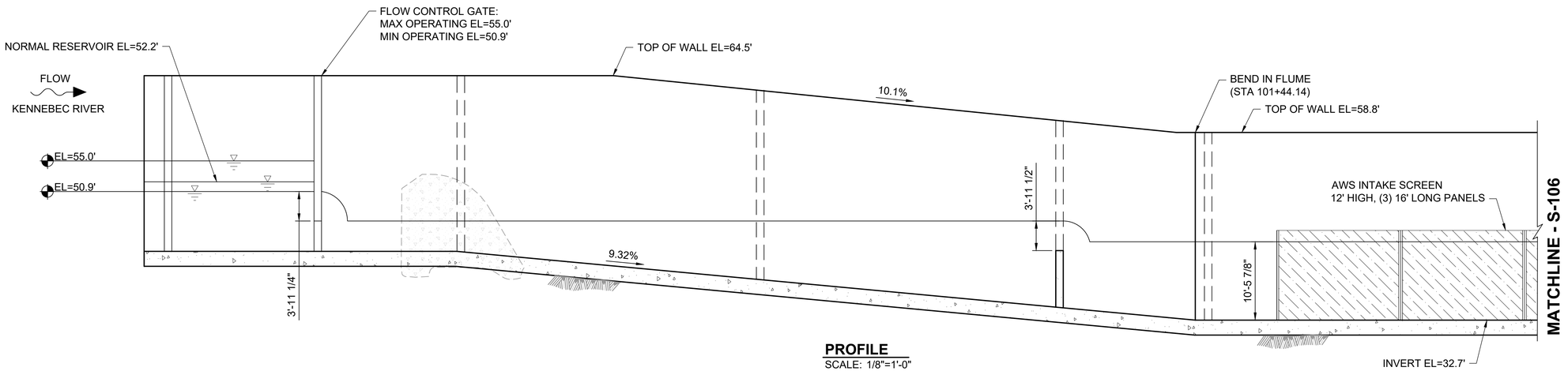
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	26 OF 53
DRAWING:	S-104





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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS CHANNEL PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	27 OF 53
DRAWING:	S-105

DWG: S:\13100\PH\den\Lockwood\000 CAD\02-SHEETS\S-105.dwg USER: MKA00889
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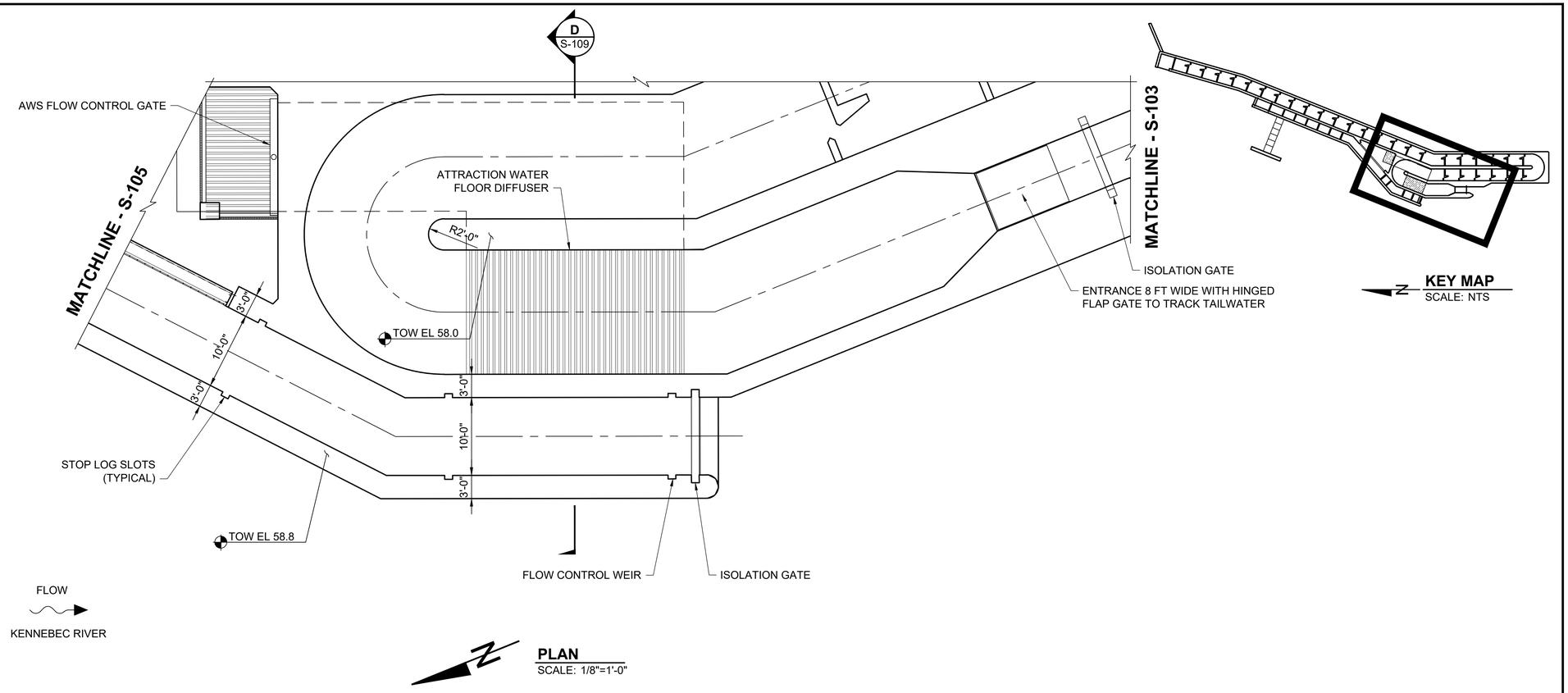

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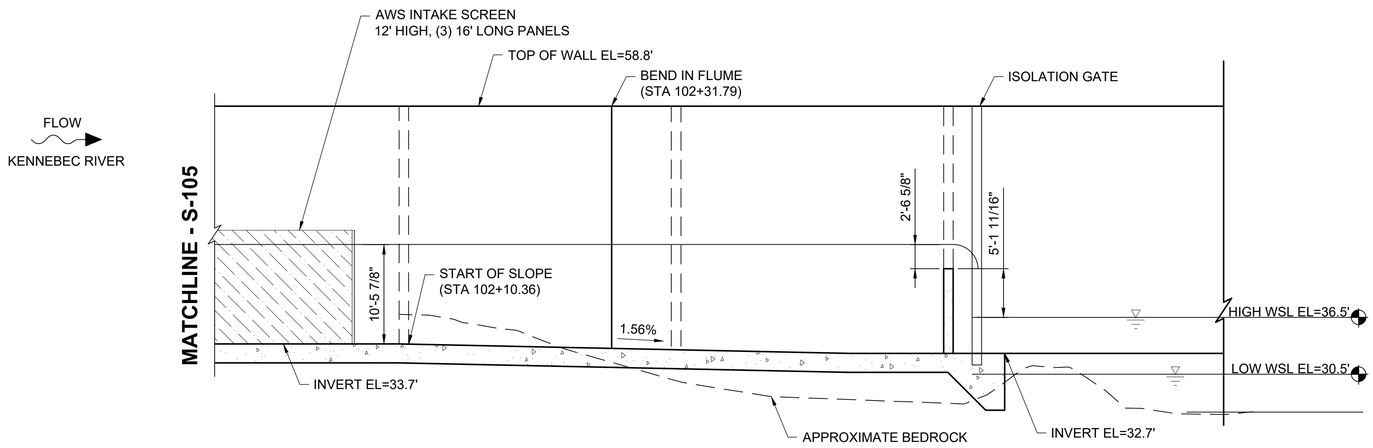

PROFILE
SCALE: 1/8"=1'-0"

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS CHANNEL PLAN AND PROFILE

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	28 OF 53
DRAWING:	S-106

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\S-106.dwg USER: MKA00989
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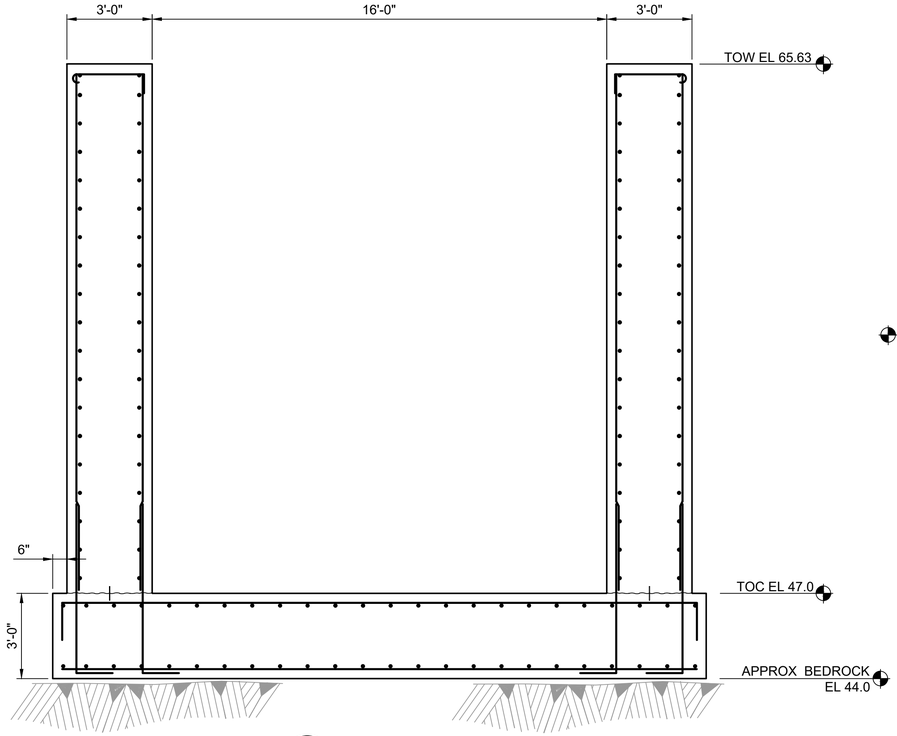

A SECTION
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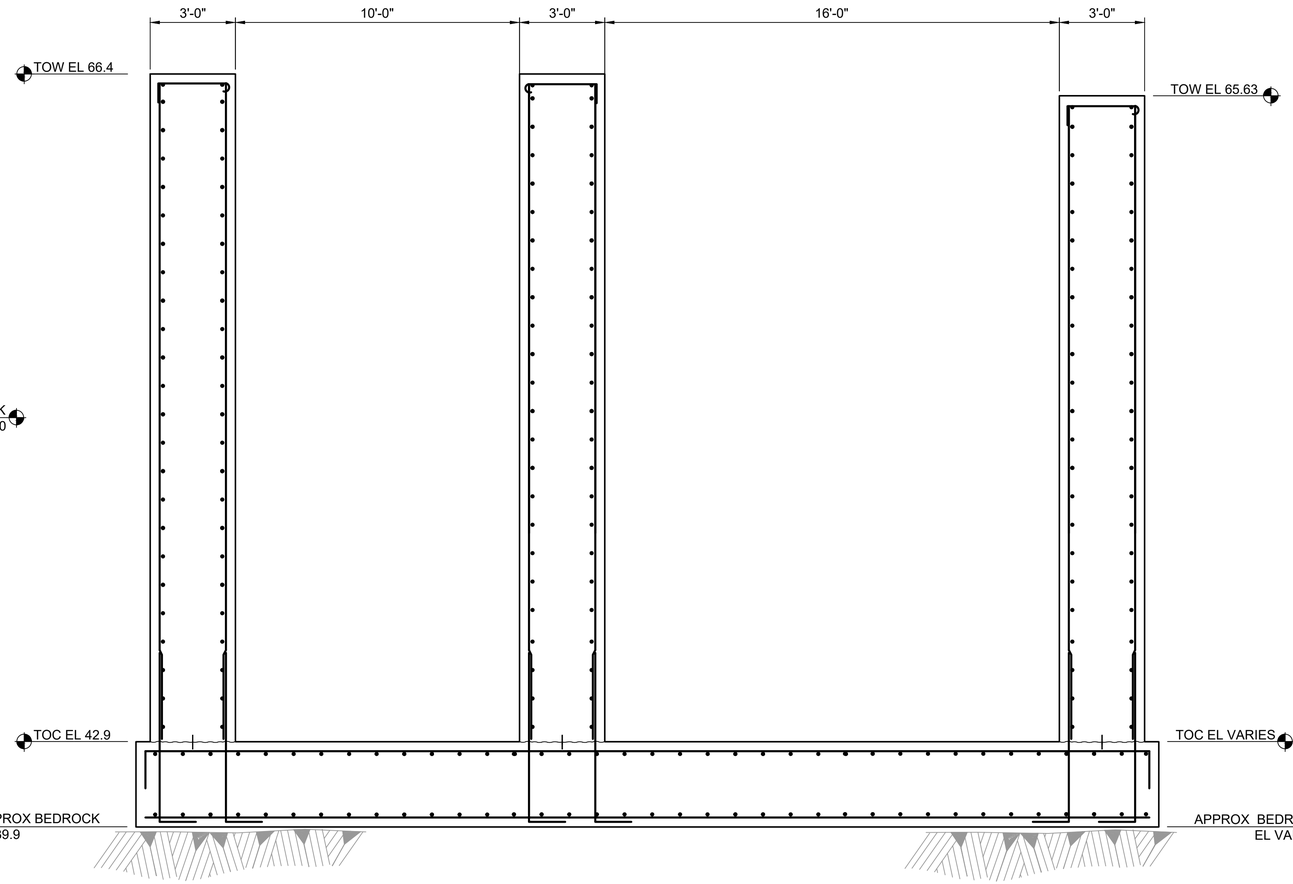

B SECTION
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S-105

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REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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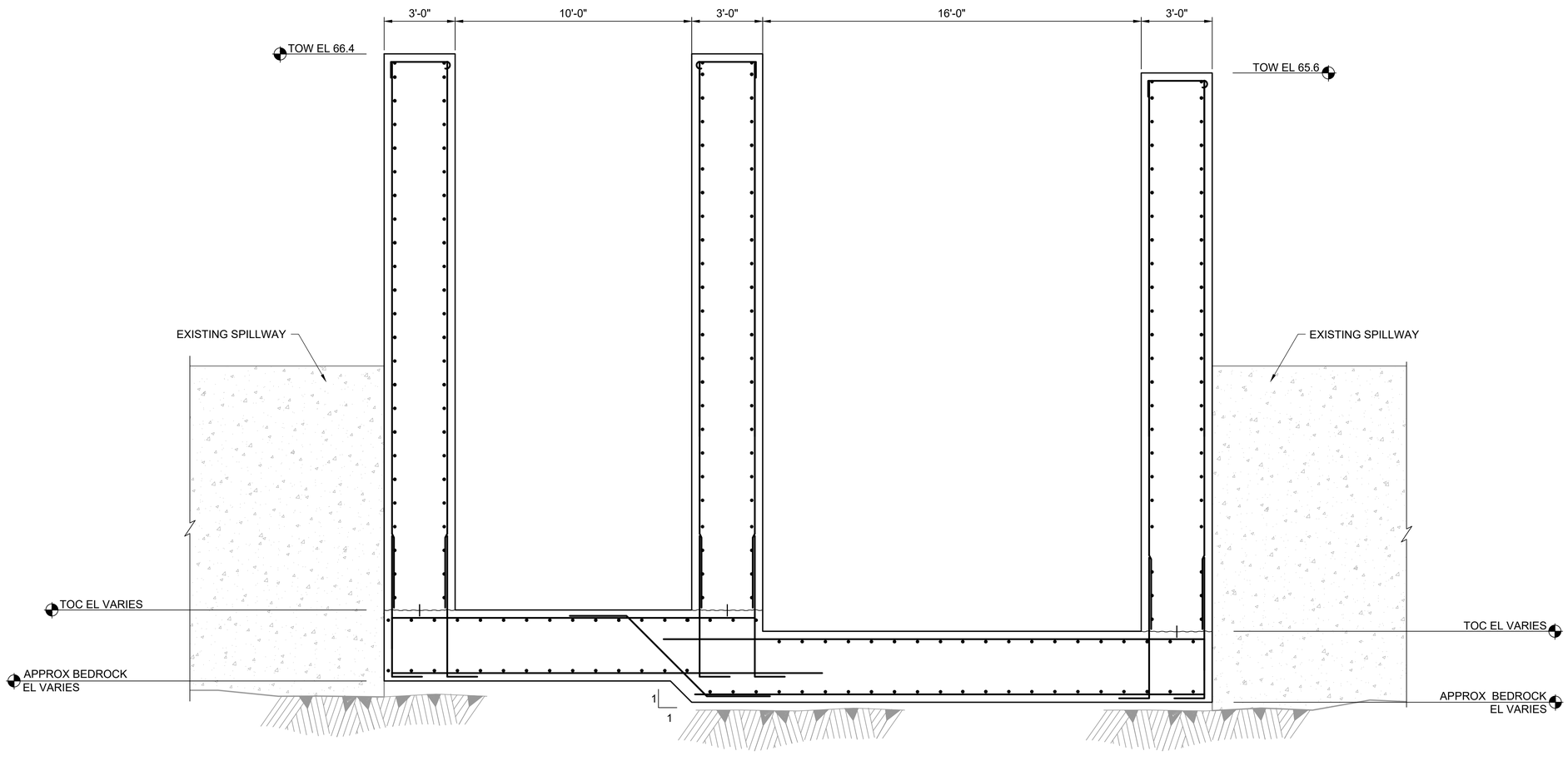
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	29 OF 53
DRAWING:	S-107

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\S\S-107.dwg USER: MKA00889
DATE: Jul 02, 2020 8:22pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



C S-101 **SECTION**
SCALE: 3/8"=1'-0"
S-105

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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	30 OF 53
DRAWING:	S-108

DWG: S:\1310\09\Holden\Lockwood\900 CAD\02-SHEETS\BS-108.dwg USER: MKA0889
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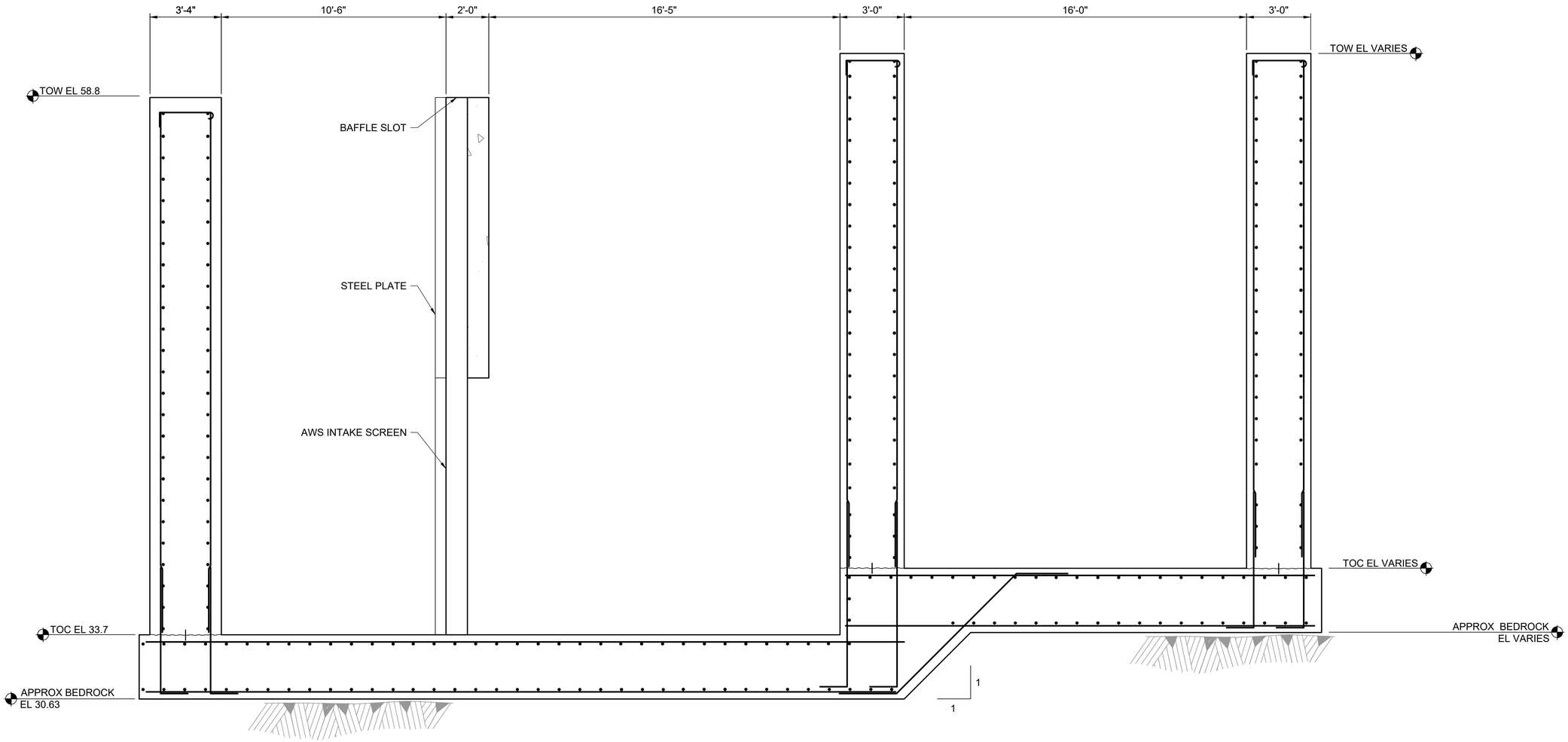

D S-102 S-106 **SECTION**
SCALE: 3/8"=1'-0"

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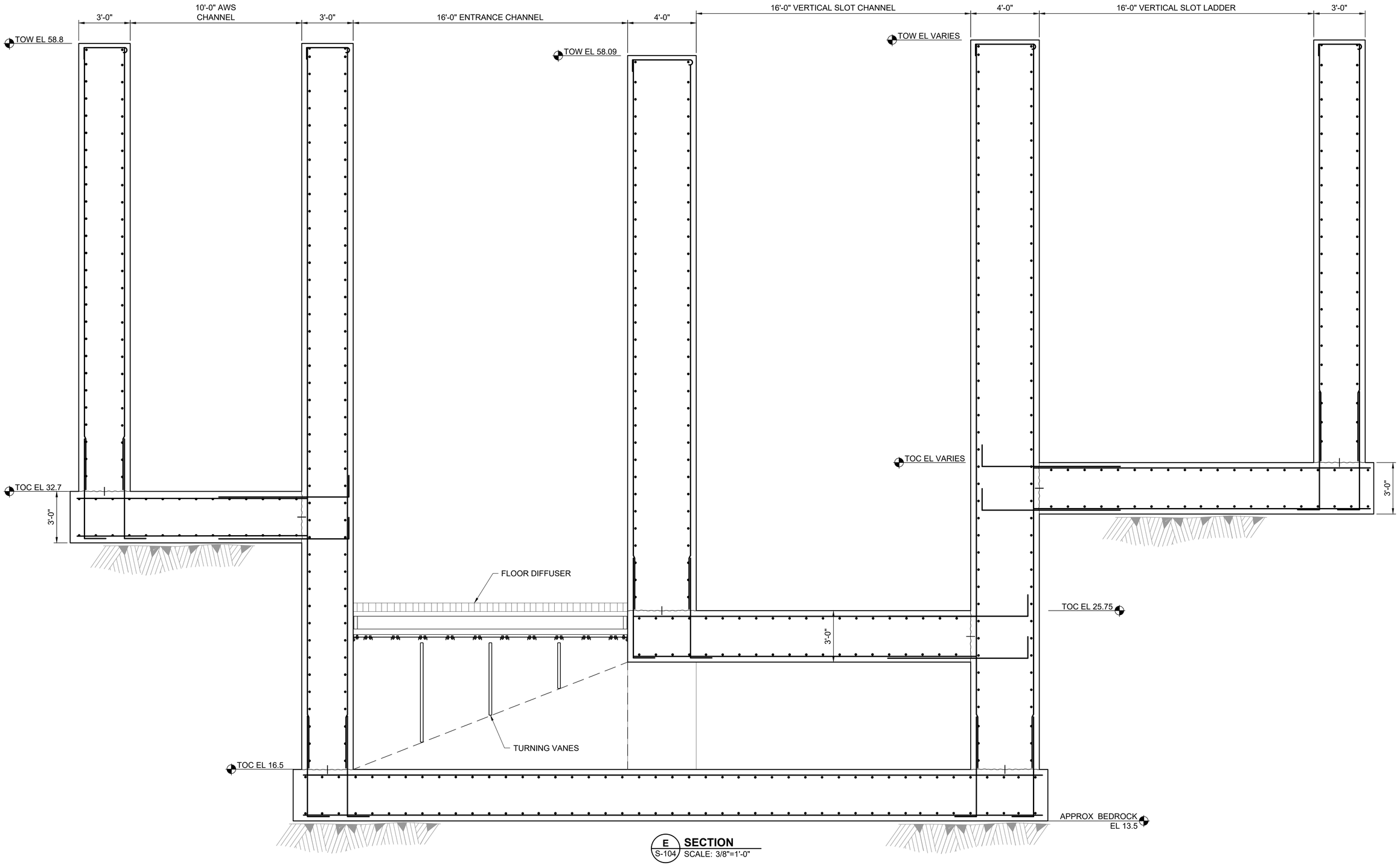
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	31 OF 53
DRAWING:	S-109

DWG: S:\13100\Holden\Lockwood\000 CAD\02-SHEETS\S\S-109.dwg USER: MKA00889
DATE: Jul 02, 2020 8:25pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-SEC IMAGES:



E S-104 **SECTION**
SCALE: 3/8"=1'-0"

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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
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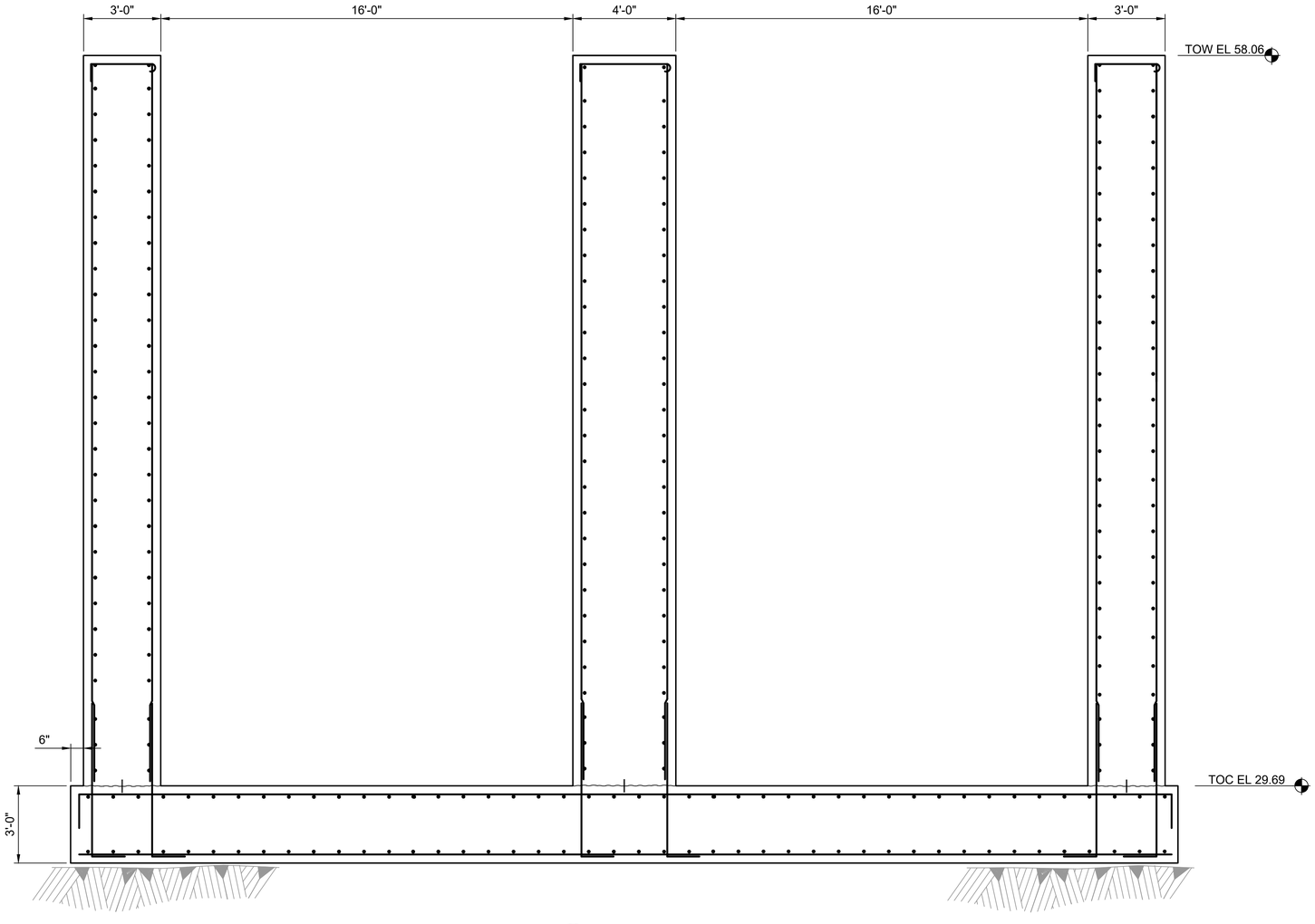
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	32 OF 53
DRAWING:	S-110

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\SS-110.dwg USER: MKA00889
DATE: Jul 02, 2020 7:01pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



F / S-103 **SECTION**
SCALE: 3/8"=1'-0"

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DATE: 07/03/2020

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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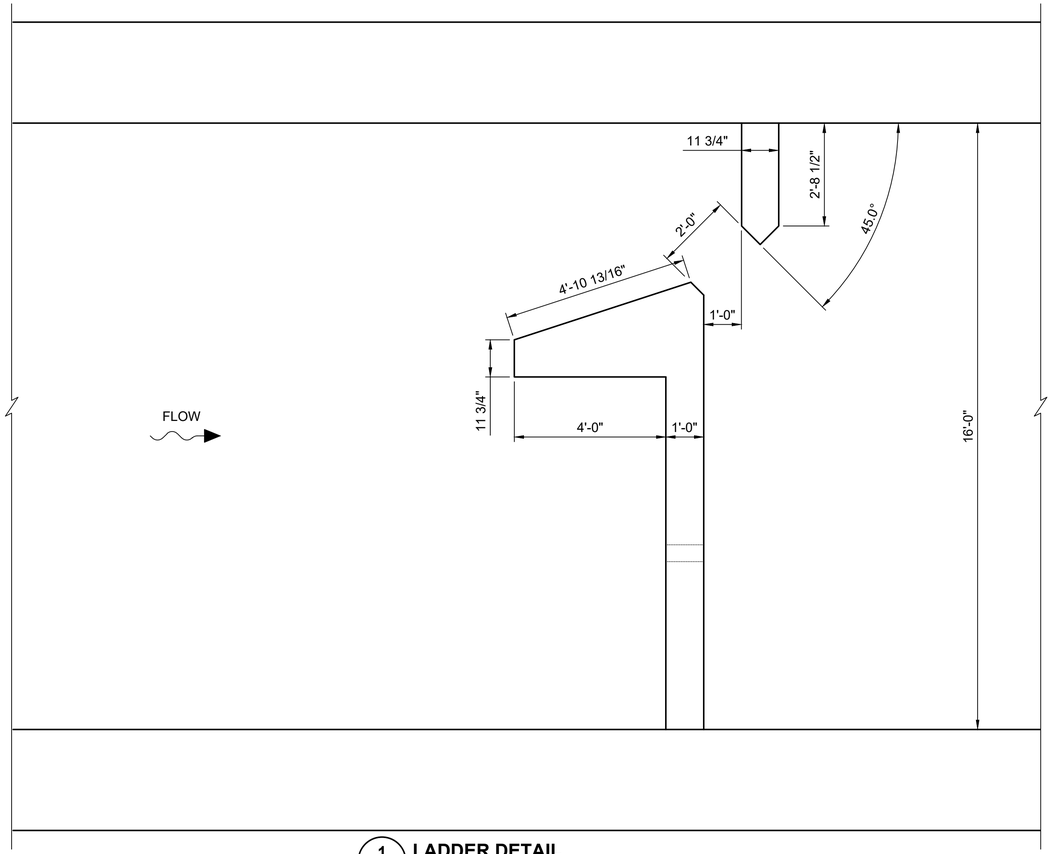
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	33 OF 53
DRAWING:	S-111

DWG: S:\131009Holden\Lockwood\900 CAD\02-SHEETS\S\S-111.dwg USER: MKA00889
DATE: Jul 02, 2020 5:31pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



1 — **LADDER DETAIL**
SCALE: 1/2"=1'-0"

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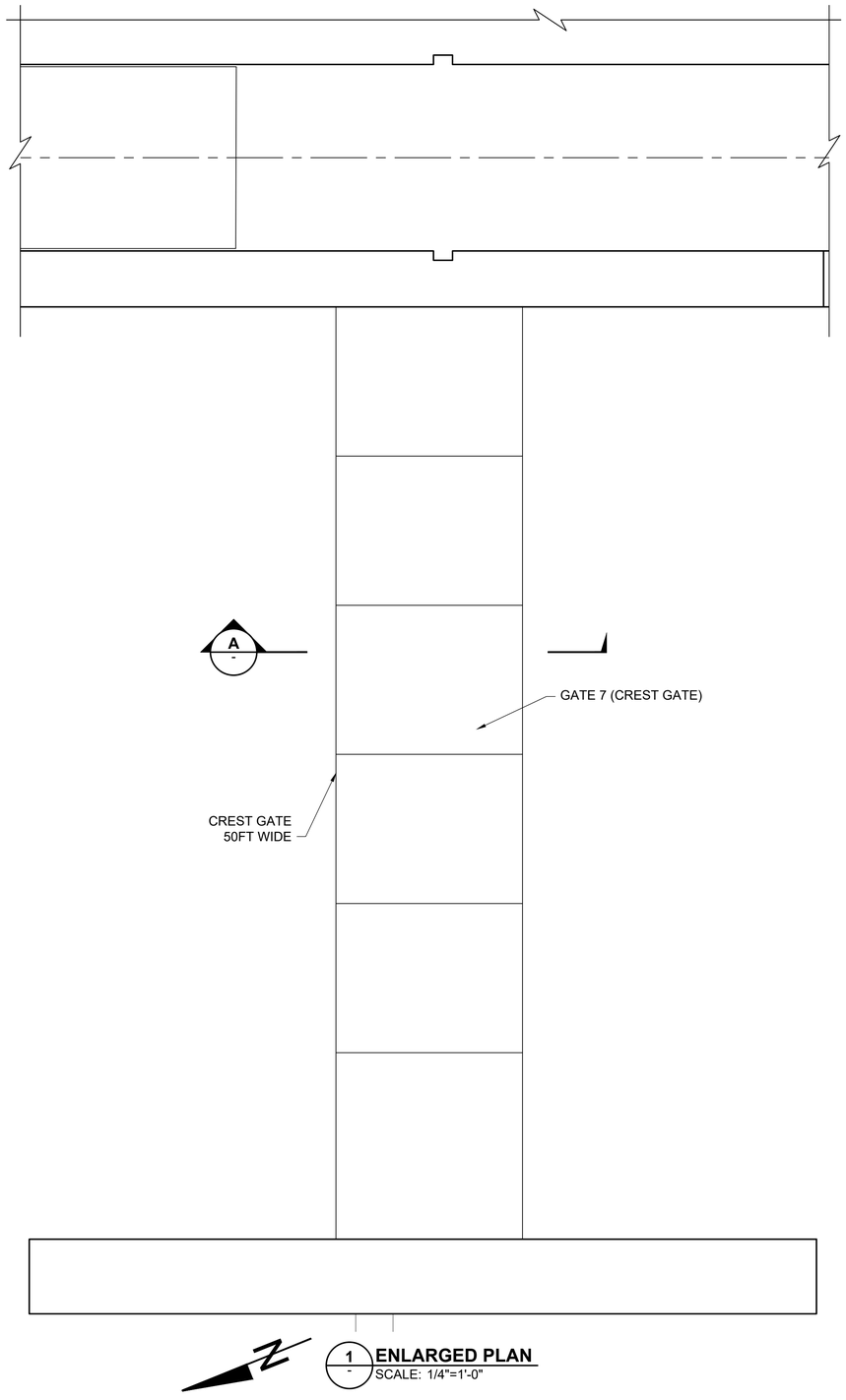
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

FISH LADDER AND AWS CHANNEL DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	34 OF 53
DRAWING:	S-112

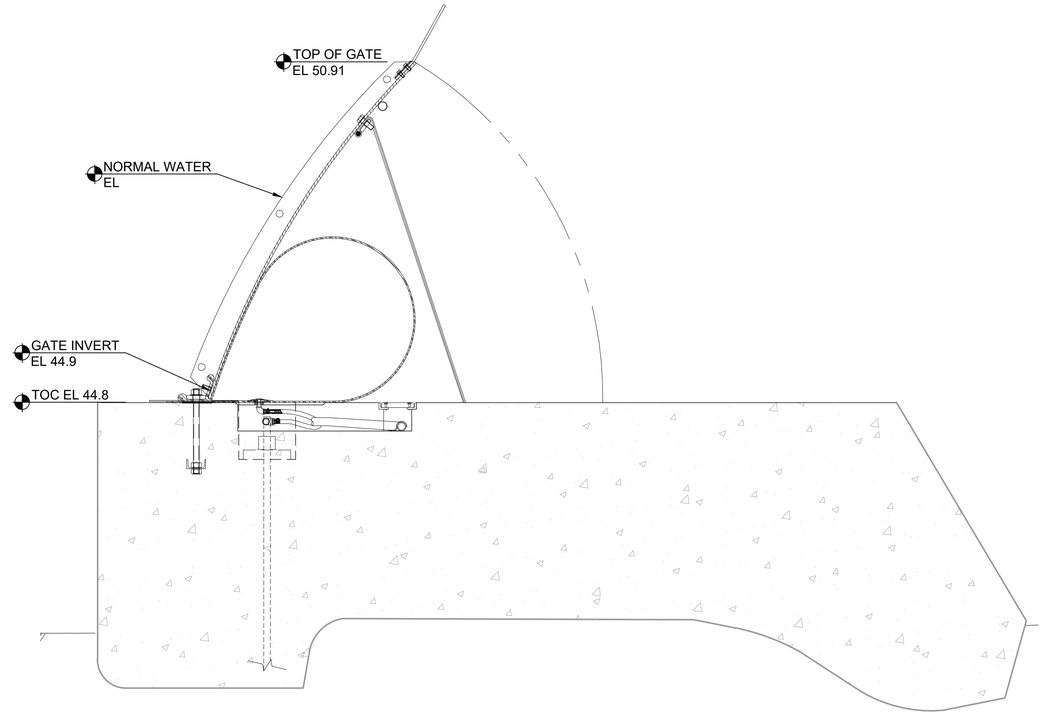
DWG: S:\131009Holden\Lockwood\900 CAD\02-SHEETS\S\S-112.dwg USER: MKA00889
DATE: Jul 02, 2020 7:04pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC IMAGES:



1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"

FLOW

KENNEBEC RIVER



A - **ELEVATION GATE 7 (SPILLWAY)**
SCALE: 3/4"=1'-0"

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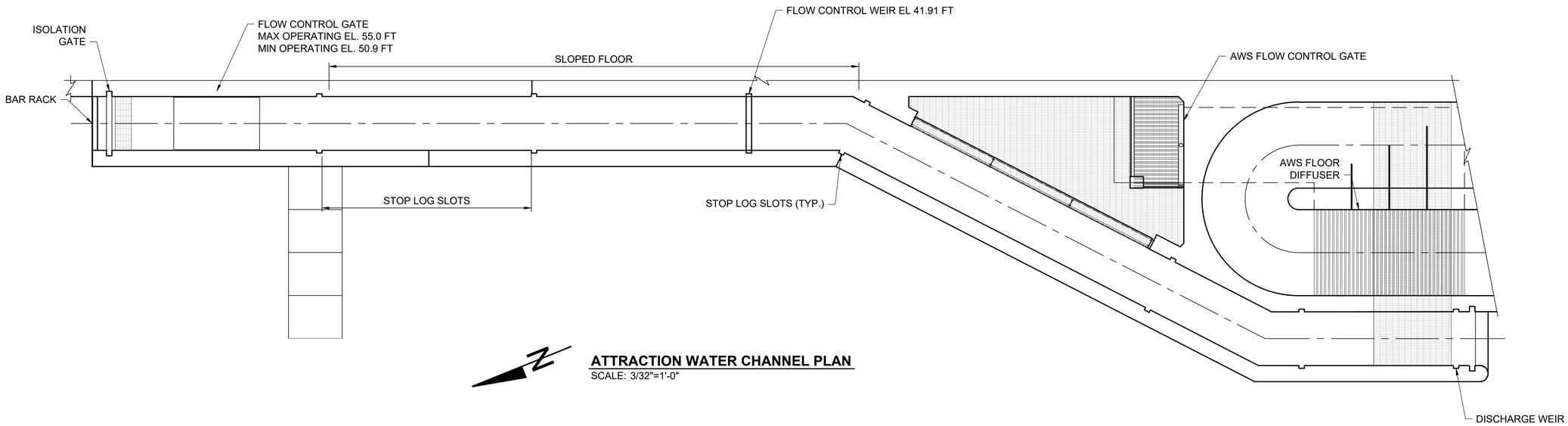
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

SPILLWAY MODIFICATIONS

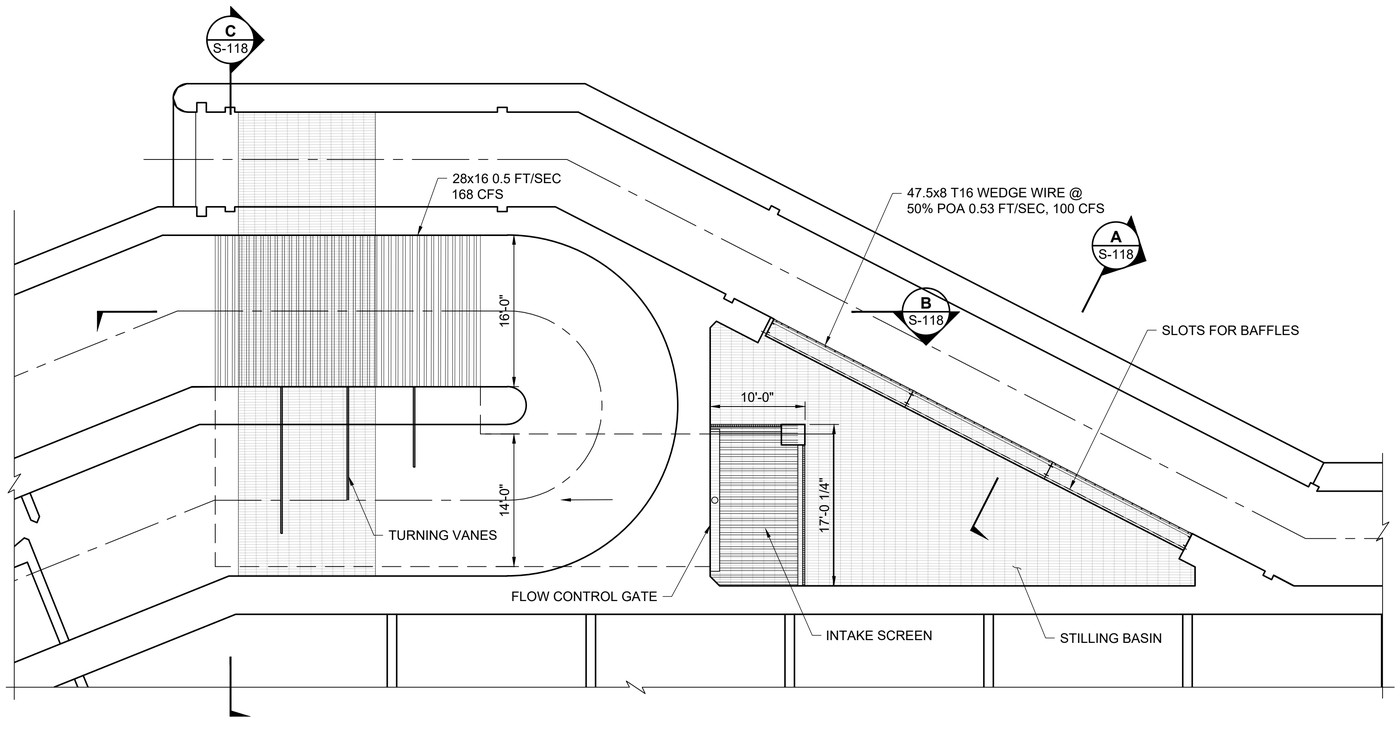
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	37 OF 53
DRAWING:	S-115

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\S\S-115.dwg USER: MKA00889
DATE: Jul 02, 2020 7:06pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN C-LCKWD-SV S-LCKWD-SEC IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg



ATTRACTION WATER CHANNEL PLAN

SCALE: 3/32"=1'-0"



ATTRACTION WATER CHANNEL PLAN

SCALE: 1/8"=1'-0"

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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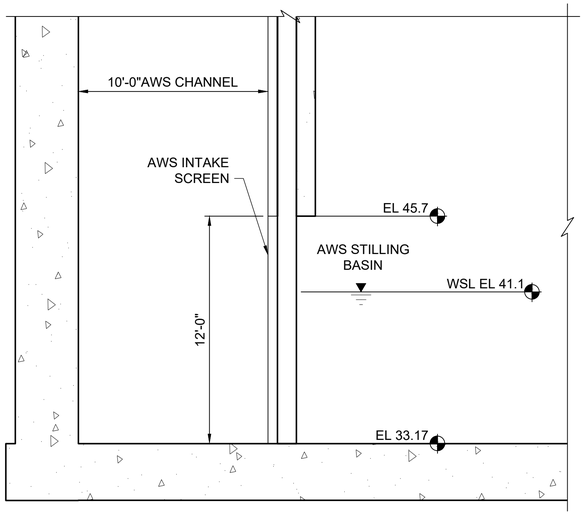
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

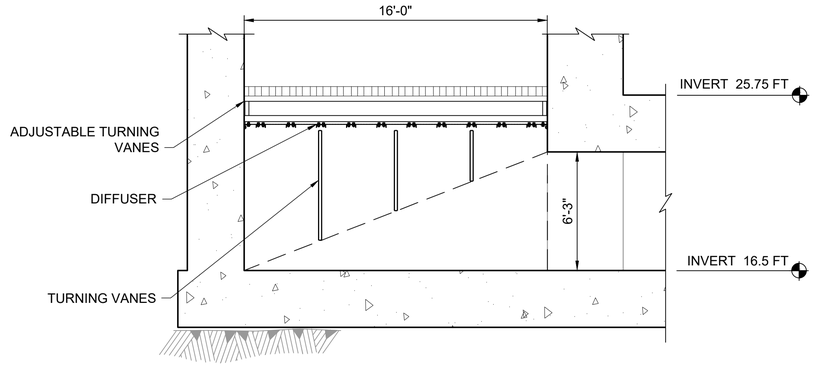
AWS CHANNEL PLAN AND SECTIONS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	39 OF 53
DRAWING:	S-117

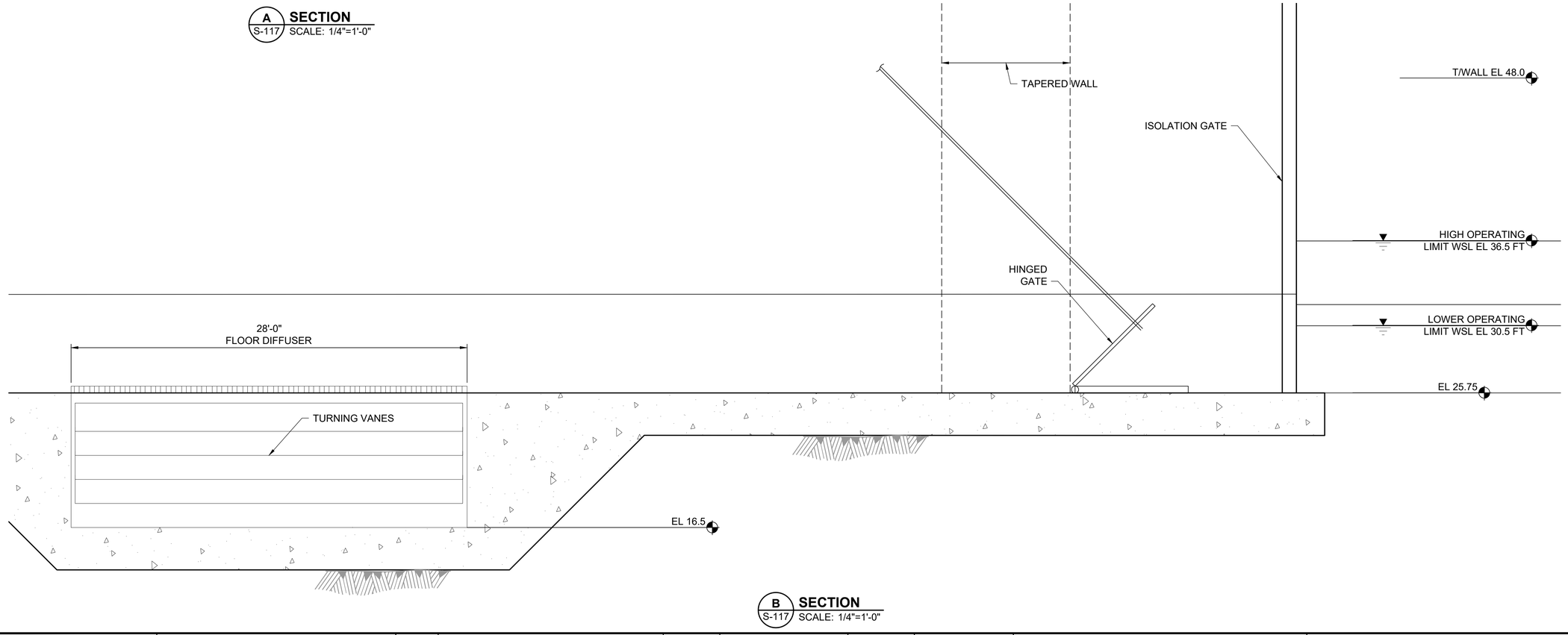
DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\SS-117.dwg USER: MKA00889
DATE: Jul 02, 2020 5:11pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN IMAGES:



A S-117 **SECTION**
SCALE: 1/4"=1'-0"



C S-117 **AWS CONVEYANCE SECTION**
SCALE: 1/4"=1'-0"



B S-117 **SECTION**
SCALE: 1/4"=1'-0"

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DATE: 07/03/2020

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7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

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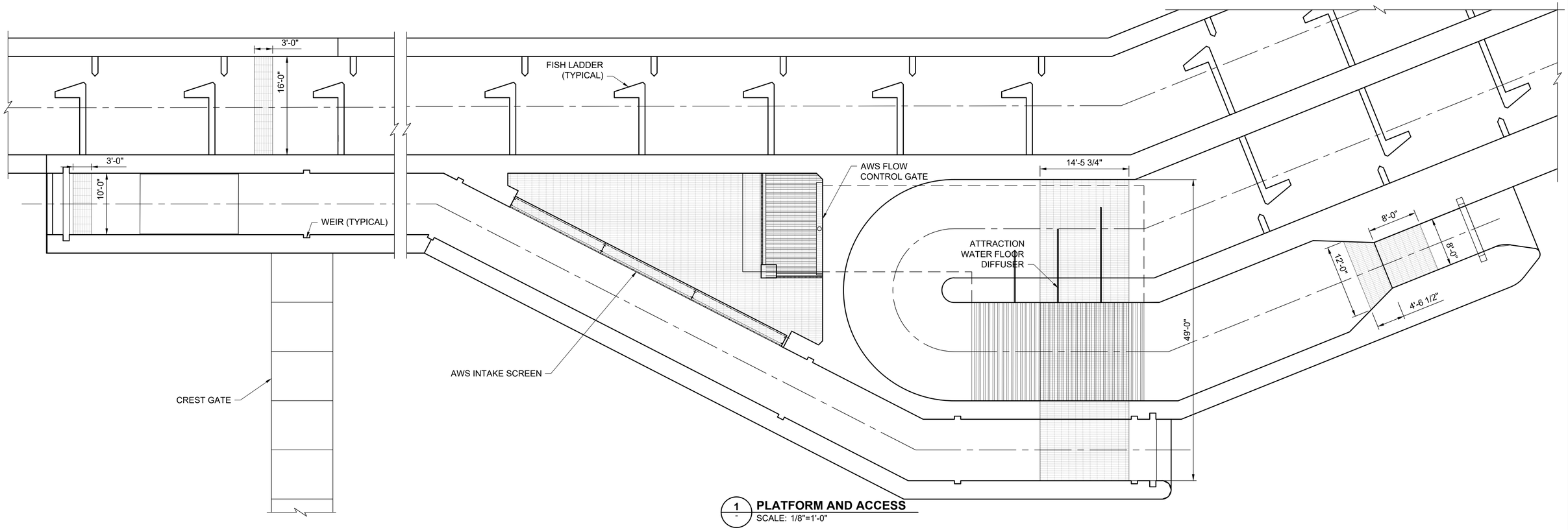
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS SECTIONS AND DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	40 OF 53
DRAWING:	S-118

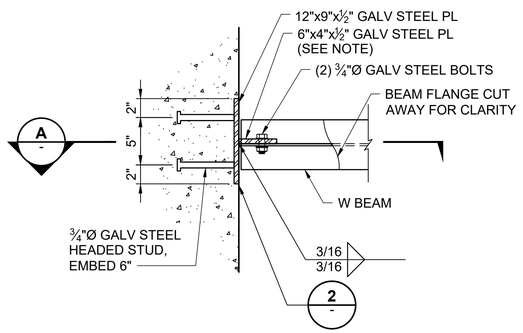
DWG: S:\131009\Holden\Lockwood\900 CAD\02-SHEETS\S-118.dwg USER: MKA00889
DATE: Jul 02, 2020 4:45pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-DTLS S-LCKWD-PP IMAGES:



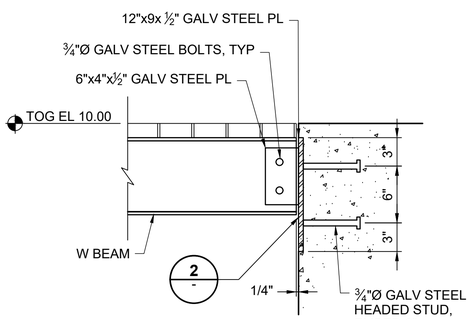
1 / - PLATFORM AND ACCESS
SCALE: 1/8"=1'-0"

NOTES:

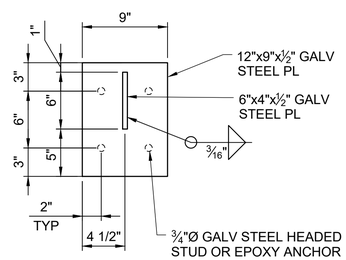
1. GALVANIZED STEEL GRATING, 1 ½"x3/16" BEARING BARS @ 1 3/16" OC. AND CROSS BARS @ 4" OC. BAND ALL EDGES OF GRATING. USE SADDLE TYPE CLIPS, MINIMUM 4 PER PANEL.
2. ALL RAILING IS SIDE MOUNTED UNLESS OTHERWISE NOTED.



1 / - CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



A / - SECTION
SCALE: 1-1/2"=1'-0"



2 / - END PLATE DETAIL
SCALE: 1-1/2"=1'-0"

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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

MISC. PLATFORMS AND ACCESS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	41 OF 53
DRAWING:	S-119

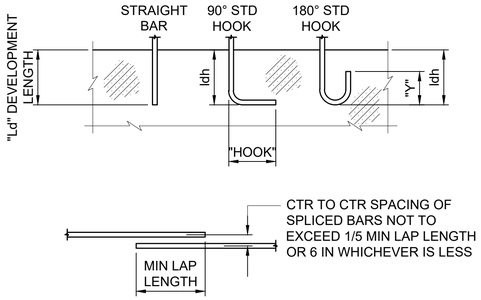
DWG: S:\13100\Hidden\Lockwood\900 CAD\02-SHEETS\SS-119.dwg USER: MKA00889
DATE: Jul 02, 2020 1:58pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-PLN IMAGES:

f'c = 4500 psi		fy = 60,000 psi		bar spacing = 6" min				
BAR SIZE	DIAMETER (d_b) (INCHES)	DEVELOPMENT LENGTH (l_d) (INCHES)		CLASS B LAP SPLICE (INCHES)		90° STD HOOK (INCHES)		180° STD HOOK "Y"
		"TOP" BARS	OTHER	"TOP" BARS	OTHER	HOOK	l_{dh}	
		REINFORCING BARS IN TENSION						
#3	0.375	12	12	16	16	6	6	4
#4	0.5	14	12	19	16	8	7	5
#5	0.625	18	14	24	19	10	8	5
#6	0.75	21	17	28	23	12	10	6
#7	0.875	31	24	41	32	14	11	7
#8	1.0	35	27	46	36	16	13	8
#9	1.128	44	34	58	45	20	15	11
#10	1.270	52	40	68	52	22	16	12
#11	1.375	62	48	81	63	24	18	13
REINFORCING BARS IN COMPRESSION								
#3	0.375	8		12		HOOKED BARS SHALL NOT BE USED IN COMPRESSION		
#4	0.5	9		15				
#5	0.625	12		19				
#6	0.75	14		23				
#7	0.875	16		27				
#8	1.0	18		30				
#9	1.125	21		34				
#10	1.270	23		38				
#11	1.375	25		42				

f'c = 4500 psi		fy = 60,000 psi		bar spacing = 2*d_b min				
BAR SIZE	DIAMETER (d_b) (INCHES)	DEVELOPMENT LENGTH (L_d) (INCHES)		CLASS B LAP SPLICE (INCHES)		90° STD HOOK (INCHES)		180° STD HOOK "Y"
		"TOP" BARS	OTHER	"TOP" BARS	OTHER	HOOK	l_{dh}	
		REINFORCING BARS IN TENSION						
#3	0.375	27	21	36	28	6	6	4
#4	0.5	35	27	46	36	8	7	5
#5	0.625	44	34	58	45	10	8	6
#6	0.75	53	41	69	54	12	10	6
#7	0.875	77	59	101	77	14	11	7
#8	1.0	88	68	115	89	16	13	8
#9	1.128	98	76	128	99	20	15	11
#10	1.270	108	83	141	108	22	16	12
#11	1.375	147	113	192	147	24	18	13
REINFORCING BARS IN COMPRESSION								
#3	0.375	8		12		HOOKED BARS SHALL NOT BE USED IN COMPRESSION		
#4	0.5	9		15				
#5	0.625	12		19				
#6	0.75	14		23				
#7	0.875	16		27				
#8	1.0	18		30				
#9	1.125	21		34				
#10	1.270	23		38				
#11	1.375	25		42				

NOTES:

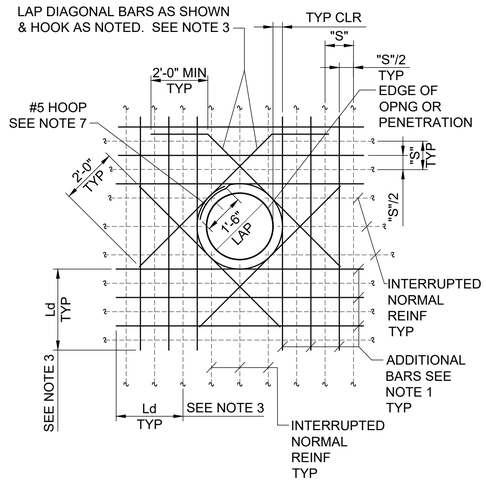
1. "TOP" BARS SHALL BE HORIZONTAL REINFORCEMENT PLACED SO THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE DEVELOPMENT LENGTH OR SPLICE.
2. ALL LAP SPLICES SHALL BE CLASS B UNLESS NOTED OTHERWISE.
3. SPLICES ARE TO BE MADE SO THAT THE GIVEN DISTANCES TO FACE OF CONCRETE WILL BE MAINTAINED.

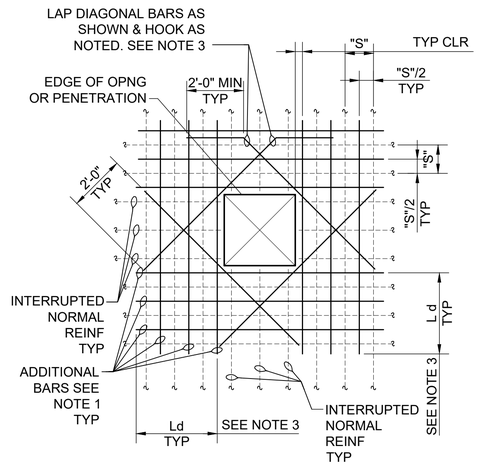


1 - STANDARD HOOK AND REINF LAP SPLICE
SCALE: NTS

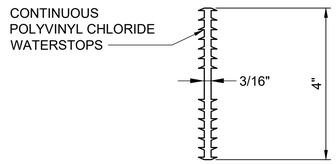
NOTES:

1. NUMBER OF ADD'L REINF BARS AT EA SIDE OF OPNG SHALL EQUAL HALF THE NUMBER OF INTERRUPTED BARS IN EACH LAYER OF REINF, 2 MIN.
2. SIZE OF ADD'L REINF BARS TO EQUAL SIZE OF INTERRUPTED REINF BARS.
3. PROVIDE STD HOOKS FOR BARS IF LAP LENGTH EXTENSION CANNOT BE OBTAINED AT JOINTS OR OTHER OBSTRUCTIONS. PLACE ADDITIONAL BARS IN SAME PLANES AS INTERRUPTED REINF.
4. SIZE OF DIAGONAL BARS SHALL BE THE SIZE OF THE LARGEST NORMAL REINF BAR CUT, UON. LOCATE DIAGONALS IN EACH LAYER OF REINF.
5. PLACE DIAGONAL BARS INSIDE NORMAL REINF.
6. ALL REINF TO CLEAR OPNG OR FLANGE COLLARS BY 2".
7. PROVIDE ADD'L HOOP @ EACH LAYER OF REINF.



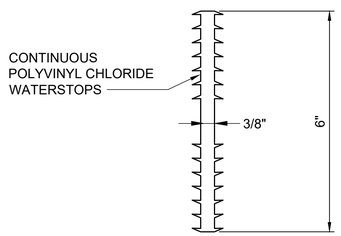


2 - ADDITIONAL REINF BAR DETAILS
SCALE: NTS



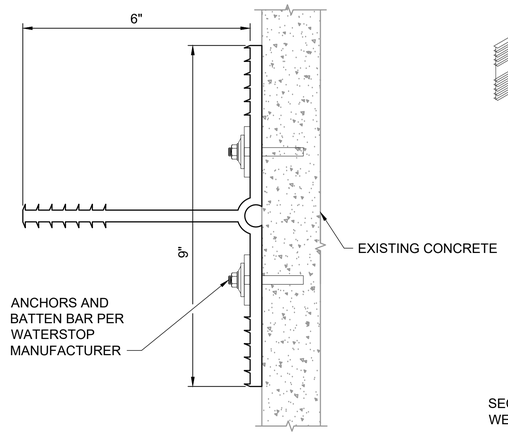
SEE JT NOTES & SPECIFICATIONS FOR REQD LOCATIONS

4" PVC FLAT WATERSTOP



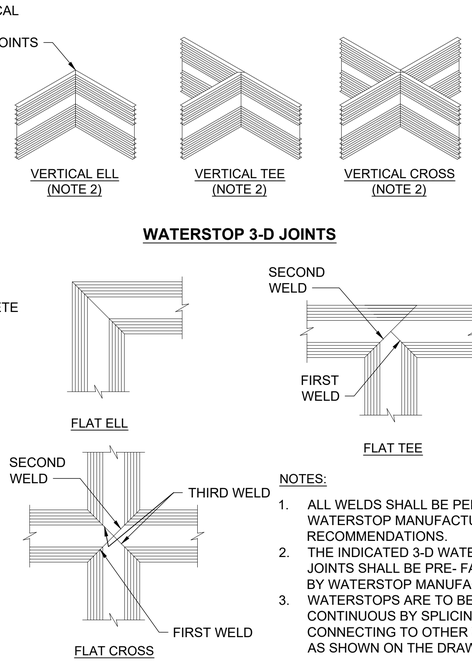
SEE JT NOTES & SPECIFICATIONS FOR REQD LOCATIONS

6" PVC FLAT WATERSTOP



SEE JT NOTES & SPECIFICATIONS FOR REQD LOCATIONS

6" PVC CENTER BULB RETROFIT WATERSTOP

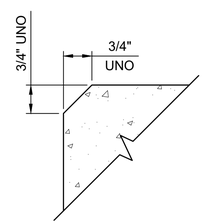


NOTES:

1. ALL WELDS SHALL BE PER WATERSTOP MANUFACTURER'S RECOMMENDATIONS.
2. THE INDICATED 3-D WATERSTOP JOINTS SHALL BE PRE- FABRICATED BY WATERSTOP MANUFACTURER.
3. WATERSTOPS ARE TO BE MADE CONTINUOUS BY SPLICING AND CONNECTING TO OTHER WATERSTOPS AS SHOWN ON THE DRAWINGS.

WATERSTOP SPLICE DETAILS

3 - PVC WATERSTOPS
SCALE: NTS



4 - CHAMFER DETAIL
SCALE: NTS

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TEL: (508) 829-6000 www.aldenlab.com

30% DESIGN
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DATE: 07/03/2020

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
7/3/2020	CONCEPTUAL DESIGN SUBMITTAL	M. GRAESER

VERIFY SCALE
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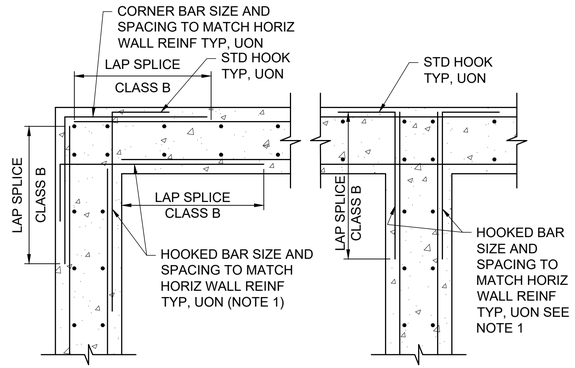
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

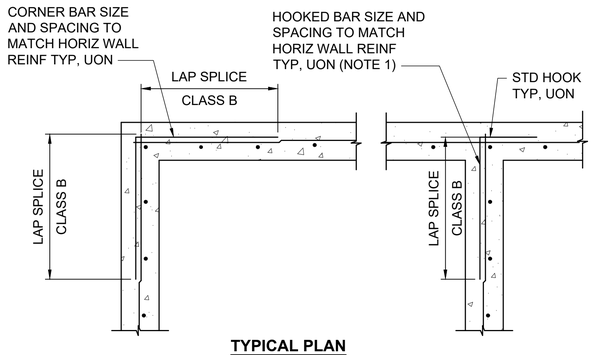
STRUCTURAL STANDARD DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	42 OF 53
DRAWING:	S-201

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\S\S-201.dwg USER: MKA00889
DATE: Jul 02, 2020 8:25pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



TYPICAL PLAN
REINFORCING EACH FACE

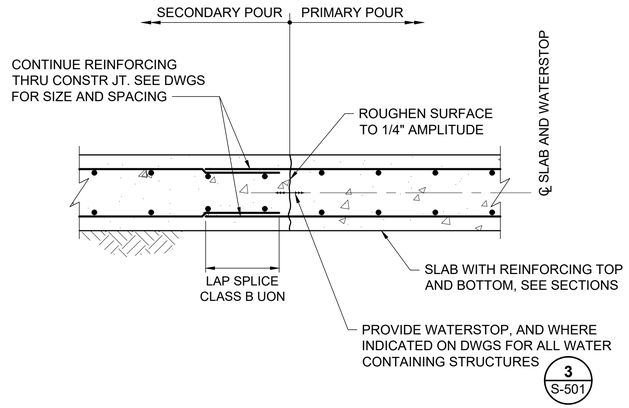


TYPICAL PLAN
SINGLE LAYER REINFORCING

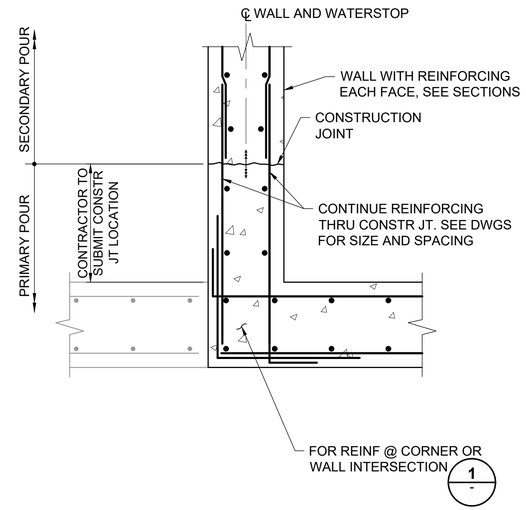
NOTE:

IN LIEU OF SEPARATE HOOKED BAR, CONTRACTOR OPTION TO USE HORIZ REINF WITH STD HOOK EA END.

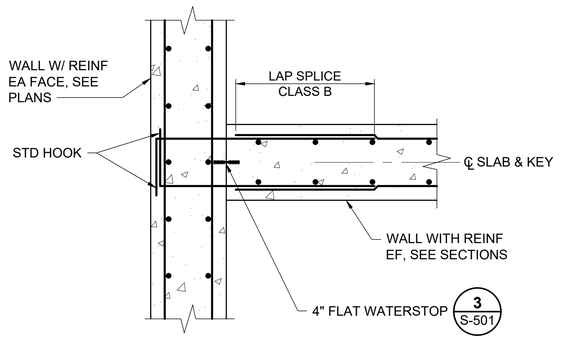
1 / - **WALL INTERSECTION / CORNER REINF**
SCALE: NTS



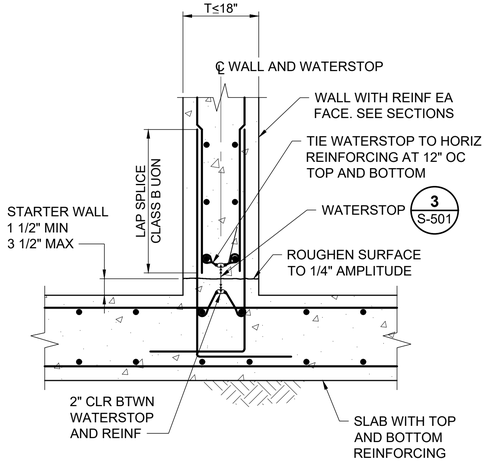
2 / - **CONSTRUCTION JOINT (CJ)**
SCALE: NTS



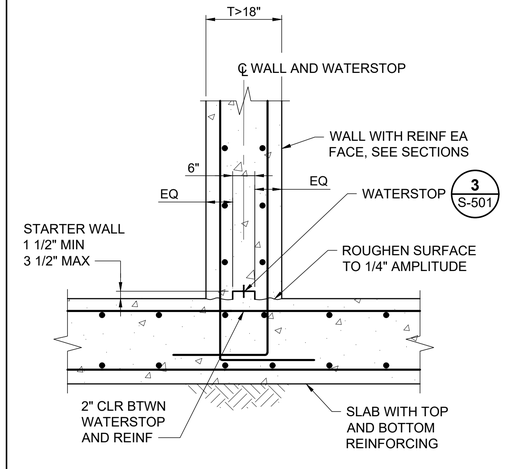
3 / - **CONSTRUCTION JOINT-WALL TO WALL**
SCALE: NTS



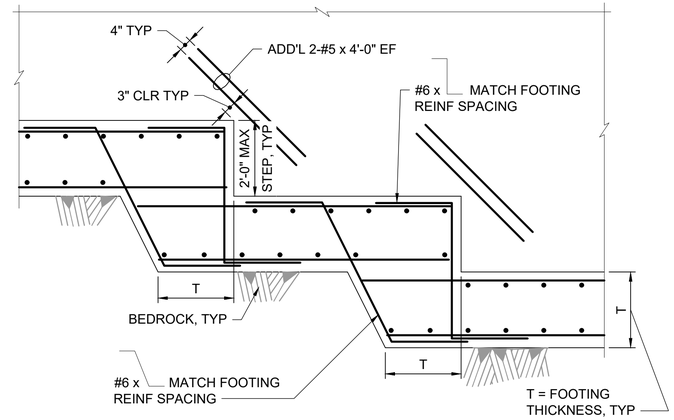
4 / - **CONSTRUCTION JOINT-WALL TO WALL**
SCALE: NTS



5 / - **CONSTRUCTION JOINT-WALL TO SLAB (T<18")**
SCALE: NTS



6 / - **CONSTRUCTION JOINT WALL TO SLAB (T>18")**
SCALE: NTS



7 / - **STEPPED FOOTING**
SCALE: 1/2"=1'-0"

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BAR IS ONE INCH ON ORIGINAL DRAWING
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LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL STANDARD DETAILS

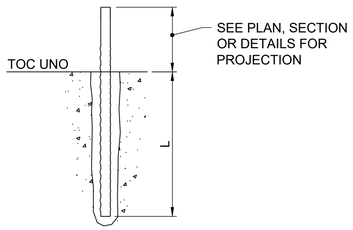
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	43 OF 53
DRAWING:	S-202

DWG: S:\131909\Holden\Lockwood\900 CAD\02-SHEETS\S\S-202.dwg USER: MKA00889
DATE: Jul 02, 2020 8:26pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT IMAGES:

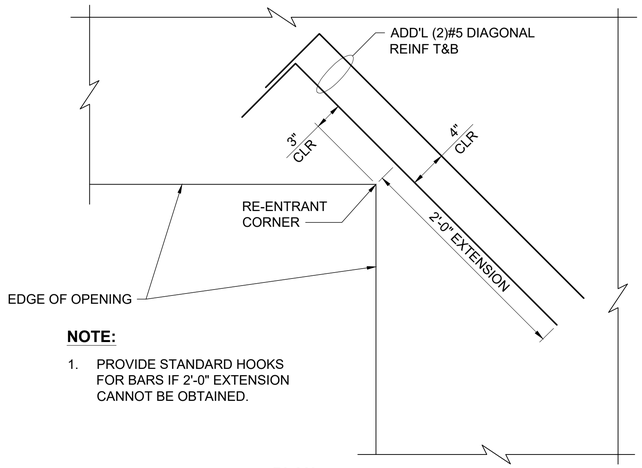
NOTES:

1. DOWEL EDGE DISTANCE SHALL BE A MINIMUM OF 1.5 X L, UNO ON THE DRAWINGS. SMALLER EDGE DISTANCES SHALL BE APPROVED BY THE ENGINEER OF RECORD.
2. MINIMUM CENTER TO CENTER SPACING OF DOWELS SHALL BE 3 X L, UNO ON THE DRAWINGS. SMALLER BOLT SPACINGS SHALL BE APPROVED BY THE ENGINEER OF RECORD.
3. HOLES SHALL BE DRILLED USING A HAMMER DRILL AND CARBIDE BIT, OR EQUAL.
4. REINFORCEMENT SHALL BE ASTM A615 GRADE 60.

BAR SIZE	"L" MIN (IN)
4	6
5	8
6	10
7	13.5
8	16
9	18.5
10	21



1 - **REBAR ADHESIVE ANCHOR DEAIL**
SCALE: NTS



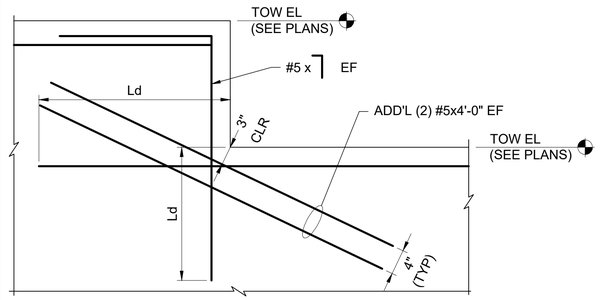
NOTE:

1. PROVIDE STANDARD HOOKS FOR BARS IF 2'-0" EXTENSION CANNOT BE OBTAINED.

PLAN

2 - **RE-ENTRANT CORNER DETAIL**
SCALE: 1-1/2"=1'-0"

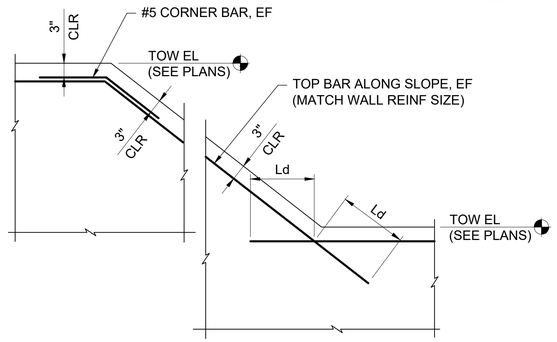
NOTE:
Ld SHALL BE DEVELOPMENT LENGTH PER DETAIL 1/S-501



ELEVATION

3 - **STEP IN TOP OF WALL DETAIL**
SCALE: 1"=1'-0"

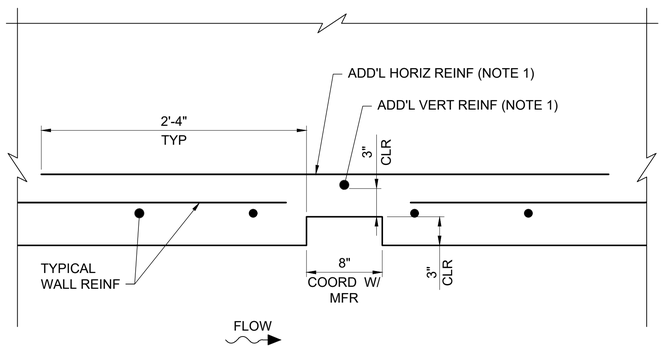
NOTE:
Ld SHALL BE DEVELOPMENT LENGTH PER DETAIL 1/S-501



ELEVATION

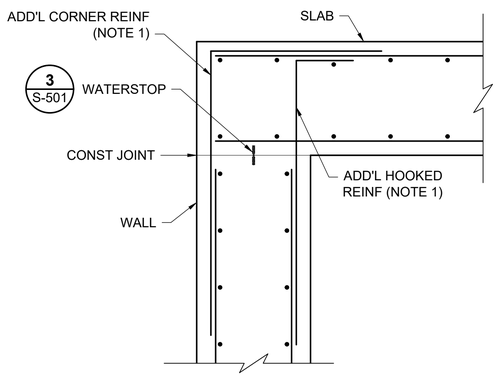
4 - **SLOPING TOP OF WALL DETAIL**
SCALE: 1/4"=1'-0"

NOTE:
1. ADD'L REINF SIZE AND SPACING SHALL MATCH WALL REINF.



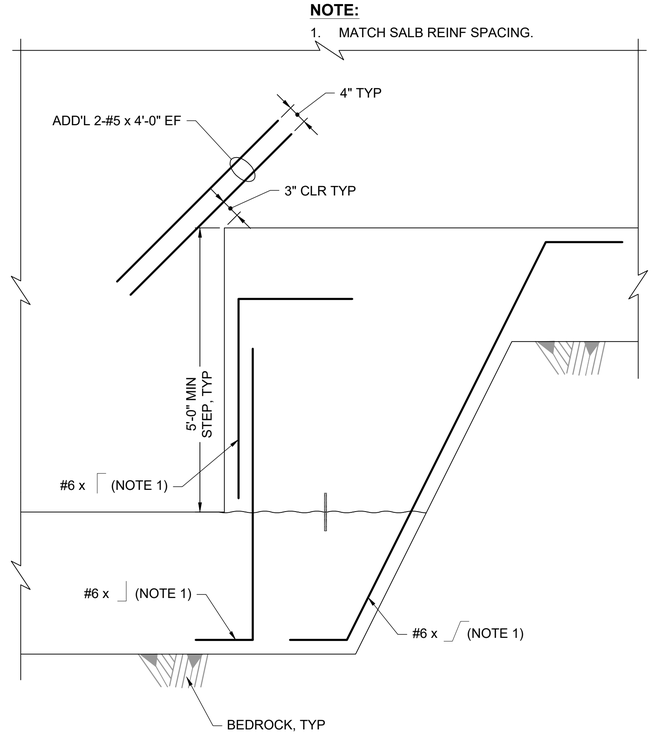
5 - **BULKHEAD/STOPLOG SLOT DETAIL**
SCALE: 1-1/2"=1'-0"

NOTE:
1. ADD'L REINF SIZE & SPACING SHALL MATCH WALL REINF.



6 - **TOP SLAB TO WALL DETAIL**
SCALE: NTS

NOTE:
1. MATCH SALB REINF SPACING.



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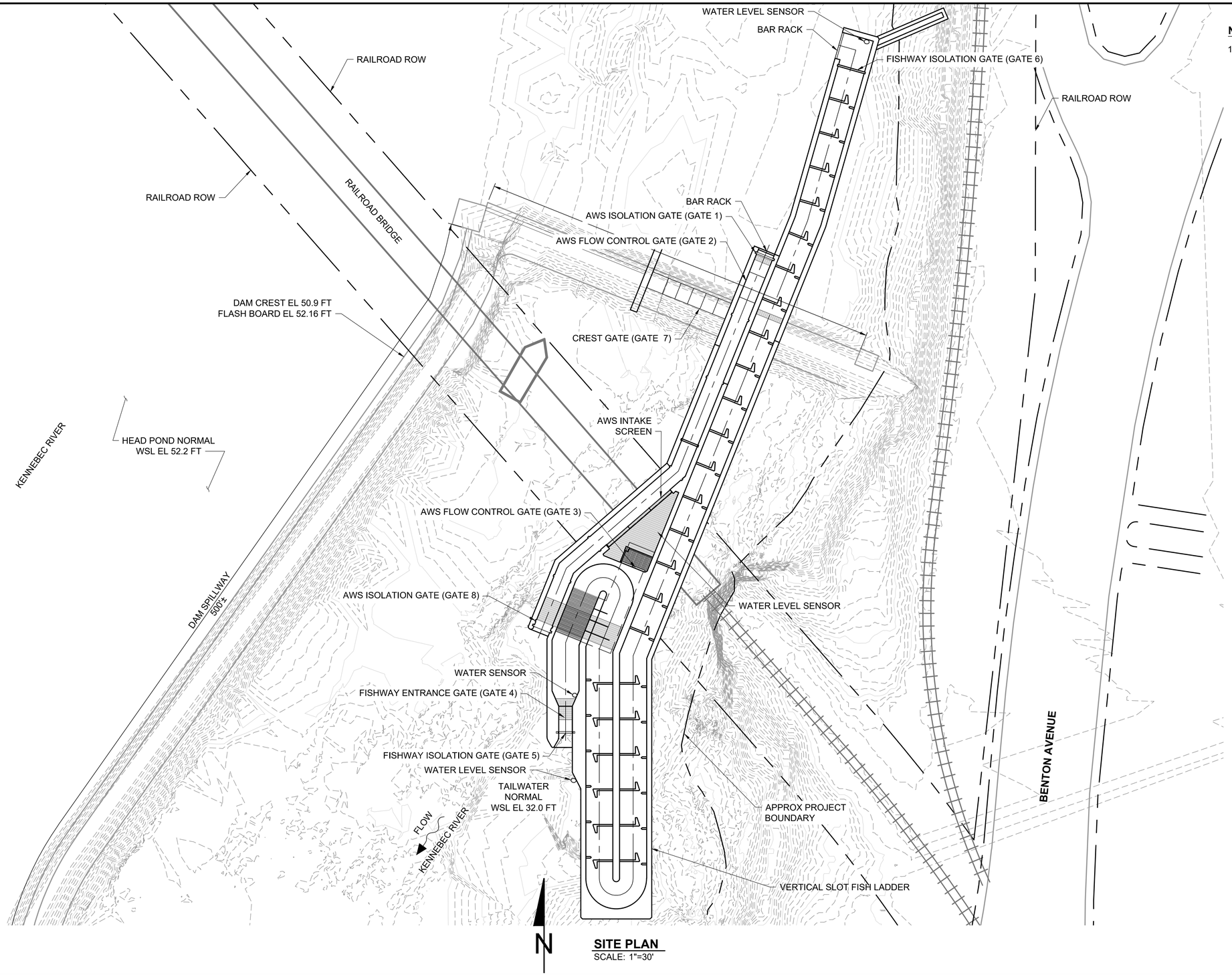
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

STRUCTURAL STANDARD DETAILS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	44 OF 53
DRAWING:	S-203

DWG: S:\13100\Holden\Lockwood\900 CAD\02-SHEETS\S-203.dwg USER: MKA00889
DATE: Jul 02, 2020 8:26pm XREFS: G-LCKWD-BD G-LCKWD-SUBMIT IMAGES:



SITE PLAN
SCALE: 1"=30'

NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

DWG S:\131009Holden\Lockwood\900 CAD\02-SHEETS\MM-100.dwg USER: MKA00889
DATE Jul 02, 2020 2:55pm XREFS G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-SV IMAGES: 713-27-0007.tif Mosaic-2-part0x0.jpg Overview Google Earth Map.jpg

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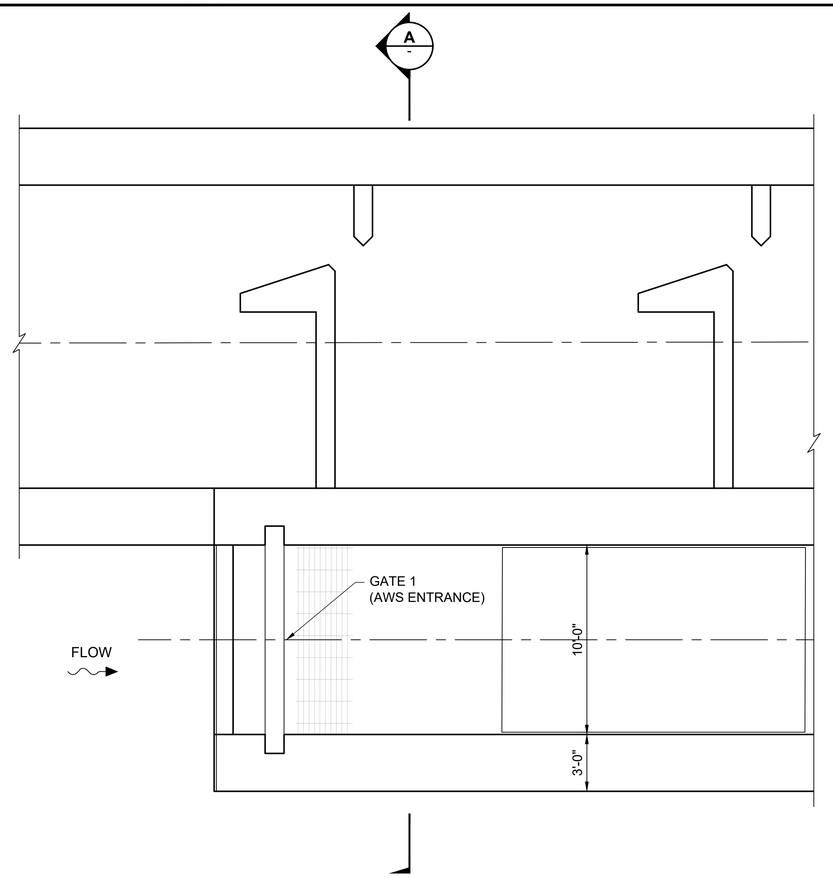
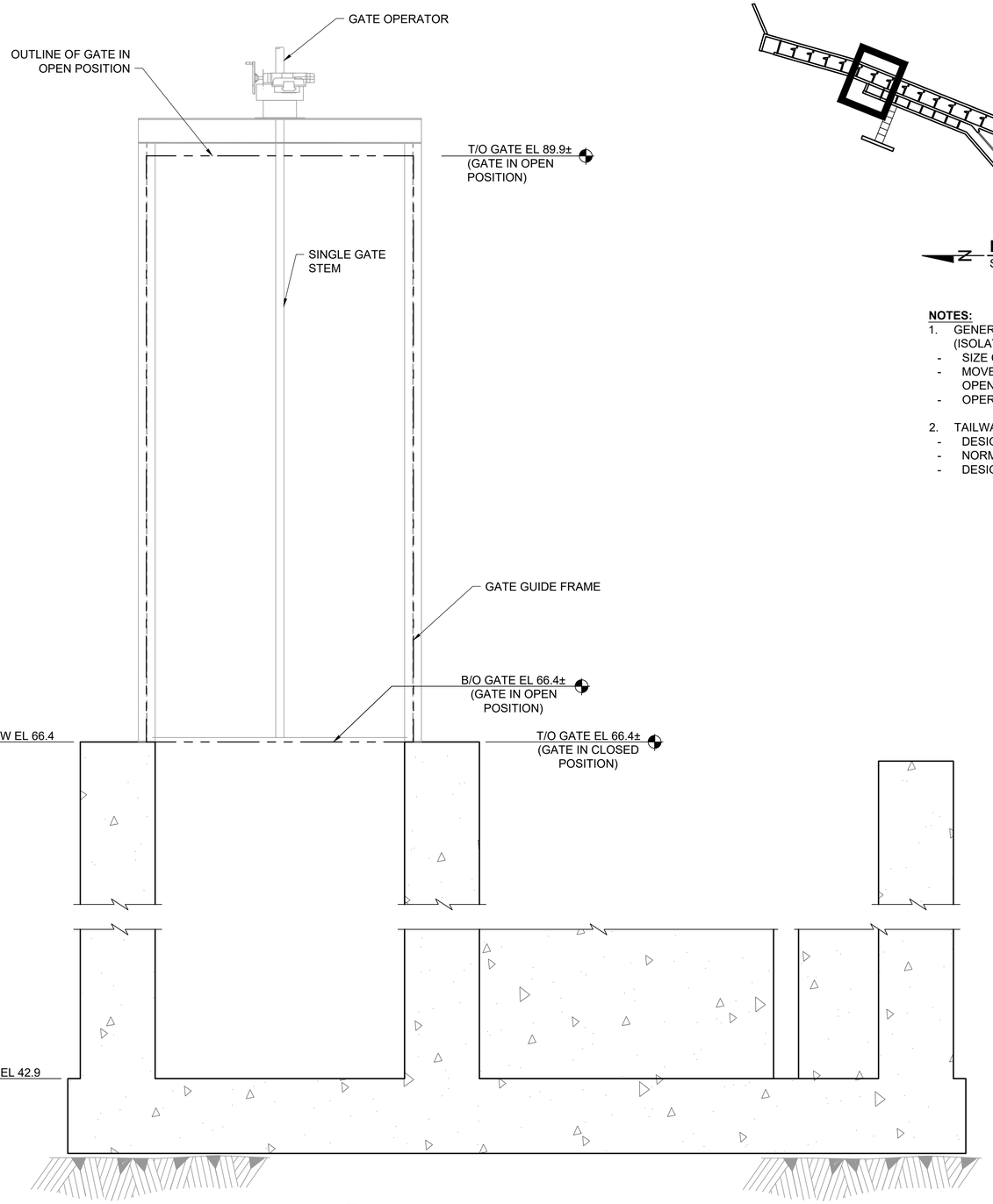
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

GENERAL MECHANICAL LAYOUT

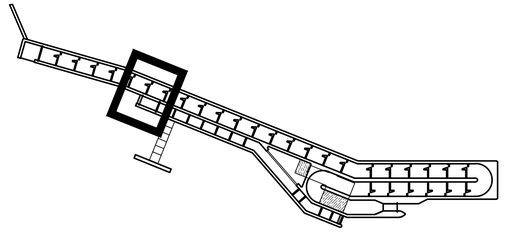
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	45 OF 53
DRAWING:	M-100



1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



A - **ELEVATION GATE 1 (AWS ENTRANCE)**
SCALE: 3/8"=1'-0"



N **KEY MAP**
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 1 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, 10'W x 23.5'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW XXX
   - NORMAL XXX
   - DESIGN HIGH XXX

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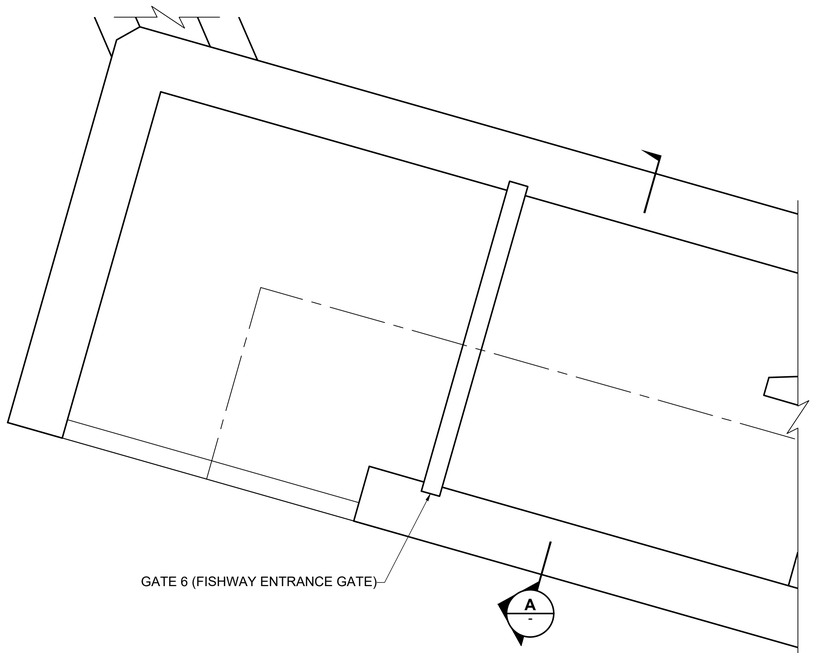
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS ISOLATION GATE (GATE 1) REQUIREMENTS

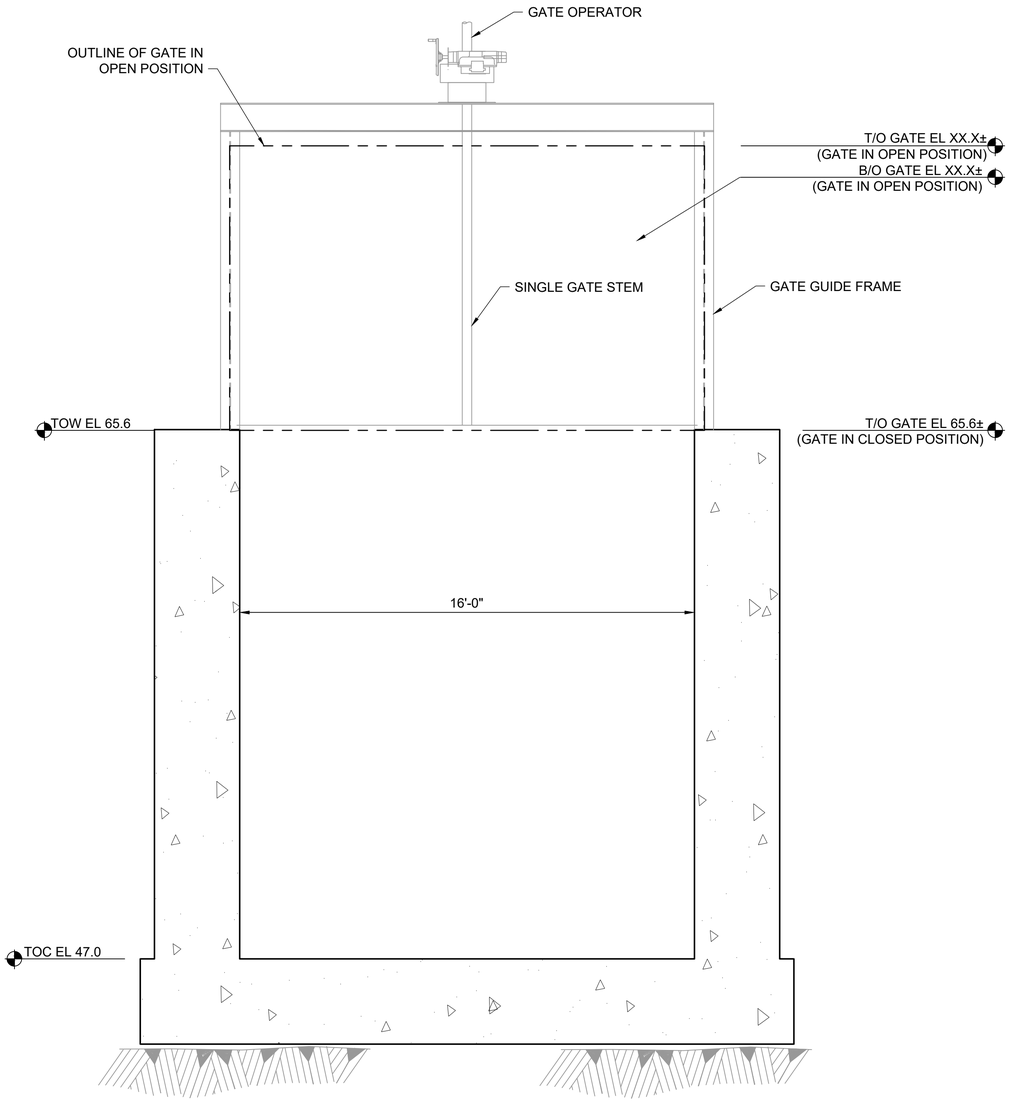
PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	46 OF 53
DRAWING:	M-101

DWG: S:\13100\Holden\Lockwood\600 CAD\02-SHEETS\MM-101.dwg USER: JMG01318
DATE: Jul 02, 2020 11:46am XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-PLN IMAGES:

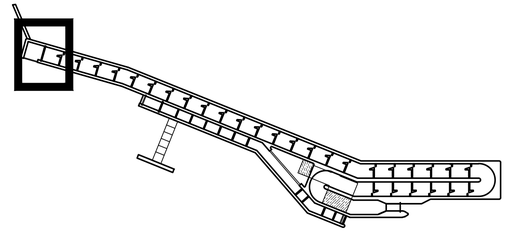


N

1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



A - **ELEVATION GATE 6 (FISHWAY ENTRANCE)**
SCALE: 3/8"=1'-0"



N

KEY MAP
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 6 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, XXX'W x XXX'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW XXX
   - NORMAL XXX
   - DESIGN HIGH XXX

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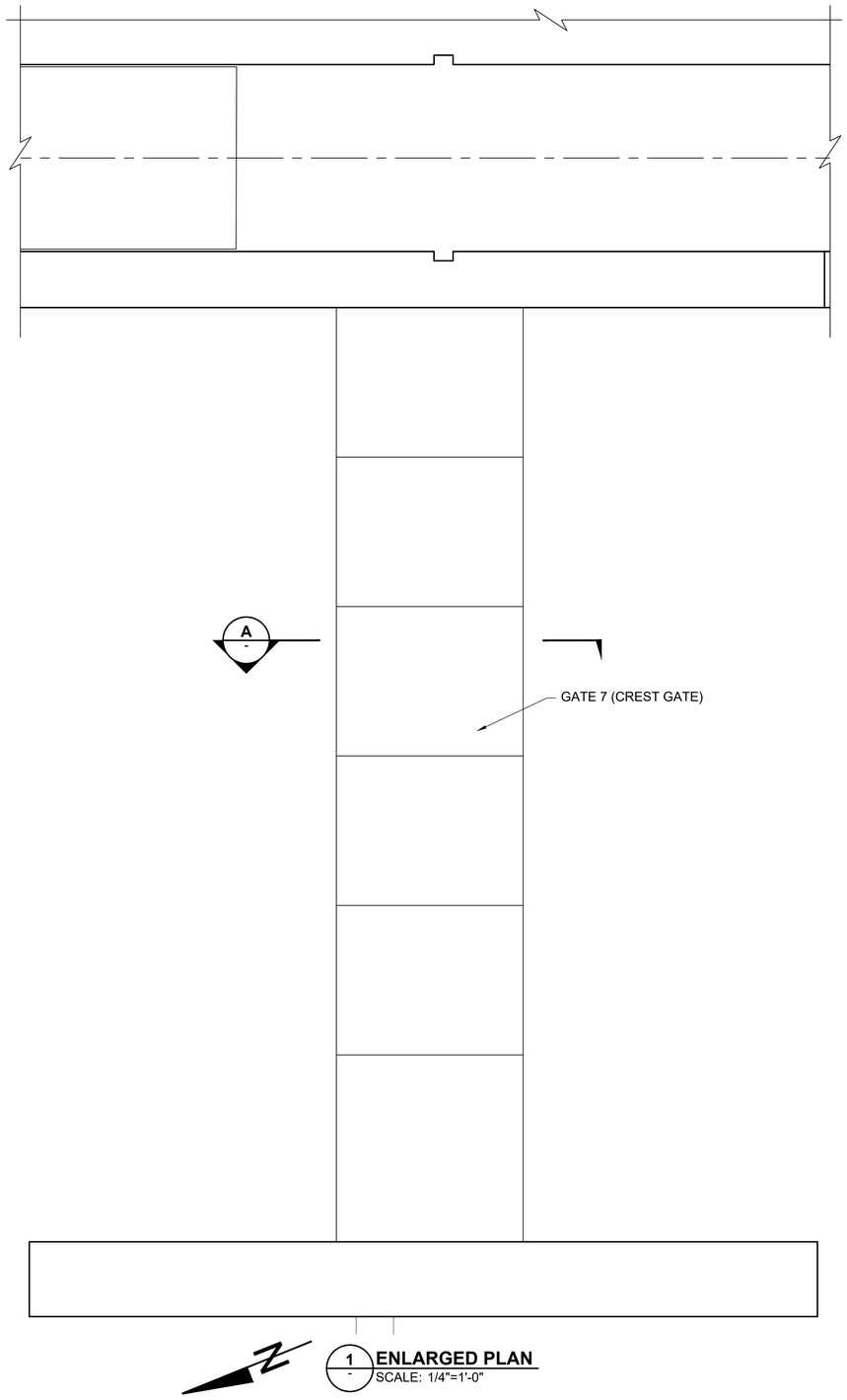
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

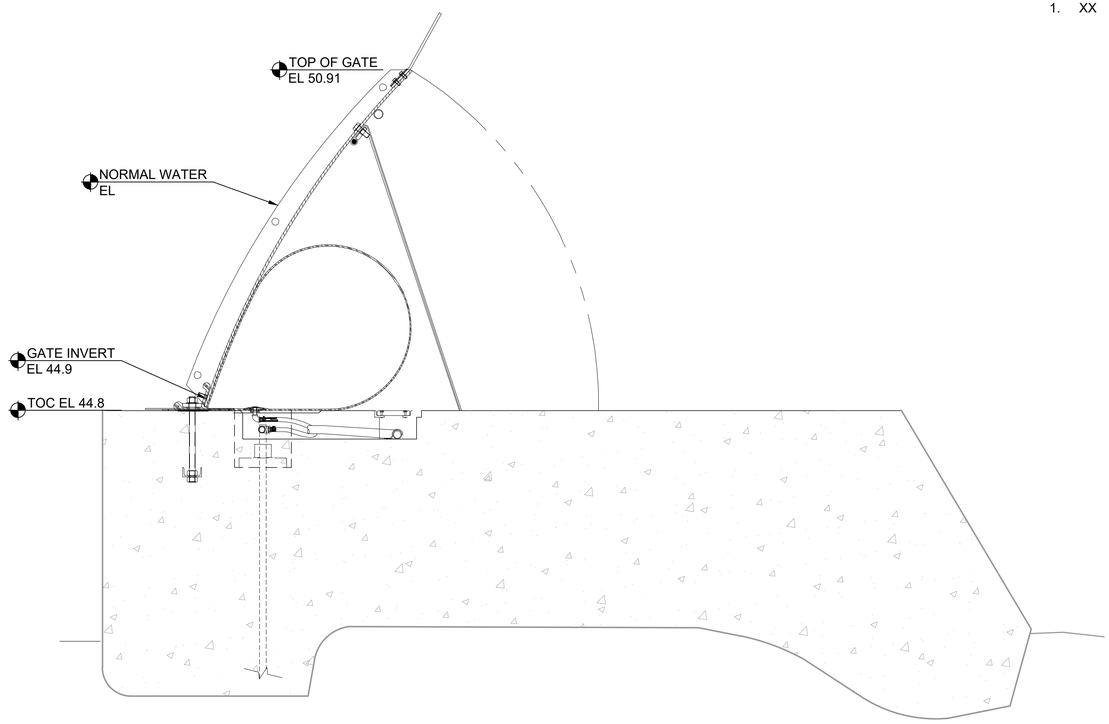
FISHWAY ISOLATION GATE (GATE 6) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	51 OF 53
DRAWING:	M-106

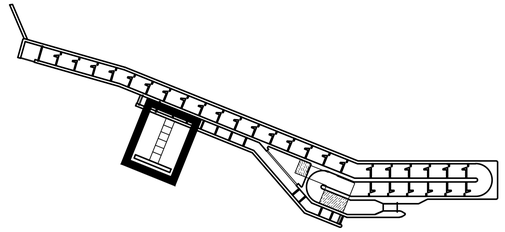
DWG: S:\13\1009\Holden\Lockwood\900 CAD\02-SHEETS\M\M-106.dwg USER: IMG01318
DATE: Jul 02, 2020 9:58am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-SEC IMAGES:



1 - **ENLARGED PLAN**
SCALE: 1/4"=1'-0"



A - **ELEVATION GATE 7 (SPILLWAY)**
SCALE: 3/4"=1'-0"



N **KEY MAP**
SCALE: NTS

NOTES:

1. XX

DWG: S:\131009Holden\Lockwood\900 CAD\02-SHEETS\M1A-107.dwg USER: MKA00889
DATE: Jul 02, 2020 3:14pm XREFS: G-LCKWD-BD G-LCKWD-SUBMT S-LCKWD-SEC S-LCKWD-PLN IMAGES:

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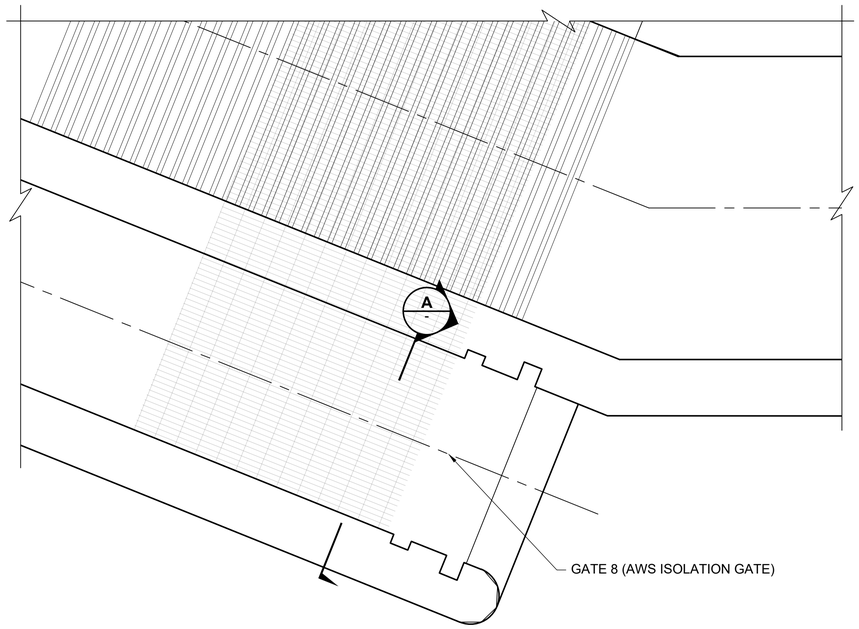
LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

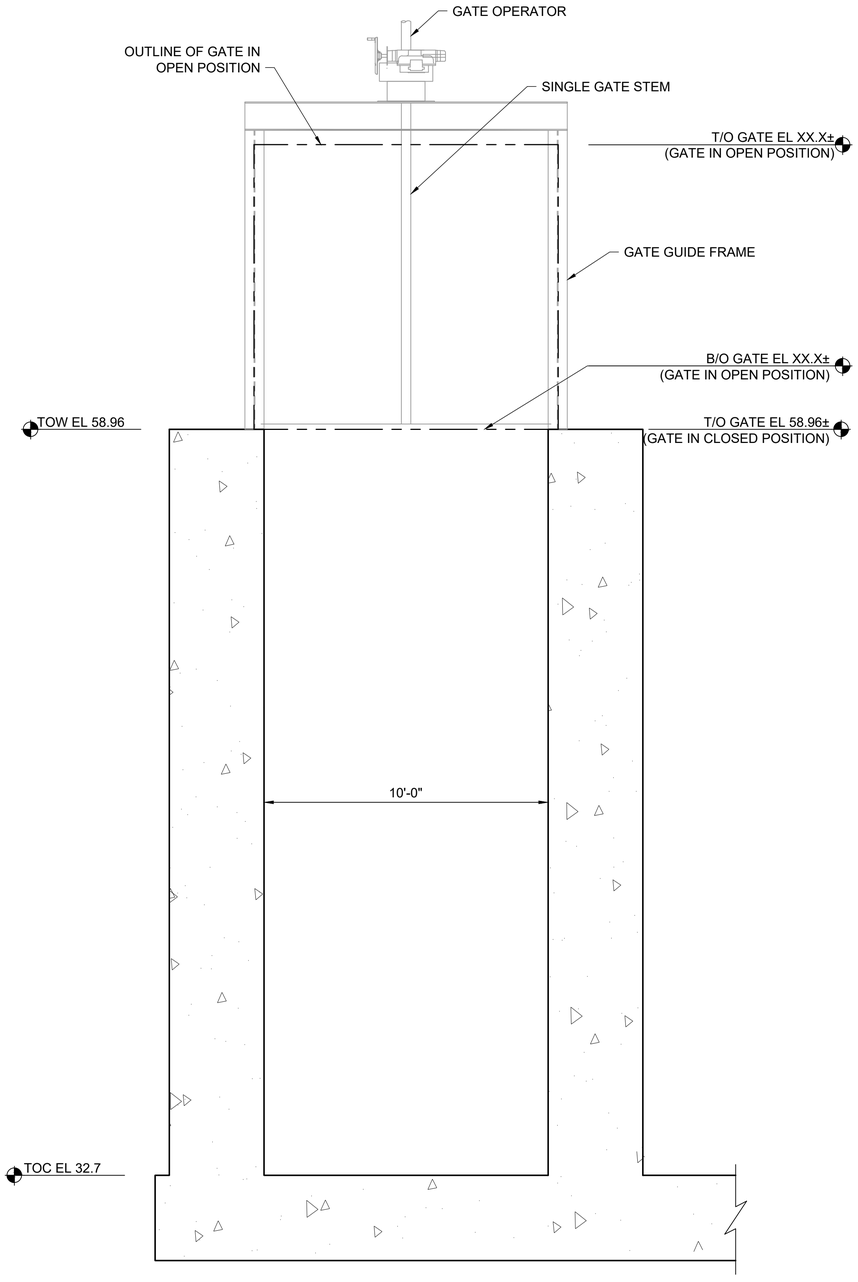
CREST GATE (GATE 7)
REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	52 OF 53
DRAWING:	M-107

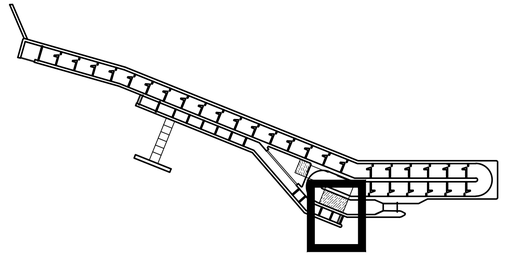


N

1
-
ENLARGED PLAN
SCALE: 1/4"=1'-0"



A
-
ELEVATION GATE 8 (AWS EXIT)
SCALE: 3/8"=1'-0"



N

KEY MAP
SCALE: NTS

NOTES:

1. GENERAL OVERVIEW OF GATE 8 (ISOLATION GATE) IS PROVIDED:
   - SIZE OF OPENING, XXX'W x XXX'H
   - MOVEMENT OF GATE. UPWARD OPENING.
   - OPERATION OF GATE: OPEN / CLOSE
2. TAILWATER ELEVATIONS:
   - DESIGN LOW XXX
   - NORMAL XXX
   - DESIGN HIGH XXX

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FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

AWS ISOLATION GATE (GATE 8) REQUIREMENTS

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	M. GRAESER
APPROVED BY:	M. GRAESER
SHEET:	53 OF 53
DRAWING:	M-108

DWG: S:\1310099\Holden\Lockwood\900 CAD\02-SHEETS\M\M-108.dwg USER: JMG01318
DATE: Jul 02, 2020 11:41am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN S-LCKWD-SEC IMAGES:

October 26, 2020

VIA USPS – PRIORITY MAIL

Penobscot Indian Nation
Indian Island Reservation
Attn: Mr. Chris Sockalexis, THPO
12 Wabanaki Way
Indian Island, ME 04468

Re: Lockwood Hydroelectric Project (FERC No. 2574)
Project Review – Upstream Fish Passage Facility

Dear Mr. Sockalexis:

On behalf of Merimil Limited Partnership, a subsidiary of Brookfield Renewable Energy (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates herein files with the Tribes, Project Notification and Information for Project Review for the construction of an upstream fish passage facility at the Project on the east side of the Kennebec River. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine (see location map in Attachment A).

Project Background

The Lockwood Project is operated in a run-of-river mode and consists of an 875-foot-long by 17-foot-high dam with two spillway sections equipped with 1.25-foot-high pinned flashboards and a 160-foot-long forebay headworks section; a 450-foot-long forebay canal; two powerhouses containing a total of 7 generating units with a total installed capacity of 6.915 MW; an approximately 1,300-foot-long bypass reach; and an 81.5-acre reservoir. An interim fish trap, lift, and transfer facility is located along the west side of the Kennebec River, on the east side of the Project powerhouse. The Project releases a minimum flow of 50 cubic feet per second (cfs), or inflow, whichever is less, into the bypass reach and a minimum downstream flow of 2,114 cfs, or inflow, whichever is less, downstream of the project powerhouse for protection of aquatic species.

On March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) issued a new license for the Project. The license and corresponding August 26, 2004 Water Quality Certificate (WQC) (L-20218-33-C-N) included fish passage requirements. As

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Attached please find a USGS topographic map and Project Location Map depicting the proposed project area (Attachment A), photos of the proposed area of project effect (Attachment B), and engineering drawings depicting the proposed project (Attachment

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Should you have any questions upon review, please contact me at 207.416.1218 or at Katie.Sellers@kleinschmidtgroup.com. Due to COVID-19 related work from home restrictions, please forward any project related responses via email.

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KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds
Regulatory Coordinator

KSR:TMJ
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cc: Gerry Mitchell and Kelly Maloney, Brookfield Renewable
Fatima Oswald, Kleinschmidt Associates

ATTACHMENT A

USGS TOPOGRAPHIC AND GOOGLE EARTH MAPS

FIGURE 1 LOCKWOOD UPSTREAM FISH PASSAGE PROJECT AREA - PROPOSED WORK LOCATION (TOPO MAP)

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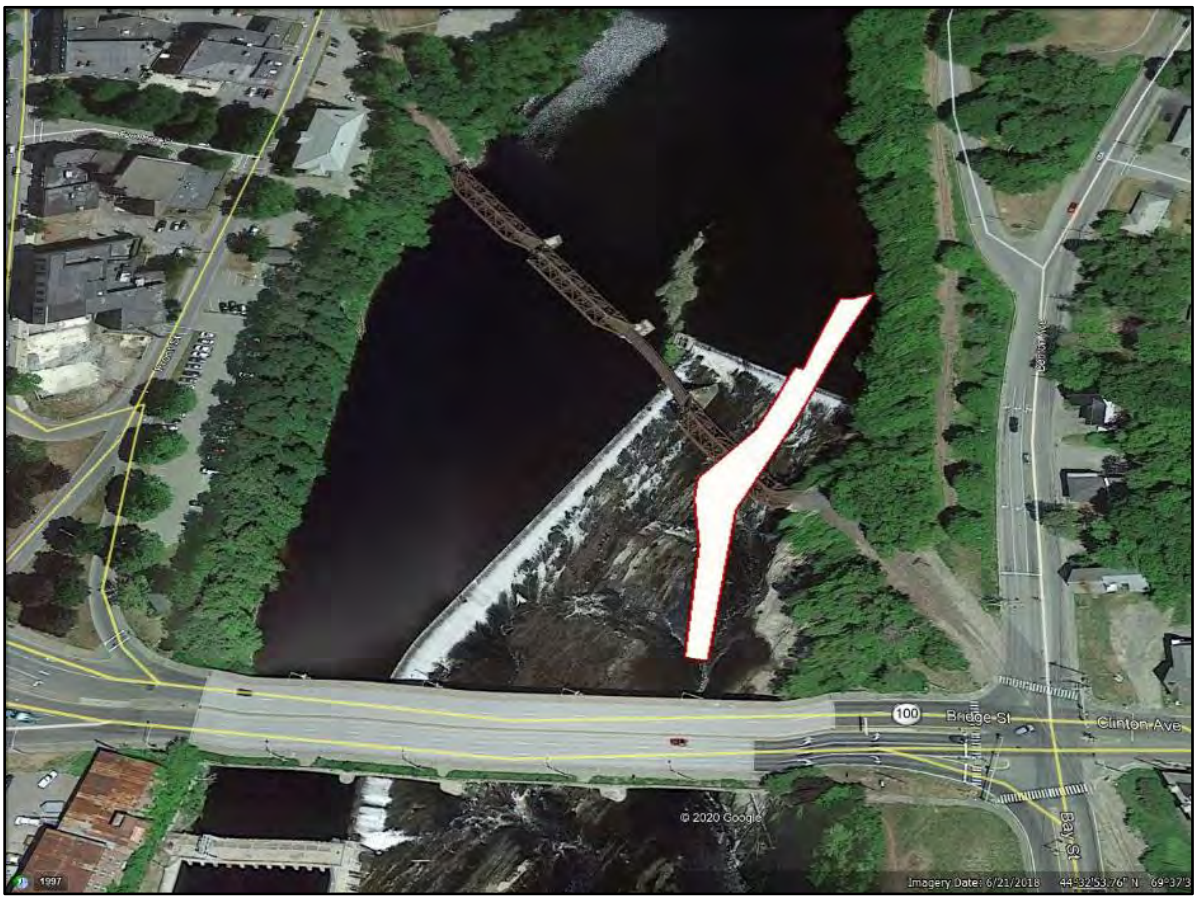
ATTACHMENT B

PHOTOS



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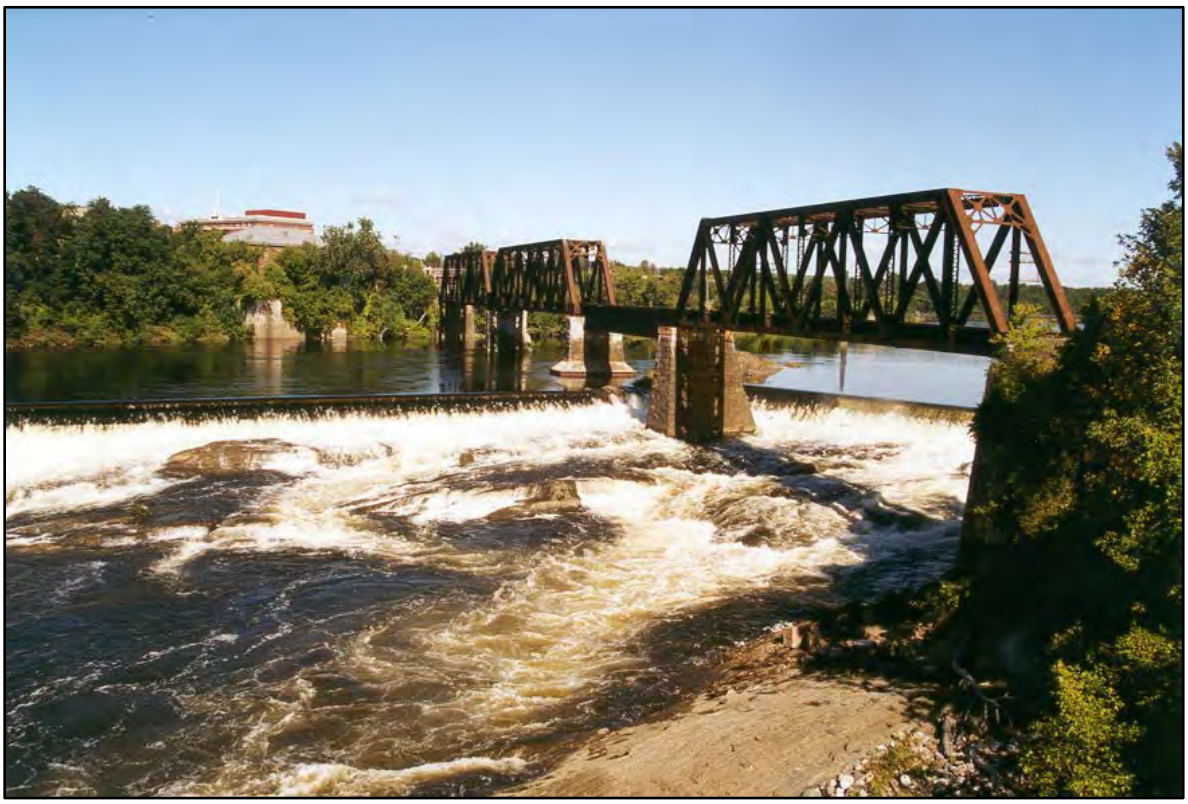

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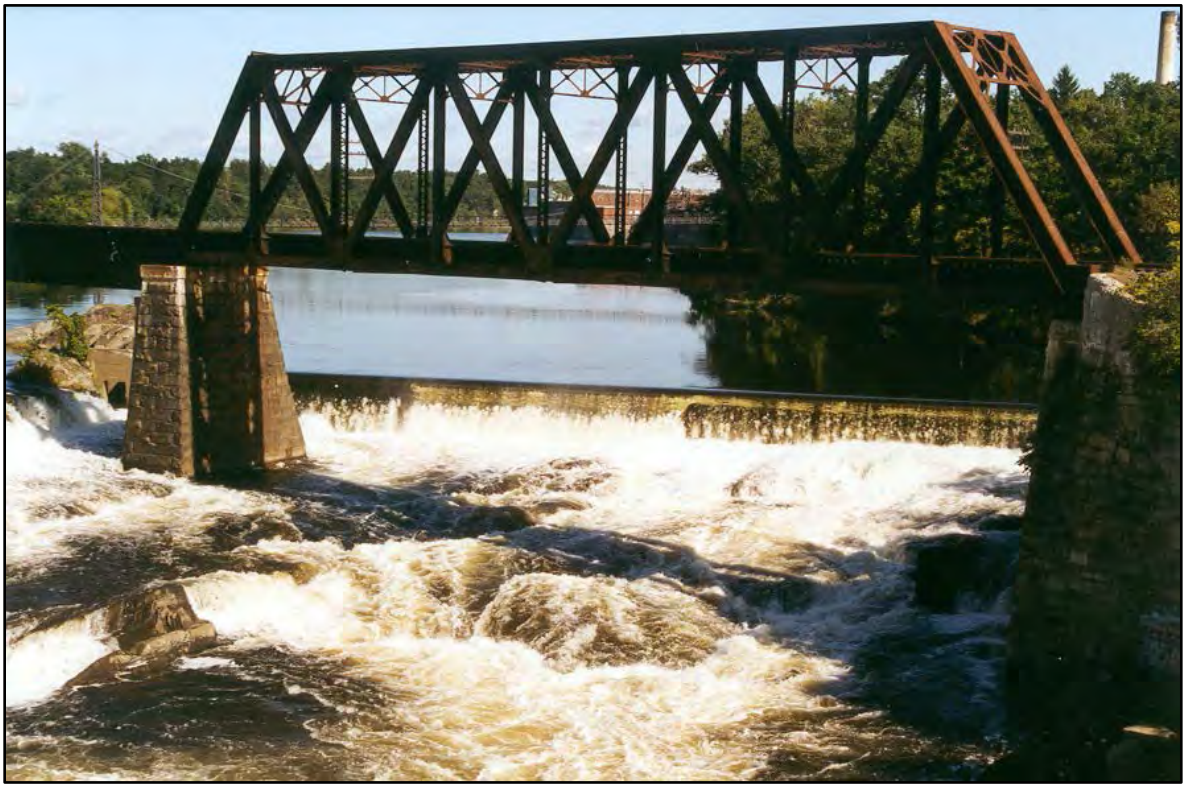

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ATTACHMENT C

ENGINEERING DRAWINGS

October 26, 2020

VIA USPS – PRIORITY MAIL

Passamaquoddy Tribe of Indians
Indian Township Reservation
Attn: Donald Soctomah, THPO
P. O. Box 301
Princeton, ME 04668

Re: Lockwood Hydroelectric Project (FERC No. 2574)
Project Review – Upstream Fish Passage Facility

Dear Mr. Soctomah:

On behalf of Merimil Limited Partnership, a subsidiary of Brookfield Renewable Energy (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates herein files with the Tribes, Project Notification and Information for Project Review for the construction of an upstream fish passage facility at the Project on the east side of the Kennebec River. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine (see location map in Attachment A).

Project Background

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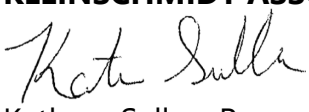

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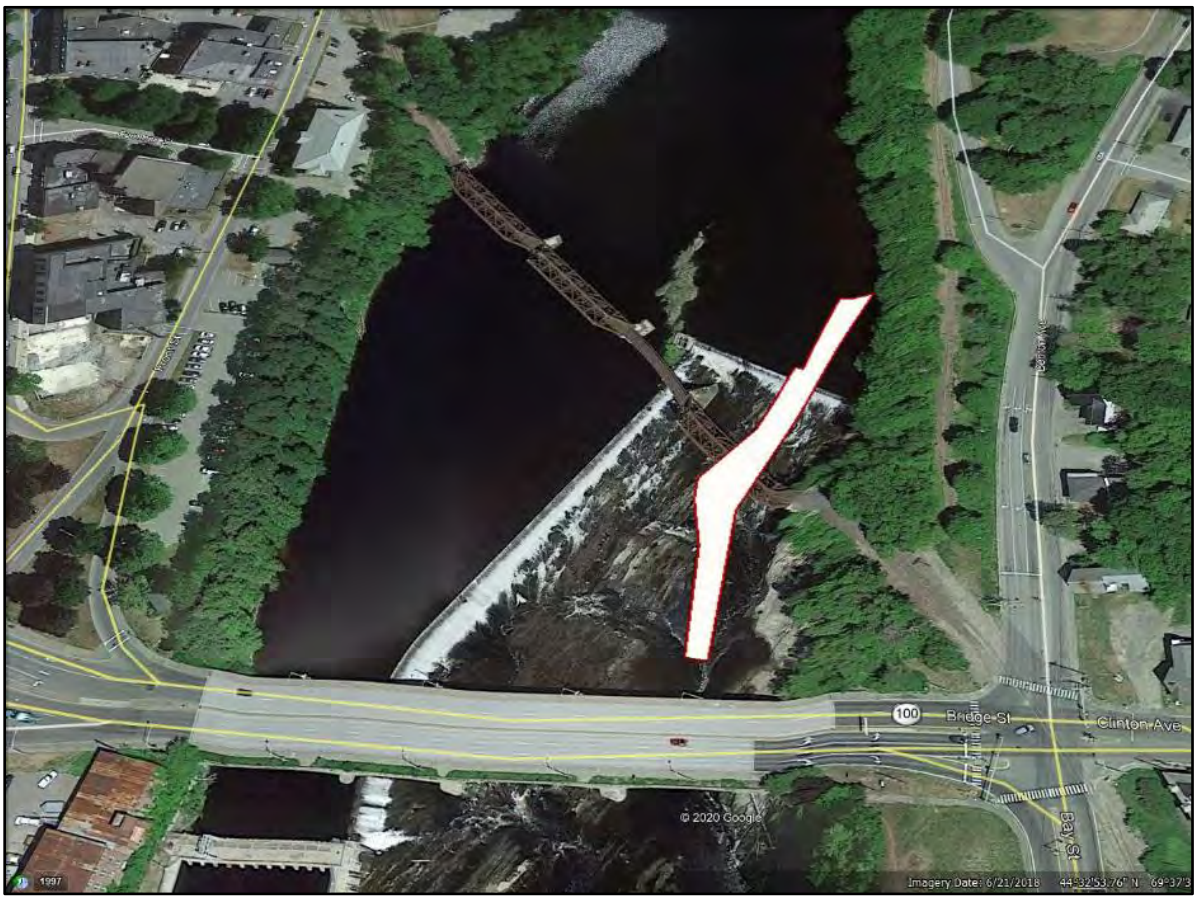

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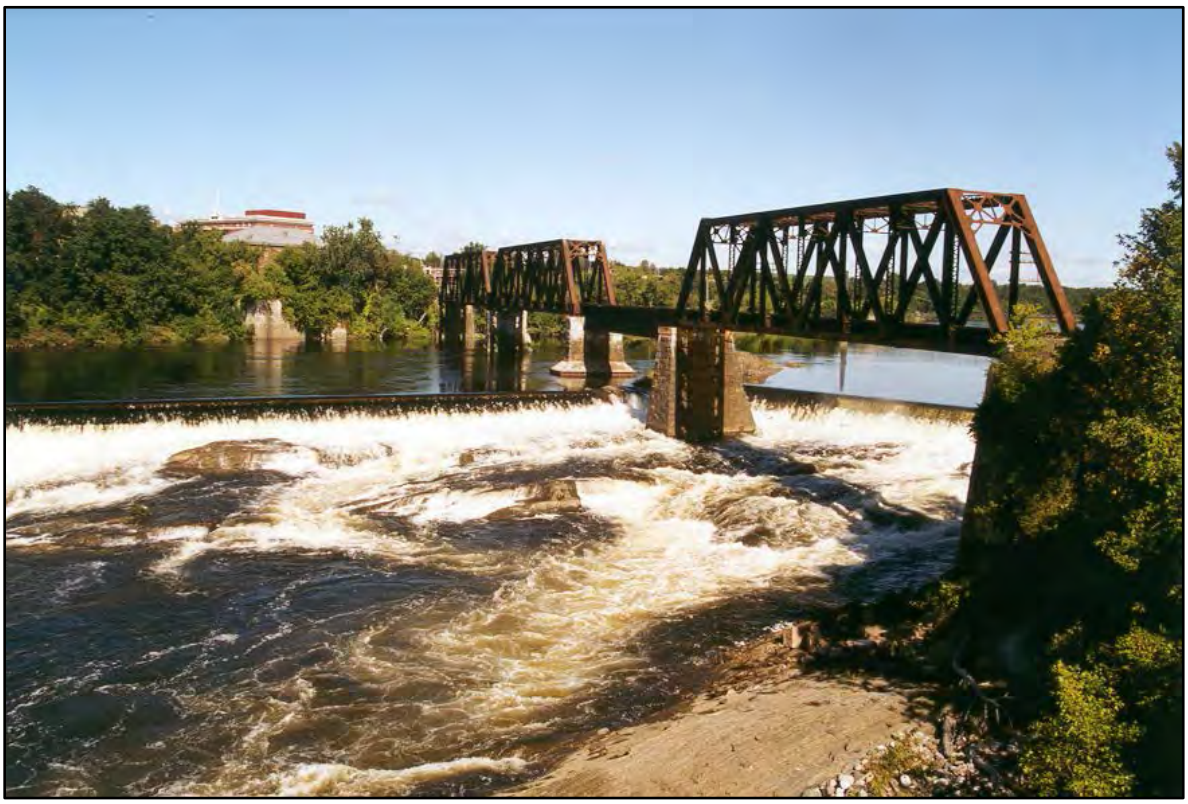

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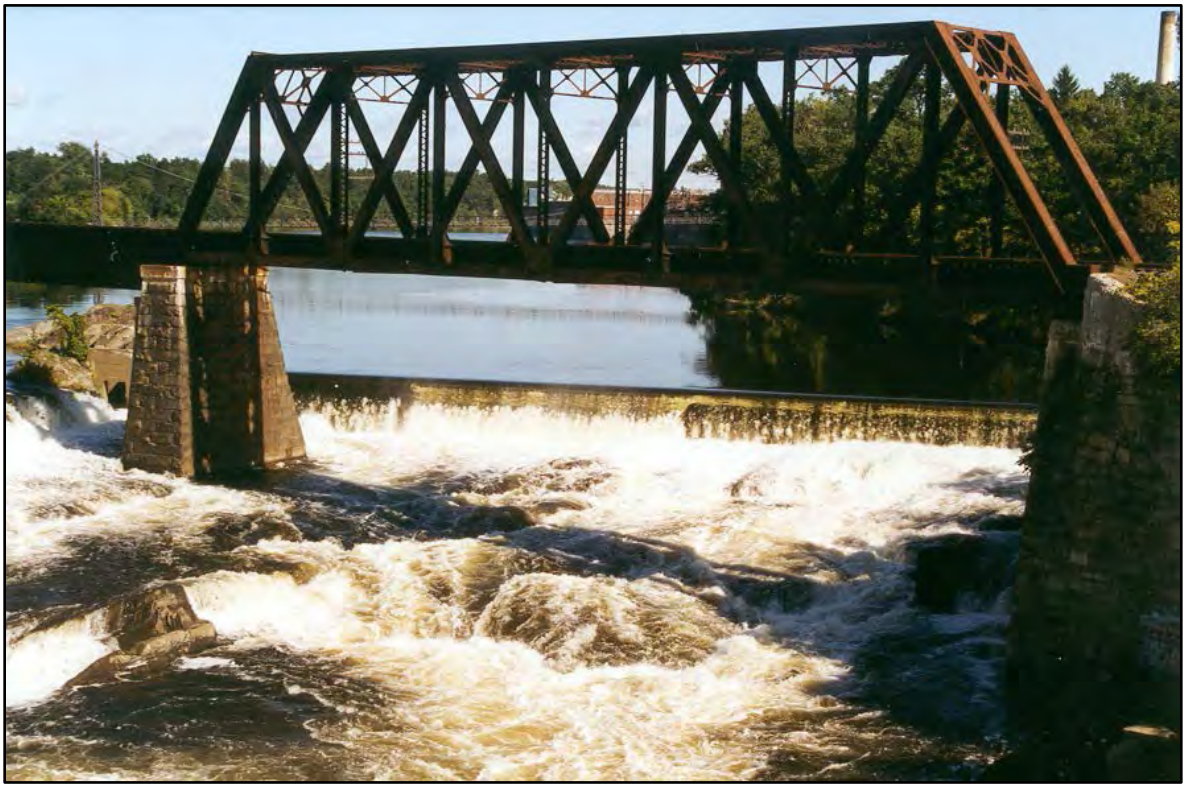

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ENGINEERING DRAWINGS

October 26, 2020

VIA USPS – PRIORITY MAIL

Passamaquoddy Tribe of Indians
Pleasant Point Reservation
Attn: Donald Soctomah, THPO
P.O. Box 343
Perry, ME 04667

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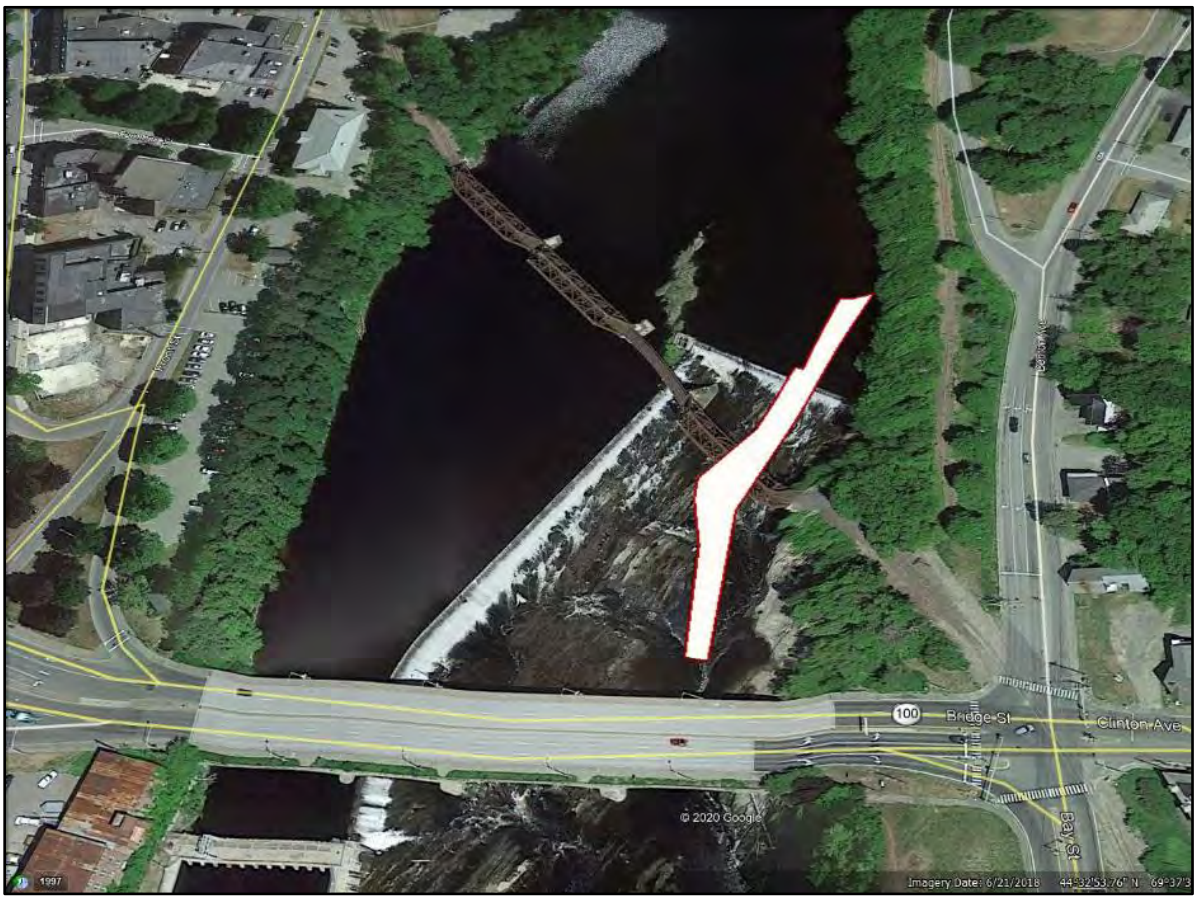

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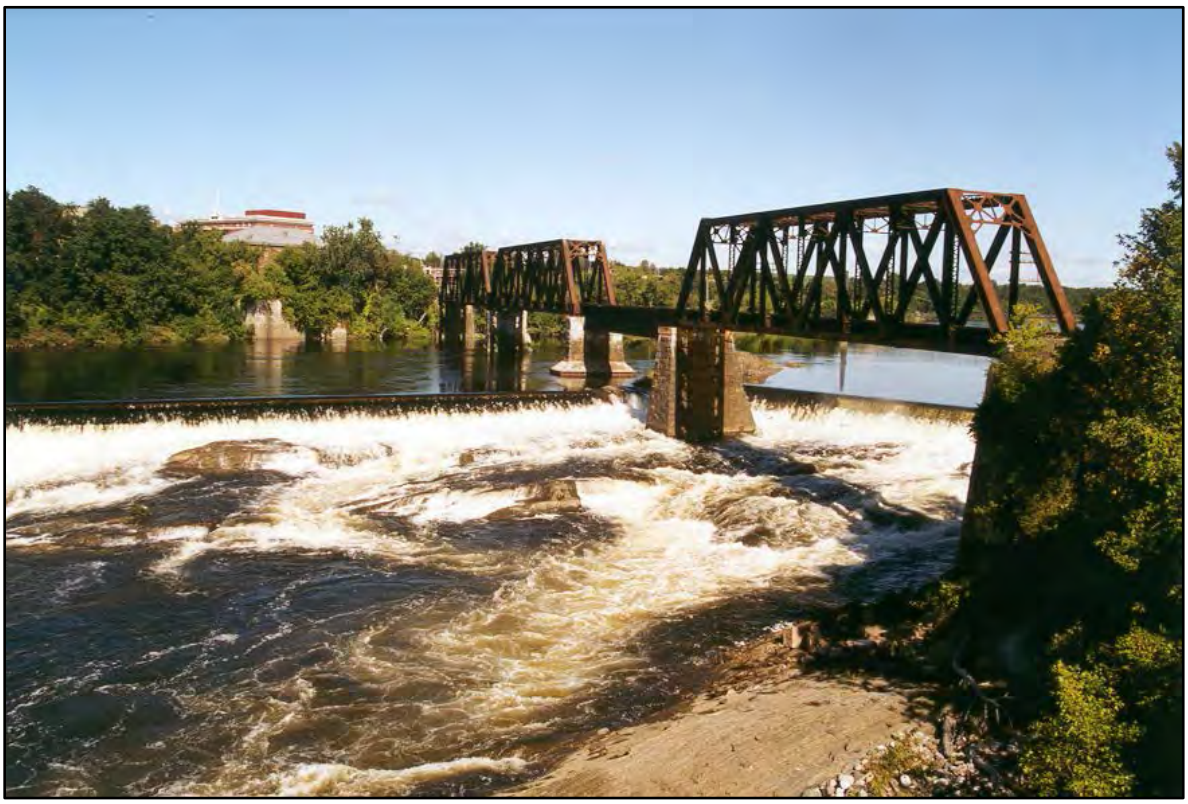

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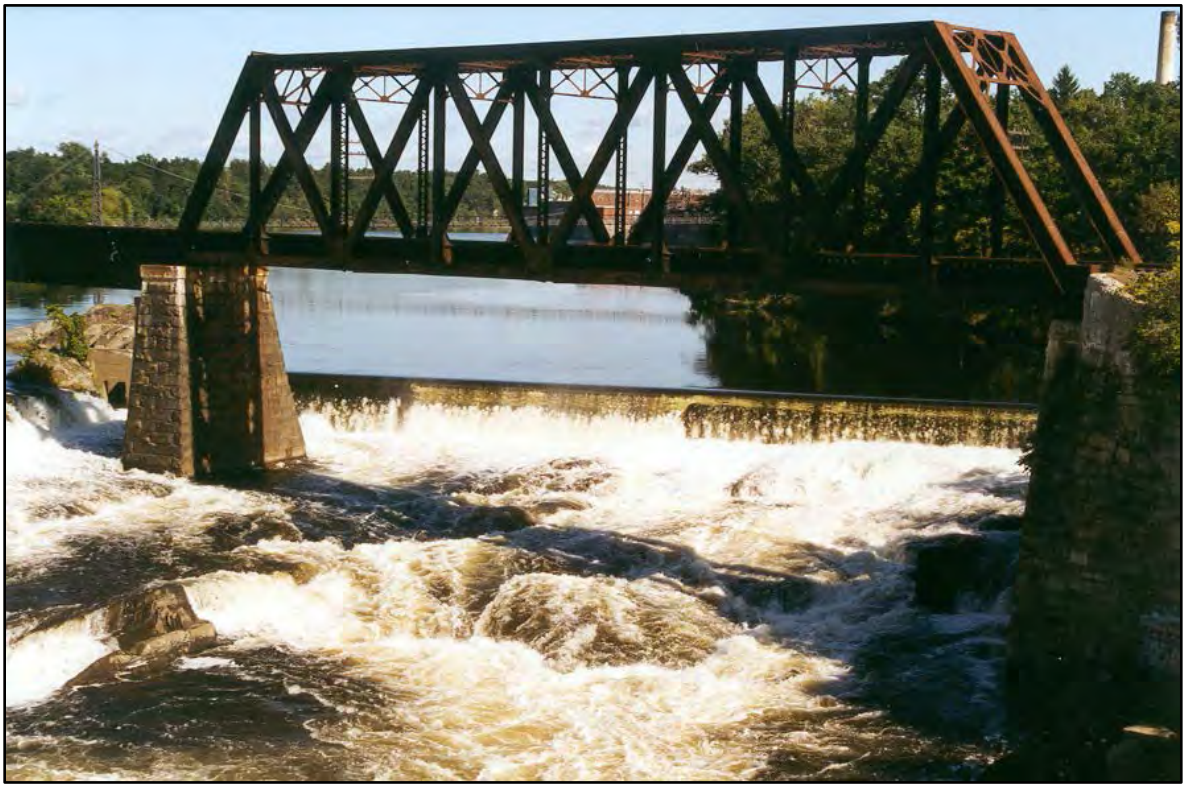

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ENGINEERING DRAWINGS

October 26, 2020

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Aroostook Band of Micmacs
Attn: Jennifer Pictou, THPO
8 Northern Road
Presque Isle, ME 04769

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Project Review – Upstream Fish Passage Facility

Dear Ms. Pictou:

On behalf of Merimil Limited Partnership, a subsidiary of Brookfield Renewable Energy (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates herein files with the Tribes, Project Notification and Information for Project Review for the construction of an upstream fish passage facility at the Project on the east side of the Kennebec River. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine (see location map in Attachment A).

Project Background

The Lockwood Project is operated in a run-of-river mode and consists of an 875-foot-long by 17-foot-high dam with two spillway sections equipped with 1.25-foot-high pinned flashboards and a 160-foot-long forebay headworks section; a 450-foot-long forebay canal; two powerhouses containing a total of 7 generating units with a total installed capacity of 6.915 MW; an approximately 1,300-foot-long bypass reach; and an 81.5-acre reservoir. An interim fish trap, lift, and transfer facility is located along the west side of the Kennebec River, on the east side of the Project powerhouse. The Project releases a minimum flow of 50 cubic feet per second (cfs), or inflow, whichever is less, into the bypass reach and a minimum downstream flow of 2,114 cfs, or inflow, whichever is less, downstream of the project powerhouse for protection of aquatic species.

On March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) issued a new license for the Project. The license and corresponding August 26, 2004 Water Quality Certificate (WQC) (L-20218-33-C-N) included fish passage requirements. As

stipulated by WQC Condition 3C, MLP installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided via a trap and truck program where migrants are transported upstream to spawning habitat. Both the License and WQC stipulate that installation of permanent upstream fish passage at the Project will be triggered by a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, lift and transfer facility at the Lockwood powerhouse or b) development of an alternate trigger for fishway installation based on the biological assessment process for the Atlantic Salmon, alewife, and blueback herring, whichever comes first.

Since the FERC License was issued, Atlantic Salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with FERC an Interim Species Protection Plan for Atlantic Salmon (Interim SPP). On May 19, 2016, FERC amended the Lockwood License to include the Interim SPP that requires a volitional (swim through) upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC prescribed the required operational date for the volitional upstream fish passage to be May 31, 2022.

In accordance with the Interim SPP, FERC license, and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Lockwood Project to provide volitional passage for upstream migration of salmon and other anadromous species.

The facility has been designed in consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MDIFW) to determine an appropriate fish passage technology for the Lockwood Project.

Proposed Construction Project

Brookfield proposes to construct a concrete vertical slot fish ladder system (fishway). The fishway will be built on the east side of the Kennebec River, under the railroad bridge, and over the north dam spillway. The fish passage facility will be approximately 530-feet-long by approximately 60-feet-wide at its widest point (Attachment C). An attraction flow channel will be constructed on the western side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide. To allow for fish passage system construction, in-river bedrock removal will occur and an approximately 105-foot-wide

section of the concrete spillway will be removed. The fishway and attraction flow channel will be installed within the removed spillway section along with a 60-foot-wide crest gate to replace spillway capacity. A permanent concrete access pad will additionally be constructed within and along the river's edge in connection with the access road, to allow for enhanced access during construction and to provide an access area for continued facility maintenance.

A contractor designed temporary cofferdam system will be constructed around the in-river work area to provide a de-watered workspace. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown area. Pumps will be utilized during construction to control water in the construction area and a dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

The work and laydown areas for the Project will be accessed via an access road. The access road will be gated and secured. Construction work is scheduled to begin in 2021, after spring river flows recede and allows for safe access.

Project Review Request

In accordance with Section 106 of the National Historic Preservation Act (NHPA), Project Notification and Information must be filed with the five federally recognized Indian tribes for project review. The proposed project area is located in a previously disturbed area. As referenced in the 2005 FERC Project license, cultural resource surveys of the project area were conducted during the last licensing process. No National Register Eligible properties were identified within the Lockwood Project's area of potential effect. The Maine State Historic Preservation Office concurred with this finding in a letter dated May 8, 2002.[1] FERC staff additionally contacted federally recognized Indian tribes within the state and none identified any properties to which they attach religious or cultural significance that would be affected by ongoing hydroelectric project operations. However, in accordance with Article 412 of the Project license, if previously unidentified archeological or historic structures are discovered during construction or any other phase of this project's development, the licensee shall stop all land-disturbing activities in the vicinity of the property and consult with the MHPC.

Attached please find a USGS topographic map and Project Location Map depicting the proposed project area (Attachment A), photos of the proposed area of project effect (Attachment B), and engineering drawings depicting the proposed project (Attachment

[1] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10433836

C). As required by the U.S. Army Corps of Engineers (USACE), a request for project review is also being provided to the appropriate federally recognized Indian tribes.

Should you have any questions upon review, please contact me at 207.416.1218 or at Katie.Sellers@kleinschmidtgroup.com. Due to COVID-19 related work from home restrictions, please forward any project related responses via email.

Sincerely,

KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds
Regulatory Coordinator

KSR:TMJ
Attachments: Attachment A – USGS Topographic and Project Location Map
Attachment B – Project Area Photos
Attachment C – 30% Design Drawings
cc: Gerry Mitchell and Kelly Maloney, Brookfield Renewable
Fatima Oswald, Kleinschmidt Associates

ATTACHMENT A

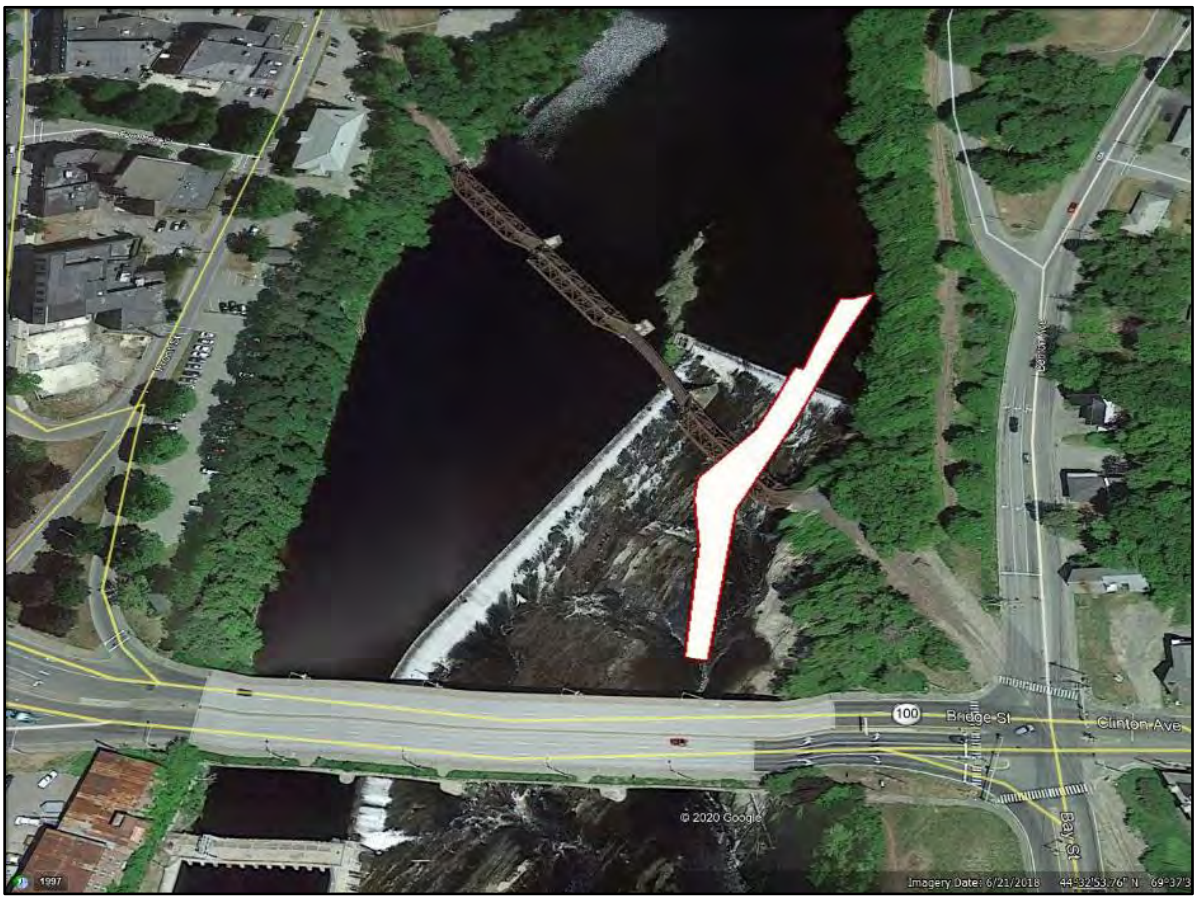
USGS TOPOGRAPHIC AND GOOGLE EARTH MAPS

FIGURE 1 LOCKWOOD UPSTREAM FISH PASSAGE PROJECT AREA - PROPOSED WORK LOCATION (TOPO MAP)

FIGURE 2 LOCKWOOD UPSTREAM FISH PASSAGE - PROPOSED WORK AREA

ATTACHMENT B

PHOTOS



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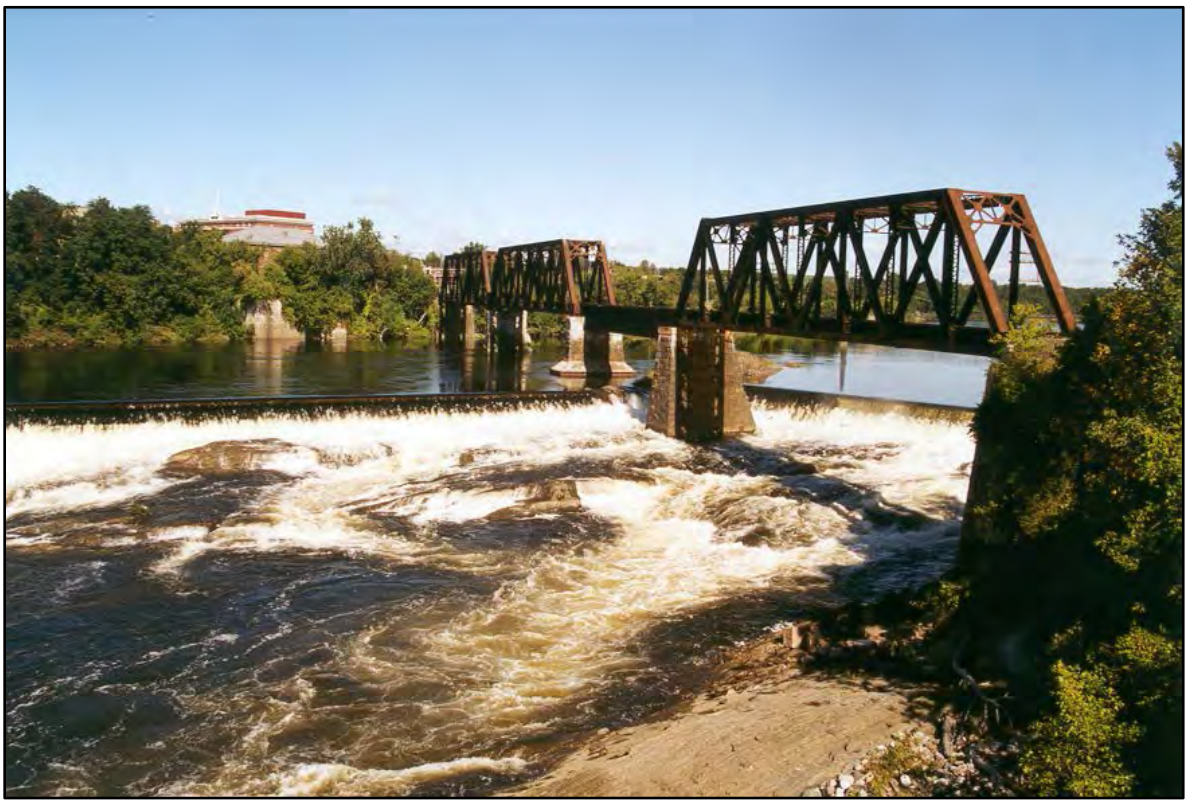

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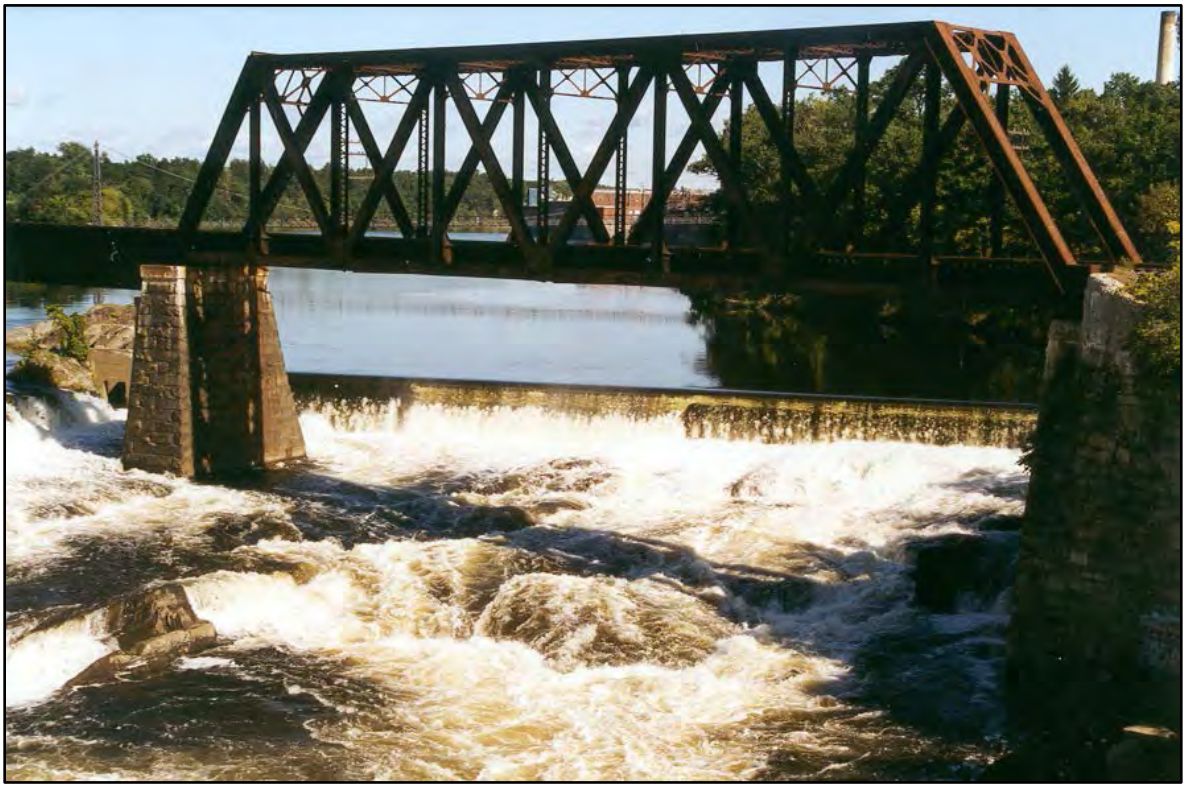

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ATTACHMENT C

ENGINEERING DRAWINGS

October 26, 2020

VIA USPS – PRIORITY MAIL

Houlton Band of Maliseet Indians
Attn: Sharri Venno, Environmental Planner
88 Bell Road
Littleton, ME 04730

Re: Lockwood Hydroelectric Project (FERC No. 2574)
Project Review – Upstream Fish Passage Facility

Dear Ms. Venno:

On behalf of Merimil Limited Partnership, a subsidiary of Brookfield Renewable Energy (Brookfield), owner and operator of the Lockwood Hydroelectric Project (Project) (FERC No. 2574), Kleinschmidt Associates herein files with the Tribes, Project Notification and Information for Project Review for the construction of an upstream fish passage facility at the Project on the east side of the Kennebec River. The Lockwood Dam is located on the Kennebec River and in the Towns of Waterville and Winslow, Maine. The proposed upstream fish passage facility will be located entirely within the Town of Winslow, Maine (see location map in Attachment A).

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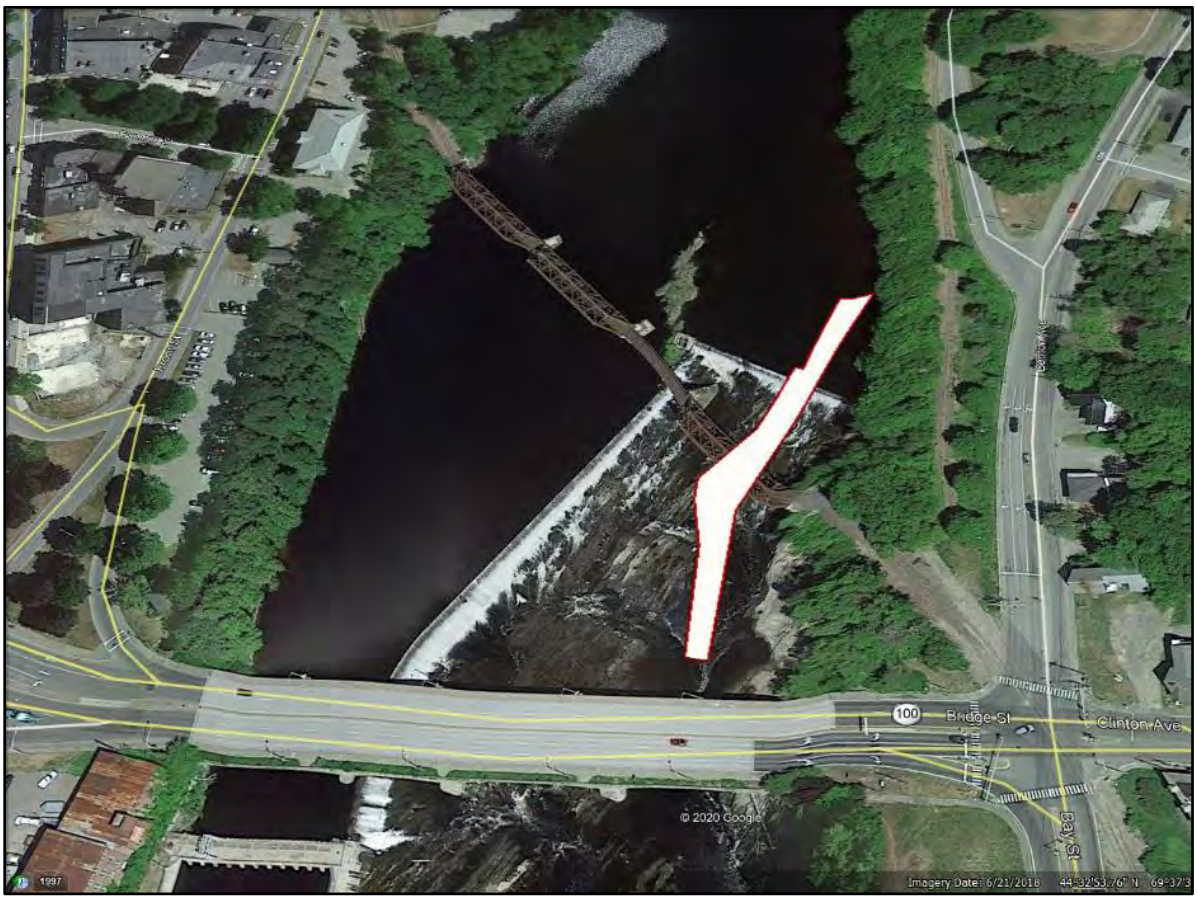

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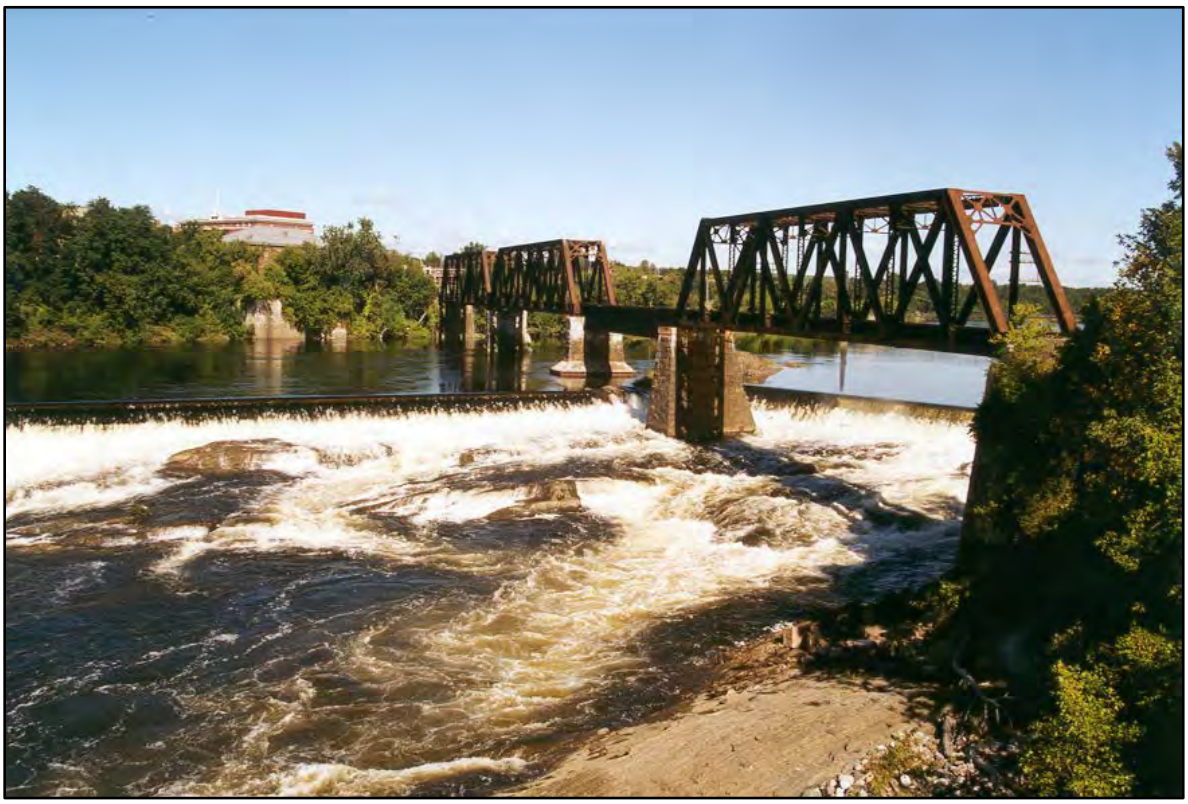

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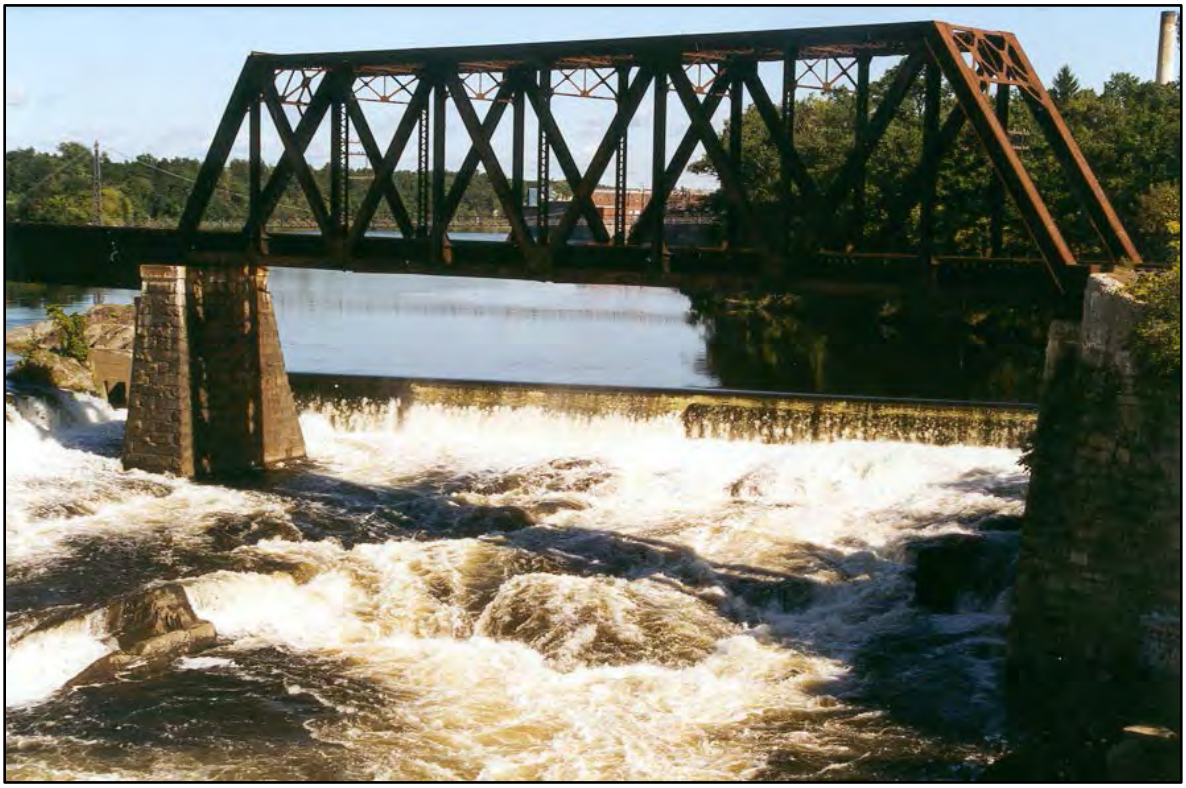

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ENGINEERING DRAWINGS

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ALTERNATIVES ANALYSIS

Alternatives Analysis: Upstream Fish Passage Facility

Lockwood Hydroelectric Project
FERC No. 2574

Prepared for:
Merimil Limited Partnership
Winslow, Maine

Prepared by:
Kleinschmidt Associates

July 2021

Kleinschmidt

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

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1.0 INTRODUCTION

Merimil Limited Partnership (MLP), a subsidiary of Brookfield Renewable Energy Group (Brookfield or Licensee), owner and operator of the Lockwood Hydroelectric Project (FERC No. 2574) (Project), proposes to construct a volitional upstream fish passage facility at the Lockwood Project. The Lockwood Project is located on the Kennebec River in the City of Waterville and Town of Winslow, Kennebec County, Maine.

In accordance with U.S. Army Corps of Engineers (USACE) Individual Permit Application requirements, this Alternatives Analysis evaluates the available alternatives for the project.

2.0 PROJECT NEED

On May 26, 1998, the Licensees for the Lockwood Project filed the 1998 Lower Kennebec River Settlement Accord which modified a 1987 Agreement between a group of licensees known as the Kennebec Hydro Developer Group (KHDG) and the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), State of Maine and the Kennebec Coalition, a group consisting of American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited. On September 16, 1998, the FERC issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement).

The modified 1998 KHDG Agreement, as incorporated into the Project license, stipulated that installation of permanent upstream fish passage at the Lockwood Project will be triggered by a) the passage of at least 8,000 American shad in a single season through the interim trap, lift, lift and transfer facility at the Lockwood powerhouse or b) development of an alternate trigger for fishway installation based on the biological assessment process for the Atlantic salmon, alewife, and blueback herring, whichever comes first. The terms of the modified KHDG Agreement were incorporated into the Project WQC on August 3, 1998 and into the Project license on September 16, 1998.

On March 4, 2005, the Federal Energy Regulatory Commission (FERC or Commission) issued a new license for the Project. The license and corresponding Maine Department of Environmental Protection (Maine DEP) August 26, 2004 Water Quality Certification (WQC) (L-20218-33-C-N) included fish passage requirements that required the installation of an interim trap, lift and transfer facility at the Project by May 1, 2006 and continued the terms of the 1998 KHDG Agreement for the installation of permanent volitional passage predicated on biological triggers. As stipulated by the license and WQC Condition 3C, Brookfield installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the Project powerhouse in 2006. Upstream fish passage at the Project is presently provided via a trap and truck program where migrants are transported upstream to spawning habitat.

Since the FERC License was issued, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic

salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with FERC a 2013 Interim Species Protection Plan (Interim SPP) and Biological Assessment for Atlantic Salmon and Atlantic and shortnose Sturgeon on February 21, 2013 and as amended on March 29, 2013. On July 22, 2013 and as amended on September 3, 2013, NMFS issued its Biological Opinion for the ISPP.

On May 19, 2016, FERC amended the Lockwood License to include the Interim SPP and the terms and conditions of NMFS' Biological Opinion that require a volitional (swim through) upstream fish passage facility be designed and constructed at the Project. While originally envisioned to be a flume connecting the existing lift to the headpond, Brookfield, with the concurrence of the agencies and as a result of effectiveness testing of the existing lift for Atlantic salmon and shad, informed FERC in August 2017 of the decision to build a second fishway in the bypass reach that would serve the purpose of providing volitional passage at the Project. On May 31, 2021, Brookfield filed an SPP and Biological Assessment with the FERC, which analyzes the construction effects of the upstream fish passage facilities on listed species. Section 7 Endangered Species Act (ESA) consultation is being conducted pursuant to this BA.

In accordance with the FERC license and WQC, MLP proposes to construct a permanent upstream fish passage facility at the Lockwood Project to provide volitional passage for upstream migration of salmon and other anadromous species.

3.0 PROJECT PURPOSE

The project purpose is to create a permanent and volitional upstream fish passage facility at the Lockwood Hydroelectric Project that is designed for passage of Atlantic salmon and other anadromous fish species. While the Lockwood Project has an existing fish lift, upstream passage studies conducted for Atlantic salmon and American shad have indicated attraction to the bypass reach. As such, the proposed upstream volitional fishway, as well as any alternatives, would be constructed within the bypass reach area of the Lockwood Dam.

4.0 PROPOSED ACTION

The Proposed Action (Alternative 1) will construct a concrete vertical slot volitional upstream fish ladder system (fishway) at the Lockwood Hydroelectric Project (Project). The fishway will be built on the east side of the Kennebec River, under the railroad bridge, and over the north dam spillway, within the bypass reach, to provide volitional passage for upstream migration of salmon and other anadromous species. The fish passage facility will be approximately 530-feet-long by approximately 60-feet-wide at its widest point. An attraction flow channel will be constructed on the west side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide.

Construction of the Proposed Action will involve the placement of temporary fill below the ordinary high-water line (OHW) to allow for in-water construction, placement of permanent concrete fill below the OHW, and permanent excavation of the rocky area in the bypass reach and partial removal of the north dam spillway to make room for the upstream fishway.

This facility has been designed in full consultation with NMFS, USFWS, MDMR, and MDIFW to determine the appropriate fish passage technology for the Lockwood Project and to finalize all aspects of design. Design consultation for supporting studies, and the conceptual 30%, 60%, and 90% design efforts are provided in Appendix C of the USACE Permit Application Additional Information Report.

The Proposed Action will involve the discharge of concrete fill into the Kennebec River (classified as waters of the United States under Section 10 of the Rivers and Harbors Act) therefore, MLP is required to comply with Section 404(b)(1) of the Clean Water Act and provide an analysis of potential alternatives to the Proposed Action.

5.0 EVALUATION CRITERIA

5.1 Waterway Impacts

The impacts to the waterway – the proposed project's estimated temporary and permanent fill quantities as well as proposed excavation quantities are summarized in the Additional Information Report for the Lockwood Upstream Fishway. Design Drawings included in Appendix D of the USACE Permit Application Additional Information Report visually depict these impacts.

Fill and construction methods, as well as impact footprint vary with the considered alternatives. The effects of the proposed fishway on aquatic habitat, fish and wildlife resources, and wetlands are analyzed in Section 7.0.

5.2 Erosion and Sedimentation

BMPs will be implemented before and during construction to limit any temporary adverse impacts to water quality, soil stability, and the natural environment. In-stream work will occur on bedrock and no significant erosion or sedimentation problems are expected as a result of the proposed construction. All work will occur behind a cofferdam and in the dry, eliminating the risk of sediment plumes. To avoid adverse environmental impacts, installation and removal of cofferdams will be scheduled during summer or winter low flows during the designated in water work windows. To create a dry work area, water will be pumped out of the cofferdam areas and back into the river. This pumped water will pass through a filtration system before reentering the riverway to avoid depositing sediment laden waters back into the waterway. Additionally, the cofferdam structures will be surrounded by turbidity curtains. Silt fences will be employed around all upland access and laydown areas to eliminate the risk of sedimentation.

Erosion and sediment control features are included within the Proposed Action designs (see USACE Permit Application Additional Information Report Appendix D).

Any alternative for a fishway in the bypass reach would require coffer-damming and wet road access regardless of design.

5.3 Temporary Operational Changes

For safety during cofferdam construction, the Project impoundment will be lowered 1.5 feet. The impoundment drawdown will not exceed a rate of approximately 1-inch per hour. When downstream flow regulation is necessary to raise the impoundment level after construction of the cofferdam, MLP will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment. Minimum flows and downstream fish passage will be maintained throughout the duration of the construction period.

Any alternative for a fishway in the bypass reach would require temporary changes to water levels regardless of design.

5.4 Magnitude and Duration of In-Stream Activity

Construction is proposed within a specific timeframe such that proposed work minimizes the magnitude and duration of in-stream activity, and when water levels are at a naturally low level. In-river work will not begin until the downstream smolt migration period (May 1 to June 15) has passed and will be targeted for in water work windows of July 15 to September 30 and November 8 to April 8. The construction of the cofferdam system will occur in the low flow summer and winter months within these work windows, in order to avoid environmentally sensitive time periods, including downstream smolt passage season. "Instream activity" will otherwise occur in the dry behind a cofferdam system wherein, once the cofferdam system is installed, construction activities will take place in the dry behind the cofferdams. Construction and removal of the cofferdam system will encompass the majority of construction activity impact.

Any alternative for a fishway in the bypass reach would include in-water construction to take place within the proposed work windows regardless of design.

6.0 ALTERNATIVES INITIALLY REMOVED FROM CONSIDERATION

Throughout the design process, MLP evaluated appropriate technologies that would provide permanent volitional upstream fish passage for anadromous fish species including Atlantic salmon. The alternatives for providing a volitional path for upstream migrants also took the form of a flume or channel reaching from the existing fish lift to the head pond upstream of the existing power canal. Two alternatives were eliminated as impractical or not meeting the project purpose.

MLP considered routing the exit flume outside of the power canal on the western shore (Waterville side of River). Interference with buried utilities, instability of adjacent foundations, and property ownership issues precluded this possibility.

MLP also considered simulating an exit flume with a floating boom to guide fish along the power canal wall. This did not satisfy the project purpose since the fishway could not be operated when the power canal was dewatered, and fish could not escape the power canal during high water.

Upstream passage utilizing a concrete flume connected to the existing interim fish lift facility was a fully developed volitional passage concept. This volitional passage concept was brought to final design and proceeded through initial permitting processes in 2017 (see Appendix B, Concrete Power Canal Flume), but it was dismissed as a viable option in accordance with consultation with resource agencies. Research from fish tracking efforts, identified that fish are more attracted to the bypass reach area, than the interim fish lift side or powerhouse side of the Project.

This alternative would have augmented the existing interim fish lift by adding a volitional route for upstream migration of salmon and other anadromous species, while maintaining the existing trap and transport capability. The design was developed such that fish would have been discharged from the existing fish lift hopper into a new 6-foot-wide, 60-foot-long steel flume located on the north side of the fish lift tower and adjacent to the powerhouse (Unit No. 7). The flume would have been equipped with a crowding system to allow operators to count upstream migrants, and trap and remove invasive species. Upstream of the crowding system, the steel flume would have transitioned to a 30-foot-long concrete flume, penetrating the powerhouse wall into the power canal, continuing another 500-feet along the west wall of the power canal, and ending at the existing

gatehouse just downstream of the Route 201 bridge. A new fishway exit and grizzly rack were designed to attach to the upstream face of the gatehouse.

While originally envisioned to be a flume connecting the existing interim lift facility to the headpond, MLP in accordance with results from effectiveness testing of the existing lift for Atlantic salmon and shad, and in accordance with concurrence from resource agencies, informed FERC in August 2017 of the decision to build a second fishway in the bypass reach. The flume alternative, therefore, does not meet the project purpose of providing permanent and volitional upstream fish passage facility at the Lockwood Hydroelectric designed for Atlantic salmon and other anadromous fish species.

7.0 ALTERNATIVE ANALYSIS

MLP explored several alternatives for the development of permanent, volitional upstream fish passage at the Lockwood Project. The final alternatives considered included:

- Alternative 1 – (Proposed Action) – Concrete Vertical Slot Fish Ladder
- Alternative 2 – Nature Like Fishway
- Alternative 3 – Ice Harbor
- Alternative 4 – No Action

7.1 Alternative 1 (Proposed Action) – Concrete Vertical Slot Fish Ladder

7.1.1 Summary of Scope and Construction Methods

Alternative 1 (Proposed Action) will construct a permanent upstream fish passage facility that provides a volitional route for upstream migration of salmon and other anadromous fish species, in the bypass reach area of the Lockwood Project. This Alternative would be constructed in addition to the existing interim fish lift facility located at the Lockwood Project powerhouse (see Appendix A for Fishway Design Drawing).

A permanent crane access pad road base (approximately 2,550 square feet (SF)/950 cubic yards (CY) of fill) will be constructed within the river to connect with the access road and allow for work area access during construction, and to provide access for continued fishway facility maintenance and operation, after construction. A temporary earth fill wet road (approximately 14,060 SF/1,050 CY of crushed stone or gravel fill) will be constructed in river, to facilitate access to the fishway construction area. For temporary fill quantities, please see the Additional Information Report.

Fishway construction is expected to begin in 2021.

Vertical slot fishways are an efficient fish passage technology. The design for a vertical slot is ideal for a hydraulic connection between the tailrace and headpond. The Proposed Action does meet the project purpose of providing an upstream fish passage facility at the Project designed for Atlantic salmon and other anadromous fish species.

7.1.2 Environmental Impacts

Aquatic Habitat

The Kennebec River within the Proposed Project vicinity provides critical habitat for Atlantic salmon as well as essential fish habitat (EFH) for American shad, alewives, and blueback herring. And both Atlantic sturgeon and shortnose sturgeon also have the potential to occur below the Lockwood dam. Although the conditions of the Kennebec River will be permanently and temporarily altered by proposed construction activities, the Proposed Project will have an overall long term beneficial effect on the area's critical habitat and EFH as it will provide upstream passage for anadromous fish species. BMPs will also be utilized to minimize the amount of sediments that may be released into the waterway during construction.

Fish Resources

The Kennebec River supports approximately 50 species of freshwater and diadromous fish species, including cold and warm water angling opportunities for wild and stocked brook trout, landlocked salmon, brown trout, rainbow trout, and smallmouth bass. The lower Kennebec River, including the Lockwood Project waters, supports runs of diadromous fish species, including American shad, blueback herring, alewives, endangered Atlantic salmon, and American eel. Endangered Atlantic and shortnose sturgeon also occur in the lower Kennebec River, but typically no further upstream than the Lockwood Project.

Throughout construction, prescribed minimum flows will be maintained and existing upstream fish passage will continue to be provided via the current onsite fish lift facility.

Construction of the fishway will take place within the waterbody, for a limited duration. Temporary effects will mostly be associated with the cofferdam construction and removal, as all other in-river work will occur behind the cofferdam. Some noise may be associated with construction and excavation, though it will be buffered by the cofferdam. Proposed construction activities are not anticipated to negatively affect water quality as sediment and erosion control BMP's will be implemented during project construction to limit any temporary adverse impacts to water quality (sedimentation inputs).

Overall, the intent of this project is to provide volitional upstream fish passage for Atlantic salmon and other migratory species. Operation of the new upstream fishway will not

change the normal pond elevation or minimum flows and thus will have minimal effect on the existing aquatic habitat.

A Biological Assessment of the construction impacts to Atlantic salmon and Atlantic and shortnose sturgeon and critical habitat was filed with the Commission on May 31, 2021.

Wildlife Resources

The project area is located within an urbanized and previously disturbed area and wildlife species likely to inhabit the area are mostly rodent-type mammals and some bird species. There is a possibility that project construction may temporarily impact endangered Northern Long Eared Bat (NLEB), which are documented as having the potential to occur in the project area. Construction activities may disturb NLEB feeding patterns and disturb transient bald eagles. Provided the temporary nature and short timeline associated with this project, impacts are expected to be temporary and short in duration.

Wetlands

Lands surrounding the Lockwood dam consist of a mix of residential and industrial developments and represent a disturbed upland system with limited to no vegetated surfaces. The Kennebec River shoreline within and surrounding the Proposed Project area is characterized by steep, bedrock slopes and does not host freshwater wetland systems as identified in the U.S. Fish and Wildlife Service's National Wetlands Inventory Database. There is a freshwater forested shrub wetland system located approximately one third of a mile south of the Project area on the west side of the Kennebec River (USFWS, 2021) (Figure 1).

Proposed Project activities are not anticipated to affect this wetland area. The majority of construction activities will occur within the facility's existing bypass reach which will be dewatered during construction. Best management practices (BMPs) such as silt fencing will be implemented to prevent sediment run-off into the Kennebec River.

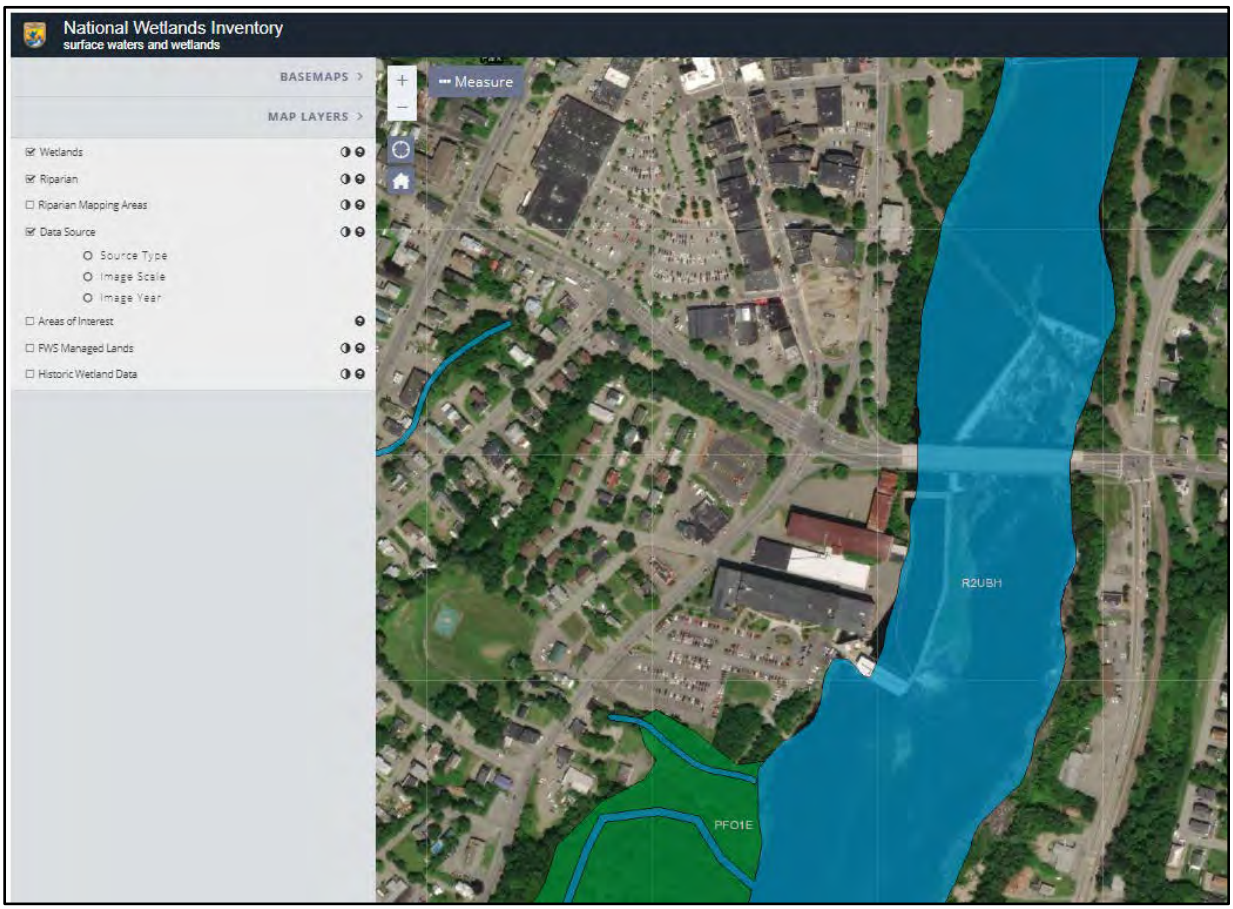

Figure 1 USFWS National Wetlands Mapper - No wetlands in the Project Area

7.2 Alternative 2 – Nature Like Fishway

A nature-like fishway (NLF) is a channel that emulates a natural stream channel, typically with a low gradient, sinuous and a roughened bed to dissipate energy. NLF channels are constructed out of irregular natural materials that create diverse hydraulic conditions which are suitable for a wide variety of aquatic species. NLF channels are a relatively new technology for fish passage and there have been very few evaluations of effectiveness.

Construction of the NLF would involve installing cofferdams in the impoundment and the tailrace channel. These cofferdams could be designed as permanent structures as the NLF will require diversion walls along the right side, the full length of the NLF to isolate the channel from the river. This structure would also act as a dam in the impoundment. Site access and material storage yard would be similar to that described for the vertical slot ladder option.

This options would be significantly larger than the proposed alternative and occupy significant areas both upstream and downstream of the dam; ranging in length from 700 ft to 2,000 ft depending on the desired slope, requiring substantially more fill.

7.2.1 Environmental Impacts

Alternative 2 is similar to Alternative 1 in terms of temporary and permanent impacts and effects on waters and shorelands, however it would occupy a significantly greater areas of the Kennebec River and significantly larger quantities of fill. Coffer-damming would be substantially greater.

Planned mitigation measures for Alternative 2 would be very similar to Alternative 1. Turbidity curtains would be installed around the cofferdams to limit transport of suspended sediment.

While the NLF would meet the project purpose of providing effective volitional passage in the bypass reach, the substantial size of the NLF renders it not the least environmentally damaging alternative.

7.3 Alternative 3 – Ice Harbor

7.3.1 Summary of Scope and Construction Methods

The Ice Harbor fish ladder would be located in the bypass reach with an entrance located just downstream of the railroad bridge, similar to the vertical slot ladder alignment. The main difference between the two ladder configurations is that the Ice Harbor is not as long as the vertical slot. The other aspects are very similar including an auxiliary attraction flow channel, and the addition of gates to replace project discharge capacity due to the fish ladder. An Ice Harbor fish ladder consists of a series of pools and water flows over short weirs and through small orifices between pools. The weir design has a high non-overflow center section with weirs on the outer third of the pool width.

The construction of the Ice Harbor fish ladder would be very similar to that described for the proposed vertical slot fish ladder. The key difference, is the smaller footprint for the Ice Harbor design.

Due to the lack of information on appropriate design and operational criteria for smaller pool and weir fishways to effectively pass shad and because experiences on the East Coast suggest these ladder designs are difficult for shad to negotiate, there is significant risk

that this type of fishway would not pass large numbers of shad if installed at Lockwood. As such, this alternative was determined to not meet the project purpose.

7.3.2 Environmental Impacts

Alternative 3 is similar to Alternative 1 in terms of temporary and permanent impacts and effects on waters and shorelands. Planned mitigation measures for Alternative 3 would also be very similar to Alternative 1. And Alternative 3 would occupy less riverine habitat compared with Alternative 1.

However, Alternative 3 would not meet the project purpose of providing effective volitional passage in the bypass reach as this technology is potentially ineffective for American shad.

7.4 Alternative 4 – No Action

7.4.1 Summary of Scope and Construction Methods

Alternative 4, No Action, would continue operation and maintenance of the existing interim fish lift, trap, and transport facility. This alternative would leave the Lockwood Project unchanged and the installation of a permanent and volitional upstream fishway would not occur. FERC and resource agency requirements to construct and operate a volitional upstream fishway by May of 2022 would not be addressed.

Alternative 4 does not meet the Project purpose of providing permanent and volitional upstream fish passage facility at the Lockwood Hydroelectric designed for Atlantic salmon and other anadromous fish species.

7.4.2 Environmental Impacts

Alternative 4, No Action, would continue operation and maintenance of the existing interim fish lift, trap, and transport facility. This alternative would leave the Lockwood Project unchanged. The existing fish lift designed for interim use will continue to be available to provide fish passage though, this current lift is not located in the most beneficial area for fish passage. Agency research has shown that fish are attracted to the bypassed reach area of the Project.

Though the No Action Alternative would not cause any immediate environmental impacts associated with construction, the long-term effects of this alternative would have continued lasting impacts on the Kennebec River system.

7.5 Alternatives Analysis

Alternative 1 is MLP's preferred alternative. It is considered the least environmentally damaging alternative (and environmentally beneficial alternative) because this alternative provides volitional fish passage in the bypass reach and restores connectivity within the these reaches of the Kennebec River for native sea-run fish species in the area of the river where they are shown to be present while occupying a reasonable footprint in the bypass reach, compared with other alternatives.

MLP considers Alternative 1 (Proposed Action) to be the least environmentally damaging practicable alternative.

Though Alternative 2 avoids larger areas of impact within the Kennebec River, Alternative 2 is not as desirable as Alternative 1, as American shad are not documented to utilize Alternative 2 effectively. Because Alternative 2 is not as desirable for fish to migrate, Alternative 2 is not considered the least environmentally damaging practicable alternative because it does not meet the project purpose. While Alternative 3 would be expected to meet the project purpose, it is a relatively new and somewhat untested fish passage technology. Further, Alternative 3 would occupy significantly greater aquatic habitat. MLP's consultation with resource agencies regarding these Alternatives also concluded that they were not a practicable alternative to Alternative 1.

Under the No Action Alternative, environmental conditions at the Lockwood Hydroelectric Project would remain unchanged. This alternative may have the greatest environmental impact as it would prevent the installation of a permanent and volitional upstream fishway for Atlantic salmon and other anadromous fish species. Continuation of the status quo would mean the continuance of a trap and truck program, and not volitional fish passage. The No Action Alternative is not considered the least environmentally damaging practicable alternative available.

8.0 CONCLUSION

Throughout the design process, MLP worked closely with resource agencies to determine an appropriate technology that would provide permanent and volitional upstream fish passage by connecting the Lockwood headpond and bypass reach/tailrace while also providing effective passage for anadromous fish species including Atlantic salmon. It was found that fish species were attracted to the bypass reach area of the Project instead of the powerhouse side so the alternatives for the connection of the fish lift to the headpond were removed from further consideration. Resource agency consultation ultimately recommended the fishway be placed in the bypass reach so to take advantage of the natural use of the area.

Technologies aside from Alternative 1 (Proposed Action) and Alternative 2 and 3 were considered (such as a fish lift and an NLF/vertical slot hybrid), but filtered out from design possibilities as the technologies proved impracticable for the volitional passage of target anadromous species. Alternatives 2 and 3 were found to be either more impactful and/or were not known to meet the project purpose of volitional passage for a suite of anadromous species.

Finally, the No Action Alternative proved impracticable as a permanent, volitional fish passage facility has been mandated by FERC and resource agencies and absence of a permanent, volitional upstream fish passage facility would be the least environmentally desirable of all considered alternatives. The Proposed Action (Alternative 1) is therefore considered to be the least environmentally damaging practicable alternative available.

9.0 REFERENCES

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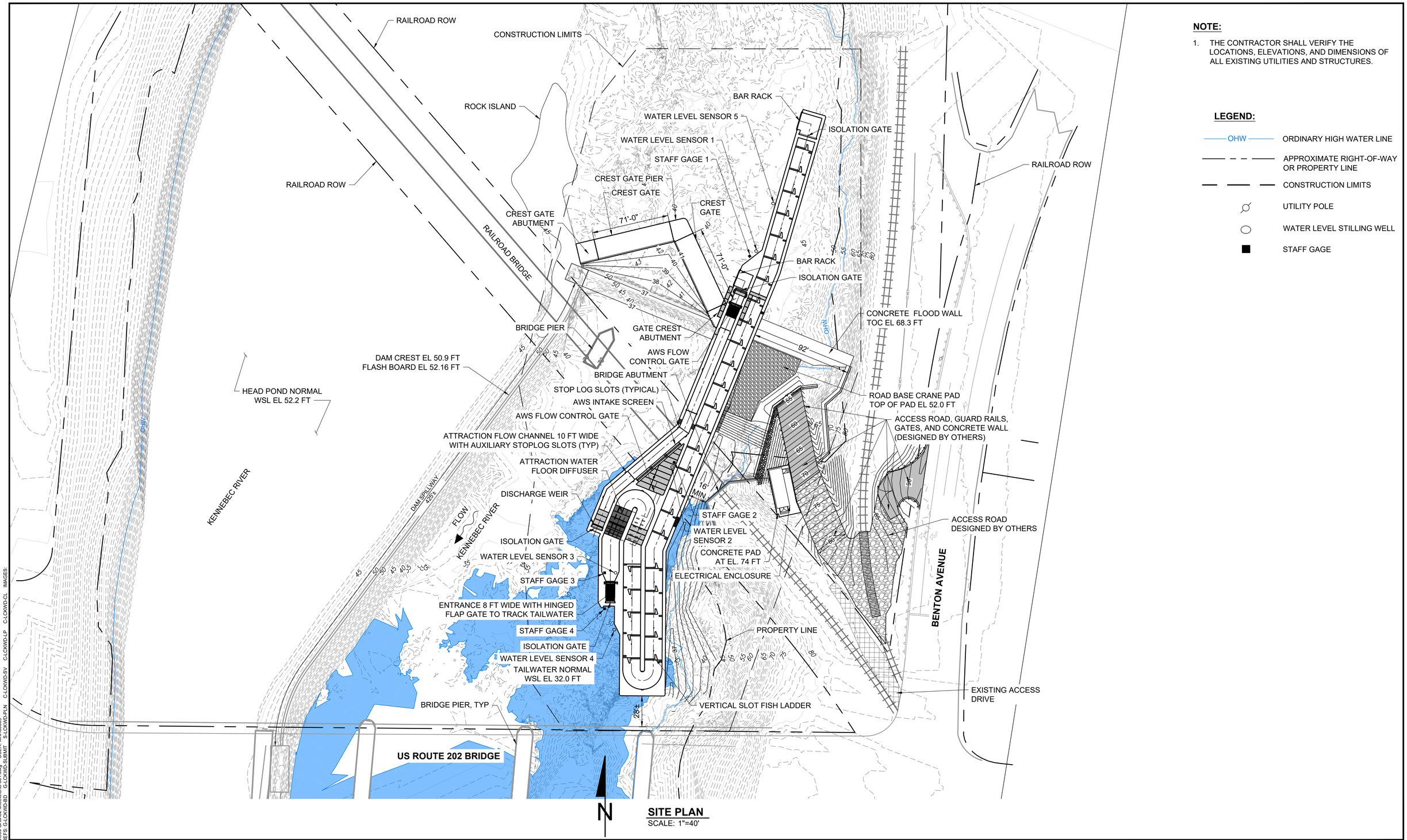
APPENDIX A

ALTERNATIVE 1 (PROPOSED ACTION) CONCRETE VERTICAL SLOT FISH LADDER DESIGN



NOTE:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

LEGEND:

- OHW — ORDINARY HIGH WATER LINE
- APPROXIMATE RIGHT-OF-WAY OR PROPERTY LINE
- CONSTRUCTION LIMITS
- UTILITY POLE
- WATER LEVEL STILLING WELL
- STAFF GAGE

N

SITE PLAN
SCALE: 1"=40'

ALDEN RESEARCH LABORATORY
30 SHREWSBURY ST, HOLDEN, MA 01520
TEL: (508) 829-6000 www.aldenlab.com

FOR AGENCY REVIEW
NOT FOR CONSTRUCTION
DATE: 2/3/2021

REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY
2/3/2020	FOR AGENCY REVIEW - NOT FOR CONSTRUCTION	M. GRAESER

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

LOCKWOOD HYDROELECTRIC PROJECT
FERC NO. 2574
BYPASS REACH SPILLWAY
UPSTREAM FISH PASSAGE

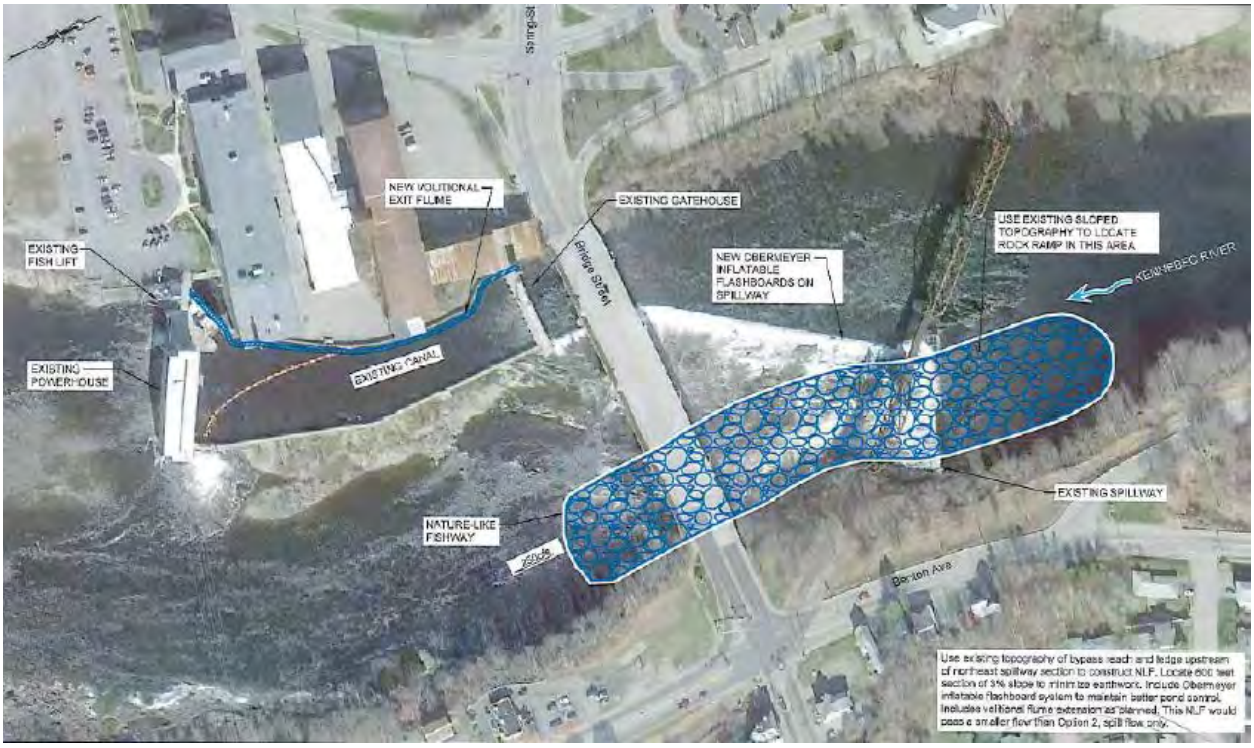
OVERALL SITE PLAN

PROJECT:	3173LOCKFISH
DRAWN BY:	M. ATWELL
DESIGNER:	A. MENGERT
APPROVED BY:	M. GRAESER
SHEET:	8 OF 94
DRAWING:	C-001

DWG: S:\13\009\Holden\Lockwood\900 CAD\02-sheets\GIC-001.dwg USER: MKA00880
DATE: Feb 03, 2021 9:00am XREFS: G-LCKWD-BD G-LCKWD-SUBMIT S-LCKWD-PLN C-LCKWD-SV C-LCKWD-LP C-LCKWD-CL IMAGES:

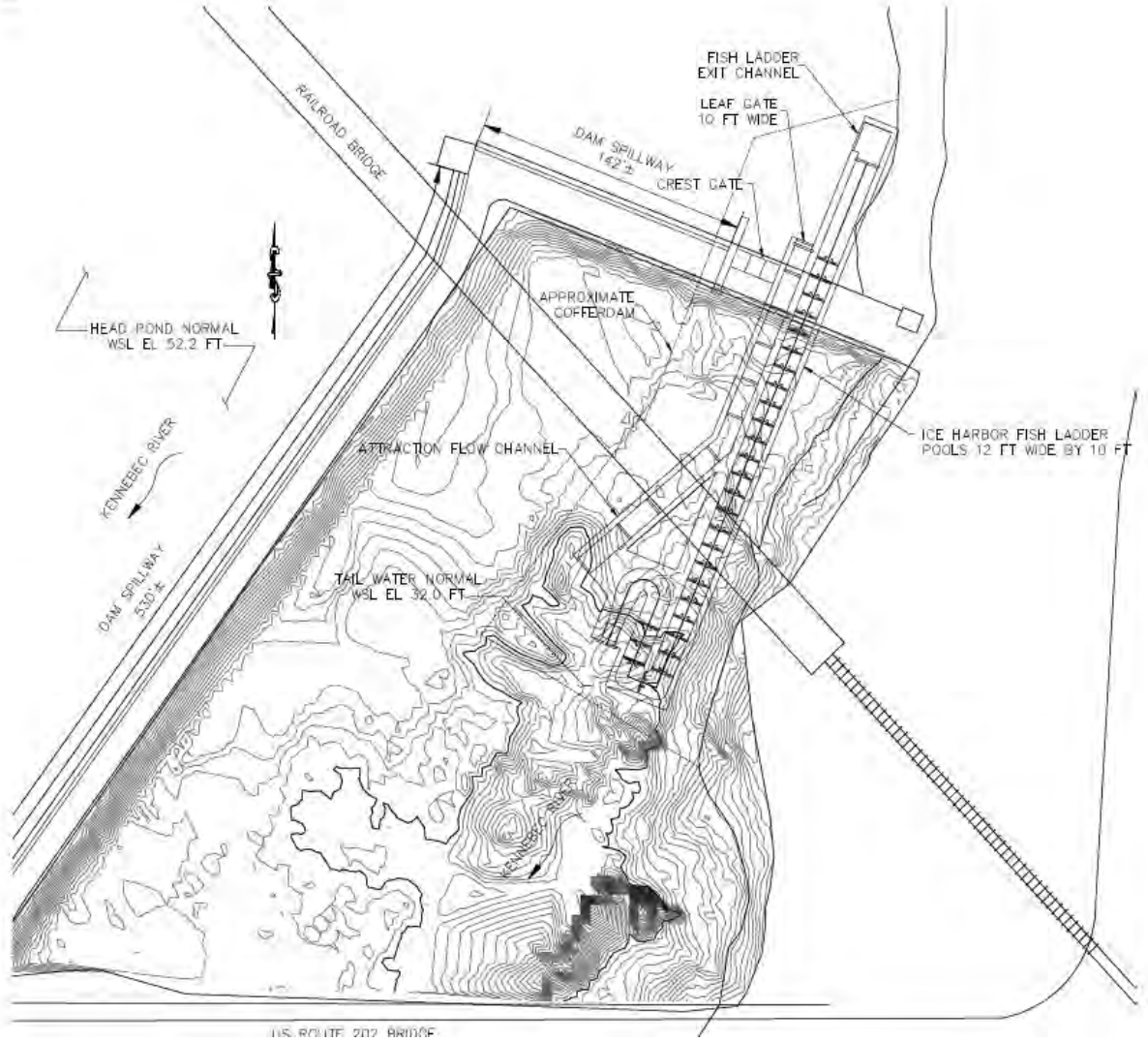
APPENDIX B

ALTERNATIVE 2 NATURE LIKE FISHWAY


NEW VOLITIONAL EXIT FLUME
EXISTING GATEHOUSE
USE EXISTING SLOPED TOPOGRAPHY TO LOCATE ROCK RAMP IN THIS AREA
EXISTING FISH LIFT
NEW OBERMEYER INFLATABLE FLASHBOARDS ON SPILLWAY
KENNEBEC RIVER
EXISTING CANAL
EXISTING POWERHOUSE
EXISTING SPILLWAY
NATURE-LIKE FISHWAY
Use existing topography of bypass reach and ledge upstream of northeast spillway section to construct NLF. Locate 600 feet section of 3% slope to minimize earthwork. Include Obermeyer inflatable flashboard system to maintain better pond control. Includes volitional flume extension as planned. This NLF would pass a smaller flow than Option 2, spill flow only.

APPENDIX C

ALTERNATIVE 3 ICE HARBOR


FISH LADDER
EXIT CHANNEL
LEAF GATE
10 FT WIDE
RAILROAD BRIDGE
DAM SPILLWAY
142'±
CREST GATE
APPROXIMATE
COFFERDAM
HEAD POND NORMAL
WSL EL 52.2 FT
ICE HARBOR FISH LADDER
POOLS 12 FT WIDE BY 10 FT
ATTRACTION FLOW CHANNEL
KENNEBEC RIVER
DAM SPILLWAY
530'±
TAIL WATER NORMAL
WSL EL 32.0 FT
KENNEBEC RIVER
U.S. ROUTE 202 BRIDGE

ACCESS PERMISSION STATEMENT

Access Permission Statement

Lockwood Hydroelectric Project
Upstream Fish Passage Facility
Access Permission Statement

The U. S. Army Corps of Engineers has permission to enter the project work site for inspection and other purposes during normal business hours. Merimil Limited Trust requests one business days' notice for access to the project site such that appropriate personnel may be present.

MERIMIL LIMITED TRUST

BY_____

Kelly Maloney
Manager, Licensing and Compliance

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION PERMIT APPLICATION ATTACHED SEPARATELY