FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

All sections must be addressed, or the application will be considered invalid

I. APPLICANT INFORMATION

A. Applicant Name: Clark Fork Coalition

Mailing Address: PO Box 7593

City: Missoula State: MT Zip: 59807

Telephone: (406) 550-5503 E-mail: brian@clarkfork.org

B. Contact Person (if different than applicant): Jed Whiteley

Address: PO Box 7593

City: Missoula State: MT Zip: 59807

Telephone: (406) 531-0256 E-mail: jed@clarkfork.org

C. Landowner and/or Lessee Name (if different than applicant): Bitter Root Irrigation District (BRID)

Mailing Address: 1182 Lazy J Lane

City: Corvallis State: MT Zip: 59828

Telephone: (406) 360-1565 E-mail: bigditchone@gmail.com

II. PROJECT INFORMATION

A. Project Name: BRID Diversion Fish Screen - Lost Horse Creek

River, stream, or lake: Lost Horse Creek

Location: Township: T4N Range: R21W Section: 18

Latitude: 46.1039 Longitude: -114.2591 *Within project (decimal degrees)*

County: Ravalli

B. Purpose of Project: *(high level, focus on why the project is important)*

The purpose of the BRID Diversion Fish Screen project is to increase wild trout populations in Lost Horse Creek and the Bitterroot River. This will be achieved by restoring critical habitat for bull trout and Westslope cutthroat trout in the upper Bitterroot River watershed by ending entrainment at the BRID diversion, thereby reconnecting more than 34 miles of essential fish habitat. Habitat fragmentation, dewatering, high water temperatures, and isolation of local populations have severely impacted bull trout in Lost Horse Creek, making connectivity and habitat restoration essential for their recovery. The project aligns with conservation objectives outlined in the Columbia Headwaters Recovery Unit Implementation Plan, the Montana Westslope Cutthroat MOU, and the Bitterroot Watershed Restoration Plan.

C. Brief Project Description (attach additional information to end of application). Please include the anticipated construction schedule:

The BRID Diversion Fish Screen project on Lost Horse Creek is a critical conservation project aimed at restoring native bull trout and Westslope cutthroat trout habitat in the upper Bitterroot River watershed. As part of a long-term program to remove barriers to fish passage, the project will install a 150 cfs Corrugated Water Screen (CWS) and replace a failing headgate on the BRID irrigation ditch, permanently preventing the annual entrainment of over 1,500 fish, reconnecting 34 miles of nearly pristine upstream habitat and stopping the loss of critical instream flow. By addressing habitat fragmentation and stream dewatering, this effort significantly enhances the resilience of native trout populations. The project builds upon past successful restoration work, including the installation of a siphon that ended the annual loss of 14,000 fish per year in the lower reaches of Lost Horse Creek. This project is part of a Lost Horse watershed wide restoration initiative led by the Clark Fork Coalition (CFC) in collaboration with the Bitterroot National Forest and multiple additional stakeholders—including federal and state agencies, conservation groups, and private donors. The initiative aligns with broader conservation goals outlined in the Columbia Headwaters Recovery Unit Implementation Plan and other strategic watershed restoration efforts. With completion anticipated by the end of 2025, the BRID screen project represents a major step toward long-term habitat connectivity and native fish recovery in the Bitterroot watershed.

Other restoration projects underway in the Lost Horse drainage include installing up to 4 additional fish screens on irrigation diversions, lining canals to increase irrigation efficiency, reducing sediment and increasing fish passage on 17 miles of Forest Service roads through BMP's and crossing upgrades, and increasing headwater storage in the Twin Lakes reservoirs to augment instream flows on the creek in August/September.

D. What was the cause of habitat degradation and how will the project correct the cause?

The degradation of bull trout and Westslope cutthroat trout habitat in the Bitterroot watershed, particularly in Lost Horse Creek, has been caused by several key factors, including habitat fragmentation, dewatering, high water temperatures, isolation of local populations, and entrainment of fish into irrigation ditches. One of the most significant issues is entrainment due to the diversion of water for irrigation, which has led to the annual loss of thousands of native fish, limiting their ability to migrate and access critical spawning and rearing habitats. This project will completely end losses of fish due to entrainment at the largest diversion on Lost Horse Creek.

E. Length of stream or size of lake that will be treated (project extent): 34 miles

Length/size of impact, if larger than project extent (e.g., stream miles opened): 34 miles

F. Project Budget Summary:

Grant Request (Dollars):	**$**	100,000.00
Matching Dollars:	**$**	1,243,125.00
Matching In-Kind Services:*	**$**	

**salaries of government employees are not considered matching contributions*

Other Contributions (not used as match)	**$**	
Total Project Cost:	**$**	1,343,125.00

G. Attach itemized (line item) budget – *see budget template*

H. Attach project location map(s) that include:

- [■] Extent of the project, including context (relation to major landmark or town)
- [■] Indication of public and private property
- [ ] Riparian buffer locations and widths (if applicable) and grazing locations

I. Attach project plans:

- [■] Detailed sketches or plan views with the location and proposed restoration
- [■] Pre-project photographs (GPS location strongly recommended)
- [ ] If water leasing or water salvage is involved, attach a supplemental questionnaire (*https://myfwp.mt.gov/getRepositoryFile?objectID=36110*)

J. Attach letters or statements of support (e.g., landowner consent, community or public support). For FWP statement, attach provided template. List any other project partners:

Project partners: Bitter Root Irrigation District, Bitterroot National Forest, USFWS

III. MAINTENANCE AND MONITORING (attach additional information to end of application):

A. A 20-year maintenance commitment is required*. Please confirm that you will ensure this protection and describe your approach. Attach any relevant maintenance plans. Yes [■] No [ ]

**If it is a water leasing project, describe the length of the agreement.*

CFC will take responsibility for cleaning and maintaining the BRID screen for 20 years after the project is constructed. This will ensure that the screen is operated in the right configuration for the large variation in flows conveyed in the canal (4-150 cfs) and that it is kept clean so that irrigators receive their water. See pages 2-3 in the attached landowner agreement with BRID for specific language.

B. Will grazing be part of or adjacent to the project? If so, describe or attach land management plans, including short term and long term grazing regimes. If the landowner is not the applicant, please describe their involvement in the project. *If you want assistance with grazing plan development, note your need.*

There is no grazing associated with this project.

C. Will the project be monitored to determine if goals were met? If so, what are the short-term and long-term plans to assess benefits and lessons learned? Were pre-project data collected? Will monitoring information be shared with FWP?

CFC plans to work with Forest Service and FWP biologists to assess fish population responses to the project and to check that the screen is working properly and keeping 100% of fish out of the canal. Pre-project data was collected in 2006-2007 as part of a graduate student's study on entrainment on Lost Horse Creek and by USFS and FWP biologists. All post-project monitoring data will be shared with all project partners including FWP.

IV. PROJECT BENEFITS (attach additional information to end of application):

A. What species of fish will benefit from this project?

Bull trout, Westslope cutthroat trout, rainbow trout, brown trout, brook trout, and mountain whitefish.

B. How will the project protect or enhance wild fish habitat?

A key strategy behind CFC's work to improve the health and ecological functioning of the Bitterroot watershed focuses on improving connections between tributaries and the mainstem Bitterroot River, including the seasonal migration of fish within the system. On Lost Horse Creek, the BRID Ditch severely disrupts the connection for salmonids, because its water withdrawals make the ditch an irresistible channel – particularly for out-migrating fish. The project will completely end fish entrainment at the BRID Ditch diversion, retaining thousands of wild fish that would are currently lost to the system on a yearly basis.

C. What is the expected improvement to fish populations, both short term and long term? How might the project translate to angler success?

Based on the 2007 entrainment study completed by Leslie Bahn we expect an immediate positive result of an additional 1,500+ fish not being lost to the creek each year. Of these fish we expect Westslope cutthroat trout to be the species to be most positively impacted. The water rights associated with the BRID diversion includes a high water right that diverts up to 150 cfs of water out of Lost Horse Creek from May until mid-July; this has an outsized impact on migrating Westslope cutthroat trout. Replacing the leaking headgate will immediately lead to up to 20% more water in the creek at base flow during the summer, greatly increasing habitat available to fish downstream of the project and lowering water temperatures. All of this will translate to more catchable fish in Lost Horse creek and the Bitterroot River.

D. Will the project increase public fishing opportunity for wild fish and, if so, how? Is public fishing allowed onsite? Is it allowed by permission? If not, describe how the public would benefit.

Public benefits from this project will include: increased fish numbers, enhanced fishing opportunities and an improved tourism economy. The project takes place on U.S. Forest Service land and there is good public access to Lost Horse Creek starting several miles downstream of the project site and for the17 stream miles upstream of the project. Lost Horse Creek is a very popular destination for trout fishing in the Bitterroot valley.

E. Aside from angling, what local or large-scale public benefits will be realized from this project?

Recreational fishing has become an over $100 million dollar a year industry in the Bitterroot watershed and this project will enhance anglers' experiences, not only on Lost Horse Creek, but on the mainstem Bitterroot River as well.

F. Will the project interfere with water or property rights of adjacent landowners? (explain):

No water or property rights will be impacted by this project.

G. Will the project result in the development of commercial recreational use on the site (including paid access)? Explain:

Project will not result in the development of commercial recreational use on the site.

H. Is this project associated with the reclamation of past mining activity?

The project is not associated with reclamation of past mining activity.

Each approved project applicant must enter into a written agreement with Montana Fish, Wildlife & Parks specifying terms and duration of the project. The applicant must obtain all applicable permits prior to project construction. A competitive bid process must be followed when using State funds.

V. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature: Brian Chaffin Digitally signed by Brian Chaffin Date: 2025.05.15 16:47:40 -06'00' Date: 5/15/2025

Submittal: **Applications must be signed and received on or before November 15 and May 15 to be considered for the subsequent funding period**. Late or incomplete applications will be rejected.

Mail to:	FWP Future Fisheries Fish Habitat Bureau PO Box 200701 Helena, MT 59620-0701	Email:	Future Fisheries Coordinator FWPFFIP@mt.gov (electronic submissions must be signed) For files over 10MB, use https://transfer.mt.gov and send to mmcgree@mt.gov

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

Both tables MUST be completed appropriately or the application will be invalid. Please see the example budget sheet for clarification.

PROJECT COSTS					GRANT REQUEST AND FUNDING			
Work Items (Itemize by Category)	**Number of Units**	**Unit Description***	**Cost/Unit**	**Total Cost**	**FUTURE FISHERIES REQUEST**	**Matching Contributions (Cash or In-Kind)*** **	**Other Contributions (Funds not used as match)**	**Total Funding**
**Units = feet, hours, cubic yards, etc. Do not use lump sum unless necessary.*								
Personnel								
Survey	1	LS	$20,000.00	$ 20,000.00		20,000.00		$ 20,000.00
Design	1	LS	$20,000.00	$ 20,000.00		20,000.00		$ 20,000.00
Engineering	1	LS	$100,000.00	$ 100,000.00		100,000.00		$ 100,000.00
Permitting	1	LS		$ -				$ -
Oversight	1	LS	$30,000.00	$ 30,000.00		30,000.00		$ 30,000.00
Maintenance**	20	Year	$4,000.00	$ 80,000.00		80,000.00		$ 80,000.00
			Sub-Total	$ 250,000.00	$ -	$ 250,000.00	$ -	$ 250,000.00
Travel								
Mileage	1	LS	$2,000.00	$ 2,000.00		2,000.00		$ 2,000.00
Per diem				$ -				$ -
			Sub-Total	$ 2,000.00		$ 2,000.00	$ -	$ 2,000.00
Construction Materials								
Fish Screen	1	LS	$220,000.00	$ 220,000.00		220,000.00		$ 220,000.00
Concrete installed	112	yds	$3,150.00	$ 352,800.00	100,000.00	252,800.00		$ 352,800.00
Other materials installed	1	LS	$140,000.00	$ 140,000.00		140,000.00		$ 140,000.00
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
			Sub-Total	$ 712,800.00	$ 100,000.00	$ 612,800.00	$ -	$ 712,800.00
Equipment, Labor, and Mobilization								
Mobilization	1	LS	$77,500.00	$ 77,500.00		77,500.00		$ 77,500.00
Additional Equipment/Labor	1	LS	$427,385.00	$ 184,585.00		184,585.00		$ 184,585.00
Contingency	1	LS	$116,240.00	$ 116,240.00		116,240.00		$ 116,240.00
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

				$ -				$ -
				$ -				$ -
			Sub-Total	$ 378,325.00	$ -	$ 378,325.00	$ -	$ 378,325.00
			OVERALL TOTALS	$ 1,343,125.00	$ 100,000.00	$ 1,243,125.00	$ -	$ 1,343,125.00

OTHER REQUIREMENTS:

**For projects that include a maintenance request, it cannot exceed 10% of the total project cost.

***Match can include in-kind materials or labor. Justification for in-kind labor (e.g. hourly rates used) can be noted below. Do not use government salaries as match.

Additional budget detail: See attachmnet for detailed engineers construction estimate

APPLICATION MATCHING CONTRIBUTIONS

Total should equal match listed above; do not include requested funds

CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
US Forest Service	$ -	$ 863,125.00	$ 863,125.00	Y
USFWS	$ -	$ 200,000.00	$ 200,000.00	Y
Private donors	$ -	$ 100,000.00	$ 100,000.00	Y
To be determined (Maintenance $)	$ -	$ 80,000.00	$ 80,000.00	N
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ -	$ 1,243,125.00	$ 1,243,125.00	

OTHER CONTRIBUTIONS

Total should equal other contributions listed above; these are funds not specically matched to the Future Fisheries application

CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ -	$ -	$ -	

MONTANA FISH, WILDLIFE & PARKS

Future Fisheries Improvement Program

Appendix: FWP Statement

Project Title: BRID Diversion Fish Screen- Lost Horse Creek

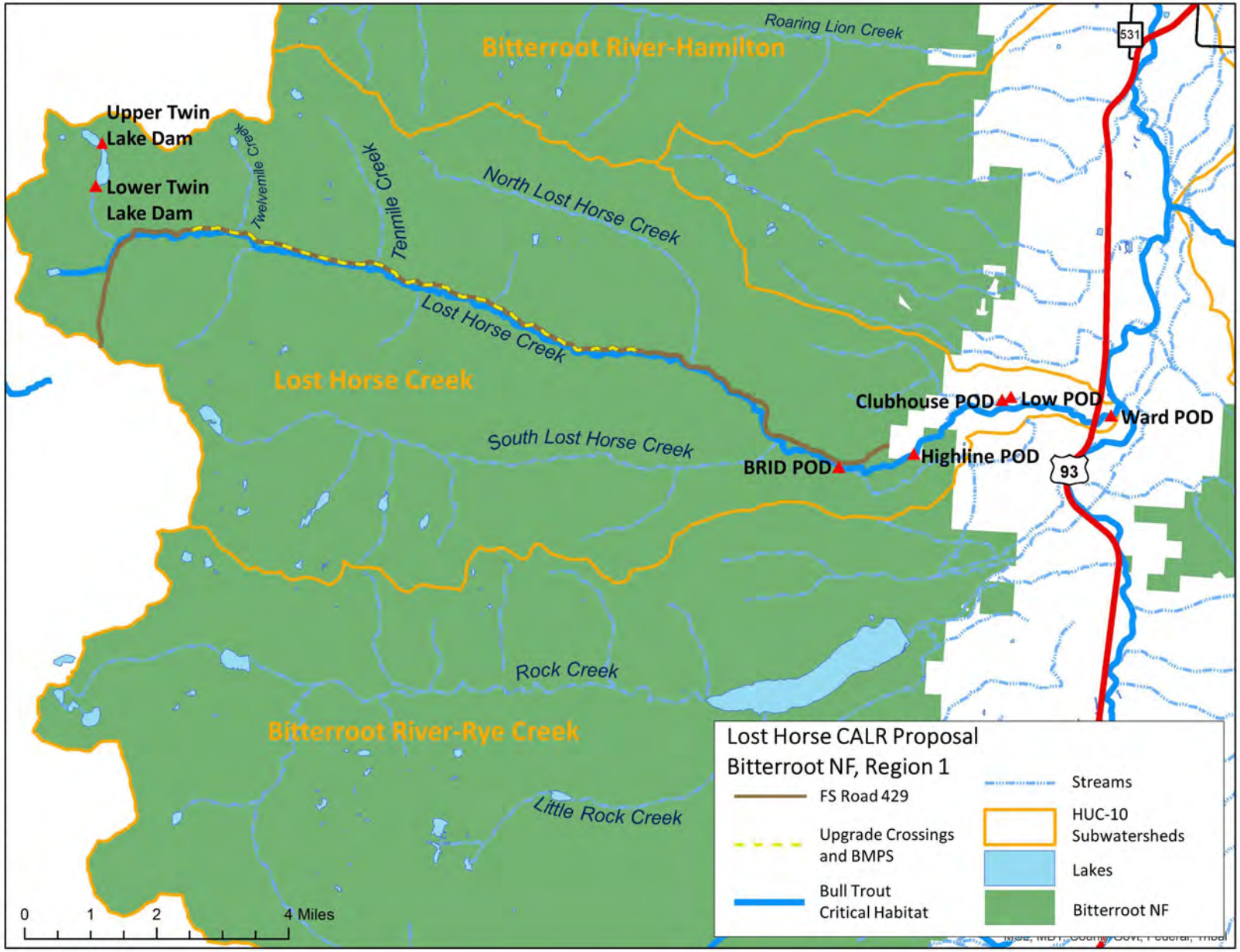
Please describe the potential impact of the project, including the priorities of the Fisheries Division and the importance to Montana's anglers.

Lost Horse Creek is a large tributary to the upper Bitterroot River. The stream provides an important source of trout recruitment to the Bitterroot River, especially native westslope cutthroat trout. The stream also provides a great opportunity for anglers seeking small stream fishing opportunities. Federally Threatened bull trout occupy upper Lost Horse Creek and non-native brook trout, rainbow trout and brown trout are found in the lower portion of the drainage. The current management direction in Lost Horse Creek is to conserve and enhance migratory and resident native trout populations.

The proposed fish screen project on the Bitter Root Irrigation District's Lost Horse Creek Diversion will eliminate or significantly reduce the entrainment of fish into this very large ditch. Past sampling and graduate student work has shown the ditch to entrain high numbers of salmonids. Installation and operation of this fish screen will have a direct benefit to trout recruitment in Lost Horse Creek and the Bitterroot River. The objectives of this project are in alignment with the current fish management strategy in the drainage.

Name of FWP Biologist Jason Lindstrom, R2 - Bitterroot Date: 5/16/2025

Please attach to the FFIP application and materials and submit according to listed deadlines.


Bitterroot River-Hamilton
Roaring Lion Creek
531
Upper Twin
Lake Dam
Lower Twin
Lake Dam
Twelvemile Creek
Tenmile Creek
North Lost Horse Creek
Lost Horse Creek
Lost Horse Creek
South Lost Horse Creek
Clubhouse POD
Low POD
Ward POD
Highline POD
BRID POD
93
Rock Creek
Bitterroot River-Rye Creek
Little Rock Creek
0 1 2 4 Miles
Lost Horse CALR Proposal
Bitterroot NF, Region 1
FS Road 429
Upgrade Crossings and BMPS
Bull Trout Critical Habitat
Streams
HUC-10 Subwatersheds
Lakes
Bitterroot NF

FLATHEAD
SALISH KOOTENAI
NATION

A Confederation of the Salish,
Pend d' Oreille
and Kootenai Tribes

THE CONFEDERATED SALISH AND KOOTENAI TRIBES
OF THE FLATHEAD NATION
P.O. BOX 278
Pablo, Montana 59855
(406) 275-2700
FAX (406) 275-2806
www.cskt.org

A People of Vision

June 1, 2023

RE: Lost Horse Watershed Passage and Water Quality Enhancement Plan

To whom it may concern,

I'm Les Evarts, the Fisheries Program Manager for the Confederated Salish and Kootenai Tribes (CSKT). I am writing to express the Program's support for the Lost Horse Watershed Passage and Water Quality Enhancement Plan being undertaken by the Clark Fork Coalition in partnership with the Bitterroot National Forest. We believe this initiative is of utmost importance in conserving and enhancing the ecological balance of the ancestral lands of the CSKT and protecting the cultural heritage that is deeply intertwined with Bull Trout.

For countless generations, Bull Trout have been an integral part of the tribes' traditional way of life. Unfortunately, over the years, Bull Trout dramatically declined due to a variety factors, including habitat degradation and fragmentation, water pollution, and the introduction of non-native species. This decline not only poses a threat to the Bull Trout but also impacts the overall health and vitality of our shared environment.

We commend the Clark Fork Coalition (CFC) for taking the initiative to restore the creeks and rivers of the Bitterroot watershed, and specifically the Lost Horse drainage. We recognize the expertise and dedication that they bring to this important endeavor. The conservation and restoration of Bull Trout goes hand-in-hand with maintaining the integrity of our rivers, lakes, and streams, as well as preserving the delicate balance of our ecosystem.

In conclusion, we express our wholehearted support for the Lost Horse Watershed Passage and Water Quality Enhancement Plan, and the vital work being carried out by CFC. Together, we can make a lasting impact in conserving our environment and restoring Bull Trout.

Thank you for your attention and consideration.

Sincerely,

Les Evarts
Fisheries Program Manager
Confederated Salish and Kootenai Tribes

United States Department of the Interior
Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225; Fax: (406) 449-5339

Jed Whiteley
Project Manager
Clark Fork Coalition
140 South 4th West, Suite 1
Missoula Mt 59801

June 7, 2023

Dear Mr. Whitely

The U.S. Fish and Wildlife Service (Service) would like to provide comments on the Collaborative-Based, Aquatic-Focused, Landscape Restoration (CALR) proposal for the Bitterroot National Forest (Lost Horse Creek). Bull trout and its critical habitat were listed under the Endangered Species Act in 1998 and 2010, respectively. Primary threats to bull trout recovery in the Bitterroot River bull trout Core Area include fragmentation from irrigation diversions, fish entrainment and reduced stream flows.

The Lost Horse Creek watershed supports one of the last remaining Local Populations of bull trout in the Bitterroot River Core Area. Lost Horse Creek offers a unique opportunity for bull trout recovery by providing for long term persistence of bull trout. The proposal will address many of the primary threats to bull trout recovery including water temperatures, flows and the loss of individuals from irrigation entrainment.

Therefore, the Service fully supports the actions outlined in the CALR proposal. The establishment of permanent fish screen and improved habitat conditions should result in increased genetic health and abundance to improve resiliency of the Lost Horse Creek population and the larger Bitterroot River Core Area population. If you have any questions, please do not hesitate to contact me. Thank you for your consideration to complete these important projects and planning efforts.

Sincerely,

Daniel Brewer

Daniel Brewer
Bull Trout Recovery Coordinator, Montana

CWS

Corrugated
Water
Screens

Quotation

From:
Corrugated Water Screens LLC
Specializing in Fish Protection Screens
16671 W 74 Ave.
Arvada, Colorado 80007
Telephone: (303)-990-7714

Date: 6-May-25

To:
Jed Whiteley
Restoration Director | Clark Fork Coalition
jed@clarkfork.org
PO Box 7593, Missoula, MT 59807
O: 406.550.5509 | C: 406.531.0256

Lost Horse Creek	Qty	ea.	Total
7' long CWS modules	30	$7,200.00	$216,000.00
Custom fish screening brushes.	2	$320.00	$640.00
1/8" Neoprene Gaskets	8	$75.00	$600.00
Stainless 4.5"x 7/16" bolts with nylock nuts	120	$4.90	$588.00
	Screen Total		$217,828.00
	Shipping estimate		$3,000.00
	Tax		$0.00
Total for all Items including estimated shipping			$220,828.00

Shipping cost is estimated. Shipping may be higher or lower than estimated.
The final invoice will show actual shipping charge
Screens are 304 stainless steel with 1/8" dia perforated plate @ 40 percent open area.
Screens include an adjustable bafffle.
This bid is valid for 45 days. Should the price of stainless steel increase more than 10% before the order is accepted, the increase will be added to the quote.

To accept this Quotation sign below and date
Signature Date

Terms: 50 percent down with the remainder due upon delivery or via special agreement at purchase
2 percent interest per month shall be applied to balance past 30 days of invoice

Note: Buyer is responsible for any state, county, city or other taxes that may apply.

GreatWest ENGINEERING

OPINION OF PROBABLE COST

PROJECT		DATE
CFC - Lost Horse Creek Fish Screen	***Corrugated Water Screen - 4-150 CFS***	***4/22/2025***

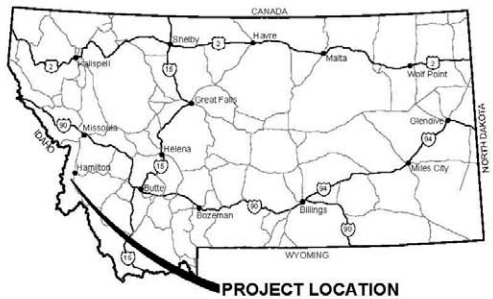
BID ITEMS

ITEM NO.	*DESCRIPTION*	*UNIT*	*QUANTITY*	*PRICE*	*AMOUNT*
1	Mobilization & Demobilization	Lump Sum	1	$77,500.00	$77,500.00
2	Construction Staking	Lump Sum	1	$20,000.00	$20,000.00
3	Preliminary Exploratory Excavation	Lump Sum	1	$2,000.00	$2,000.00
4	Erosion & Sediment Control (Includes Site Dewatering)	Lump Sum	1	$45,000.00	$45,000.00
5	Access Route Development	Lump Sum	1	$15,000.00	$15,000.00
6	Site Demolition	Lump Sum	1	$20,000.00	$20,000.00
7	Unclassified Excavation & Embankment	Lump Sum	1	$26,000.00	$26,000.00
8	Install 3"-Minus Structural Backfill Material	Cubic Yard	415	$50.00	$20,750.00
9	Furnish & Install 1"-Minus Bedding Material	Cubic Yard	49	$90.00	$4,410.00
10	Furnish & Install MDT Class I Riprap	Cubic Yard	128	$175.00	$22,400.00
11	Furnish & Install MDT Class II Riprap	Cubic Yard	57	$200.00	$11,400.00
12	Furnish & Install Cast-In-Place Concrete	Cubic Yard	112	$3,150.00	$352,800.00
13	Install Corrugated Water Fish Screens & Appurtenances	Lump Sum	1	$28,000.00	$28,000.00
14	Furnish & Install Fish Screen Access Walkways	Lump Sum	1	$50,000.00	$50,000.00
15	Furnish & Install Steel Trash Rack	Lump Sum	1	$8,000.00	$8,000.00
16	Furnish & Install 4'-6" x 4'-6" Stainless Steel Slide Gate	Each	2	$10,000.00	$20,000.00
17	Furnish & Install 2'-0" x 2'-6" Stainless Steel Slide Gate	Each	1	$6,000.00	$6,000.00
18	Furnish & Install 12" Dia. Cast Iron Canal Gate	Each	1	$3,000.00	$3,000.00
19	Furnish & Install 24" Dia. Cast Iron Canal Gate	Each	1	$5,000.00	$5,000.00
20	Furnish & Install 12" Dia. Sch 40 PVC Pipe	Linear Feet	65	$75.00	$4,875.00
21	Furnish & Install 24" Dia. Sch 40 PVC Pipe	Linear Feet	65	$150.00	$9,750.00
22	Furnish & Install Steel Low Flow Measurement Weir	Lump Sum	1	$5,000.00	$5,000.00
23	Furnish & Install Chain Link Fencing	Lump Sum	1	$18,000.00	$18,000.00
			SUBTOTAL:		**$774,885.00**
			CONTINGENCY (15%)		**$116,240.00**
			TOTAL W/CONTINGENCY:		**$891,125.00**

ESTIMATE BY:
Evan Carroll, P.E.

CHECKED BY:
Ryan Elliott, P.E.

This Opinion of Probable Cost is the opinion of the engineer of the probable construction cost, and is supplied as a guide only. Since the engineer has no control over the costs of labor and materials or over competitive bidding and market conditions, the engineer does not guarantee the accuracy of such opinion as compared to contractor's bids or actual costs to the owner. Estimate is calculated in 2025 dollars.

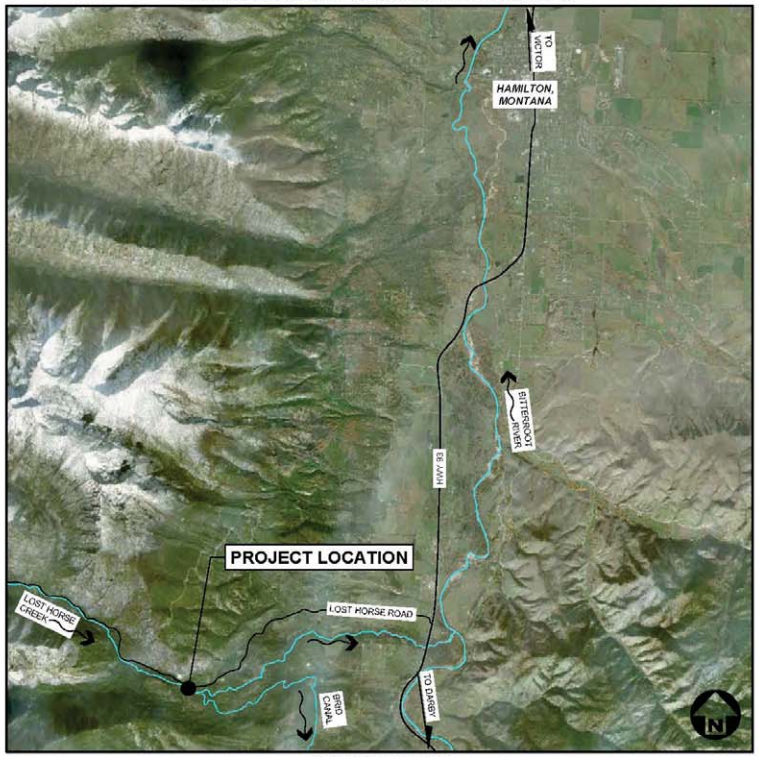


STATE MAP - MONTANA

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT

CONSTRUCTION PLANS

SECTION 18, TOWNSHIP 4N, AND RANGE 21W
LATITUDE: 46.10035556° N, LONGITUDE: -114.25908611° W



SCALE: 1" = 2 MILES

PLANS PREPARED FOR:

CLARK FORK COALITION

DESIGNED BY:

EVAN CARROLL, P.E.
GREAT WEST ENGINEERING

MONTANA — EVAN A. CARROLL — 90607PE — 12-1205 — LICENSED PROFESSIONAL ENGINEER

REVIEWED BY:

RYAN ELLIOTT, P.E.
GREAT WEST ENGINEERING

MONTANA — RYAN ELLIOTT — 23790PE — 12-1205 — LICENSED PROFESSIONAL ENGINEER

GreatWest ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406)449-8627

SHEET INDEX

PROJECT: 1-21322
DATE: APRIL 22, 2026

NO.	REVISION DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			
6			

SET NO.

SHEET NO. 1

Y:\Shared\Helena Projects\1-21322 - CFC - Lost Horse Fish Screen\CADD 1-21322\Sheets\1-21322-01-Cover.dwg

ABBREVIATIONS

@	AT	LONG	LONGITUDINAL
Δ	ANGLE OF DEFLECTION, DELTA ANGLE	LPG	LIQUID PROPANE GAS
<PT	ANGLE POINT	LT	LEFT
AB	ANCHOR BOLT	MAX	MAXIMUM
ABDN	ABANDON	MD	MEASURE DOWN
AC	ASBESTOS CONCRETE	MFD	MANUFACTURED
ADDN	ADDITIONAL	MFR	MANUFACTURE, MANUFACTURER
ADJ	ADJACENT	MH	MANHOLE
AFF	ABOVE FINISHED FLOOR	MIN	MINIMUM
ALT	ALTERNATE	MISC	MISCELLANEOUS
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MJ	MECHANICAL JOINT
APPROX	APPROXIMATE	MOV	MOTOR OPERATED VALVE
APVD	APPROVED	MPWSS	MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
ARCH	ARCHITECTURE, ARCHITECTURAL	N	NORTH
ASPH	ASPHALT	NE	NORTHEAST
AVE	AVENUE	NG	NATURAL GAS
AVG	AVERAGE	NIC	NOT IN CONTRACT
BFV	BUTTERFLY VALVE	NO	NUMBER
BLDG	BUILDING	NOM	NOMINAL
BLK	BLOCK	NTS	NOT TO SCALE
BLVD	BOULEVARD	NW	NORTHWEST
BM	BEAM, BENCHMARK	OC	ON CENTER
BOT	BOTTOM	OD	OUTSIDE DIAMETER
BRG	BEARING	OF	OVERFLOW
BRKT	BRACKET	OH	OVERHEAD
BVC	BEGIN VERTICAL CURVE	OHP	OVERHEAD POWER
C-C	CENTER TO CENTER	OHT	OVERHEAD TELEPHONE
CHAN	CHANNEL	OPNG	OPENING
CHK	CHECK	PC	POINT OF CURVATURE
CI	CAST IRON	PCC	POINT OF COMPOUND CURVATURE
CIPC	CAST-IN-PLACE CONCRETE	PE	PLAIN END, POLYETHYLENE
CIRC	CIRCULAR	PERP	PERPENDICULAR
CJ	CONSTRUCTION JOINT, CONTROL JOINT	PI	POINT OF INTERSECTION
℄	CENTER LINE	P	PROPERTY LINE
CLR	CLEAR, CLEARANCE	PNL	PANEL
CMP	CORRUGATED METAL PIPE	PRC	POINT OF REVERSE CURVATURE
CMU	CONCRETE MASONRY UNITS	PREFAB	PREFABRICATED
CO	CLEANOUT	PRELIM	PRELIMINARY
COL	COLUMN	PREP	PREPARE, PREPARATION
CONC	CONCRETE	PROP	PROPERTY
CONSTR	CONSTRUCTION	PRV	PRESSURE REDUCING VALVE
CONT	CONTINUE, CONTINUED, CONTINUOUS	PSF	POUNDS PER SQUARE FOOT
CONTR	CONTRACTOR	PSI	POUNDS PER SQUARE INCH
COORD	COORDINATE	PT	POINT, POINT OF TANGENCY
CP	CONTROL PANEL, CONTROL POINT	PVC	POLYVINYL CHLORIDE
CPLG	COUPLING	PVI	POINT OF VERTICAL INTERSECTION
CTR	CENTER	PVMT	PAVEMENT
CTV	CABLE TELEVISION	R	RADIUS
CU	CUBIC, COPPER	RL RAD	RAILROAD
CF	CUBIC FEET	RC	REINFORCED CONCRETE
CULV	CULVERT	RCP	REINFORCED CONCRETE PIPE
CY	CUBIC YARD	RD	ROAD
DET	DETAIL	RDCR	REDUCER
DI	DUCTILE IRON, DRAIN INLET	REBAR	REINFORCEMENT BAR
DIA, ⌀	DIAMETER	REF	REFERENCE
DIAG	DIAGONAL	REINF	REINFORCE
DIM	DIMENSION	REQD	REQUIRED
DR	DRIVE	RR	RAILROAD
DWG	DRAWING	RST	REINFORCING STEEL
		RT	RIGHT
E	EAST	R/W	RIGHT-OF-WAY
EA	EACH	S	SOUTH, SANITARY SEWER
EL, ELEV	ELEVATION	SAN	SANITARY
ELB	ELBOW	SCH	SCHEDULE
ELEC	ELECTRIC, ELECTRICAL	SD	STORM DRAIN
ENCL	ENCLOSE	SDWK	SIDEWALK
ENGR	ENGINEER	SE	SOUTHEAST
EOP	EDGE OF PAVEMENT	SECT	SECTION
EQ	EQUAL, EQUALLY	SF	SQUARE FOOT
EQ SP	EQUALLY SPACED	SHT	SHEET
EQUIP	EQUIPMENT	SIM	SIMILAR
EQUIV	EQUIVALENT	SLP	SLOPE
EVC	END VERTICAL CURVE	SPEC	SPECIFICATION
EW	EACH WAY	SQ	SQUARE
EXC	EXCAVATE	SSTL	STAINLESS STEEL
EXP	EXPANSION	STA	STATION
EXP JT	EXPANSION JOINT	SS	SANITARY SEWER SERVICE
EXST	EXISTING	STD	STANDARD
		ST	STREET
FCV	FLOW CONTROL VALVE	STL	STEEL
FD	FLOOR DRAIN	STRUCT	STRUCTURE
FDN	FOUNDATION	SW	SOUTHWEST
FES	FLARED END SECTION	SYM	SYMMETRICAL
FET	FLARED END TERMINAL		
FF	FINISHED FLOOR	TB	THRUST BLOCK
FG	FINISH GRADE	TBC	TOP BACK OF CURB
FHYD	FIRE HYDRANT	TBM	TEMPORARY BENCH MARK
FJ	FLANGE JOINT	TEL	TELEPHONE
FL	FLOW LINE	TEMP	TEMPORARY
FLEX	FLEXIBLE	THRU	THROUGH
FM	FORCEMAIN	TRANS	TRANSVERSE
FT	FOOT, FEET	TYP	TYPICAL
FO	FIBER OPTIC		
FTG	FOOTING, FITTING	UG	UNDERGROUND
		UGP	UNDERGROUND POWER
G	NATURAL GAS	UGT	UNDERGROUND TELEPHONE
GA	GAGE, GAUGE	UTIL	UTILITY
GAL	GALLON		
GALV	GALVANIZED	V	VALVE, VOLT
GND	GROUND	VB	VALVE BOX
GVL	GRAVEL	VERT	VERTICAL
		VOL	VOLUME
HB	HOSE BIB		
HDPE	HIGH DENSITY POLYETHYLENE	W	WEST, WATER
HOR, HORIZ	HORIZONTAL	WTR	WATER
HWY	HIGHWAY	WD	WOOD
HYD	HYDRANT	W/	WITH
		W/O	WITHOUT
ID	INSIDE DIAMETER	WL	WETLAND
IE	INVERT ELEVATION	WM	WIRE MESH, WATER METER
IN	INCH	WS	WATERSTOP, WATER SURFACE, WATER SERVICE
INV	INVERT	WT	WEIGHT
		WWF	WELDED WIRE FABRIC
JB	JUNCTION BOX	WWM	WELDED WIRE MESH
JT	JOINT		
		XFMR	TRANSFORMER
K	RATE OF VERTICAL CURVATURE	X-ING	CROSSING
		XS	CROSS SECTION
LBS	POUNDS	YD	YARD
LF	LINEAR FEET		
LN	LANE		

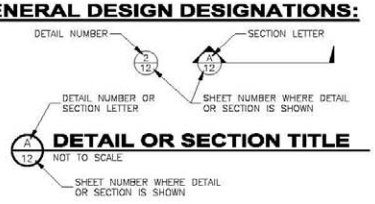
LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		MAJOR CONTOUR			STUMP
		MINOR CONTOUR			SHRUB/BUSH
OHT	OHT	OVERHEAD TELEPHONE			TREE-CONIFER
UGT	UGT	UNDERGROUND TELEPHONE			TREE-DECIDUOUS
CTV	CTV	CABLE TELEVISION			TREE LINE
FO	FO	FIBER OPTIC	C	C	COMMUNICATION MANHOLE
G	G	NATURAL GAS	C	C	COMMUNICATION VAULT
OHP	OHP	OVERHEAD POWER			TELEPHONE RISER
UGP	UGP	UNDERGROUND POWER	TV	TV	CABLE TV RISER
S	S	SANITARY SEWER			NATURAL GAS METER
SS SS SS	SS SS SS	SANITARY SEWER SERVICE	G	G	NATURAL GAS RISER
FM	FM	SANITARY SEWER FORCEMAIN			NATURAL GAS VALVE
SD	SD	STORM DRAIN			LIGHT POLE
		STORM CULVERT			STREET LIGHT POLE
W	W	WATER	P	P	POWER RISER
WS WS SW	WS WS SW	WATER SERVICE	P	P	PAD MOUNTED TRANSFORMER
		CHAINLINK FENCE	P	P	POWER VAULT
X X X	X X X	BARBED WIRE FENCE			UTILITY POLE
		WOOD FENCE			GUY WIRE
		PAVED ROAD	S	S	SANITARY MANHOLE
		GRAVEL ROAD	CO	CO	SANITARY CLEANOUT
		PROPERTY/LOT LINE			SANITARY LAMPHOLE
		PROPERTY EASEMENT	ST	ST	STORM MANHOLE
		PROPERTY SETBACK			STORM ROUND INLET
		RIGHT-OF-WAY			STORM SQUARE INLET
		CITY LIMIT/DISTRICT BOUNDARY			STORM CATCH BASIN
		RAILROAD			11.25° ELBOW
		DITCH			22.50° ELBOW
		WATER EDGE			45° ELBOW
WL		WETLAND			90° ELBOW
		BUILDING			TEE
		BENCHMARK			CROSS
		CONTROL POINT			CAP
		PROPERTY PIN			FIRE HYDRANT
		BORING			GATE VALVE
		MONITORING WELL			REDUCER
		TEST PIT	W	W	WATER METER
		BOLLARD			WELL
		MAIL BOX			CURB STOP
		SIGN			FROST FREE HYDRANT

GENERAL NOTES:

1. THIS IS A STANDARD LEGEND AND ABBREVIATION LIST. THEREFORE, NOT ALL SYMBOLS AND ABBREVIATIONS MAY BE USED ON THIS PROJECT.
2. UNLESS MODIFIED BY THE CONTRACT DOCUMENTS, ALL WORK WILL CONFORM TO THE MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS, SEVENTH EDITION, APRIL 2021 (REFERRED TO COLLECTIVELY AS MPWSS).
3. EXISTING UNDERGROUND UTILITIES SHOWN ARE FROM THE BEST INFORMATION AVAILABLE AT THE TIME THE CONSTRUCTION DOCUMENTS WERE PREPARED AND SURVEY OCCURRED. THIS INFORMATION IS APPROXIMATE AND MAY BE INCOMPLETE. OWNER AND ENGINEER ARE NOT TO BE HELD LIABLE FOR DAMAGED UTILITIES. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES. FOR ACCURATE LOCATION, THE CONTRACTOR SHALL CONTACT, PRIOR TO EXCAVATION, THE UTILITIES UNDERGROUND LOCATION CENTER AT: 1-800-424-5555.
4. MINIMIZE, TO THE MAXIMUM EXTENT POSSIBLE, IMPACTS TO TREES AND VEGETATION WITHIN AND ADJACENT TO THE CONSTRUCTION AREA. WHERE PRACTICABLE, EXISTING TREES AND VEGETATION SHOULD BE LEFT IN PLACE TO FACILITATE NATURAL REGENERATION AND SOIL STABILIZATION. CONSTRUCTION EQUIPMENT TRACKS AND PATHWAYS SHALL BE GRADED AND RECONTOURED AFTER CONSTRUCTION TO PREVENT RILL AND GULLY EROSION. THIS WORK IS INDIRECT TO APPLICABLE BID ITEMS, AND NO SEPARATE PAYMENT SHALL BE MADE.

GENERAL DESIGN DESIGNATIONS:



NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
2911 BELT VIEW DRIVE
HELENA, MT 59601
(406) 442-5627

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
GENERAL NOTES, LEGEND & ABBREVIATIONS

SHEET NO.
2
OF 21

Y:\Shared\Helena Projects\1-21322- CFC - Lost Horse Fish Screen\CADD 1-21322\Sheets\1-21322-02-General.dwg

TOTAL ESTIMATED QUANTITIES (TEQ)

Bid Item No.	Description	Unit	Quantity	Remarks*
1	Mobilization & Demobilization	Lump Sum	1	
2	Construction Staking	Lump Sum	1	
3	Preliminary Exploratory Excavation	Lump Sum	1	Includes two test pits to be dug in the canal after dewatering and prior to material placement. Pits are assumed to be a maximum of 8' deep and shall be dug while the Engineer is present. Intent of test pits is to evaluate subsurface soils to determine suitability. Test pits must be backfilled and compacted with native materials.
4	Erosion & Sediment Control (Includes Site Dewatering)	Lump Sum	1	Includes all dewatering necessary for removal of the existing headgate and placement of the new headgate, fish screen, fish returns, and riprap.
5	Access Route Development	Lump Sum	1	Includes grading and compaction of canal banks to cross from FSR 13290 to the BRID Canal Access Road. Also includes necessary vegetation removal and cleanup of deleterious material.
6	Site Demolition	Lump Sum	1	Includes removal of the existing concrete headgate structure, as well as disposal and/or salvage of the existing headgate components. Contractor shall coordinate with BRID to determine which items should be salvaged to BRID and which can be legally disposed of.
7	Unclassified Excavation & Embankment	Lump Sum	1	Includes all excavation necessary for installation of the new headgate structure, fish screen structure, low flow measurement weir, and fish returns, as well as embankment for the fish returns. Estimated excavation quantity = 869 CY; Estimated fish return embankment quantity = 85 CY.
8	Install 3"-Minus Structural Backfill Material	Cubic Yard	415	Includes structural backfill of new headgate structure, new fish screen structure, and new low flow measurement weir. All structural backfill to be sourced from suitable onsite excavated material. Material sorting and screening will be required to meet gradation requirements. Refer to Section 02300 of the Project Specifications for additional requirements.
9	Furnish & Install 1"-Minus Bedding Material	Cubic Yard	49	Includes all bedding material under new headgate structure, new fish screen structure, and new fish returns. Inlcudes geotextile below bedding material.
10	Furnish & Install MDT Class I Riprap	Cubic Yard	128	Includes any excavation and embankment required to install riprap to the grades and lines shown on these Drawings. Includes geotextile below riprap.
11	Furnish & Install MDT Class II Riprap	Cubic Yard	57	Includes any excavation and embankment required to install riprap to the grades and lines shown on these Drawings. Includes geotextile below riprap.
12	Furnish & Install Cast-In-Place Concrete	Cubic Yard	112	Includes concrete reinforcement, waterstops, construction joints, blockouts, stopboard channels, and casting components into the concrete as shown on these Drawings.
13	Install Corrugated Water Fish Screens & Appurtenances	Lump Sum	1	Owner-furnished fish screen panels and hardware will be delivered to the site and installed by the Contractor. Includes furnishing and installing timber stopboards and gaskets, furnishing and installing stainless steel divider plates, as well as furnishing and installing all angles, plates, and fasteners required to construct the fish return weir.
14	Furnish & Install Fish Screen Access Walkways	Lump Sum	1	Includes steel bar grating, fasteners, supports, welding, handrails, and appurtenances.
15	Furnish & Install Steel Trash Rack	Lump Sum	1	Includes all steel angles, HSS, plates, fasteners, and appurtenances.
16	Furnish & Install 4'-6" x 4'-6" Stainless Steel Slide Gate	Each	2	Includes framing, handwheel, appurtenances, and attachment to concrete.
17	Furnish & Install 2'-0" x 2'-6" Stainless Steel Slide Gate	Each	1	Includes framing, handwheel, appurtenances, and attachment to concrete.
18	Furnish & Install 12" Dia. Cast Iron Canal Gate	Each	1	Includes framing, handwheel, appurtenances, and attachment to concrete.
19	Furnish & Install 24" Dia. Cast Iron Canal Gate	Each	1	Includes framing, handwheel, appurtenances, and attachment to concrete.
20	Furnish & Install 12" Dia. Sch 40 PVC Pipe	Linear Feet	65	Includes pipe supply, gaskets, lubricants, and installation at the grades shown on these Drawings.
21	Furnish & Install 24" Dia. Sch 40 PVC Pipe	Linear Feet	65	Includes pipe supply, gaskets, lubricants, and installation at the grades shown on these Drawings.
22	Furnish & Install Steel Low Flow Measurement Weir	Lump Sum	1	Includes steel plate, chamfering, and installation.
23	Furnish & Install Chain Link Fencing	Lump Sum	1	Includes chain link material, support posts, rails, tension bars, truss rods, barbed wire and supports, tension wires, gate hinges, and concrete footings.

*Refer to General Requirements for further descriptions on work inclusions.

PROJECT NOTES:

1. ALL OWNER FURNISHED ITEMS TO BE DELIVERED TO THE PROJECT SITE. CONTRACTOR SHALL COORDINATE WITH THE OWNER. REFER TO SECTION 00500 GENERAL REQUIREMENTS.
2. ANY TRASH, DEBRIS, OR OTHER DELETERIOUS MATERIALS SHALL BE HAULED OFF-SITE AND DISPOSED OF PER ALL LOCAL, STATE, AND FEDERAL GUIDELINES. THIS WORK IS INDIRECT TO APPLICABLE BID ITEMS.
3. CONTRACTOR SHALL DEWATER WORK AREAS (IF SURFACE/GROUNDWATER FLOWS EXIST) PRIOR TO CONSTRUCTION. MEANS AND METHODS OF DEWATERING TO BE DETERMINED BY THE CONTRACTOR. AREAS THAT WILL REQUIRE DEWATERING INCLUDE BUT ARE NOT LIMITED TO: THE CONCRETE FISH SCREEN STRUCTURE, THE CONCRETE HEADGATE STRUCTURE, AND THE FISH RETURN PIPES. CONTRACTOR SHALL PREPARE AND SUBMIT A DEWATERING PLAN TO THE OWNER AND ENGINEER FOR APPROVAL PRIOR TO STARTING CONSTRUCTION. ALL WORK ASSOCIATIED WITH DEWATERING IS INCLUDED IN THE EROSION & SEDIMENT CONTROL BID ITEM.
4. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE SAFETY ASSOCIATED WITH THE WORK UNDER THIS PROJECT AND WITH COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL HEALTH AND SAFETY LAWS, CODES, REGULATIONS, AND ORDINANCES INCLUDING BUT NOT LIMITED TO THOSE CURRENTLY MANDATED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).
5. PROJECT OWNER (OWNER) IS "CLARK FORK COALITION" (CFC). LANDOWNER IS "UNITED STATES FOREST SERVICE" (USFS). THE CANAL AND DRAINAGE EASEMENT ARE OPERATED BY "BITTERROOT RIVER IRRIGATION DISTRICT" (BRID). ALL PROJECT WORK IS OCCURRING ON FEDERAL USFS LANDS.

EARTHWORK NOTES:

1. ALL EXCAVATION, TRENCHING, AND SHORING NECESSARY FOR ANY CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.
2. EXCAVATION VOLUMES SHOWN THROUGHOUT PLANS ARE ESTIMATES AND FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR TO CONFIRM ACTUAL QUANTITIES FOR BIDDING. NO SHRINK/SWELL FACTORS HAVE BEEN APPLIED.
3. PROPER DRAINAGE SHALL BE MAINTAINED DURING CONSTRUCTION TO KEEP SURFACE WATER RUNOFF (OR FROM SATURATED SOILS) FROM ENTERING THE EXCAVATIONS.
4. 3"-MINUS STRUCTURAL BACKFILL SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF 8" AND COMPACTED TO 95% OF ASTM D698.
5. STRUCTURAL BACKFILL SHALL BE COMPLETED TO WITHIN 3" OF THE TOP OF ALL WALLS.
6. CONTRACTOR SHALL TIE INTO EXISTING GRADE WITH 2:1 SLOPES WHERE POSSIBLE. MAXIMUM FINISH GRADE SLOPE SHALL BE 1.5:1. CONTRACTOR SHALL PROVIDE 4' FLAT AREAS AROUND STRUCTURES AND 2:1 FILL SLOPES TO EXISTING GROUND.
7. IF ON-SITE MATERIALS ARE SPECIFIED FOR USE; DRYING, SORTING, AND SCREENING OF THIS MATERIAL MAY BE NECESSARY TO MEET PROJECT SPECIFICATIONS.
8. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

RIPRAP NOTES:

1. MDT CLASS I AND CLASS II RIPRAP SHALL MEET THE REQUIREMENTS IN SECTION 02378 OF THE PROJECT SPECIFICATIONS.
2. CONTRACTOR MAY SALVAGE SUITABLE ONSITE ROCK/RIPRAP FOR USE AS RIPRAP IN LOCATIONS SHOWN ON THESE PLANS, ONLY FROM EXCAVATED MATERIALS. SORTING OF THESE MATERIALS MAY BE NECESSARY TO MEET PROJECT SPECIFICATIONS.

HYDRAULIC NOTES:

1. HYDRAULIC ANALYSIS OF THE SYSTEM HAS BEEN PERFORMED UTILIZING A TWO-DIMENSIONAL HEC-RAS MODEL (VERSION 6.5).
2. HYDRAULIC CHARACTERISTICS OF THE FISH SCREEN REQUIRE MORE THAN THE DESIRED AMOUNT OF IRRIGATION WATER TO BE DIVERTED INTO THE DITCH UPSTREAM OF THE SCREEN TO ACCOUNT FOR FISH RETURN BYPASS FLOW. AT THE MAXIMUM FLOW OF 150 CFS (IRRIGATION), AN INFLOW OF 175 CFS THROUGH THE HEADGATE IS REQUIRED TO ALLOW FOR 25 CFS OF FISH RETURN BYPASS FLOW. APPROXIMATELY 800 CFS OF FLOW IN LOST HORSE CREEK (UPSTREAM OF HEADGATE) IS REQUIRED TO ACHIEVE THIS INFLOW.

CAST-IN-PLACE CONCRETE NOTES:

PLACEMENT:

1. UNLESS SHOWN OTHERWISE, ALL EXPOSED CONCRETE EDGES ARE TO BE CHAMFERED ¾".
2. CONCRETE SHALL BE f'c OF 4000 PSI AT 28 DAYS. CONCRETE FOR FISH SCREEN STRUCTURE AND HEADGATE STRUCTURE SHALL BE MDT CLASS "STRUCTURE". REFER TO GENERAL REQUIREMENTS.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS SUITABLE FOR CONSTRUCTION BEFORE CONCRETE PLACEMENT, INLCUDING THESE DRAWINGS AND ANY MANUFACTURER'S DRAWINGS FOR ANY MATERIAL THAT IS REQUIRED TO BE EMBEDDED AS PART OF THE PLACEMENT.
4. CONTRACTOR SHALL SUBMIT A CONCRETE POUR PLAN TO SHOW SEQUENCING AND LOCATIONS OF ALL WATERSTOPS AND JOINTS FOR ENGINEER APPROVAL PRIOR TO BEGINNING CONCRETE WORK. THIS WORK IS INDIRECT TO THE CAST-IN-PLACE CONCRETE BID ITEM.
5. DIMENSIONS SHOWN FOR DEPTHS OF RECESSES ARE FROM THE SURFACE OF THE STRUCTURAL CONCRETE. THICKNESSES SHOWN FOR SLABS AND WALLS THAT ARE ADJACENT TO UNDISTURBED SOIL ARE THE MINIMUM DIMENSIONS.
6. BACKFILL SHALL NOT BE PLACED AGAINST CONCRETE WALLS UNTIL THE CONCRETE HAS OBTAINED SPECIFIED 28-DAY COMPRESSIVE STRENGTH.
7. REFER TO SECTION 03150 OF THE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

REINFORCEMENT:

1. ALL CONCRETE REINFORCING SHALL CONFORM TO ASTM A615, GRADE 60.
2. MINIMUM CLEARANCE FOR REINFORCEMENT BARS, UNLESS NOTED OTHERWISE, SHALL BE 3". IN LOCATIONS WHERE ONLY ONE MAT OF REBAR IS REQUIRED, REINFORCEMENT BARS SHALL BE CENTERED IN THE WALL OR SLAB.
3. THE FIRST AND LAST BARS IN WALLS AND SLABS SHALL START AND END AT A MAXIMUM SPACING OF ONE HALF OF THE ADJACENT BAR SPACING.
4. ALL REINFORCEMENT BARS REQUIRING BENDING SHALL BE BENT AROUND A PIN WITH A DIAMETER OF 2½", UNLESS OTHERWISE SPECIFIED.
5. SPACERS, BAR SUPPORTS, AND OTHER ACCESSORIES NECESSARY TO INSTALL THE REINFORCEMENT BARS ARE NOT SHOWN ON THE DESIGN DRAWINGS. CONTRACTOR SHALL FOLLOW RECOMMENDATIONS OF THE MOST RECENT ACI DETAILING MANUAL (MNL-66(20)) OR OTHER APPROVED SUPPORTING SYSTEMS.
6. REFER TO SECTION 03200 OF THE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

STRUCTURAL STEEL:

1. PLATES SHALL MEET ASTM A36, Fy=36 KSI.
2. TUBES SHALL MEET ASTM A500 GRADE B, Fy=50 KSI.
3. PIPES SHALL MEET ASTM A501 OR A53, GRADE B.
4. BOLTS SHALL MEET ASTM A325-N. HEADED OR BENT ANCHOR BOLTS SHALL MEET ASTM A307. PROVIDE WASHERS AND NUTS AS REQUIRED IN THE DETAILS.
5. UNLESS NOTED OTHERWISE, ALL STEEL FABRICATIONS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION. REFER TO THE DETAILS FOR PAINTING/FINISHING REQUIREMENTS.

WELDING:

1. WELDS SHALL CONFORM TO AWS D1.1 LATEST EDITION OR AS SPECIFIED. BUTT JOINT WELDS TO BE COMPLETED BY COMPLETE JOINT PENETRATION (CJP) PROCESS UNLESS INDICATED OTHERWISE.
2. REPAIR WELDS FOUND DEFECTIVE IN ACCORDANCE WITH AWS D1.1, 5.26.
3. USE LOW HEAT INPUT FOR WELDS OF EMBED PLATES AND ANGLES TO AVOID SPALLING OR CRACKING OF CONCRETE.

CONNECTIONS:

1. ADHESIVE ANCHORS SHALL UTILIZE INJECTABLE ADHESIVE HILTI HIT-RE 500-SD FOR CONCRETE OR APPROVED EQUAL.
2. SCREW ANCHORS SHALL MEET ASTM B 633, CLASS SC1, TYPE III SIMPSON TITEN HD OR APPROVED EQUAL.

NOTE: STAKING INFORMATION WILL BE PROVIDED TO THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

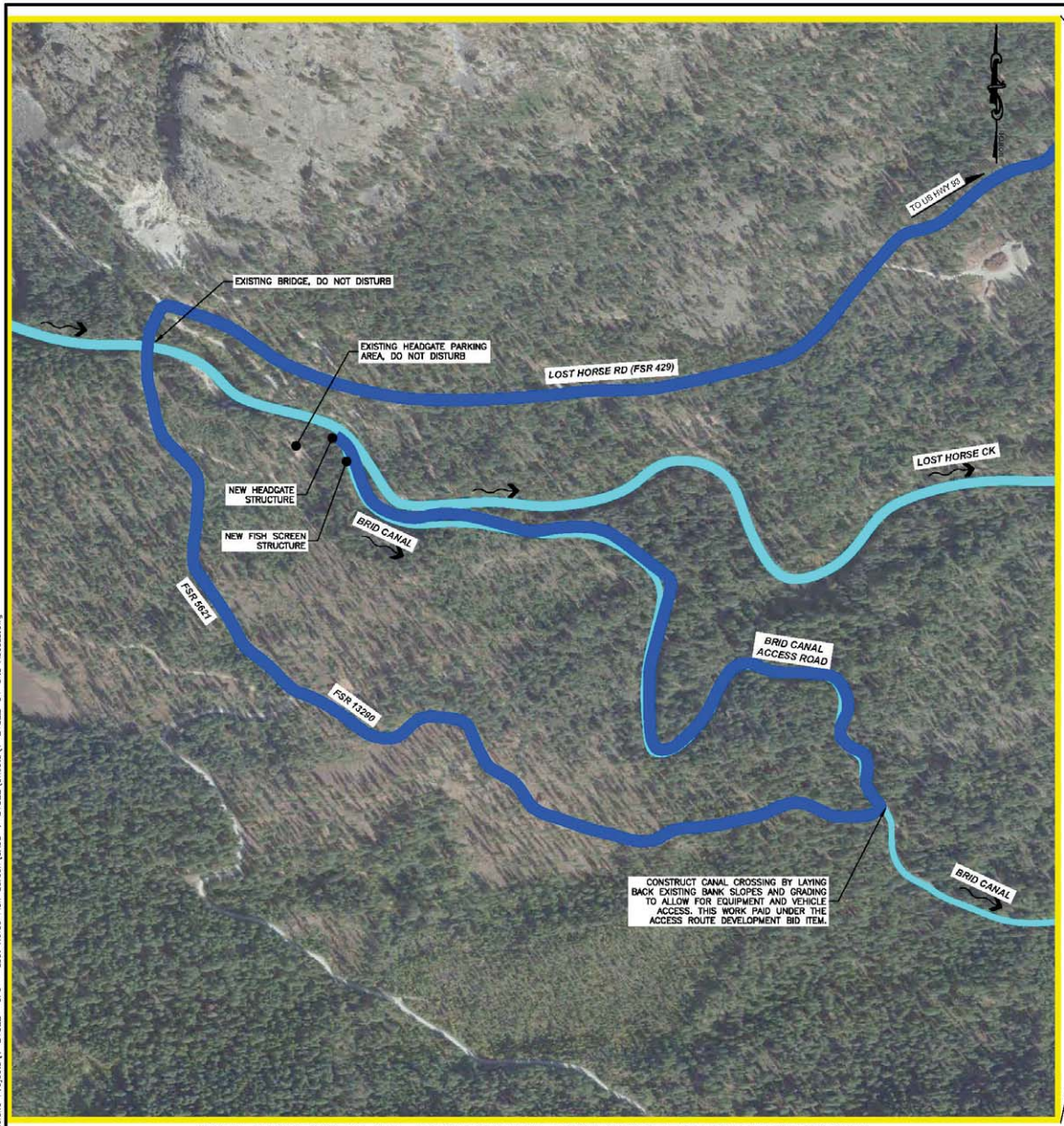
NO.	REVISION DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
ENGINEERING
2911 BELT VIEW DRIVE
HELENA, MT 59601
(406) 442-5627

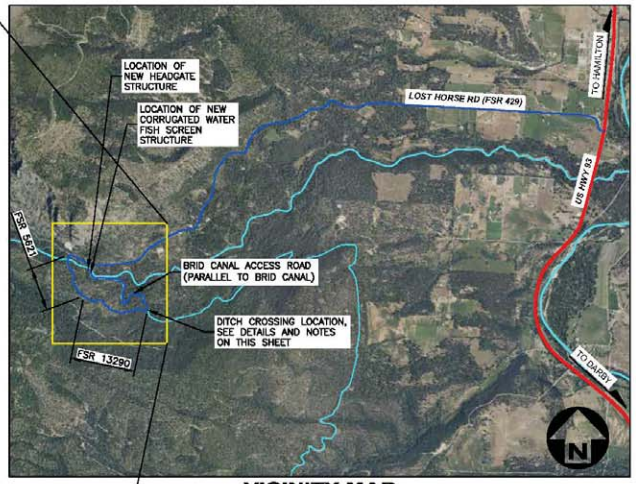
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
QUANTITIES TABLE & PROJECT NOTES

SHEET NO.
3
OF 21



SITE ACCESS PLAN - BRID CANAL FISH SCREEN AND HEADGATE

0 250 500
SCALE IN FEET



VICINITY MAP

0 2500 5000
SCALE IN FEET

PHOTO: BRID CANAL AT CROSSING LOCATION

SITE ACCESS NOTES:

1. CONTRACTOR TO ACCESS SITE USING EXISTING FOREST SERVICE ROADS AND THE EXISTING PRIVATE ACCESS ROAD ADJACENT TO THE BRID CANAL. TOTAL ACCESS ROUTE DISTANCE IS 6.50 MILES FROM THE INTERSECTION OF LOST HORSE ROAD AND US HWY 93 TO THE PROJECT SITE.
2. GRADING OF THE EXISTING CANAL BANKS WILL BE REQUIRED AT THE LOCATION WHERE FSR 13290 CROSSES THE BRID CANAL IN ORDER TO ACCESS THE SITE. CONTRACTOR SHALL LAY BACK SLOPES AND COMPACT THE ROADWAY SURFACE IN ORDER TO SAFELY MOVE EQUIPMENT, VEHICLES, AND PERSONNEL TO THE SITE. ROADWAY COMPACTION SHALL BE COMPLETED USING VIBRATORY ROLLER COMPACTION EQUIPMENT. OPERATE EQUIPMENT ON THE FULL ROADWAY WIDTH UNTIL THERE IS NO VISIBLE EVIDENCE OF FURTHER CONSOLIDATIONS. THIS WORK IS PAID UNDER THE ACCESS ROUTE DEVELOPMENT BID ITEM.
3. CONTRACTOR SHALL AVOID DAMAGING ANY EXISTING FENCES, GATES, AND SIGNAGE WHILE ACCESSING SITE. ANY DAMAGE TO EXISTING INFRASTRUCTURE SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR OWN EXPENSE.
4. VEGETATION REMOVAL OR GRADING OF PRIVATE ACCESS ROAD MAY BE NECESSARY TO MOVE EQUIPMENT, VEHICLES, AND PERSONNEL TO THE SITE SAFELY. WHERE PRACTICABLE, EXISTING TREES AND VEGETATION SHOULD BE LEFT IN PLACE. CONSTRUCTION EQUIPMENT TRACKS AND PATHWAYS SHALL BE GRADED AND RECONTOURED AFTER CONSTRUCTION TO PREVENT RILL AND GULLY EROSION. THIS WORK IS PAID UNDER THE ACCESS ROUTE DEVELOPMENT BID ITEM.
5. EQUIPMENT AND MATERIAL SHALL BE STAGED DIRECTLY ADJACENT TO THE BRID CANAL ACCESS ROAD IN THE VICINITY OF THE NEW HEADGATE AND FISH SCREEN STRUCTURES.
6. IMPROVEMENTS TO THE EXISTING BRID CANAL ACCESS ROAD, INCLUDING GRADING AND COMPACTION, MAY BE REQUIRED IN ORDER TO SAFELY MOVE EQUIPMENT, VEHICLES, AND PERSONNEL TO THE SITE. MATERIAL PLACEMENT IS NOT ANTICIPATED TO BE REQUIRED FOR SITE ACCESS. IF MATERIAL PLACEMENT IS REQUIRED, CONTACT THE OWNER AND ENGINEER IMMEDIATELY. NO IMPROVEMENTS SHALL BE MADE TO EXISTING FOREST SERVICE ROADS WITHOUT EXPRESS WRITTEN PERMISSION FROM FOREST SERVICE PERSONNEL. ALL SITE ACCESS IMPROVEMENTS ARE PAID UNDER THE ACCESS ROUTE DEVELOPMENT BID ITEM.
7. CONTRACTOR IS RESPONSIBLE FOR CLEANUP OF ALL DELETERIOUS MATERIAL WITHIN THE WORK AREA, ACCESS ROUTE, AND STAGING AREAS. CONTRACTOR SHALL CLEAN UP ANY TRACKED MUD ON LOST HORSE ROAD THAT OCCURS FROM CONSTRUCTION ACTIVITIES.

NO.	REVISION DESCRIPTION	BY	DATE

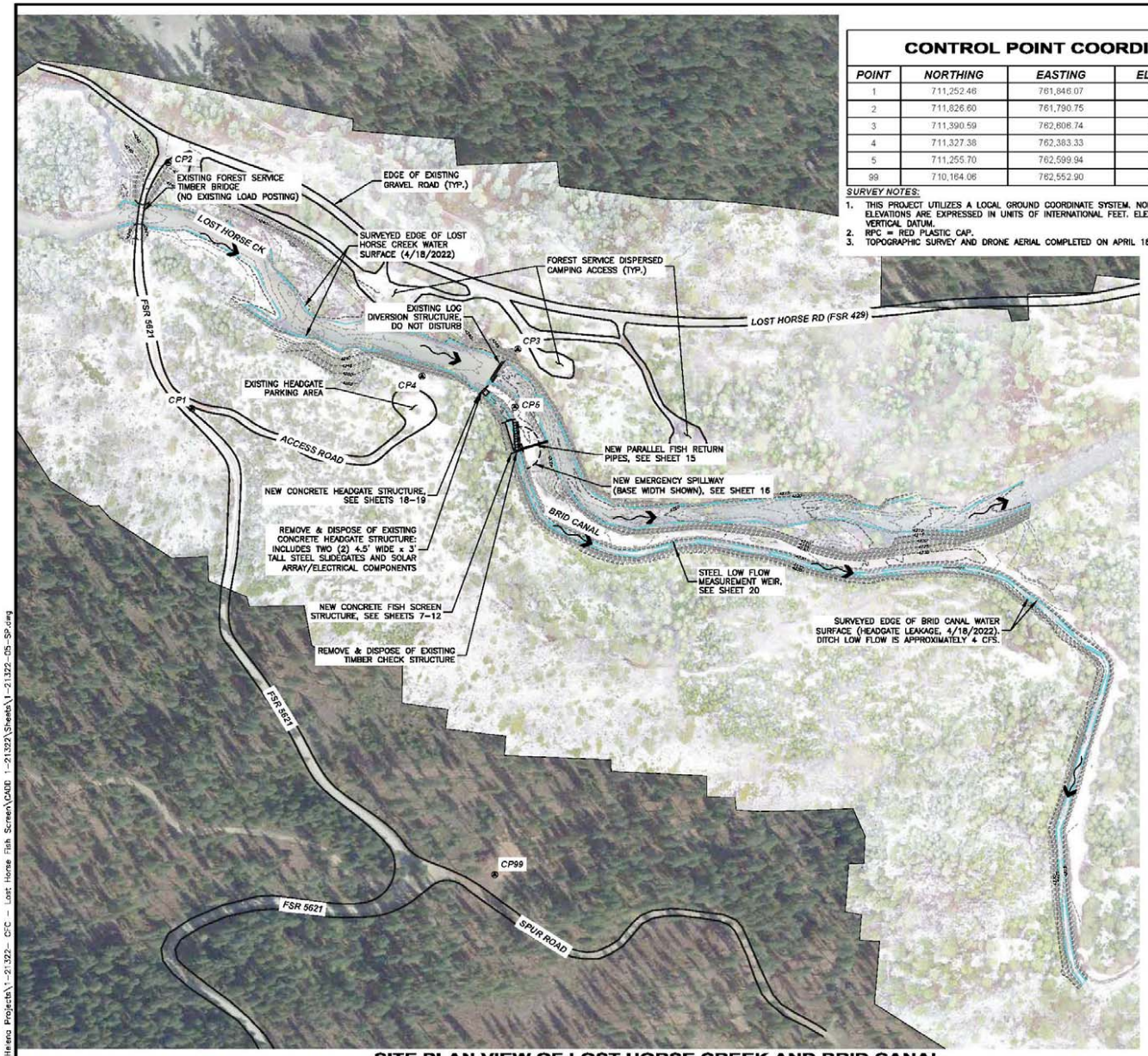
PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

Great West Engineering
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406)495-5007

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
SITE ACCESS PLAN

SHEET NO.
4
OF 21

Y:\Shared\Helena Projects\1-21322 - CFC - Lost Horse Fish Screen\CADD 1-21322\Sheets\1-21322-04-Site Access.dwg



SITE PLAN VIEW OF LOST HORSE CREEK AND BRID CANAL

0 125 250
SCALE IN FEET

CONTROL POINT COORDINATE TABLE

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	711,252.46	761,846.07	4,262.87	REBAR W/ RCP
2	711,826.60	761,790.75	4,247.77	REBAR W/ RCP
3	711,390.59	762,608.74	4,251.15	REBAR W/ RCP
4	711,327.38	762,383.33	4,248.90	REBAR W/ RCP
5	711,255.70	762,599.94	4,236.01	REBAR W/ RCP
99	710,164.06	762,552.90	4,307.32	REBAR W/ RCP

SURVEY NOTES:

1. THIS PROJECT UTILIZES A LOCAL GROUND COORDINATE SYSTEM. NORTHING AND EASTING COORDINATES AND ELEVATIONS ARE EXPRESSED IN UNITS OF INTERNATIONAL FEET. ELEVATIONS ARE REFERENCED TO THE NAVD88 VERTICAL DATUM.
2. RPC = RED PLASTIC CAP.
3. TOPOGRAPHIC SURVEY AND DRONE AERIAL COMPLETED ON APRIL 18, 2022.

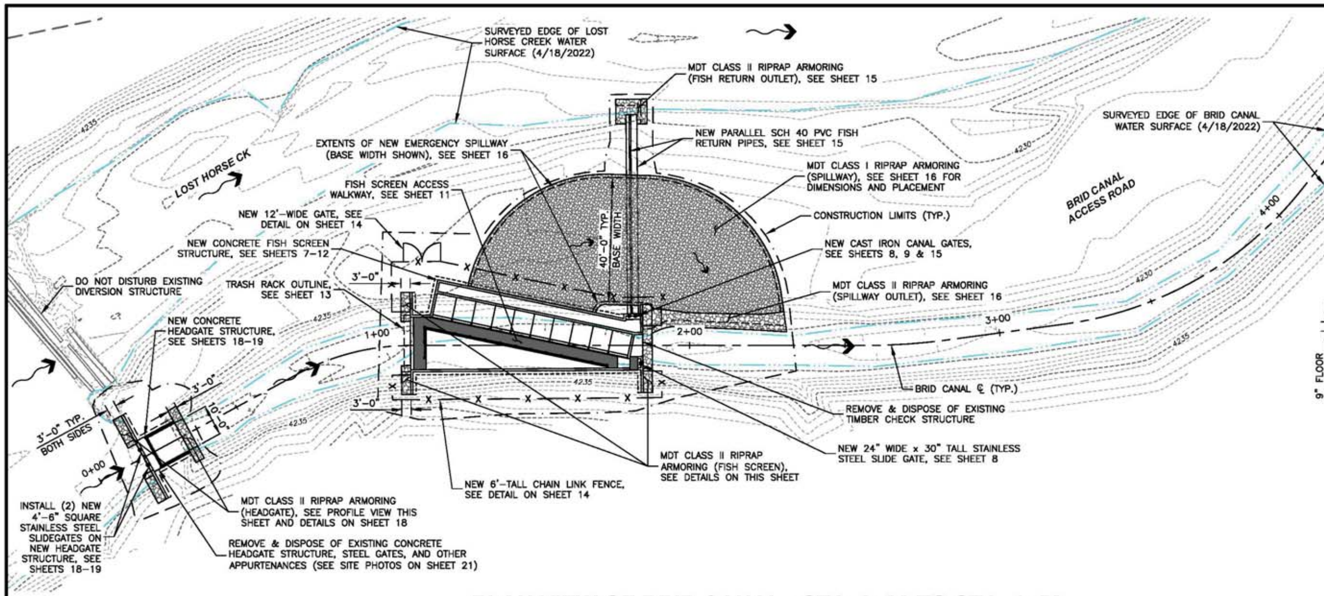
NO.	REVISION DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			
99			

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406) 449-8627

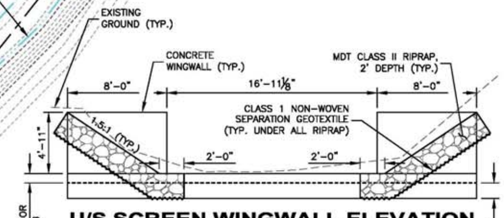
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
SITE PLAN & CONTROL TABLE

SHEET NO.
5
OF 21



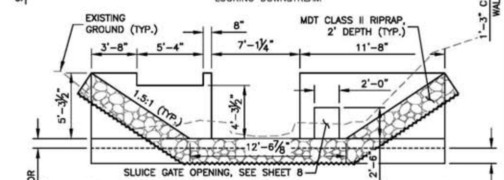
PLAN VIEW OF BRID CANAL - STA. 0+00 TO STA. 4+50

0 20 40
SCALE IN FEET



U/S SCREEN WINGWALL ELEVATION

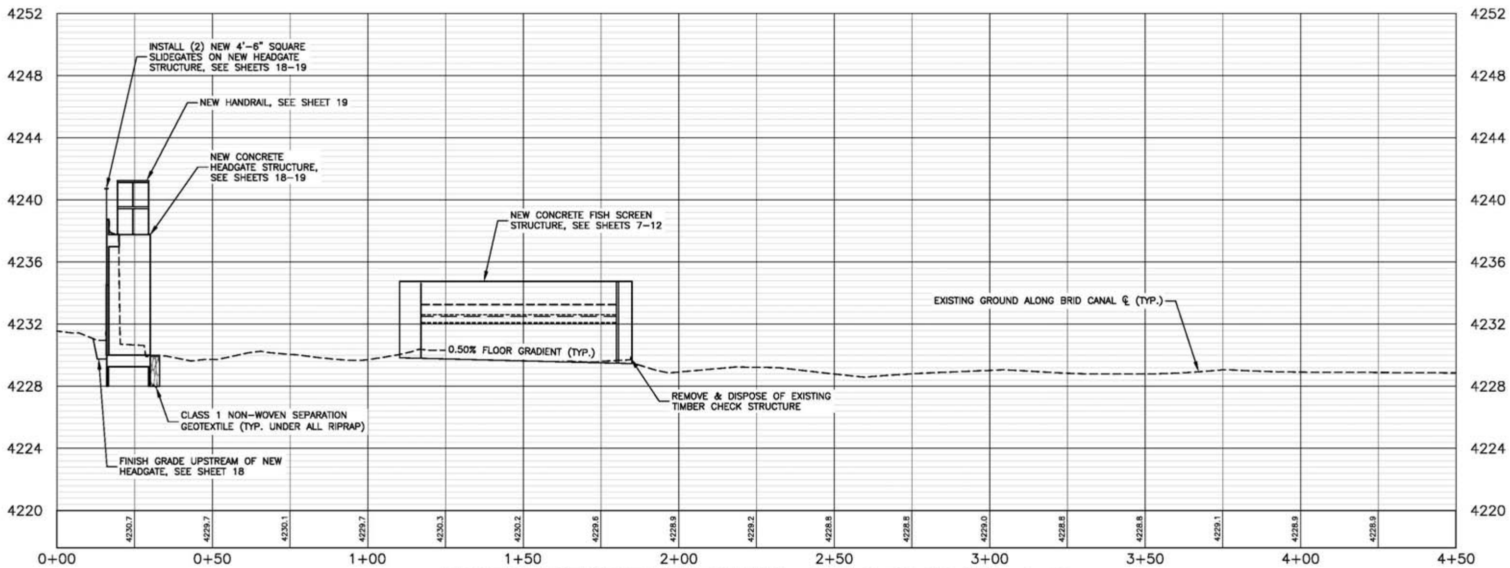
SCALE: 1" = 10'-0"
LOOKING DOWNSTREAM



D/S SCREEN WINGWALL ELEVATION

SCALE: 1" = 10'-0"
LOOKING DOWNSTREAM

NOTE: CONCRETE REINFORCING BARS NOT SHOWN FOR CLARITY, SEE SHEETS 8 & 9



PROFILE VIEW OF BRID CANAL - STA. 0+00 TO STA. 4+50

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 20'

NOTE: FENCING NOT SHOWN FOR CLARITY.

SITE DEMOLITION NOTES:

1. FOOTING CONFIGURATION AND CONCRETE SLAB THICKNESSES OF THE EXISTING HEADGATE STRUCTURE ARE NOT KNOWN. CONTRACTOR IS RESPONSIBLE FOR FULL REMOVAL AND OFFSITE DISPOSAL OF THE EXISTING CONCRETE HEADGATE STRUCTURE, STEEL GATES AND FRAMES, SOLAR ARRAY AND HOUSING, AND OTHER APPURTENANCES. CONTRACTOR SHALL COORDINATE WITH OWNER TO DETERMINE IF ANY ITEMS SHOULD BE SALVAGED.
2. FOOTING CONFIGURATION OF THE EXISTING TIMBER CHECK STRUCTURE IS NOT KNOWN. CONTRACTOR IS RESPONSIBLE FOR FULL REMOVAL AND OFFSITE DISPOSAL OF THE EXISTING TIMBER CHECK STRUCTURE.
3. ALL REMOVAL AND OFFSITE DISPOSAL OR SALVAGE OF EXISTING INFRASTRUCTURE IS PAID UNDER THE SITE DEMOLITION BID ITEM.

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406)449-8627

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
BRID CANAL PLAN & PROFILE

SHEET NO.
6
OF 21

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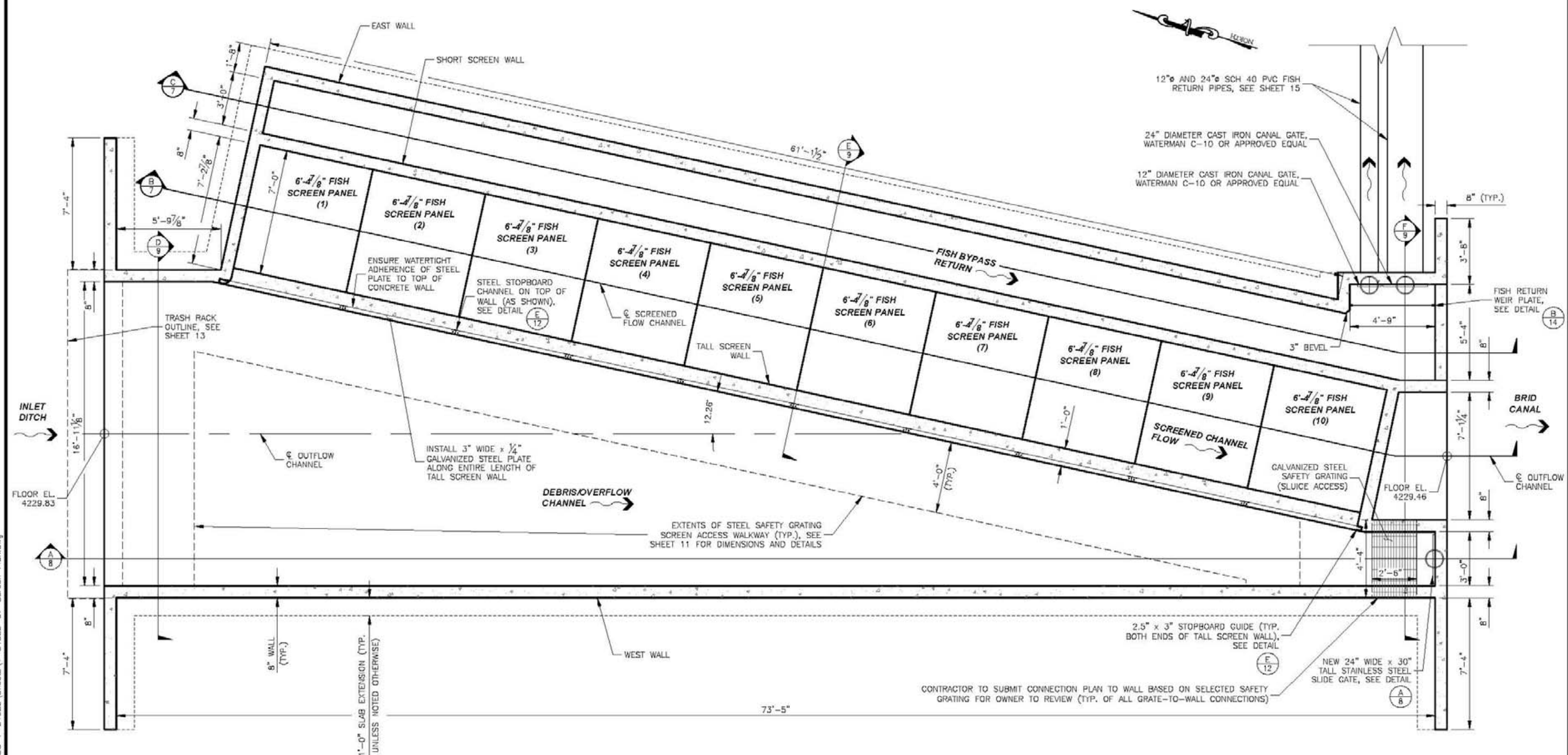

PLAN VIEW OF FISH SCREEN

SCALE: 1" = 6'-0"

ESTIMATED QUANTITIES FOR FISH SCREEN*

ITEM	QUANTITY	
EXCAVATION	391	CY
3"-MINUS STRUCTURAL BACKFILL	275	CY
1"-MINUS BEDDING	35	CY
SEPARATION GEOTEXTILE**	227	SY
CAST-IN-PLACE CONCRETE	90	CY
MDT CLASS II RIPRAP	12	CY

*FOR INFORMATIONAL PURPOSES ONLY

**INDIRECT TO RIPRAP AND 1"-MINUS BEDDING BID ITEMS

NOTES:

1. INTERIOR WALLS AND FLOORS TO HAVE SMOOTH FINISH.
2. ALL WELDS SHALL BE COMPLETED IN A SHOP ENVIRONMENT.
3. REFER TO SHEETS 8 & 9 FOR FLOOR AND WALL ELEVATIONS.
4. REFER TO SHEET 14 FOR FENCING PLAN AND DETAILS.

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
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CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT

FISH SCREEN PLAN

SHEET NO. 7 OF 21

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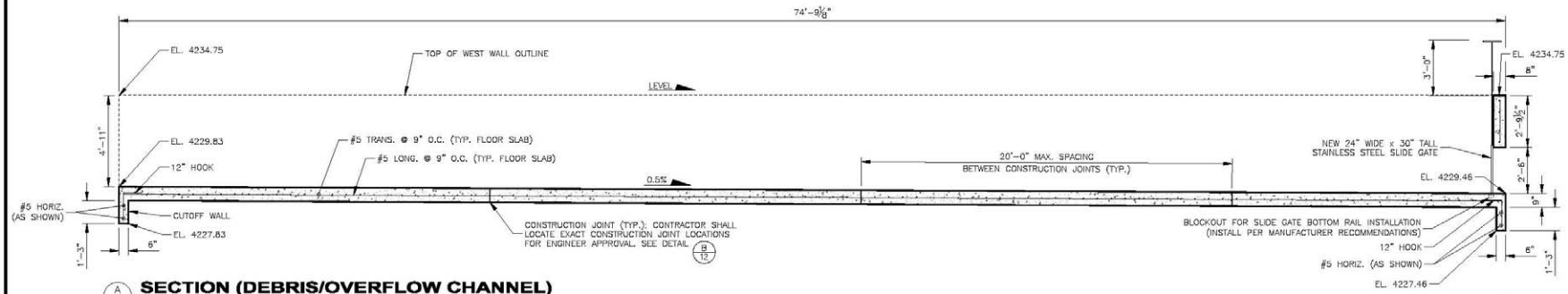
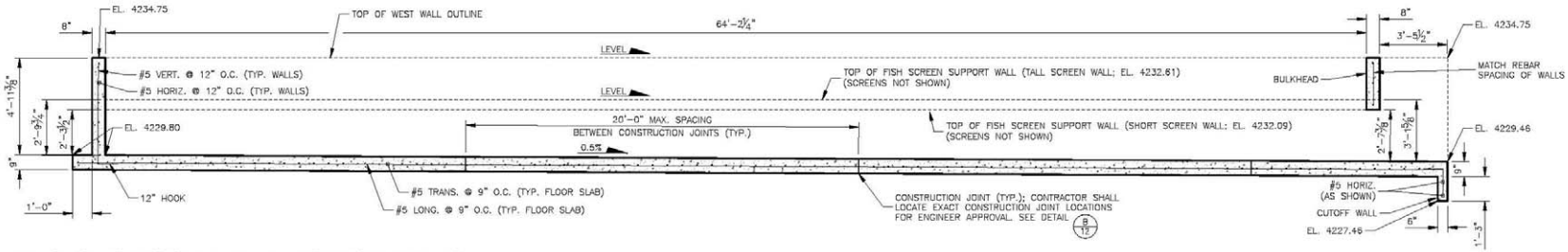


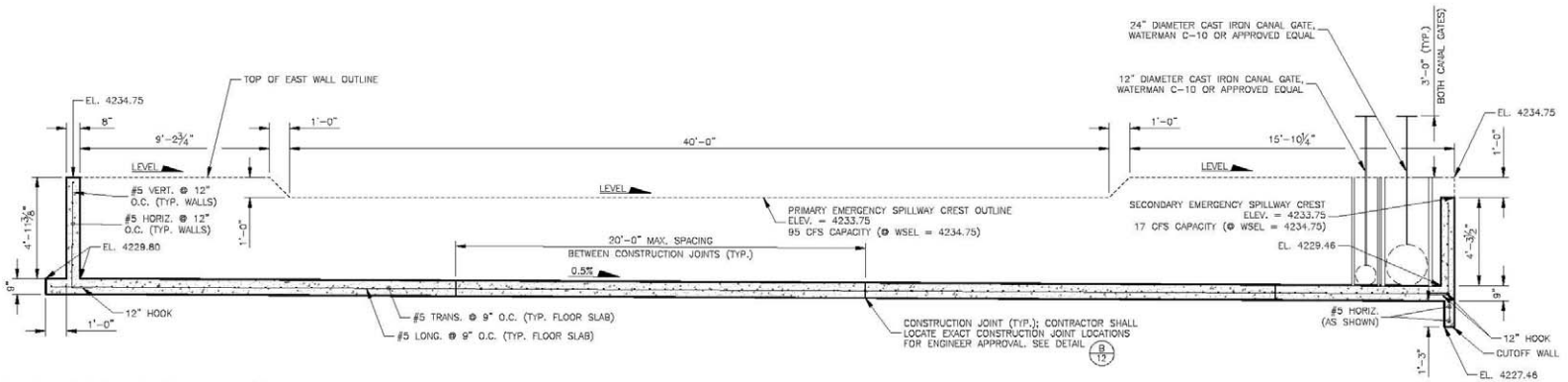
A/8 SECTION (DEBRIS/OVERFLOW CHANNEL)

SCALE: 1" = 6'-0"



B/8 SECTION (SCREENED FLOW CHANNEL)

SCALE: 1" = 6'-0"



C/8 SECTION (FISH RETURN)

SCALE: 1" = 6'-0"

NOTE: SCREEN WALKWAYS AND HANDRAILS NOT SHOWN ON SECTIONS FOR CLARITY; *REFER TO SHEET 11*

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest ENGINEERING
291 BELT VIEW DRIVE
HELENA, MT 59601
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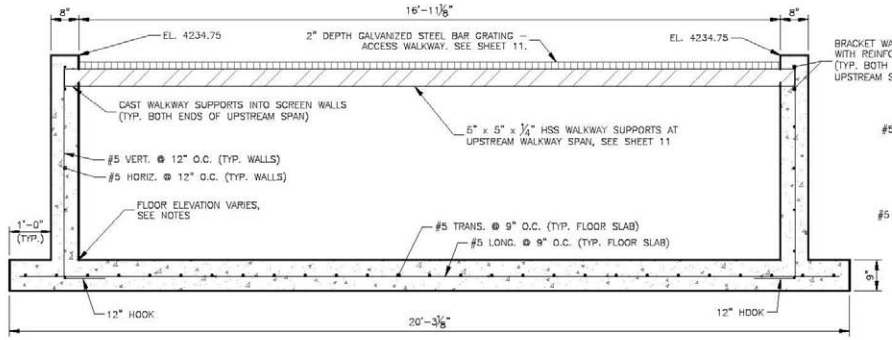
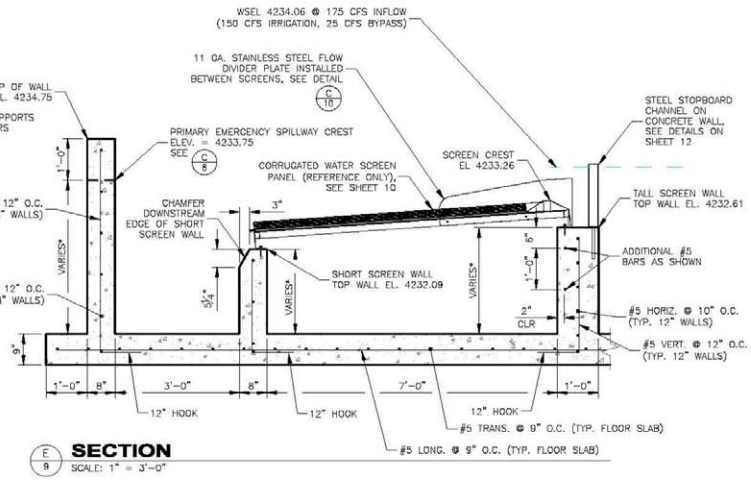
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FISH SCREEN SECTIONS

SHEET NO.
8
OF 21

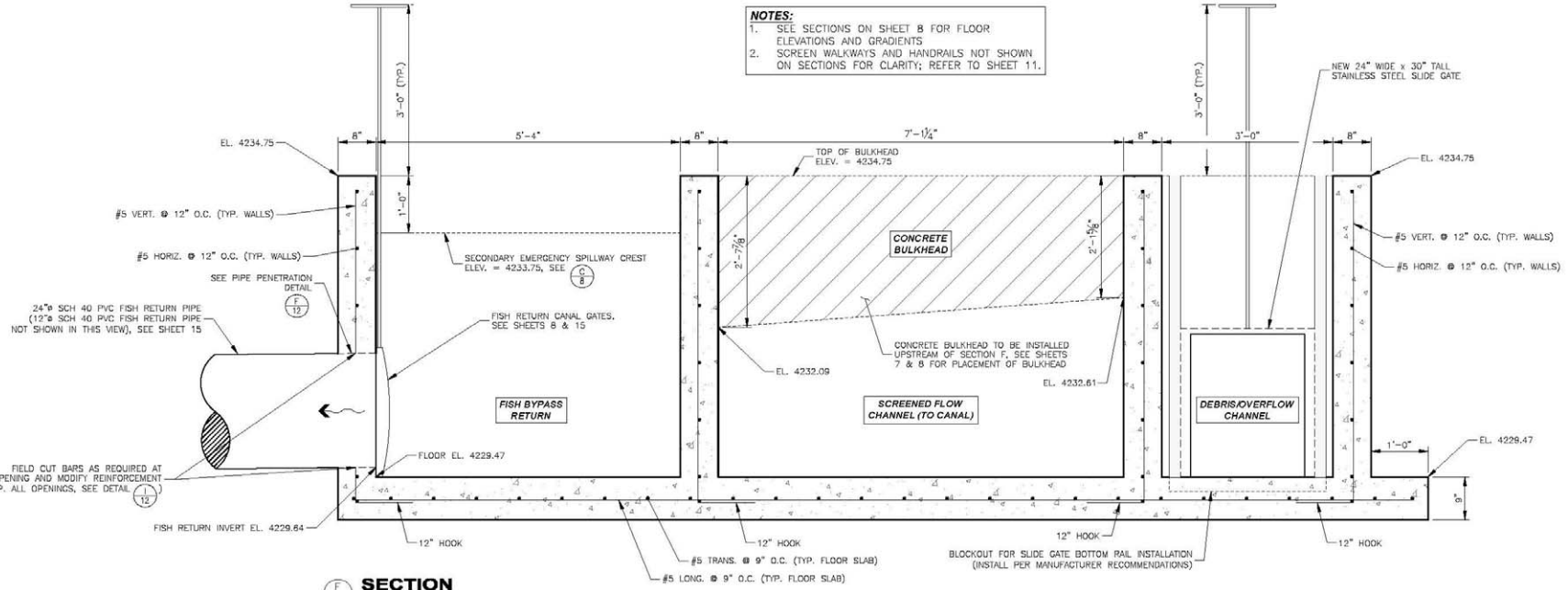


D/9 **SECTION**
SCALE: 1" = 3'-0"



E/9 **SECTION**
SCALE: 1" = 3'-0"

NOTES:
1. SEE SECTIONS ON SHEET 8 FOR FLOOR ELEVATIONS AND GRADIENTS
2. SCREEN WALKWAYS AND HANDRAILS NOT SHOWN ON SECTIONS FOR CLARITY; REFER TO SHEET 11.



F/9 **SECTION**
SCALE: 1" = 2'-0"

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
2501 BELT VIEW DRIVE
HELENA, MT 59601
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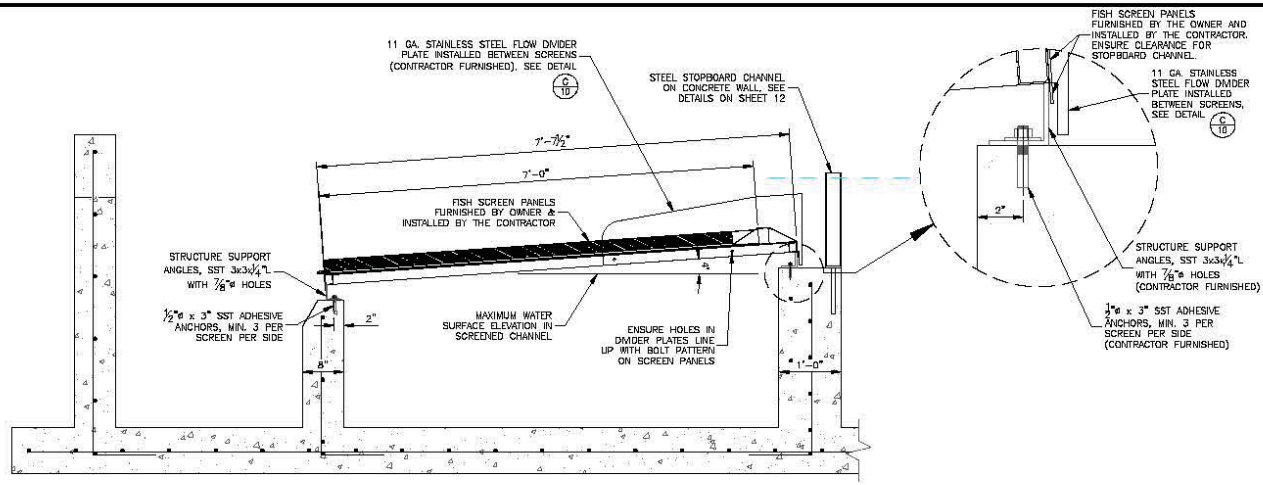
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FISH SCREEN SECTIONS

SHEET NO.
9
OF 21



A/10 SCREEN PANEL INSTALLATION

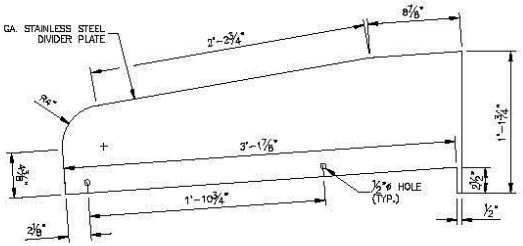
SCALE: 1" = 2'-0"

NOTE: WALKWAY AND SUPPORTS NOT SHOWN FOR CLARITY; REFER TO SHEET 11.

VIEW OF TOP SCREEN SURFACE (COURTESY OF BRENT MEFFORD)

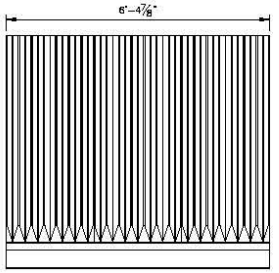
NOTES:

1. OWNER WILL FURNISH AND CONTRACTOR WILL INSTALL (10) 6'-4⅞" STAINLESS STEEL FISH SCREEN PANELS WITH ALL REQUIRED NEOPRENE GASKETS AND ASSOCIATED SCREEN-SPECIFIC MOUNTING HARDWARE AND FASTENERS. CORRUGATED SCREEN PANELS ARE 16 GAGE STAINLESS STEEL PERFORATED PLATE W/ ⅜" DIAMETER HOLES AND A 40 PERCENT OPEN AREA. THIS WORK IS PAID UNDER THE CORRUGATED WATER FISH SCREEN BID ITEM.
2. INSTALLATION SHALL NOT COMMENCE UNTIL THE CONTRACTOR, OWNER AND ENGINEER HAVE JOINTLY MEASURED AND LAID OUT THE PRECISE ELEVATION AND BOLT PATTERN FOR THE ITEMS SHOWN IN THE DRAWING.
3. ADHESIVE ANCHORS SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS FOR TEMPERATURE DURING APPLICATION. DRILL ⅝"ø HOLES FOR ANCHORS AND PROVIDE HEX NUTS AND WASHERS.
4. THE CONTRACTOR SHALL FURNISH & INSTALL THE STAINLESS STEEL SCREEN DIVIDER PLATES. DIVIDER PLATES SHALL BE CONNECTED TO THE SCREEN PANELS BY THE SAME FASTENERS WHICH CONNECT THE SCREEN PANELS TO EACH OTHER.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL THE STAINLESS STEEL STRUCTURE SUPPORT ANGLES AND ASSOCIATED STAINLESS STEEL APPURTENANCES, WASHERS, AND NUTS SHOWN ON THE DRAWINGS.
6. CONTRACTOR MAY SUBMIT ALTERNATE STOPBOARD CHANNEL TO CONCRETE WALL CONNECTION FOR APPROVAL BY THE ENGINEER.



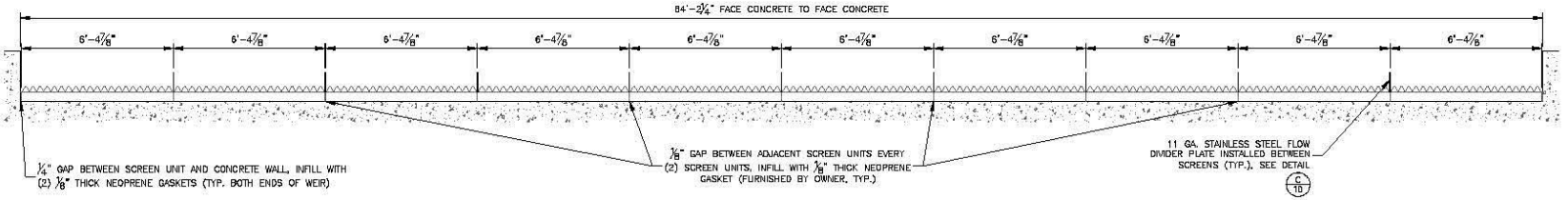
C/10 DIVIDER PLATE CONFIGURATION

SCALE: 1" = 1'-0"



6' - 4 7/8" (3 SCREEN) PANEL UNIT - TOP SIDE

NO SCALE



B/10 SCREEN PANEL INSTALLATION

SCALE: 1" = 5'-0"

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
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DATE: APRIL 22, 2025

GreatWest ENGINEERING
2821 E BELT VIEW DRIVE
HELENA, MT 59601
(406) 457-5900

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FISH SCREEN PANEL INSTALLATION

SHEET NO. **10** OF 21

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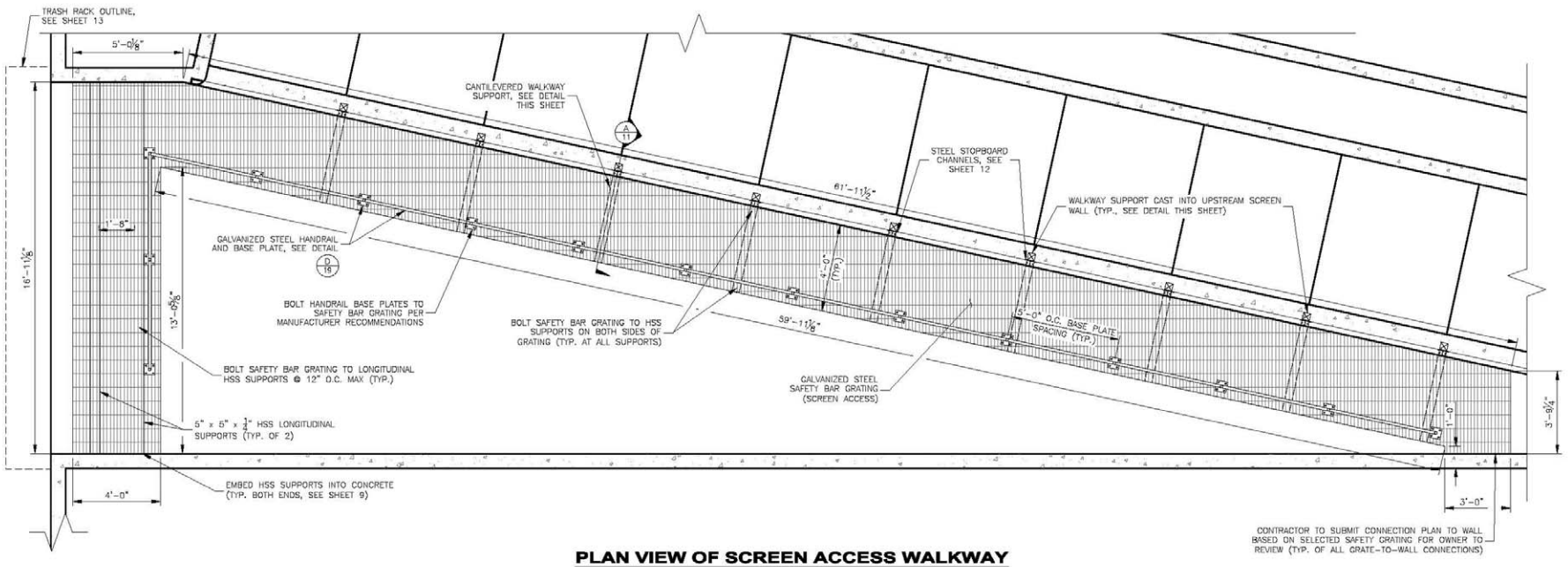
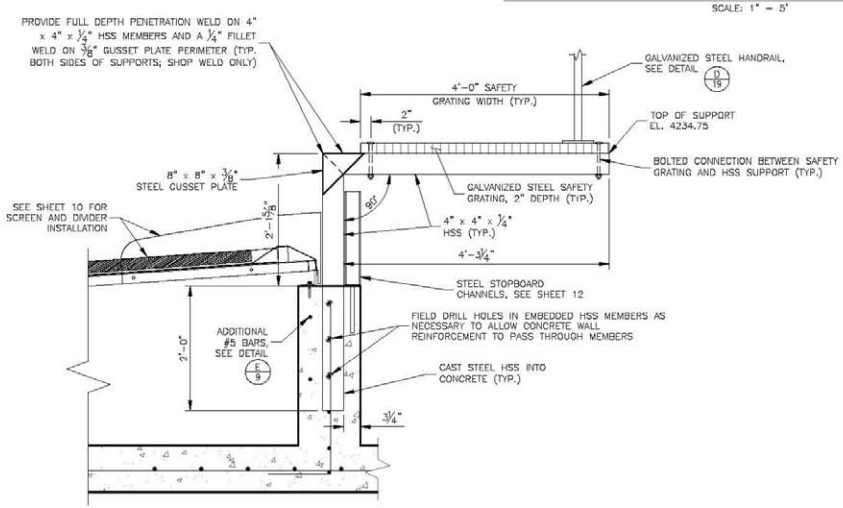


PLAN VIEW OF SCREEN ACCESS WALKWAY

SCALE: 1" = 5'



A 11 CANTILEVERED WALKWAY SUPPORT SECTION

1" = 2'-0"

NOTES:

1. CONTRACTOR MAY SUBMIT AN ALTERNATIVE CONNECTION PLAN TO SECURE SAFETY GRATING TO SUPPORTS AND CONCRETE WALLS. CALCULATIONS MUST BE PROVIDED, AND PLAN MUST BE SUBMITTED TO OWNER AND ENGINEER FOR REVIEW AND APPROVAL.
2. ALL WELDS MUST BE FULL-DEPTH AND BE COMPLETED IN A SHOP ENVIRONMENT.
3. SEE SHEET 7 FOR DIMENSIONS OF SAFETY BAR GRATING AT DOWNSTREAM SCREEN SLUICE GATE.

NO.	REVISION DESCRIPTION	BY	DATE

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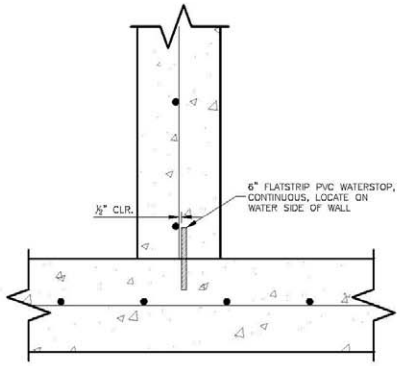
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406) 442-5627

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FISH SCREEN WALKWAY DETAILS

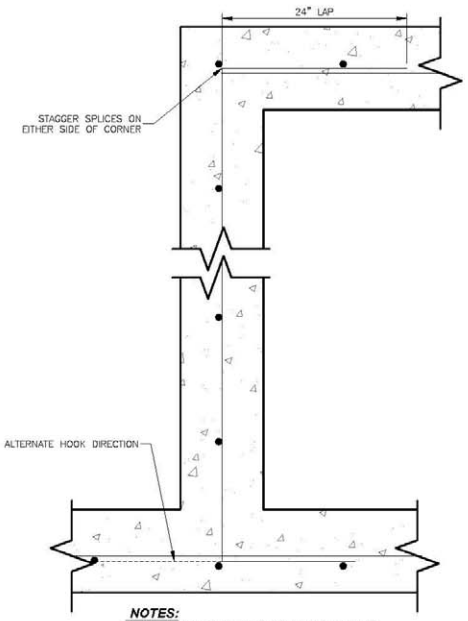
SHEET NO.
11
OF 21

Y:\Shared\Helena Projects\1-21322- CFC - Lost Horse Fish Screen\CADD 1-21322\Sheets\1-21322-11-Walkway Details.dwg



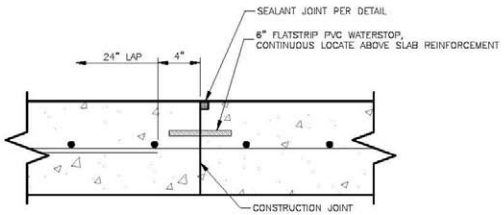
NOTES:
1. WATERSTOP TO BE GREENSTREAK NO. 679 (OR APPROVED EQUAL).
2. WATERSTOP TO BE CONTINUOUS W/HEAT WELDED BUTT JOINTS.
3. ALL WORK, MATERIALS AND LABOR ASSOCIATED WITH THE WATERSTOP ARE INDIRECT TO THE FURNISH AND INSTALL CAST-IN-PLACE CONCRETE BID ITEM.

A 12 SLAB TO WALL WATERSTOP
NO SCALE



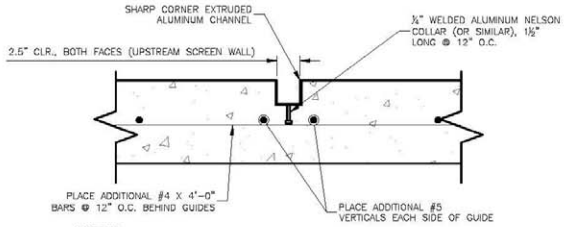
NOTES:
1. ALL HOOKS TO BE ACI STD 90 DEGREE HOOKS
2. SEE SHEETS 8-10 FOR REINFORCING.
3. POUR CORNERS AND JUNCTIONS MONOLITHICALLY, UNLESS NOTED OTHERWISE.

D 12 WALL INTERSECTION REINFORCING (PLAN VIEW)
NO SCALE



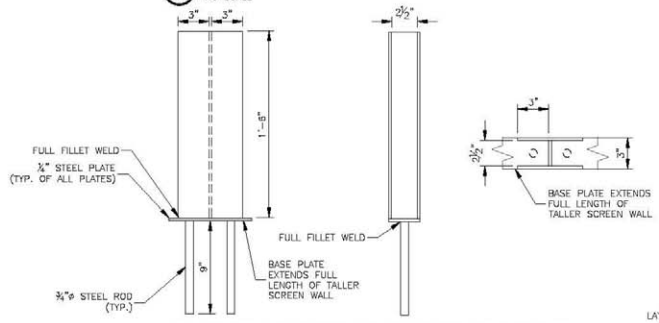
NOTES:
1. WATERSTOP TO BE GREENSTREAK NO. 679 (OR APPROVED EQUAL).
2. WATERSTOP TO BE CONTINUOUS W/HEAT WELDED BUTT JOINTS.
3. STAGGER SPLICES UNLESS INDICATED OTHERWISE.
4. RUN ALL REINFORCING BARS CONTINOUS THROUGH JOINT UNLESS INDICATED OTHERWISE.
5. ALL WORK, MATERIALS AND LABOR ASSOCIATED WITH THE WATERSTOP ARE INDIRECT TO THE FURNISH AND INSTALL CAST-IN-PLACE CONCRETE BID ITEM.

B 12 SLAB CONST. JOINT W/ WATERSTOP
NO SCALE



NOTES:
1. CONTRACTOR TO COAT THE BACK SIDES OF THE ALUMINUM CHANNEL WITH COAL TAR EPOXY.
2. ALL WORK, MATERIALS AND LABOR ASSOCIATED WITH THE STOP BOARD GUIDE ARE INDIRECT TO THE FURNISH AND INSTALL CAST-IN-PLACE CONCRETE BID ITEM.
3. UPSTREAM SCREEN WALL GUIDE WILL BE CUT TO FIT RADIUS EDGE. MINIMUM CONTACT DISTANCE OF 3" BETWEEN CHANNEL AND CONCRETE REQUIRED. ENSURE ALUMINUM CHANNEL IS NOT BENT DURING CUTTING OR INSTALLATION.

E 12 STOPBOARD GUIDE DETAIL
NO SCALE

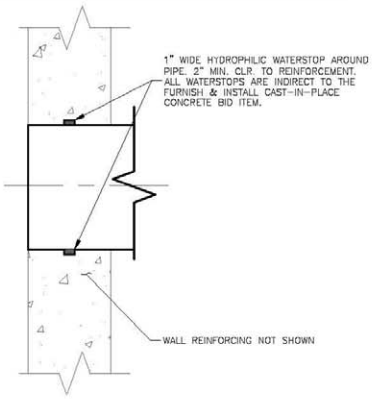


NOTES:
1. ALL WALL AND SLAB CONSTRUCTION JOINTS REQUIRE WATERSTOPS. SEE DETAILS THIS SHEET.
2. CONSTRUCTION JOINT LOCATIONS ARE NOT SHOWN AND SHALL BE LOCATED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
3. ALL EXPOSED CONCRETE EDGES TO INCLUDE ¾" CHAMFER.
4. CONTRACTOR SHALL PROVIDE 2" X 6" NOMINAL DIMENSION, 6'-3"-LONG PRESSURE TREATED TIMBER STOPBOARDS TO OWNER (30 TOTAL). BOARDS SHALL BE STRAIGHT AT FREE FROM WARPING. STOPBOARDS ARE PAID UNDER THE FISH SCREEN INSTALLATION BID ITEM.
5. ALL STOPBOARDS SHALL BE INSTALLED WITH A NEOPRENE GASKET BETWEEN THE BOARD AND STEEL PLATE TO PREVENT LEAKAGE. THIS GASKET SHALL BE FURNISHED BY CONTRACTOR AND IS PAID UNDER THE FISH SCREEN INSTALLATION BID ITEM.

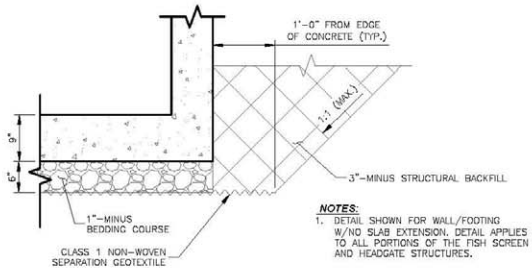
G 12 STOPBOARD CHANNEL DETAILS
NO SCALE

NOTES:
1. INSTALL GROOVE AND JOINT SEALANT AT SLAB ON GRADE-JOINTS.
2. SANDBLAST & CLEAN JOINT GROOVE PRIOR TO PRIMER APPLICATION.
3. ALL WORK, MATERIALS AND LABOR ASSOCIATED WITH THE JOINT SEALANT ARE INDIRECT TO THE FURNISH AND INSTALL CAST-IN-PLACE CONCRETE BID ITEM.

C 12 JOINT SEALANT AT SLAB W/ WATERSTOP
NO SCALE

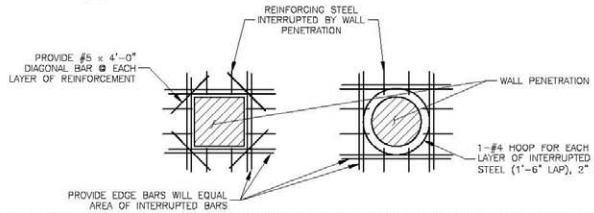


F 12 PIPE PENETRATION DETAIL
NO SCALE



NOTES:
1. DETAIL SHOWN FOR WALL/FOOTING W/NO SLAB EXTENSION. DETAIL APPLIES TO ALL PORTIONS OF THE FISH SCREEN AND HEADGATE STRUCTURES.

H 12 EXCAVATION/BACKFILL DETAIL
NO SCALE



I 12 REINFORCEMENT FOR CONCRETE WALL OPENINGS
NOT TO SCALE

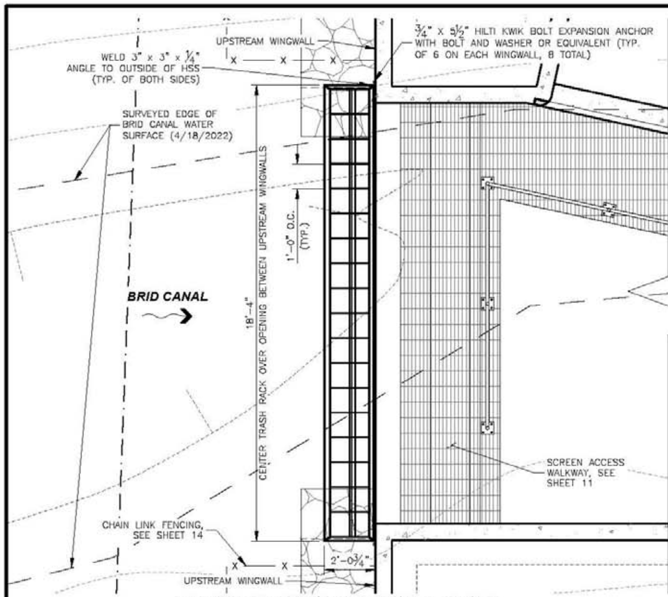
NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
2911 BELT VIEW DRIVE
HELENA, MT 59601
(406) 442-5627

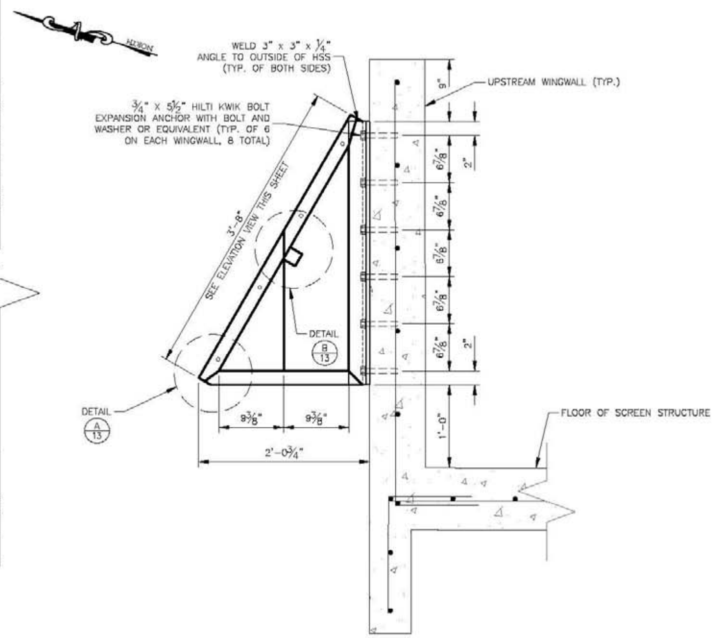
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
CONCRETE DETAILS

SHEET NO.
12
OF 21



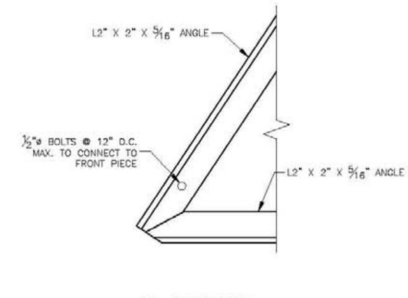
PLAN VIEW OF TRASH RACK

0 2.5 5
SCALE IN FEET

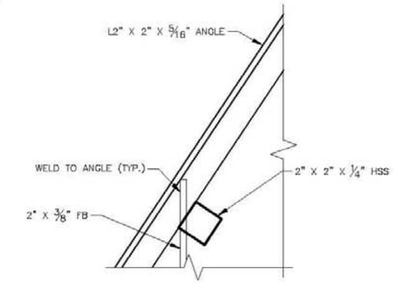


SIDE VIEW OF TRASH RACK

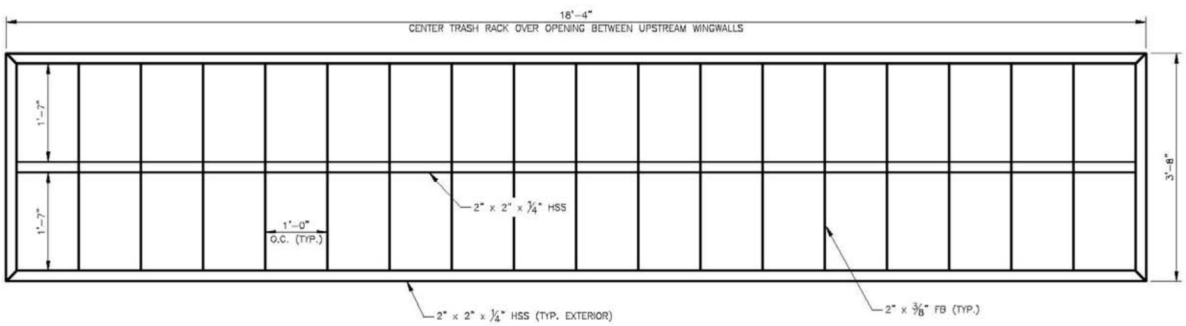
SCALE: 1" = 1'-6"



A/C8 **DETAIL**
SCALE: 1 1/2" = 1'-0"



B/13 **DETAIL**
SCALE: 1 1/2" = 1'-0"



ELEVATION VIEW OF TRASH RACK

SCALE: 1" = 2'-0"

NOTES:

1. THESE PLANS REPRESENT THE GENERAL CONCEPT AND MATERIALS NECESSARY TO CONSTRUCT THE STEEL TRASH RACK. FINAL DESIGN SHALL BE COMPLETED BY THE FABRICATOR WITH SHOP DRAWINGS SUBMITTED FOR APPROVAL. MULTIPLE (BOLTED) PIECES WILL LIKELY AID IN EASE OF INSTALLATION FOR THE CONTRACTOR. THE CONTRACTOR MAY SUBMIT AN ALTERNATE SYSTEM FOR REVIEW AND APPROVAL.
2. EXPANSION ANCHORS SHALL BE ZINC COATED.
3. SUPPLY STEEL AS GALVANIZED STEEL. REFER TO SHEET 3 FOR ADDITIONAL STEEL REQUIREMENTS.
4. UTILIZE 1/4" WELDS OR AS RECOMMENDED BY THE SUPPLIER AND APPROVED BY THE ENGINEER.
5. ABBREVIATION LEGEND
   - HSS = HOLLOW STRUCTURAL STEEL
   - FB = FLAT BAR
6. TOTAL TRASH RACK WEIGHT ESTIMATED AT 550 POUNDS (EXCLUDING HARDWARE).

NO	REVISION DESCRIPTION	BY	DATE

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GreatWest ENGINEERING
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406) 449-8627

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
TRASH RACK DETAILS

SHEET NO.
13
OF 21

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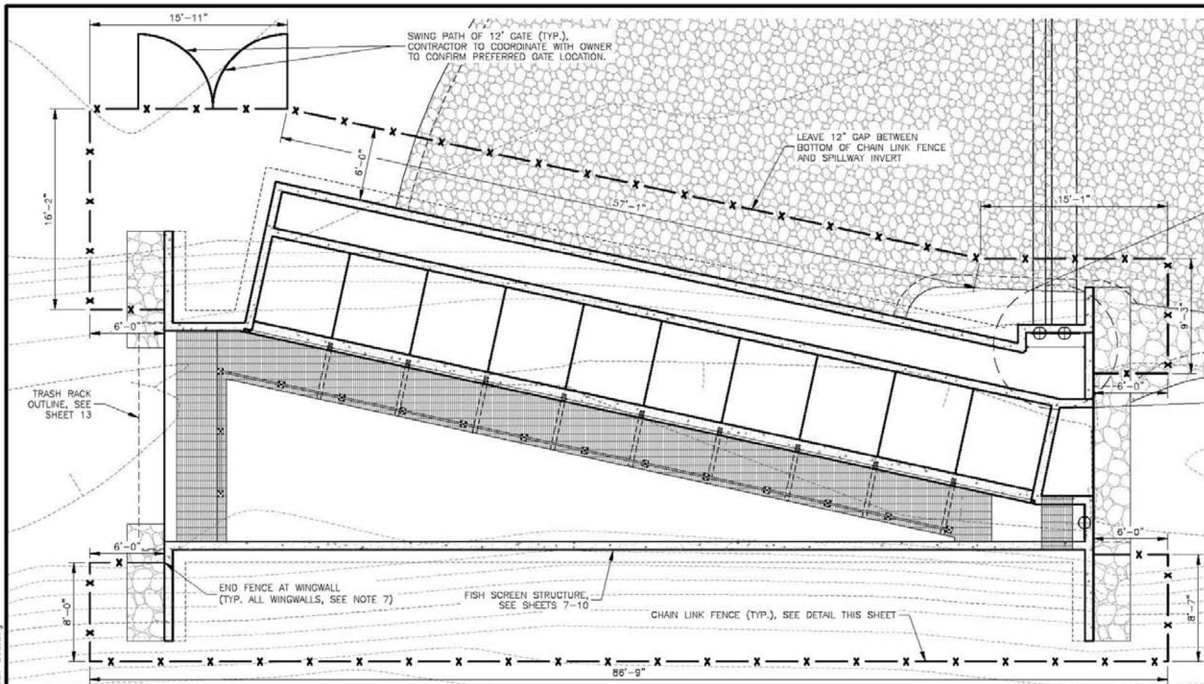
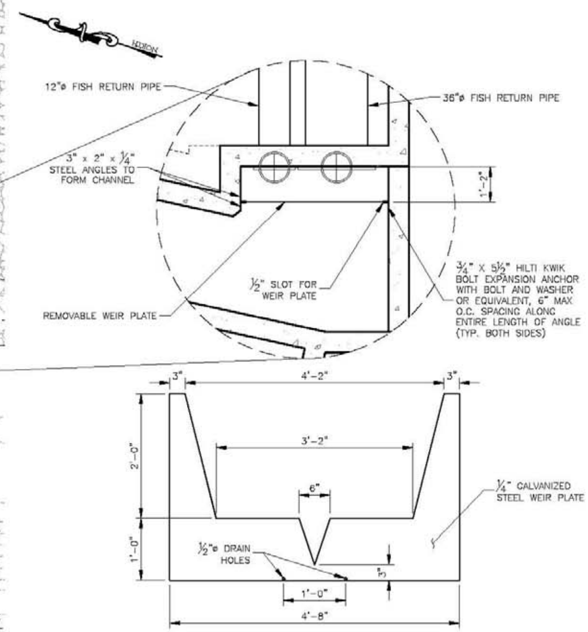


PLAN VIEW

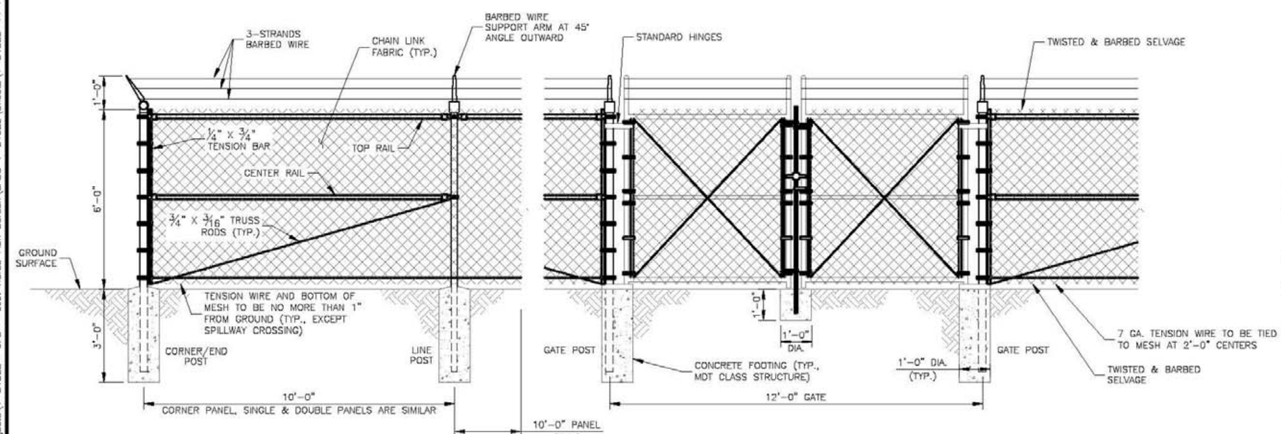
SCALE: 1" = 10'-0"



FISH RETURN WEIR PLATE DETAILS

B/14 NO SCALE

NOTE: ALL ANGLES, PLATES, AND FASTENERS REQUIRED TO CONSTRUCT THE FISH RETURN WEIR ARE INDIRECT TO THE FISH SCREEN INSTALLATION BID ITEM.



ELEVATION VIEW

NO SCALE

FISH SCREEN STRUCTURE FENCING DETAILS

A/14 NO SCALE

FENCE NOTES:

1. PULL POST BRACING SHALL BE SAME AS CORNER BRACING.
2. A DROP BAR LOCKING DEVICE IS REQUIRED FOR DOUBLE GATE. THE DROP BAR SHALL BE ABLE TO BE INSERTED INTO THE CONCRETE BLOCK AT LEAST 6 INCHES.
3. AT LEAST ONE POST WILL BE EXTENDED 3' INTO THE GROUND FOR LIGHTNING PROTECTION.
4. CHAIN LINK MESH TO BE TIED TO TOP & CENTER RAILS AT 2'-0" CENTERS.
5. GATE CHAIN LINK FABRIC SHALL MATCH FENCE CHAIN LINK FABRIC.
6. GATE FRAMES SHALL BE WELDED & BRACES FURNISHED AS REQUIRED.
7. AT LOCATIONS WHERE FENCE ABUTS CONCRETE WALLS, INSTALL CONCRETE FOOTER DIRECTLY ADJACENT TO CONCRETE WALL AND ENSURE THE GAP BETWEEN THE VERTICAL FENCE POST AND THE CONCRETE WALL DOES NOT EXCEED 4".
8. ALL CONCRETE FOOTERS SHALL BE INSTALLED PRIOR TO RIPRAP INSTALLATION.

FENCE MATERIALS:

1. TOP & CENTER RAILS TO BE 1 5/8" O.D.
2. FABRIC TO BE 9 GAUGE 2" MESH.
3. CORNER POSTS TO BE 2 7/8" O.D. x 0.160" WALL THICKNESS.
4. GATE POSTS TO BE 2 7/8" O.D. x 0.160" WALL THICKNESS.
5. LINE POSTS TO BE 1 7/8" x 2.28 LB./ FT. FORMED STL. SECTION.
6. POST SPACING NOT TO EXCEED 10'-0".

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GreatWest ENGINEERING
2501 BELT VIEW DRIVE HELENA, MT 59601 (406)449-8627

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FENCING PLAN & WEIR PLATE DETAILS

SHEET NO.
14
OF 21

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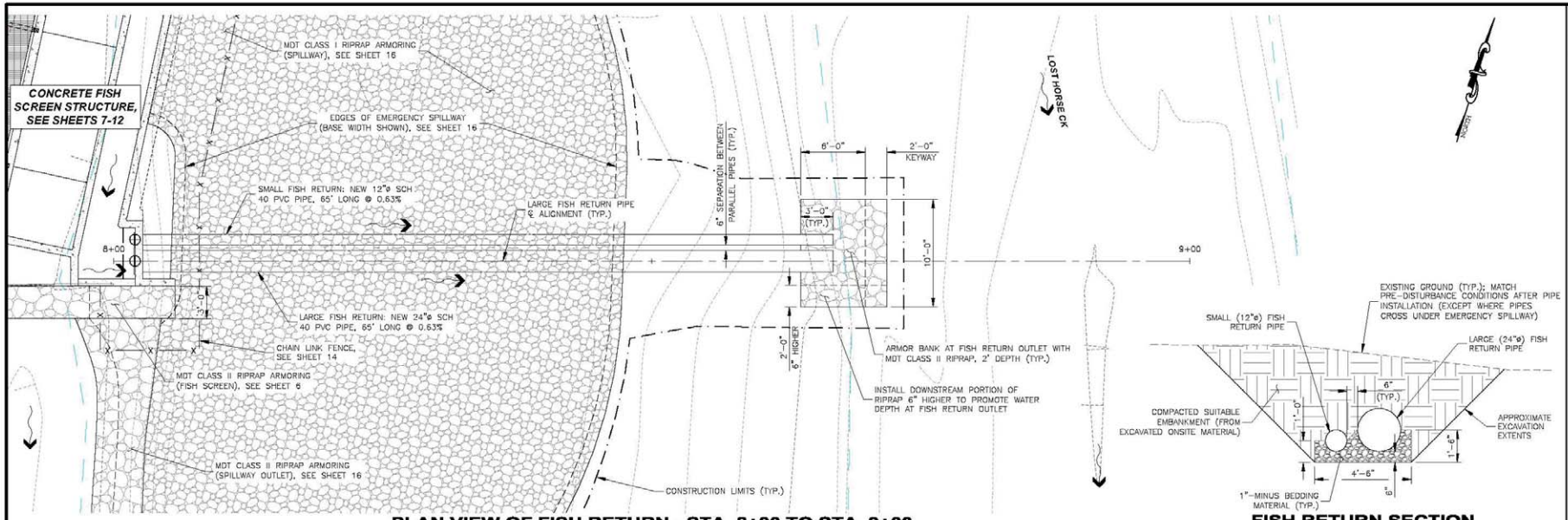
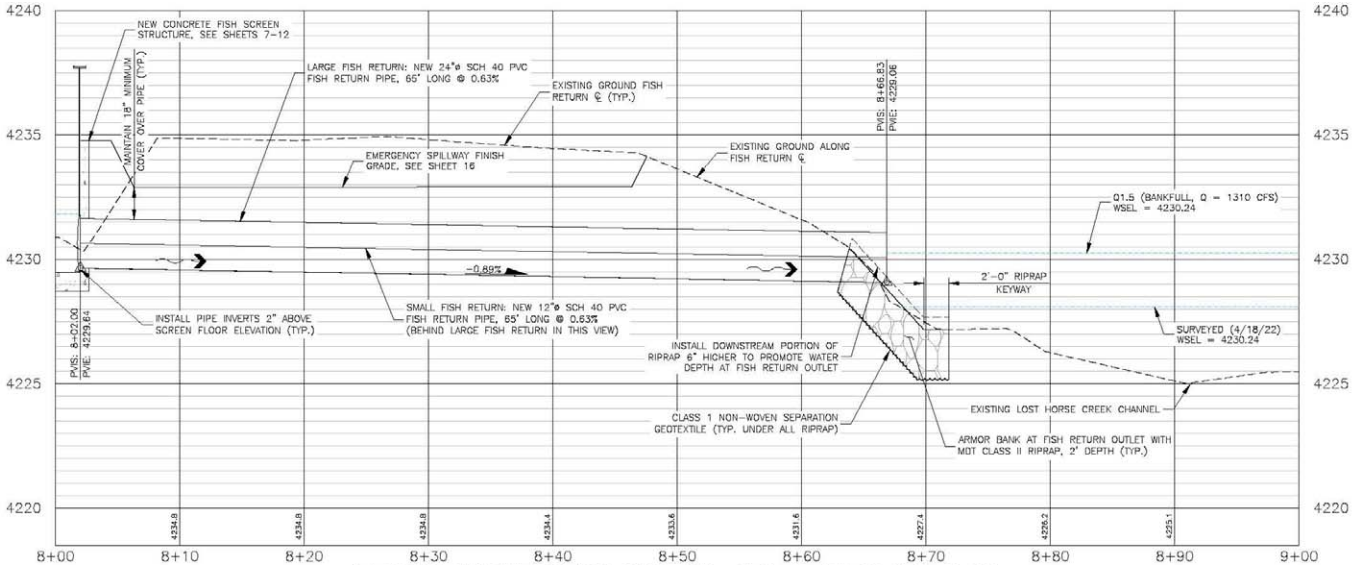


PLAN VIEW OF FISH RETURN - STA. 8+00 TO STA. 9+00

FISH RETURN SECTION

NO SCALE
LOOKING DOWNSTREAM



PROFILE VIEW OF FISH RETURN - STA. 8+00 TO STA. 9+00

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 5'

ESTIMATED QUANTITIES FOR FISH RETURN*

ITEM	QUANTITY
EXCAVATION	104 CY
EMBANKMENT	85 CY
1"-MINUS BEDDING	10 CY
SEPARATION GEOTEXTILE**	11 SY
MDT CLASS II RIPRAP	7 CY

*FOR INFORMATIONAL PURPOSES ONLY.

**INDIRECT TO RIPRAP AND 1"-MINUS BEDDING BID ITEMS

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APPROVED: EAC
DATE: APRIL 22, 2025

GreatWest Engineering
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406) 449-8287

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
FISH RETURN PLAN & PROFILE

SHEET NO.
15
OF 21

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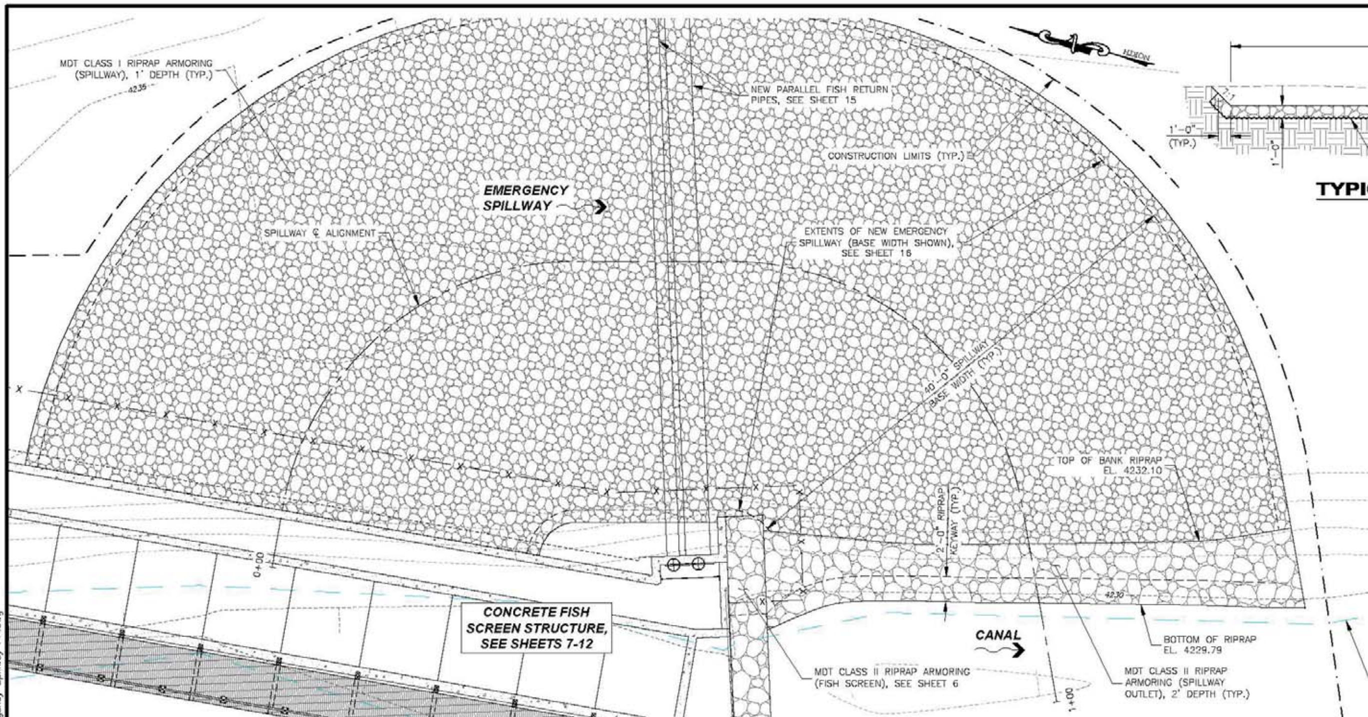
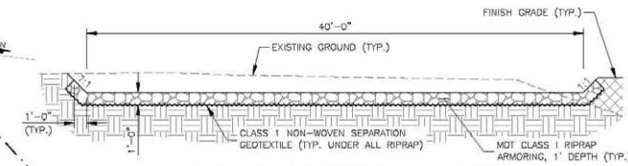


PLAN VIEW OF EMERGENCY SPILLWAY - STA. 0+00 TO STA. 1+00

0 5 10
SCALE IN FEET



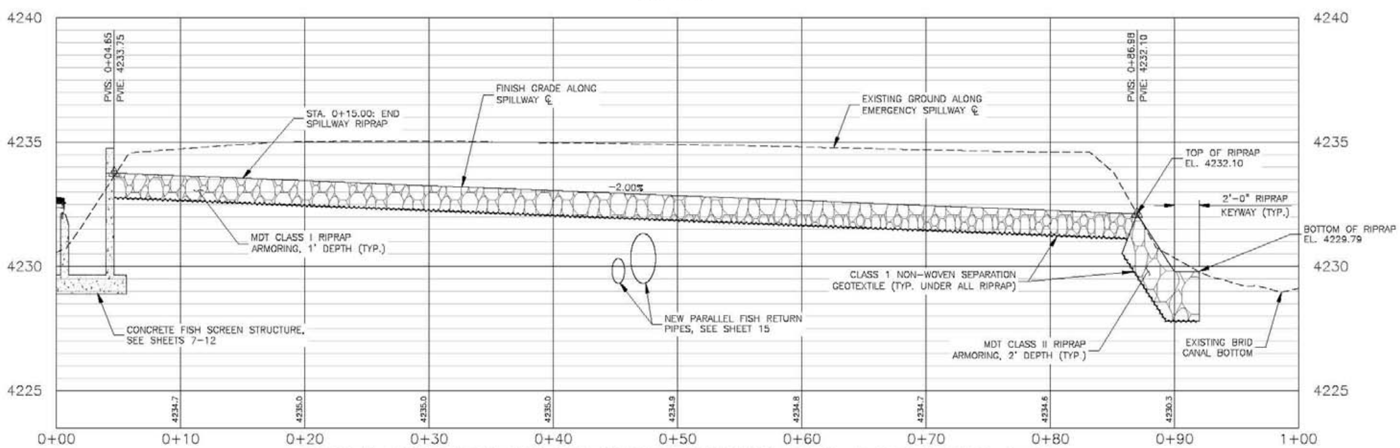
TYPICAL SPILLWAY SECTION

NO SCALE

ESTIMATED QUANTITIES FOR EMERGENCY SPILLWAY*	
ITEM	***QUANTITY***
EXCAVATION	213 CY
SEPARATION GEOTEXTILE**	417 SY
MDT CLASS I RIPRAP (SPILLWAY)	128 CY
MDT CLASS II RIPRAP (OUTLET)	18 CY

*FOR INFORMATIONAL PURPOSES ONLY

**INDIRECT TO RIPRAP AND 1"-MINUS BEDDING BID ITEMS



PROFILE VIEW OF EMERGENCY SPILLWAY - STA. 0+00 TO STA. 1+00

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 5'

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NO	REVISION DESCRIPTION	BY	DATE

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GreatWest ENGINEERING
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CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT

EMERGENCY SPILLWAY PLAN & PROFILE

SHEET NO.
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OF 21

VIEW OF UPSTREAM END OF FISH SCREEN STRUCTURE

VIEW OF FISH BYPASS RETURN

VIEW OF CORRUGATED WATER SCREEN PANELS

VIEW OF DOWNSTREAM END OF FISH SCREEN STRUCTURE

VIEW OF OVERALL STRUCTURE FOOTPRINT

NOTE: PHOTOS ON THIS SHEET REPRESENT A SIMILAR CUSTOM CORRUGATED WATER FISH SCREEN STRUCTURE DESIGNED FOR 32 CFS. THIS SCREEN WAS DESIGNED BY GREAT WEST ENGINEERING AND INSTALLED IN 2019 NEAR DEER LODGE, MT.

FOR REFERENCE ONLY - NOT INTENDED TO BE USED FOR CONSTRUCTION

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Great West Engineering
2501 BELT VIEW DRIVE
HELENA, MT 59601
(406) 449-8267

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
EXAMPLE SCREEN PHOTOS

SHEET NO.
17
OF 21

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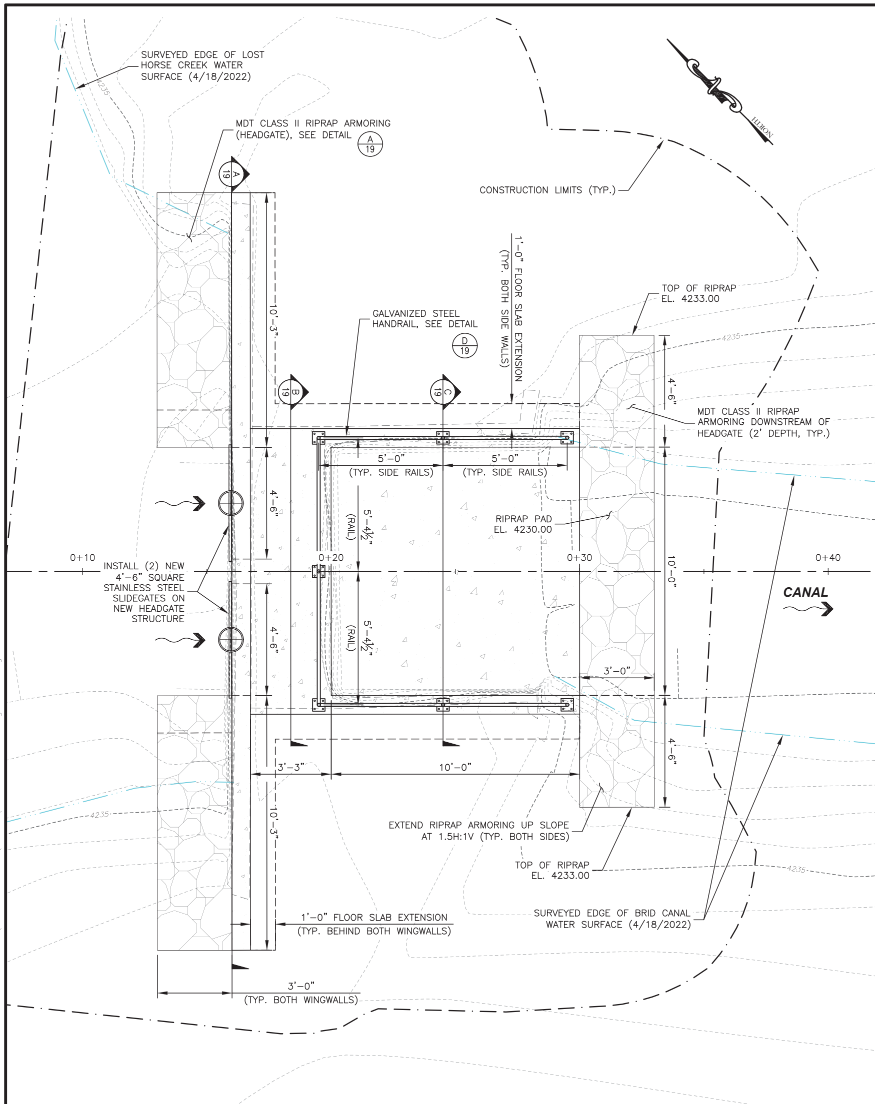
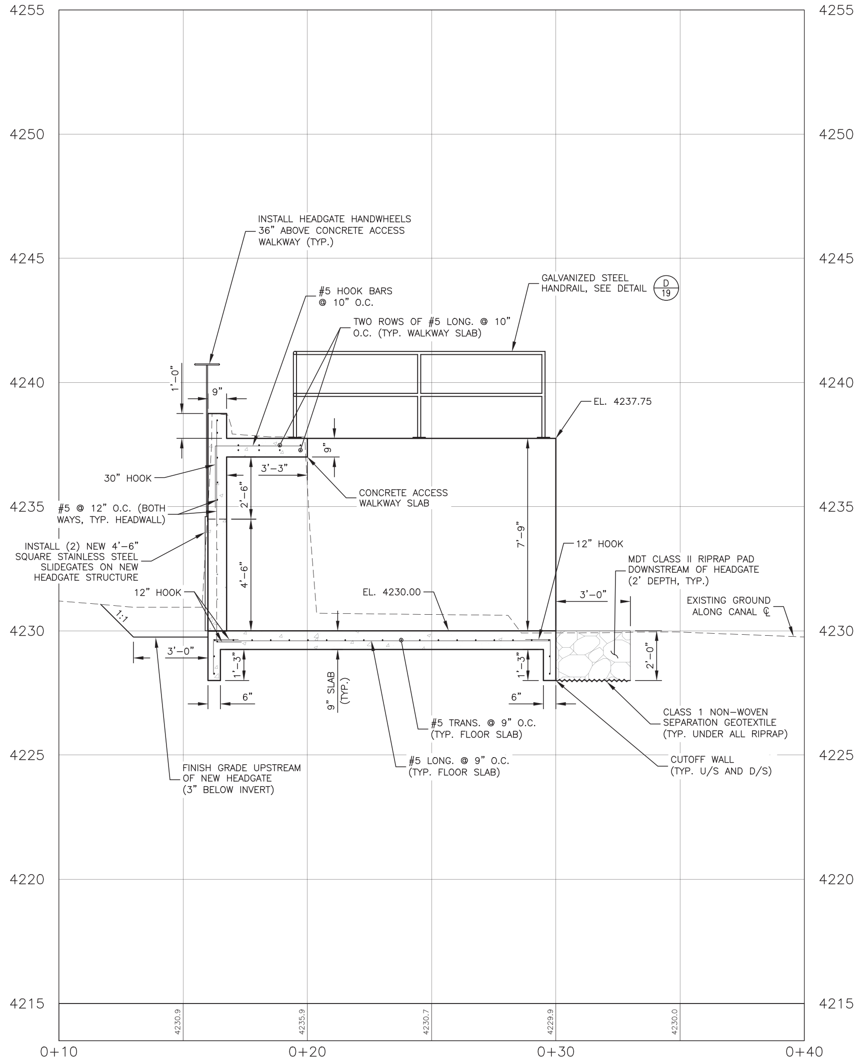


PLAN VIEW OF HEADGATE - STA. 0+10 TO STA. 0+40

0 2.5 5
SCALE IN FEET



PROFILE VIEW OF HEADGATE - STA. 0+10 TO STA. 0+40

HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 5'

NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-21322
DESIGNED: EAC
DRAWN: EAC
CHECKED: RME
APPROVED: EAC
DATE: APRIL 22, 2025

STATE OF MONTANA — EVAN A. CARRIGE — 90607PE — LICENSED PROFESSIONAL ENGINEER

GreatWest ENGINEERING
2501 BELT VIEW DRIVE
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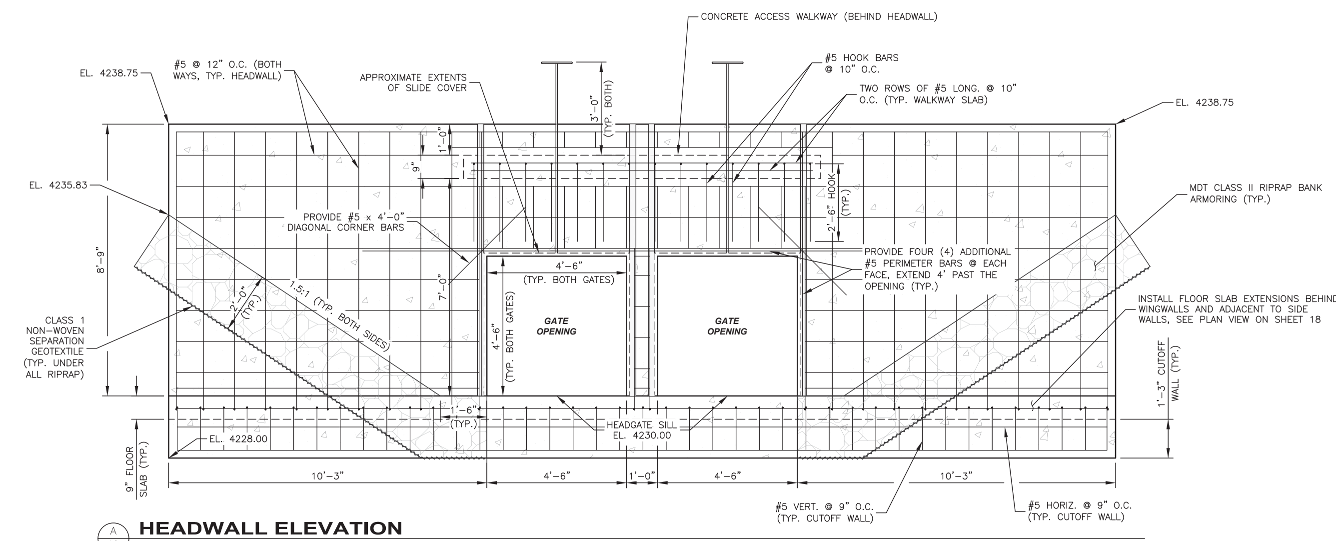
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
HEADGATE PLAN & PROFILE

SHEET NO.
18
OF 21



A 19 **HEADWALL ELEVATION**
SCALE: 1" = 4'-0"

NOTE: DIMENSIONS OF SLIDE GATE RAILS, STEMS, HANDWHEELS, AND COVERS ARE APPROXIMATE; CONTRACTOR TO CONFIRM FINAL DIMENSIONS FROM HEADGATE SUPPLIER.

ESTIMATED QUANTITIES FOR CONCRETE HEADGATE*

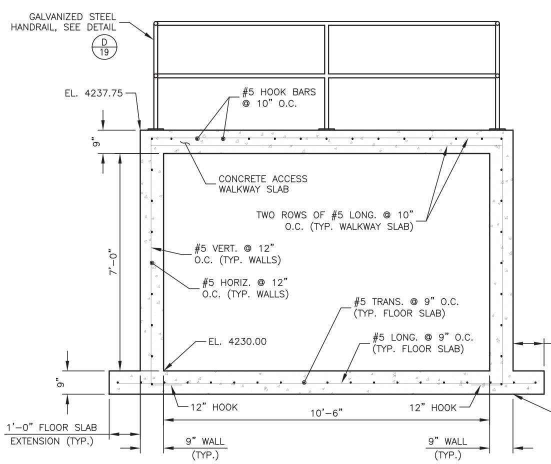
ITEM	QUANTITY
EXCAVATION	161 CY
3"-MINUS STRUCTURAL BACKFILL	125 CY
1"-MINUS BEDDING	4 CY
SEPARATION GEOTEXTILE**	31 SY
CAST-IN-PLACE CONCRETE	22 CY
MDT CLASS II RIPRAP	11 CY

*FOR INFORMATIONAL PURPOSES ONLY

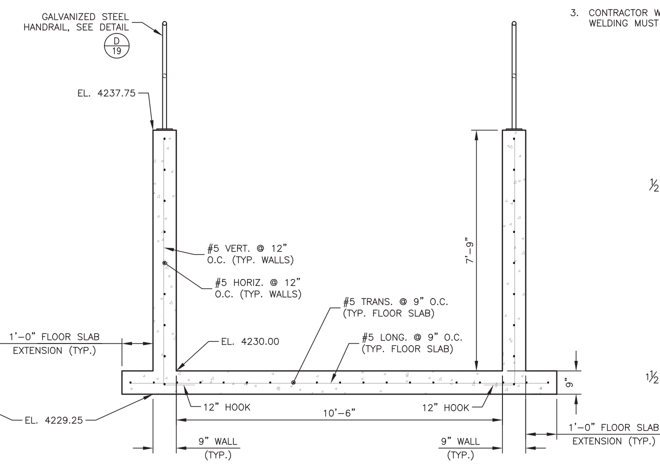
**INDIRECT TO RIPRAP AND 1"-MINUS BEDDING BID ITEMS

GALVANIZED RAILING NOTES:

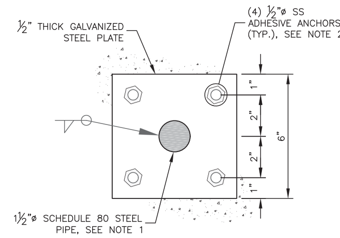
1. RAILING PIPES AND BASE PLATES SHALL BE WELDED AND THEN HOT DIPPED GALVANIZED.
2. ½"ø ANCHORS SHALL BE EMBEDDED A MINIMUM OF 4" DEPTH INTO THE CONCRETE AFTER CONCRETE HAS ACHIEVED 4000 PSF COMPRESSIVE STRENGTH.
3. CONTRACTOR WILL NOT BE ALLOWED TO FIELD WELD RAILING; ALL WELDING MUST OCCUR IN A SHOP ENVIRONMENT.



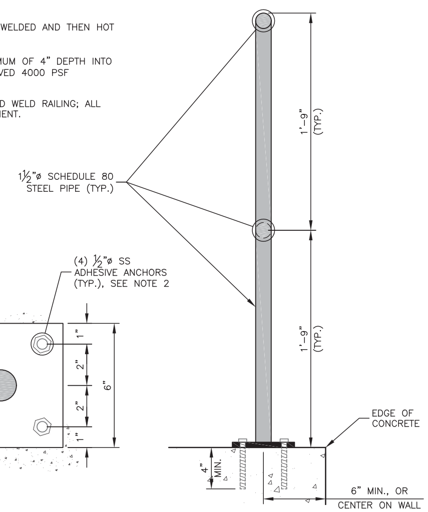
B 19 **HEADGATE SECTION**
SCALE: 1" = 4'-0"



C 19 **HEADGATE SECTION**
SCALE: 1" = 4'-0"



BASE PLATE PLAN
SCALE: 1" = 0'-6"



RAIL SECTION
SCALE: 1" = 1'-0"

D 19 **GALVANIZED RAILING DETAILS**

NOTE: BASE PLATE PLAN IS REPRESENTATIVE OF CONNECTIONS TO CONCRETE. CONNECTIONS TO SAFETY BAR GRATING SHALL BE COMPLETED PER MANUFACTURER RECOMMENDATIONS.

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MONTANA — EVAN A. CARDEL 90607PE — LICENSED PROFESSIONAL ENGINEER

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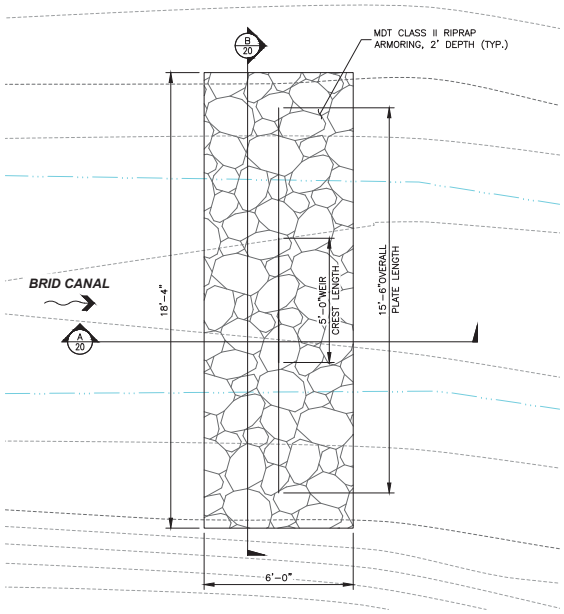
CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
HEADGATE SECTIONS

SHEET NO.
19
OF 21



PLAN VIEW OF LOW FLOW MEASUREMENT WEIR

0 2.5 5
SCALE IN FEET

ESTIMATED QUANTITIES FOR LOW FLOW MEASUREMENT WEIR*

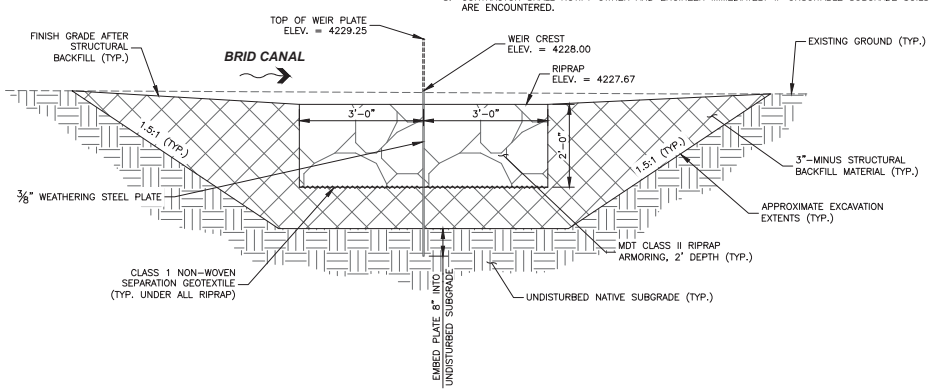
ITEM	QUANTITY
EXCAVATION	31 CY
3"-MINUS STRUCTURAL BACKFILL	15 CY
3/8" WEATHERING STEEL PLATE	75 SF
SEPARATION GEOTEXTILE**	15 SY
MDT CLASS II RIPRAP	9 CY

*FOR INFORMATIONAL PURPOSES ONLY

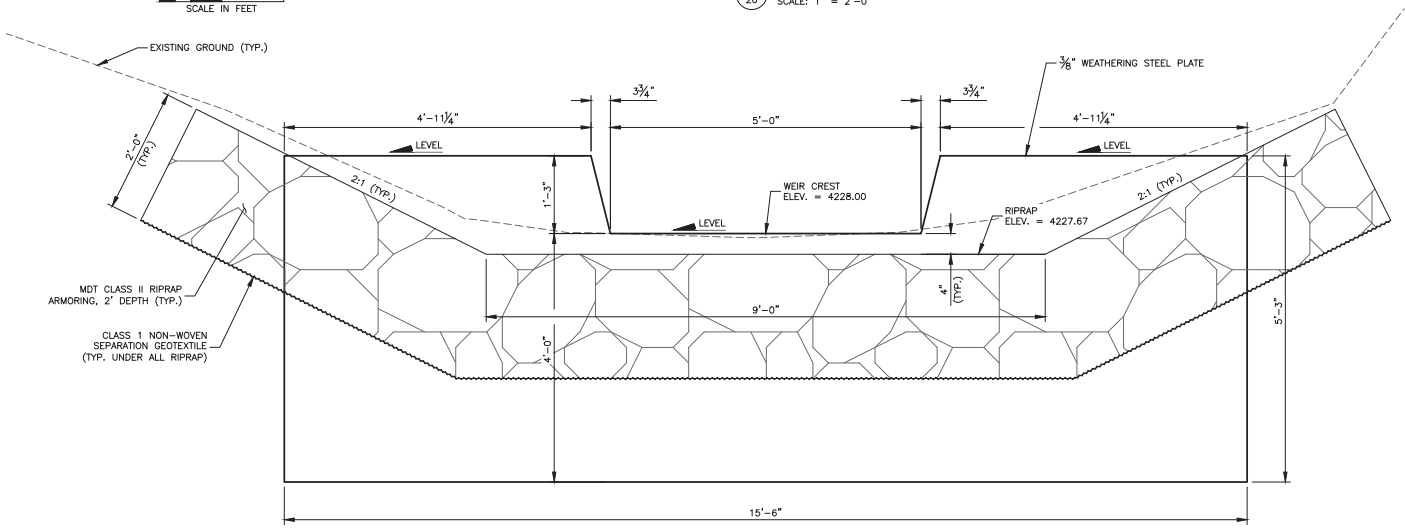
**INDIRECT TO RIPRAP BID ITEM

NOTES:

1. SUPPLY STEEL AS WEATHERING STEEL. REFER TO SHEET 3 FOR ADDITIONAL STEEL REQUIREMENTS.
2. CHAMFER ALL EXPOSED STEEL EDGES 1/8".
3. STEEL LOW FLOW MEASUREMENT WEIR SHALL BE CONSTRUCTED IN A SHOP ENVIRONMENT AND TRANSPORTED TO THE SITE FOR INSTALLATION. FIELD CUTTING OF STEEL PLATE IS NOT PERMITTED.
4. CONTRACTOR SHALL AVOID DAMAGING STEEL DURING INSTALLATION OF WEIR OR RIPRAP. ANY DAMAGE TO THE STEEL PLATE SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR OWN EXPENSE.
5. CONTRACTOR SHALL ENSURE LOW FLOW MEASUREMENT WEIR IS INSTALLED LEVEL FROM END TO END AND VERTICALLY. A DROP OF NO MORE THAN 1/4" FROM ONE END OF THE WEIR PLATE TO THE OTHER WILL BE TOLERATED. IN ORDER TO ENSURE PROPER HYDRAULIC PERFORMANCE, ELEVATIONS MUST MATCH THOSE SHOWN WITHIN 0.05 FEET.
6. APPROXIMATE LOW FLOW MEASUREMENT WEIR WEIGHT ESTIMATED AT 1150 POUNDS.
7. REFER TO NOTES ON SHEET 3 FOR BACKFILL AND RIPRAP REQUIREMENTS.
8. CONTRACTOR SHALL NOTIFY OWNER AND ENGINEER IMMEDIATELY IF UNSUITABLE SUBGRADE SOILS ARE ENCOUNTERED.



A 20 **SECTION VIEW OF LOW FLOW MEASUREMENT WEIR**
SCALE: 1" = 2'-0"



B 20 **ELEVATION VIEW OF LOW FLOW MEASUREMENT WEIR**
SCALE: 1" = 2'-0"

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DATE: APRIL 22, 2025

EVAN A. CARBIA
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CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
LOW FLOW MEASUREMENT WEIR DETAILS

SHEET NO.
20
OF 21

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VIEW OF EXISTING LOG DIVERSION
(4/18/2022)

VIEW OF EXISTING SOLAR ARRAY AND ELECTRICAL HOUSING
(4/18/2022)

VIEW OF EXISTING DITCH AND BRID ACCESS ROAD
(4/18/2022)

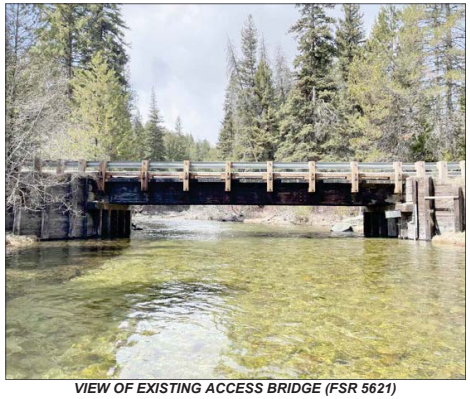
VIEW OF EXISTING CONCRETE HEADGATE STRUCTURE (UPSTREAM)
(4/18/2022)

VIEW OF EXISTING HEADGATE FRAMES
(4/18/2022)

VIEW OF EXISTING DIVERSION AND HEADGATE (LOOKING DS)
(4/18/2022)

VIEW OF EXISTING CONCRETE HEADGATE STRUCTURE (DOWNSTREAM)
(4/18/2022)

VIEW OF EXISTING DITCH (LOOKING DS FROM HEADGATE)
(4/18/2022)



VIEW OF EXISTING ACCESS BRIDGE (FSR 5621)
(4/18/2022)

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(406) 449-8267

CLARK FORK COALITION
LOST HORSE CREEK - BRID FISH SCREEN PROJECT
SITE PHOTOS

SHEET NO.
21
OF 21