MONTANA DEPARTMENT OF NATURAL RESOURCES & CONSERVATION

Nevada Creek Water Project

Douglas Canal Rehabilitation Project- Headgate Replacement

Powell County, MT

In Cooperation with Nevada Creek WUA

North

Vicinity Map

No Scale

Location Map

No Scale

WATER RESOURCES DIVISION
STATE WATER PROJECTS BUREAU

MAILING ADDRESS:
PO BOX 201601
HELENA, MT 59620-1601
TEL 406.444.2074

PHYSICAL ADDRESS:
1424 9th AVENUE
HELENA, MT 59620
FAX 406.444.5918

dnrc.mt.gov/divisions/water/projects

DRAWING INDEX

MONTANA
JOHN M. CONNORS
8-20-2019
No. 19316 PE
LICENSED PROFESSIONAL ENGINEER

John Connors, P.E.	7/15/2019	Mark McNearney, P.E.	8/01/2019	APPROVED: DATE:	
DESIGNED BY:	DATE:	CHECKED BY:	DATE:	Brian K. Holling, P.E.	
John Connors, P.E.	7/15/2019			DNRC State Water Projects Bureau	
DRAWN BY:	DATE:	APPROVED BY:	DATE:		

Cover Sheet

Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement

SHEET: 1 of 23

GENERAL NOTES:

1. All Work shall be in accordance with the project drawings and specifications, Local Jurisdictional Standards, Special Provisions, and Contract Documents.

2. Owner is responsible for SPA-124 and 404 Permits necessary for the project. The contractor is responsible for any other permits necessary to complete the project.

3. Contractor will be responsible for complying with the terms of all permits during construction including any labor and materials to install and maintain BMP's.

4. The Contractor shall notify One Call @1-800-424-5555 for any onsite utility location. All existing utilities shall be marked before excavating.

5. The Contractor shall maintain service of all existing utilities. If said service is damaged, the Contractor shall have a qualified person repair the damage at the Contractors expense.

6. The Contractor shall restore all disturbed surfaces to conditions that existed prior to construction or excavation, as determined by the Owner or Engineer.

7. The Contractor is responsible for controlling dust and erosion during construction at his expense.

8. All disturbed areas shall be seeded by the Contractor in accordance with the project specifications.

9. Reference all survey monuments, section corners, $\frac{1}{4}$ corners and property corners prior to being disturbed by construction. A PLS must replace any monuments and corners that are disturbed during construction.

10. All equipment shall be cleaned of all earthen and organic materials prior to entering the site to prevent the spread of weeds. Vehicles and equipment must be inspected be the Engineer prior to entry. See specification for requirements.

11. Cattle Guard protection during construction is required.

12. Close gates during and after construction hours as directed by the Land Owner.

13. Protect and maintain access road during construction and restore road to pre construction or better condition at end of project.

14. Protect and maintain bridges and culverts used for construction access. Restore to pre construction or better condition at end of project.

CONSTRUCTION STAKING:

1. The owner will provide construction staking one time. Additional staking will be the responsibility of the contractor for scheduling and payment.

2. Contractor is responsible to coordinate and request staking at least five days in advance, unless otherwise agreed upon in writing by Engineer.

3. Staking will be provided as indicated in the Contract Documents, or as requested by contractor.

GENERAL STRUCTURAL NOTES:

1. Basic Design Code: ASCE 7-10 International Building Code, 2012 Edition, Concrete Structures: ACI 350. AISC 360, AWS D1.1.04.

2. All materials, workmanship, and designs by others shall conform to the design codes unless noted otherwise by drawings and specifications.

3. Drawings indicate general and typical details of construction. Where conditions are not specifically indicated but are of similar character to details shown, similar details of construction shall be used, subject to review and approval by the engineer.

4. Repetitive features are not drawn in the entirety and shall be provided and constructed completely as if drawn in full.

5. The structure shall be adequately braced for soil, wind, earthquake and construction loads until structure is completed.

6. Dimensions are based on the Drawings. Contractor to verify all prior to fabrication.

STRUCTURAL STEEL:

1. Detailing, fabrication, and erection shall be in accordance with AISC specifications

2. Welding shall conform to requirements or AWS D1.1

3. All steel shall be hot dipped galvanized after fabrication unless noted otherwise.

4. Coat non-hot dipped galvanized steel surfaces with a zinc-rich cold galvanizer coating such as Galvax, manufactured by AmCon Epoxy, or approved equal.

5. All holes for bolts shall be equal to bolt diameter plus $\frac{1}{16}$ inch unless noted otherwise.

6. Bolts: ASTM A325-N, provide washers and nuts for each bolt location.

7. Anchor Bolts: ASTM F1554, Grade 36, Hilti HY-200 Epoxy, or equal, unless otherwise noted

8. The Contractor is solely responsible for erection scheduling, temporary bracing, safety of workers, and overall compliance with applicable OSHA requirements

NON_SHRINK GROUT:

1. Provide Category III High Strength, Non-Shrink Grout free of gas-releasing agents, oxidizing agents, inorganic accelerators, and chlorides.

2. Minimum Compressive Strength of 5000 psi

3. All water for grout mixtures shall be clean, potable, and free from injurious substances and conforming to ASTM C94.

REINFORCING STEEL:

1. All reinforcing steel shall conform to ASTM A615, Grade 60, deformed bars.

2. Do not weld reinforcing steel.

3. Fabrication and placements of reinforcing steel shall be in accordance with ACI 301 "Specifications for Structural Concrete."

4. Minimum clearance for reinforcing steel and associated tie wire, unless otherwise shown, shall be:

Unformed exposure to ground surface- 3 inches
Vertical formed exposure to ground surface- 2 inches
Formed exposure to water, weather, condensation- 2 inches

5. All Bends, unless otherwise shown, shall be standard bends as defined in teh latest edition of ACI 318.

6. Splice reinforcing only at locations indicated on Drawings, except as approved by the Engineer.

7. Unless otherwise noted, all reinforcement lap splices, embedments, and hooks shall comply with ACI 318. Splices in adjacent bars shall be staggered a minimum of 18 inches or as approved by the Engineer.

8. All reinforcing laps shall be 18 inches, unless otherwise noted.

9. Tolerances in placing reinforcement shall be +/- $\frac{3}{8}$ inch.

10. Concrete blocks, dobbies, or plastic supports shall be used to support reinforcing. Do not tie or connect reinforcing steel to form ties or other supports.

11. Reinforcing shown in section applies for full length of wall, grade beam or slab.

CONCRETE:

1. See specifications for information on concrete mix designs, testing, aggregate sizes, air content, slump, etc.

2. Submit concrete mix design to engineer for approval prior to concrete placement.

3. Provide concrete with the following criteria:

Compressive Strength (28 Days)-	4,000 psi.
Slump prior to the addition of admixtures-	3 inches+/- 1 inch
Maximum Slump (with admixture added)	8 inches
Minimum Cement Content	6 sacks/yard
Entrained Air Content	4% to 6%
Maximum Water Cement Ratio	0.45

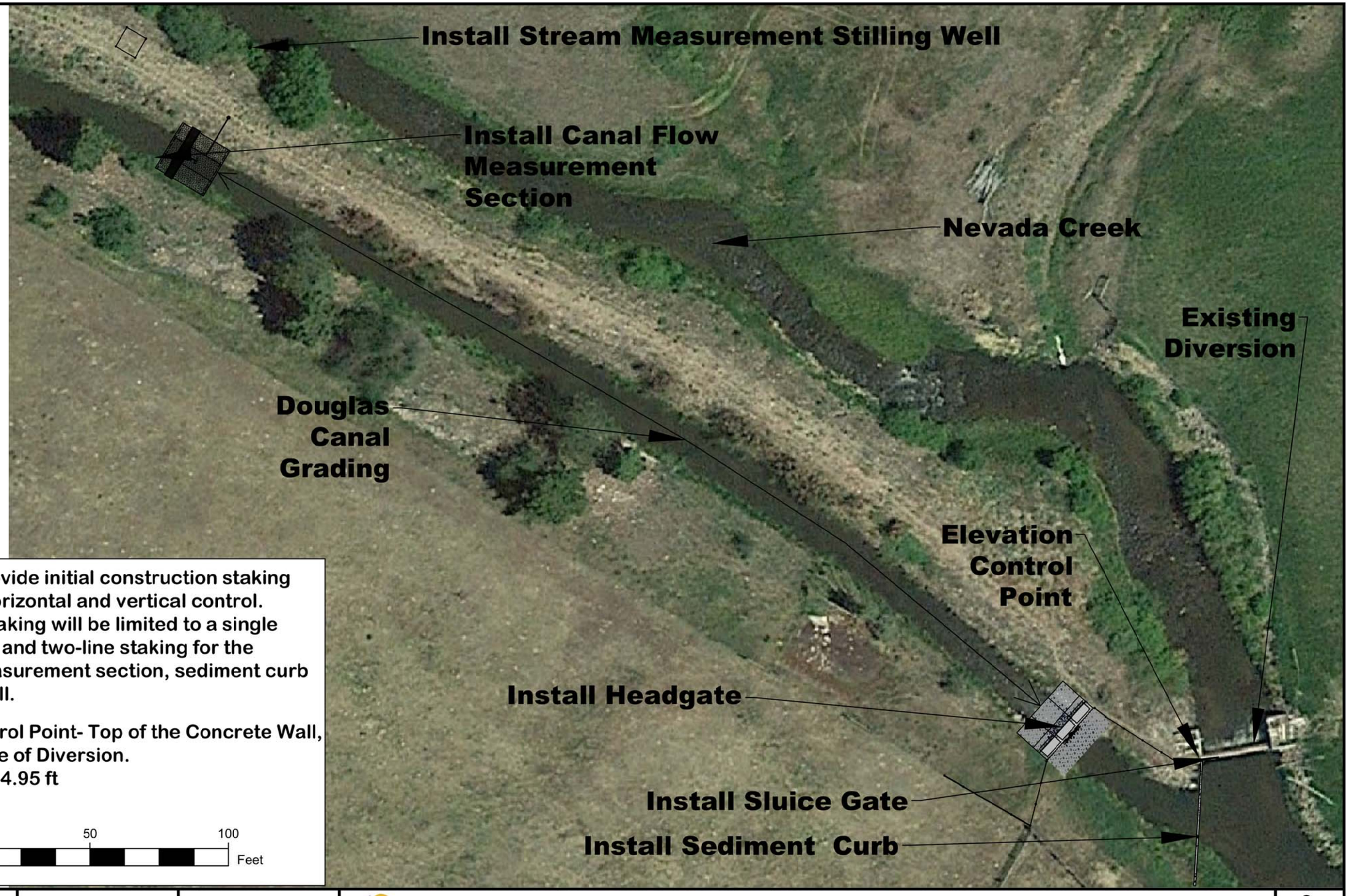
4. Weather conditions may require ACI 306.1, Cold Weather Concreting, criteria be followed.

5. Exposed concrete surfaces are to be smooth trowel finished.

6. Provide $\frac{3}{4}$" chamfer at all exposed concrete corners, except in walkway areas.

John Connors, P.E.	7/15/2019	Mark McNearney, P.E.	8/01/2019	MONTANA DNRC	Construction Notes Nevada Creek -Douglas Canal Rehabilitation Project- Headgate Replacement
DESIGNED BY:	DATE:	CHECKED BY:	DATE:		SHEET: 2 of 23
John Connors, P.E.	7/15/2019				
DRAWN BY:	DATE:	APPROVED BY:	DATE:		

North



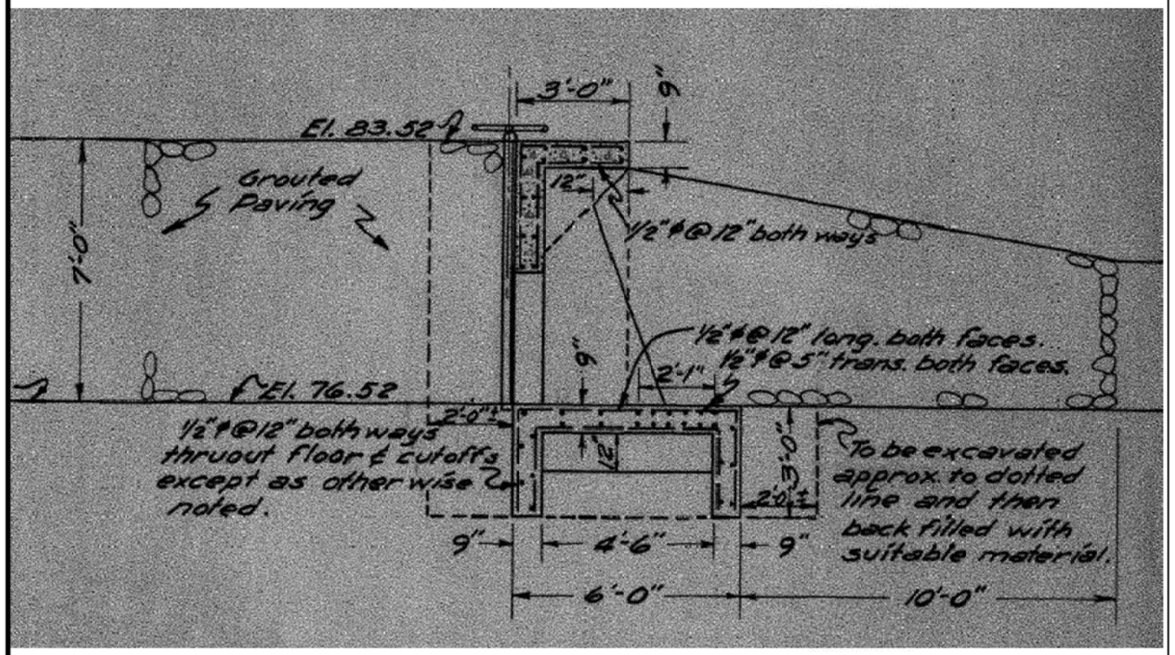
Owner will provide initial construction staking to establish horizontal and vertical control. Anticipated staking will be limited to a single reference hub and two-line staking for the diversion, measurement section, sediment curb and stilling well.

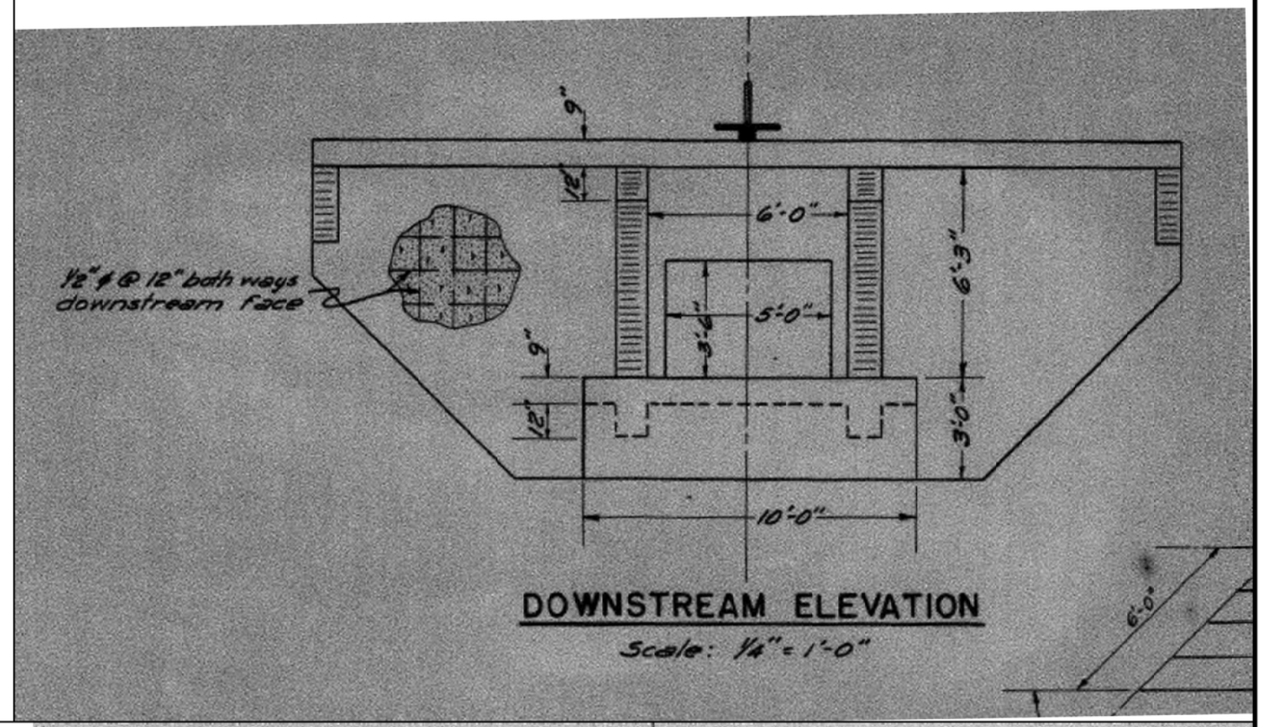
Elevation Control Point- Top of the Concrete Wall, Left (West) side of Diversion.
Elevation - 4484.95 ft

0 50 100 Feet

John Connors, P.E. 7/15/2019	CHECKED BY: DATE:		Proposed Site Plan
DESIGNED BY: DATE:			Nevada Creek -Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 7/15/2019	APPROVED BY: DATE:		SHEET: 3 of 23
DRAWN BY: DATE:			

John Connors, P.E. 7/15/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:		MONTANA DNRC	Construction Access Overview Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 7/15/2019 DRAWN BY: DATE:	APPROVED BY: DATE:			SHEET: 4 of 23



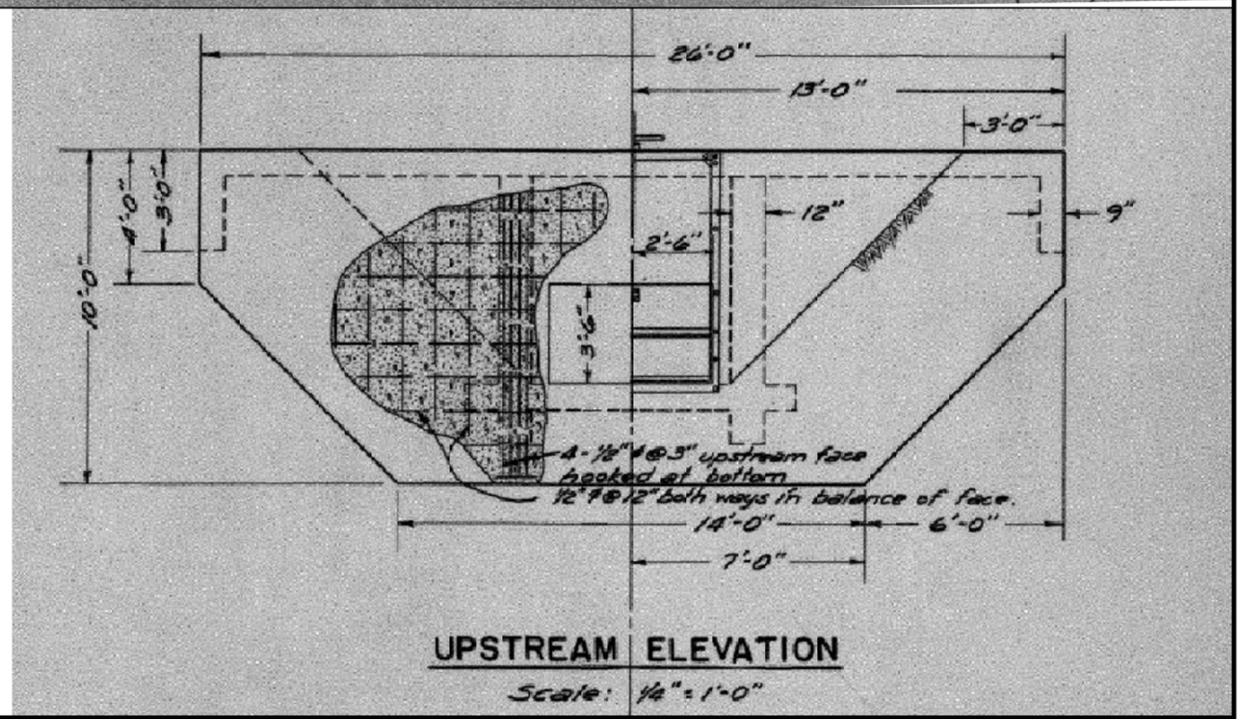


DOWNSTREAM ELEVATION

Scale: ¼" = 1'-0"

Notes:

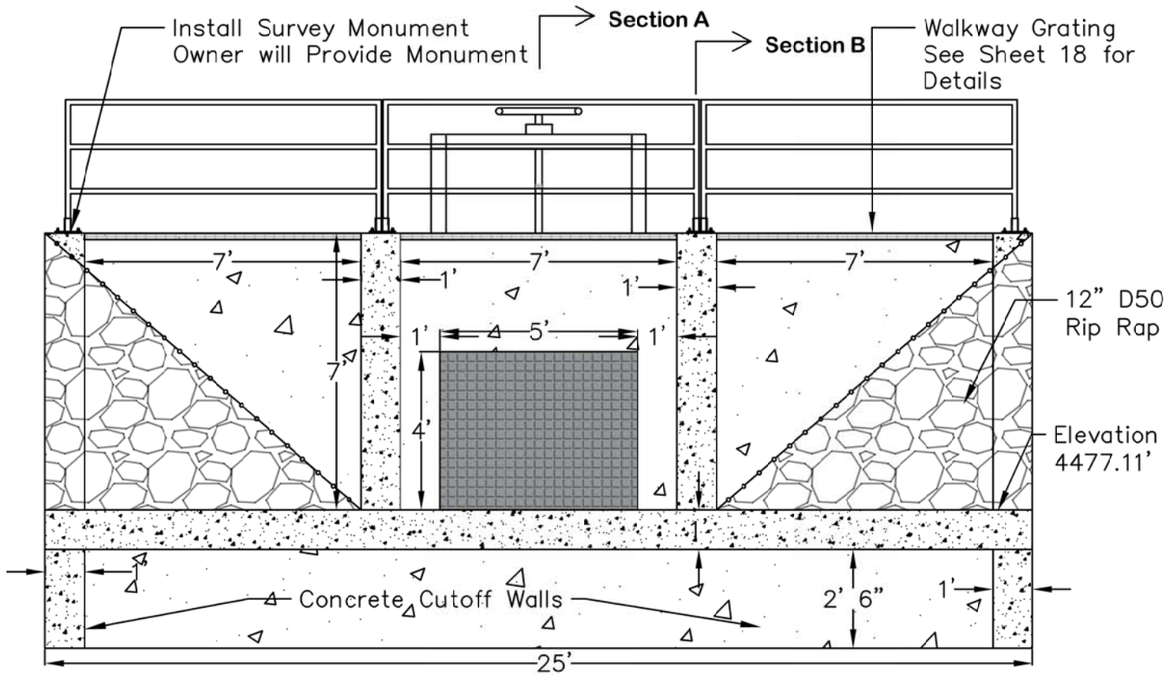
1. Remove existing headgate structure in it's entirety. Salvage existing rip rap. Do not remove or damage existing diversion dam.
2. Salvage and deliver the gate to the Nevada Creek Water Users. Dispose of existing headgate concrete and reinforcing steel appropriately off site.
3. Schematics represented on this sheet may not reflect as–built conditions, but are provided as a reference to reflect approximate dimensions and/or quantities.



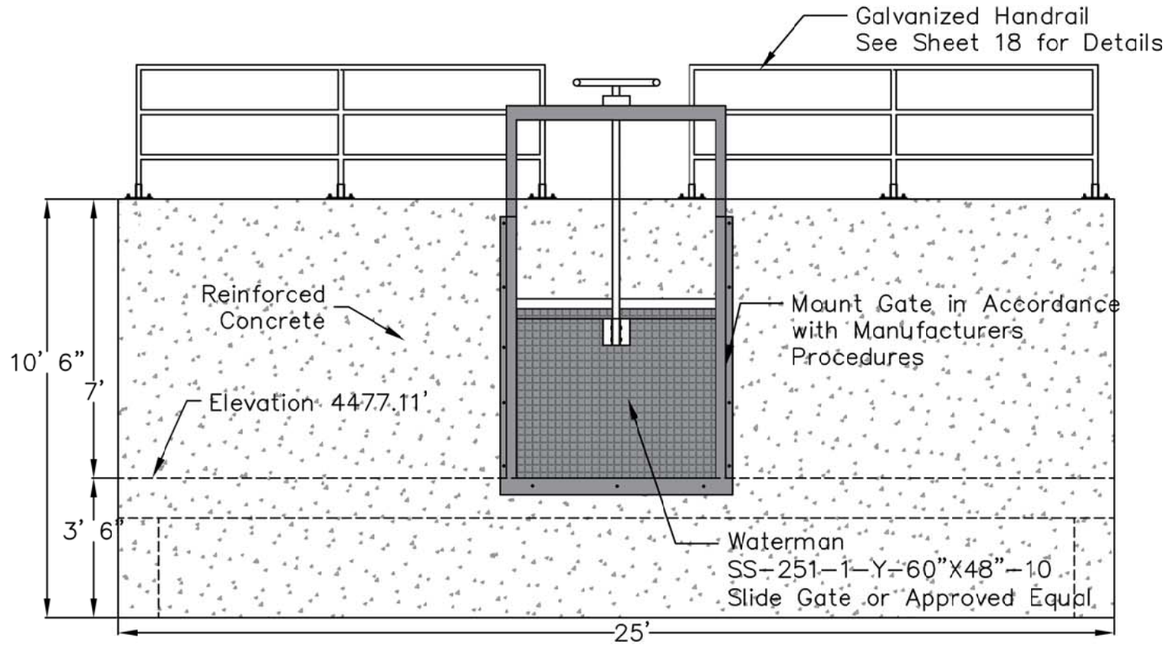
UPSTREAM ELEVATION

Scale: ¼" = 1'-0"

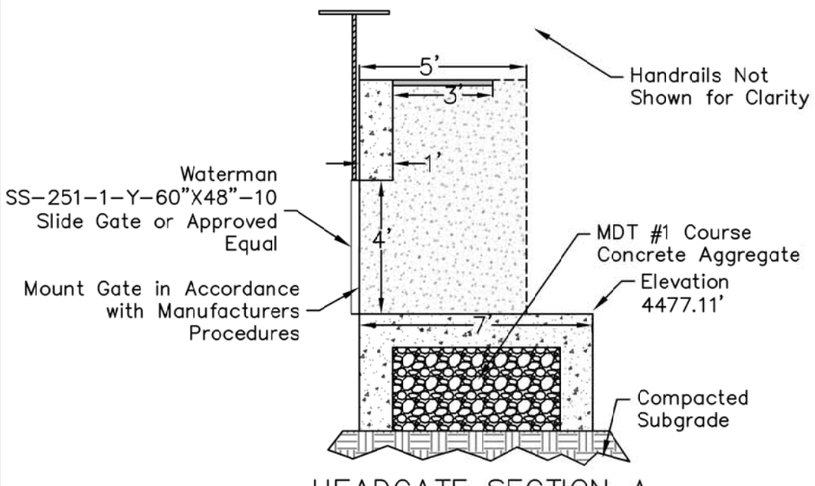
John Connors, P.E. 8/25/2017 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Demolition Details** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 8/25/2017 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 5 of 23



DOWNSTREAM SIDE OF HEADGATE
(No Scale)



UPSTREAM SIDE OF HEADGATE
(No Scale)



HEADGATE SECTION A
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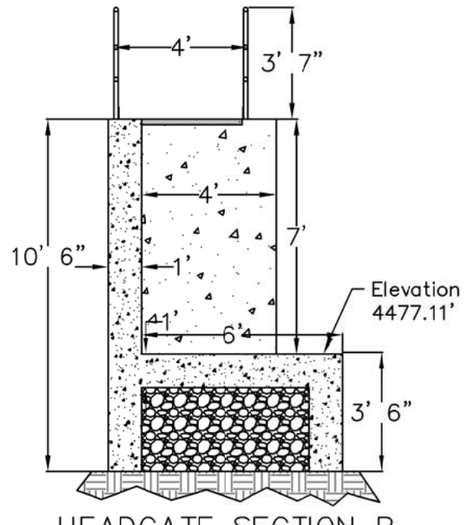

HEADGATE SECTION B
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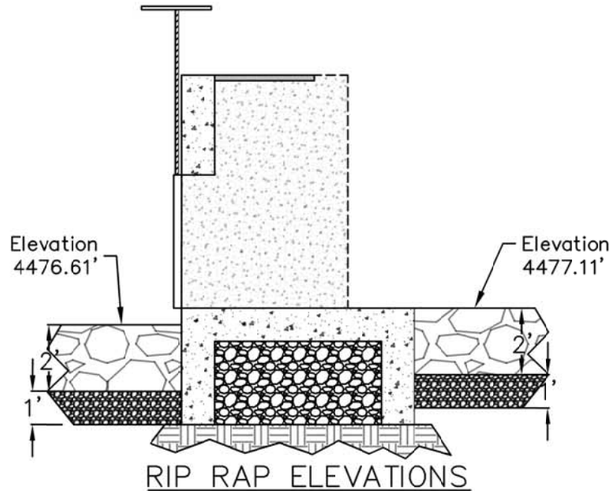
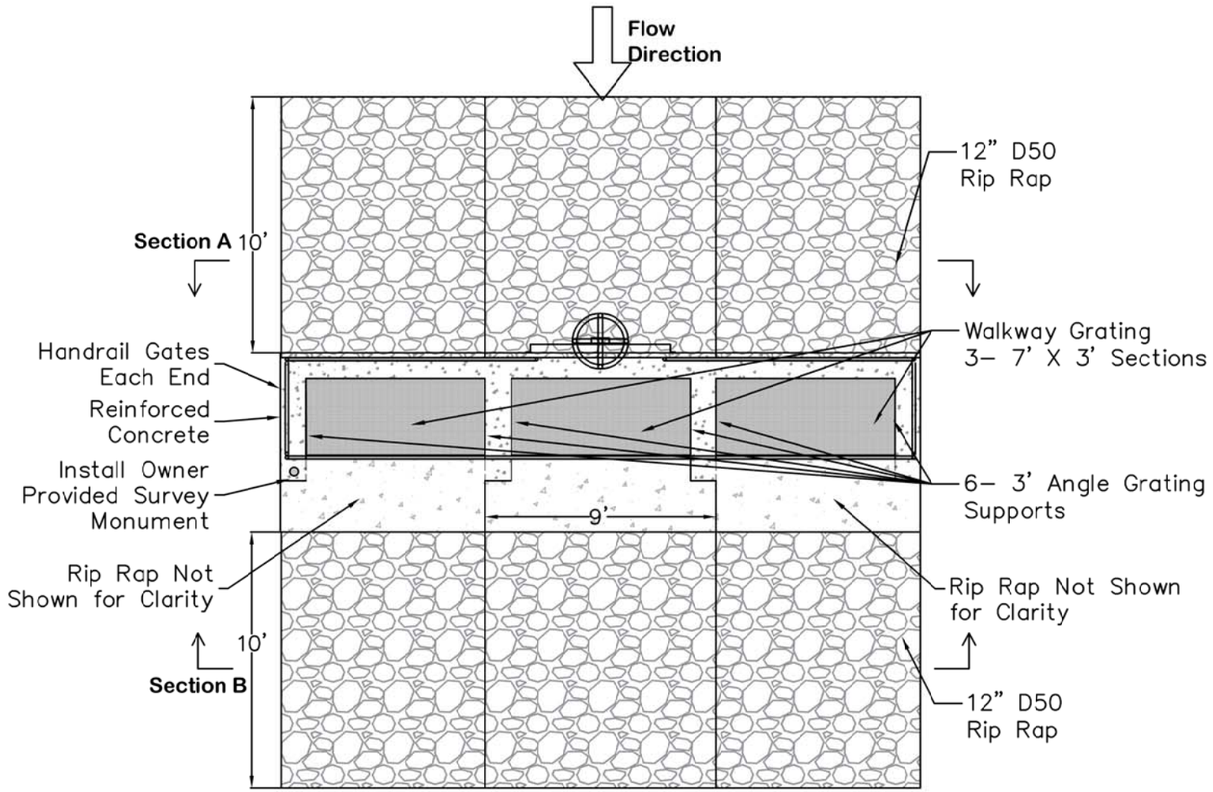
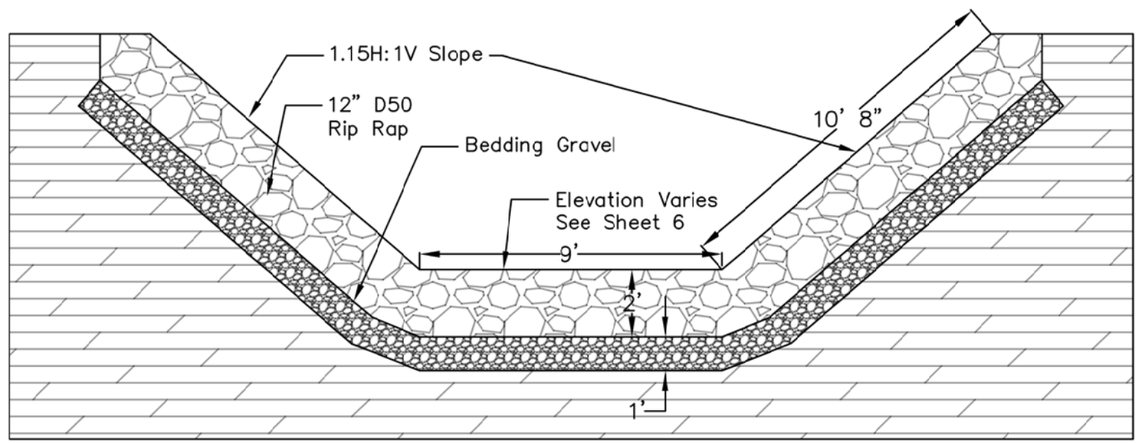


RIP RAP ELEVATIONS
(No Scale)

John Connors, P.E. 7/15/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Headgate Sections**
John Connors, P.E. 7/15/2018 DRAWN BY: DATE:	APPROVED BY: DATE:		Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement

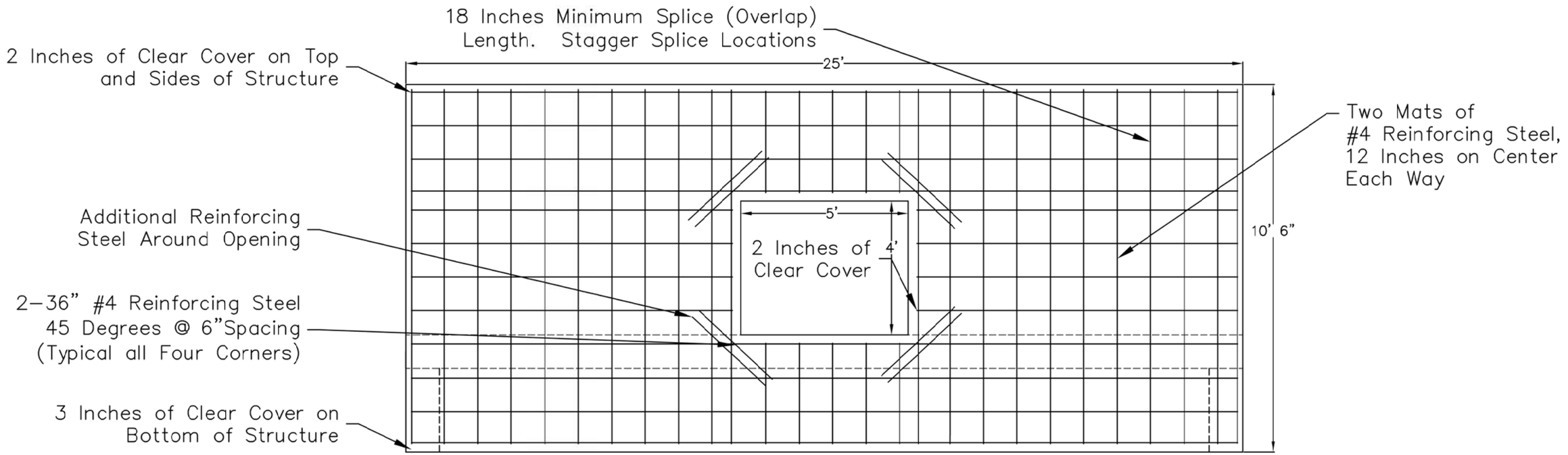


PLAN VIEW OF HEADGATE
(No Scale)

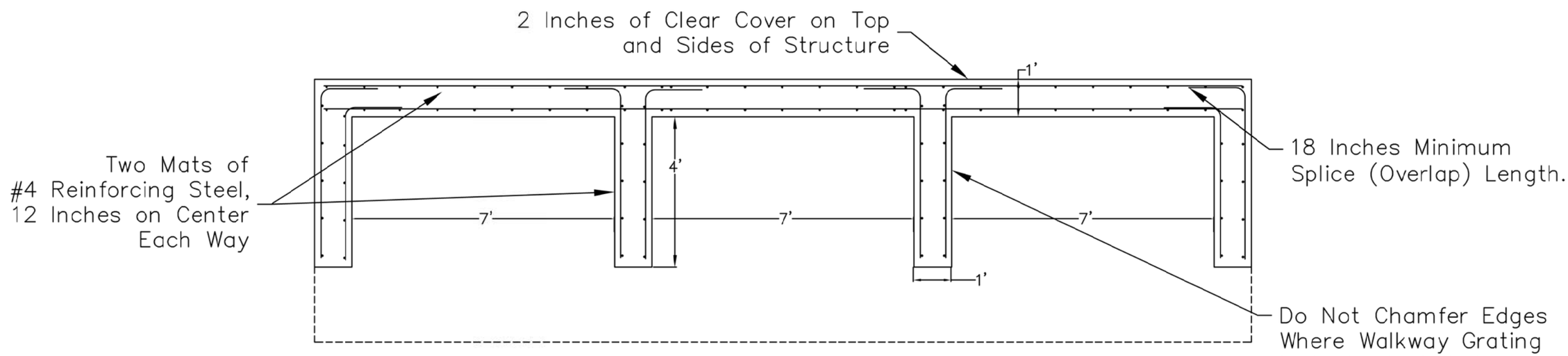


HEADGATE RIP RAP SECTIONS A&B
(No Scale)

John Connors, P.E. 7/15/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Headgate Plan View and Rip Rap**
John Connors, P.E. 7/15/2018 DRAWN BY: DATE:	APPROVED BY: DATE:		Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement

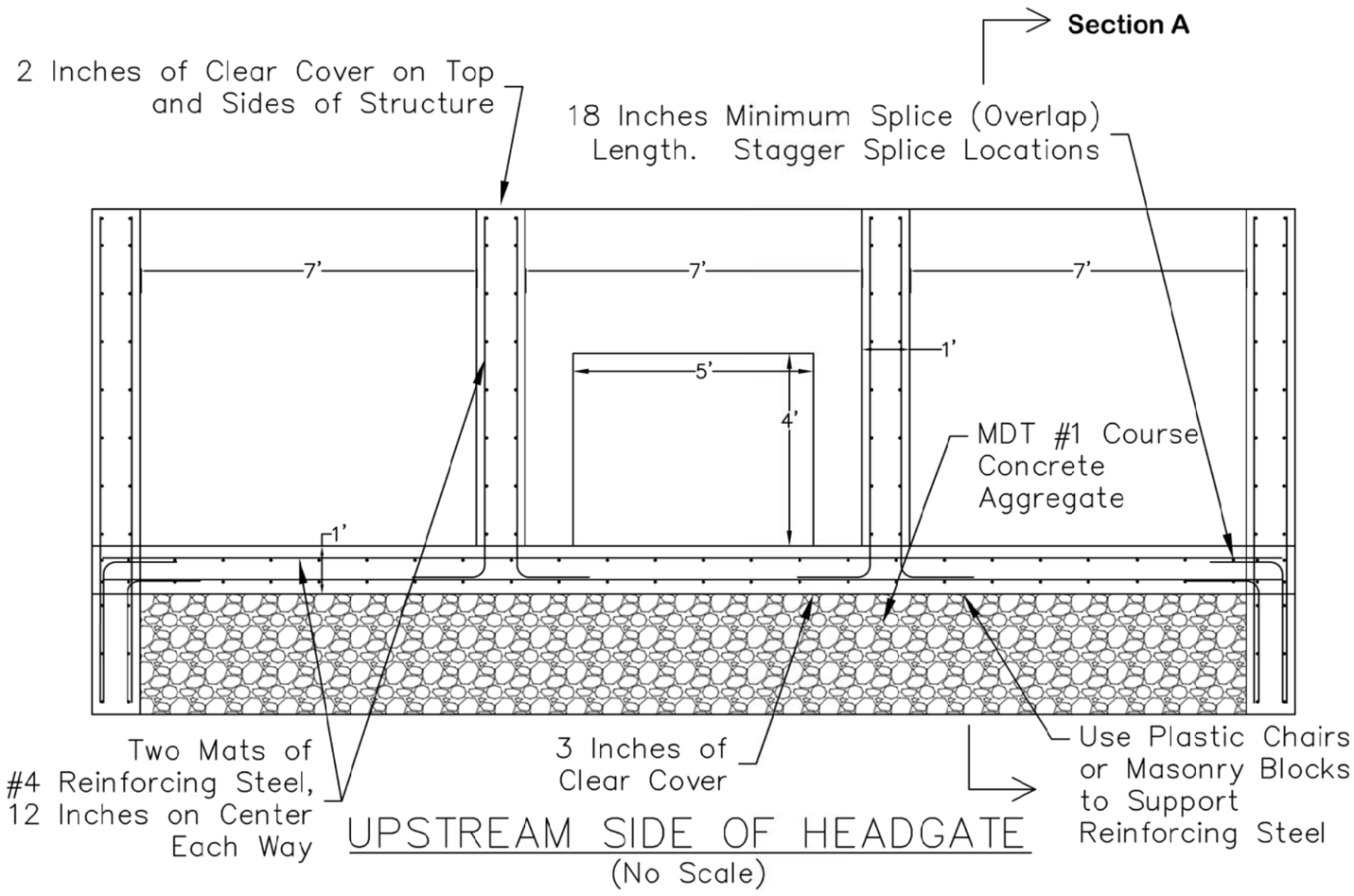


UPSTREAM SIDE OF HEADGATE
(No Scale)

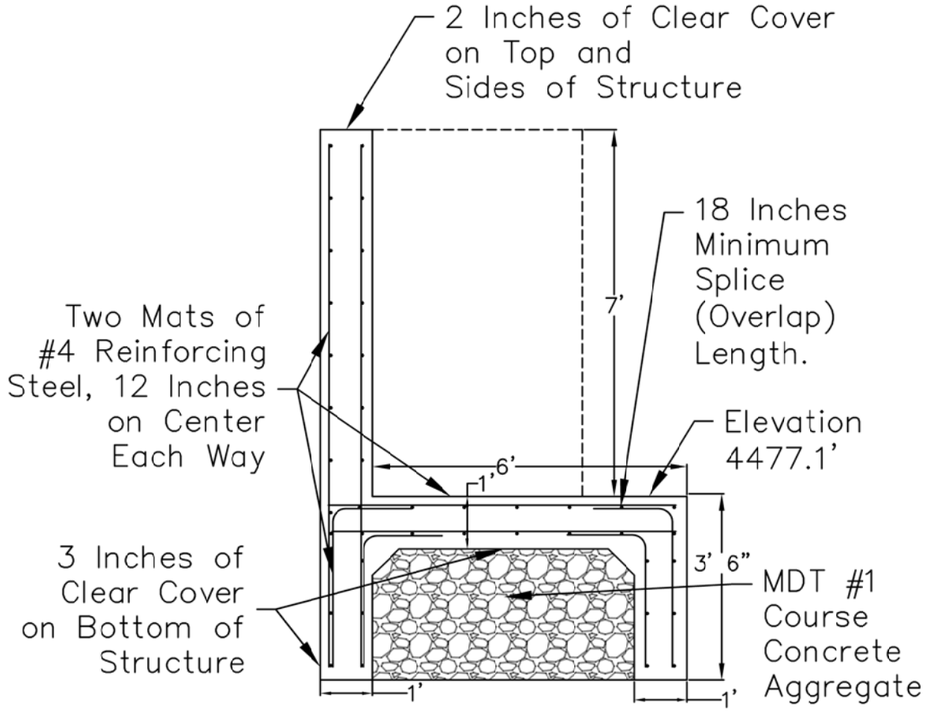


TOP VIEW OF HEADGATE
(No Scale)

John Connors, P.E. 7/15/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Headgate Reinforcing Steel** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 7/15/2018 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 8 of 23

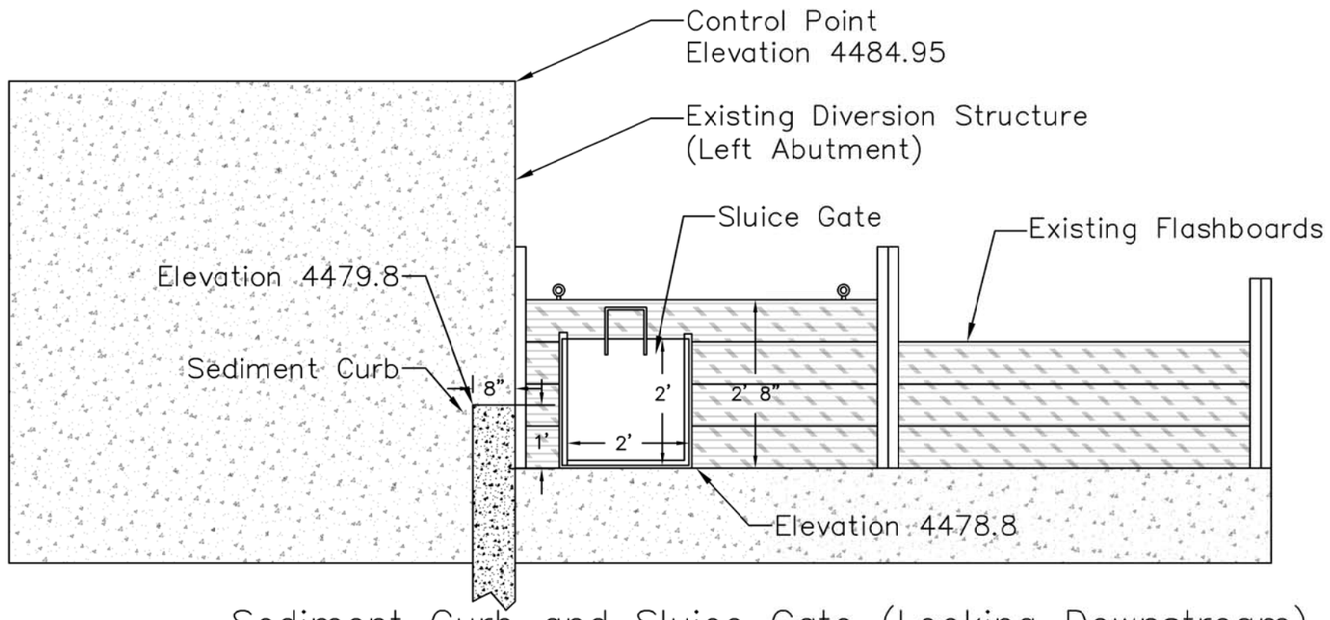


UPSTREAM SIDE OF HEADGATE
(No Scale)



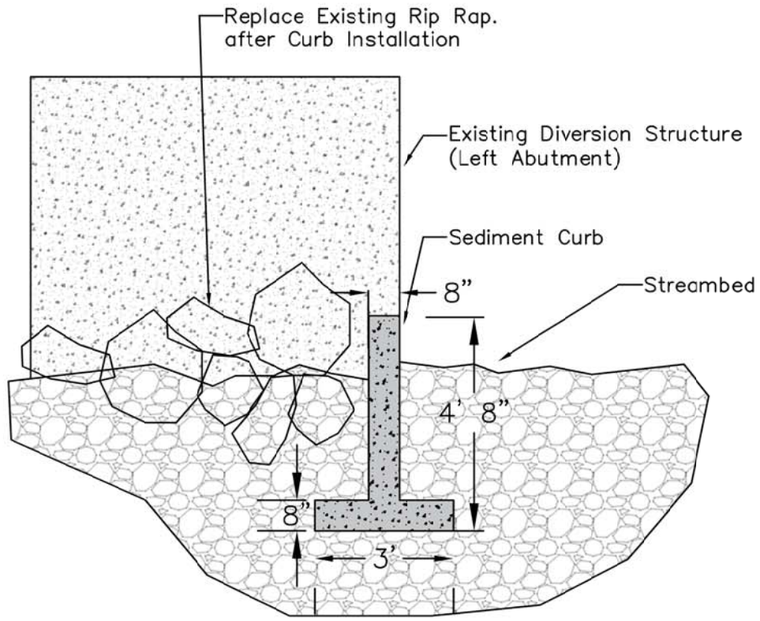
SIDE VIEW OF HEADGATE
(SECTION A)
(No Scale)

John Connors, P.E. 7/15/2019 DESIGNED BY: DATE: John Connors, P.E. 7/15/2018 DRAWN BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE: APPROVED BY: DATE:	MONTANA DNRC	**Headgate Reinforcing Steel** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 9 of 23



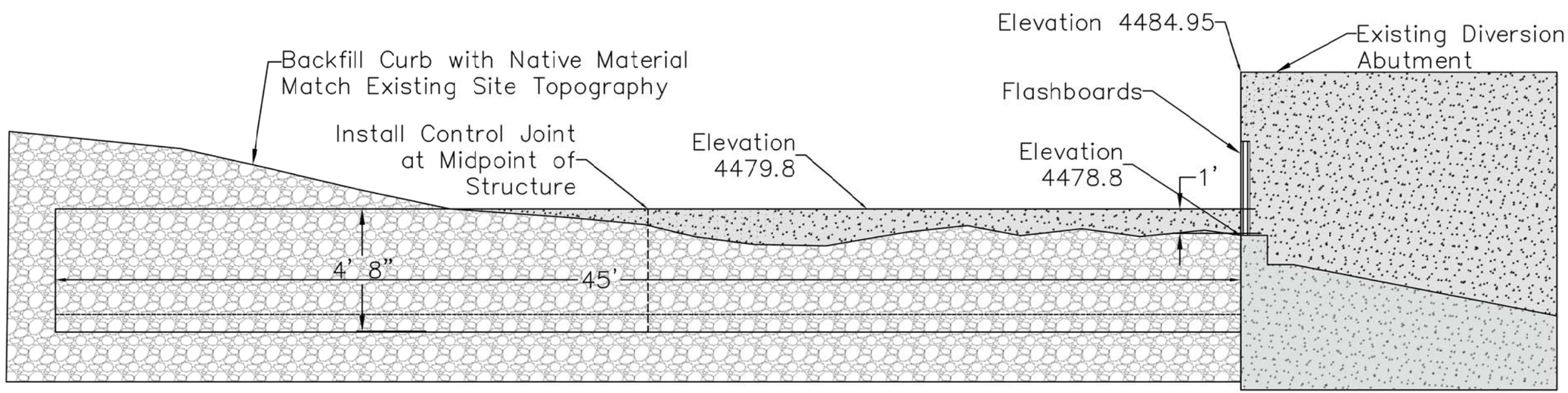
Sediment Curb and Sluice Gate (Looking Downstream)

(No Scale)



Cross Section View of Sediment Curb

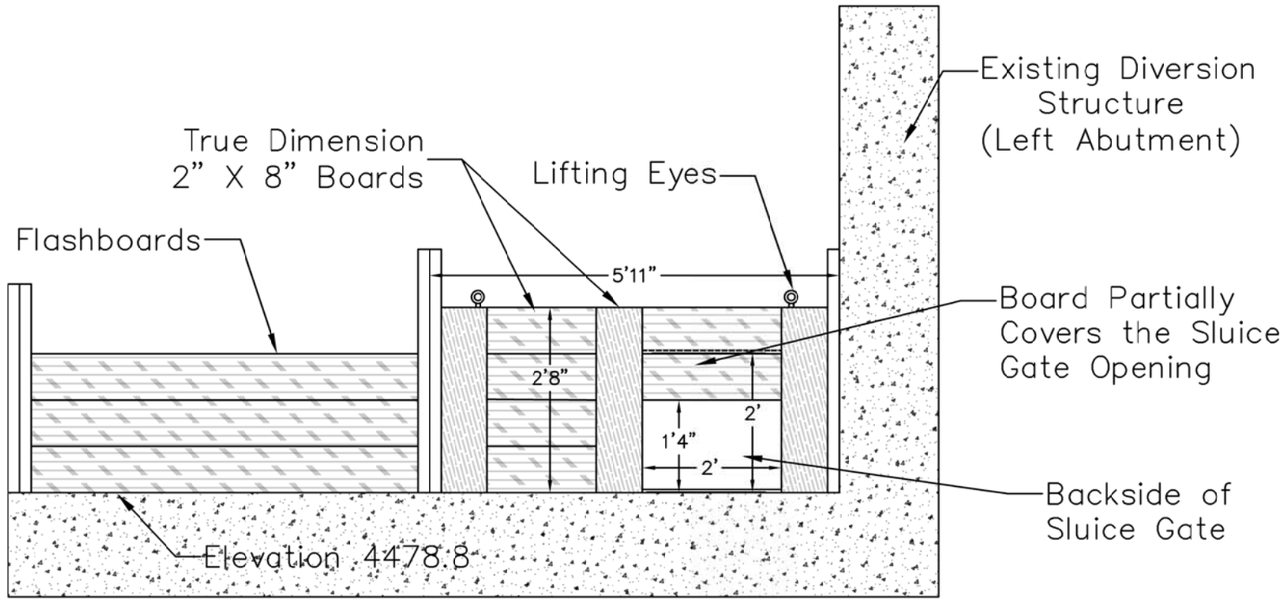
(No Scale)



Sediment Curb and Intake to the Douglas Canal

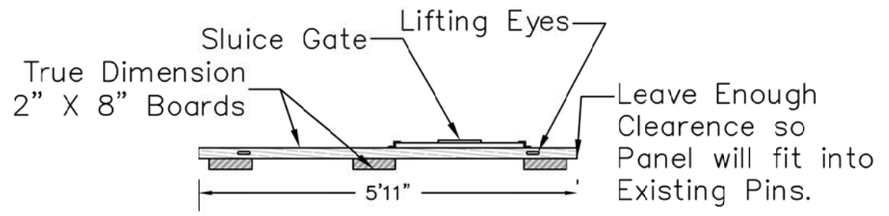
(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:		MONTANA DNRC	**Sediment Curb and Sluice Gate** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 10 of 23
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:				



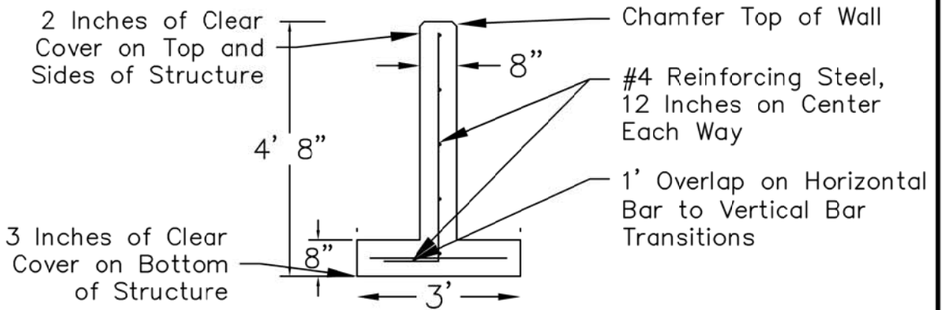
SLUICE GATE PANEL (LOOKING UPSTREAM)

(No Scale)



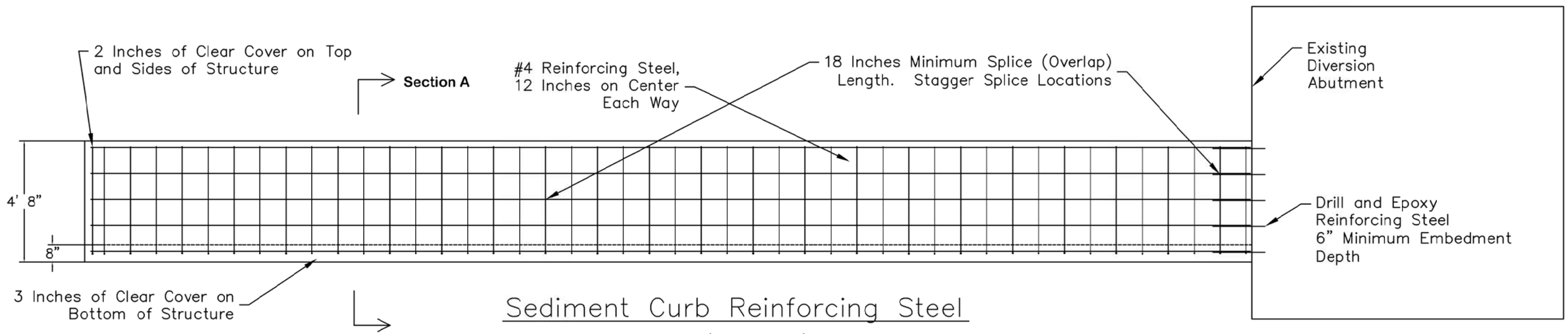
SLUICE GATE PANEL, TOP VIEW

(No Scale)



SEDIMENT CURB SECTION A

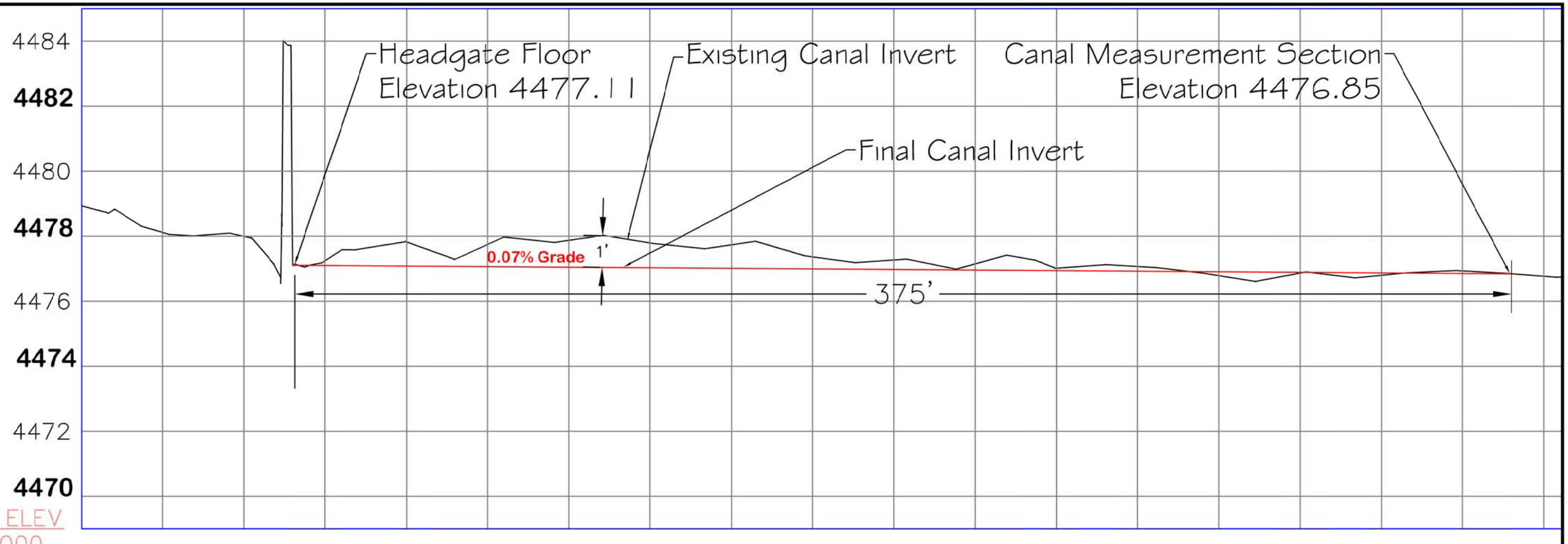
(No Scale)

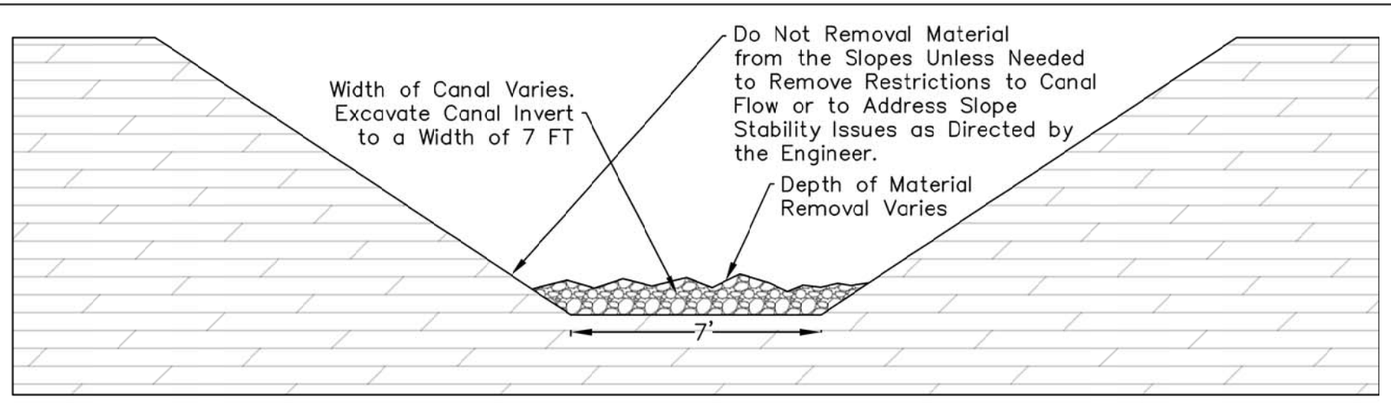


Sediment Curb Reinforcing Steel

(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Sediment Curb and Sluice Gate** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 11 of 23





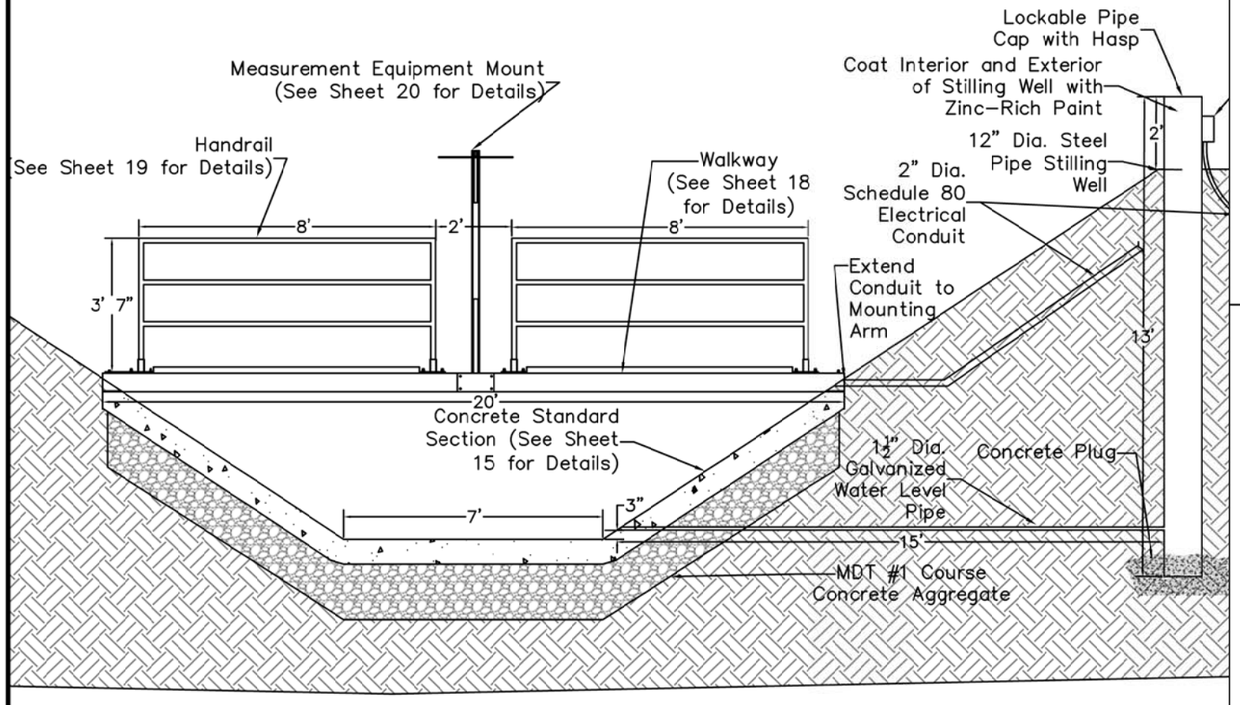
CANAL GRADING CROSS SECTION VIEW
(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	SHEET: 12 of 23
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		

Canal Grading

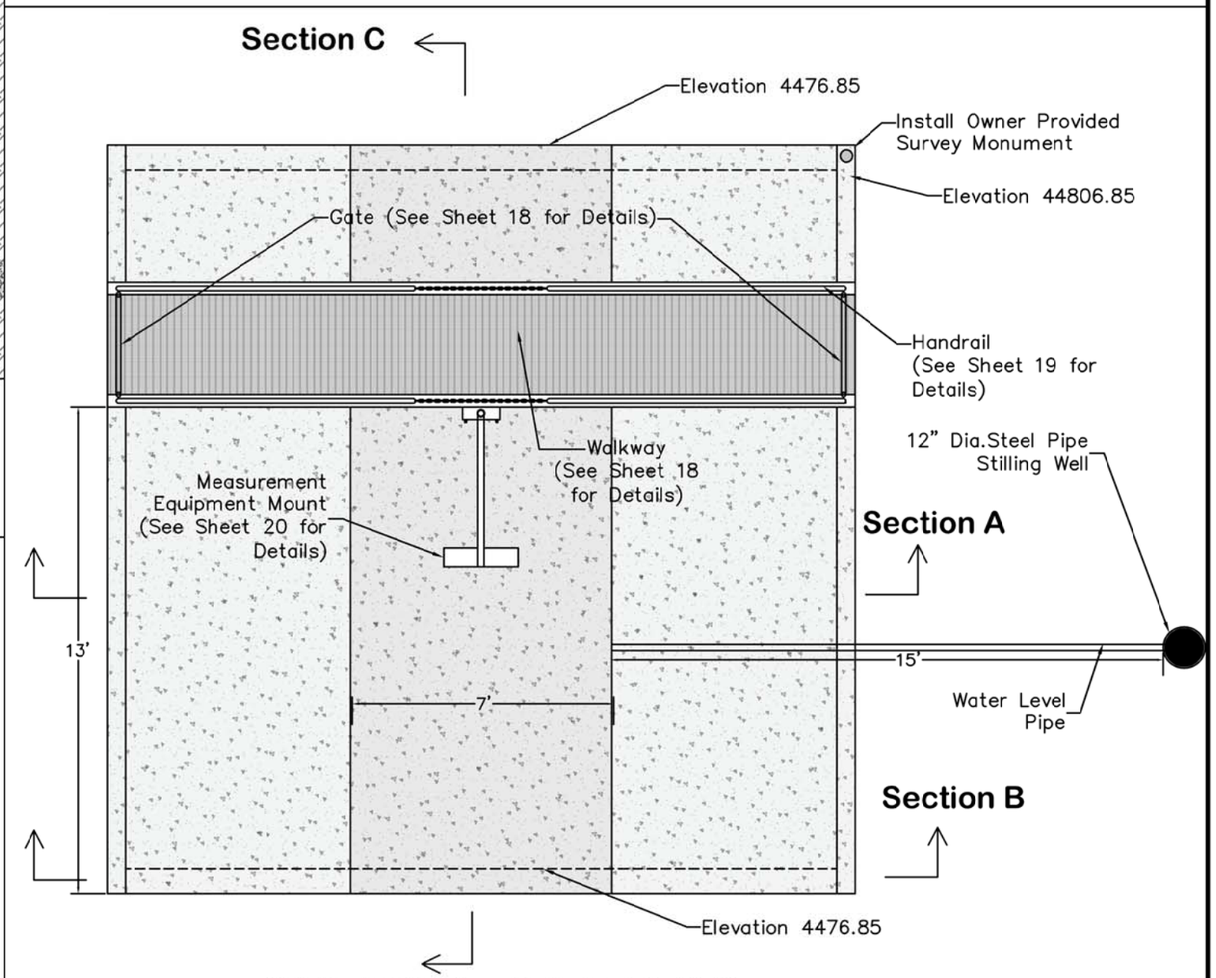
Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	Plan View- Canal and Stream Flow Measurement Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 13 of 23



MEASUREMENT AREA CROSS SECTION VIEW

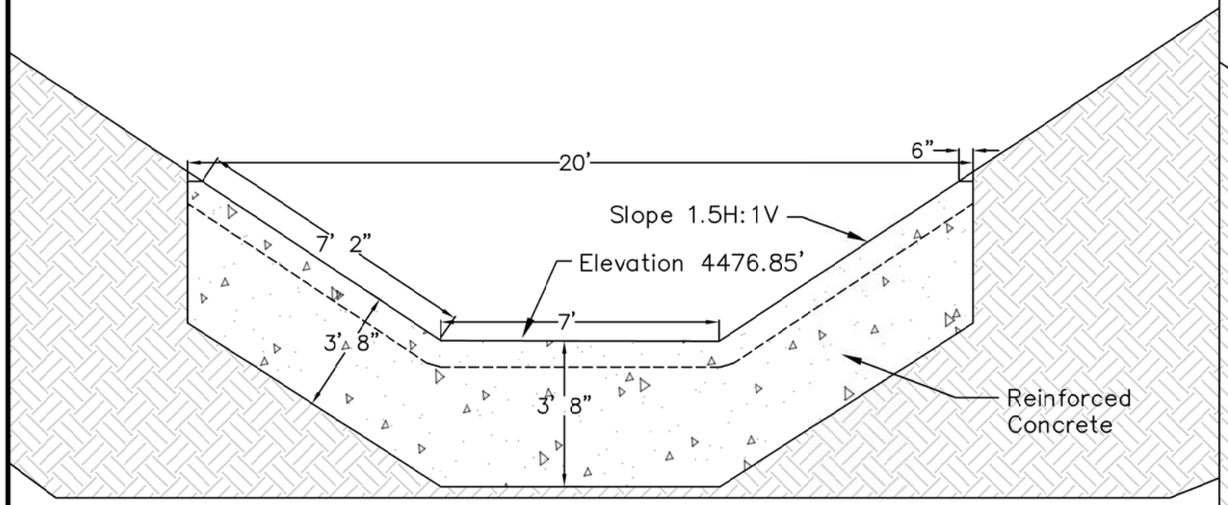
(No Scale)



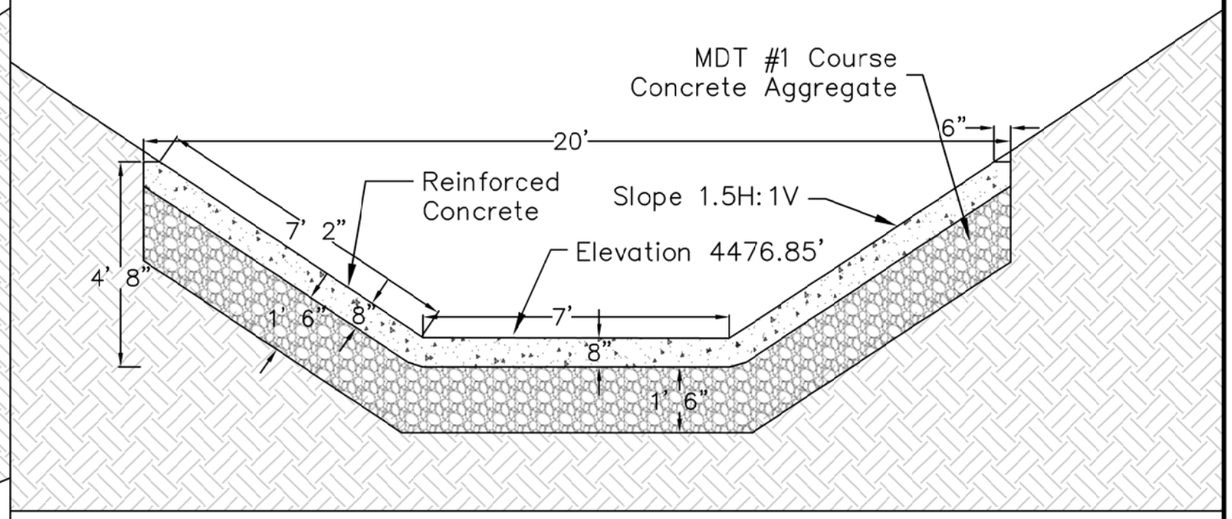
MEASUREMENT AREA PLAN VIEW

(No Scale)

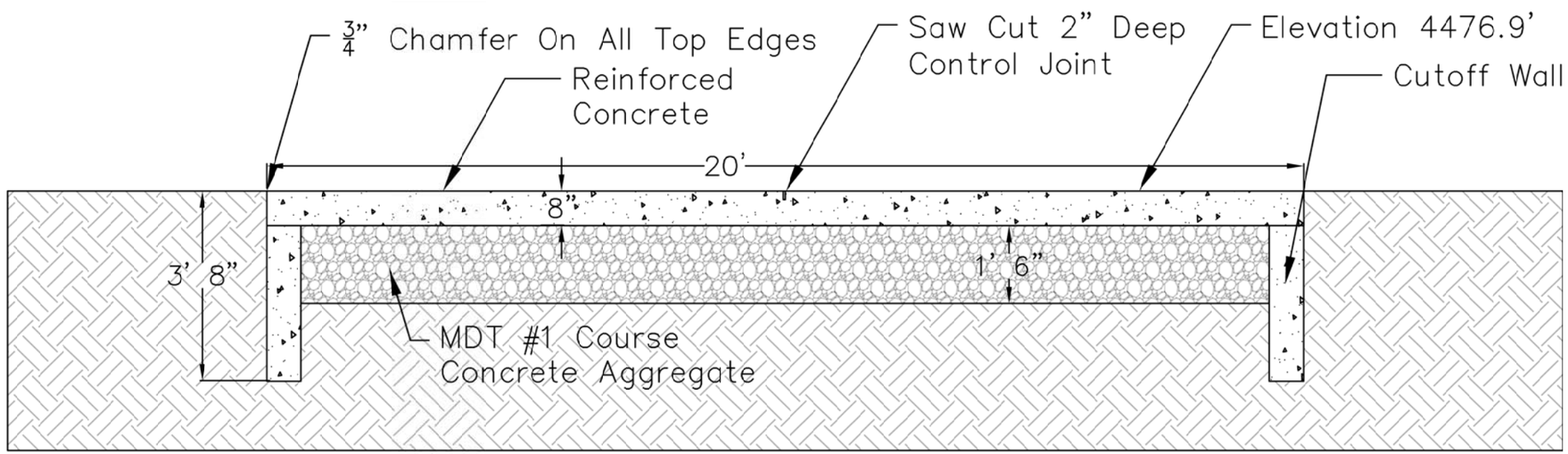
John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Canal Measurement Section** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 14 of 23



CUTOFF WALL (SECTION B)
UPSTREAM AND DOWNSTREAM
(No Scale)

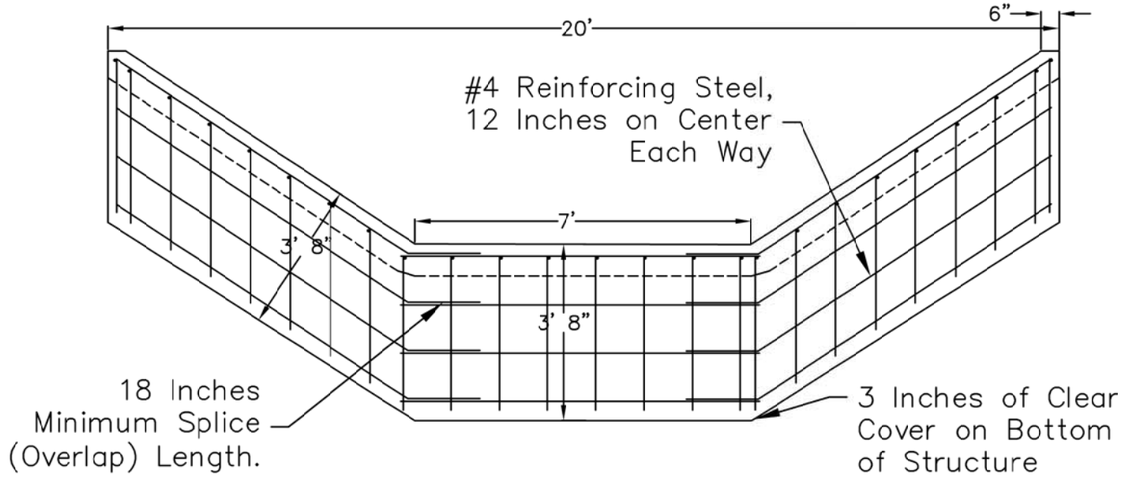


CROSS SECTION OF MEASUREMENT SLAB
(SECTION A)
(No Scale)



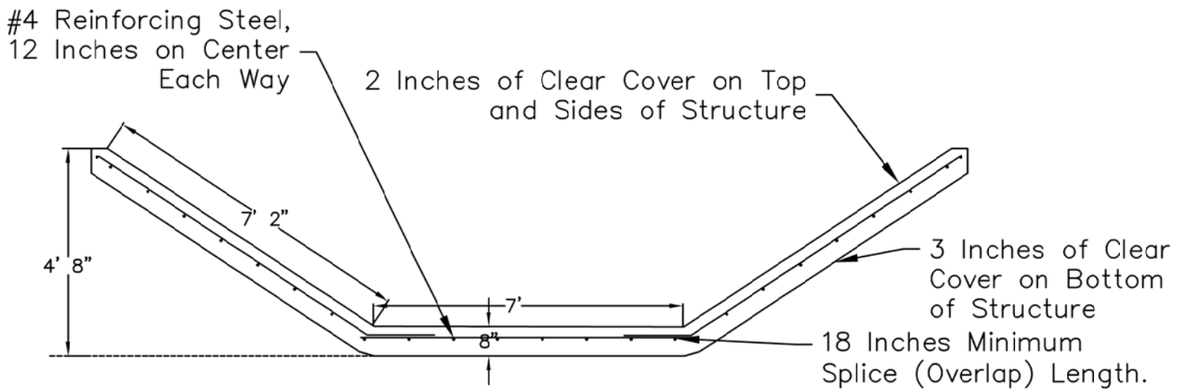
CROSS SECTION OF MEASUREMENT SLAB
(SECTION C)
(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	**Measurement Section Concrete** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 15 of 23



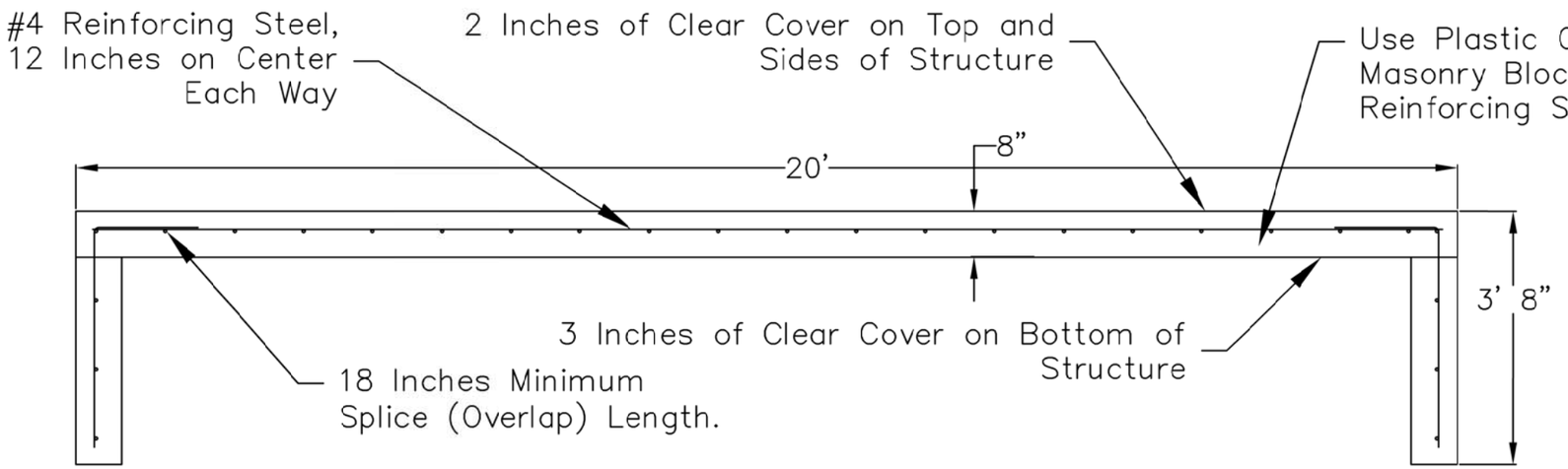
REINFORCING STEEL IN CUTOFF WALL
(SECTION B)

(No Scale)



REINFORCING STEEL IN MEASUREMENT SLAB
(SECTION A)

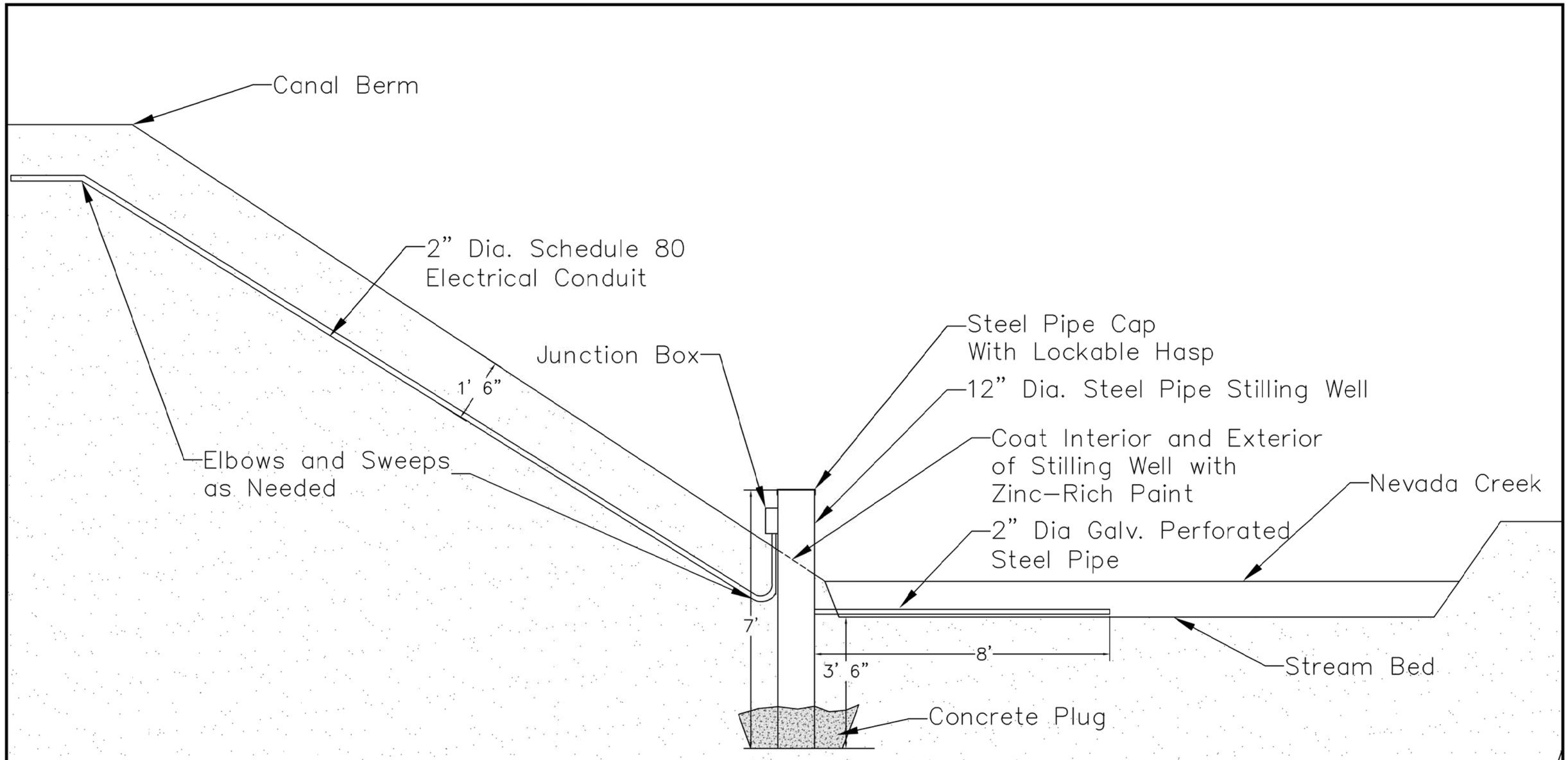
(No Scale)



REINFORCING STEEL IN MEASUREMENT SLAB
(SECTION C)

(No Scale)

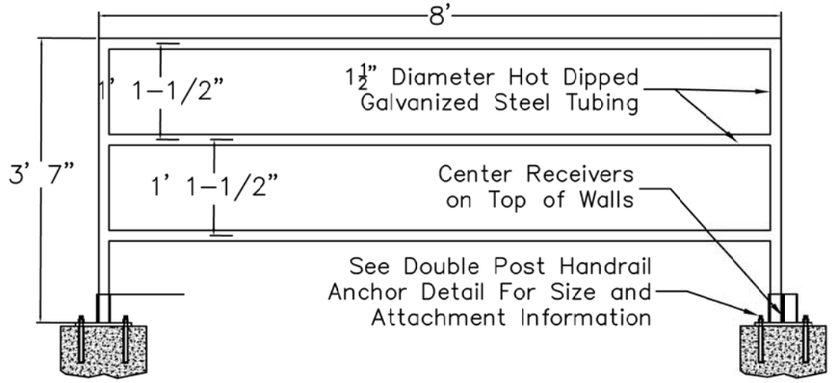
John Connors, P.E. 6/25/2019 DESIGNED BY: DATE: John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE: APPROVED BY: DATE:	MONTANA DNRC	**Measurement Section Reinforcing Steel** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 16 of 23



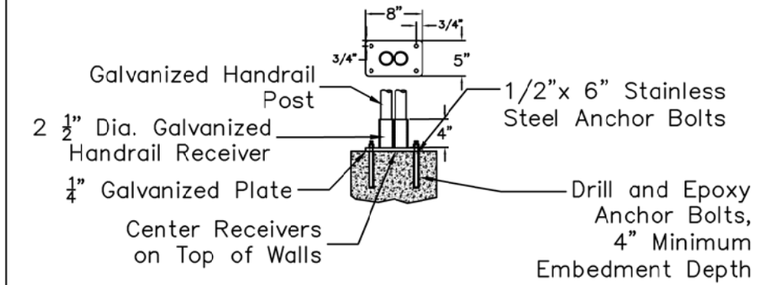
Stream Measurement Stilling Well

(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE: John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE: APPROVED BY: DATE:	MONTANA DNRC	**Stream Measurement Stilling Well** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 17 of 23

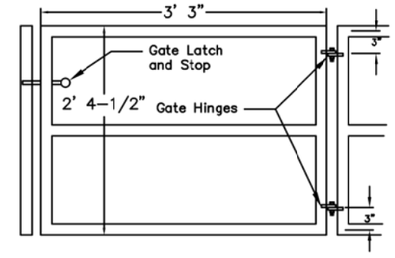


HEADGATE DOWNSTREAM HANDRAIL
(No Scale)

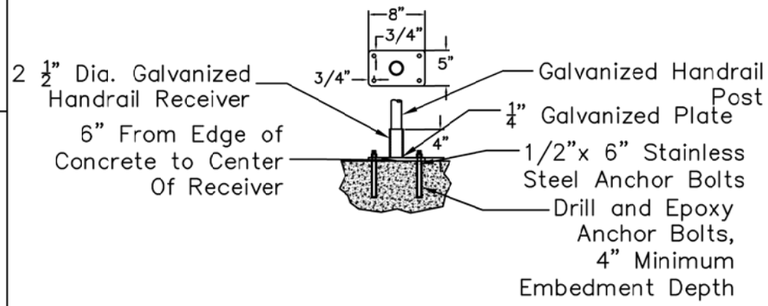


DOUBLE POST HANDRAIL ANCHOR DETAIL

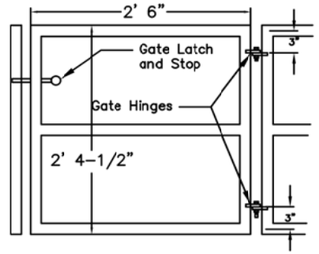
(No Scale)



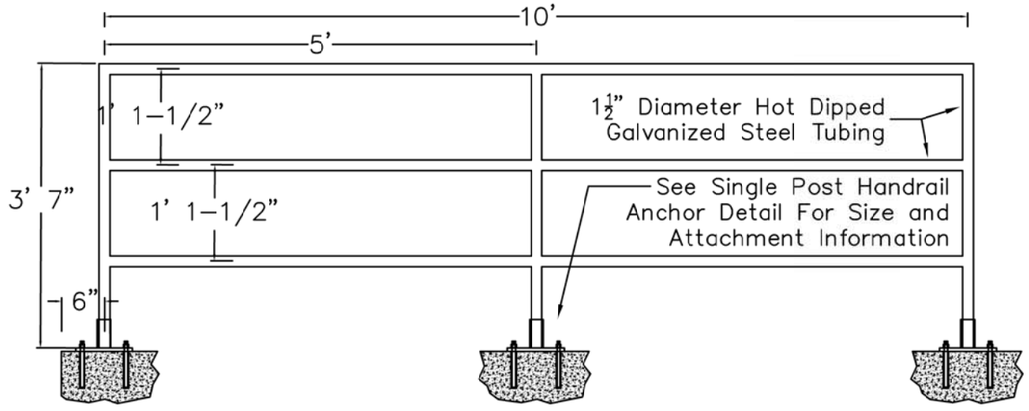
HEADGATE HANDRAIL GATE DETAIL
(No Scale)



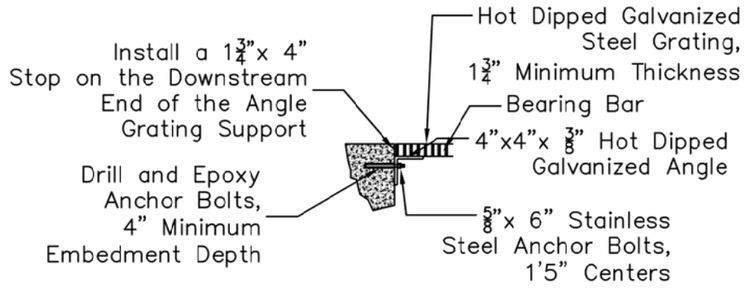
SINGLE POST HANDRAIL ANCHOR DETAIL
(No Scale)



MEASUREMENT AREA HANDRAIL GATE DETAIL
(No Scale)



HEADGATE UPSTREAM HANDRAIL
(No Scale)

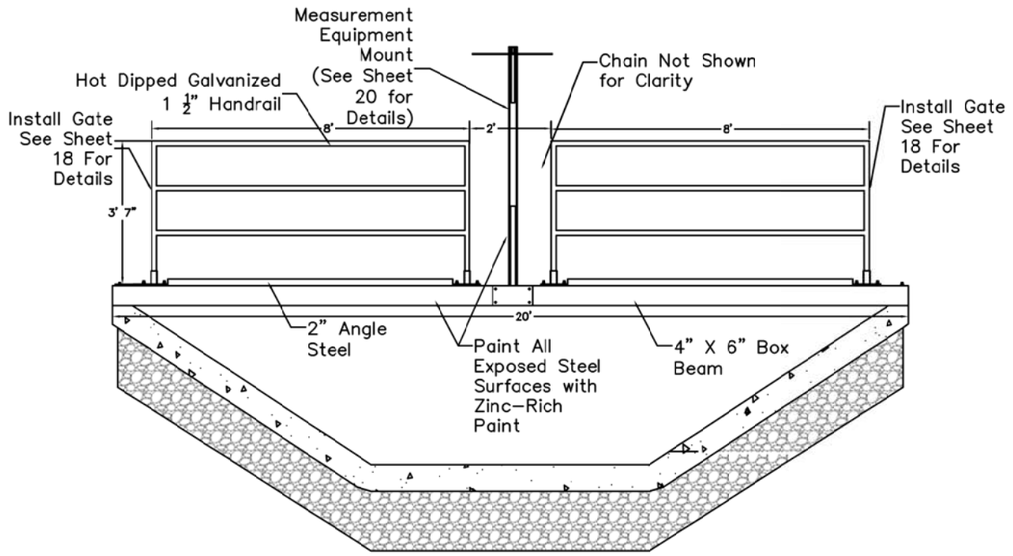


WALKWAY GRATING CONNECTION DETAIL
(No Scale)

GRATING NOTES

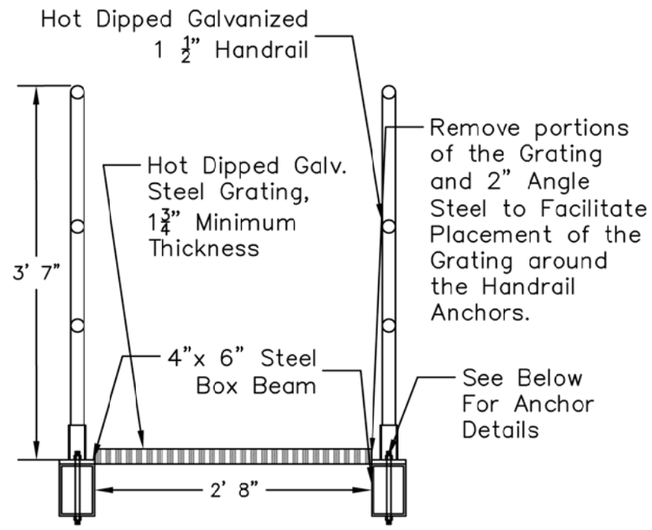
1. See Plan Views for Grating Spans and Angle Support Locations.
2. Width of Grating Sections Shall Not Exceed 3' 0".
3. Shop Drawings Based on Field Dimensions Shall be Submitted to the Engineer Prior to Fabrication.
4. Material for Supports of Steel Grating to be the Same as Grating.
5. Bearing Bar thickness for Grating to be $\frac{3}{16}$" Minimum.
6. Provide Grating Fasteners as Required.
7. The Horizontal Clearance Between the Grating and Grating Supports Shall Not be Less than ¼" nor Greater than ½".
8. All Grating Sections, When in Place, Shall Always be Firmly Anchored to Their Supports as Specified.

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	MONTANA DNRC	Handrail Details- Headgate Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		SHEET: 18 of 23



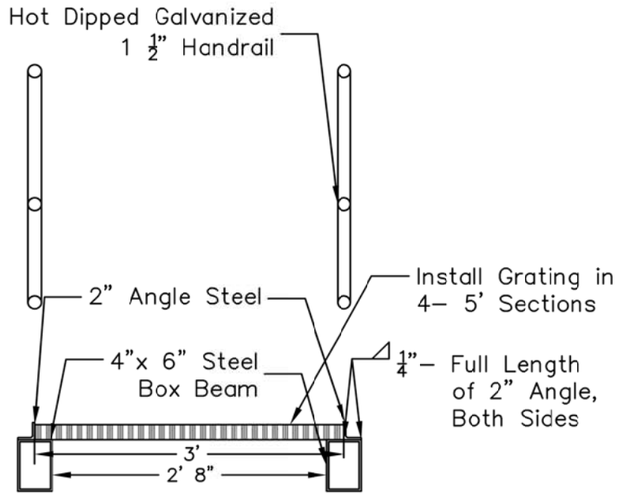
MEASUREMENT AREA UPSTREAM VIEW

(No Scale)



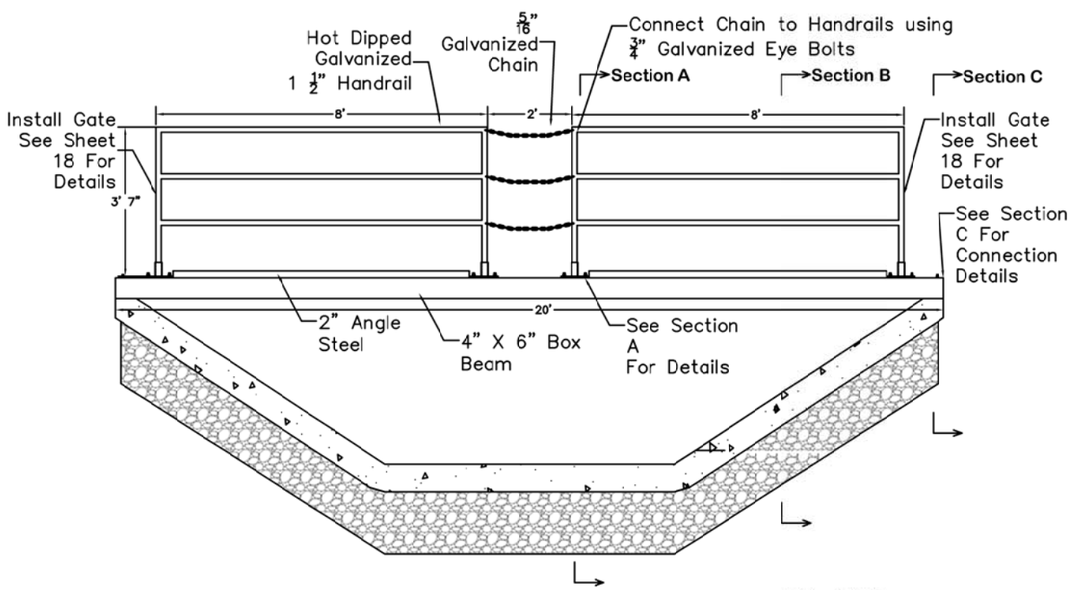
SECTION A
HANDRAIL DETAIL

(No Scale)



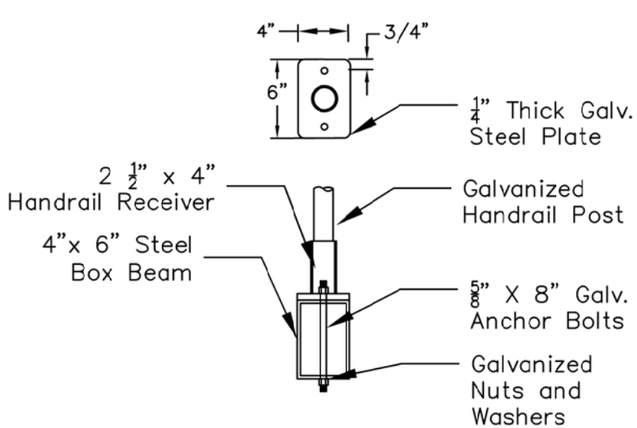
SECTION B
GRATING DETAIL

(No Scale)



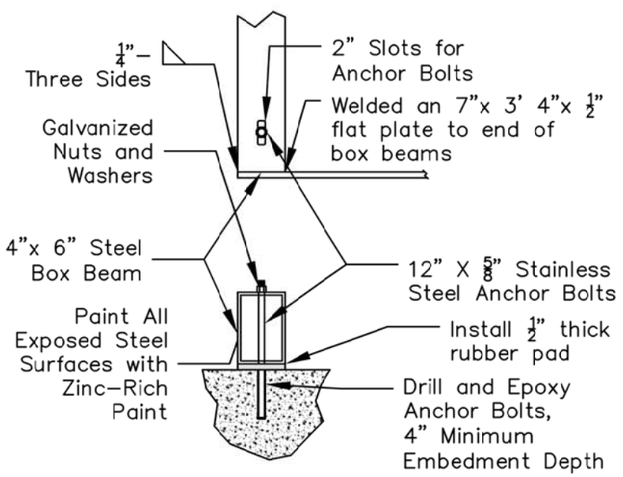
MEASUREMENT AREA DOWNSTREAM VIEW

(No Scale)



MEASUREMENT AREA
HANDRAIL ANCHOR DETAIL

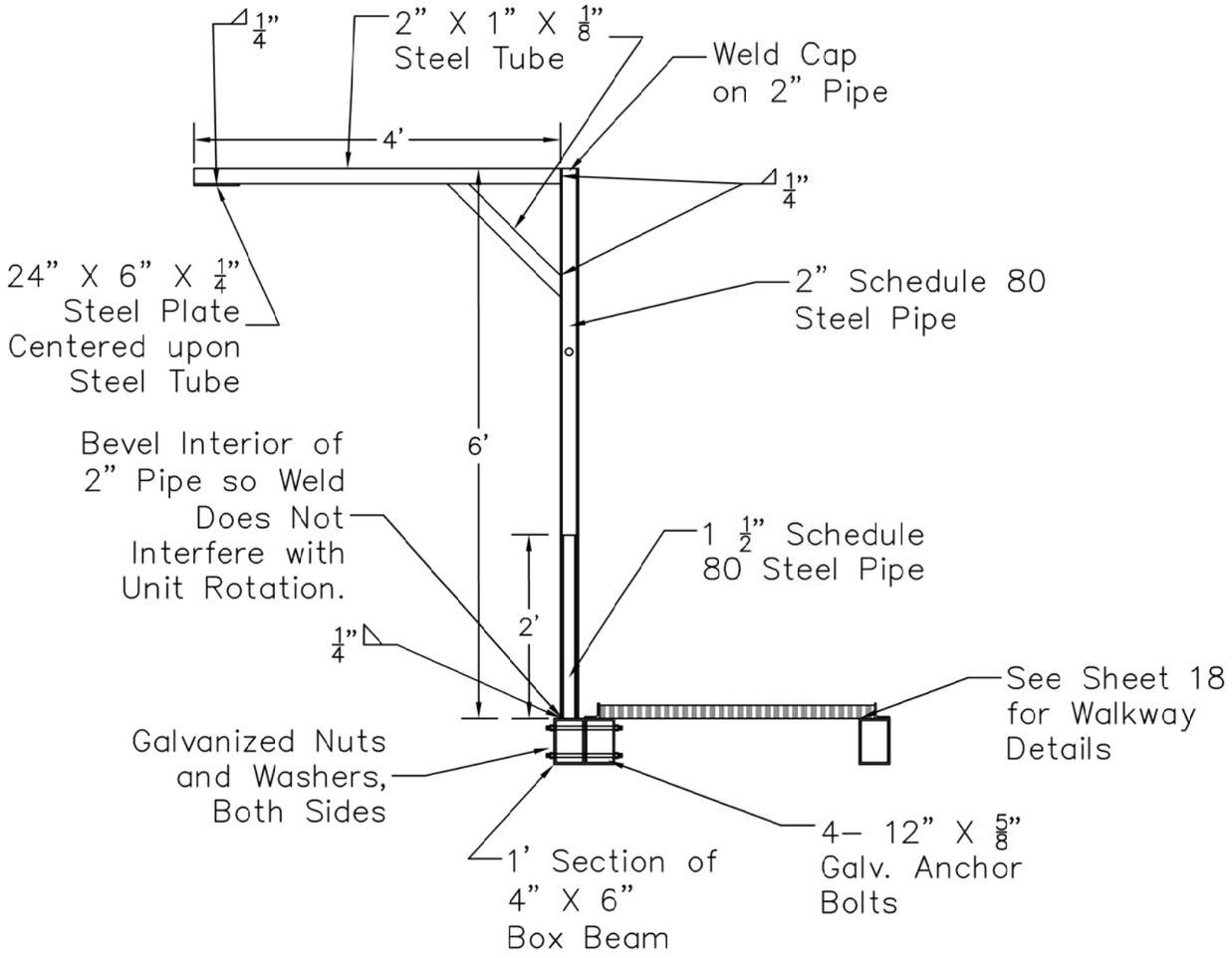
(No Scale)



SECTION C
WALKWAY SUPPORT
ANCHOR DETAIL

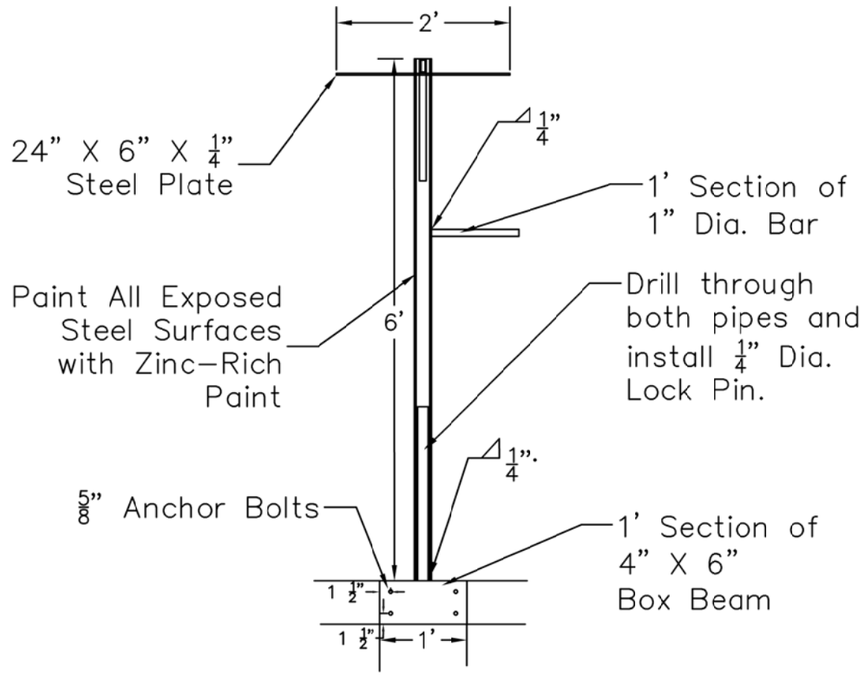
(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:	# Handrail Details- Measurement Section
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:	Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement



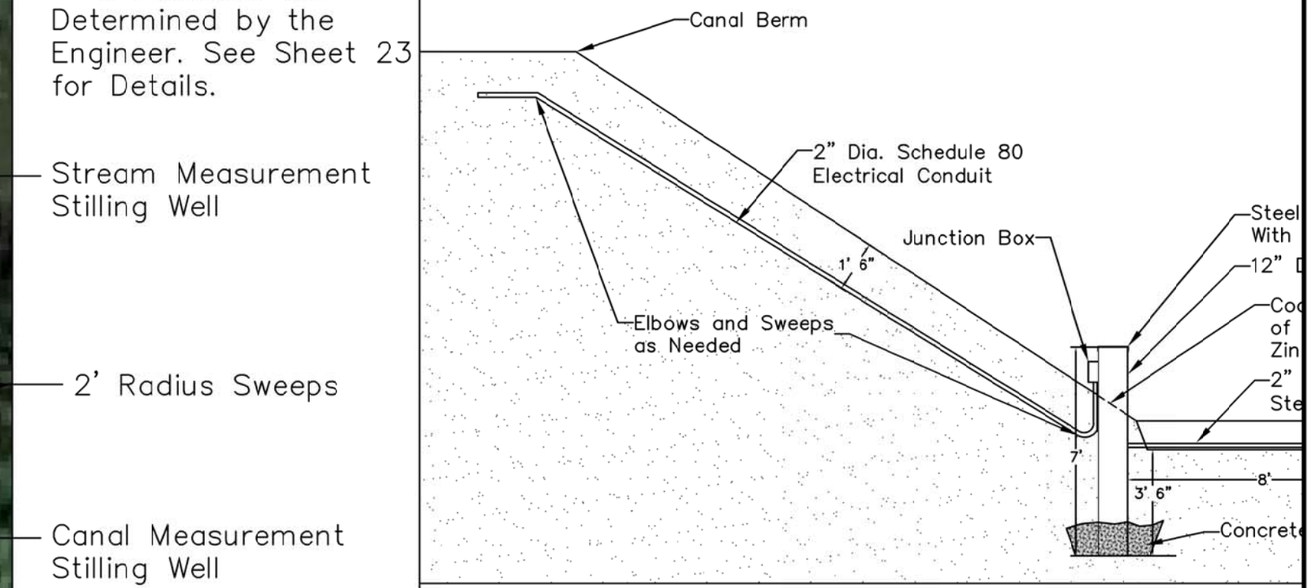
Note: Verify Plumbness of Steel Pipe Support Prior to Welding

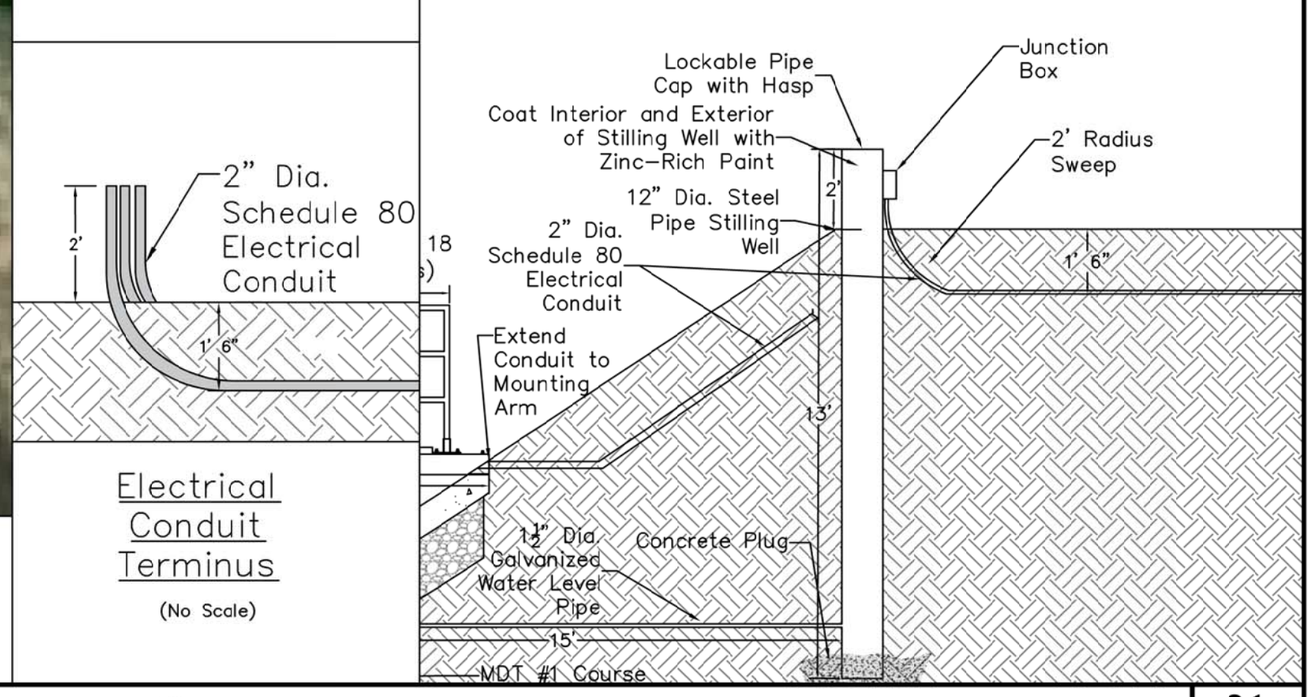
MEASUREMENT DEVICE MOUNTING ARM
SIDE VIEW
(No Scale)



MEASUREMENT DEVICE MOUNTING ARM
FRONT VIEW
(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE:		Measurement Section Equipment Mount Details	SHEET: 20 of 23
John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	APPROVED BY: DATE:		Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	

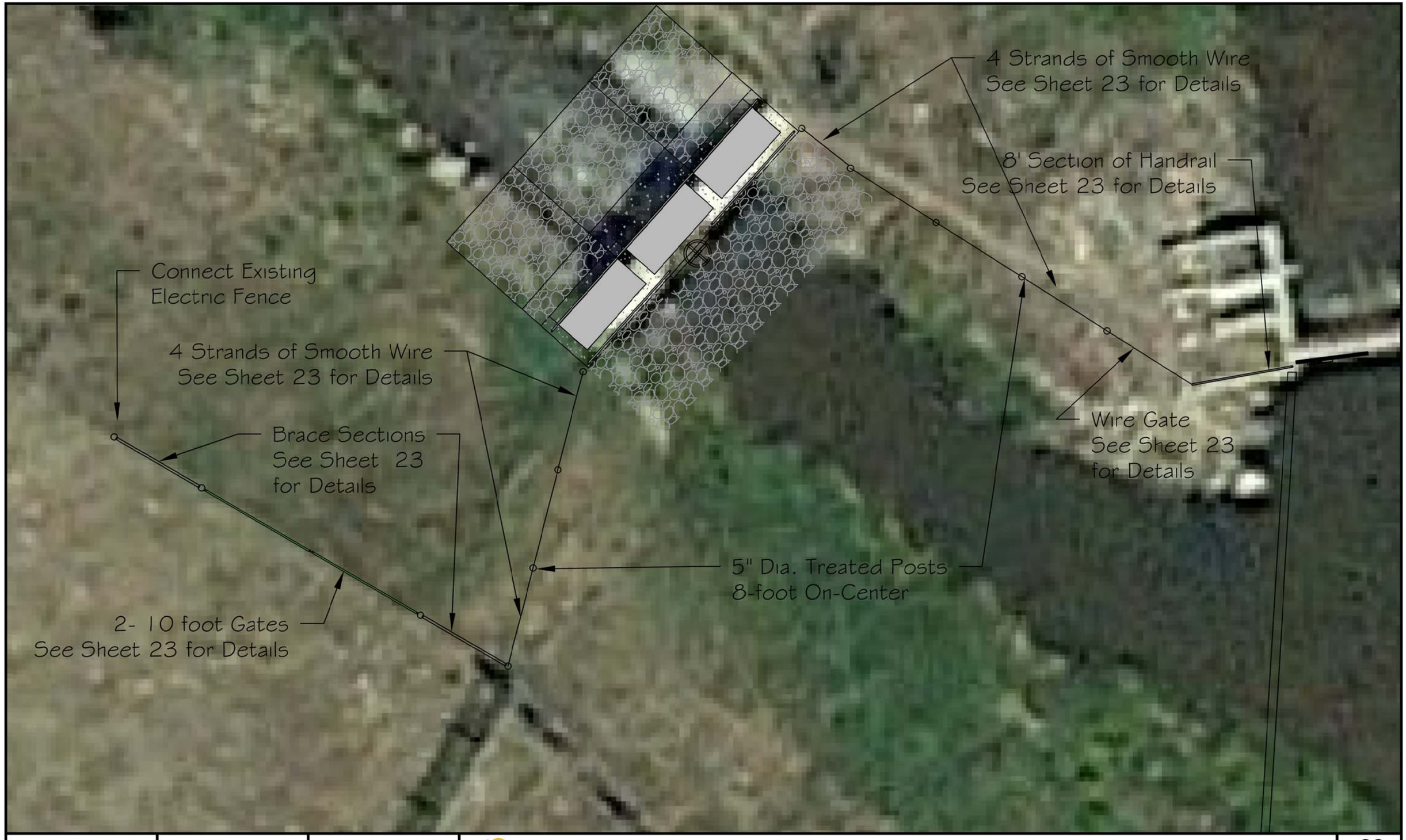




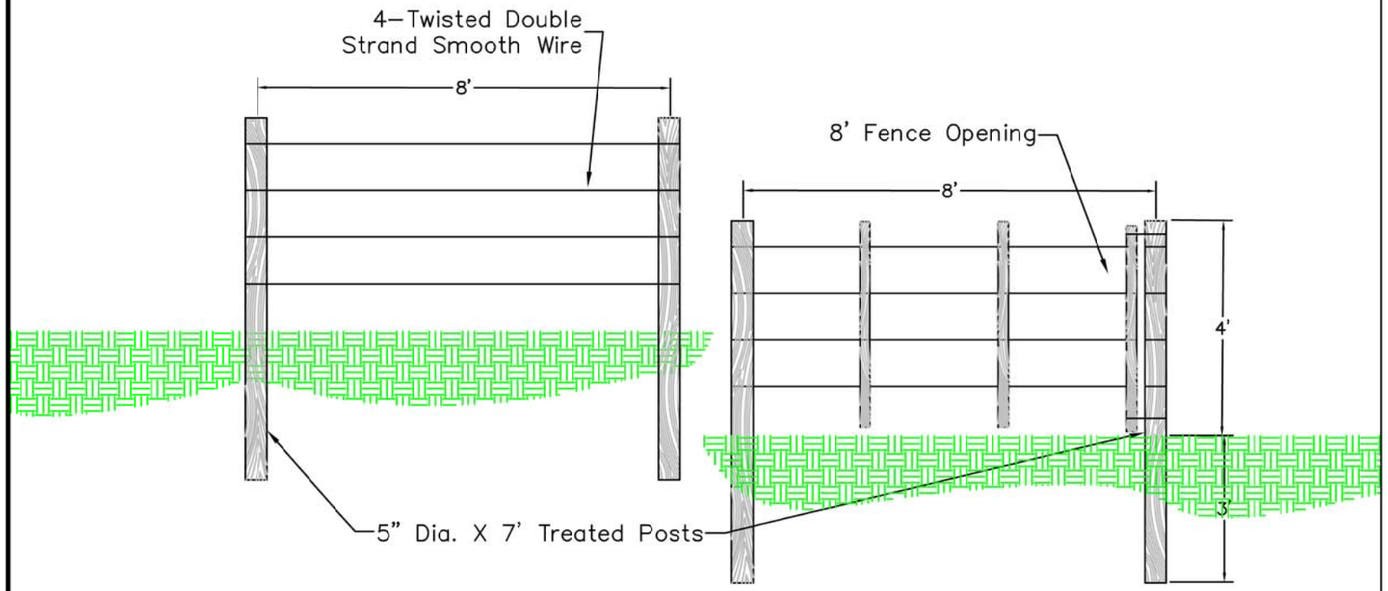
Electrical Conduit Terminus

(No Scale)

John Connors, P.E. 6/25/2019	Mark McNearney, P.E. 8/01/2019		SHEET: 21 of 23
DESIGNED BY: DATE:	CHECKED BY: DATE:	MONTANA DNRC	Electrical Details
John Connors, P.E. 6/25/2019			Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement
DRAWN BY: DATE:	APPROVED BY: DATE:		

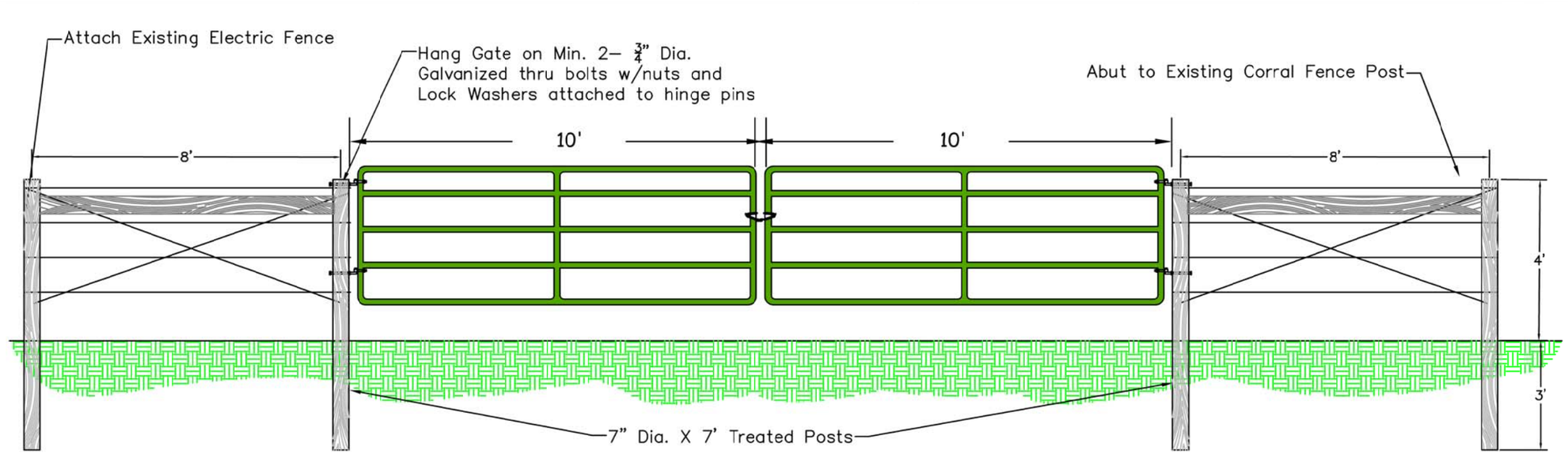


John Connors, P.E. 6/25/2019 DESIGNED BY: DATE: John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE: APPROVED BY: DATE:	MONTANA DNRC	**Headgate Area Fencing Layout** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 22 of 23



WIRE FENCE DETAILS

(No Scale)



HEADGATE ACCESS GATE DETAIL

(No Scale)

John Connors, P.E. 6/25/2019 DESIGNED BY: DATE: John Connors, P.E. 6/25/2019 DRAWN BY: DATE:	Mark McNearney, P.E. 8/01/2019 CHECKED BY: DATE: APPROVED BY: DATE:		**Fencing Details** Nevada Creek- Douglas Canal Rehabilitation Project- Headgate Replacement	SHEET: 23 of 23