



MEMORANDUM

To: MCWD Board of Managers

From: Anna Brown

Date: October 11, 2018

Re: Agenda item 9.1: Public hearing on the impoundment of Judicial Ditch 2 – Six Mile Creek

Purpose:

To provide background information to facilitate the public hearing on the proposed impoundment of Judicial Ditch 2 (JD 2) – Six Mile Creek through the installation of a carp barrier.

Background:

Minnehaha Creek Watershed District (MCWD) is executing a habitat restoration program in the Six Mile Creek-Halsted Bay Subwatershed, funded through the Lessard Sams Outdoor Heritage Council. The project will restore 2,488 acres of deep and shallow lake habitat through the management of invasive common carp. The management strategy is three-fold:

- Adult biomass removal
- Aeration of shallow lakes to prevent successful carp reproduction
- Barriers to prevent carp movement between waterbodies and assist with removal

In March of 2018, the MCWD Board of Managers (Board) awarded a contract to Wenck Associates to design the four proposed barriers. The design for three of these barriers was approved by the Board on September 27, 2018 and staff are currently soliciting quotes for construction.

One of the proposed barriers is located in the portion of Six Mile Creek that runs through Six Mile Marsh, between Mud Lake and Halsted Bay. At this location, Six Mile Creek has the status of a public drainage system designated as Judicial Ditch 2. The MCWD is the drainage authority for JD 2 and responsible for managing the system according to the drainage code (Minnesota Statutes Chapter 103E) to provide drainage for the benefit of upstream lands. Section 103E.227 allows a landowner over which a drainage ditch passes or a public authority to realign a drainage channel, do work in the channel or place a structure in it, provided the work does not impair the drainage function of the system. The Highland Road carp barrier, as an in-channel structure, will

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have a small but perceptible effect on upstream water level and therefore is subject to Board approval under 103E.227.

MCWD has adhered to procedures as directed under 103E.227 to place an impoundment in a drainage ditch, as follows:

- On September 13, 2018, a petition was accepted by the Board, who, as the drainage authority and initiator of the project, served as both the petitioner and petitionee;
- Also on September 13, 2018, the Board directed Wenck Associates to prepare an engineer's report determining that the structure will not impair the utility of the drainage system or deprive affected landowners of its benefit;
- On September 19, 2018, Wenck filed an engineer's report affirming the aforementioned finding; and
- On October 1, 2018, MCWD issued public notice to affected property owners regarding the proposed barrier.

Summary:

On October 11, 2018, MCWD will hold a public hearing regarding the proposed impoundment of JD 2. Staff will present the findings of the engineer's report in advance of opening the public hearing. Following the conclusion of the public hearing, the Board will consider authorizing the construction of the carp barrier under agenda item 11.3.

If there are questions in advance of the meeting, please contact: Anna Brown at (952) 641-4522 or abrown@minnehahacreek.org.

Attachments:

- Engineer's Report: Judicial Ditch 2 – Six Mile Creek Impoundment

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Technical Memo



To: Minnehaha Creek Watershed District Board of Managers

CC: Anna Brown, Planner-Project Manager, Minnehaha Creek Watershed District

From: Rena Weis, Wenck Associates, Inc.
Erik Megow, Wenck Associates, Inc.

Date: September 19, 2018

Subject: Judicial Ditch 2 (Six Mile Creek) Impoundment – Engineer’s Report

A fish barrier is proposed along Judicial Ditch 2 (Six Mile Creek) in the Minnehaha Creek Watershed District (MCWD). The location for the proposed fish barrier is downstream of Highway 7 at Highland Road. This location is shown on sheet C-100 of the attached plans. On September 13, 2018, the MCWD Board of Managers directed Wenck Associates to prepare a hydrologic report regarding the proposed barrier. This technical memo describes the methods used to model the barrier in XP-SWMM and documents changes in up- and down-stream high-water levels as a result of the barrier.

Updated Existing XP-SWMM Model

Wenck used the DNR’s FEMA-approved XP-SWMM model to size the fish barrier and calculate the high-water level impacts they would have along Judicial Ditch 2. Wenck updated the existing FEMA model with survey data collected by Wenck in June of 2018. The survey information was used to confirm the geometry and cross-sections near Highland Road so updates could be made to the existing XP-SWMM model.

Proposed XP-SWMM Model

Wenck modeled the proposed fish barrier in XP-SWMM as a user-defined orifice device. Since the barrier consists of 1.5” aluminum bars spaced 1.5” apart and 2” x 2” chain link fence, one orifice was defined for the vertical bars and one orifice was defined for the chain link fence. The height and length of the barrier was determined from the cross section provided in the plans, which are attached to this memo on sheet C-101A. The effective flow length was determined by subtracting flow blockages (vertical bars, piles, or chain link wires). It should also be noted that only one of the two fish barriers were modeled. Only the downstream fish barrier at Highland Road was modeled as it was the more limiting of the two structures and modeling both orifices upstream and downstream of the bridge is not necessary as it would not change the model output. Fish barriers will be installed directly upstream and downstream of Highland Road, but only the more constricting, downstream fish barrier was modeled.

For the vertical bars, the effective flow length was taken to be one-half of the measured barrier length, since for every 1.5” of open space, there is 1.5” of aluminum bar. All vertical bars used to support the barriers are 1 ft long and were also subtracted.

For the chain link fence, the effective flow length was taken to be 85.6% of the measured barrier length, since 85.6% of the area covered by the chain link fence is open area. Table 1 lists the inputs used for the orifice calculations at each crossing.

Table 1. Effective flow lengths and areas used for orifice devices in proposed model

Location	Vertical Bars				Chain Link			
	Barrier Height (ft)	Barrier Length (ft)	Barrier Effective Length (ft)	Effective Area (sf)	Barrier Height (ft)	Barrier Length (ft)	Barrier Effective Length (ft)	Effective Area (sf)
Highland Road	6.0	35.0	14.5	87.0	6.0	20.0	17.1	102.7

The dimensions referenced in Table 1 are defined below in Figure 1, and sample geometry calculations for the Highland Road barrier are provided.

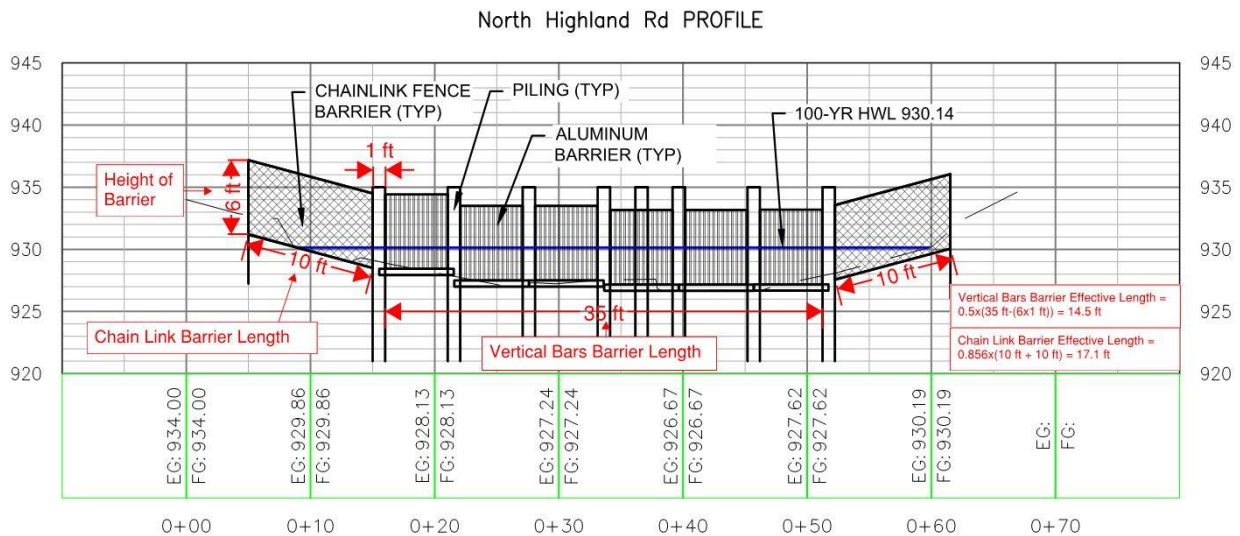


Figure 1. Highland Road carp barrier cross section with labeled dimensions and sample calculations

The updated existing model 100-yr, 10-day high water levels (100-yr HWLs) were compared to the proposed model results at locations up- and downstream of the fish barrier. Table 2 lists the change in the 100-yr HWLs for locations up- and downstream of the Highland Road fish barrier.

Table 2. 100-year HWLs as calculated by the FEMA-approved XP-SWMM model.

Site Location	Description	Node ID	Updated Existing (ft)	Proposed (ft)	Change (ft)
Highland Road	Mud Lake, US of barrier	SMC-61	930.71	930.70	-0.01
	US of barrier, DS of HWY 7	SMC-61b	929.89	930.14	0.25
	DS of Highland Road	SMC-66	929.83	929.82	-0.01

Conclusions

All of the nodes show a decrease in maximum stage when subjected to the 100-year flood except for one. Node SMC-61b shows an increase in maximum stage of 0.25 ft; this node represents a 275 ft long stretch of stream between Highway 7 and Highland Road. The flood extent for the updated existing and proposed high water levels are shown in Figure 2, attached to this memo. The proposed increase in the high water level does not further impound or effect any upstream structures. Additionally, the proposed barriers will not impair the utility of the drainage system or deprive affected landowners of its benefit.



MINNEHAHA CREEK WATERSHED DISTRICT

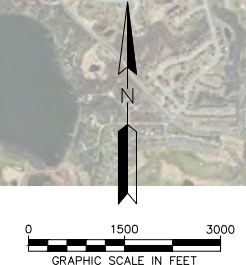
Highland Road Carp Barrier - Existing and Proposed HWL



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AUG 2018

Figure 2



ISSUE NO.:	0
DESCRIPTION:	100% DESIGN
DATE:	09/21/2018

CERTIFICATION:
 I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

NAME: _____
 DATE: _____

PROJECT NO.:	0185-0100	
DWN BY:	CHK'D BY:	APP'D BY:
SJB	MJS	CM
ISSUE DATE:	09/21/2018	
ISSUE NO.:	0	

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ISSUE NO.	DESCRIPTION	DATE
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 License #:
 Date:

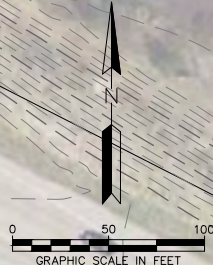
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SJB	MJS	CM

ISSUE DATE: 09/21/2018
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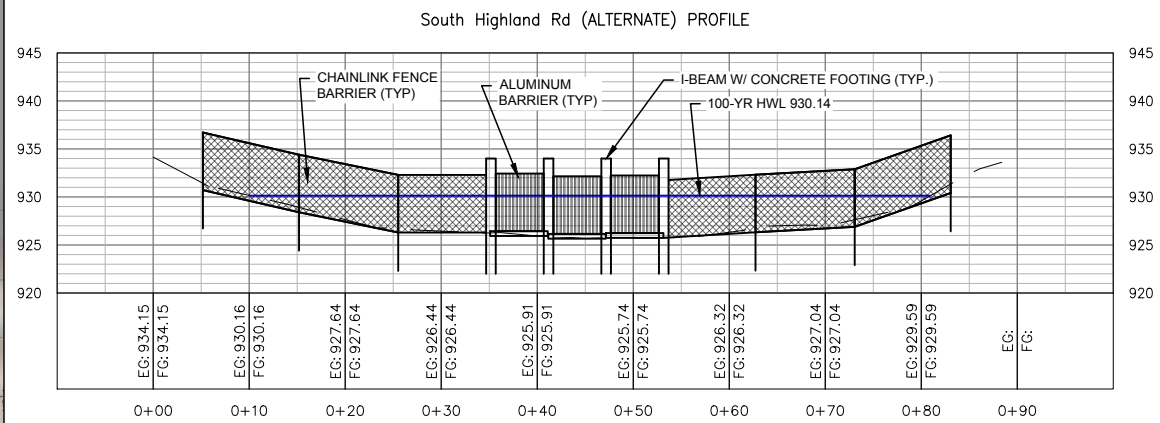
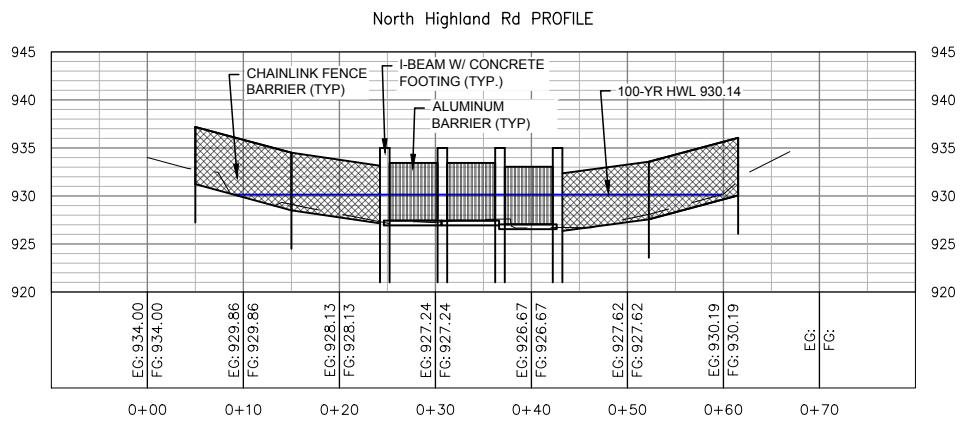
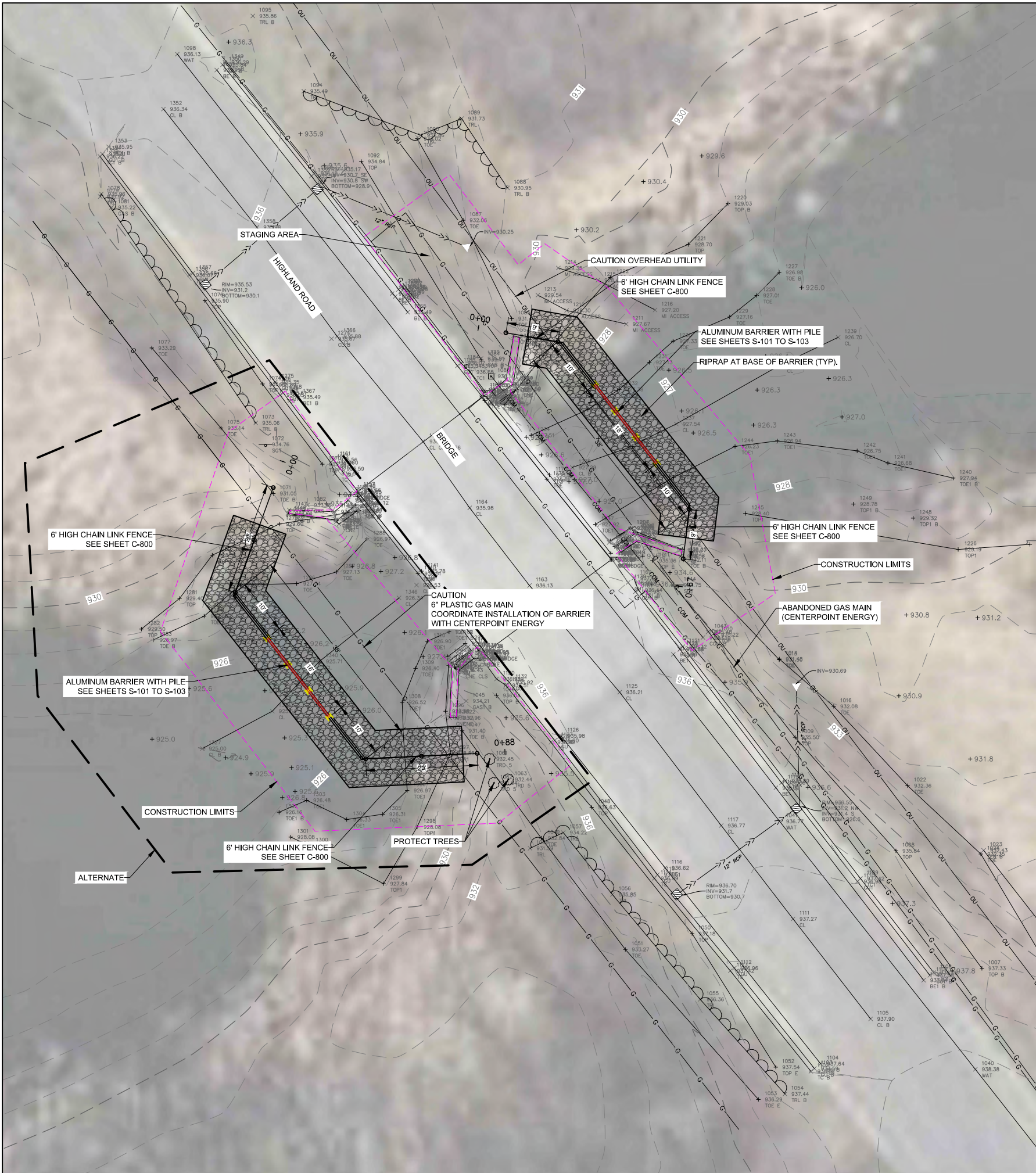
SHEET TITLE:
C-101

SHEET NO.:
 SIX MILE BRIDGE
 SITE PLAN

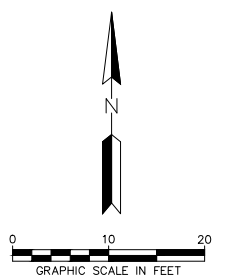


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- SITE PLAN NOTES**
- CLEAR AND GRUB BRUSH AS REQUIRED. COORDINATE ANY TREE REMOVAL WITH ENGINEER/OWNER PRIOR TO REMOVAL.
 - PROTECT ALL EXISTING SIGNS OR SALVAGE AND REINSTALL (INCIDENTAL)



CALL BEFORE YOU DIG
GOPHER STATE ONE CALL
 TWIN CITY AREA: 651-454-0002
 TOLL FREE 1-800-252-1166



**SIX MILE CREEK
 CARP BARRIERS**
 VICTORIA, MN

PROJECT TITLE: **SIX MILE CREEK CARP BARRIERS**

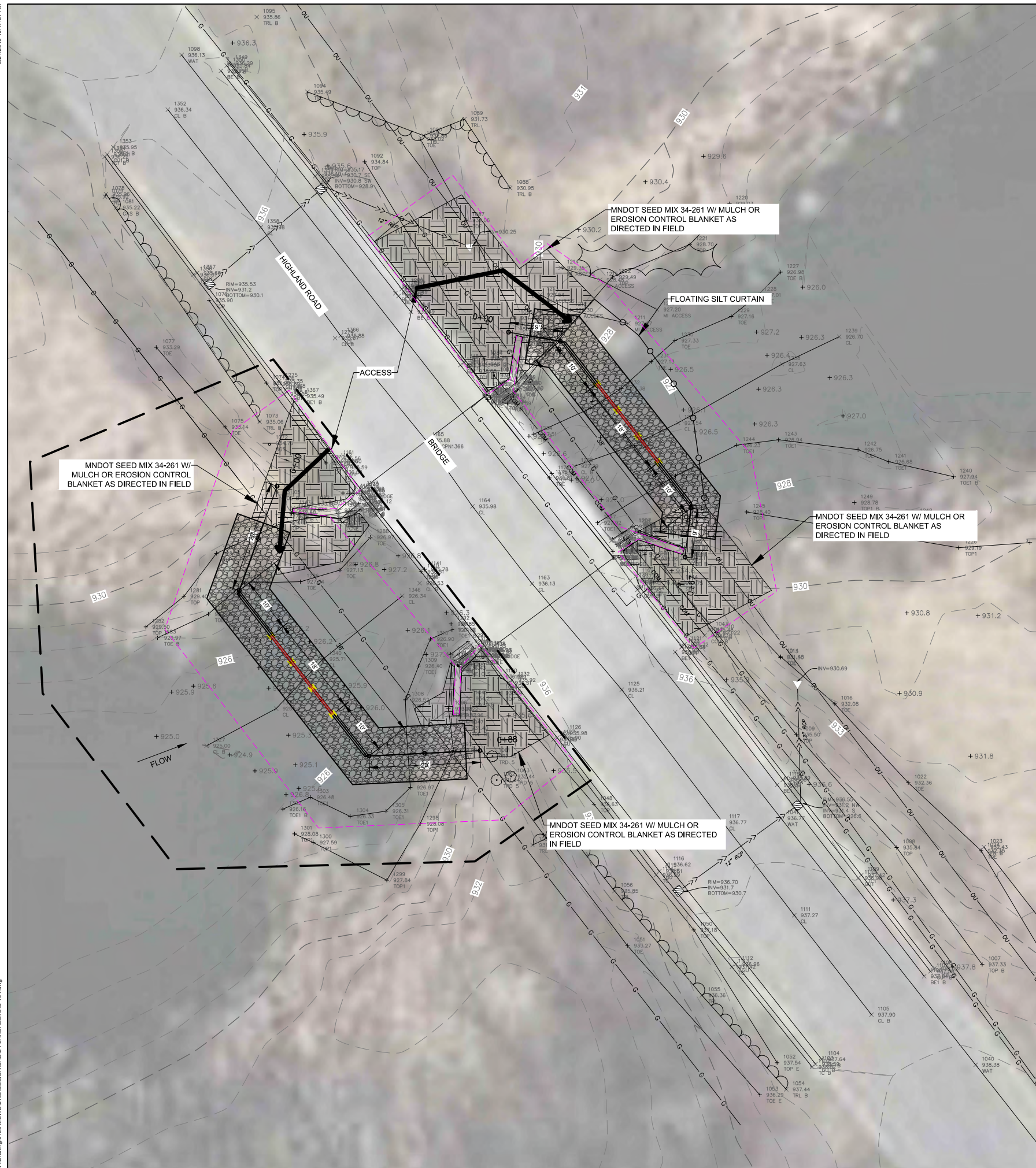
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DWN BY:	SJB	CHK'D BY:	MJS	APP'D BY:	CM
ISSUE DATE:	09/21/2018				
ISSUE NO.:	0				
SHEET TITLE:	C-101A				
SHEET NO.:	SIX MILE BRIDGE SITE PLAN				

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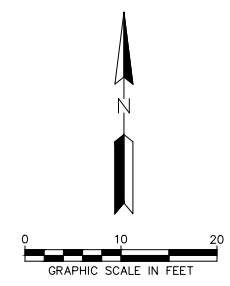
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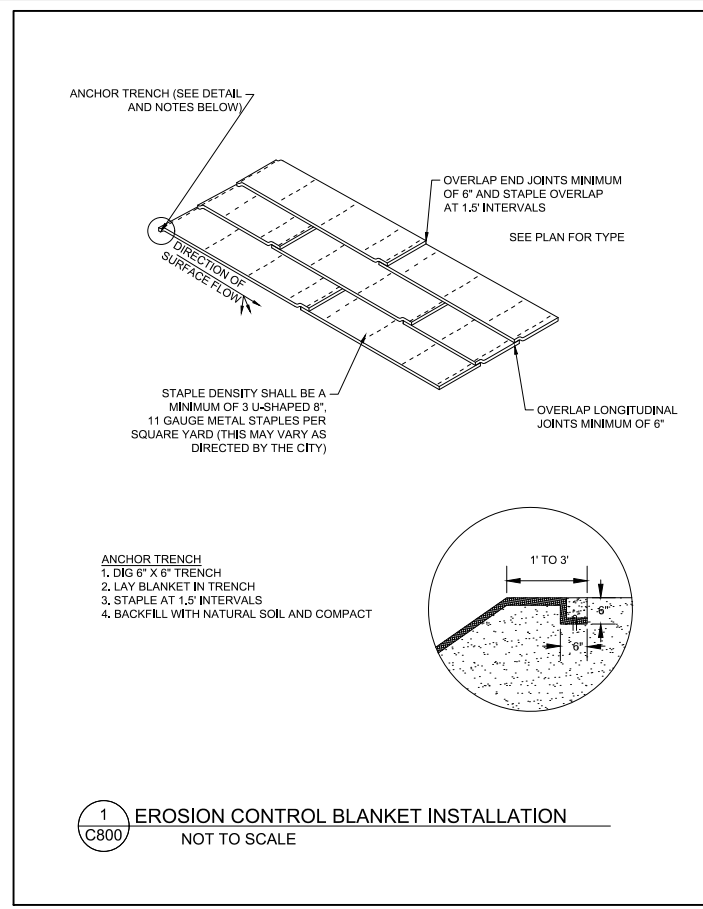
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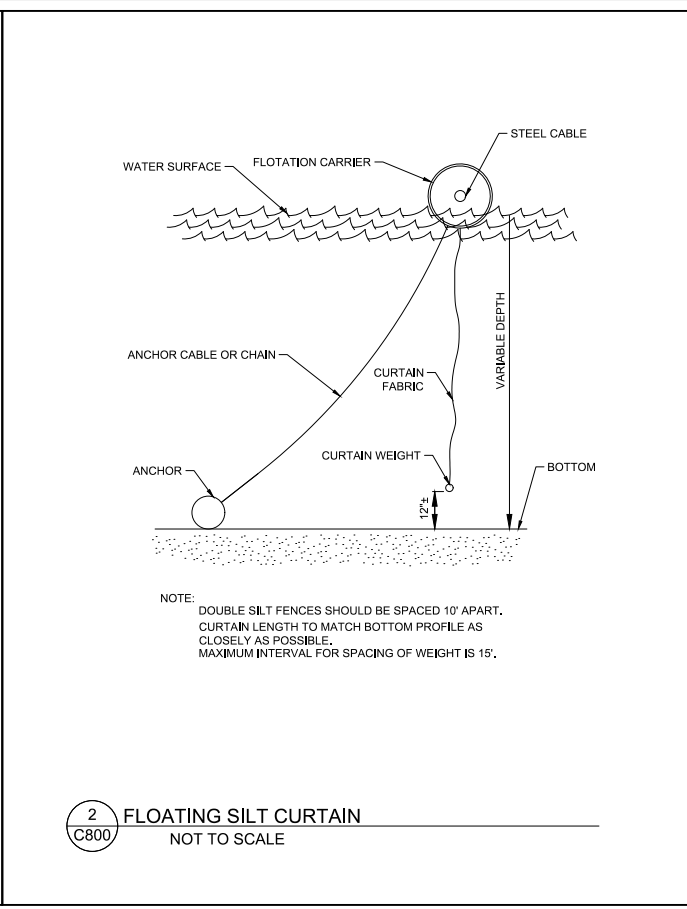
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DWN BY:	CHK'D BY:	APP'D BY:
SJB	MJS	CM
ISSUE DATE:	09/21/2018	
ISSUE NO.:	0	

SHEET TITLE:
C-101B
 SHEET NO.:
 SIX MILE BRIDGE
 RESTORATION PLAN

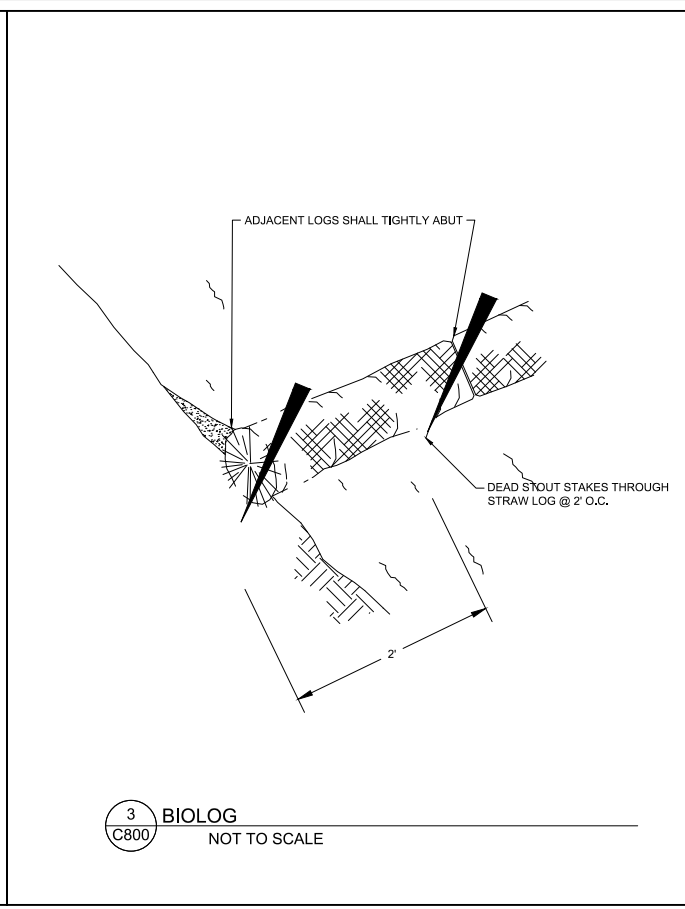




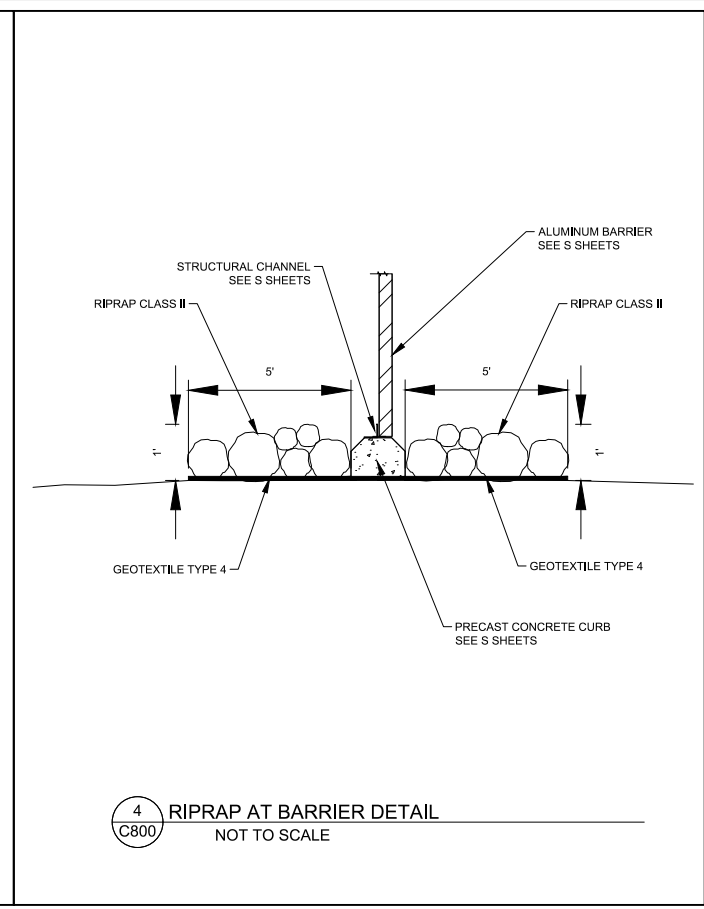
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 C800 **EROSION CONTROL BLANKET INSTALLATION**
 NOT TO SCALE



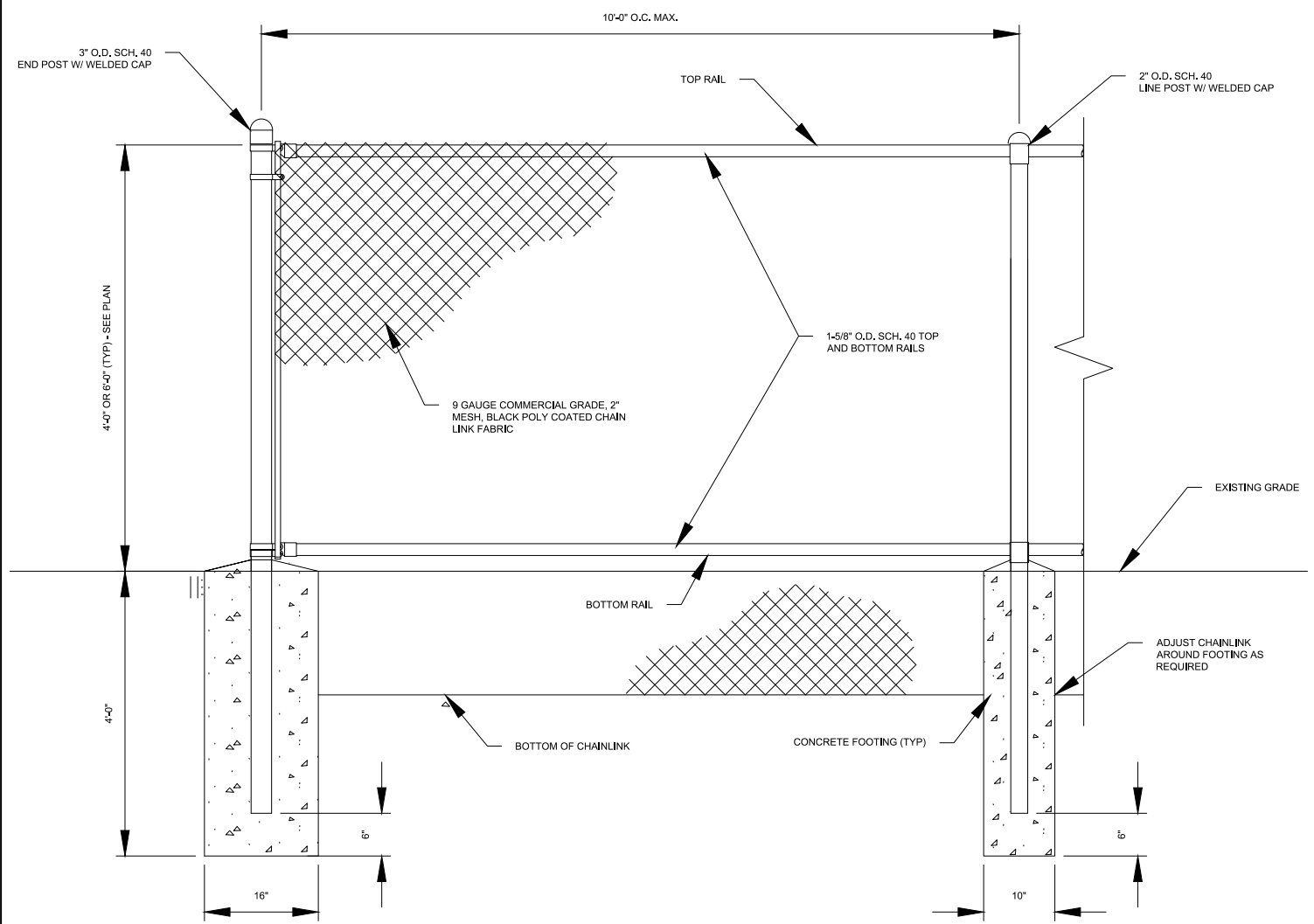
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 C800 **FLOATING SILT CURTAIN**
 NOT TO SCALE



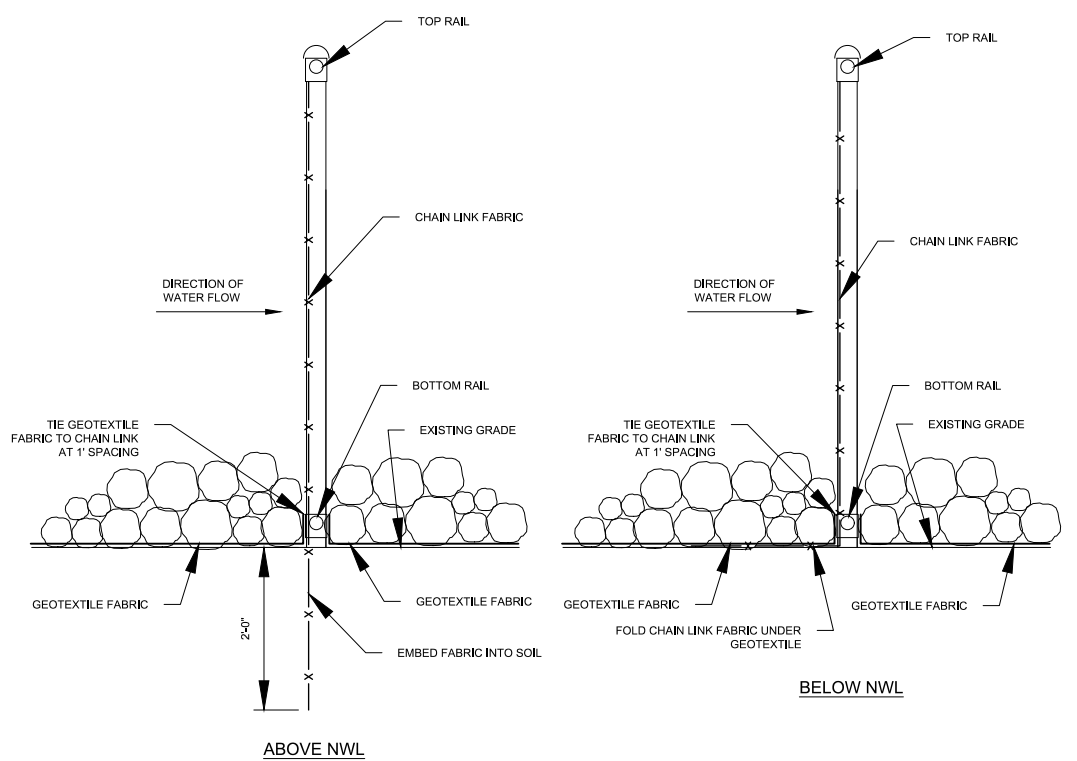
3
 C800 **BIOLOG**
 NOT TO SCALE



4
 C800 **RIPRAP AT BARRIER DETAIL**
 NOT TO SCALE



5
 C800 **CHAIN LINK FENCE**
 NOT TO SCALE



- NOTES:
 1. EMBED CHAIN LINK FABRIC MINIMUM 2 FOOT INTO SOIL AS DETAILED.
 2. PROVIDE END POSTS AT ALL TERMINATION POINTS AND CHANGES IN DIRECTION.
 3. FENCE AND POSTS SHALL BE BLACK POLY COATED AS SPECIFIED.

ISSUE NO.: 0

DATE	DESCRIPTION
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PROJECT NO.: 0185-0100
 DWN BY: SJB CHK'D BY: MJS APP'D BY: CM
 ISSUE DATE: 09/21/2018
 ISSUE NO.: 0

SHEET TITLE:
C-800
 STANDARD DETAILS

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APPROXIMATE WEIGHTS - 6' LONG w/ TUBES

- 2-6' LONG CHORDS = 12' x 3.5 LBS/FT = 42 LBS
- 23-3' LONG SPINDALS = 69' x 0.63 LBS/FT = 44 LBS
- TOTAL WEIGHT = 86 LBS PER BARRIER

CONCRETE:

- $f_c = 4,000$ PSI
- AIR CONTENT = 5% - 7%

REINFORCEMENT:

- ASTM A615 GRADE 60
- $f_y = 60,000$ PSI
- CLEAR COVER = 3"

ALUMINUM SECTIONS:

- 6061-T6

STEEL SECTIONS:

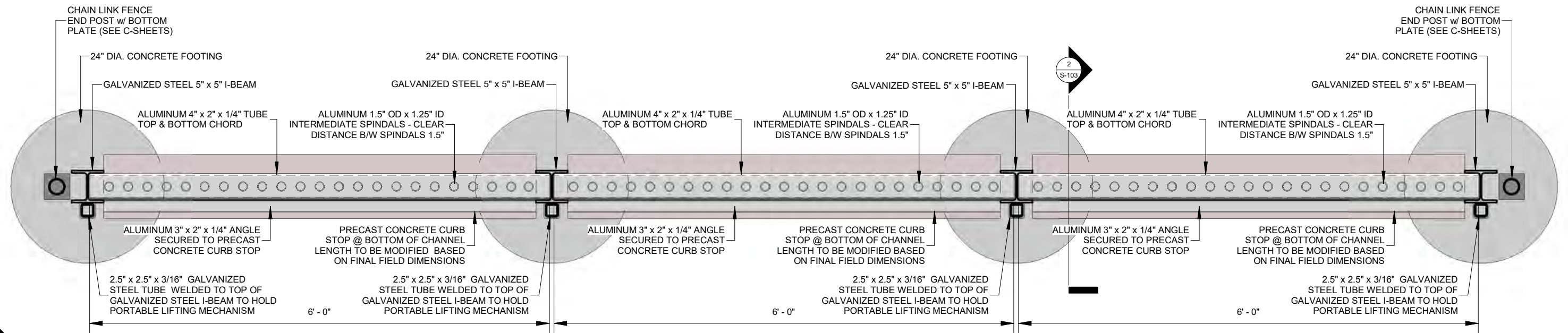
- HOT DIPPED GALVANIZED

LIFTING MECHANISM:

- MECHANISM IS TO CONSIST OF A PULLEY SYSTEM
- MECHANISM IS TO HAVE A 200 LB LIFTING WEIGHT CAPACITY
- MECHANISM IS TO BE CAPABLE OF
- MECHANISM IS TO BE ABLE TO LOCK IN PLACE AT VARIOUS LIFTING HEIGHTS

BARRIER & LIFTING MECHANISM SECURITY:

- BARRIERS ARE TO HAVE THE CAPABILITY TO BE SECURELY LOCKED IN-PLACE TO PREVENT STEALING AND VANDALISM IF OWNER DEEMS NECESSARY
- LIFTING MECHANISM IS TO HAVE THE CAPABILITY TO BE SECURELY LOCKED IN-PLACE TO PREVENT STEALING AND VANDALISM IF OWNER DEEMS NECESSARY



PLAN VIEW - HIGHLAND ROAD BRIDGE

BARRIER

3/4" = 1'-0"

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REV	REVISION DESCRIPTION	DWN	APP	REV DATE



1012 5th AVE., Suite 1B
WINDOM, MN 56101
507-831-2703
507-831-5271

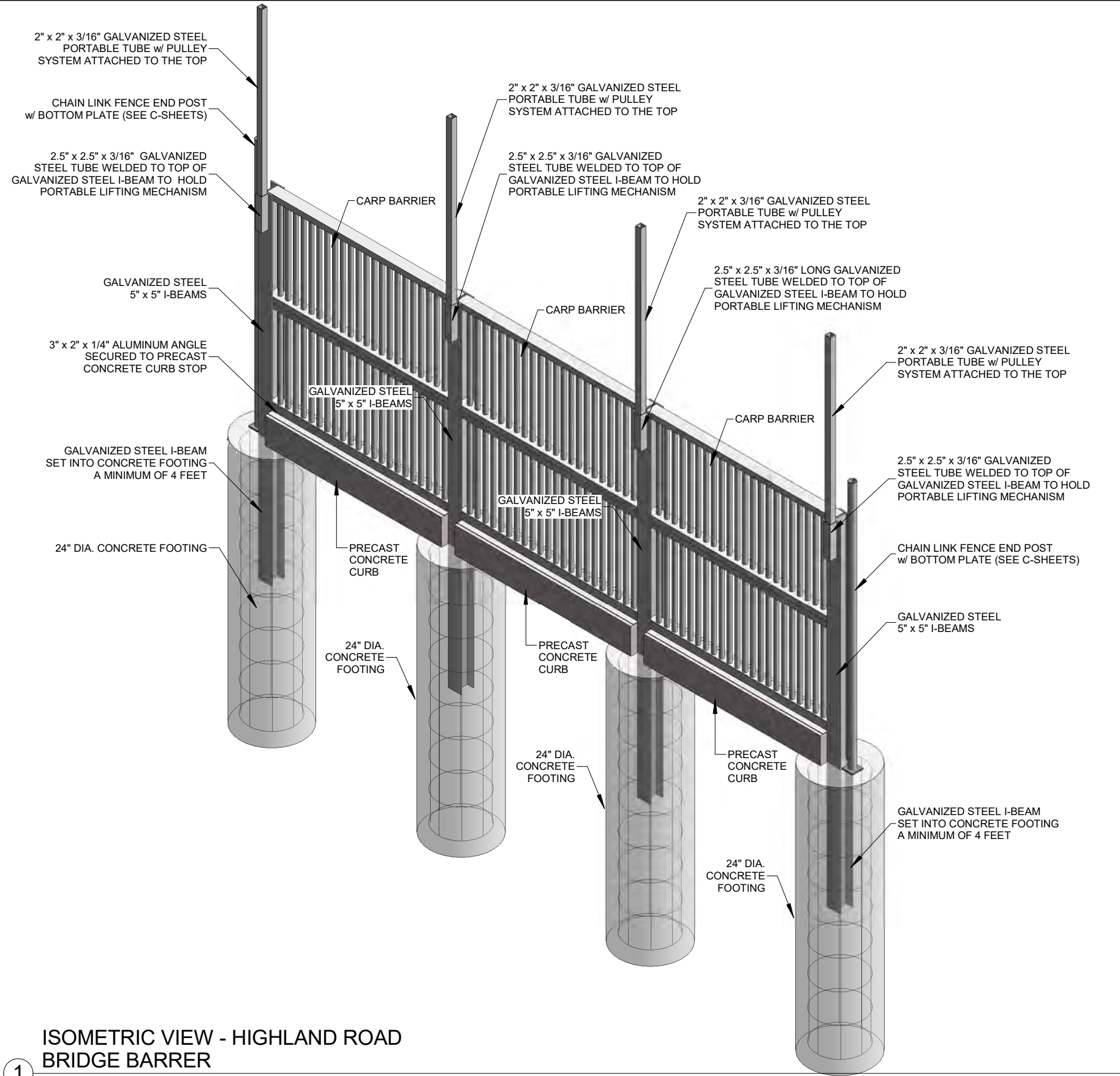
DWN BY MPJ	CHK'D DJJ	APP'D DJJ
DWG DATE 9/20/2018		
SCALE 3/4" = 1'-0"		

PROJECT SIX MILE CREEK CARP BARRIERS
CLIENT Minnehaha Creek Watershed District 15320 Minnetonka Blvd Minnetonka, MN 55345

SHEET TITLE Plan View - Highland Road Barrier		
PROJECT NO. 0185-0100	SHEET NO. S-101	REV NO.

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1 ISOMETRIC VIEW - HIGHLAND ROAD BRIDGE BARRER

REV	REVISION DESCRIPTION	DWN	APP	REV DATE



1012 5th AVE., Suite 1B
WINDOM, MN 56101
507-831-2703
507-831-5271

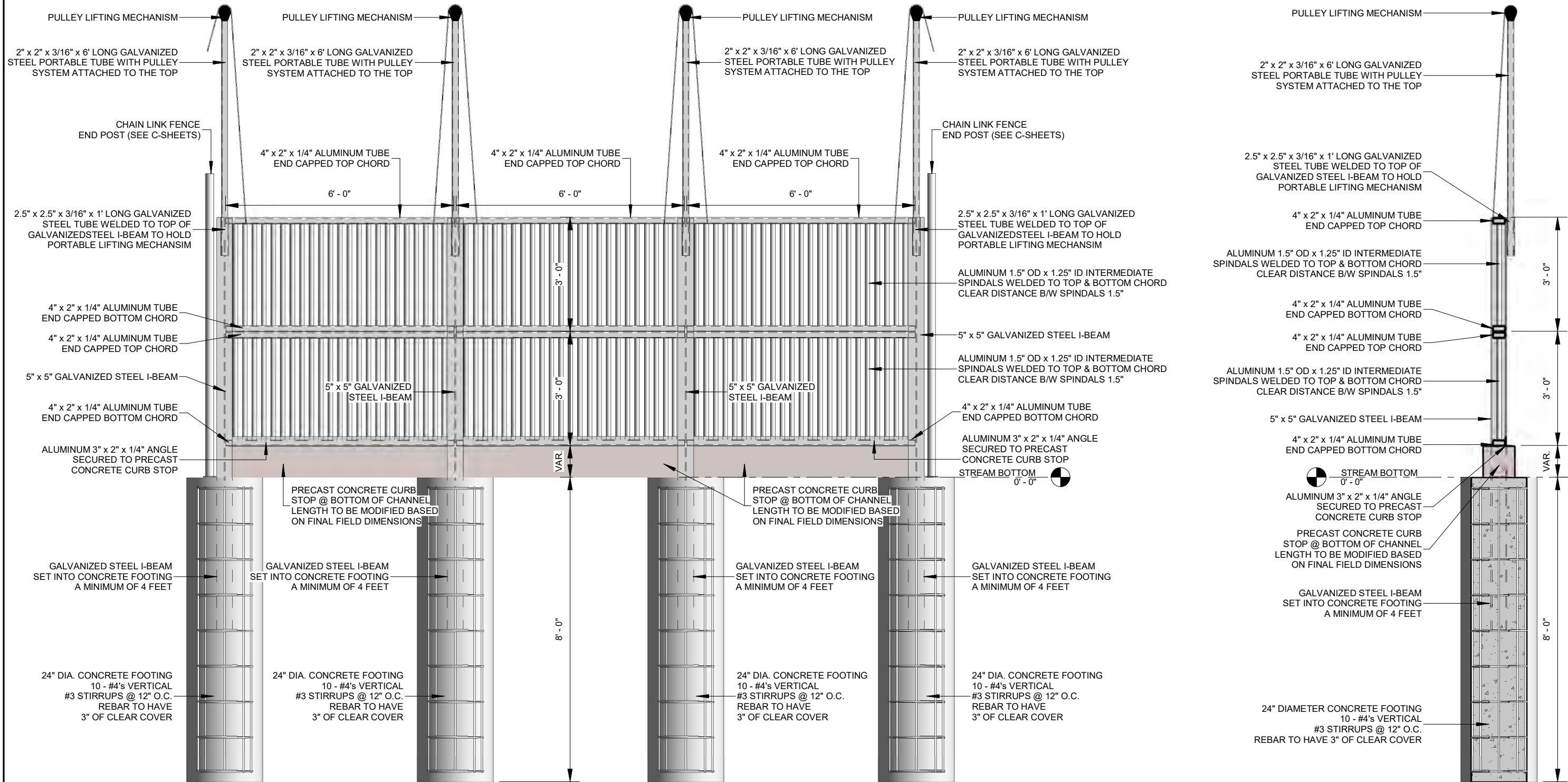
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DWG DATE 9/20/2018		SCALE

PROJECT SIX MILE CREEK CARP BARRIERS	CLIENT Minnehaha Creek Watershed District 15320 Minnetonka Blvd Minnetonka, MN 55345
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SHEET TITLE ISO View - Highland Road Barrier		
PROJECT NO. 0185-0100	SHEET NO. S-102	REV NO.

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ELEVATION - HIGHLAND ROAD BRIDGE BARRIER

① 3/8" = 1'-0"

SECTION - HIGHLAND ROAD BRIDGE BARRIER

② 3/8" = 1'-0"

REV	REVISION DESCRIPTION	DWN	APP	REV DATE



1012 5th AVE., Suite 1B
WINDOM, MN 56101
507-831-2703
507-831-5271

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DWG DATE 9/20/2018		CLIENT Minnehaha Creek Watershed District 15320 Minnetonka Blvd Minnetonka, MN 55345
SCALE 3/8" = 1'-0"		

PROJECT SIX MILE CREEK CARP BARRIERS
CLIENT Minnehaha Creek Watershed District 15320 Minnetonka Blvd Minnetonka, MN 55345

SHEET TITLE Highland Road Barrier Details		
PROJECT NO. 0185-0100	SHEET NO. S-103	REV NO.