



HART RD.

S. RIVER RD.

SHIAWASSEE RIVER

SHIAWASSEE NATIONAL WILDLIFE REFUGE

FERGUSON BAYOU

SPALDING DRAIN

W MOORE RD.

BARTEL RD.

PROJECT LOCATION

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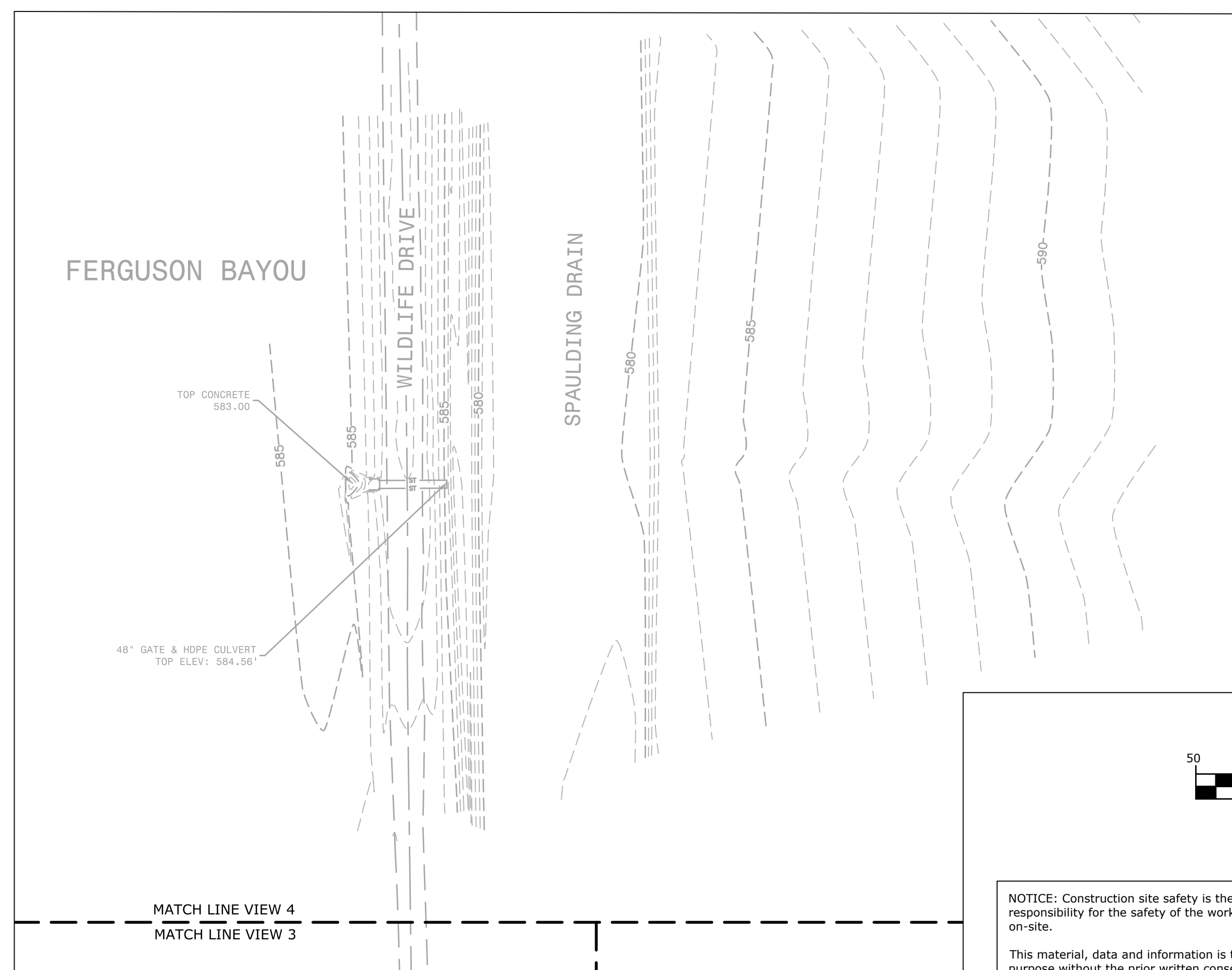
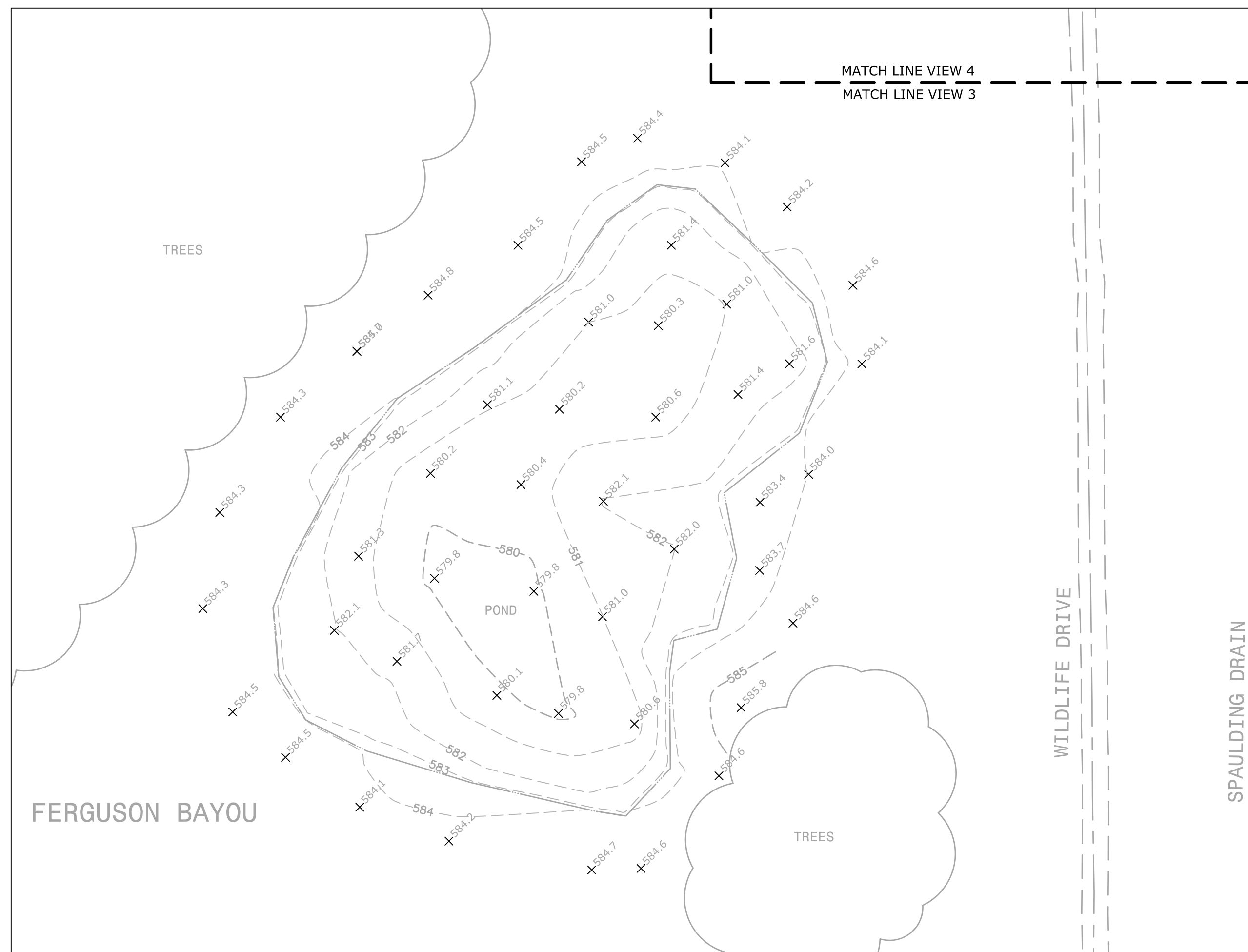
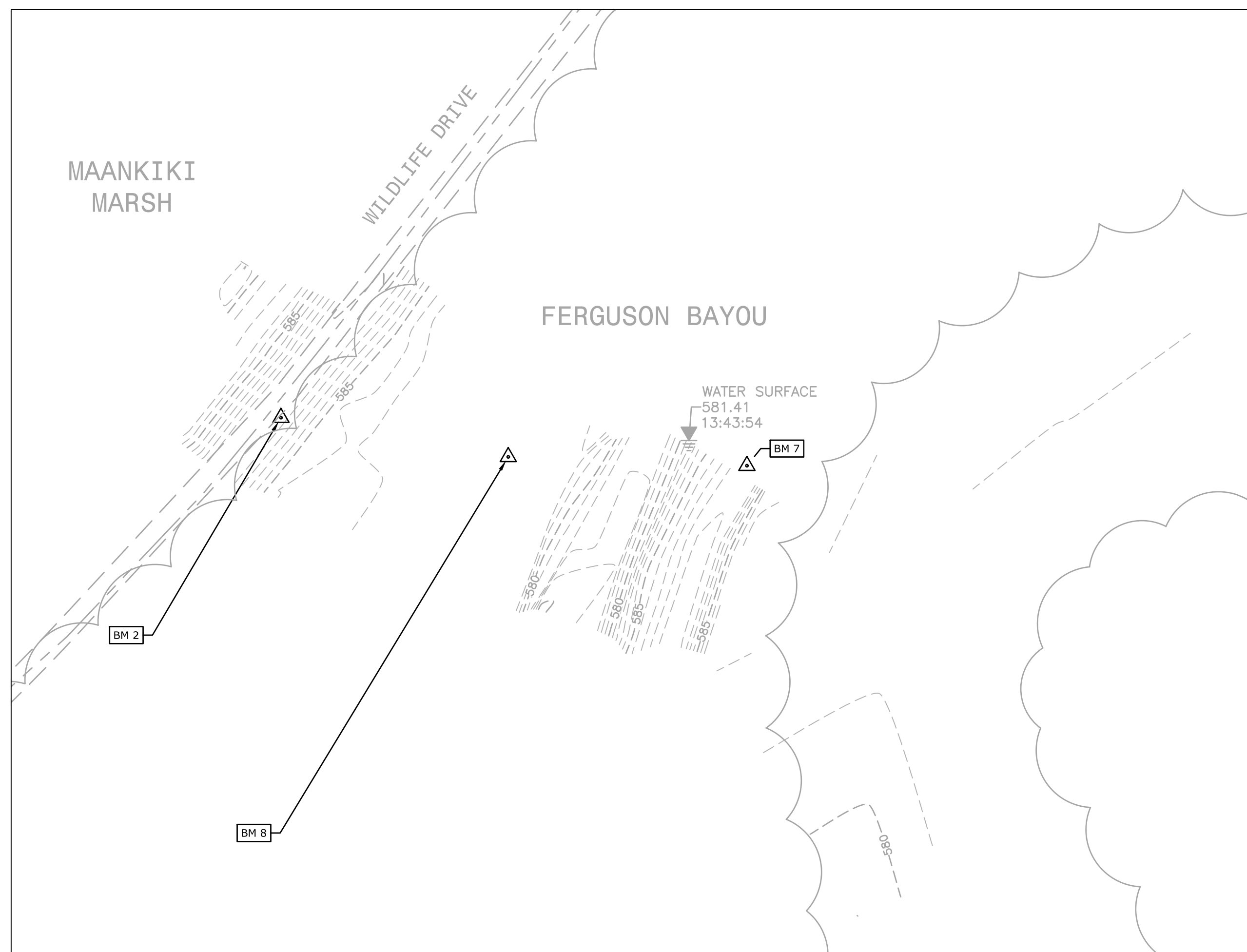


Know what's **below**.
Call before you dig.

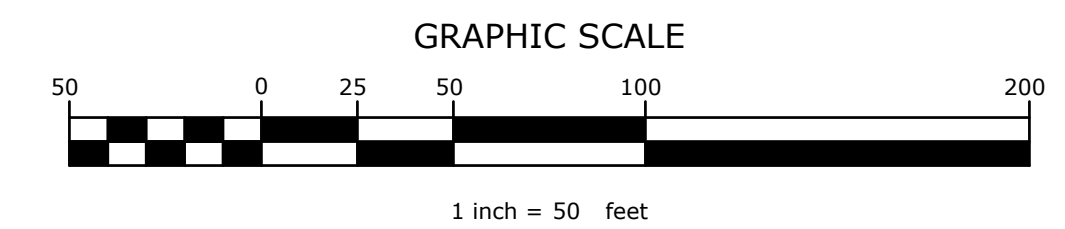
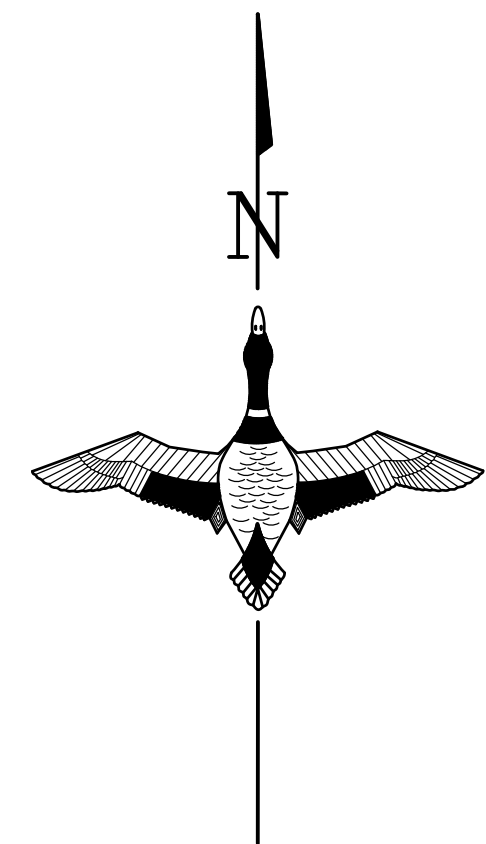
COVER SHEET
FERGUSON BAYOU
SHITAWASSEE NATIONAL
WILDLIFE REFUGE
SAGINAW COUNTY, MI

 DUCKS UNLIMITED

GREAT LAKES/ATLANTIC REGIONAL OFFICE
7322 NEWMAN BOULEVARD, BUILDING 1
DEXTER, MICHIGAN 48130
(734) 623-2000 www.ducks.org



- | | |
|---|-------------------------|
| — — — — — | EXISTING DIKE |
| — — — — — | EDGE OF WATER |
| $\times 000.0$ | EXISTING SPOT ELEVATION |
| — — — — —000 | EXISTING MAJOR CONTOUR |
| — — — — —000 | EXISTING MINOR CONTOUR |
| ————— | EDGE OF PAVEMENT |
| — — — — — | EXISTING ROAD |
|  | SURVEY CONTROL |
|  | BENCHMARK |
| — — — — — | EXISTING PIPE |

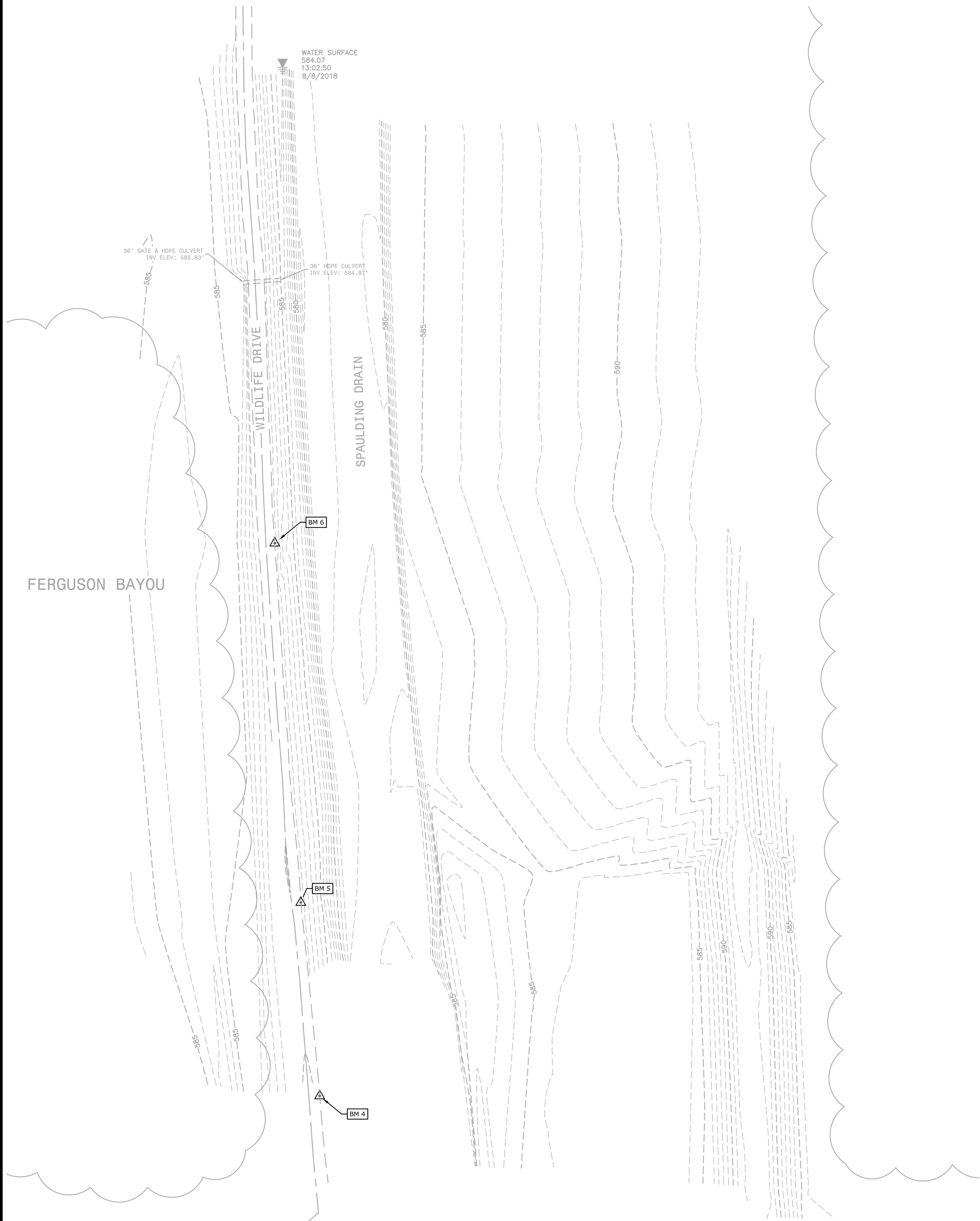


NOTICE: Construction site safety is the sole responsibility of the contractor. Ducks Unlimited, Inc. shall not assume any responsibility for the safety of the work performed, persons engaged in the work, nearby structures, or of other persons on-site.

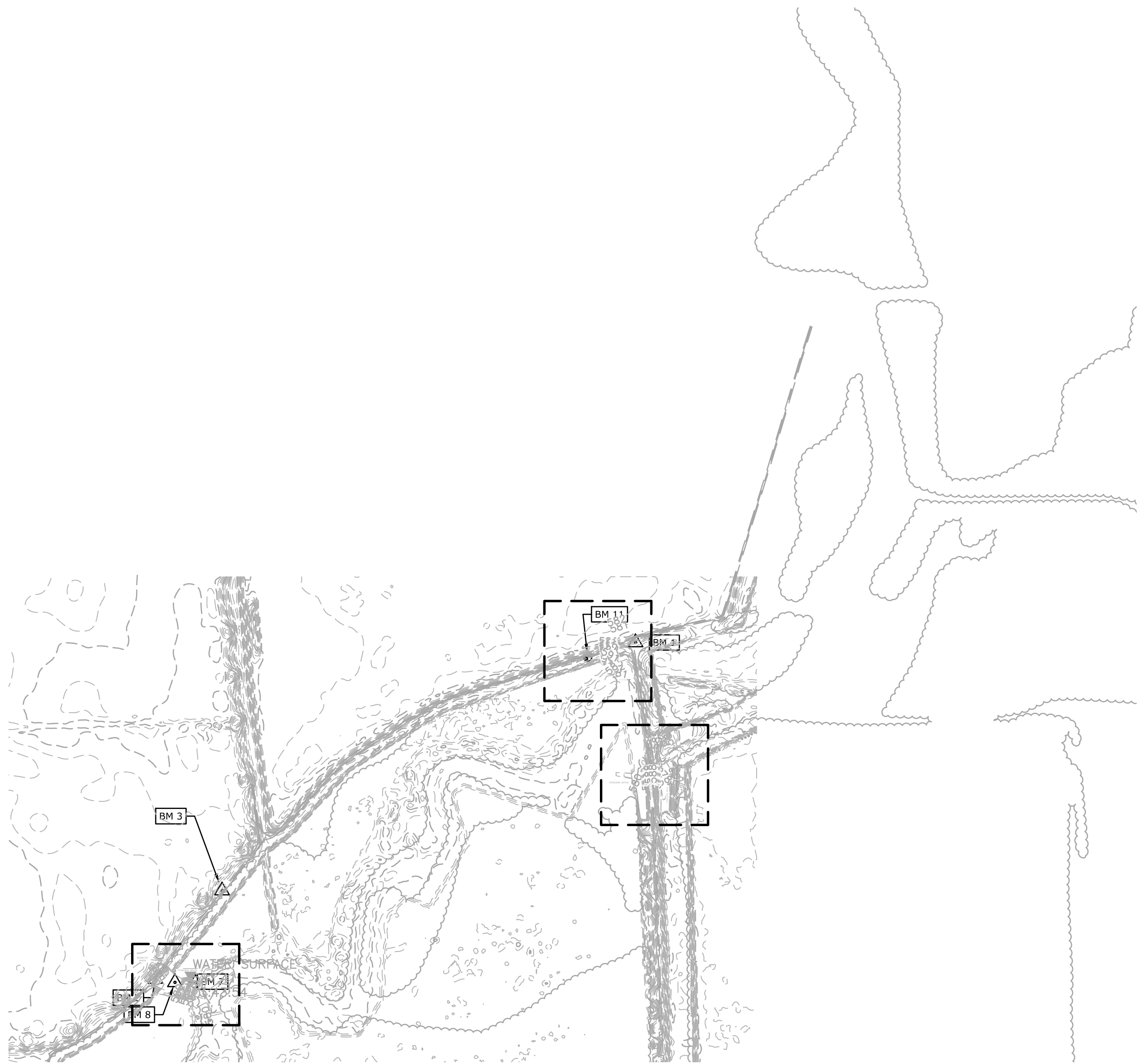
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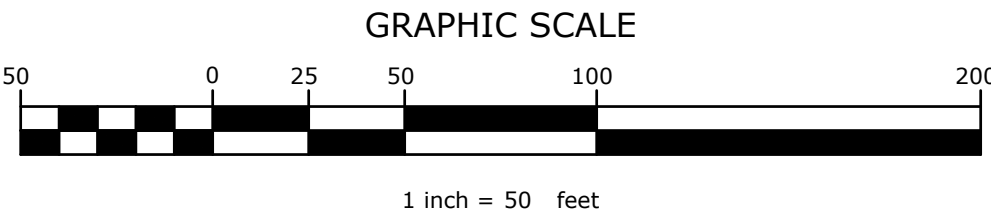
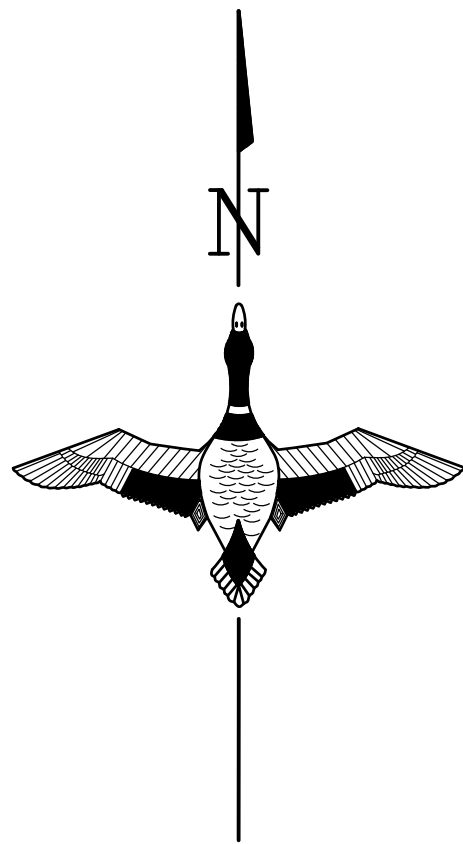
K:\glaro\cadd\projects\mi-222-2\ferguson bayou\cadd_drawing\MI-222-2 TOPO.dwg, 11/8/2019 12:53 PM, Patrick Lydon, TOPO SURVEY 50 SCALE, None



VIEW 5 TOPOGRAPHIC SURVEY
1" = 50'



VIEW 6 TOPOGRAPHIC SURVEY
1" = 50'



LEGEND

- EXISTING DIKE C/L
- EDGE OF WATER
- EXISTING SPOT ELEVATION
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EDGE OF PAVEMENT
- EXISTING ROAD C/L
- SURVEY CONTROL
- BENCHMARK
- EXISTING PIPE

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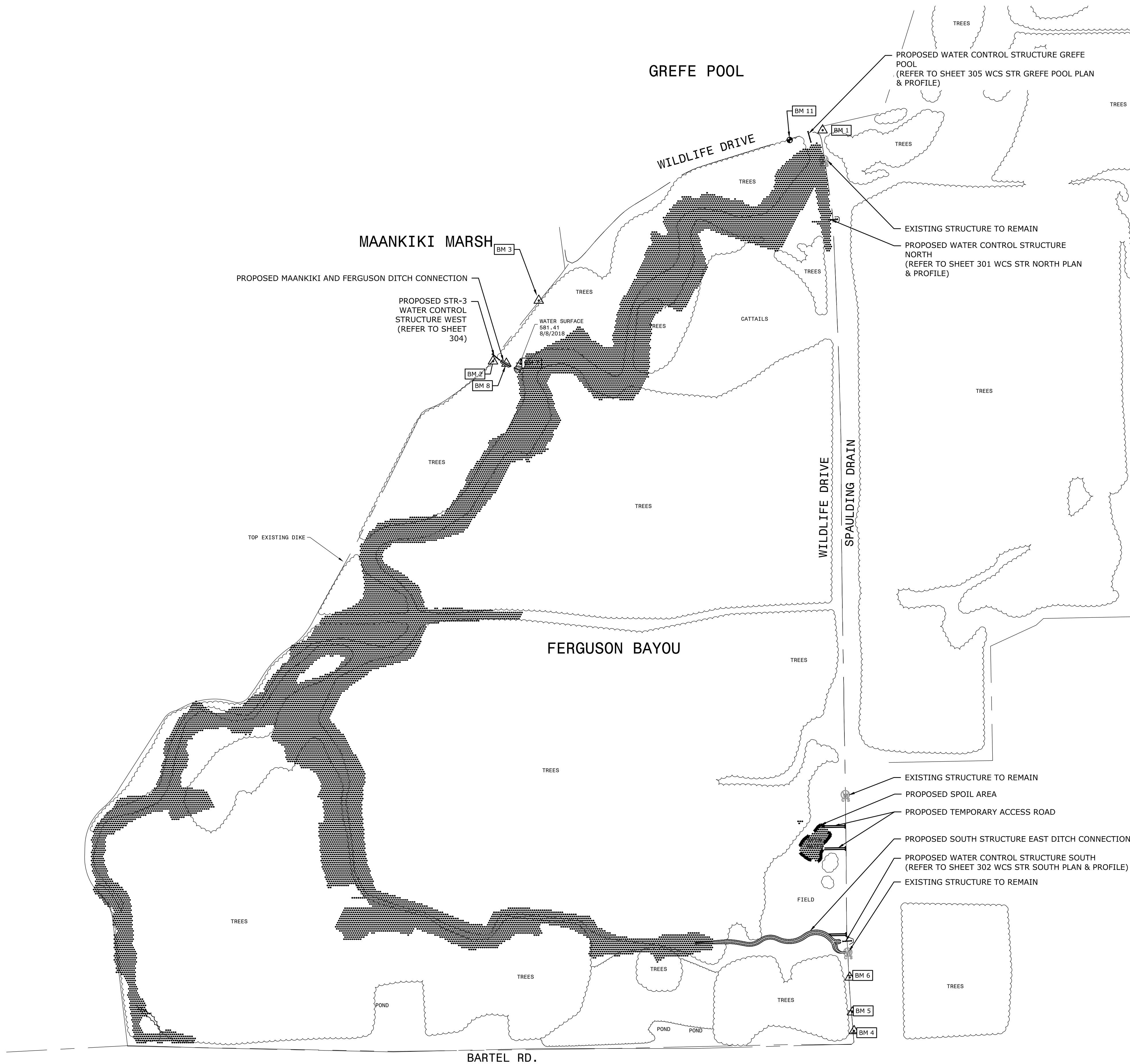
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DEXTER, MICHIGAN 48130
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TOPOGRAPHIC SURVEY
FERGUSON BAYOU
SHIAWASSEE NATIONAL
WILDLIFE REFUGE
SAGINAW COUNTY, MI

Revision	Sheet	Revisions	Date	By

CAD FILE:
MI-222-2 TOPO
DESIGNED BY: BN
DRAWN BY: PL
SURVEYED BY: JD
BIOLOGIST: DC/KR
DATE:
11/13/2018
PROJECT NUMBER:
US-MI-222-2
GLARO-MI3-094-103

K:\glaro c3d projects\mi-222-2 ferguson bayou\c3d_drawing\MI-222-2_200 Site Plan.dwg, 11/8/2019 12:54 PM, Patrick Lydon, C201 Overall Site Plan, None



LEGEND

PROPOSED FULL SERVICE LEVEL
(FSL): 134.12 ACRES

PROPOSED DITCH

PERMIT QUANTITIES					
ORDINARY HIGH WATER MARK					
BASED ON EXISTING POOL ELEVATION IN FERGUSON BAYOU					
582.50					
RIPRAP CALCULATIONS					
	WCS NORTH	WCS SOUTH	WCS WEST	GREFE STRUCTURE	TOTAL
MAX LENGTH ABOVE OHWM (FT)	22	45	10	27	104
MAX WIDTH ABOVE OHWM (FT)	50	46	40	55	191
MAX DEPTH ABOVE OHWM	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
VOLUME ABOVE OHWM (CY)	51	74	17	75	217
AREA ABOVE OHWM (SF)	1,378	1,994	450	2,047	5,869
MAX LENGTH BELOW OHWM (FT)	31	34	46	59	170
MAX WIDTH BELOW OHWM (FT)	53	40	33	32	158
MAX DEPTH BELOW OHWM	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
VOLUME BELOW OHWM (CY)	51	50	40	62	203
AREA BELOW OHWM (SF)	1,377	1,355	1,090	1,661	5,483
EARTHWORK VOLUMES & AREAS					
PERMANENT EARTHWORK (CY)	7,320 (CUT)	5,618 (FILL)			
TOTAL DISTURBED AREA FOR PERMANENT EARTHWORK (ACRES)	3.03 AC				
TEMPORARY EARTH COFFER & ACCESS ROAD EARTHWORK (CY)	2,326 (CUT)	0 (FILL)			
AREA OF TEMPORARY EARTH COFFER & ACCESS ROAD DISTURBANCE (ACRES)	0.70 AC				
VOLUME FINAL EARTHWORK BELOW OHWM (CY)	6,058 (CUT)	5,606 (FILL)			
DISTURBED PERMANENT AREA BELOW OHWM (ACRES)	2.42 AC				

GRAPHIC SCALE

500025050010002000

1 inch = 500feet

AFFIX SEAL: DUCKS UNLIMITED, INC.

ON:

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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DEXTER, MICHIGAN 48130
(734) 623-2000 www.ducks.org

DUCKS UNLIMITED

OVERALL SITE PLAN
FERGUSON BAYOU
SHIAWASSEE NATIONAL
WILDLIFE REFUGE
SAGINAW COUNTY, MI

By	
Date	
Revisions	
Sheet	
Revision	

CAD FILE:
MI-222-2_200 Site Plan

DESIGNED BY: BN

DRAWN BY: PL

SURVEYED BY: JD

BIOLOGIST: DC/KR

DATE:
11/13/2018

PROJECT NUMBER:
US-MI-222-2

GLARO-MI3-094-201

K:\laro\cd\projects\mi-222-2\ferguson bayou\C3d_drawing\MI-222-2_200 Site Plan.dwg, 11/8/2019 12:55 PM, Patrick Lydon, 301 WCS STR North Plan & Profile, None

PROPOSED TEMPORARY EARTH COFFER
±180 LF, 10' TOP @ EL. 586.0 WITH
2:1 SIDE SLOPES

FERGUSON BAYOU

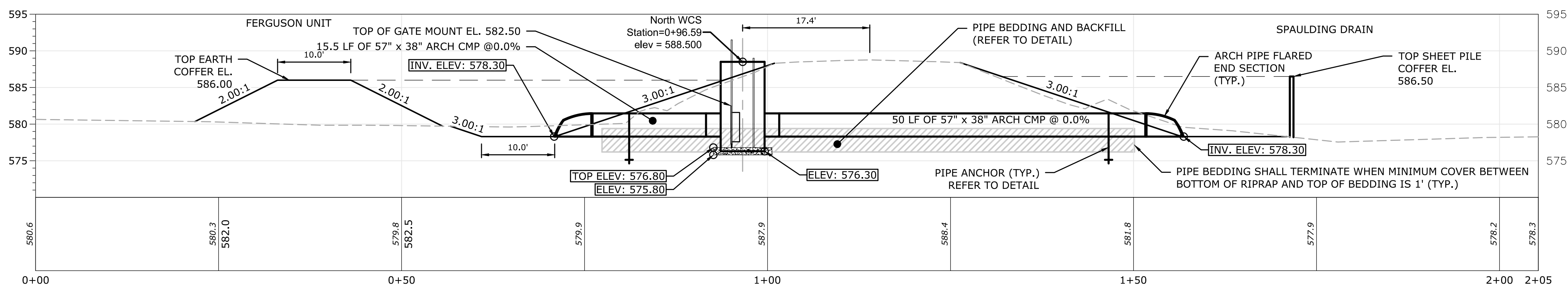
WILDLIFE DRIVE

SPAULDING DRAIN

PROPOSED TEMPORARY
SHEET PILE COFFER,
120 LF, TOP EL. 586.50

NORTH WATER CONTROL STRUCTURE PLAN

1" = 10'

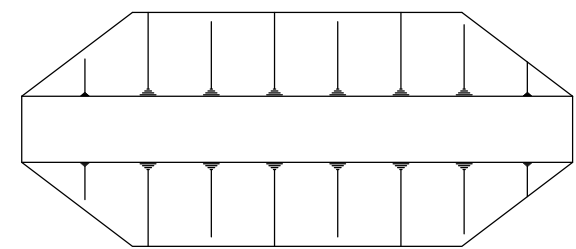


STR-1 NORTH WATER CONTROL STRUCTURE PROFILE

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

PLAN LEGEND

- EDGE OF WATER
- EXISTING SPOT ELEVATION
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EDGE OF ROADWAY
- EXISTING ROAD C
- PROPOSED COFFER DAM C
- PROPOSED RIPRAP



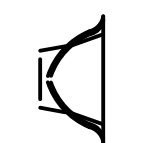
PROPOSED TEMPORARY EARTH
COFFER DAM



PROPOSED WATER CONTROL
STRUCTURE



PROPOSED PIPE



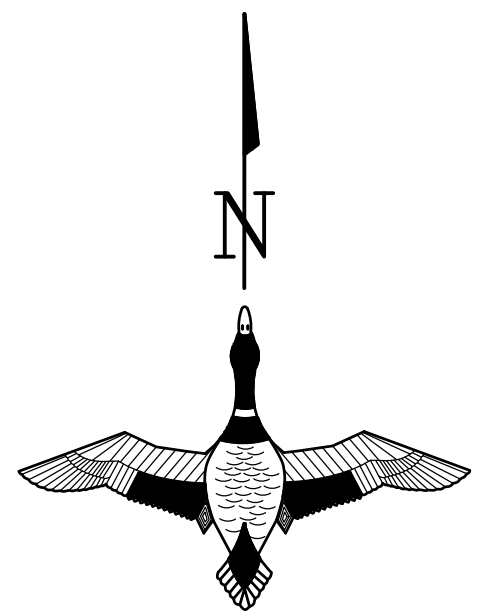
PROPOSED FLARED END SECTION



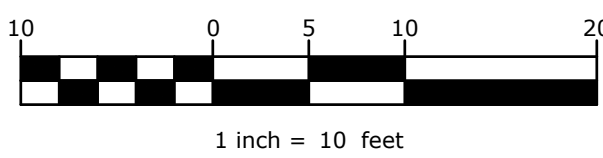
PROPOSED TEMPORARY SHEET PILE
COFFER DAM

NOTES:

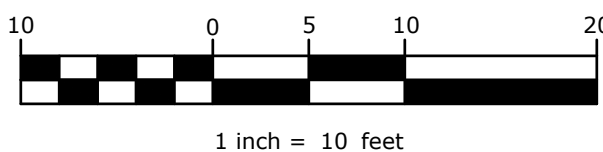
- ALL METAL PIPE SHALL BE CONNECTED WITH CONNECTING BANDS.
- INLET AND/OR OUTLET PIPES GREATER THAN 20 LINEAR FEET SHALL BE FABRICATED USING MULTIPLE SECTIONS, NOT TO EXCEED 20 LINEAR FEET, CONNECTED WITH BAND COUPLERS. A FULL 20 FOOT SECTION MUST BE UTILIZED AS THE END SECTION OF PIPE.
- REFER TO CONSTRUCTION DETAIL SHEETS FOR ADDITIONAL STRUCTURE INFORMATION
- SHEET PILE COFFER MUST BE USED ON SPAULDING DRAIN SIDE.
- EARTH COFFER, SHEET PILE COFFER, OR DRAINING OF UNIT MAY BE USED ON IMPOUNDMENT SIDE. EARTH COFFER SHOWN REPRESENTS MAXIMUM AREA AND VOLUME FOR PERMIT COMPLIANCE.
- COFFERS SHOWN ON DRAWING ARE CREATED FOR PERMIT CALCULATIONS, AND ARE REPRESENTATIONAL ONLY. CONTRACTOR IS RESPONSIBLE FOR ALL COFFER DESIGN.
- RIPRAP SHALL BE PLACED AROUND RISER ENSURING 1' MAXIMUM DROP BETWEEN THE RISER TOP AND TOP OF ROCK.
- PROPOSED CONTOURS SHOWN ARE TO TOP OF RIPRAP.
- No. OF STOPLOGS INCLUDES THE ADDITIONAL STOPLOG POSITIONED UNDER THE GATE ON FRAME.



HORIZONTAL SCALE



VERTICAL SCALE



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STRUCTURE	ARCH PIPE			RISER		TOP OF DIKE	TOP OF RISER	FULL SERVICE LEVEL	CONCRETE BASE	INLET I.E.	OUTLET I.E.	TOP DIKE WIDTH	INLET LENGTH	OUTLET LENGTH	C - C OFFSET	RISER HEIGHT "H"	No. OF STOPLOGS (NOTE #9)	No. OF FISH GRATES	GATE FRAME HEIGHT
	SPAN	RISE	GA.	SIZE	GA.														
STR-1 (NORTH STRUCTURE)	57"	38"	10	72"	8	MATCH EX. ± 588.75	588.50	582.50	575.80	578.30	578.30	MATCH EX. ± 25.0'	15.5 LF	55 LF	17.4'	12.2'	8	11	12.0'

* INCLUDES THE STOPLOG BELOW THE GATE ON FRAME

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DEXTER, MICHIGAN 48130

(734) 623-2000 www.ducks.org



WCS STR NORTH PLAN &

PROFILE

FERGUSON BAYOU

SHIAWASSEE NATIONAL

WILDLIFE REFUGE

SAGINAW COUNTY, MI

By

Date

Revisions

Sheet

Revision

CAD FILE:
MI-222-2_200 Site Plan

DESIGNED BY: BN

DRAWN BY: PL

SURVEYED BY: JD

BIOLOGIST: DC/KR

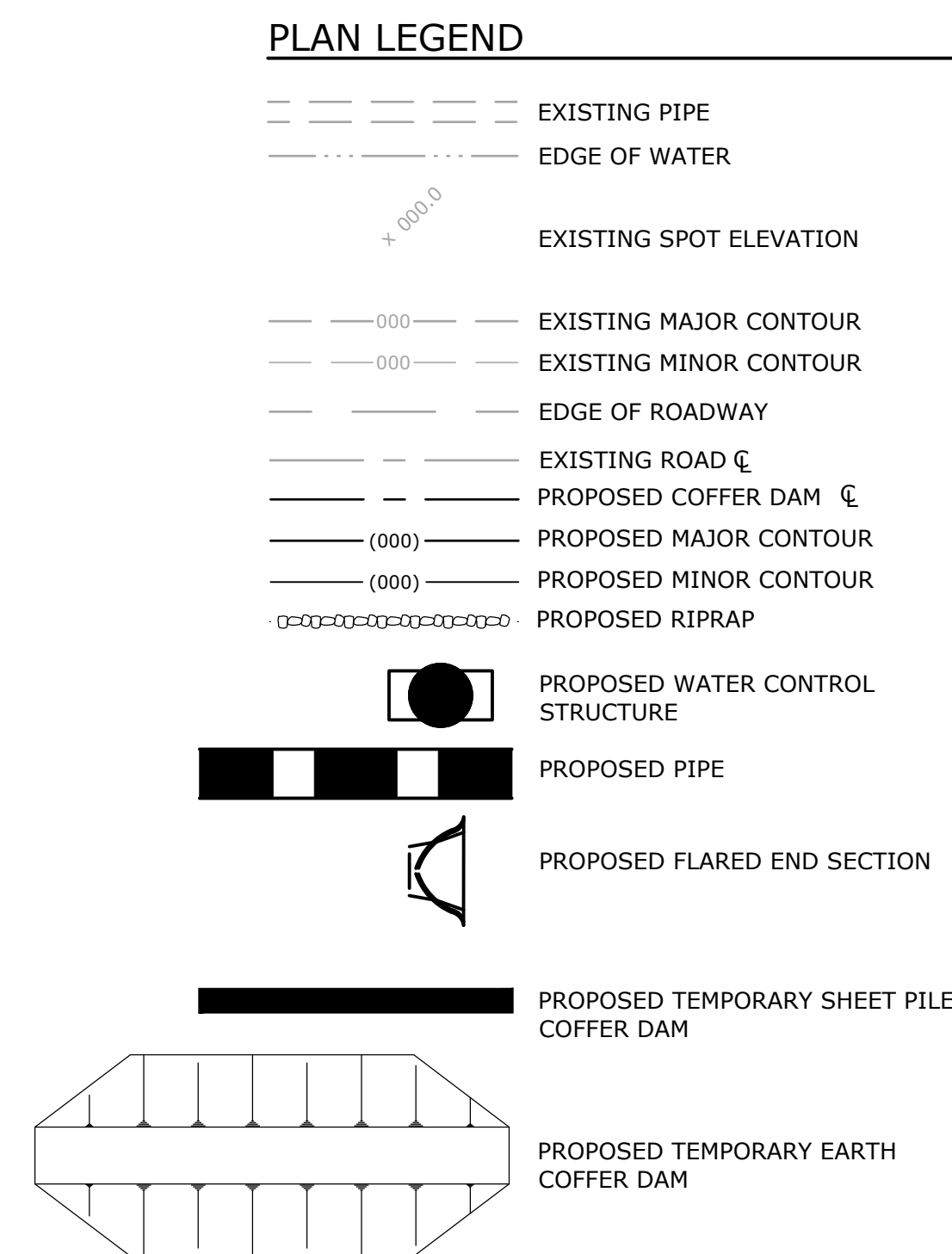
DATE:

11/13/2018

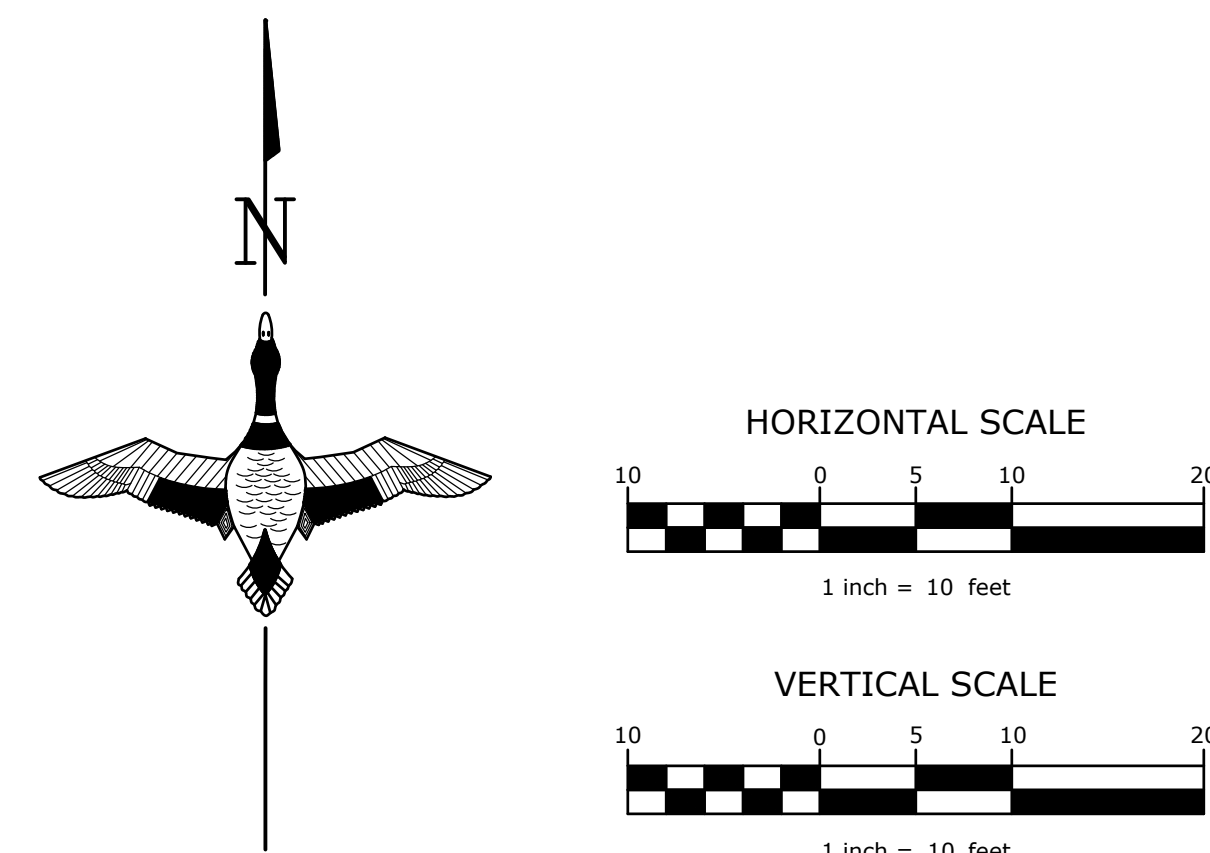
PROJECT NUMBER:

US-MI-222-2

GLARO-MI3-094-301



- NOTES:
1. ALL METAL PIPE SHALL BE CONNECTED WITH CONNECTING BANDS.
 2. INLET AND/OR OUTLET PIPES GREATER THAN 20 LINEAR FEET SHALL BE FABRICATED USING MULTIPLE SECTIONS, NOT TO EXCEED 20 LINEAR FEET, CONNECTED WITH BAND COUPLERS. A FULL 20 FOOT SECTION MUST BE UTILIZED AS THE END SECTION OF PIPE.
 3. REFER TO CONSTRUCTION DETAIL SHEETS FOR ADDITIONAL STRUCTURE INFORMATION
 4. SHEET PILE COFFER MUST BE USED ON SPAULDING DRAIN SIDE.
 5. EARTH COFFER, SHEET PILE COFFER, OR DRAINING OF UNIT MAY BE USED ON IMPOUNDMENT SIDE. EARTH COFFER SHOWN REPRESENTS MAXIMUM AREA AND VOLUME FOR PERMIT COMPLIANCE.
 6. COFFERS SHOWN ON DRAWING ARE CREATED FOR PERMIT CALCULATIONS, AND ARE REPRESENTATIONAL ONLY. CONTRACTOR IS RESPONSIBLE FOR ALL COFFER DESIGN.
 7. RIPRAP SHALL BE PLACED AROUND RISER ENSURING 1' MAXIMUM DROP BETWEEN THE RISER TOP AND TOP OF ROCK.
 8. PROPOSED CONTOURS SHOWN ARE TO TOP OF RIPRAP.
 9. NO. OF STOPLOGS INCLUDES THE ADDITIONAL STOPLOG POSITIONED UNDER THE GATE ON FRAME.

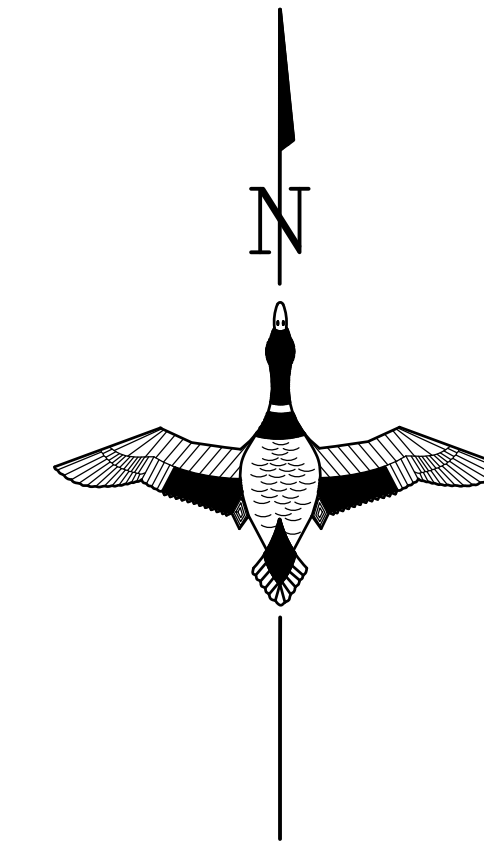
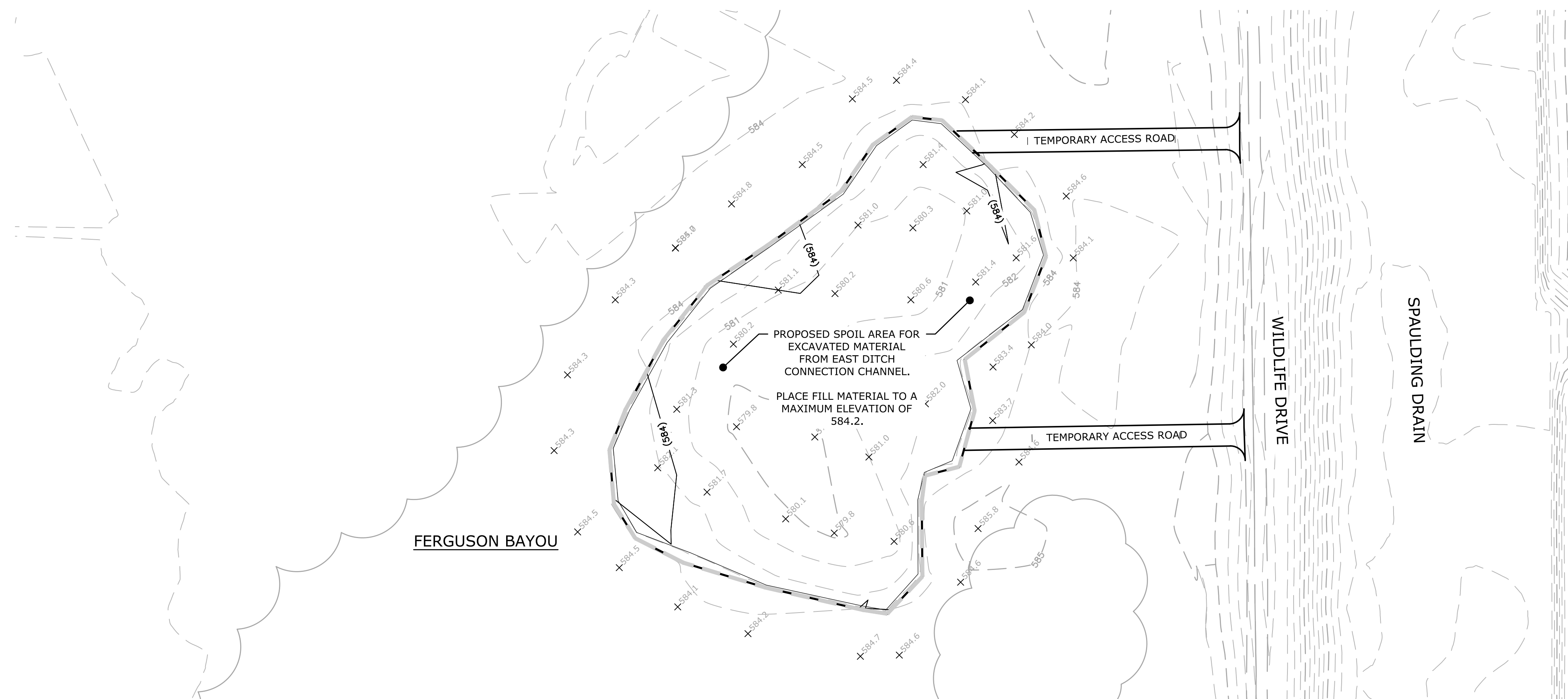


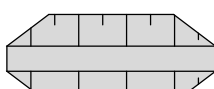
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'

STRUCTURE	ARCH PIPE			RISER		TOP OF DIKE	TOP OF RISER	FULL SERVICE LEVEL	CONCRETE BASE	INLET I.E.	OUTLET I.E.	TOP DIKE WIDTH	INLET LENGTH	OUTLET LENGTH	℄ - ℄ OFFSET	RISER HEIGHT "H"	No. OF STOPLOGS (NOTE #9)	No. OF FISH GRATES	GATE FRAME HEIGHT
	SPAN	RISE	GA.	SIZE	GA.														
STR-2 (SOUTH STRUCTURE)	57"	38"	10	72"	8	MATCH EX. ± 589.70	589.50	582.50	575.80	578.30	578.30	MATCH EX. ± 16.0'	19.5 LF	44 LF	12'	13.2'	8	12	13.0'

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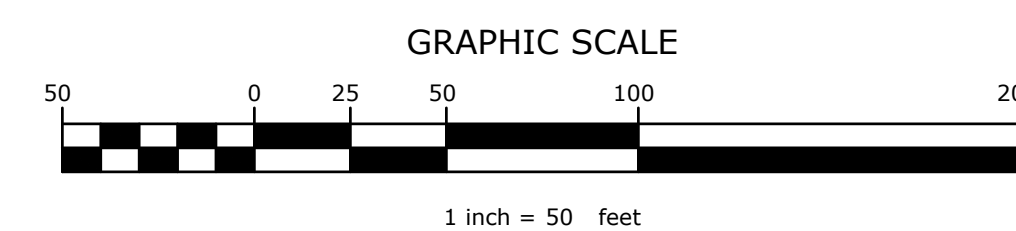
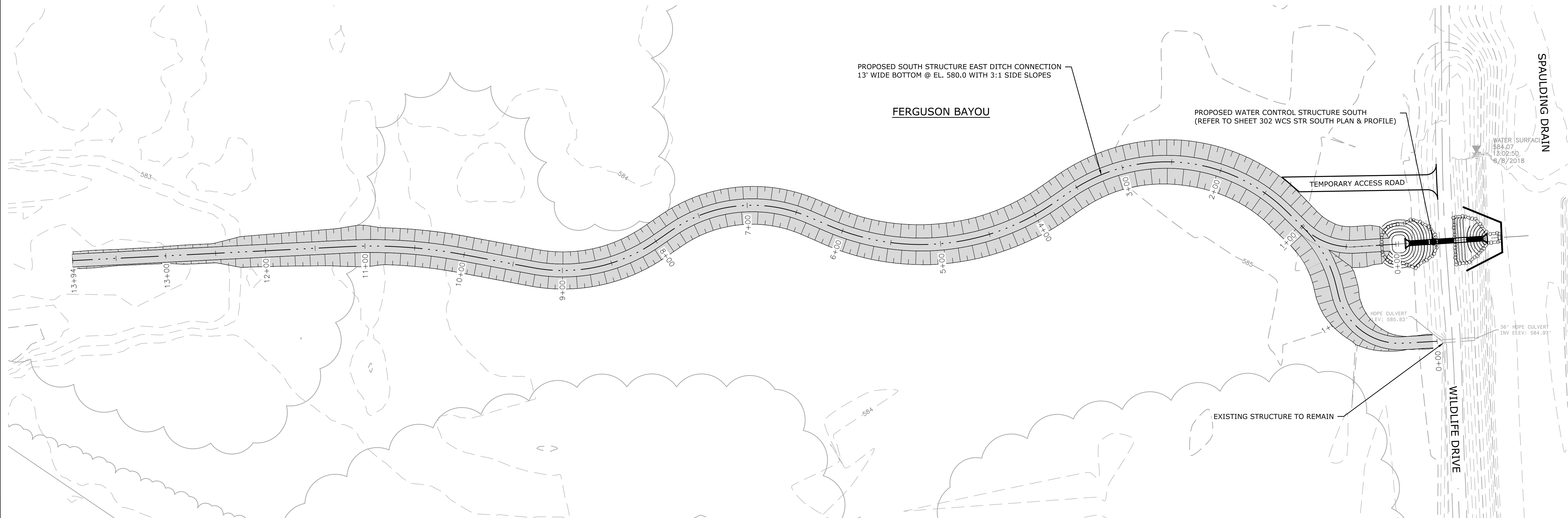
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- # LEGEND
-
- | | |
|---|---|
|  | SURVEY CONTROL |
|  | EDGE OF WATER |
|  | EXISTING SPOT ELEVATION |
|  | EXISTING MAJOR CONTOUR |
|  | EXISTING MINOR CONTOUR |
|  | EDGE OF ROADWAY |
|  | EXISTING ROAD ☺ |
|  | PROPOSED COFFER DAM ☺ |
|  | PROPOSED MAJOR CONTOUR |
|  | PROPOSED MINOR CONTOUR |
|  | PROPOSED WATER CONTROL STRUCTURE |
|  | PROPOSED PIPE |
|  | PROPOSED FLARED END SECTION |
|  | PROPOSED DITCH (REFER TO CROSS SECTION IN CONSTRUCTION DETAILS) |
|  | PROPOSED SPOIL AREA BOUNDARY |
|  | APPROXIMATE PROPERTY LINE |

NOTES:

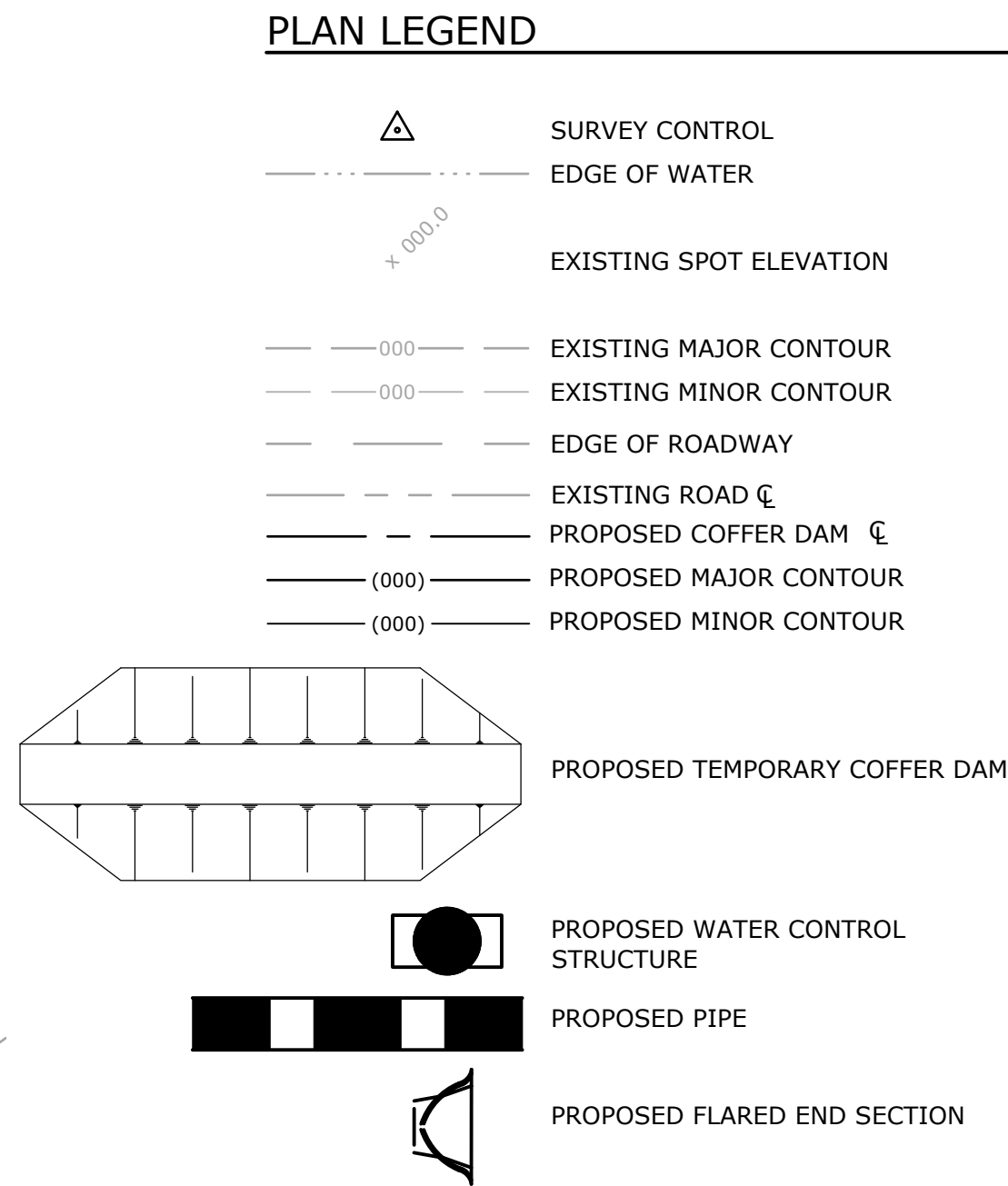
1. MATERIAL EXCAVATED FROM THE SOUTH STRUCTURE DITCH CONNECTION CHANNEL SHALL BE HAULED NORTH APPROXIMATELY 850' TO THE DESIGNATED SPOIL AREA LOCATION. FILL SHALL BE PLACE AS SHOWN ON THE PLANS IN ACCORDANCE WITH DUCKS UNLIMITED SPECIFICATIONS.



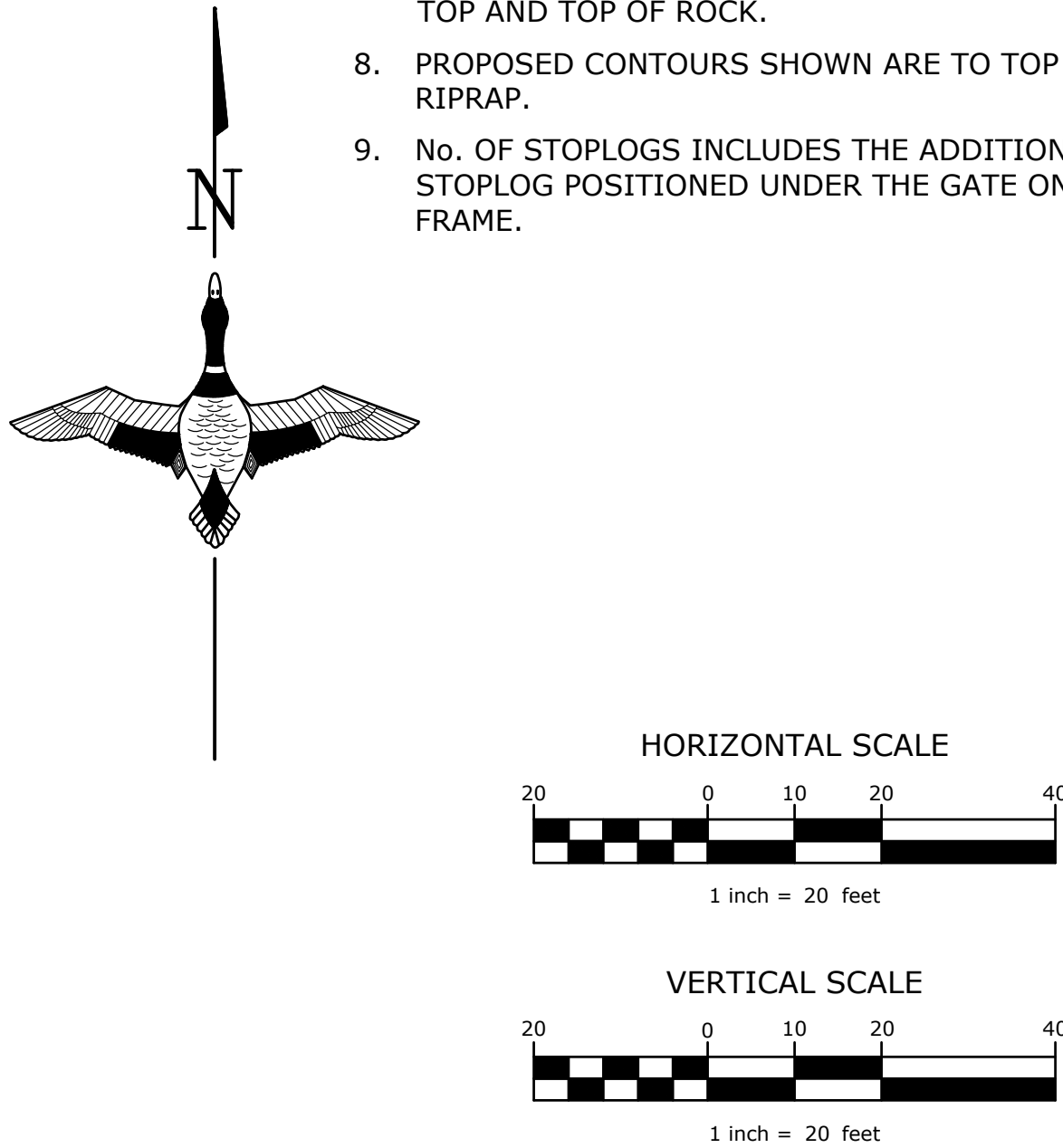
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[illegible]



- NOTES:
1. ALL METAL PIPE SHALL BE CONNECTED WITH CONNECTING BANDS.
 2. INLET AND/OR OUTLET PIPES GREATER THAN 20 LINEAR FEET SHALL BE FABRICATED USING MULTIPLE SECTIONS, NOT TO EXCEED 20 LINEAR FEET, CONNECTED WITH BAND COUPLERS. A FULL 20 FOOT SECTION MUST BE UTILIZED AS THE END SECTION OF PIPE.
 3. REFER TO CONSTRUCTION DETAIL SHEETS FOR ADDITIONAL STRUCTURE INFORMATION
 4. EARTH COFFER, SHEET PILE COFFER, OR DRAINING OF UNIT MAY BE USED ON IMPOUNDMENT SIDE. EARTH COFFER SHOWN REPRESENTS MAXIMUM AREA AND VOLUME FOR PERMIT COMPLIANCE.
 5. COFFERS SHOWN ON DRAWING ARE CREATED FOR PERMIT CALCULATIONS, AND ARE REPRESENTATIONAL ONLY. CONTRACTOR IS RESPONSIBLE FOR ALL COFFER DESIGN.
 6. MATERIAL EXCAVATED RESULTING IN A NET CUT SHALL BE USED TO EXTEND THE MAANKIKI BARRIER BERMS. CONSULT WITH ENGINEER PRIOR TO PLACEMENT OF ANY MATERIAL IN THE MAANKIKI UNIT.
 7. RIPRAP SHALL BE PLACED AROUND RISER ENSURING 1' MAXIMUM DROP BETWEEN THE RISER TOP AND TOP OF ROCK.
 8. PROPOSED CONTOURS SHOWN ARE TO TOP OF RIPRAP.
 9. NO. OF STOPLOGS INCLUDES THE ADDITIONAL STOPLOG POSITIONED UNDER THE GATE ON FRAME.



WCS STR-3 WEST & MAANKIKI, FERGUSON DITCH CONNECTION

PROFILE

HORIZONTAL SCALE: 1" = 20'

VERTICAL SCALE: 1" = 20'

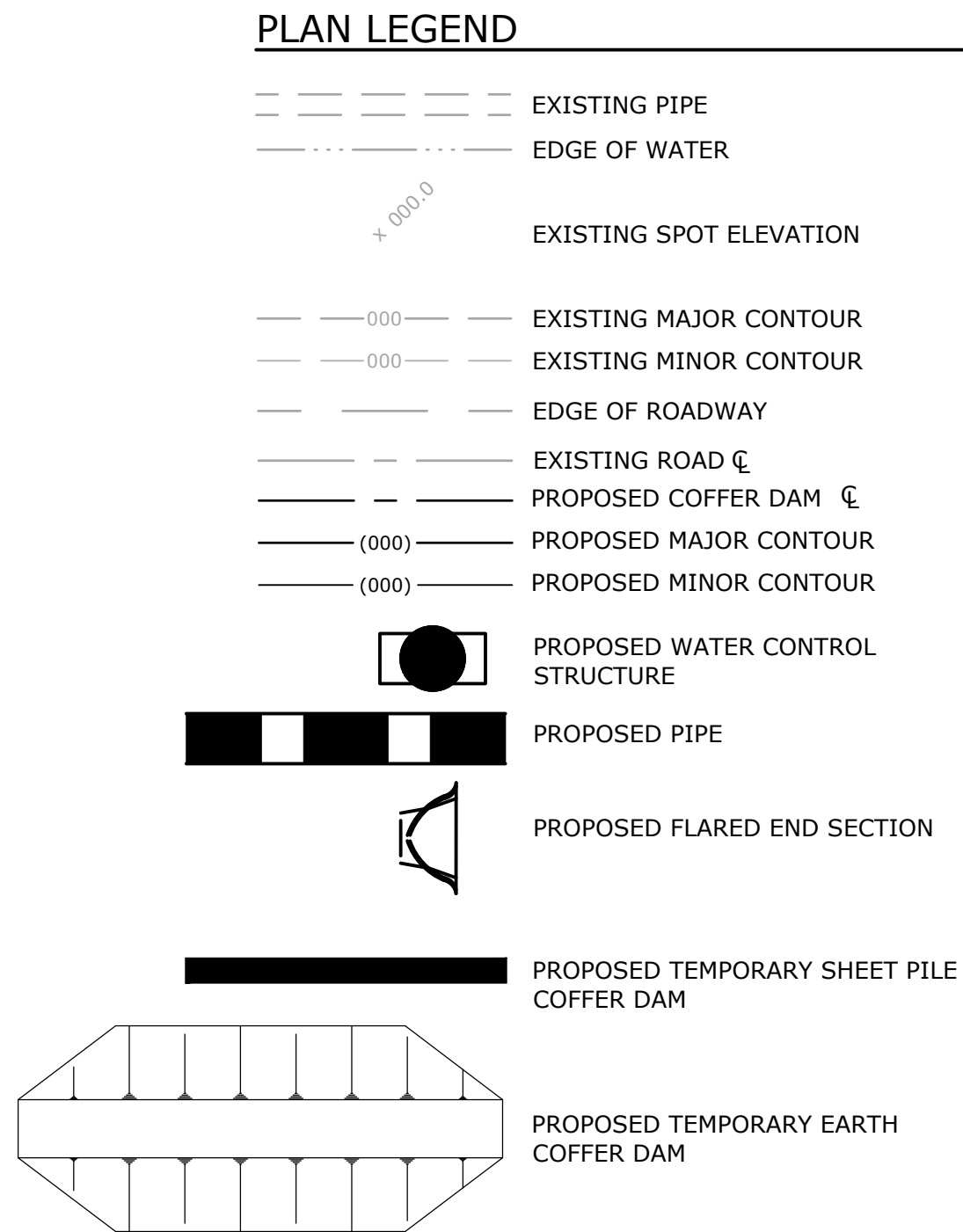
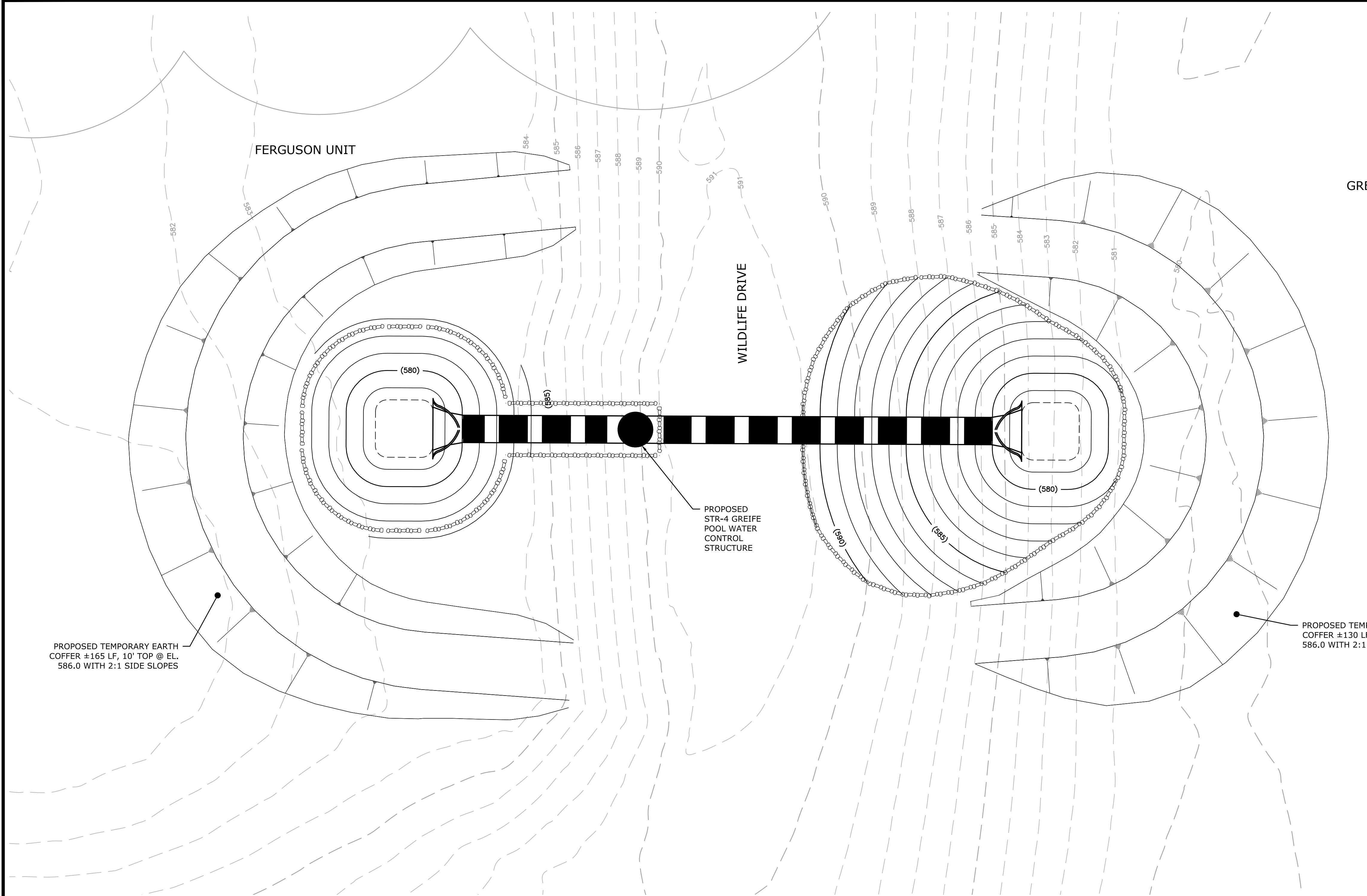
STRUCTURE	ARCH PIPE			RISER		TOP OF DIKE	TOP OF RISER	FULL SERVICE LEVEL	CONCRETE BASE	INLET I.E.	OUTLET I.E.	TOP DIKE WIDTH	INLET LENGTH	OUTLET LENGTH	℄ -℄ OFFSET	RISER HEIGHT "H"	No. OF STOPLOGS (NOTE #9)	No. OF FISH GRATES	GATE FRAME HEIGHT
	SPAN	RISE	GA.	SIZE	GA.														
STR-3 (WEST STRUCTURE)	57"	38"	12	72"	-	MATCH EX. ± 589.85	590.00	582.5	575.80	578.30	578.30	MATCH EX. ± 14.0'	20.0 LF	46.0 LF	11.0'	13.7'	8	13	13.5'

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By		Date	
Revisions			
Sheet			
Revision			
			
CAD FILE: MI-222-2_200 Site Plan			
DESIGNED BY: BN			
DRAWN BY: PL			
SURVEYED BY: JD			
BIOLOGIST: DC/KR			
DATE: 11/13/2018			
PROJECT NUMBER: US-MI-222-2			
GLARO-MI3-094-304			

K:\laro\cd\projects\mi-222-2\ferguson bayou\Cad_drawing\MI-222-2_200 Site Plan.dwg, 11/8/2019 12:56 PM, Patrick Lydon, 305 GREIFE WCS STR PLAN & PROFILE, None

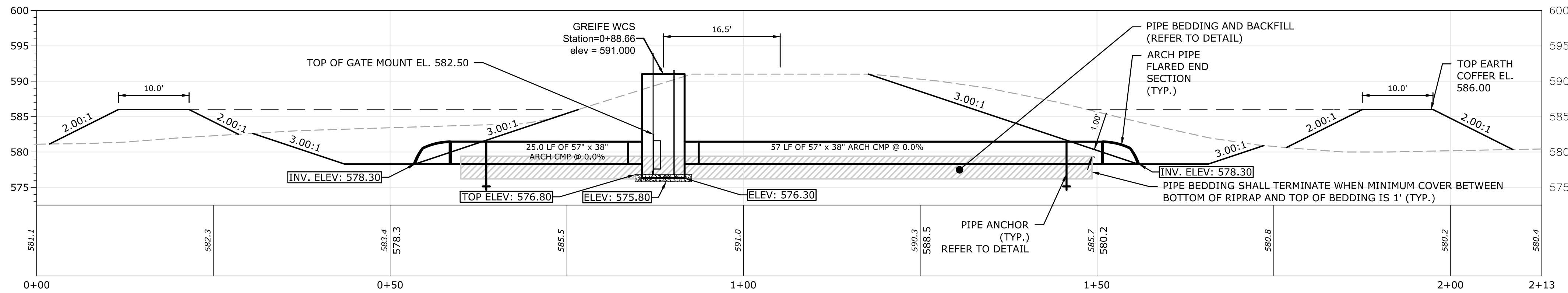


NOTES:

1. ALL METAL PIPE SHALL BE CONNECTED WITH CONNECTING BANDS.
2. INLET AND/OR OUTLET PIPES GREATER THAN 20 LINEAR FEET SHALL BE FABRICATED USING MULTIPLE SECTIONS, NOT TO EXCEED 20 LINEAR FEET, CONNECTED WITH BAND COUPLERS. A FULL 20 FOOT SECTION MUST BE UTILIZED AS THE END SECTION OF PIPE.
3. REFER TO CONSTRUCTION DETAIL SHEETS FOR ADDITIONAL STRUCTURE INFORMATION
4. SHEET PILE COFFER MUST BE USED ON SPAULDING DRAIN SIDE.
5. EARTH COFFER, SHEET PILE COFFER, OR DRAINING OF UNIT MAY BE USED ON IMPOUNDMENT SIDE. EARTH COFFER SHOWN REPRESENTS MAXIMUM AREA AND VOLUME FOR PERMIT COMPLIANCE.
6. COFFERS SHOWN ON DRAWING ARE CREATED FOR PERMIT CALCULATIONS, AND ARE REPRESENTATIONAL ONLY. CONTRACTOR IS RESPONSIBLE FOR ALL COFFER DESIGN.
7. RIPRAP SHALL BE PLACED AROUND RISER ENSURING 1' MAXIMUM DROP BETWEEN THE RISER TOP AND TOP OF ROCK.
8. PROPOSED CONTOURS SHOWN ARE TO TOP OF RIPRAP.
9. No. OF STOPLOGS INCLUDES THE ADDITIONAL STOPLOG POSITIONED UNDER THE GATE ON FRAME.
10. CONTOURS AND QUANTITIES ARE BASED ON LIDAR DATA FOR GREIFE POOL WATER CONTROL STRUCTURE.

GREIFE POOL WATER CONTROL STRUCTURE PLAN

1" = 10'



GREIFE POOL WATER CONTROL STRUCTURE PROFILE

HORIZONTAL SCALE: 1" = 10'

VERTICAL SCALE: 1" = 10'

STRUCTURE	ARCH PIPE			RISER		TOP OF DIKE	TOP OF RISER	FULL SERVICE LEVEL	CONCRETE BASE	INLET I.E.	OUTLET I.E.	TOP DIKE WIDTH	INLET LENGTH	OUTLET LENGTH	C - C OFFSET	RISER HEIGHT "H"	No. OF STOPLOGS (NOTE #9)	No. OF FISH GRATES	GATE FRAME HEIGHT
	SPAN	RISE	GA.	SIZE	GA.														
STR-2 (SOUTH STRUCTURE)	57"	38"	10	72"	8	MATCH EX. ± 591.00	591.00	582.50	575.80	578.30	578.30	MATCH EX. ± 25.0"	25.0 LF	57.0 LF	16.5'	14.7'	8	14	14.5'

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DEXTER, MICHIGAN 48130

(734) 623-2000 www.ducks.org



GREFE STR PLAN & PROFILE
FERGUSON BAYOU

SHIAWASSEE NATIONAL
WILDLIFE REFUGE

SAGINAW COUNTY, MI

By

Date

Revisions

Sheet

Revision

DESIGNED BY: BN

DRAWN BY: PL

SURVEYED BY: JD

BIOLOGIST: DC/KR

DATE:

11/13/2018

PROJECT NUMBER:

US-MI-222-2

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MI-222-2_200 Site Plan

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CAD FILE:

MI-222-2_200 Site Plan

DESIGNED BY: BN

DRAWN BY: PL

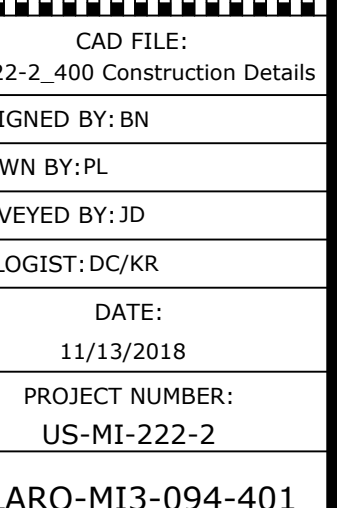
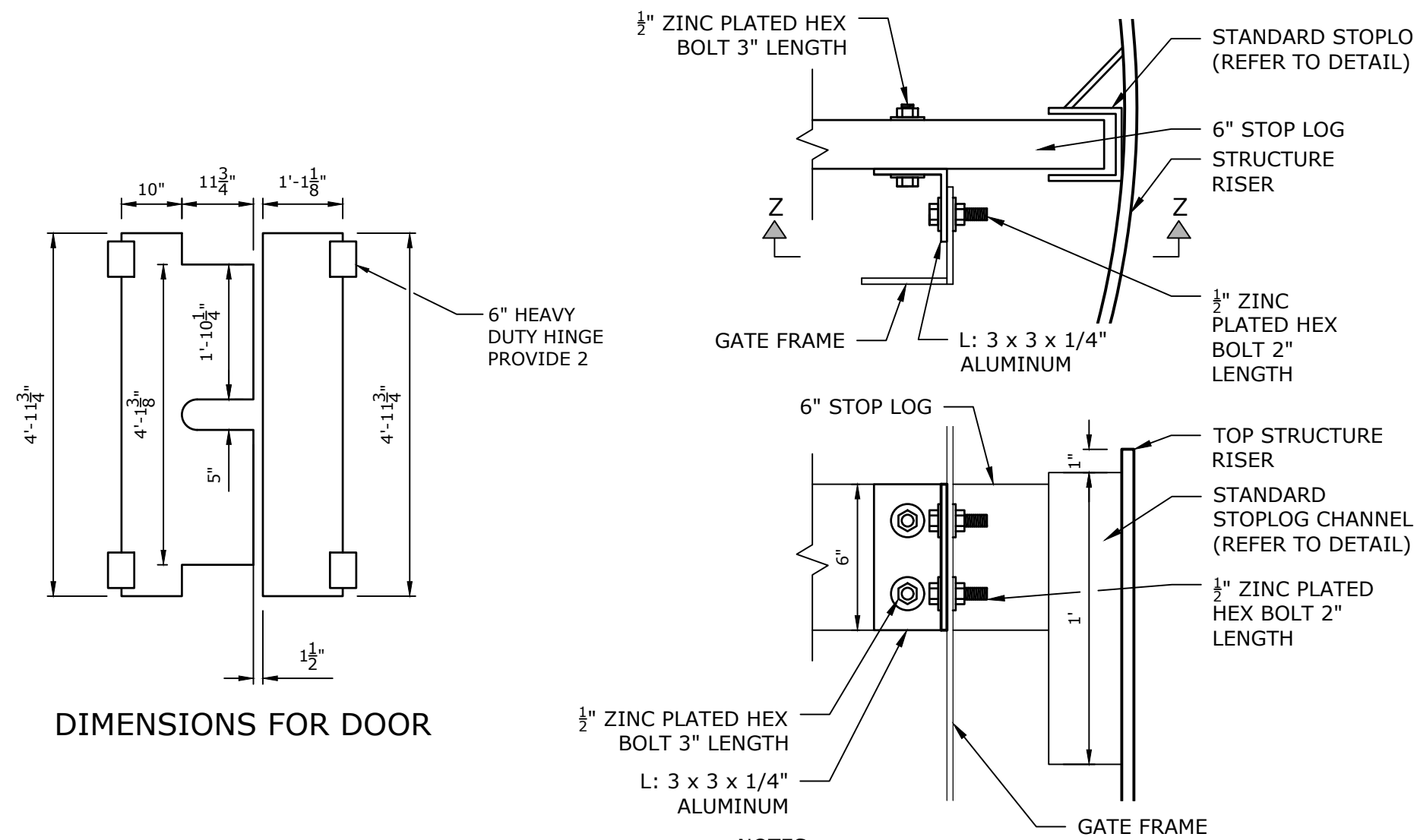
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BIOLOGIST: DC/KR

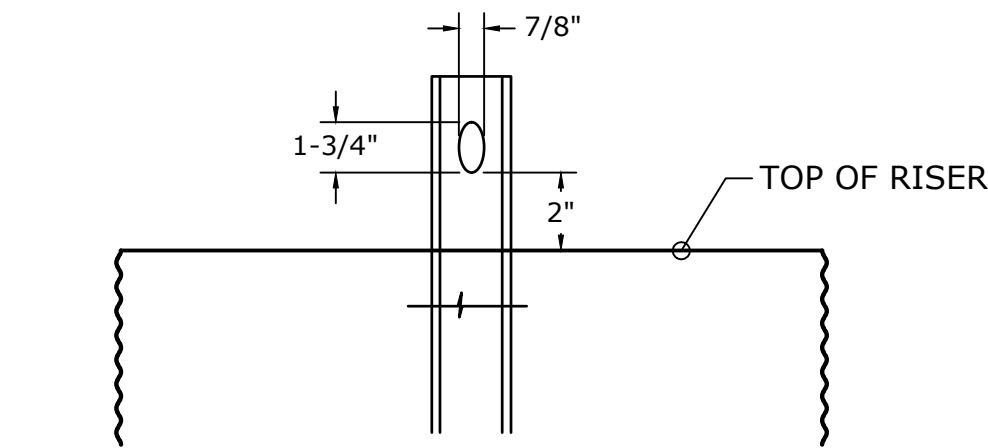
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11/13/2018

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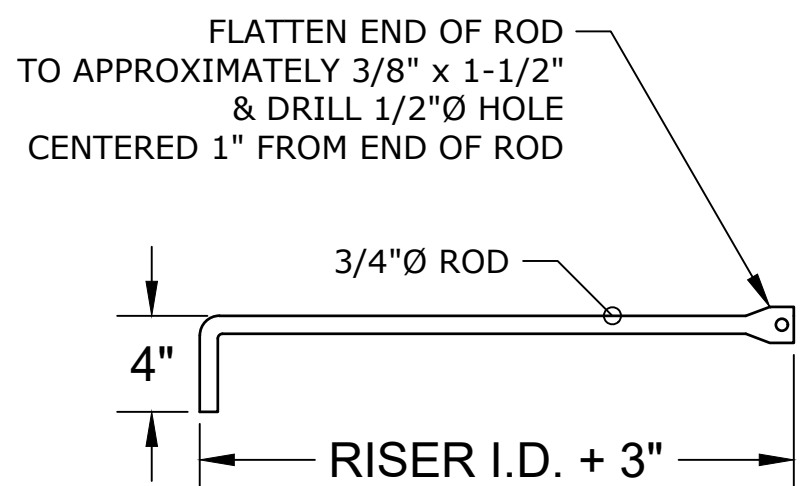


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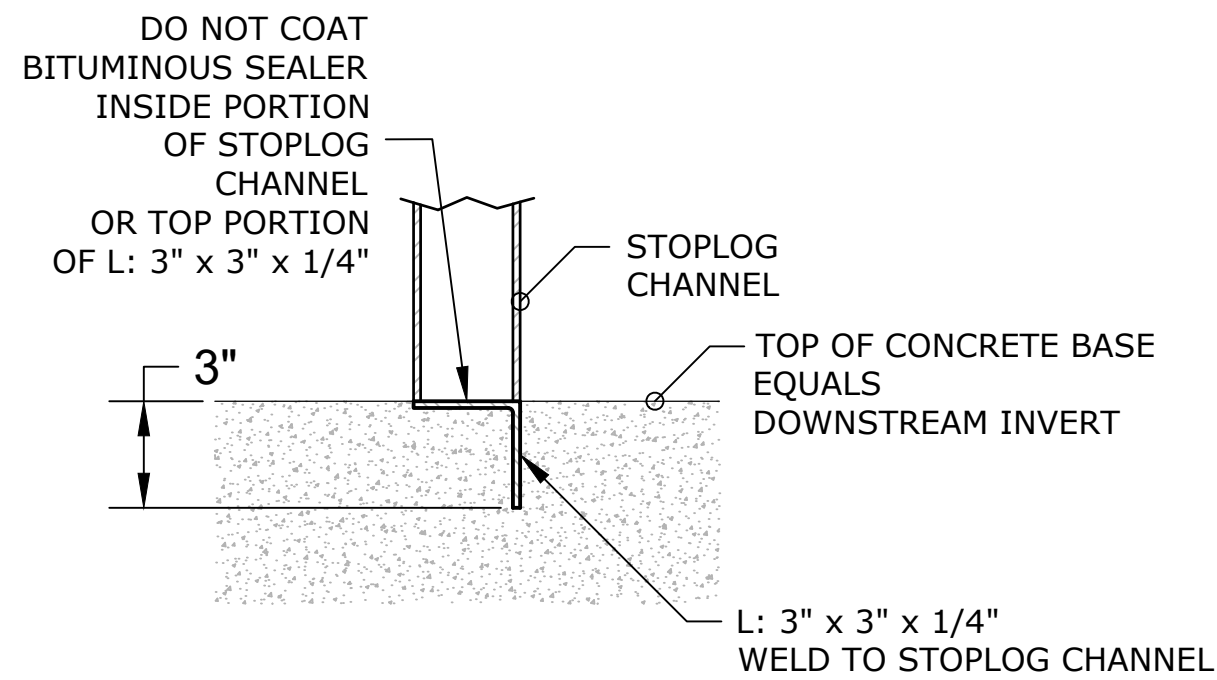
LOCKING ROD SLOT DETAIL

NOT TO SCALE



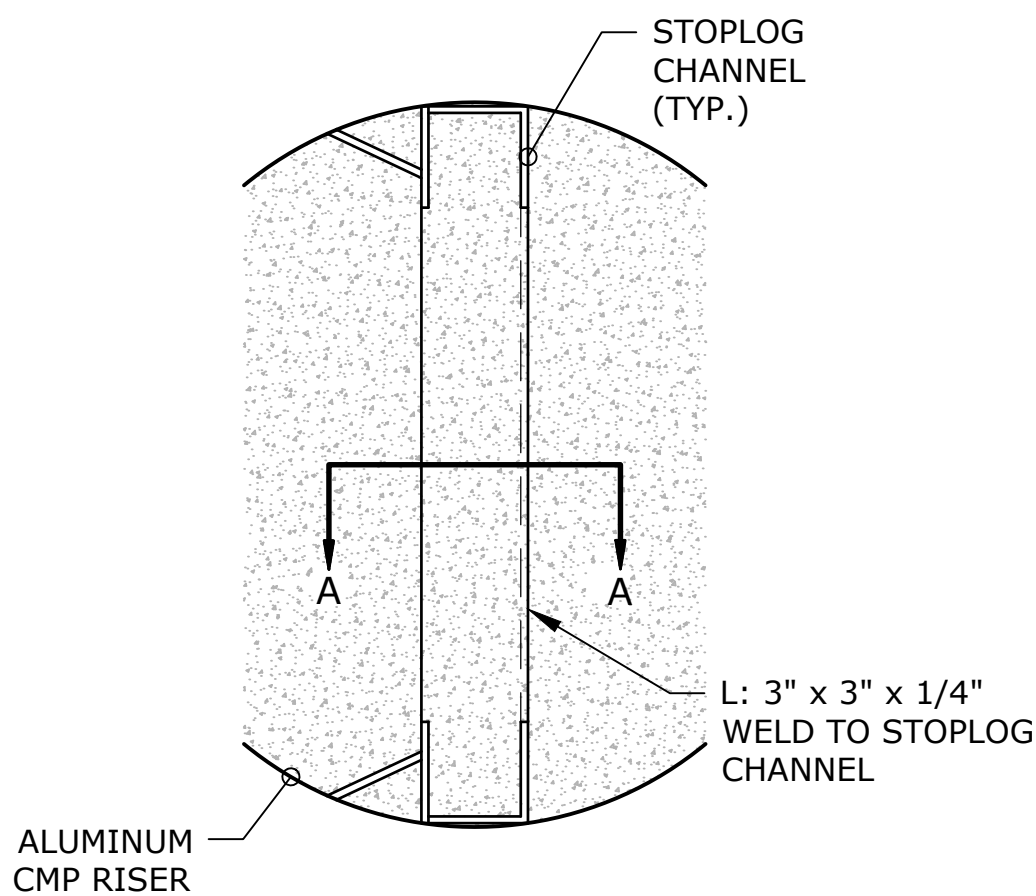
LOCKING ROD DETAIL

NOT TO SCALE



SECTION A-A

NOT TO SCALE

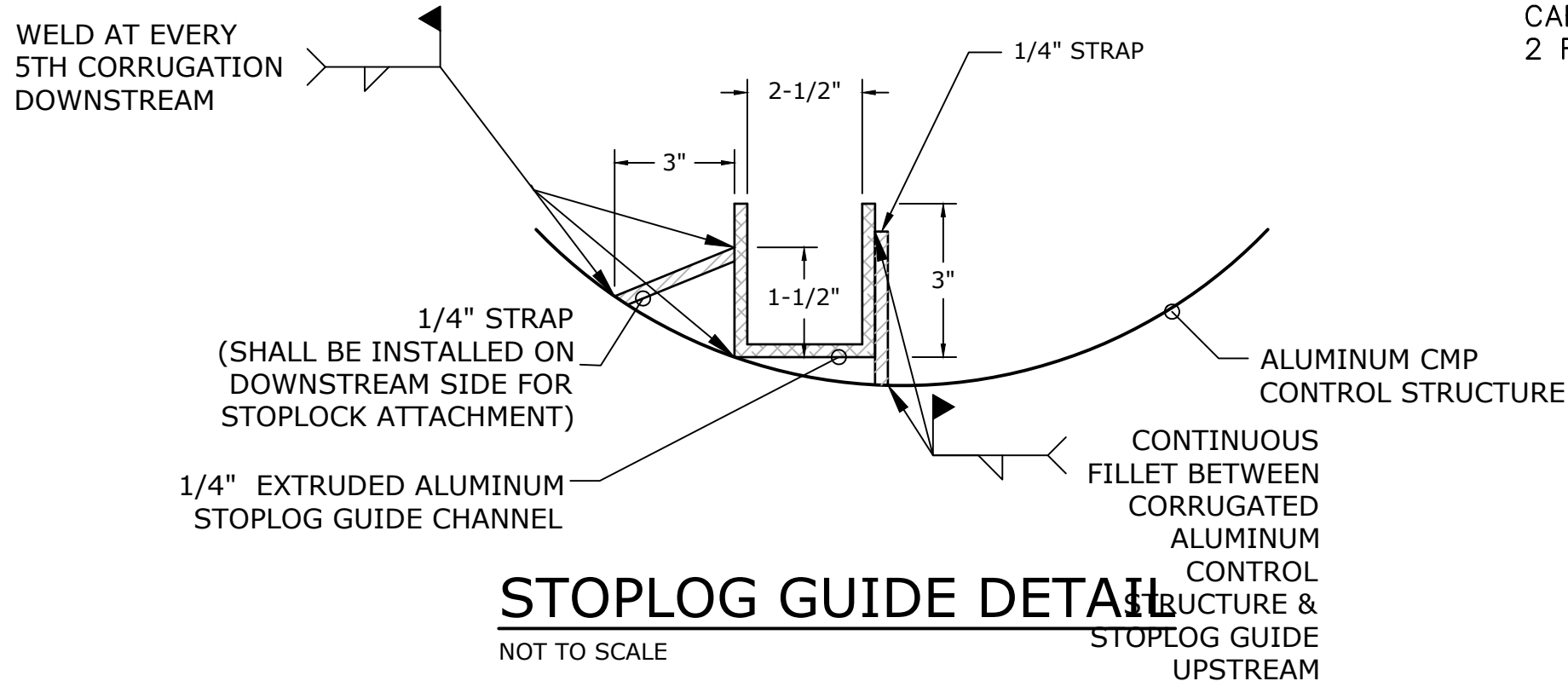


PLAN VIEW

NOT TO SCALE

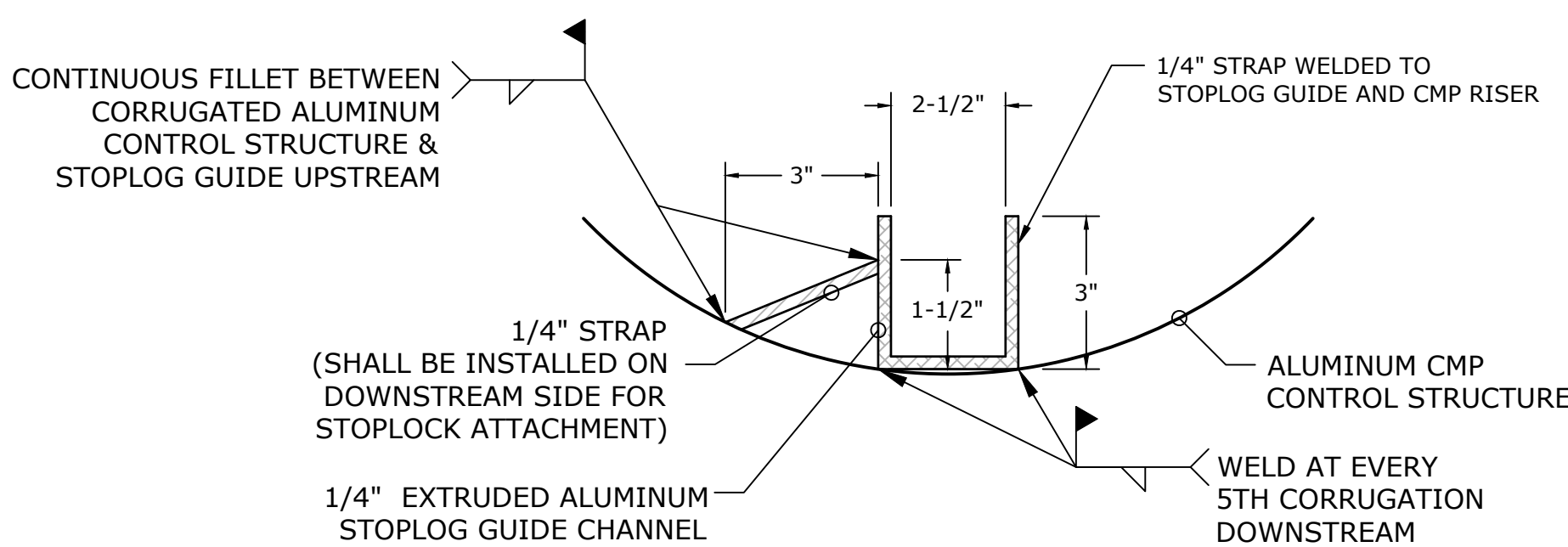
STOPLOG GUIDE BASE DETAIL

NOT TO SCALE



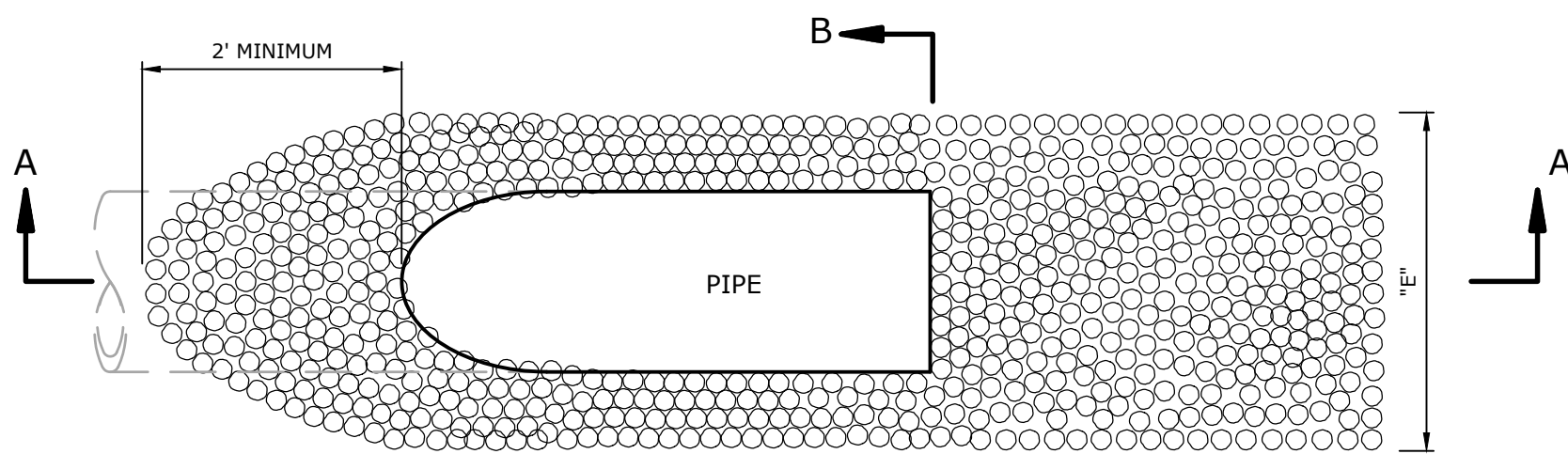
STOPLOG GUIDE DETAIL

NOT TO SCALE

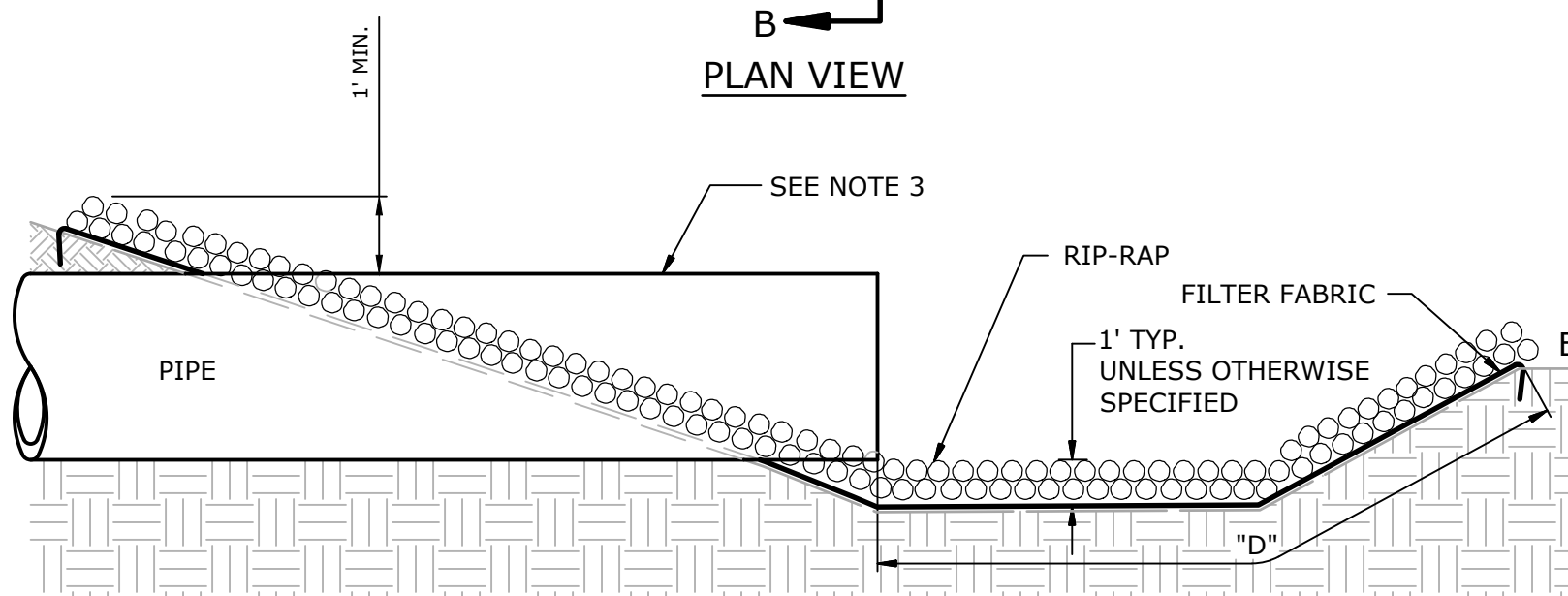


STANDARD STOPLOG GUIDE DETAIL

NOT TO SCALE



PLAN VIEW



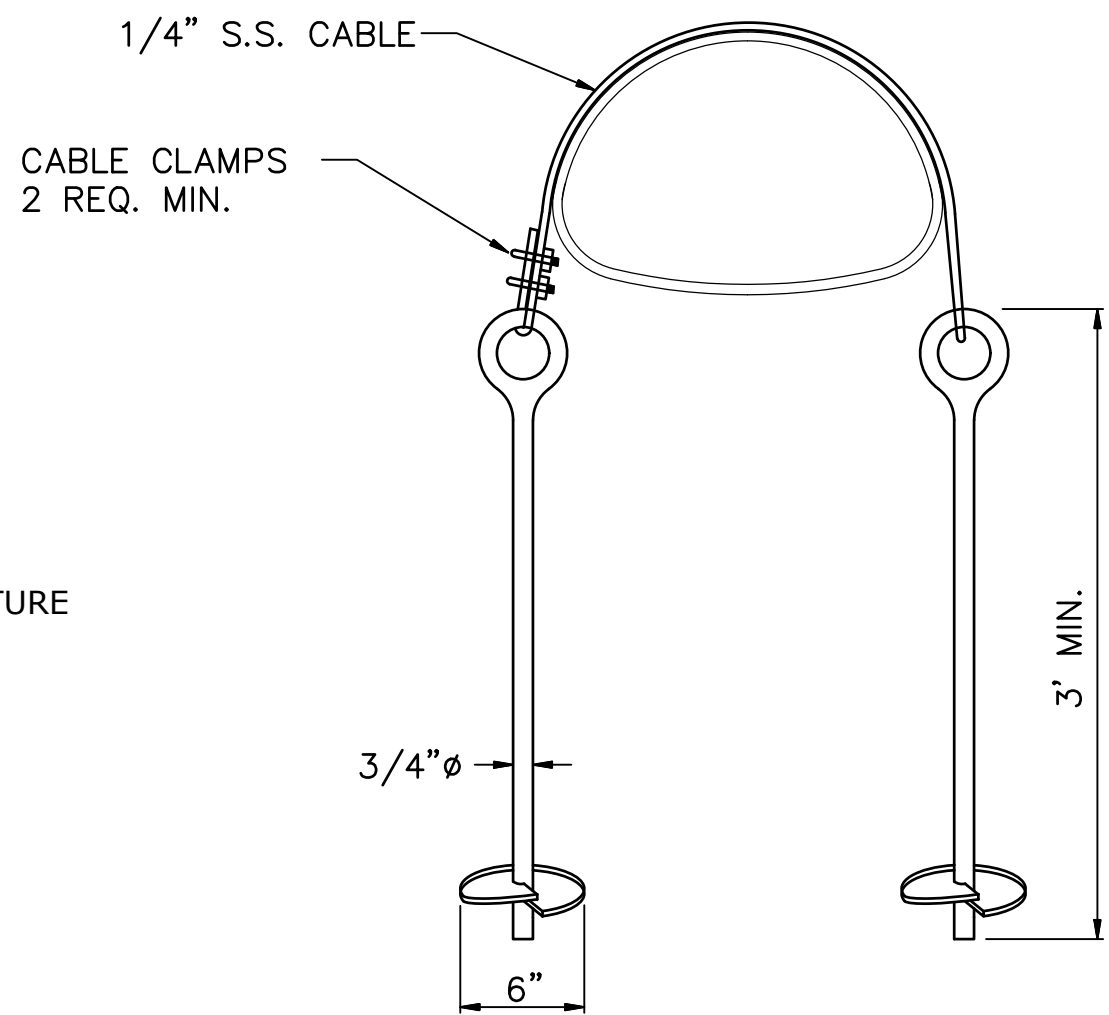
SECTION A-A

NOTES:

- IF THE RIP-RAP CLASS DESIGNATION IS NOT SPECIFIED ON THE CONSTRUCTION PLANS, CLASS 1 ROCK RIP-RAP SHALL BE UTILIZED. THE ROCK SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
- UNLESS OTHERWISE SPECIFIED, FILTER FABRIC SHALL BE UTILIZED IN THE INSTALLATION OF RIP-RAP.
- UPSTREAM AND DOWNSTREAM CMP PIPE OUTLET SHALL INCLUDE FLARED END SECTION.
- SELECT RIPRAP DIMENSIONS BASED ON LARGER DIMENSION FOR ARCHED PIPE.

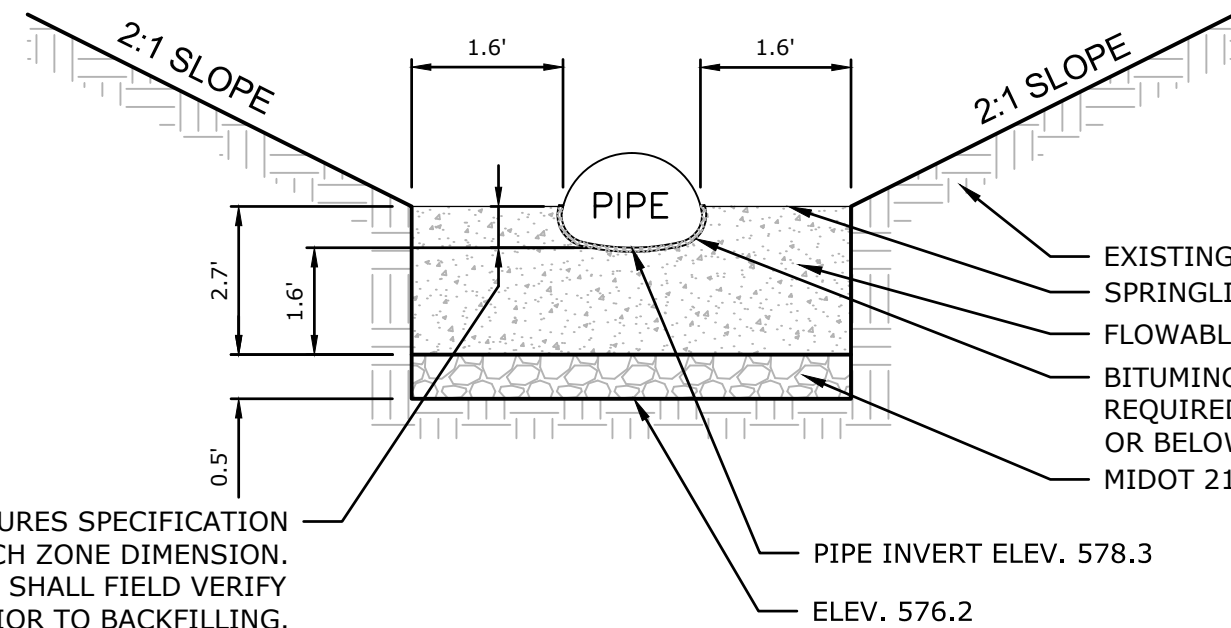
OUTLET AND RIP-RAP DETAIL

NOT TO SCALE



CULVERT ANCHOR

NO SCALE

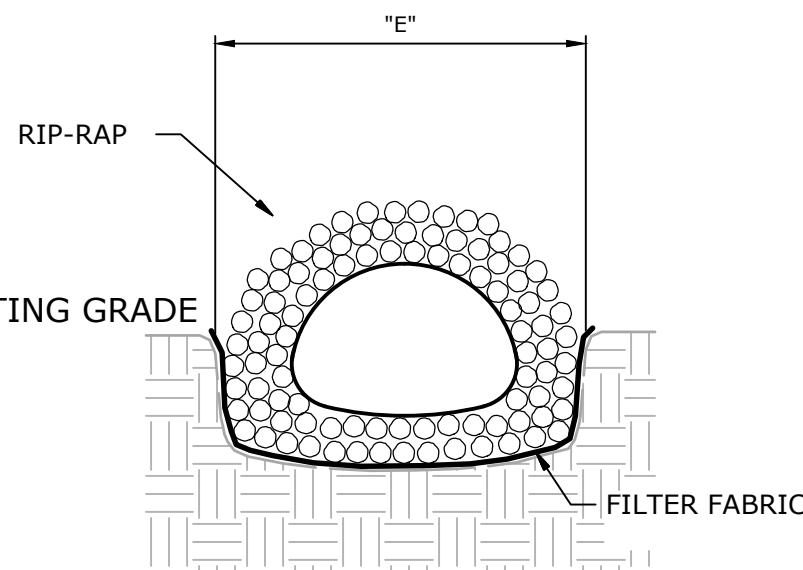


NOTES:

- CONTRACTOR SHALL SUBMIT BEDDING DETAIL TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION OF WATER CONTROL STRUCTURE.

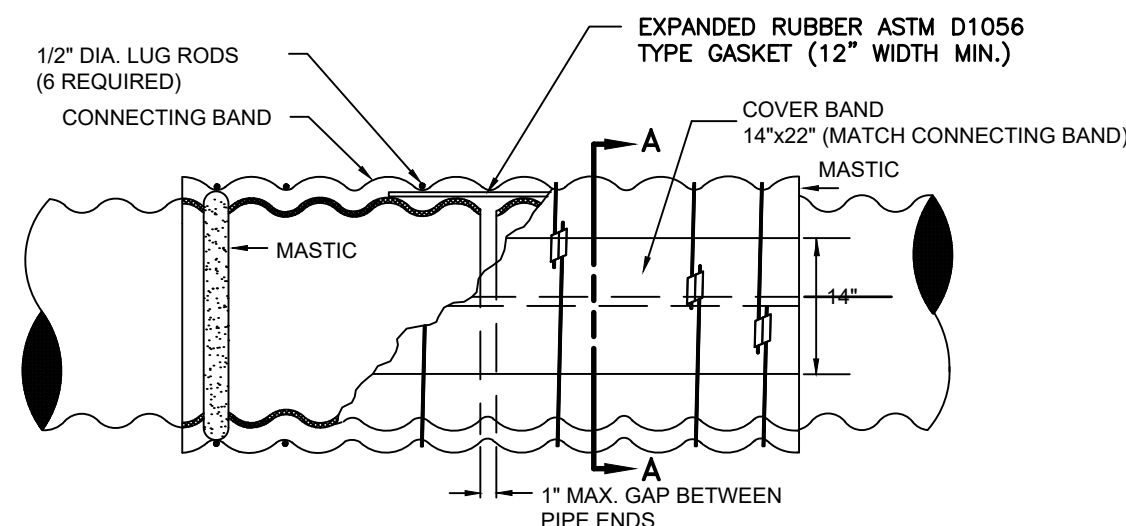
PIPE BEDDING AND BACKFILL DETAIL

NOT TO SCALE



SECTION B-B

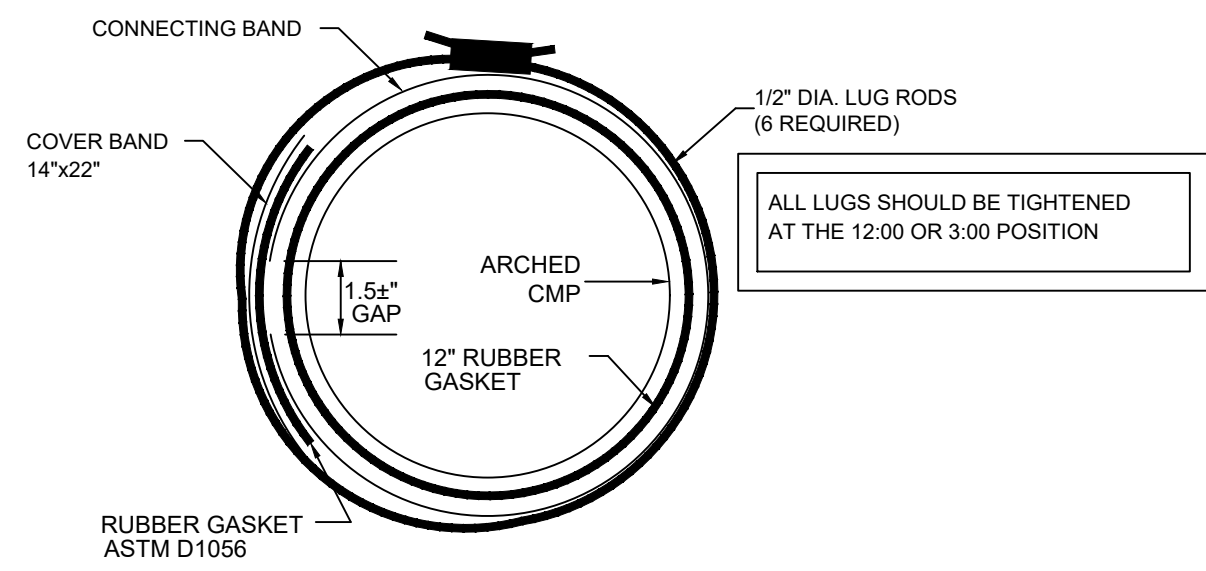
CLASS 1 ROCK			
PIPE Ø	D	E	Sq.Yds.
12"	5'	4'	4.2
15"	5'	4.25'	4.6
18"	5'	4.5'	5.1
21"	5.5'	5.75'	7.3
24"	6'	6'	8.1
27"	6.5'	6.25'	9.1
30"	7'	6.5'	10
36"	8'	7'	12
42"	9'	7.5'	14.1
48"	10'	8'	16.3
54"	12'	8.5'	19.5
60"	12.5'	9'	21.5



- NOTES:
- 6 inch BAND OVERLAP SHALL BE COATED WITH TAR PRIOR TO SECURING RODS.
 - A MASTIC SHALL BE PLACED ON EACH SIDE OF THE GASKET.
 - FOR ACCEPTABLE BANDING ALTERNATIVES, SEE D.U. SPECIFICATION 207.

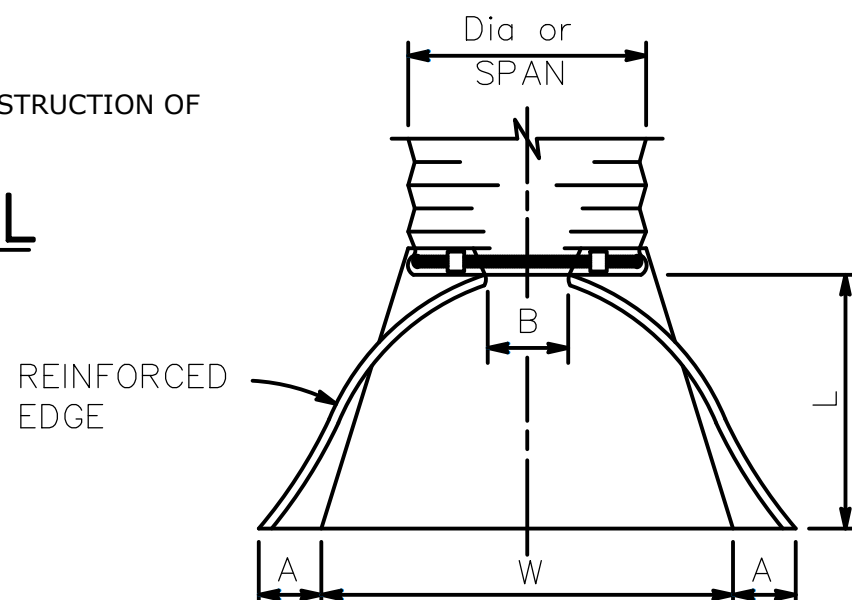
CONNECTING BAND DETAIL

NOT TO SCALE



SECTION A-A

NOT TO SCALE



PLAN

ARCHED PIPE						
PIPE SPAN	PIPE RISE	END SECTION THICKNESS	DIMENSION			
			A	B	L	W
57"	38"	0.109"	1'-2"	2'-2" (MAX)	5'-3"	7'-6"

NOTE:

- UPSTREAM AND DOWNSTREAM CMP PIPE OUTLET SHALL INCLUDE FLARED END SECTION.

FLARED END SECTION

NOT TO SCALE

AFFIX SEAL: DUCKS UNLIMITED, INC.

ON:

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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7322 NEWMAN BOULEVARD, BUILDING 1

DEXTER, MICHIGAN 48130

(734) 623-2000 www.ducks.org



CONSTRUCTION DETAILS

FERGUSON BAYOU

SHIAWASSEE NATIONAL

WILDLIFE REFUGE

SAGINAW COUNTY, MI

By

Date

Revisions

Sheet

Revision

CAD FILE:

MI-222-2_400 Construction Details

DESIGNED BY: BN

DRAWN BY: PL

SURVEYED BY: JD

BIOLOGIST: DC/KR

DATE:

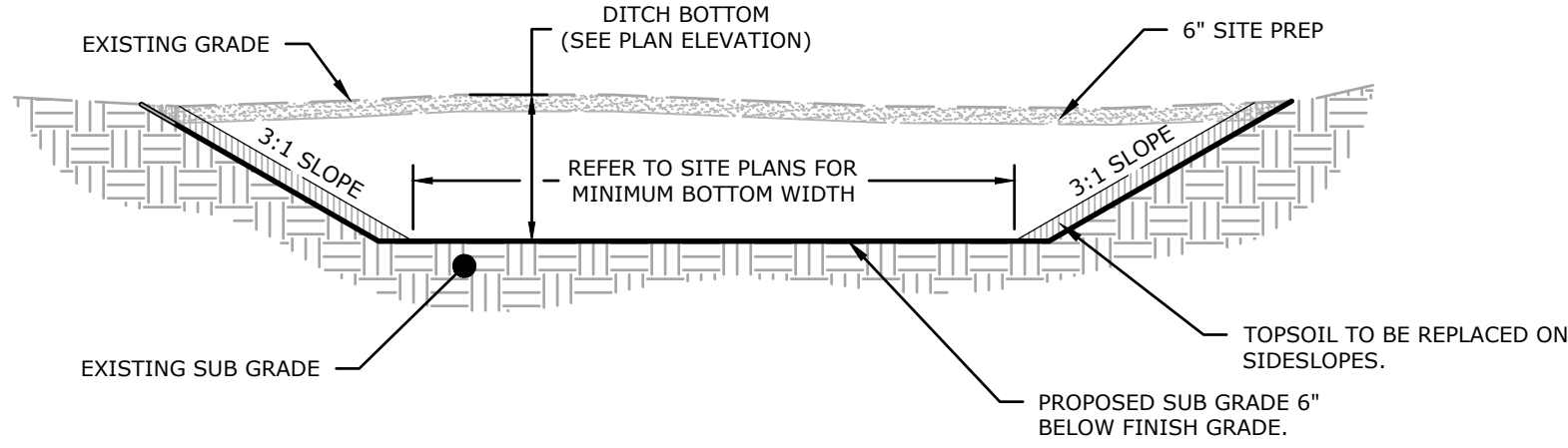
11/13/2018

PROJECT NUMBER:

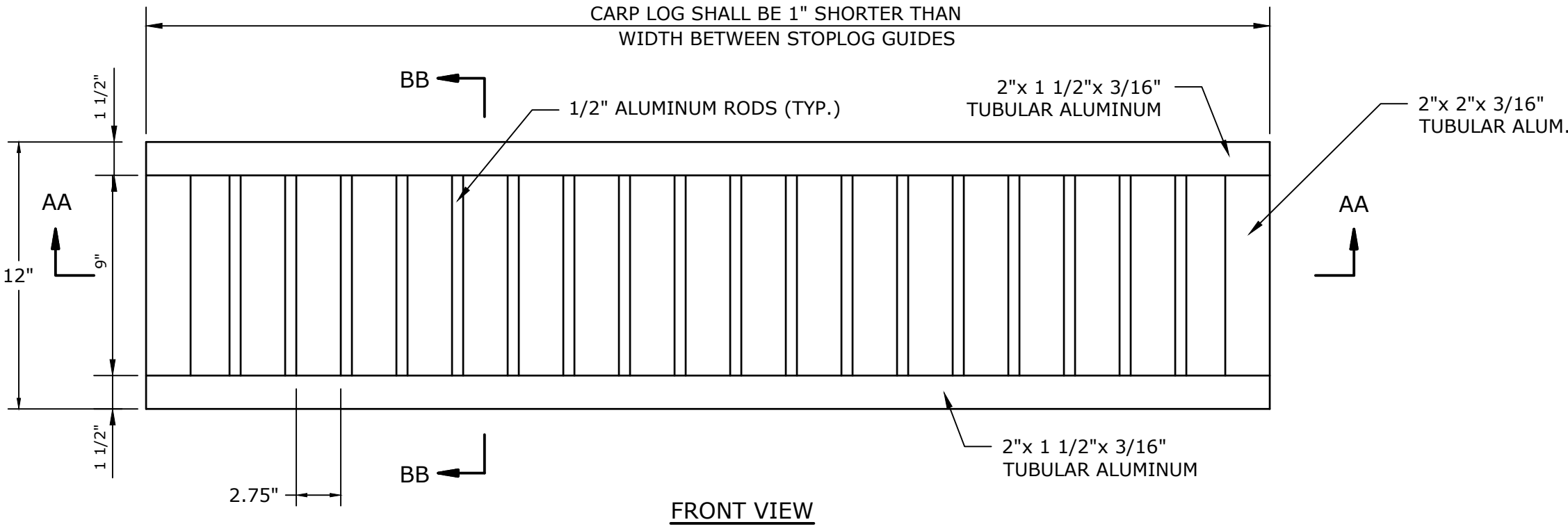
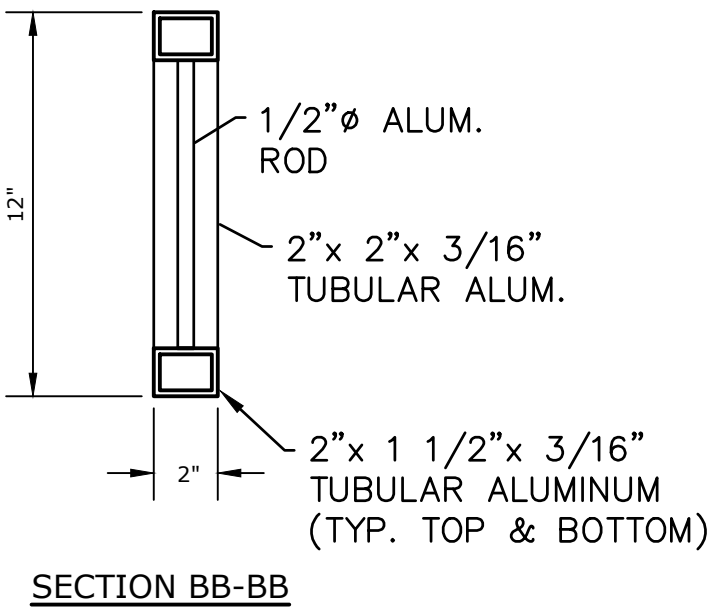
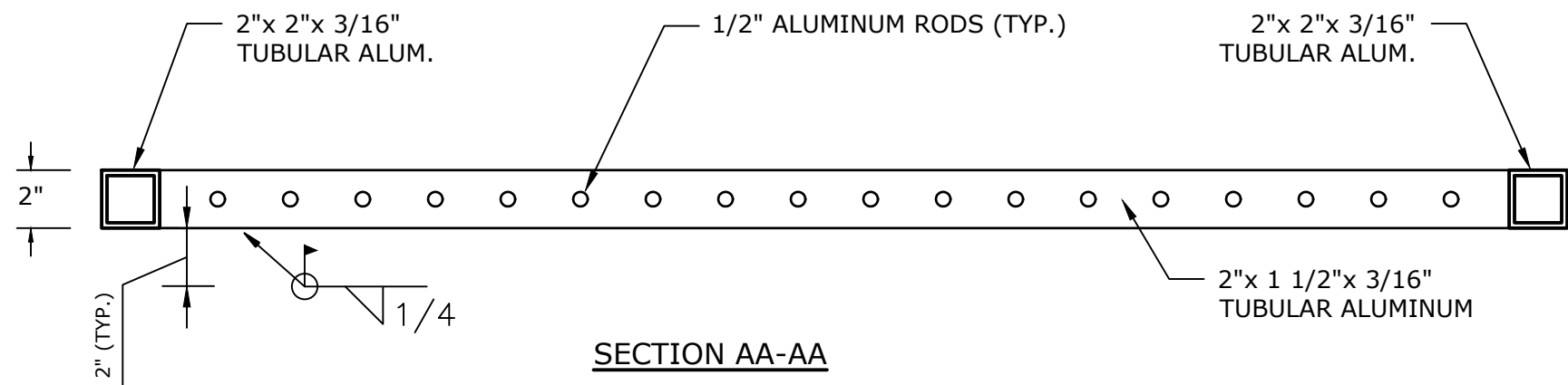
US-MI-222-2

GLARO-MI3-094-402

K:\glaro c3d projects\mi-222-2 Ferguson Bayou\C3d_drawing MI-222-2_400 Construction Details.dwg, 11/8/2019 12:56 PM, patrick lydon, 403 DETAILS, None



TYPICAL DITCH DETAIL
NOT TO SCALE



CARP LOG DETAIL (PINLESS)
N.T.S.

AFFIX SEAL: DUCKS UNLIMITED, INC.
ON:

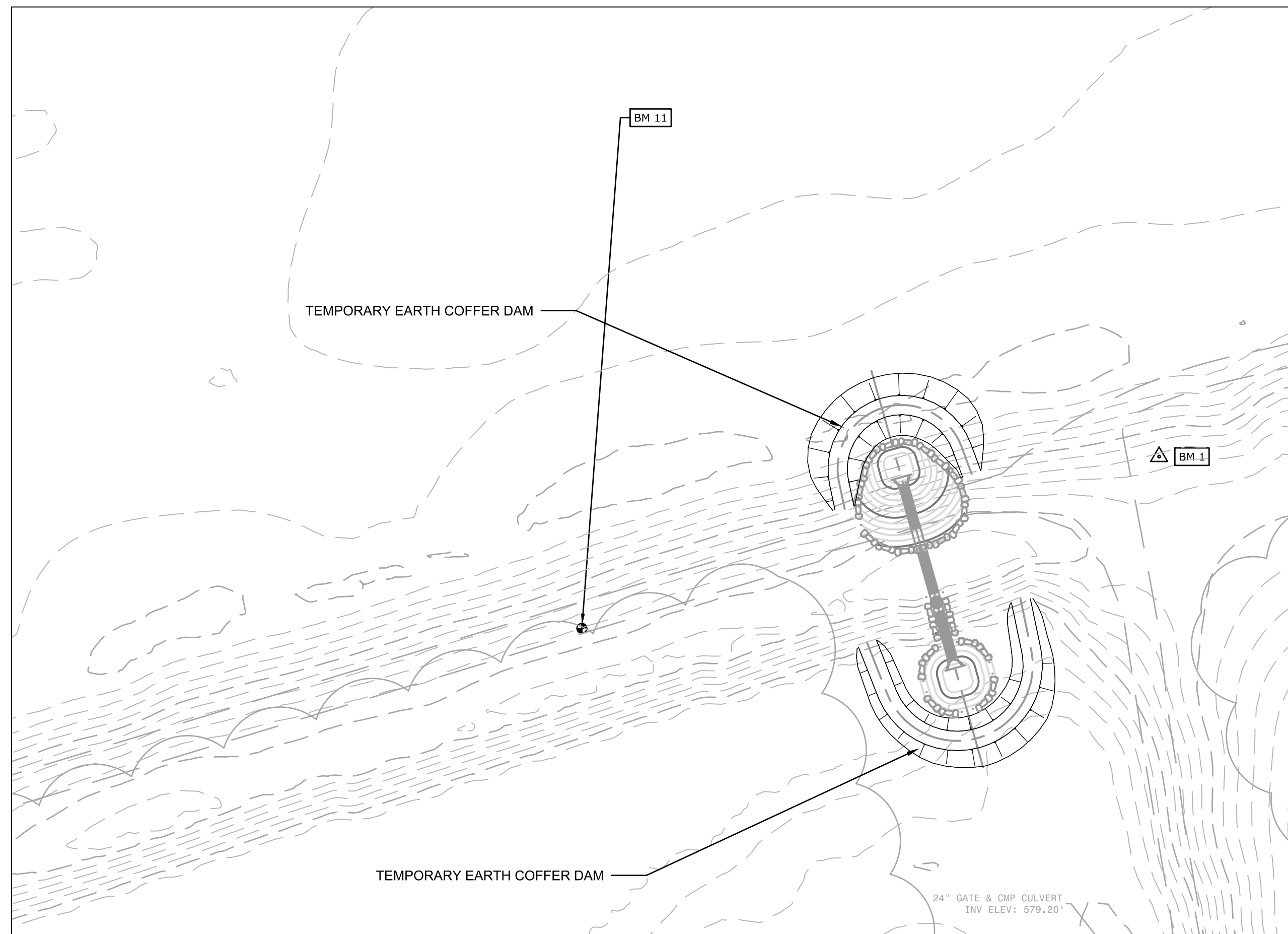
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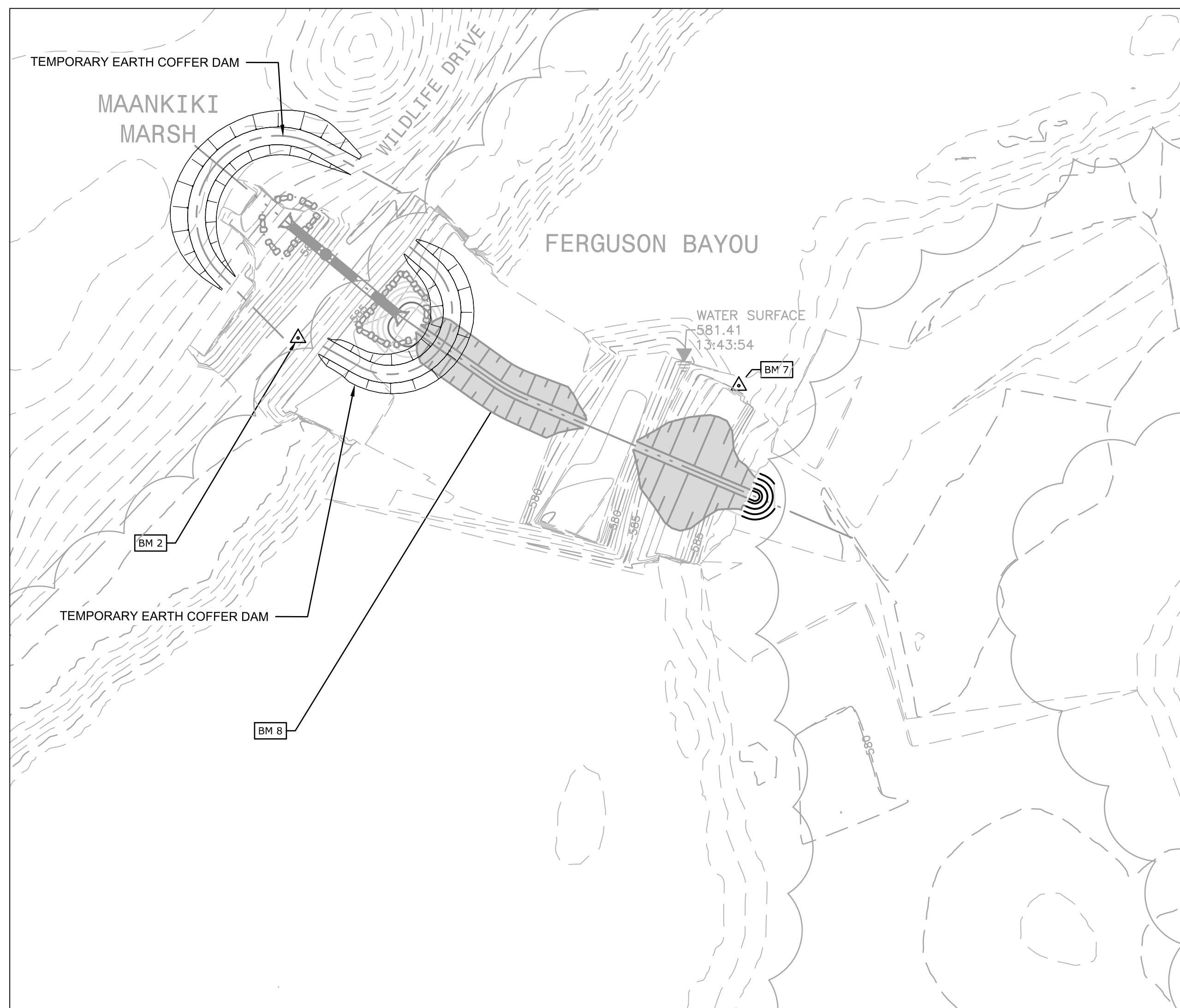
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Revision	Sheet	Revisions	Date	By

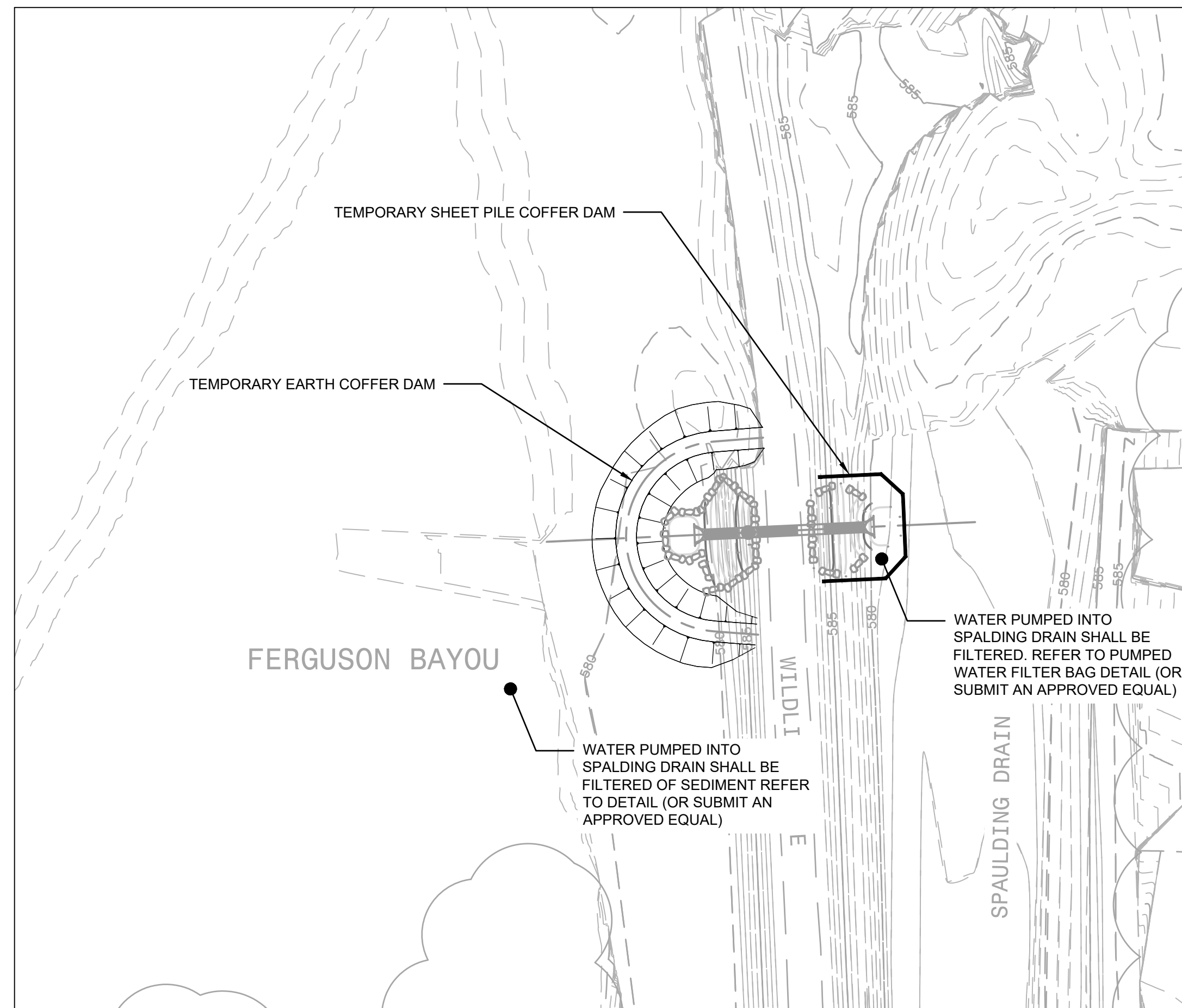
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BIOLOGIST:DC/KR
DATE: 11/13/2018
PROJECT NUMBER: US-MI-222-2
GLARO-MI3-094-403



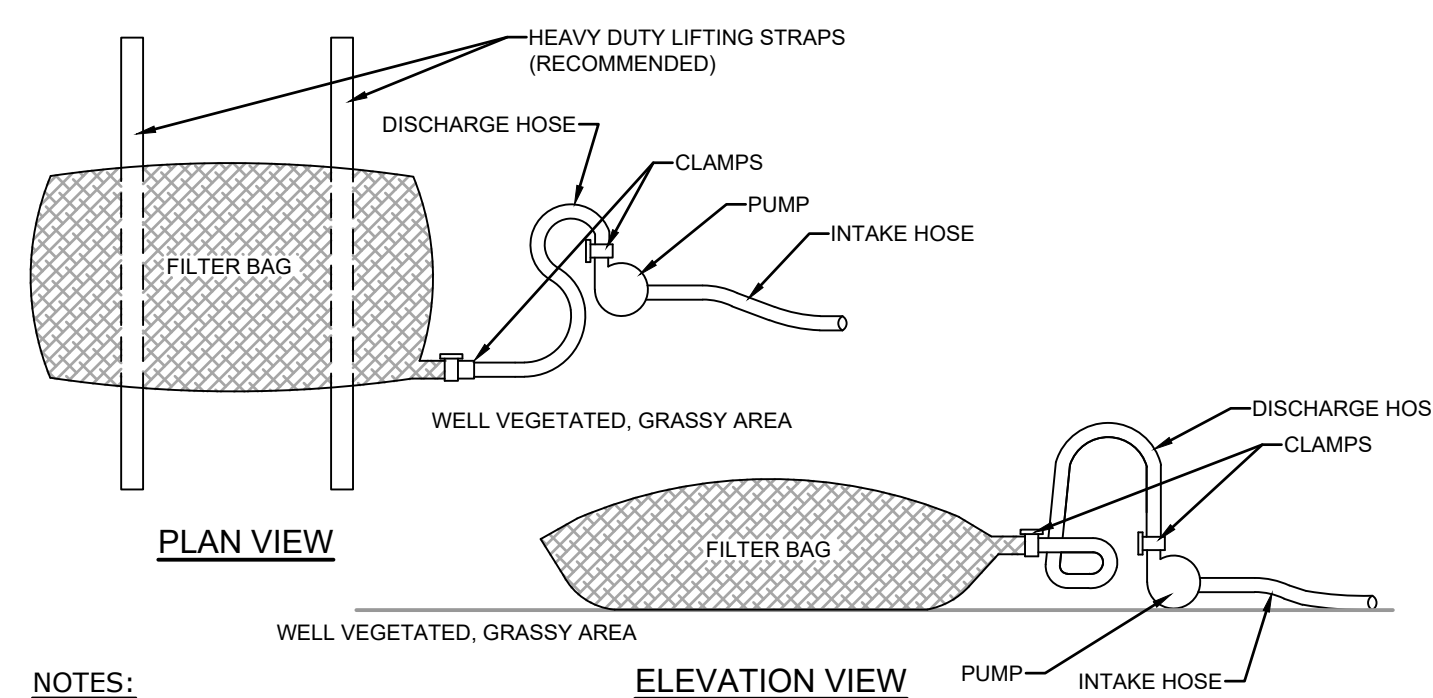
GREFE WATER CONTROL STRUCTURE



WATER CONSTROL STRUCTURE WEST & MAANKIKI FERGUSON DITCH CONNECTION



WATER CONTROL STRUCTURE NORTH



NOTES:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

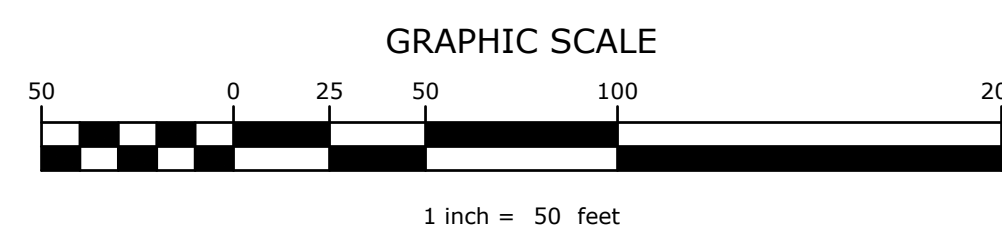
THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

PUMPED WATER FILTER BAG

NO SCALE



AFFIX SEAL: DUCKS UNLIMITED, INC.
ON:

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NOTICE: Construction site safety is the sole responsibility of the contractor. Ducks Unlimited, Inc. shall not assume any responsibility for the safety of the work performed, persons engaged in the work, nearby structures, or of other persons on-site.

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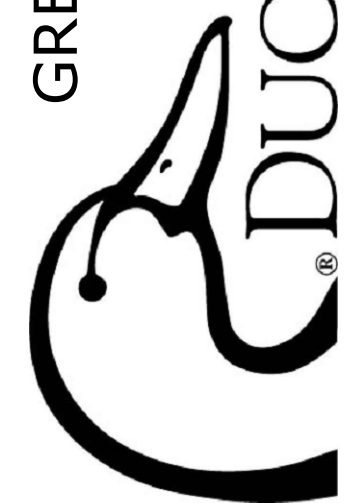
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GREAT LAKES/ATLANTIC REGIONAL OFFICE

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DUCKS UNLIMITED

STORM WATER POLLUTION
PREVENTION PLAN
FERGUSON BAYOU
SHIAWASSEE NATIONAL
WILDLIFE REFUGE
SAGINAW COUNTY, MI

[illegible]

CAD FILE: MI-222-500 SWPP	
DESIGNED BY: BN	
DRAWN BY: PL	
SURVEYED BY: JD	
BIOLOGIST: DC/KR	
DATE: 11/13/2018	
PROJECT NUMBER: US-MI-222-2	
GLARO-MI3-094-501	

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