PLAN SYMBOLS

EXISTING / PROPOSED	CENTERLINE
EXISTING / PROPOSED	RIGHT–OF–WAY LINE
CONSTRUCTION / PERMANENT	EASEMENT LINE
LOT / SECTION	PROPERTY LINE
	CONSTRUCTION LIMITS CLEAR ZONE
INTERMEDIATE INDEX / GRADE BREAK	EXISTING CONTOURS
INTERMEDIATE INDEX / GRADE BREAK	PROPOSED CONTOURS
EXISTING / PROPOSED / EXISTING COUNTY	DITCH LINE
X X X	FENCE LINE – ANY TYPE
	SILT FENCE
W W W	WETLAND BOUNDARY
FP FP FP	FLOOD PLAIN
TREE LINE / TREE SYMBOLS	EXISTING TREES (TO REMAIN)
X BM	BENCH MARK / IRON MONUMENT
	LIGHT POLE / BOLLARD
	SOIL BORING
	BUILDING
PROPOSED	RIPRAP
MB	MAILBOX
EXISTING / PROPOSED	SIGN

UTILITY SYMBOLS

GAS GAS	GAS LINE
PETRO PETRO	PETROLEUM LINE
OHE OHE / UGE UGE (OVERHEAD / UNDERGROUND)	ELECTRIC
T T T	UNDERGROUND TELEPHONE LINE
CATV CATV	UNDERGROUND CABLE TV LINE
FO FO (PRIVATE) / MnDOT FO MnDOT FO	UNDERGROUND FIBER OPTIC LINE
T MANHOLE / T JUNC. BOX	TELEPHONE STRUCTURES
X	ELECTRIC JUNC. BOX
TV	CABLE TV JUNC. BOX
F MANHOLE / F JUNC. BOX	FIBER OPTIC STRUCTURES
EXISTING	POWER POLE AND GUY WIRE
EXISTING / PROPOSED	STORM DRAIN LINE
EXISTING / PROPOSED	FLARED END SECTION
EXISTING / PROPOSED	CATCH BASIN
EXISTING / PROPOSED	MANHOLE
W	WELL

HATCH LEGEND

BITUMINOUS / CONCRETE	
GRAVEL / HYDROMULCH	EROSION CONTROL
GRAVEL / CONCRETE / BITUMINOUS	REMOVAL

PLOT DATE: 3/13/2024 14:25

MINNESOTA DEPARTMENT OF TRANSPORTATION

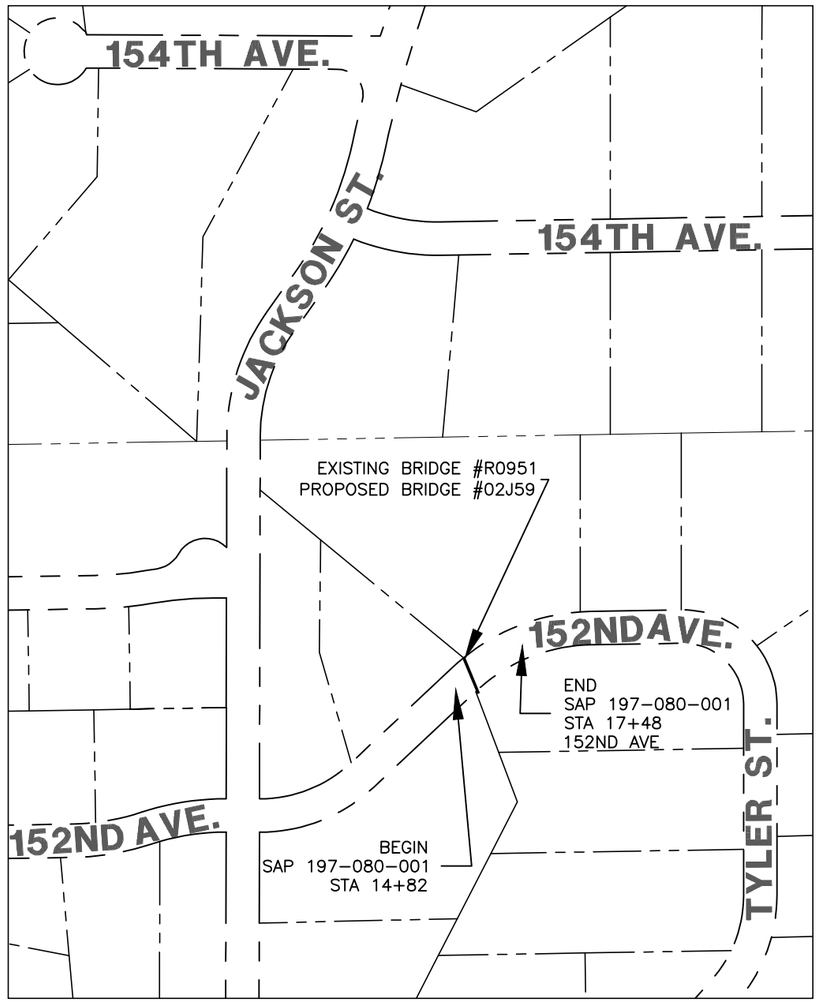
City of Ham Lake, Minnesota

CONSTRUCTION PLAN FOR GRADING, AGGREGATE BASE, PLANT MIXED BITUMINOUS SURFACE, BOX CULVERT AND ASPHALT CURB

LOCATED ON 152ND AVENUE FROM 482 FEET EAST OF JACKSON STREET TO 352 FEET WEST OF TYLER STREET

SAP 197–080–001

GROSS LENGTH	266 FEET	0.050	MILES
BRIDGES LENGTH	100 FEET	0.019	MILES
EXCEPTIONS LENGTH	0 FEET	0	MILES
NET LENGTH	266 FEET	0.050	MILES



PLAN REVISIONS		
DATE	SHEET NO.	APPROVED BY
3/11/24	16, 18–21	DAK

ADT (2022) 100 ADT (2043) 150
Design Speed 30 MPH
NO. OF TRAFFIC LANES 2 NO. OF PARKING LANES 0
FUNCTIONAL CLASSIFICATION COLLECTOR, LOW DENSITY
SOIL FACTOR 50% HCADT <150
TON DESIGN 7 TON
STOPPING SIGHT DISTANCE BASED ON:
HEIGHT OF EYE 3.5'
HEIGHT OF OBJECT 2.0'
Design Speed not achieved at:
STA. N/A TO STA. N/A

PROJECT LOCATION

ANOKA COUNTY
METRO DISTRICT

ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO THE MN MUTCD, INCLUDING FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38–02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

THE UTILITIES SHOWN ARE BASED UPON THE BEST INFORMATION AVAILABLE AND MAY NOT REFLECT THE ACTUAL EFFECTS ON THE UTILITIES BY CONSTRUCTION. ACTUAL DETERMINATIONS WILL BE MADE IN THE FIELD DURING CONSTRUCTION.

STATE AID PROJ. NO.	CHARGE	IDENTIFIER
197–080–001		

GOVERNING SPECIFICATIONS

THE 2020 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

INDEX

ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.

THIS PLAN CONTAINS 21 SHEETS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNED Dave Krugler
David A. Krugler
DATE: 03/06/24 REG. NO. 48768

APPROVED Dave Krugler DATE: 03/06/24
CITY ENGINEER – HAM LAKE

Lucas Lortie Digitally signed by Lucas Lortie Date: 2024.03.07 15:28:56 -06'00'
DISTRICT STATE AID ENGINEER: REVIEWED FOR COMPLIANCE WITH STATE AID RULES/POLICY 20 For

Lucas Lortie Digitally signed by Lucas Lortie Date: 2024.03.07 15:29:40 -06'00'
APPROVED FOR STATE AID FUNDING: STATE AID ENGINEER 20 For

RFC ENGINEERING, INC.
Consulting Engineers
13635 Johnson Street NE
Ham Lake, MN 55304
Telephone 763–862–8000
Fax 763–862–8042

JOB NO. 2302.038
FILE: 37–2–150

STATEMENT OF ESTIMATED QUANTITIES

NOTES	ITEM NO.	ITEM	UNIT	ENTIRE PROJECT	197-080-001	NON-PARTICIPATING
				ESTIMATED QUANTITIES	ESTIMATED QUANTITIES	ESTIMATED QUANTITIES
	2021.501	MOBILIZATION	LUMP SUM	1	1	
	2101.505	CLEARING	ACRE	0.1		0.1
	2101.505	GRUBBING	ACRE	0.1		0.1
7, 8	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH) DRIVEWAY	LIN FT	10		10
7, 8	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH) DRIVEWAY	LIN FT	24		24
	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	58		58
	2104.503	REMOVE PIPE CULVERTS	LIN FT	173		173
7, 8	2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	31		31
7, 8	2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	49		49
5	2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD	255		255
1, 3	2106.507	EXCAVATION - COMMON	CU YD	271		271
1	2106.507	GRANULAR EMBANKMENT (CV)	CU YD	263		263
	2211.509	AGGREGATE BASE CLASS 5	TON	88		88
7, 8	2211.604	AGGREGATE BASE (CV) CLASS 5 4.0" THICK-DRIVEWAY	SQ YD	49		49
7, 8	2360.504	TYPE SP 9.5 WEARING COURSE MIXTURE (2;C) 2.0" THICK-DRIVEWAY	SQ YD	49		49
	2360.509	TYPE SP 9.5 WEARING COURSE MIXTURE (2;C)	TON	23		23
	2360.509	TYPE SP 12.5 WEARING COURSE MIXTURE (2;C)	TON	31		31
1	2412.502	10X6 PRECAST CONCRETE BOX CULVERT END SECTION TYPE 1	EACH	1	1	
1	2412.502	10X6 PRECAST CONCRETE BOX CULVERT END SECTION TYPE 3, 30° SKEW	EACH	1	1	
1	2412.503	10X6 PRECAST CONCRETE BOX CULVERT	LIN FT	84	84	
7, 8	2531.504	6" CONCRETE DRIVEWAY PAVEMENT	SQ YD	31		31
	2535.503	BITUMINOUS CURB	LIN FT	161		161
	2563.601	TRAFFIC CONTROL	LUMP SUM	1	1	
6	2573.501	STABILIZED CONSTRUCTION EXIT	LUMP SUM	1		1
6	2573.502	STORM DRAIN INLET PROTECTION	EACH	2		2
6	2573.503	FLOTATION SILT CURTAIN TYPE MOVING WATER	LIN FT	50		50
	2575.504	ROLLED EROSION PREVENTION CATEGORY 20	SQ YD	501		501
2	2575.605	TURF ESTABLISHMENT	ACRE	0.2		0.2

PLATE NO.	STANDARD PLATES - RFC ENGINEERING (IN THE PLANS)
RFC-353B	BITUMINOUS CURB
RFC-363A1	PRIVATE DRIVEWAY/FIELD ENTRANCE
RFC-366E10BM	TYPICAL STREET SECTION - BROOK VIEW MEADOWS
RFC-654A	BOX CULVERT BEDDING AND PLASTIC SOIL CAP

BASIS FOR ESTIMATED QUANTITIES

AGGREGATE BASE	105 LBS/S.Y./INCH
BITUMINOUS MIXTURE	110 LBS/S.Y./INCH
TACK COAT	0.05 GAL./S.Y.
TYPE I OR 3 MULCH	2 TONS/ACRE

NOTES:

1. SELECT GRANULAR EMBANKMENT, STRUCTURAL EXCAVATION, AND GRANULAR BACKFILL FOR BOX CULVERT AND END SECTIONS IS INCIDENTAL.
2. ALL DISTURBED AREAS DETERMINED NOT TO BE PAVED, AGGREGATE SURFACE, CONCRETE SURFACE OR RIPRAPPED SHALL HAVE 4 INCHES OF TOPSOIL. FERTILIZER TYPE 2, MULCH MATERIAL TYPE 1 OR 3, AND SEED MIXTURE NO. 34-261 PER MnDOT STANDARD SPECIFICATION 3876. APPLY TYPE 1 OR 3 MULCH AT THE RATE OF 2 (TWO) TONS PER ACRE (TO ACHIEVE A 90% UNIFORM GROUND COVERAGE). SEED MIXTURE, WATER, TYPE 2 FERTILIZER, TYPE 1 OR 3 MULCH, AND DISK ANCHORING ARE INCIDENTAL. SOIL TESTING TO DETERMINE FERTILIZER MIXTURE RATIO AND RATE OF APPLICATION IS INCIDENTAL.
3. MATERIAL FOUND IN THE SUBCUTS THAT IS UNSUITABLE FOR FILL IN THE ROADBED SHALL BE REMOVED OFF-SITE.
4. THE CONTRACTOR SHALL NOT DISTURB AREAS OUTSIDE THE CONSTRUCTION LIMITS.
5. AVERAGE DEPTH OF EXISTING BITUMINOUS PAVEMENT IS 4.5".
6. MAINTENANCE AND REMOVAL ARE INCIDENTAL.
7. DRIVEWAYS ARE NOT TO BE DISTURBED WITHOUT ENGINEER'S APPROVAL.
8. DRIVEWAY REMOVAL AND INSTALLATION IS FOR BUDGETARY PURPOSES ONLY.

GOPHER STATE ONE CALL
800-252-1166 651-454-0002
PLOT DATE: 3/13/2024 14:25

UTILITIES:
CENTURYLINK (763) 712-5017
CENTERPOINT ENERGY (763) 323-2760
COMCAST (952) 607-4078
CONNEXUS ENERGY (763) 323-4268
XCEL ENERGY (612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

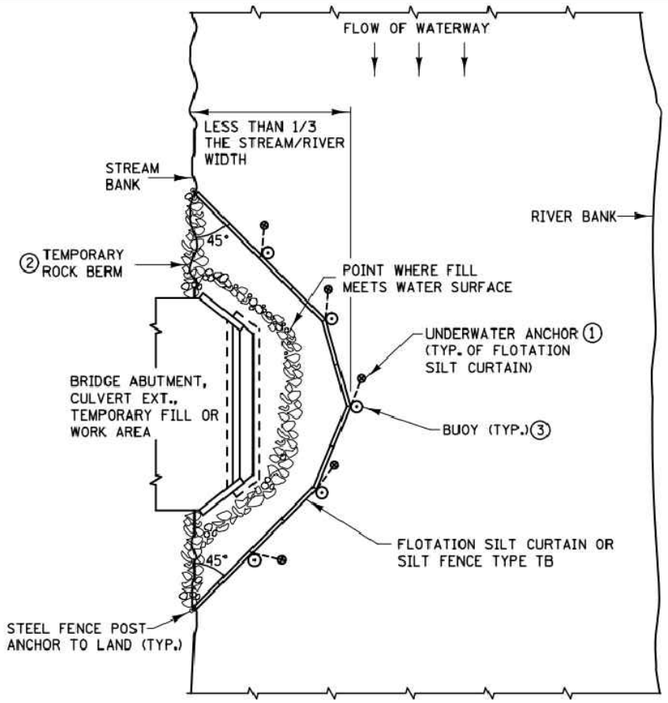
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
Dan Krueger
DATE 03/06/24 REG. NO. 48768

RFC ENGINEERING, INC.
Consulting Engineers
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

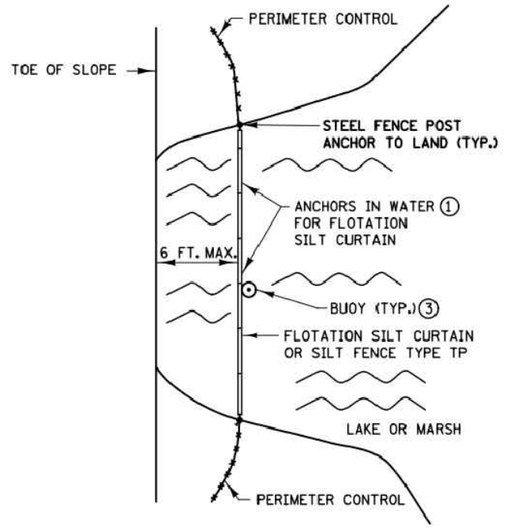
SAP - 197-080-001
COUNTY DITCH #58 CROSS CULVERT
STATEMENT OF ESTIMATED QUANTITIES

DESIGN BY: DAK DRAWN BY: JAB CHECKED: TPC

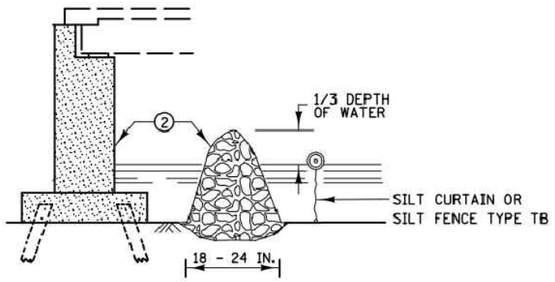
DWG: 2302.038 QTY
DATE: 03/06/24
JOB NUMBER: 2302.038
SHEET: 2 OF 21
FILE: 37-2-151



PLAN VIEW FOR STREAM ⑤



PLAN VIEW FOR LAKE OR MARSH ⑤



TEMPORARY ROCK BERM
FOR SEDIMENT CONTROL

INSTALLATION GUIDELINES
SILT FENCE TYPE TB

MINIMUM WATER DEPTH: 1 FT.
MAXIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER VELOCITY: 5 FT./SEC.

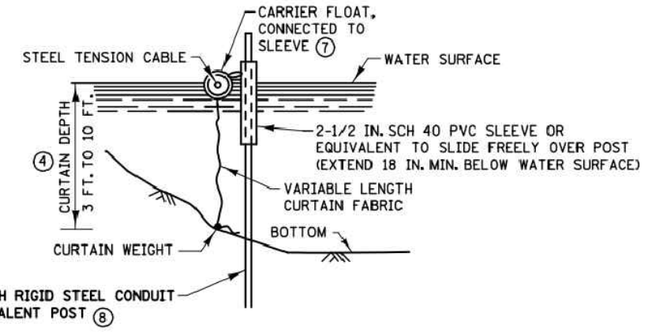
INSTALLATION GUIDELINES ④
FLOTATION SILT CURTAIN
TYPE: STILL WATER

MINIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER DEPTH: 10 FT.
MAXIMUM WATER VELOCITY: 2 FT./SEC.
MAXIMUM WAVE HEIGHT: 1 FT

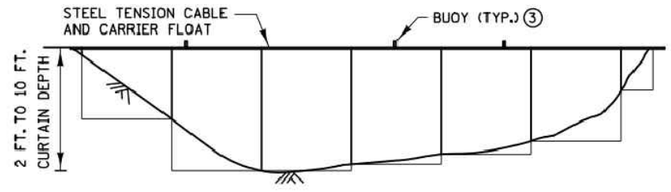
INSTALLATION GUIDELINES ④
FLOTATION SILT CURTAIN
TYPE: MOVING WATER

MINIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER DEPTH: 10 FT.
MAXIMUM WATER VELOCITY: 5 FT./SEC.
MAXIMUM WAVE HEIGHT: 2 FT.

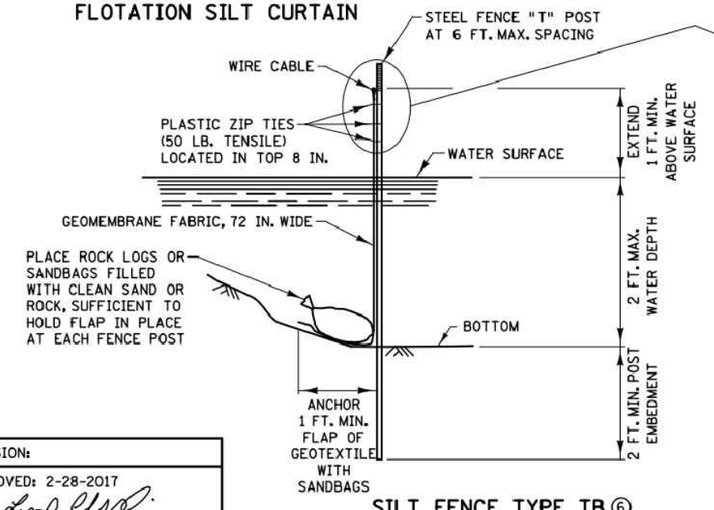
FLOTATION SILT CURTAIN



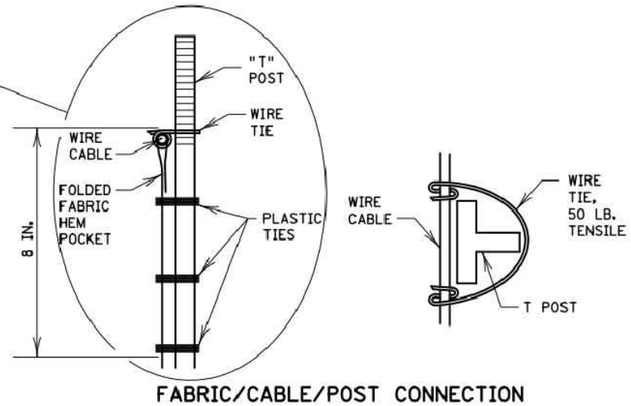
ALTERNATE FLOTATION SILT CURTAIN



FRONT VIEW FOR FLOTATION SILT CURTAIN



SILT FENCE TYPE TB ⑥



FABRIC/CABLE/POST CONNECTION

NOTES:

SEE SPECS. 2573, 3886, 3887 & 3893.

① FOR ANCHOR SPACING AND WEIGHT REQUIREMENTS, SEE SPEC. 2573.

② IN AREAS WHERE THE PLAN CALLS FOR RIPRAP AT A BRIDGE, CULVERT, OR SLOPE, A TEMPORARY ROCK BERM CONSTRUCTED FROM THE RIPRAP CAN BE USED TO PROVIDE ADDITIONAL PROTECTION. WHEN THE WORK IS COMPLETE THE RIPRAP CAN THEN BE MOVED TO THE PERMANENT LOCATION INDICATED IN THE PLANS. THE TEMPORARY ROCK BERM IS INCIDENTAL.

③ ON U.S. COAST GUARD OR OTHER MOTORIZED WATERWAYS, BUOYS ARE REQUIRED TO MARK THE ENDS AND SPECIAL AREAS FOR VISIBILITY. PLACE BUOYS AS REQUIRED FOR NAVIGATIONAL PURPOSES.

④ MINIMUM WATER DEPTH APPLIES TO THE DEEPEST POINT ALONG THE FLOTATION SILT CURTAIN OR SILT FENCE TYPE TB FOR DETERMINING APPLICABILITY OF FLOTATION SILT CURTAIN OR SILT FENCE TYPE TB.

⑤ SILT CURTAIN SHOULD BE REMOVED WHEN THE AREA CONTRIBUTING DIRECT RUNOFF HAS BEEN TEMPORARILY OR PERMANENTLY STABILIZED. SILT CURTAIN SHOULD ALSO BE REMOVED BEFORE WINTER IF ICE UP OR ICE FLOW IS ANTICIPATED.

⑥ EMBED POST INTO BOTTOM A MINIMUM OF 40% OF THE WATER DEPTH (INCLUDING WAVE HEIGHT), BUT IN NO CASE SHALL EMBEDMENT BE LESS THAN 2 FEET.

⑦ ANCHOR FLOAT MUST BE CONNECTED SECURELY TO SLEEVE WITH A MINIMUM TENSILE STRENGTH OF 100 LBS. CONNECTION METHOD MUST ALLOW FOR SLEEVE TO MOVE FREELY ON POST.

⑧ PROVIDE SUFFICIENT NUMBER OF POST ANCHORS TO MAINTAIN SILT CURTAIN POSITION.

REVISION:

APPROVED: 2-28-2017
CHIEF ENVIRONMENTAL OFFICER

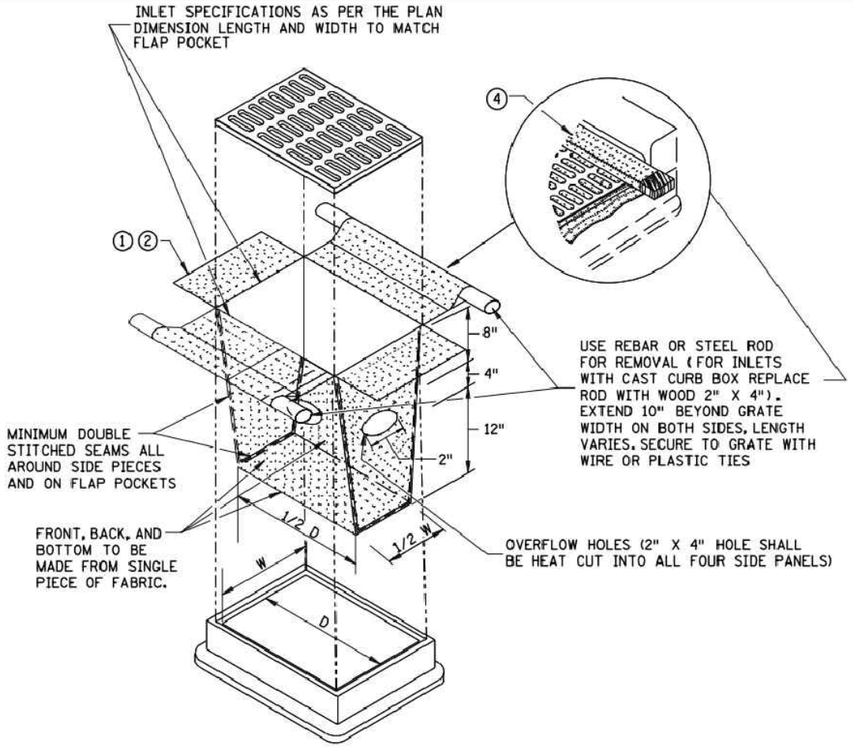
MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.405 | 1 OF 8

APPROVED: 2-28-2017
REVISED:
STATE DESIGN ENGINEER

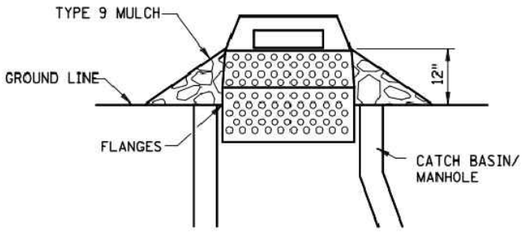
TEMPORARY SEDIMENT CONTROL
SILT CURTAIN OR SILT FENCE TYPE TB

STATE PROJ. NO. 197-080-001 (T.H.) SHEET NO. 3 OF 21 SHEETS



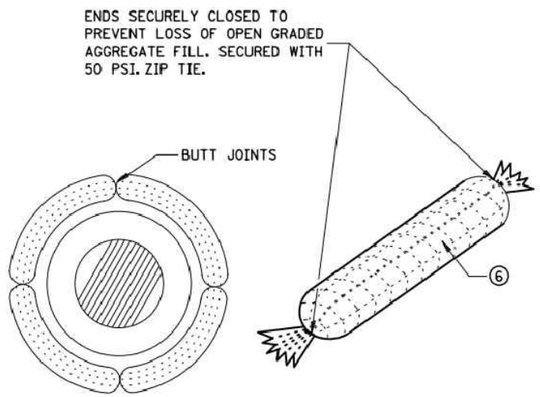
FILTER BAG INSERT ③

(CAN BE INSTALLED IN ANY INLET TYPE
WITH OR WITHOUT A CURB BOX)

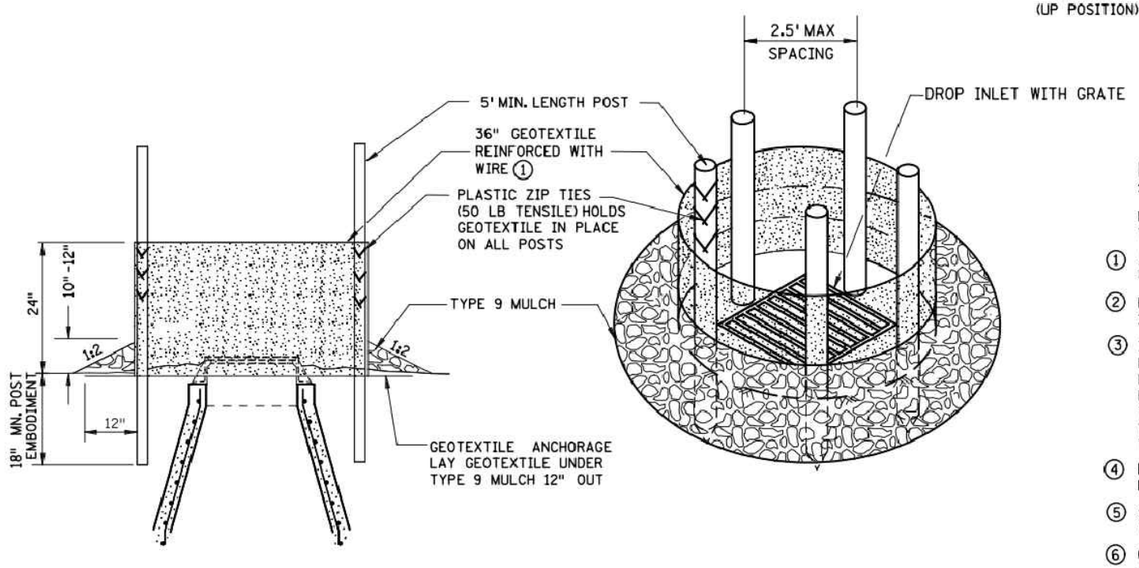


SEDIMENT CONTROL INLET HAT

NOTE:
THE SEDIMENT CONTROL BARRIER SHALL BE A METAL OR PLASTIC/POLYETHYLENE RISER SIZED TO FIT INSIDE THE CATCH BASIN/MANHOLE; HAVE PERFORATIONS TO ALLOW FOR WATER INFILTRATION; HAVE AN OVERFLOW OPENING, FLANGES AND A LID/COVER.

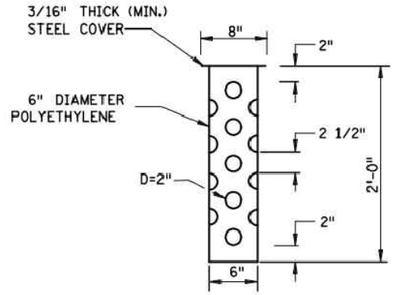


ROCK LOG/COMPOST LOG

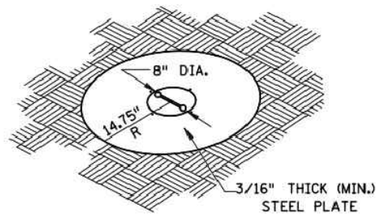


SILT FENCE RING AND ROCK FILTER BERM

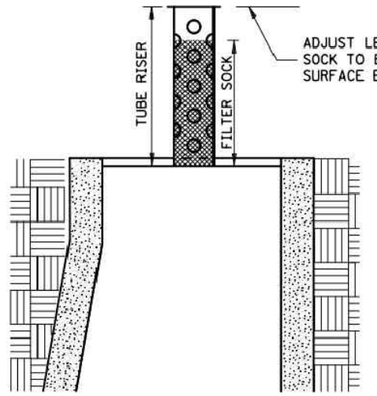
USE WHERE INLET DRAINS IN AN AREA WITH SLOPES AT 1:3 or LESS



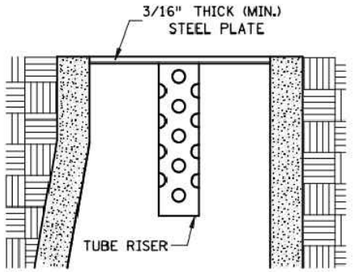
TUBE RISER



PERSPECTIVE VIEW



SECTION
(UP POSITION)



SECTION
(DOWN POSITION)

POP-UP HEAD

NOTES:
SEE SPECS. 2573, 3137, & 3886.

DEVICES MUST BE ADJUSTED ACCORDINGLY AS TO NOT CAUSE FLOODING ON ROADWAY THAT WOULD IMPEED TRAFFIC FLOW.

① ALL GEOTEXTILE USED FOR INLET PROTECTION SHALL BE MONOFILAMENT IN BOTH DIRECTIONS, MEETING SPEC. 3886.

② FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED SHALL EXTEND A MINIMUM OF 10 INCHES AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

③ INSTALLATION NOTES:
DO NOT PLACE FILTER BAG INSERT IN INLETS SHALLOWER THAN 30 INCHES, MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE. THE PLACED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE OF 3 INCHES BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES. WHERE NECESSARY THE CONTRACTOR SHALL CLINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3 INCH SIDE CLEARANCE.

④ FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2 INCH X 4 INCH OR USE A ROCK SOCK OR SAND BAGS IN PLACE OF THE FLAP POCKETS.

⑤ SOCK HEIGHT MUST NOT BE SO HIGH AS TO SLOW DOWN WATER FILTRATION TO CAUSE FLOODING OF THE ROADWAY.

⑥ GEOTEXTILE SOCK BETWEEN 4-10 FEET LONG AND 4-6 INCH DIAMETER. SEAM TO BE JOINED BY TWO ROWS OF STITCHING WITH A PLASTIC MESH BACKING OR PROVIDE A HEAT BONDED SEAM (OR APPROVED EQUIVALENT). FILL ROCK LOG WITH OPEN GRADED AGGREGATE CONSISTING OF SOUND DURABLE PARTICLES OF COARSE AGGREGATE CONFORMING TO SPEC. 3137 TABLE 3137-1; CA-3 GRADATION.

REVISION:

APPROVED: 2-28-2017
CHIEF ENVIRONMENTAL OFFICER

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.405 | 4 OF 8

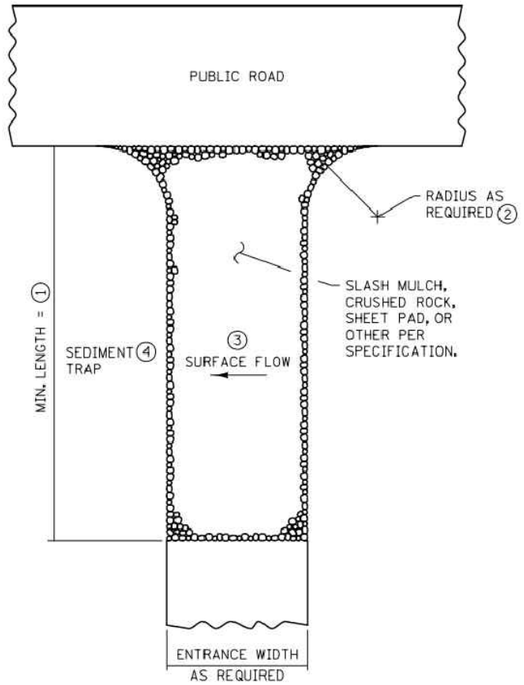
APPROVED: 2-28-2017
REVISED:

STATE DESIGN ENGINEER

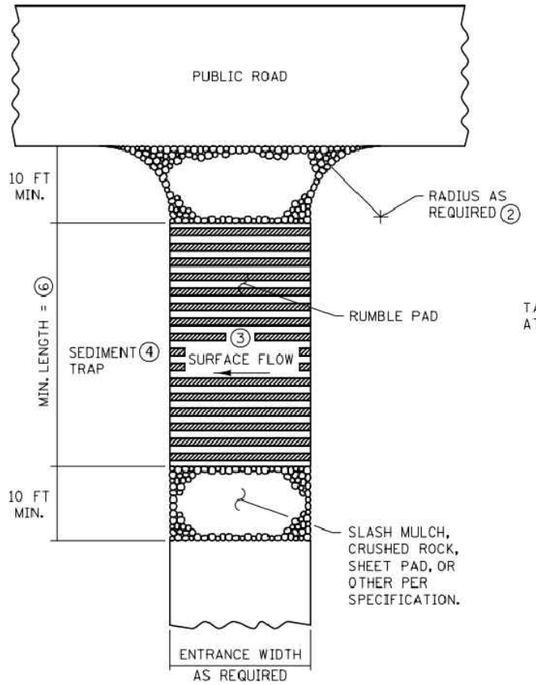
TEMPORARY SEDIMENT CONTROL

STORM DRAIN INLET PROTECTION

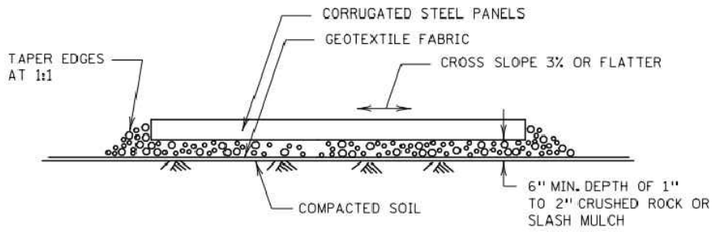
STATE PROJ. NO. 197-080-001 (T.H.) SHEET NO. 4 OF 21 SHEETS



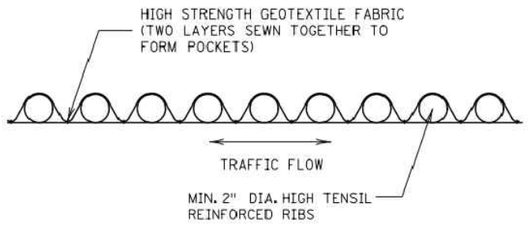
SLASH MULCH, CRUSHED ROCK, OR SHEET PAD CONSTRUCTION EXIT ⑤⑦



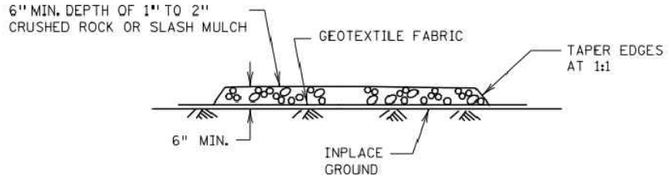
RUMBLE PAD CONSTRUCTION EXIT ⑤⑦



RUMBLE PAD



SHEET PAD



SLASH MULCH OR CRUSHED ROCK

NOTES:

SEE SPECS. 2573 & 3882.

① MINIMUM LENGTH SHALL BE THE GREATER OF 50 FEET OR A LENGTH SUFFICIENT TO ALLOW A MINIMUM OF 5 TIRE ROTATIONS ON THE PROVIDED PAD. MINIMUM LENGTH SHALL BE CALCULATED USING THE LARGEST TIRE WHICH WILL BE USED IN TYPICAL OPERATIONS.

② PROVIDE RADIUS OR WIDEN PAD SUFFICIENTLY TO PREVENT VEHICLE TIRES FROM TRACKING OFF OF PAD WHEN LEAVING SITE.

③ IF RUNOFF FROM DISTURBED AREAS FLOWS TOWARD CONSTRUCTION EXITS, PREVENT RUNOFF FROM DRAINING DIRECTLY TO PUBLIC ROAD OVER CONSTRUCTION EXIT BY CROWNING THE EXIT OR SLOPING TO ONE SIDE. IF SURFACE GRADING IS INSUFFICIENT, PROVIDE OTHER MEANS OF INTERCEPTING RUNOFF.

④ IF RUNOFF FROM CONSTRUCTION EXITS WILL DRAIN OFF OF PROJECT SITE, PROVIDE SEDIMENT TRAP WITH STABILIZED OVERFLOW.

⑤ IF A TIRE WASH OFF IS REQUIRED THE CONSTRUCTION EXITS SHALL BE GRADED TO DRAIN THE WASH WATER TO A SEDIMENT TRAP.

⑥ MINIMUM LENGTH OF RUMBLE PAD SHALL BE 20 FEET, OR AS REQUIRED TO REMOVE SEDIMENT FROM TIRES. IF SIGNIFICANT SEDIMENT IS TRACKED FROM THE SITE, THE RUMBLE PAD SHALL BE LENGTHENED OR THE DESIGN MODIFIED TO PROVIDE ADDITIONAL VIBRATION. WASH-OFF LENGTH SHALL BE AS REQUIRED TO EFFECTIVELY REMOVE CONSTRUCTION SEDIMENT FROM VEHICLE TIRES.

⑦ MAINTENANCE OF CONSTRUCTION EXITS SHALL OCCUR WHEN THE EFFECTIVENESS OF SEDIMENT REMOVAL HAS BEEN REDUCED. MAINTENANCE SHALL CONSIST OF REMOVING SEDIMENT AND CLEANING THE MATERIALS OR PLACING ADDITIONAL MATERIAL (SLASH MULCH OR CRUSHED ROCK) OVER SEDIMENT FILLED MATERIAL TO RESTORE EFFECTIVENESS.

REVISION:

APPROVED: 2-28-2017

CHIEF ENVIRONMENTAL OFFICER

MINNESOTA DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

STANDARD PLAN 5-297.405 | 5 OF 8

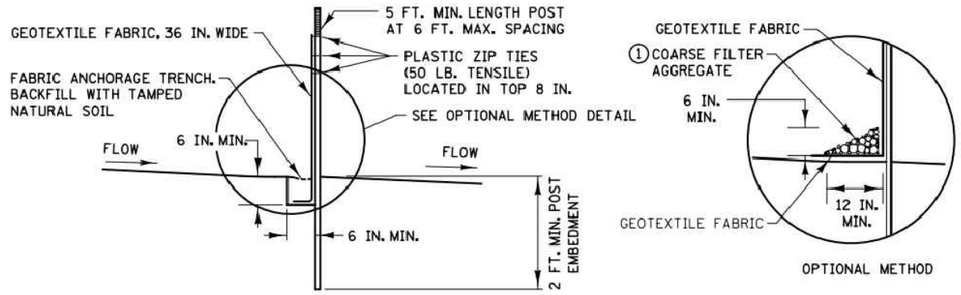
APPROVED: 2-28-2017

REVISED:

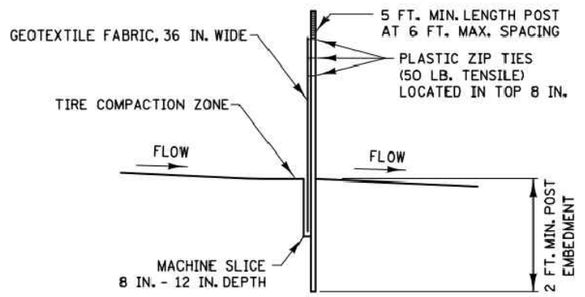
TEMPORARY SEDIMENT CONTROL

STABILIZED CONSTRUCTION EXIT

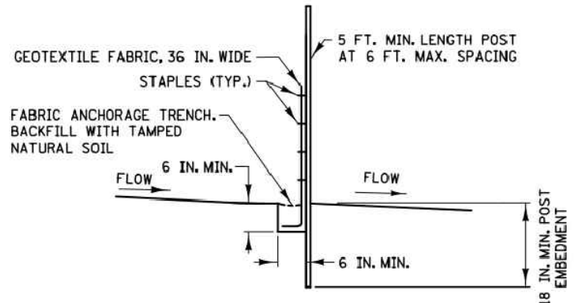
STATE PROJ. NO. 197-080-001 (T.H.) SHEET NO. 5 OF 21 SHEETS



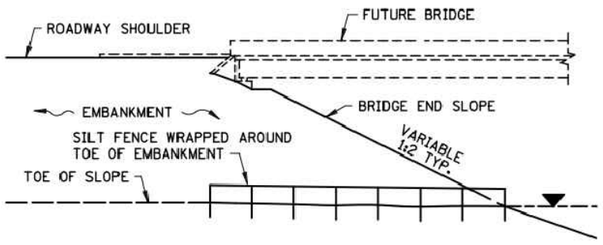
SILT FENCE TYPE HI ②
(HAND INSTALLED)



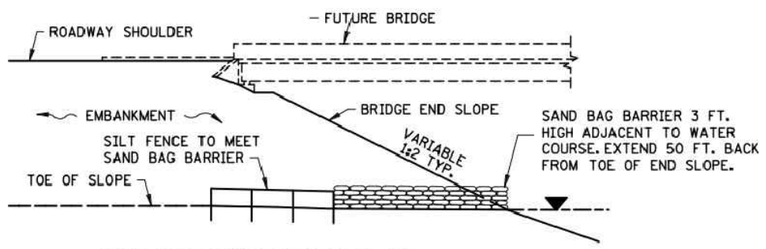
SILT FENCE TYPE MS ②
(MACHINE SLICED)



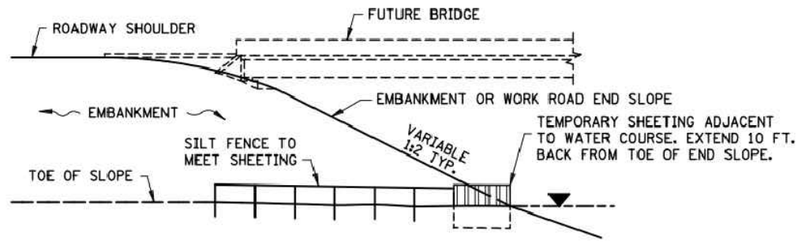
SILT FENCE TYPE PA ③
(PREASSEMBLED)



SILT FENCE ONLY ④

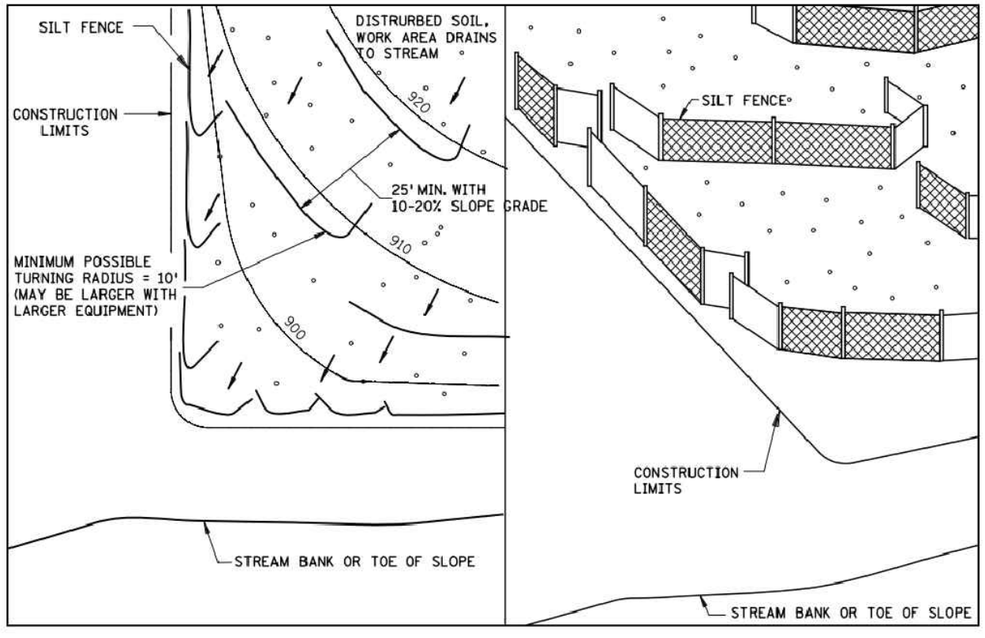


SILT FENCE WITH SAND BAGS ⑤



SILT FENCE WITH SHEETING ⑥

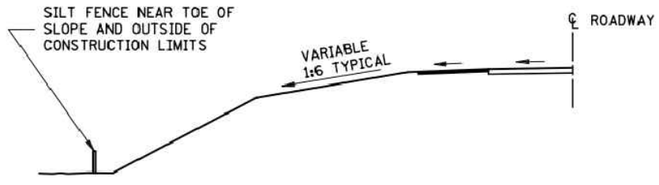
INSTALLATION AT BRIDGE EMBANKMENT ADJACENT TO WATER



PLAN VIEW

PERSPECTIVE VIEW

J-HOOK INSTALLATION



LOCATION AT TOE OF ROADWAY EMBANKMENT

NOTES:

SEE SPECS. 2573, 3149 & 3886.

① COARSE FILTER AGGREGATE (SPEC. 3149) SHALL BE INCIDENTAL.

② TO PROTECT AREAS FROM SHEET FLOW. MAXIMUM CONTRIBUTING AREA: 1 ACRE.

③ TO PROTECT AREAS FROM SHEET FLOW. MAXIMUM CONTRIBUTING AREA: 0.25 ACRE.

④ WATER COURSE FLOW VELOCITY: STANDING.
CONTRIBUTING SLOPE AREA: 1./2 ACRE.

⑤ WATER COURSE FLOW VELOCITY: 1 TO 7 FT./SEC.
CONTRIBUTING SLOPE AREA: 1. ACRE.

⑥ WATER COURSE FLOW VELOCITY: 8 TO 15 FT./SEC.
CONTRIBUTING SLOPE AREA: 3 ACRES.

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CHIEF ENVIRONMENTAL OFFICER

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.405 | 6 OF 8

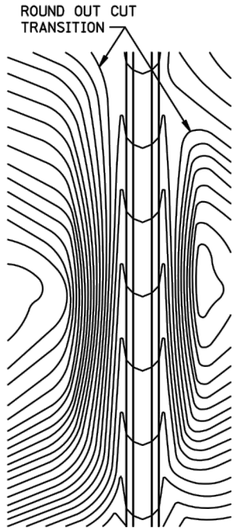
APPROVED: 2-28-2017
REVISED:

STATE DESIGN ENGINEER

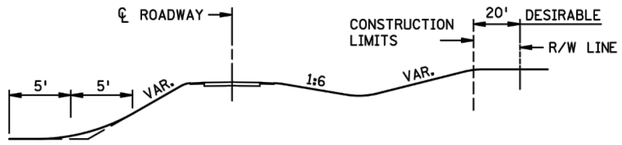
TEMPORARY SEDIMENT CONTROL

SILT FENCE

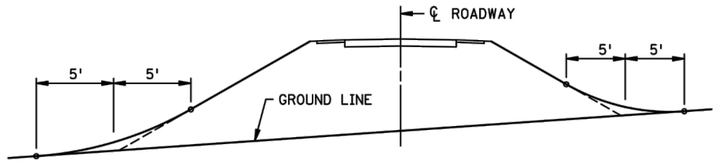
STATE PROJ. NO. 197-080-001 (T.H.) SHEET NO. 6 OF 21 SHEETS



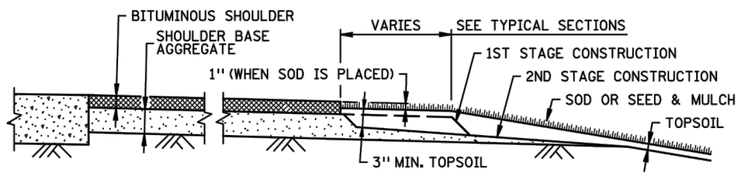
CONTOURING ROAD CUTS



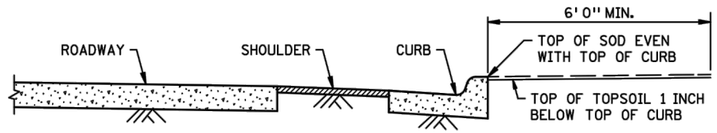
ROUNDING SHOULDERS AND BACKSLOPES



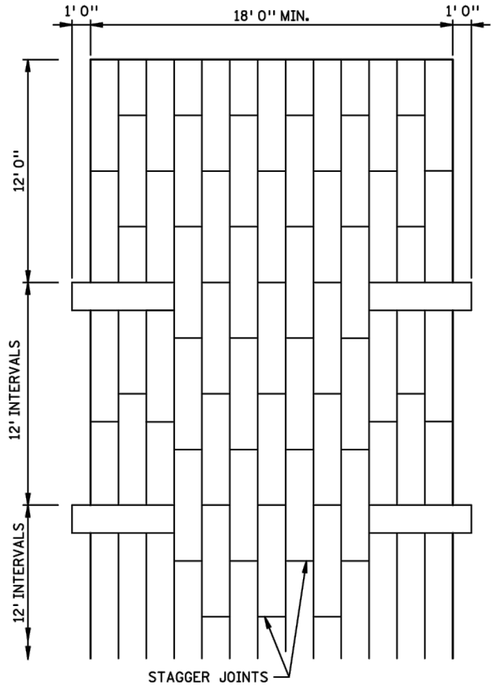
SHAPING FOR DRAINAGE ALONG THE TOE OF FILL SLOPES



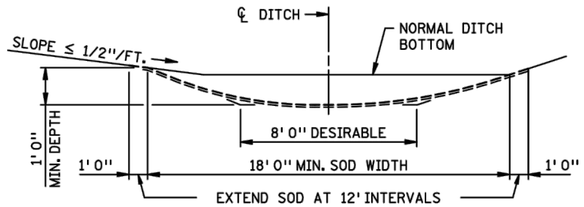
SHAPING AND TOPSOILING INSLOPES



SHAPING ADJACENT TO CURBS WHEN SOD IS PLACED

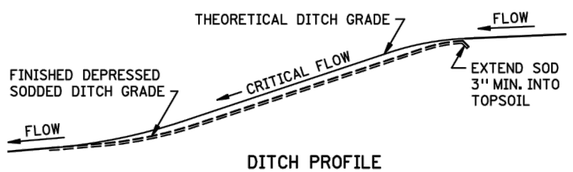


PLAN VIEW



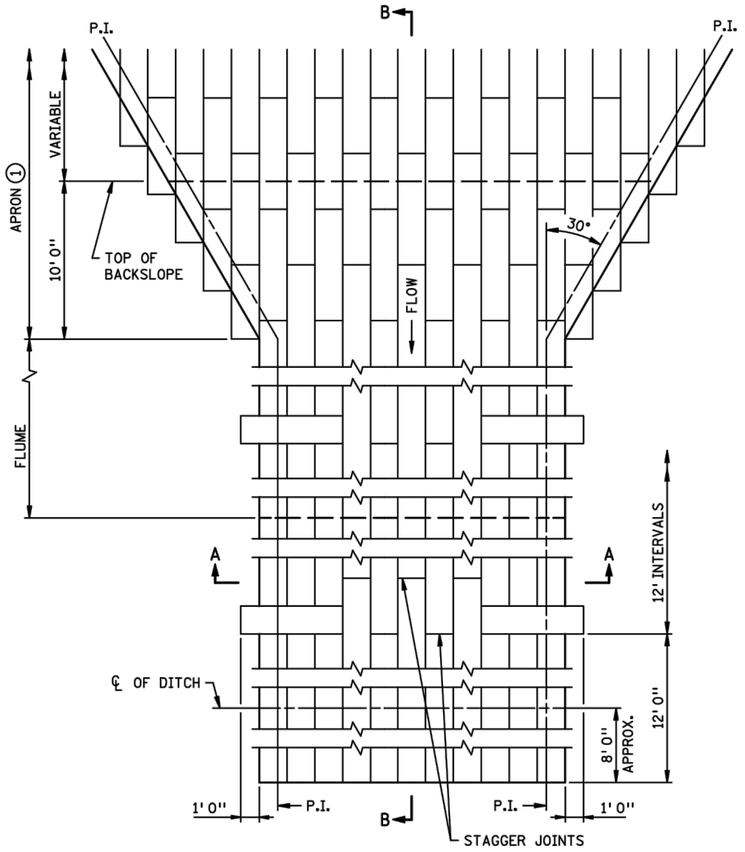
SODDED DITCH CROSS SECTION

WHERE FRONT OR BACK SLOPE IS FLAT (LESS THAN 1/2"/FT.), FIRST NOTCH DITCH AND THEN PROVIDE ROUNDING.

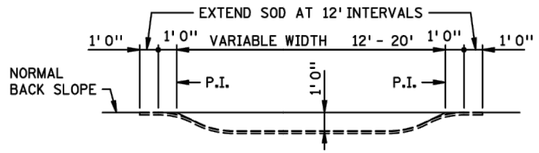


DITCH PROFILE

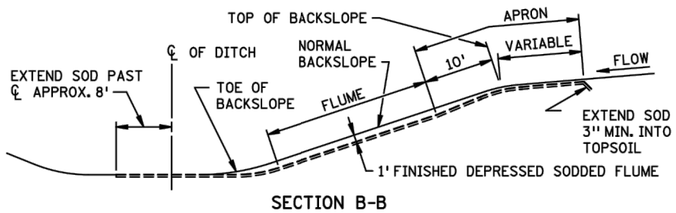
SODDED DITCH DETAILS



PLAN VIEW



SECTION A-A



SECTION B-B

SODDED FLUME DETAILS

NOTES:
SEE SPEC. 2575.3 FOR ADDITIONAL INFORMATION.
① CONSTRUCT TAPER AS DIRECTED BY THE ENGINEER.

REVISION:
APPROVED: 2-28-2017
CHIEF ENVIRONMENTAL OFFICER

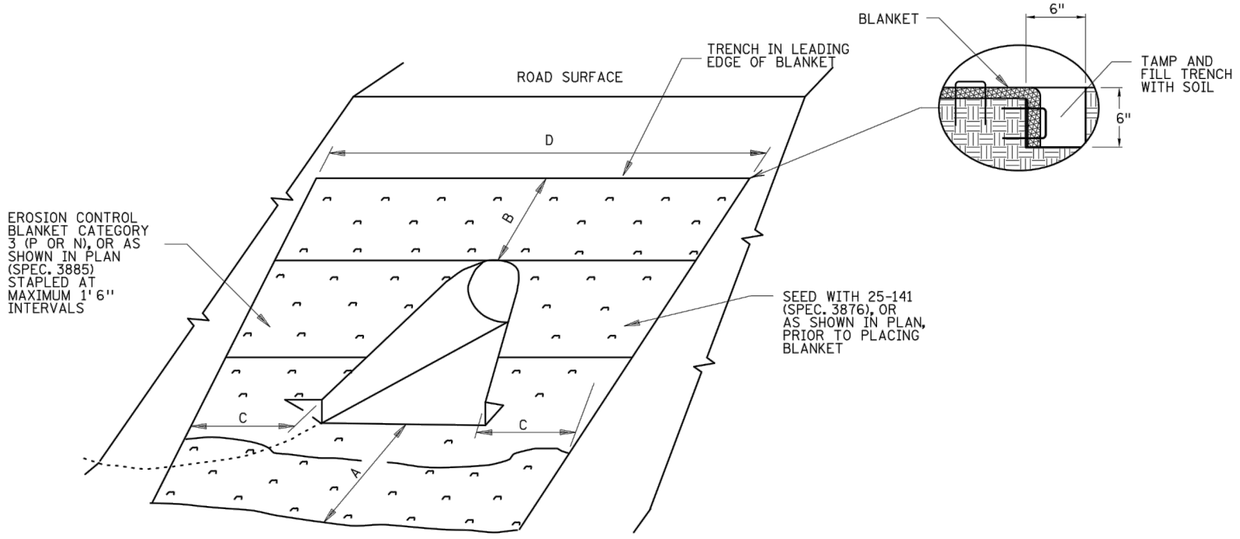
MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.404 | 1 OF 3

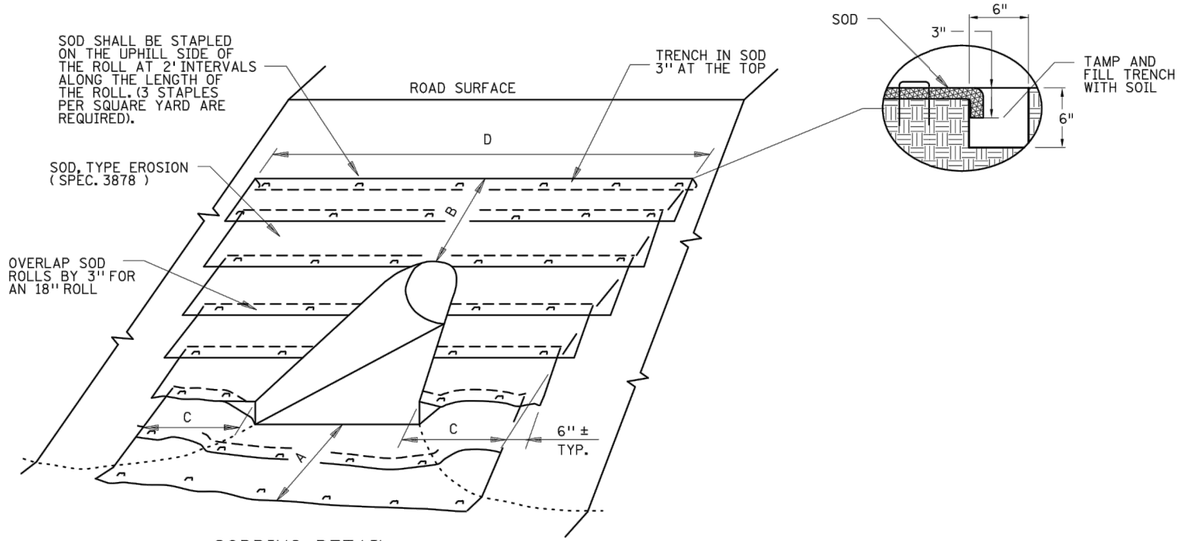
APPROVED: 2-28-2017
REVISED:
STATE DESIGN ENGINEER

PERMANENT EROSION CONTROL
ALONG ROADWAYS, DITCHES AND FLUMES

S.A.P. 197-124-004	S.P. 0208-143 (TH 65)	STATE PROJ. NO. 197-080-001 (T.H.)	SHEET NO. 7 OF 21 SHEETS



EROSION CONTROL BLANKET & SEED DETAIL



SODDING DETAIL

CULVERT INLET APRON ①

CULVERT DIAMETER ②	SOD OR EROSION CONTROL BLANKET (SQ. YDS.)						"A"	"B"	"C"	"D"
	CIRCULAR AND ARCH PIPE METAL APRON (PLATE 3123, PLATE 3122)	CIRCULAR AND ARCH PIPE CONCRETE APRON (PLATE 3100, PLATE 3110)	CIRCULAR AND ARCH PIPE METAL SAFETY APRON 1:4 SLOPE (PLATE 3148)	CIRCULAR AND ARCH PIPE METAL SAFETY APRON 1:6 SLOPE (PLATE 3148)	CIRCULAR CORRUGATED METAL PIPE SAFETY APRON 1:6 SLOPE (PLATE 3128)	CIRCULAR CORRUGATED METAL PIPE SAFETY APRON 1:4 SLOPE (PLATE 3128)				
15"	9	9	8	8	N/A	N/A	3'	1.5'	3'	13'
18"	13	12	12	14	16	N/A	3'	3'	3'	16'
21"	14	14	14	16	18	14	3'	3'	3'	17'
24"	16	15	16	19	21	17	3'	3'	3'	18'
27"	N/A	20	N/A	N/A	N/A	N/A	3'	4.5'	3'	20'
30"	23	22	25	30	32	N/A	3'	4.5'	3'	22'
36"	34	34	39	48	51	37	4.5'	4.5'	4.5'	27'
42"	43	40	51	64	N/A	N/A	4.5'	6'	4.5'	30'
48"	54	50	66	82	N/A	N/A	4.5'	7.5'	4.5'	34'
54"	65	58	81	102	N/A	N/A	4.5'	9'	4.5'	37'
60"	69	59	91	115	N/A	N/A	4.5'	9'	4.5'	39'
66"	69	63	N/A	N/A	N/A	N/A	4.5'	9'	4.5'	39'
72"	78	72	99	122	N/A	N/A	4.5'	10.5'	4.5'	41'

CULVERT OUTLET APRON ①

CULVERT DIAMETER ②	SOD OR EROSION CONTROL BLANKET (SQ. YDS.)						"A"	"B"	"C"	"D"
	CIRCULAR AND ARCH PIPE METAL APRON (PLATE 3123, PLATE 3122)	CIRCULAR AND ARCH PIPE CONCRETE APRON (PLATE 3100, PLATE 3110)	CIRCULAR AND ARCH PIPE METAL SAFETY APRON 1:4 SLOPE (PLATE 3148)	CIRCULAR AND ARCH PIPE METAL SAFETY APRON 1:6 SLOPE (PLATE 3148)	CIRCULAR CORRUGATED METAL PIPE SAFETY APRON 1:6 SLOPE (PLATE 3128)	CIRCULAR CORRUGATED METAL PIPE SAFETY APRON 1:4 SLOPE (PLATE 3128)				
15"	10	10	9	10	N/A	N/A	4.5'	1.5'	3'	13'
18"	13	13	12	14	15	N/A	6'	1.5'	3'	14'
21"	16	14	16	18	19	15	6'	1.5'	3'	15'
24"	18	18	18	21	22	18	7.5'	1.5'	3'	16'
27"	N/A	19	N/A	N/A	N/A	N/A	7.5'	1.5'	3'	17'
30"	23	23	24	28	29	N/A	9'	1.5'	3'	18'
36"	36	35	38	47	48	37	10.5'	1.5'	4.5'	23'
42"	43	40	47	58	N/A	N/A	12'	1.5'	4.5'	25'
48"	50	46	57	70	N/A	N/A	13.5'	1.5'	4.5'	27'
54"	57	50	67	84	N/A	N/A	15'	1.5'	4.5'	29'
60"	74	63	90	113	N/A	N/A	16.5'	1.5'	6'	33'
66"	75	67	N/A	N/A	N/A	N/A	16.5'	1.5'	6'	33'
72"	77	70	92	114	N/A	N/A	16.5'	1.5'	6'	34'

NOTES:

AREA SHOWN IN SQUARE YARDS IS FOR ONE CULVERT END.

QUANTITIES ARE CALCULATED TO INCLUDE SOD REQUIRED TO PROVIDE A 3" OVERLAP ON ALL 18" WIDE ROLLS. THIS ALLOWS FOR SHRINKAGE OF THE SOD.

FOR PIPE ARCHES USE EQUIVALENT PIPE DIAMETER TO APPROXIMATE AREA.

FOR CORRUGATED POLYETHYLENE PIPE METAL APRON (PLATE 3129), USE THE METAL APRON COLUMN (PLATE 3123).

AREAS AND DIMENSIONS ARE APPROXIMATE AND ARE BASED ON APRON SIDE SLOPES OF NO STEEPER THAN 1:2, UNLESS INDICATED AS FOR SAFETY APRONS.

CARE SHOULD BE TAKEN IN SELECTING SOD TO STABILIZE THE APRON. RIP-RAP SHOULD BE USED FOR FLOW VELOCITIES GREATER THAN 6 FPS.

① ADDITIONAL QUANTITIES MAY BE SHOWN IN THE PLAN OR REQUIRED BY THE ENGINEER.

② FOR ARCH PIPE USE CLOSEST CIRCULAR PIPE DIAMETER AND APRON SLOPE. (DIAMETERS LARGER THAN 72" REQUIRE SPECIAL DESIGNS.)

REVISION:

APPROVED: 2-28-2017

CHIEF ENVIRONMENTAL OFFICER

MINNESOTA DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

STANDARD PLAN 5-297.404 | 2 OF 3

APPROVED: 2-28-2017

REVISED:

PERMANENT EROSION CONTROL

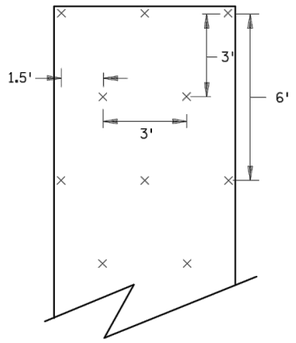
TURF ESTABLISHMENT DETAIL AT CULVERT ENDS

S.A.P. 197-124-004 | S.P. 0208-143 (TH 65)

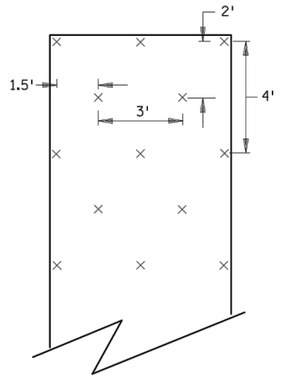
STATE PROJ. NO.)-001 (T.H.) SHEET NO. 8 OF 21 SHEETS

PLOTTED/REVISED: 4-APR-2018

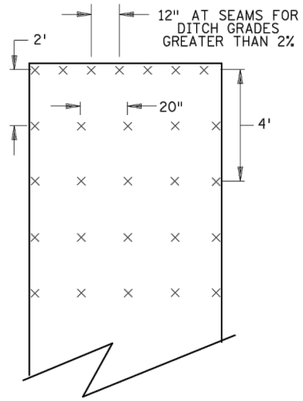
PATH & FILENAME: OTS\DesignStandards\Development\New Border\400_Series\s404_2_spn.dgn



SLOPES FLATTER THAN 1:2
(120 STAPLES PER 100 SQ YD)

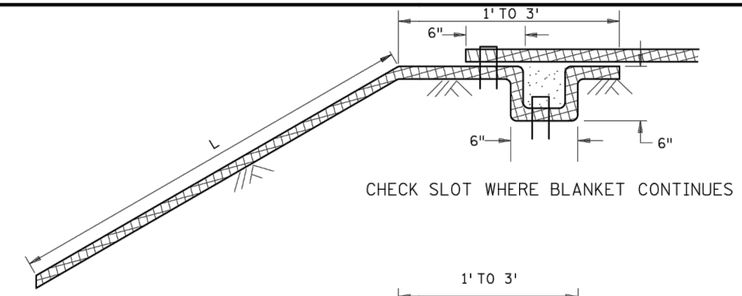


SLOPES 1:2 TO 1:1
(170 STAPLES PER 100 SQ YD)

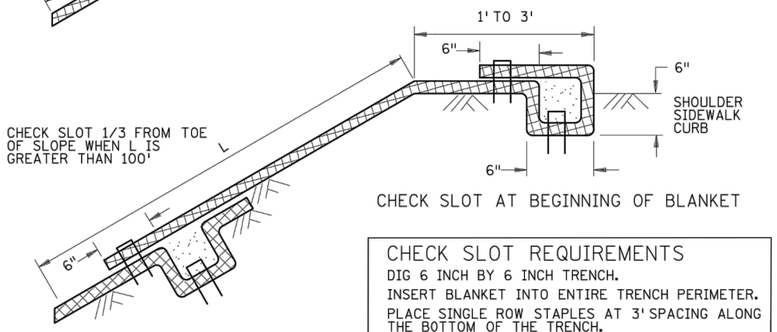


CHANNEL AND DITCH APPLICATIONS
(350 STAPLES PER 100 SQ YD)

BLANKET STAPLE PATTERN



CHECK SLOT WHERE BLANKET CONTINUES



CHECK SLOT AT BEGINNING OF BLANKET

CHECK SLOT REQUIREMENTS

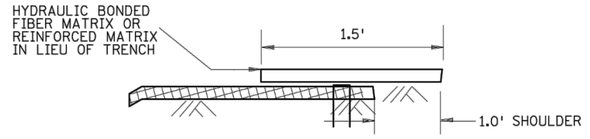
DIG 6 INCH BY 6 INCH TRENCH.

INSERT BLANKET INTO ENTIRE TRENCH PERIMETER.

PLACE SINGLE ROW STAPLES AT 3' SPACING ALONG THE BOTTOM OF THE TRENCH.

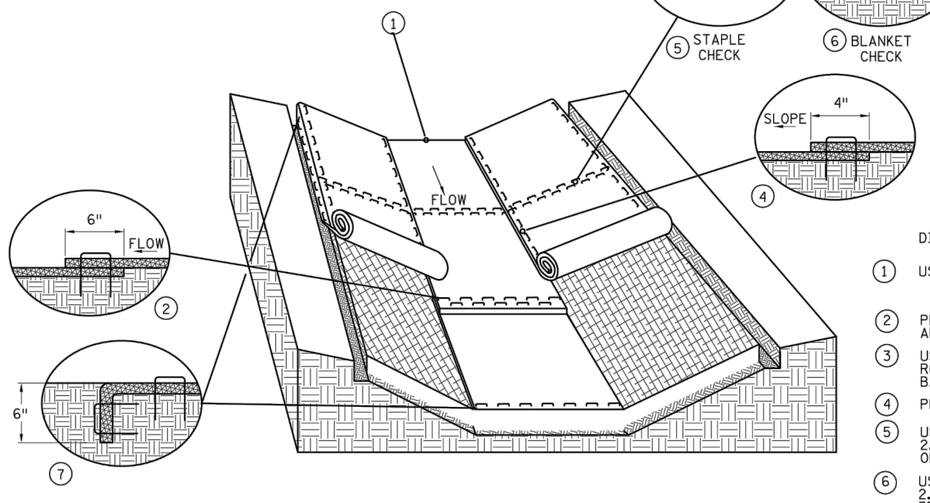
BACKFILL TRENCH WITH SOIL AND TAMP.

PLACE SINGLE ROW STAPLES AT 3' SPACING ON OVERLAP.

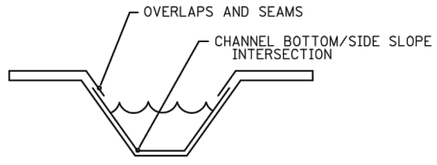


CHECK SLOT ALTERNATIVE
PLACE SINGLE ROW STAPLES AT 12" SPACING

CHECK SLOT DETAILS



DITCH BLANKET STAPLE DETAIL



DITCH BLANKET CRITICAL POINTS (7)

DITCH BLANKET STAPLE DETAIL NOTES

(1) USE CHECK SLOT DETAIL (NO ALTERNATES).

(2) PLACE DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER.

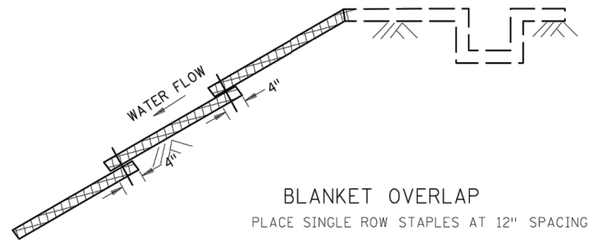
(3) USE 6" X 6" TRENCH TO PLACE BLANKET. PLACE SINGLE ROW OF STAPLES ON TOP AND TRENCH SIDES AT 12" SPACING. BACKFILL TRENCH WITH SOIL AND TAMP.

(4) PLACE SINGLE ROW OF STAPLES AT 12" SPACING.

(5) USE STAPLE CHECK FOR CHANNEL SLOPES LESS THAN 2.5% GRADE AT 100 FOOT INTERVALS. PLACE DOUBLE ROW OF STAPLES STAGGERED 4" APART AND AT 4" SPACING.

(6) USE BLANKET CHECKS FOR THE FOLLOWING SLOPES:
2.5%-3% 100 FT INTERVALS
3%-5% 50 FT INTERVALS
5%-7% 25 FT INTERVALS

(7) CRITICAL POINTS SHALL BE SECURED WITH PROPER STAPLE PATTERNS.



BLANKET OVERLAP
PLACE SINGLE ROW STAPLES AT 12" SPACING

GENERAL BLANKET INSTALLATION REQUIREMENTS

PREPARE SOIL AS PER SPECIFICATION 2574.

LAY PARALLEL OR PERPENDICULAR TO THE DIRECTION OF WATER FLOW.

OVERLAP ADJACENT STRIP EDGES A MINIMUM OF 4 INCHES.

OVERLAP BLANKET 6" (MIN.) AT EACH END. OVERLAP BOTTOM END OF UPPER BLANKET OVER TOP END OF LOWER BLANKET. STAPLE ALONG OVERLAP EVERY 1.5'.

THE UPPERMOST BLANKET OF ALL SLOPE APPLICATIONS MUST START IN A CHECK SLOT. IF SLOPE LENGTH (L) IS 100' OR GREATER, INSERT BLANKET INTO A CHECK SLOT 1/3 FROM THE BOTTOM OF THE SLOPE.

PLOTTED/REVISED: 4-APR-2018

PATH & FILENAME: OTS\Design Standards\Development\New Border\400_Series\s404_3_spndgn

REVISION:

APPROVED: 2-28-2017
CHIEF ENVIRONMENTAL OFFICER

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.404 | 3 OF 3

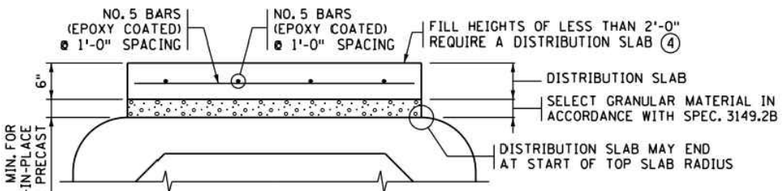
APPROVED: 2-28-2017
REVISED:

STATE DESIGN ENGINEER

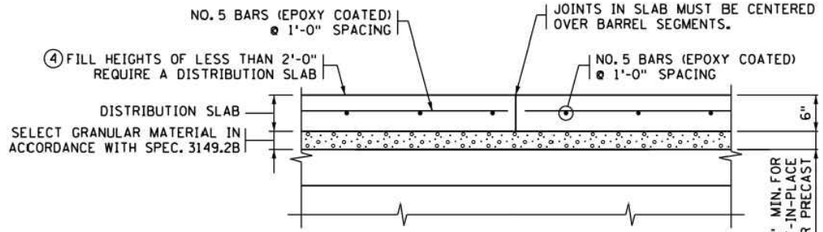
PERMANENT EROSION CONTROL

BLANKET STAPLE PATTERN FOR SLOPES

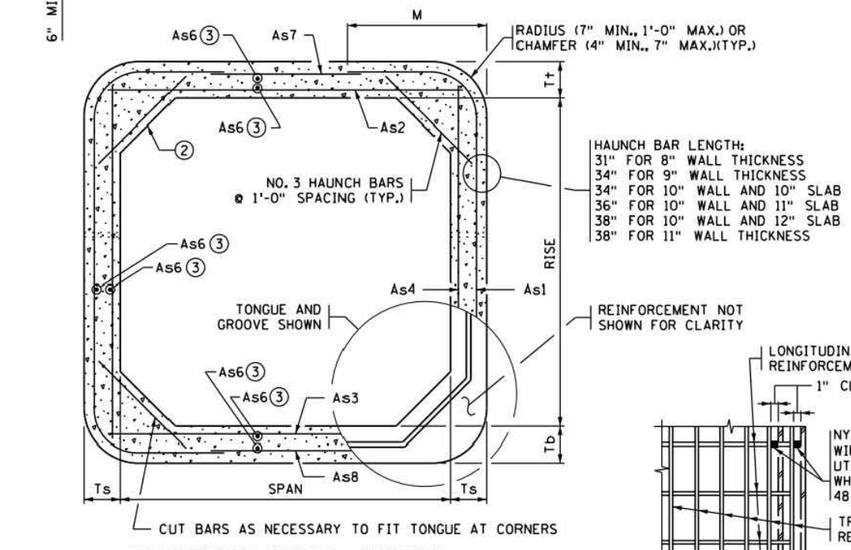
S.A.P. 197-124-004	S.P. 0208-143 (TH 65)	STATE PROJ. NO. 0208-143-001 (T.H.)	SHEET NO. 9 OF 21 SHEETS



DISTRIBUTION SLAB SECTION

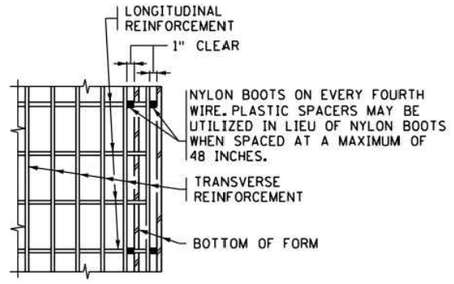


DISTRIBUTION SLAB - LONGITUDINAL SECTION



TRANSVERSE BARREL SECTION

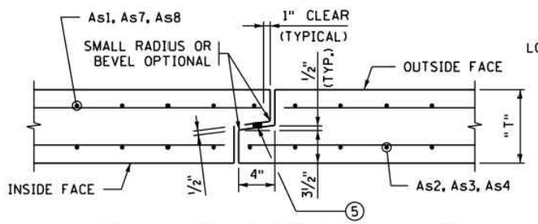
BAR REINFORCEMENT OPTION SHOWN



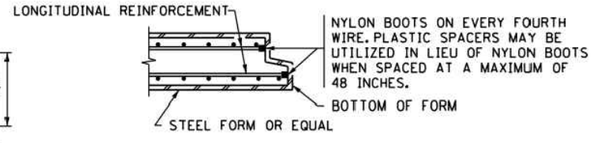
PLAN

LONGITUDINAL BARREL SECTION

BAR REINFORCEMENT OPTION SHOWN

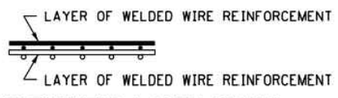


TONGUE AND GROOVE JOINT DETAIL



SECTION

FORMING DETAIL



REINFORCEMENT LAYER DETAIL

WHEN MORE THAN ONE LAYER OF WELDED WIRE REINFORCEMENT IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, PLACE THE WIRES OF THE WELDED WIRE REINFORCEMENT AS SHOWN

CONSTRUCTION NOTES

CONSTRUCT CULVERTS IN ACCORDANCE WITH SPEC. 2412 EXCEPT AS NOTED.

REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES AND TO STANDARD FIGURE 5-395.115 FOR MATERIAL REQUIREMENTS FOR FILL BETWEEN ADJACENT BOXES.

PROVIDE WELDED WIRE REINFORCEMENT, SHEAR REINFORCEMENT AND REINFORCEMENT BARS IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M259.

1½" MIN. AND 2" MAX. CONCRETE COVER ON ALL REINFORCEMENT, INCLUDING SHEAR REINFORCEMENT, EXCEPT FOR TONGUE AND GROOVE DETAIL.

ANY OF THE FOLLOWING COMBINATIONS OF STEEL REINFORCEMENT MAY BE USED:
(a) 1 OR 2 LAYERS OF WELDED WIRE REINFORCEMENT OR
(b) 1 LAYER OF WELDED WIRE REINFORCEMENT AND 1 LAYER OF REINFORCEMENT BARS OR
(c) 1 LAYER OF REINFORCEMENT BARS.
DEVELOP REINFORCEMENT IN ACCORDANCE WITH AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS". IF BAR REINFORCEMENT IS SUBSTITUTED FOR WELDED WIRE REINFORCEMENT, INCREASE THE AREA OF REINFORCEMENT BY 8%, AND SUBMIT DESIGN CALCULATIONS VERIFYING COMPLIANCE WITH AASHTO 5.7.3.4. "CONTROL OF CRACKING BY DISTRIBUTION OF REINFORCEMENT".

MAXIMUM SIZE OF REINFORCEMENT BARS IS NO. 6. THE MAXIMUM WELDED WIRE REINFORCEMENT SIZE IS W23 PER LAYER (MAXIMUM OF 2 LAYERS).

SPACE CENTER TO CENTER OF TRANSVERSE WIRES NOT LESS THAN 2" NOR MORE THAN 4". SPACE CENTER TO CENTER OF LONGITUDINAL WIRES NOT MORE THAN 8".

WHEN USING As1, As7, AND As8 REINFORCEMENT AS ONE CONTINUOUS CAGE WITH SPLICES OCCURRING IN THE CENTER OF THE TOP AND BOTTOM OF THE BOX SECTION, THE MIN. LAP LENGTH FOR THE As7 AND As8 IS 15".

WELDING IS NOT PERMITTED ON REINFORCEMENT BARS OR WELDED WIRE REINFORCEMENT, EXCEPT THAT THE ORIGINAL WELDING REQUIRED TO MANUFACTURE WIRE REINFORCEMENT IS ACCEPTABLE.

WHEN REINFORCEMENT IS CUT, PLACE ADDITIONAL REINFORCEMENT ON BOTH SIDES OF THE CUT MEMBER TO REPLACE OR EXCEED THE CUT STEEL.

USE CONCRETE MIX NO. 3W82 WITH NO CALCIUM CHLORIDE ALLOWED.

SHOP DRAWING APPROVAL IN ACCORDANCE WITH SPEC. 3238.2A IS NOT REQUIRED UNLESS OPENINGS OR ATTACHMENTS ARE PLACED ON A BARREL SEGMENT.

COMPACT THE FIRST 1.5' (LOOSE) OF FILL ABOVE THE BOX WITH LIGHT COMPACTION EQUIPMENT SUCH AS PLATE COMPACTORS OR WALK BEHIND ROLLERS.

TRANSVERSE REINFORCEMENT IS PARALLEL TO THE CULVERT SPAN. LONGITUDINAL REINFORCEMENT IS PERPENDICULAR TO THE CULVERT SPAN.

(1) USE 1" DIAMETER CULVERT TIES. SEE STANDARD PLATE NO. 3145 FOR DETAILS.

(2) USE 12" VERTICAL, 12" HORIZONTAL HAUNCHES ON ALL BOX SIZES.

(3) PLACE LONGITUDINAL REINFORCEMENT DENOTED AS As6 IN ALL SLABS AND WALLS WITH A MINIMUM OF 0.06 SQ. IN./FT.

(4) ROADWAY OR SHOULDER FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A 6" THICK DISTRIBUTION SLAB WITH CONCRETE MIX 3S52.

PLACE CAST-IN-PLACE DISTRIBUTION SLABS WITH 3" MIN. SELECT GRANULAR MATERIAL IN ACCORDANCE WITH SPEC. 3149.2B BETWEEN BARREL AND DISTRIBUTION SLAB.

PRECAST DISTRIBUTION SLABS MAY BE USED FOR FILL HEIGHTS OVER 1'-0". PROVIDE 6" MINIMUM SELECT GRANULAR MATERIAL IN ACCORDANCE WITH SPEC. 3149.2B BETWEEN BARREL AND SLAB.

EXTEND THE WIDTH OF THE DISTRIBUTION SLAB TO THE OUTSIDE EDGES OF THE ROADWAY SHOULDERS UNLESS DIRECTED BY THE ENGINEER.

REDESIGN THE DISTRIBUTION SLAB PER THE MnDOT PAVEMENT DESIGN MANUAL IF IT IS USED AS PAVEMENT SURFACE.

PAYMENT FOR THE DISTRIBUTION SLAB AND SELECT GRANULAR MATERIAL BENEATH THE SLAB IS INCLUDED IN THE PRECAST CONCRETE BOX CULVERT PAY ITEM.

(5) REFER TO SPEC. 2412 FOR SEALANT REQUIREMENTS.

BARREL INFORMATION TABLE ***

LOCATION	SIZE	CLASS	f'c (P.S.I.)	FILL HEIGHT RANGE (FT.)	DISTRIBUTION SLAB REQUIRED *	RECESSED TIE RODS REQUIRED **	DIMENSIONS					WEIGHT (LBS./FT.)	WELDED WIRE REINFORCEMENT											
													As1			As2		As3		As4		As7		As8	
							SPAN (FT.)	RISE (FT.)	Tt (IN.)	Tb (IN.)	Ts (IN.)		AREA (IN.²/FT.)	LENGTH (FT.)	M (FT.)	AREA (IN.²/FT.)	LENGTH (FT.)	AREA (IN.²/FT.)	LENGTH (FT.)	AREA (IN.²/FT.)	LENGTH (FT.)	AREA (IN.²/FT.)	LENGTH (FT.)	AREA (IN.²/FT.)	LENGTH (FT.)
15+15	10X6	2	5000	3'-7"	YES	NO	10	6	9	10	8	4200	0.45	12'-8"	2'-10"	0.56	10'-6"	0.59	10'-6"	0.20	6'-6"	0.24	8'-3"	0.24	8'-3"
					YES	NO																			

* ALL CLASS 1 CULVERTS WITH FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A DISTRIBUTION SLAB. IF A DISTRIBUTION SLAB IS NOT REQUIRED, INDICATE "NO" IN THIS BOX.

** FOR PEDESTRIAN CULVERT APPLICATIONS HIDE-AWAY OR RECESSED TIE CONNECTIONS ARE REQUIRED, SEE STANDARD PLATE 3145. IF REQUIRED, INDICATE "YES" IN THIS BOX.

*** BOX CULVERTS WITH SPANS FROM 6 TO 14 FT. ARE DESIGNED FOR HL-93 LIVE LOADS (AASHTO LRFD 3.6.2.1) NOT INCLUDING THE DESIGN LANE LOAD. BOXES WITH SPANS OF 16 FT. ARE DESIGNED FOR HL-93 LIVE LOADS INCLUDING THE DESIGN LANE LOAD.

REVISION: DECEMBER 21, 2022

APPROVED: MARCH 24, 2011
Nancy Daubenberger
STATE BRIDGE ENGINEER

REV. NO.	DATE	REVISION DESCRIPTION	BY
1	09/08/23		

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER _____ DATE

NAME: LIC. NO.

STATE PROJ. NO. 197-080-001 (T.H.) STA. + .

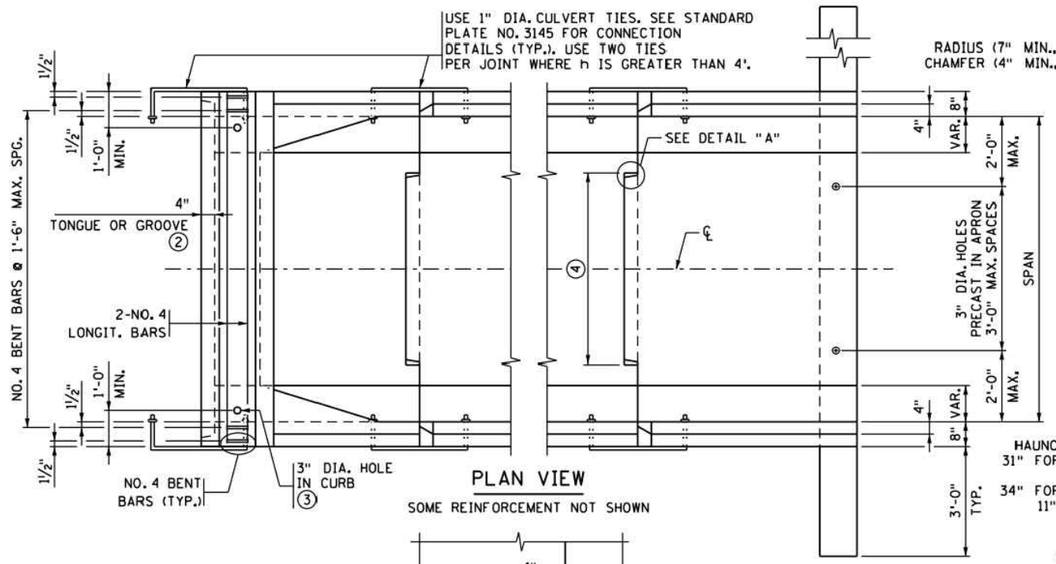
FIG. 5-395.101(A)

TITLE: PRECAST CONCRETE BARREL DETAILS

DES: DAK | DR: JAB | APPROVED:
CHK: TPC | CHK:

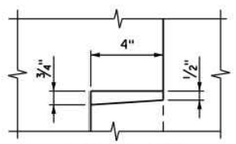
SHEET NO. 10 OF 21 SHEETS

BRIDGE NO. 02J59

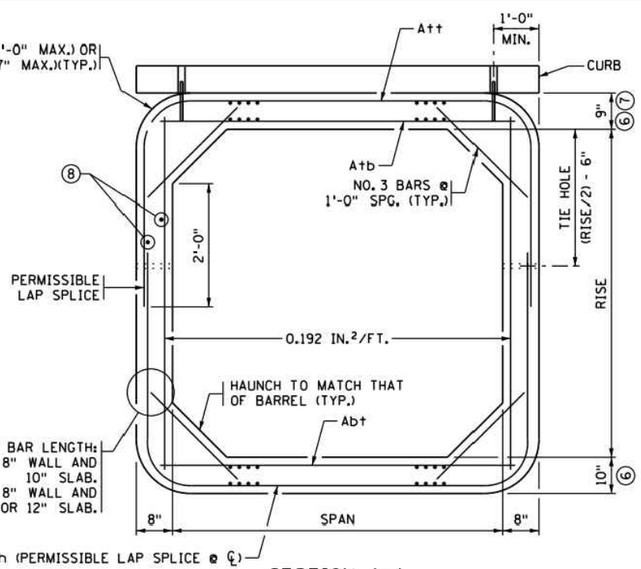


PLAN VIEW

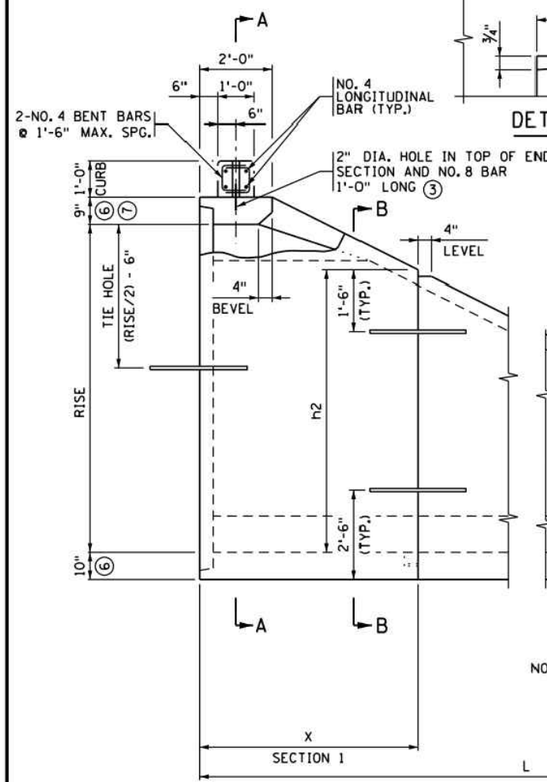
SOME REINFORCEMENT NOT SHOWN



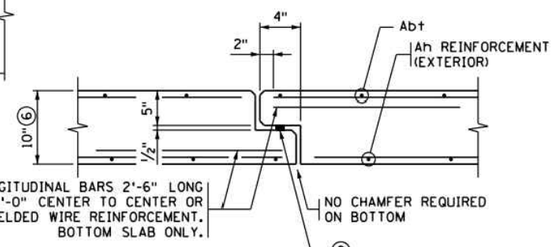
DETAIL "A"



SECTION A-A

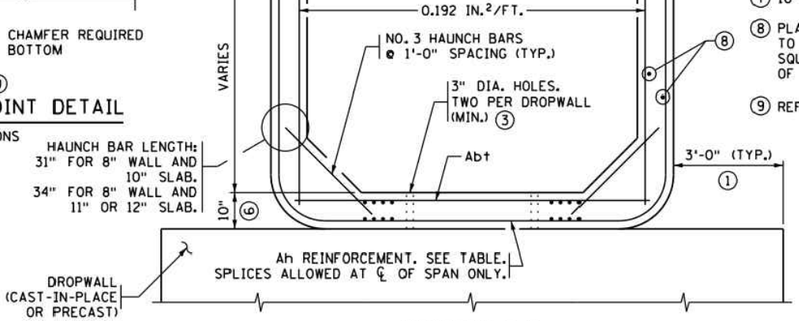


SIDE ELEVATION

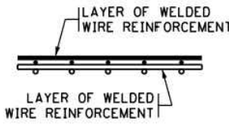


TONGUE AND GROOVE JOINT DETAIL

BETWEEN END SECTIONS



SECTION B-B



REINFORCEMENT LAYER DETAIL

WHEN MORE THAN ONE LAYER OF WELDED WIRE REINFORCEMENT IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, PLACE THE WIRES OF THE WELDED WIRE REINFORCEMENT AS SHOWN.

CONSTRUCTION NOTES

SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.

USE CONCRETE MIX NO. 3W82 WITH NO CALCIUM CHLORIDE ALLOWED.

ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.

ON ALL END SECTIONS FOR WATERWAYS, USE DROPWALLS ON INLET AND OUTLET ENDS.

SEE STANDARD FIG. 5-395.115 FOR EMBANKMENT PROTECTION.

FINISH ALL EXPOSED EDGES OF CONCRETE WITH ½" OR ¾" CHAMFER OR RADIUS UNLESS OTHERWISE NOTED.

MAXIMUM SIZE OF REINFORCEMENT BARS IS NO. 6, EXCEPT NO. 7 OR 8 BARS MAY BE USED FOR Atb ON SPANS GREATER THAN 14'. THE MAXIMUM WELDED WIRE REINFORCEMENT SIZE IS W23 PER LAYER (MAXIMUM OF 2 LAYERS).

① WITH DOUBLE BOXES LOCATE DROPWALL JOINTS BETWEEN END SECTIONS. SEE STANDARD FIG. 5-395.111 FOR ALTERNATE DROPWALLS. LIMITS OF EXCAVATION FOR DROPWALL ARE APPROXIMATELY THE SAME AS DROPWALL DIMENSIONS. DROPWALL CONCRETE MIX IS 3S52, OR 3Y82 IF PRECAST. FURNISHING AND INSTALLATION OF DROPWALL TO BE INCLUDED IN PRICE BID FOR END SECTIONS. DROPWALL NOT REQUIRED FOR NON-WATERWAY USE.

② CHECK LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED.

③ FILL HOLE WITH GROUT. GROUT CONSISTS OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE IA AIR ENTRAINED PORTLAND CEMENT. GROUT MIX MAXIMUM SLUMP IS 4".

④ 3'-6" MIN. TONGUE AND 3'-7" MIN. GROOVE FOR CULVERTS WITH 6'-0" SPANS. 5'-0" MIN. TONGUE AND 5'-1" MIN. GROOVE FOR CULVERTS WITH SPANS GREATER THAN 6'-0". CENTER TONGUE AND GROOVE ON ℄ OF EACH APRON JOINT. TONGUE AND GROOVE JOINT ON ALL THREE SIDES OF APRON IS PERMISSIBLE.

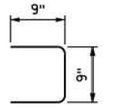
⑤ WELDED WIRE REINFORCEMENT OF EQUAL AREA MAY BE SUBSTITUTED FOR REBAR.

⑥ APRON TOP AND BOTTOM SLAB THICKNESS MAY BE 8" FOR CULVERTS WITH 6' SPANS ONLY. BOTTOM SLAB THICKNESS MAY BE INCREASED UP TO 2" MAX. PROVIDED CONCRETE COVER IS 1½" MIN., 2" MAX.

⑦ 10" MINIMUM TOP SLAB FOR 14' AND 16' SPANS.

⑧ PLACE LONGITUDINAL REINFORCEMENT PERPENDICULAR TO THE CULVERT SPAN WITH A MINIMUM OF 0.06 SQUARE INCHES PER PERIPHERAL FOOT ON ALL FACES OF THE BARREL.

⑨ REFER TO SPEC. 2412 FOR SEALANT REQUIREMENTS.



NO. 4 BENT BAR

Att, Atb REINFORCEMENT		
SPAN (FT.)	Att ($IN^2/FT.$)	Atb ($IN^2/FT.$)
6	0.27	0.44
8	0.47	0.60
10	0.62	0.74
12	0.88	1.06
14	1.20	1.58
16	1.52	2.09

Abt REINFORCEMENT	
SPAN (FT.)	Abt ($IN^2/FT.$)
6-10	0.20
12	0.30
14	0.39
16	0.39

APRON DIMENSIONS & Ah REINFORCEMENT

RISE FT.	L FT.	SECTION 1 X	SECTION 1 Ah	h2	SECTION 2 Y	SECTION 2 Ah	h3	SECTION 3 Z	SECTION 3 Ah	h4	SECTION 4 ZZ	SECTION 4 Ah	h5	SECTION 5 ZZZ	SECTION 5 Ah	h6
4	8	8'(4')	0.192	1'-9"(3'-9")	(4')	(0.192)	(1'-9")									
5	10	6'	0.192	3'-9"	4'	0.192	1'-9"									
6	12	6'	0.192	4'-9"	6'	0.192	1'-9"									
7	14	6'	0.192	5'-9"	8'(4')	0.192	1'-9"(3'-9")	(4')	(0.192)	(1'-9")						
8	16	6'	0.20	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"						
9	18	6'	0.29	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"						
10	20	6'	0.42	8'-9"	6'	0.29	5'-9"	8'(4')	0.192	1'-9"(3'-9")	(4')	(0.192)	(1'-9")			
11	22	6'	0.60	9'-9"	6'	0.42	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"			
12	24	6'	0.78	10'-9"	6'	0.60	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"			
13	26	6'	1.03	11'-9"	6'	0.78	8'-9"	6'	0.28	5'-9"	8'(4')	0.192	1'-9"(3'-9")	(4')	(0.192)	(1'-9")
14	28	6'	1.38	12'-9"	6'	1.03	9'-9"	6'	0.40	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"

NOTE: Ah IS AREA OF REINFORCEMENT PER FOOT OF LENGTH ($IN^2/FT.$) VALUES IN ( ) MAY BE USED FOR END SECTIONS WITH SPANS OF 14' AND 16' ONLY.

REVISION: DECEMBER 21, 2022

APPROVED: MARCH 24, 2011

Nancy Daubenberger
STATE BRIDGE ENGINEER

REV. NO.	DATE	REVISION DESCRIPTION	BY
--	09/08/23		

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER _____ DATE

NAME: LIC. NO.

STATE PROJ. NO. 197-080-001 (T.H.) STA. + .

TITLE: PRECAST CONCRETE END SECTION TYPE I - SINGLE OR MULTIPLE BARREL FOR SKEWS UP TO 7½°

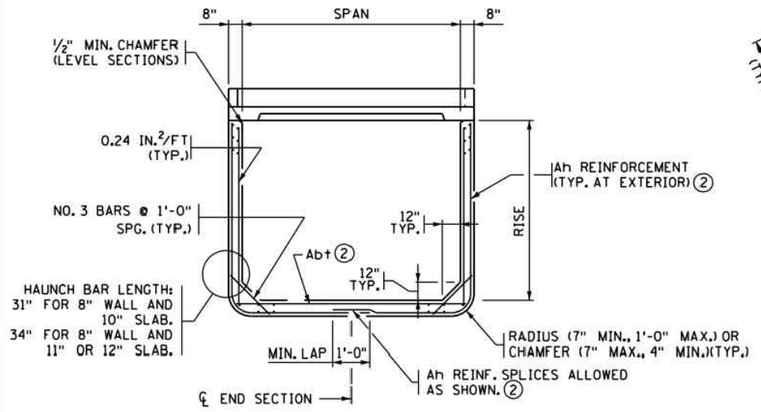
FIG. 5-395.102

DES: DAK DR: JAB CHK: TPC CHK:

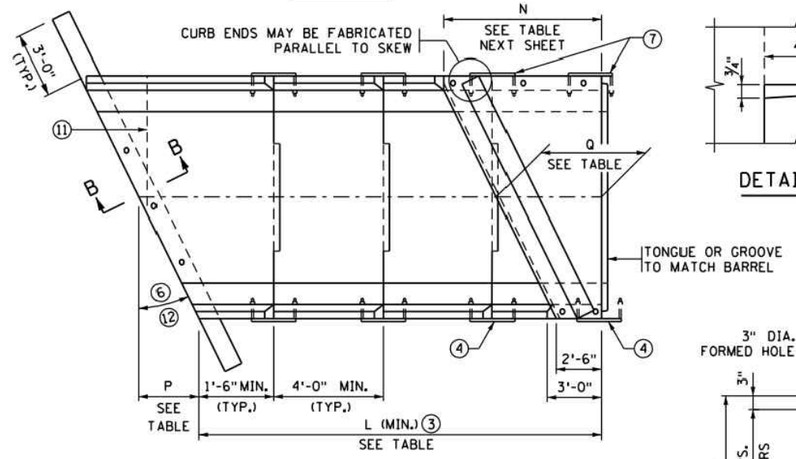
APPROVED:

SHEET NO. 11 OF 21 SHEETS

BRIDGE NO. 02J59

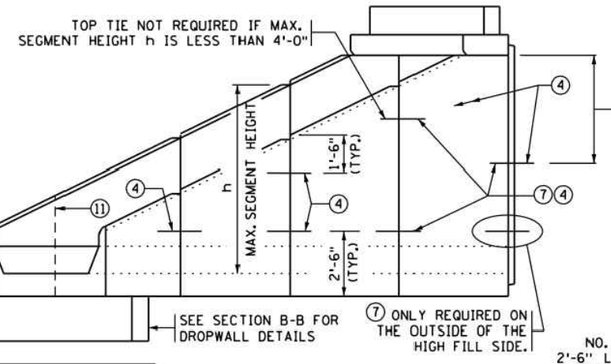


END VIEW

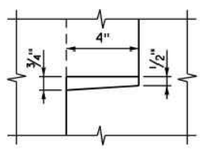


PLAN VIEW

SINGLE BARREL OPTION



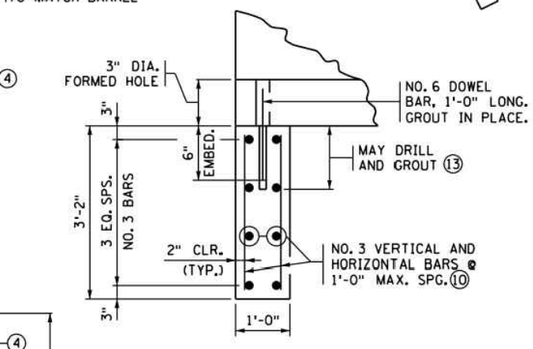
ELEVATION



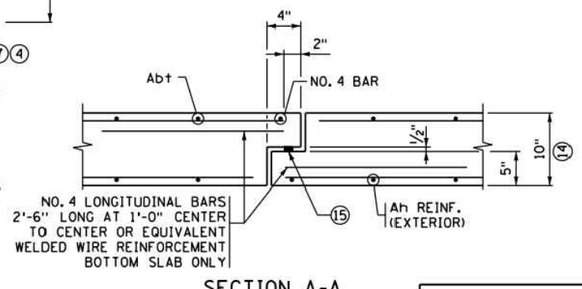
DETAIL "B"

PLAN VIEW

MULTIPLE BARREL OPTION

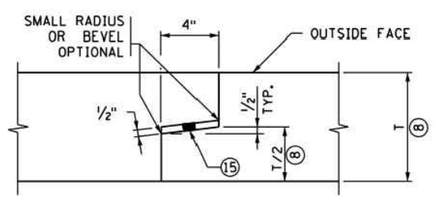


SECTION B-B



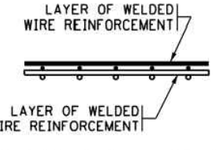
SECTION A-A

DETAIL "A"



TONGUE AND GROOVE JOINT

MAKE DIMENSION OF TONGUE OR GROOVE ON ADJACENT PRECAST BARREL SECTIONS SO INSIDE WALLS ARE FLUSH.



REINFORCEMENT LAYER DETAIL

WHEN MORE THAN ONE LAYER OF WELDED WIRE REINFORCEMENT IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, PLACE THE WIRES OF THE WELDED WIRE REINFORCEMENT AS SHOWN

CONSTRUCTION NOTES

SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.

ON ALL END SECTIONS FOR WATERWAYS, USE DROPWALLS ON INLET AND OUTLET ENDS.

FINISH ALL EXPOSED EDGES OF CONCRETE WITH ½" OR ¾" CHAMFER OR RADIUS UNLESS OTHERWISE NOTED.

USE CONCRETE MIX 3W82 WITH NO CALCIUM CHLORIDE ALLOWED.

USE DROPWALL CONCRETE MIX 3S52, OR 3Y82 IF PRECAST. LIMITS FOR DROPWALL EXCAVATION TO BE APPROXIMATELY THE SAME AS DROPWALL DIMENSIONS. FURNISHING AND INSTALLATION OF DROPWALL IS INCLUDED IN PRICE BID FOR END SECTIONS.

PLACE LONGITUDINAL REINFORCEMENT WITH A MINIMUM OF 0.06 SQ. IN. PER FT. ON BOTH FACES.

NO TONGUE OR GROOVE REQUIRED IN WALLS BETWEEN END SECTIONS.

SEE STANDARD FIG. 5-395.115 FOR EMBANKMENT PROTECTION.

① 8⅛" @ 15°; 10⅝" @ 30°; 1'-2" @ 45°

② SEE STANDARD FIG. 5-395.110 (2 OF 2) FOR REINFORCEMENT TABLES.

③ NUMBER OF SECTIONS VARIES WITH CULVERT RISE.

④ EXCEPT AS NOTED, USE 1" DIA. CULVERT TIES. SEE STANDARD PLATE NO. 3145 FOR DETAILS. TWO TIES ARE REQUIRED PER JOINT WHERE h IS GREATER THAN 4'.

⑤ 3'-6" MIN. TONGUE AND 3'-7" MIN. GROOVE FOR CULVERTS WITH 6'-0" SPANS. 5'-0" MIN. TONGUE AND 5'-1" MIN. GROOVE FOR CULVERTS WITH SPANS GREATER THAN 6'-0". CENTER TONGUE AND GROOVE ON ℄ OF EACH APRON JOINT. TONGUE AND GROOVE JOINT ON ALL THREE SIDES OF APRON IS PERMISSIBLE.

⑥ FOR SKEW ANGLES OVER 7½° UP TO 22½°, USE A 15° SKEW END SECTION. FOR SKEW ANGLES OVER 22½° UP TO 37½°, USE A 30° SKEW END SECTION. FOR SKEW ANGLES OVER 37½° UP TO 45°, USE A 45° SKEW END SECTION.

⑦ PROVIDE EXTRA STRONG CONNECTION AT LOCATION SHOWN; REQUIRED ONLY ON HIGH FILL SIDE FOR 45° SKEW END SECTIONS OVER 6'-0" HIGH. FOR MULTIPLE BARREL OPTION, ONLY INCLUDE EXTRA STRONG TIES ON THE OUTSIDE OF THE HIGH FILL SIDE. SEE STANDARD FIG. 5-395.110 (2 OF 2) FOR DETAILS.

⑧ DIMENSION "T" IS EQUAL TO Tt, Tb OR Ts.

⑨ REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES AND TO STANDARD FIGURE 5-395.115 FOR MATERIAL REQUIREMENTS FOR FILL BETWEEN ADJACENT BOXES.

⑩ WELDED WIRE REINFORCEMENT OF EQUAL AREA MAY BE SUBSTITUTED FOR REBAR.

⑪ ON THE LAST SEGMENT OF THE 45° SKEWED APRONS, A TRANSVERSE JOINT IN THE BOTTOM IS PERMITTED. A SPECIAL TIE, SIMILAR TO THE SIDE TIE, MUST BE PROVIDED. THE TIE SHALL BE INSET AND THE SPACE FILLED WITH AN APPROVED GROUT.

⑫ FOR BOX CULVERTS WITH SPANS OF 16' THE MAXIMUM SKEW SHALL BE 30°.

⑬ FILL HOLE WITH GROUT. GROUT CONSISTS OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX MAXIMUM SLUMP IS 4".

⑭ APRON BOTTOM SLAB THICKNESS MAY BE 8" FOR CULVERTS WITH 6' SPANS ONLY. BOTTOM SLAB THICKNESS MAY BE INCREASED UP TO 2" MAX. PROVIDED COVER IS 1½" MIN., 2" MAX.

⑮ REFER TO SPEC. 2412 FOR SEALANT REQUIREMENTS.

MIN. LENGTH L

RISE (FT.)	15° SKEW	30° SKEW	45° SKEW
4	7'-1¾"	7'-7⅜"	8'-7⅞"
5	9'-2½"	9'-11⅛"	11'-5⅞"
6	11'-3⅜"	12'-2⅞"	14'-3¾"
7	13'-4¼"	14'-6⅝"	17'-1¾"
8	15'-5⅛"	16'-10¼"	19'-11⅝"
9	17'-5⅞"	19'-2"	22'-9⅝"
10	19'-6¾"	21'-5¾"	25'-7½"
11	21'-7⅝"	23'-9⅜"	28'-5½"
12	23'-8½"	26'-1⅛"	31'-3⅜"
13	25'-9⅜"	28'-4⅞"	34'-1⅜"
14	27'-10⅛"	30'-8½"	36'-11¼"

LENGTH P

SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW
6	0'-11¾"	2'-1⅜"	3'-8"
8	1'-3"	2'-8⅜"	4'-8"
10	1'-6¼"	3'-3¼"	5'-8"
12	1'-9⅜"	3'-10¼"	6'-8"
14	2'-0⅝"	4'-5⅛"	7'-8"
16	2'-3⅞"	5'-0"	⑫

LENGTH Q

SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW
6	3'-5¾"	4'-7⅜"	6'-2"
8	3'-9"	5'-2⅜"	7'-2"
10	4'-0"	5'-9¼"	8'-2"
12	4'-3⅜"	6'-4⅛"	9'-2"
14	4'-6⅝"	6'-11⅛"	10'-2"
16	4'-9⅞"	7'-6⅛"	⑫

REVISION: DECEMBER 21, 2022

APPROVED: MARCH 24, 2011

Nancy Daubenberger

STATE BRIDGE ENGINEER

REV. NO.	DATE	REVISION DESCRIPTION	BY
--	09/08/23		

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER _____ DATE

NAME: LIC. NO.

STATE PROJ. NO. 197-080-001 (T.H.) STA. + .

TITLE: PRECAST CONCRETE END SECTION TYPE III - SINGLE OR MULTIPLE BARREL FOR SKEWS 7½° TO 45°

DES: DAK DR: JAB APPROVED:

CHK: TPC CHK:

FIG. 5-395.110 (1 OF 2)

SHEET NO. 12 OF 21 SHEETS

BRIDGE NO. 02J59

Ah REINFORCEMENT		
HEIGHT h (FT.)	Ah (IN^2/FT.)	
	15° & 30° SKEW	45° SKEW
7 OR LESS	0.192	0.192
8	0.20	0.24
9	0.29	0.36
10	0.42	0.53
11	0.60	0.75
12	0.78	0.98
13	1.03	1.36
14	1.38	1.85

NOTE: h IS THE LARGEST VERTICAL DIMENSION OF THE SEGMENT.

Abt REINFORCEMENT	
SPAN (FT.)	Abt (IN^2/FT.)
6-10	0.20
12	0.30
14	0.39
16	0.39

LINTEL BEAM REINFORCEMENT		
SPAN (FT.)	BOTTOM REINFORCEMENT	
	A1	A2
6	NO. 4 @ 1'-0"	NO. 4 @ 9"
8	NO. 4 @ 1'-1"	NO. 4 @ 6"
10	NO. 4 @ 9"	NO. 5 @ 6"
12	NO. 5 @ 9"	NO. 6 @ 6"
14	NO. 6 @ 9"	NO. 8 @ 6"
16	NO. 6 @ 9"	NO. 8 @ 6"

LENGTH N			
SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW
6	4'-3⅜"	6'-4¼"	9'-2"
8	4'-9⅞"	7'-6"	11'-2"
10	5'-4¼"	8'-7⅞"	13'-2"
12	5'-10¾"	9'-9¾"	15'-2"
14	6'-5⅛"	10'-11⅝"	17'-2"
16	6'-11⅝"	12'-1½"	NA (7)

LINTEL BEAM THICKNESS			
SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW
≤ 12	9"	9"	9"
14	10" (8)	10" (8)	10" (8)
16	10" (8)	10" (8)	NA (7)

CONSTRUCTION NOTES

SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.

ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.

GROUT CONSISTS OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX MAXIMUM SLUMP IS 4".

STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3306.

WELDING IN ACCORDANCE WITH SPEC. 2471.

GALVANIZE STRUCTURAL STEEL IN ACCORDANCE WITH SPEC. 3394.

GALVANIZE BOLTS, NUTS AND WASHERS IN ACCORDANCE WITH SPEC. 3392.

(1) NO. 8 DOWEL, 1'-0" LONG, 2" DIA. HOLE IN THE TOP OF THE WALL SECTION AND 3" DIA. HOLE IN THE LINTEL. FILL HOLE WITH GROUT.

(2) PROVIDE ADDITIONAL 3" HOLES AT 4'-0" MAXIMUM SPACING WHEN SIDE OF LINTEL BEAM IS OVER 6 FT.

(3) CHECK THE LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED. TONGUE AND GROOVE TO TERMINATE AT CULVERT RADIUS.

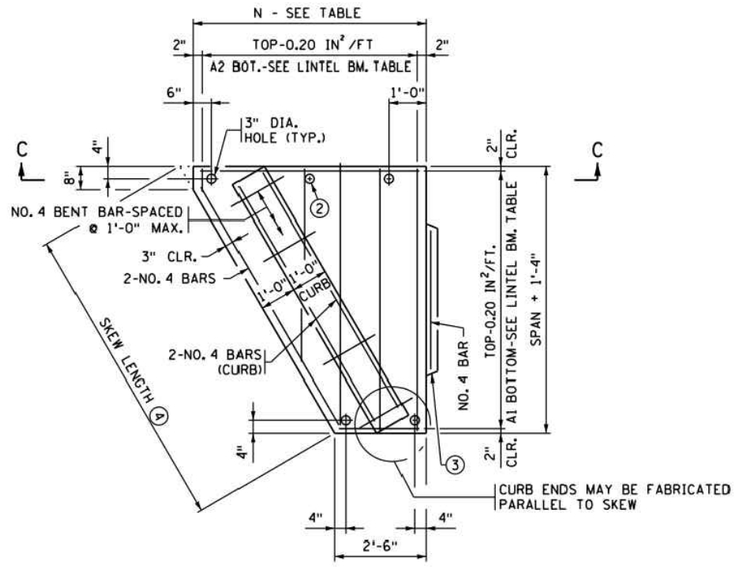
(4) FOR SKEW LENGTH UNDER 10' USE NO. 8 BARS. FOR SKEW LENGTH OF 10' TO 14' USE NO. 9 BARS. FOR SKEW LENGTH OVER 14' TO 18' USE NO. 10 BARS. FOR SKEW LENGTH OVER 18' TO 22' USE NO. 11 BARS OR EQUAL. SKEW LENGTH IS DISTANCE BETWEEN OUTSIDE FACES OF END SECTION ALONG LINTEL BEAM.

(5) SEE LINTEL BEAM THICKNESS TABLE ON THIS SHEET. USE LINTEL BEAMS WITH 5000 PSI 3W82 CONCRETE UNLESS OTHERWISE SPECIFIED.

(6) ALTERNATE BAR BEND MAY BE USED FOR NO. 4 BENT BARS.

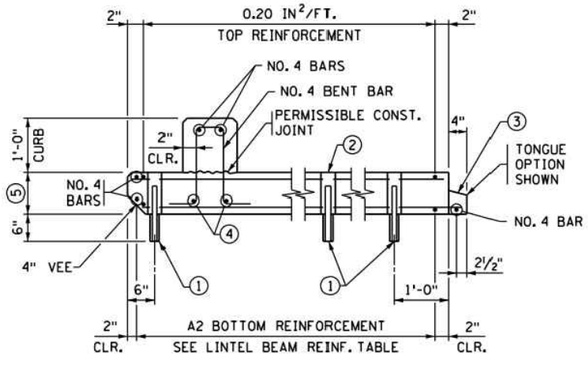
(7) FOR CULVERTS WITH SPANS OF 16' THE MAXIMUM SKEW IS 30°.

(8) ALTERNATIVELY A 9" THICKNESS MAY BE USED WITH 6500 PSI 3W82 CONCRETE.



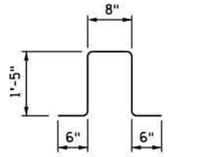
PLAN VIEW

LINTEL BEAM WITH INTEGRAL CURB

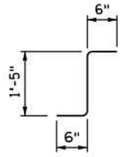


SECTION C-C

LINTEL BEAM WITH INTEGRAL CURB

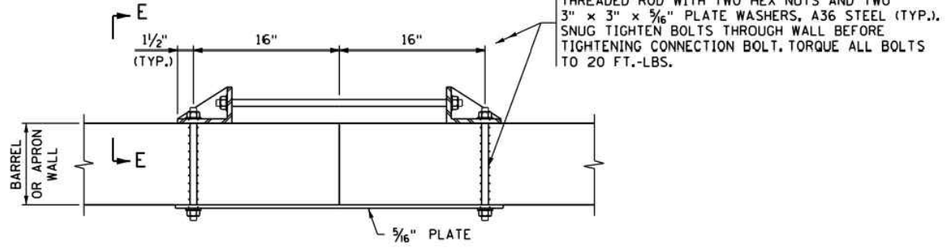


NO. 4 BENT BAR

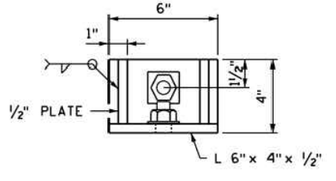


NO. 4 BENT BAR ALTERNATE

(6) 2 REQUIRED



PLAN VIEW



SECTION E-E

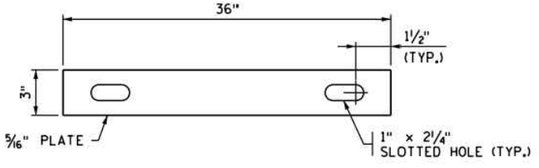


PLATE DETAIL

EXTRA STRONG CONNECTION DETAILS

REVISION: DECEMBER 21, 2022

APPROVED: MARCH 24, 2011

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NAME: LIC. NO.

STATE PROJ. NO. 197-080-001 (T.H.) STA. + .

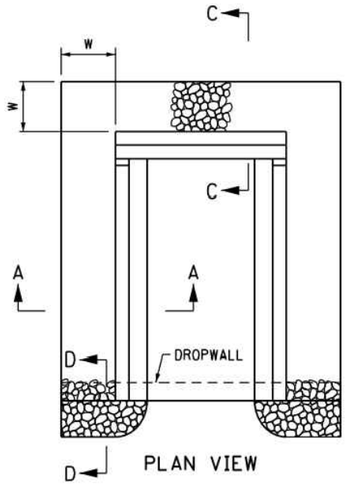
TITLE: PRECAST CONCRETE END SECTION TYPE III - SINGLE OR MULTIPLE BARREL FOR SKEWS 7½° TO 45°

FIG. 5-395.110 (2 OF 2)

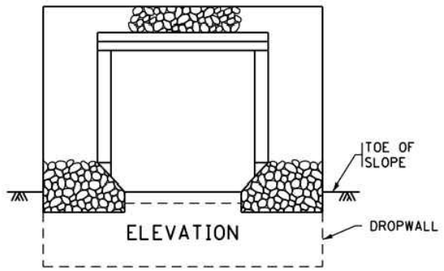
DES: DAK	DR: JAB	APPROVED:
CHK: TPC	CHK:	

SHEET NO. 13 OF 21 SHEETS

BRIDGE NO. 02J59



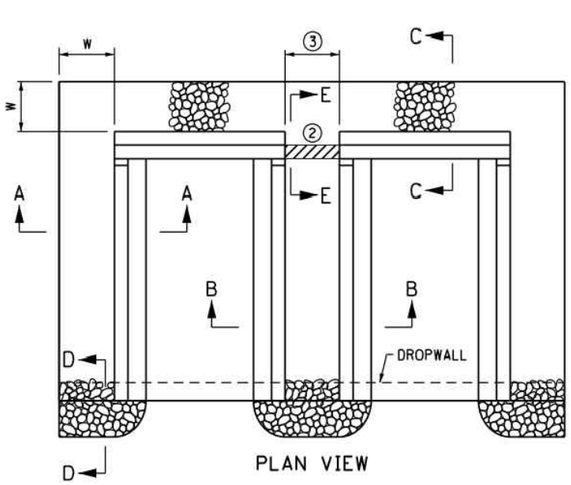
PLAN VIEW



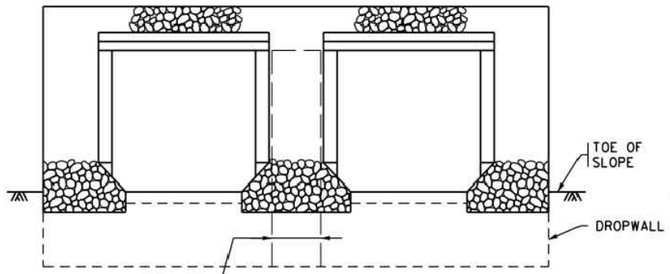
ELEVATION

SINGLE BARREL

CLASS III OR IV SHOWN
FOR SKEWS UP TO 7½°



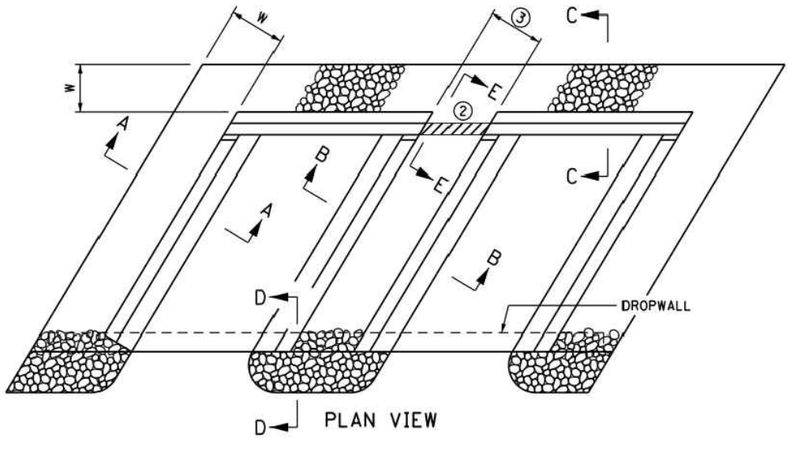
PLAN VIEW



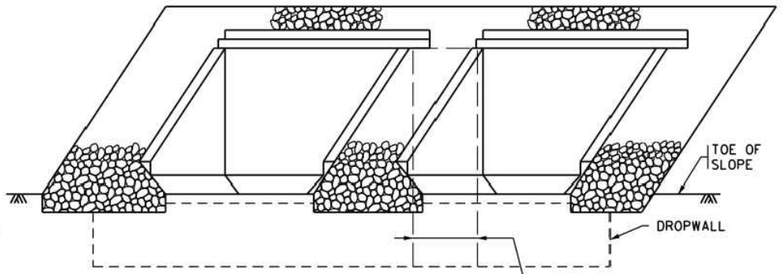
ELEVATION

MULTIPLE BARREL

FOR SKEWS UP TO 7½°
CLASS III OR IV SHOWN
DOUBLE BARREL SHOWN



PLAN VIEW



ELEVATION

MULTIPLE BARREL

FOR SKEWS OVER 7½°
CLASS III OR IV SHOWN
DOUBLE BARREL SHOWN,
OTHER BARREL CONFIGURATIONS SIMILAR.

CONSTRUCTION NOTES

THIS PLAN SHEET IS FOR CULVERT EMBANKMENT PROTECTION ONLY. REFER TO THE GRADING PLANS FOR ADDITIONAL RIPRAP OR OTHER SCOUR PROTECTION MEASURES.

PROVIDE RIPRAP IN ACCORDANCE WITH SPECS. 2511 AND 3601.

EMBANKMENT PROTECTION, INCLUDING MATERIAL PLACED BETWEEN BARRELS THAT ARE LESS THAN 2'-0" APART, IS INCLUDED IN THE PRECAST CONCRETE BOX CULVERT PAY ITEMS.

① PROVIDE TYPE 7 GEOTEXTILE IN ACCORDANCE WITH SPEC. 3733. PROVIDE GEOTEXTILE STRIPS CONTINUOUS WITHOUT OVERLAPS, EXCEPT FOR THE TOP STRIP, WHICH SHOULD SHINGLE VERTICAL STRIPS. BURY THE TOP EDGE TO PREVENT UNDERMINING.

② IF THE DISTANCE BETWEEN MULTIPLE BARRELS IS LESS THAN 2'-0" USE EITHER PEA ROCK OR LEAN MIX BACKFILL (SPEC. 2520) BETWEEN THE CULVERTS AS APPROVED BY THE ENGINEER. IF PEA ROCK IS USED PROVIDE APPROVED GROUT SEEPAGE CUTOFF CORE, MINIMUM 12" THICK BETWEEN THE CULVERT'S TWO ENDS AND PROVIDE CLASS I GROUTED RIPRAP IN LIEU OF CLASS III RIPRAP.

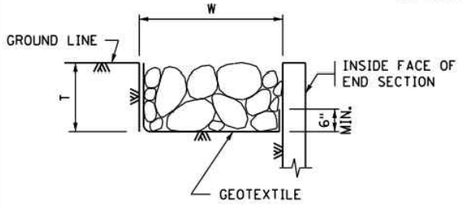
③ REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES.

RIPRAP CLASS

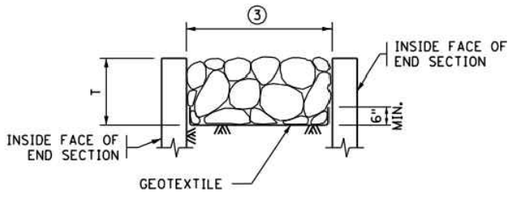
RIPRAP CLASS	RIPRAP CLASS	T	W
☐	III	1'-6"	3'-0"
☐	IV	2'-0"	4'-0"

DESIGNER NOTE:
REMOVE PRIOR TO PRINTING FINAL PLAN

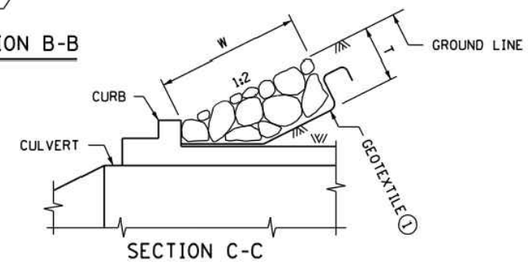
DESIGNER TO SELECT EITHER CLASS III OR IV RIPRAP USING CHECK BOX ABOVE.



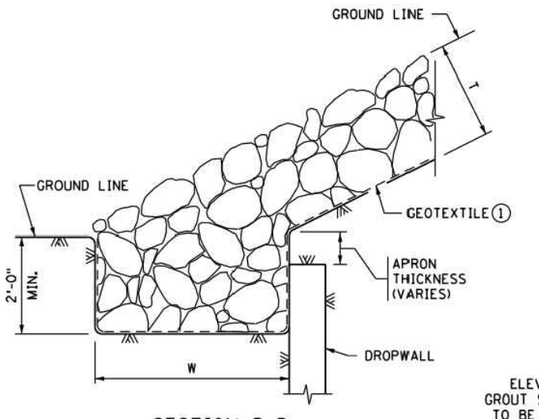
SECTION A-A



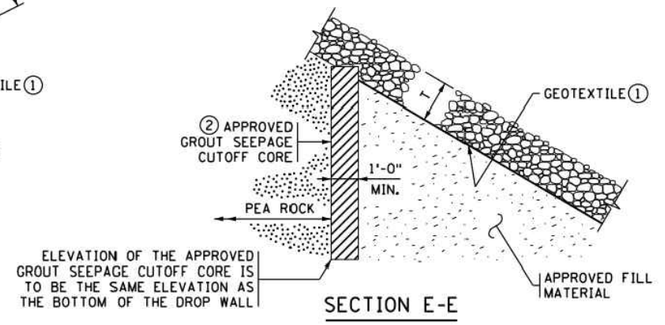
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

REVISION: DECEMBER 21, 2022

APPROVED: SEPTEMBER 11, 2014

Nancy Daubenberger
STATE BRIDGE ENGINEER

REV. NO.	DATE	REVISION DESCRIPTION	BY
--	09/08/23		

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CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER _____ DATE

NAME: LIC. NO.

STATE PROJ. NO. 197-080-001 (T.H.) STA. + .

TITLE: EMBANKMENT PROTECTION FOR BOX CULVERTS

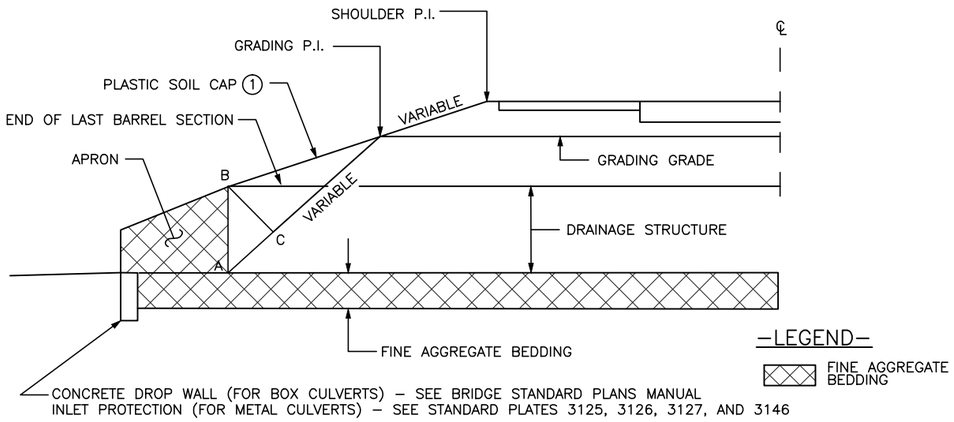
FIG. 5-395.115

DES: DAK DR: JAB CHK: TPC CHK:

APPROVED:

SHEET NO. 14 OF 21 SHEETS

BRIDGE NO. 02J59



CONCRETE DROP WALL (FOR BOX CULVERTS) – SEE BRIDGE STANDARD PLANS MANUAL
INLET PROTECTION (FOR METAL CULVERTS) – SEE STANDARD PLATES 3125, 3126, 3127, AND 3146

(1) PLASTIC SOIL CAP CONSIST OF 50% MIN. PASSING THE NO. 200 SIEVE AND 20% MIN. CLAY SIZE PARTICLES

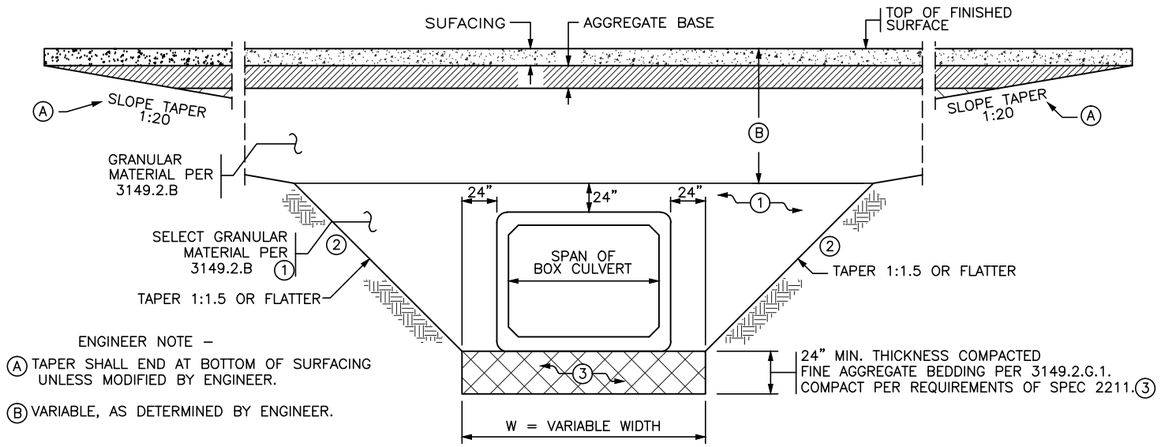
NOTES:
THE TREATMENT WILL BE RECOMMENDED BY THE DISTRICT MATERIALS/SOILS ENGINEER.

WIDTH OF PLASTIC SOIL CAP:
A) FOR PLASTIC SOIL EMBANKMENT – FULL WIDTH OF THE GRANULAR TREATMENT PLUS 2' ON EACH END.
B) FOR GRANULAR SOIL EMBANKMENT – A MINIMUM OF ONE DIAMETER OR WIDTH OF STRUCTURE ON EITHER SIDE OF THE STRUCTURE.

THE TREATMENT IS NORMALLY REQUIRED ON THE INLET END.

THE THICKNESS OF THE PLASTIC SOILS CAP (B–C) IS 3' MINIMUM AND 6' MAXIMUM.
A) FILL HEIGHTS LESS THAN 15'.
– NORMALLLY EXTEND THE LINE THRU (A–C) TO GRADING P.I. HOWEVER, IF THIS RESULTS IN A THICKNESS (B–C) GREATER THAN 6', REDUCE B–C TO 6' OR LESS AND INTERSECTION THE FILL SLOPE RATHER THAN THE P.I..

B) FILL HEIGHTS GREATER THAT 15'.
– THE LINE THRU A–C NEED NOT INTERSECT THE GRADING P.I. INSTEAD INTERSECT THE FILL SLOPE AT A POINT NOT LESS THAN 5' ABOVE THE STRUCTURE MAINTAINING AT LEAST A MINIMUM THICKNESS (B–C) OF 3'.



ENGINEER NOTE –
(A) TAPER SHALL END AT BOTTOM OF SURFACING UNLESS MODIFIED BY ENGINEER.
(B) VARIABLE, AS DETERMINED BY ENGINEER.

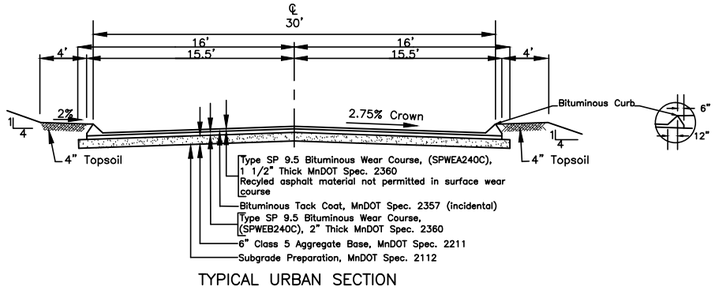
CONCRETE BOX CULVERT BEDDING

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.
ALL SLOPES SHOWN AS (V) :(H)

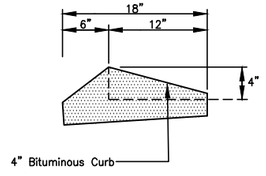
(1) MAXIMUM EMBANKMENT PARTICLE SIZE WITHIN 2 FT. OF CULVERT IS 3" PER SEPC. TABLE 2105–4.
(2) OVER EXCAVATION BENEATH TAPERS IS NOT PERMITTED UNLESS REQUIRED BY OSHA. (TYP.)
(3) IF APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE 18" OF COARSE FILTER AGGREGATE PER 3149.2.H COMPACTED TO THE QUALITY COMPACTION REQUIREMENTS OF SPEC.2211.3.C2.B. WRAP WITH GEOTEXTILE FABRIC TYPE IV PER SPEC 3733. SEAM ALL FABRIC SIDES AND ENDS PER SPEC TABLE 3733–1 INCLUDING FOOTNOTE (e) OR OVERLAP A MINIMUM OF 3 FT. ALL AT NO ADDITIONAL COST.

BOX CULVERT BEDDING AND PLASTIC SOIL CAP
RFC–654A
NOT TO SCALE

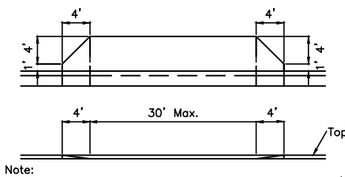


TYPICAL URBAN SECTION

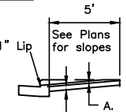
TYPICAL STREET SECTION RFC–366E10BM
NOT TO SCALE



BITUMINOUS CURB RFC–353B
NOT TO SCALE



Note:
(1) Match existing driveway apron type, width and elevation at matchline unless otherwise directed by engineer (See Plans).
(2) If existing driveway is concrete (beyond apron), apron and driveway shall be constructed of 6" concrete with 6" x 6" – 6/6 welded wire fabric per MnDOT Spec. 3303 in flat sheets, not rolls. Epoxy coated dowel bars per MnDOT Spec. 3302 shall along the sawcut. Dowel bars shall be properly coated with a MnDOT approved lubricant. Dowel bars shall be size #4 and placed at 24" OC spacing. All work shall conform to MnDOT Spec. 2301 and 2531. Concrete shall be ready–mix 4,000 PSI at 28 days, with air content of 5% to 7%, coarse aggregate shall be 1" max, class A and per MnDOT Spec. 3137. Joint sealer shall be hot–poured, low modulus, mastic type per MnDOT Spec. 3725. Membrane curing compound shall be per MnDOT Specs. 3754 and 2301.3J.
(3) If existing driveway is gravel (beyond apron), apron and driveway within R/W shall be constructed per existing bituminous driveways. Gravel driveways matching beyond R/W shall be 6" Class 5.



(4) If existing driveway is bituminous (beyond apron), apron and driveway behind apron shall be bituminous per A. above. All bituminous work shall conform to MnDOT Specifications 2112, 2211, 2357 and 2360. Tack coat is to be applied between concrete and bituminous surfaces.
(5) Driveways in fill sections to slope up from 1" curb lip to end of apron (5' from back of curb) at min of 2% then slope to matchline. See Plan for slope.

PRIVATE DRIVEWAY/FIELD ENTRANCE RFC–363A1
NOT TO SCALE

COPHER ONE STATE ONE CALL
800-252-1166 651-454-0002

UTILITIES:
CENTURYLINK (763) 712–5017
CENTERPOINT ENERGY (763) 323–2760
COMCAST (952) 607–4078
CONNEXUS ENERGY (763) 323–4268
XCEL ENERGY (612) 526–4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

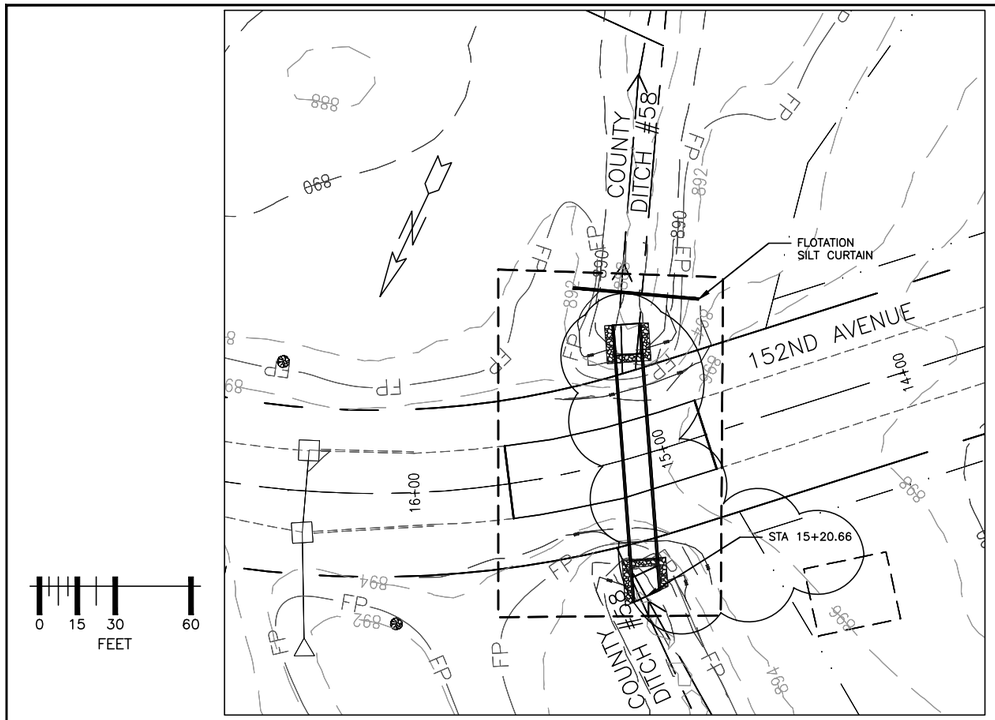
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
Dave Kruglen
DATE 03/06/24 REG. NO. 48768

RFC ENGINEERING, INC.
Consulting Engineers
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763–862–8000
Fax 763–862–8042

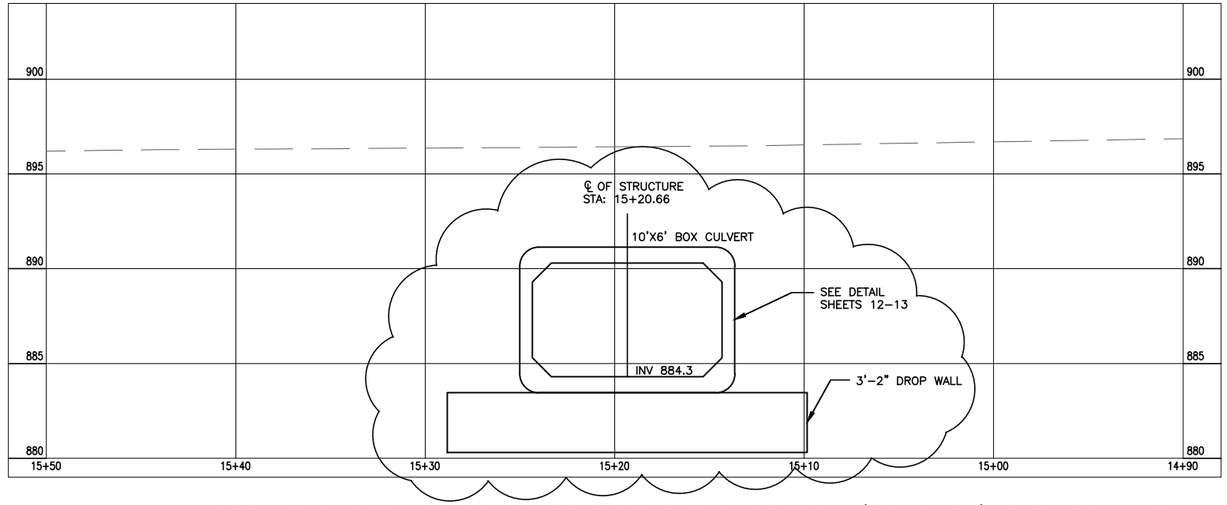
SAP – 197–080–001
COUNTY DITCH #58 CROSS CULVERT
DETAILS

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG: 2302.038 DETAIL 1
DATE: 03/06/24
JOB NUMBER: 2302.038
SHEET: 15 OF 21
FILE: 37–2–164



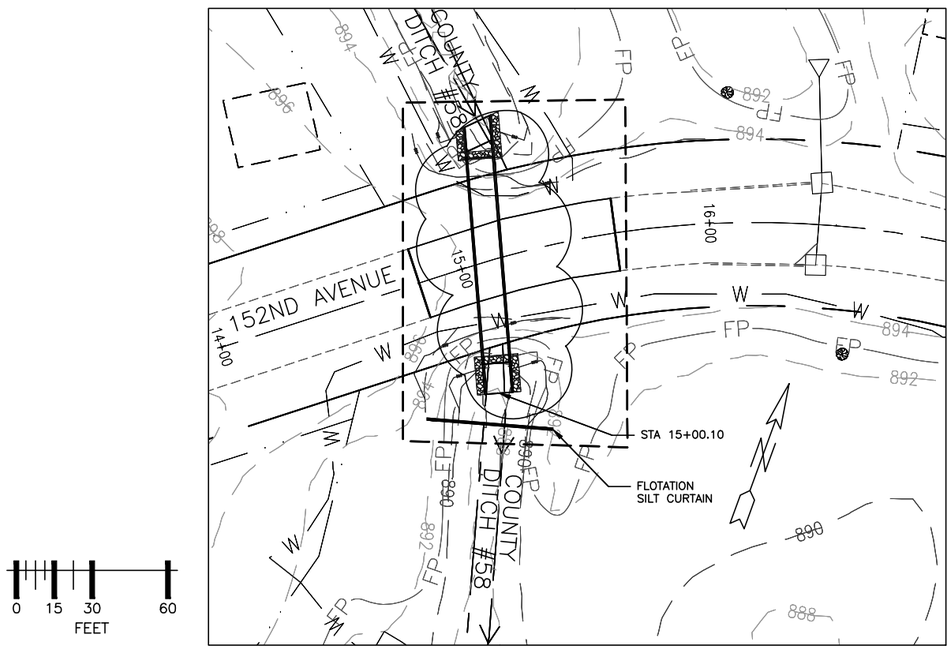
NORTH END PRECAST CONCRETE BOX CULVERT PLAN VIEW



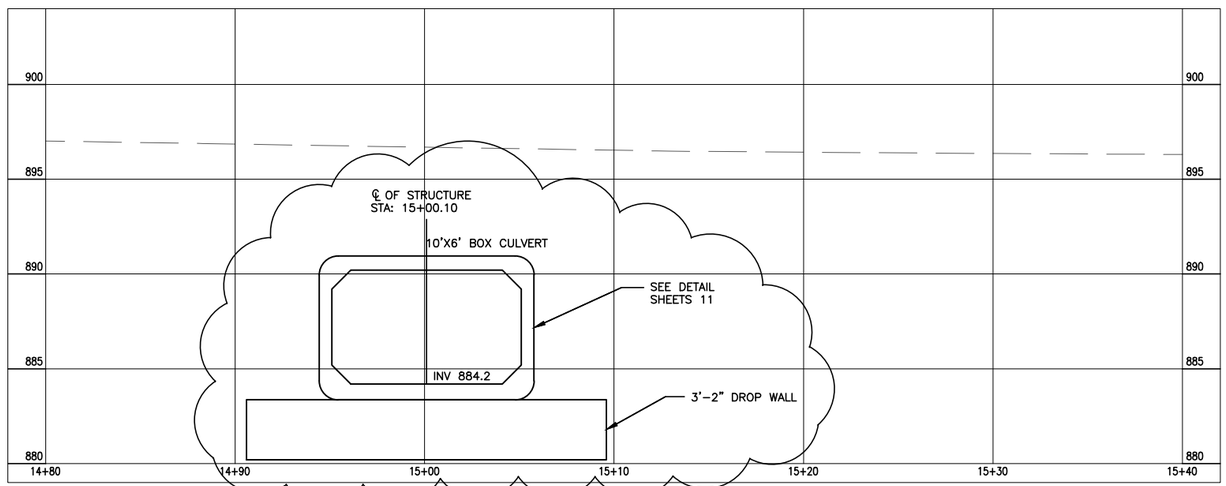
NORTH END PRECAST CONCRETE TYPE 3 END SECTION (30° SKEW) ELEVATION VIEW

NOTES:

1. SELECT GRANULAR EMBANKMENT, STRUCTURAL EXCAVATION, AND GRANULAR BACKFILL FOR BOX CULVERT AND END SECTIONS IS INCIDENTAL.



SOUTH END PRECAST CONCRETE BOX CULVERT PLAN VIEW



SOUTH END PRECAST CONCRETE TYPE 1 END SECTION ELEVATION VIEW

GOPHER STATE ONE CALL
800-252-1166 651-454-0002

UTILITIES:

CENTURYLINK	(763) 712-5017
CENTERPOINT ENERGY	(763) 323-2760
COMCAST	(952) 607-4078
CONNEXUS ENERGY	(763) 323-4268
XCEL ENERGY	(612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

I HEREBY CERTIFY THAT THIS PLAN 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.
Dan Krueger
DATE 03/06/24 REG. NO. 48768

RFC ENGINEERING, INC.
Consulting Engineers

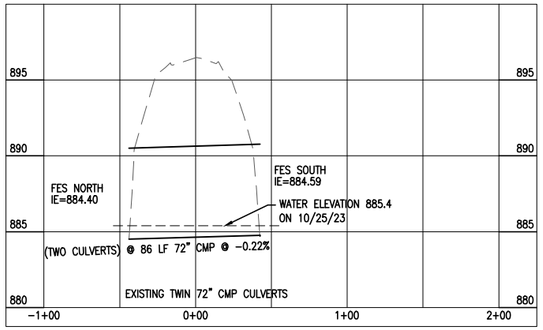
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

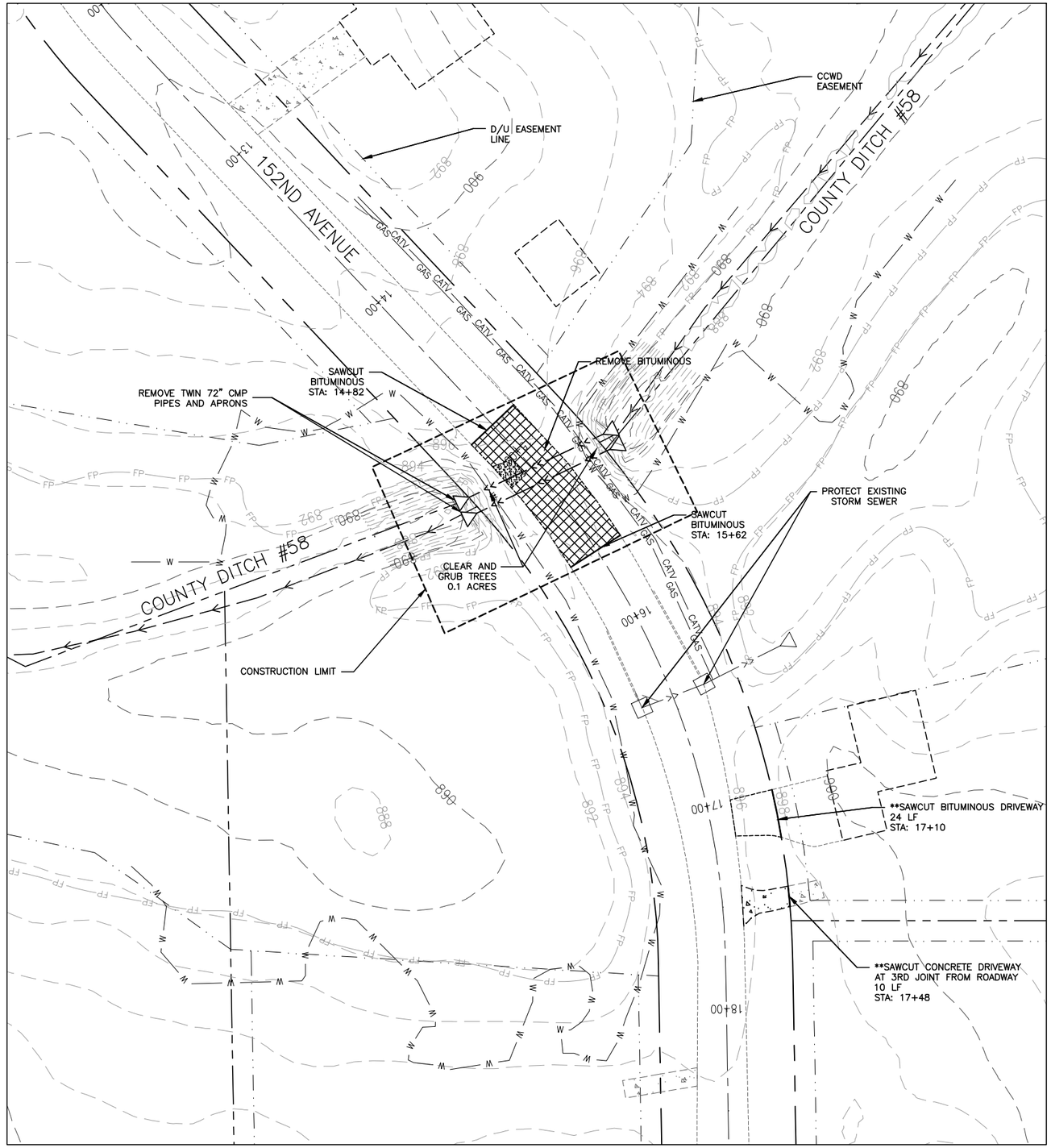
SAP – 197-080-001
COUNTY DITCH #58 CROSS CULVERT

BOX CULVERT DETAILS

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG:	2302.038 BC3
DATE:	03/06/24
JOB NUMBER:	2302.038
SHEET:	16 OF 21
FILE:	37-2-165



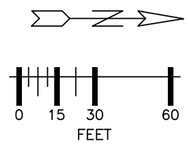


LEGEND

REMOVE BITUMINOUS PAVEMENT

NOTES:

1. ALL DISTURBED AREAS TO BE SEEDED, MULCHED AND FERTILIZED WITHIN 7 DAYS OF ROUGH GRADING.
2. THERE SHALL BE NO STOCKPILING INCLUDING TEMPORARY STOCK PILES OF MATERIALS IN WETLAND AREAS.
3. ALL LOCATIONS OF STOCKPILES SHALL BE SUBMITTED FOR THE CITY ENGINEER'S APPROVAL PRIOR TO STOCKPILING. ALL EROSION CONTROL FOR STOCKPILES SHALL BE PER BMPs AND SWPPP.
4. ALL FLOTATION SILT CURTAIN MUST BE IN PLACE BEFORE ANY LAND IS DISTURBED.
5. ALL TREES DETERMINED TO NEED REMOVAL BY CONTRACTOR AND NOT MARKED FOR REMOVAL ON THIS PLAN MUST BE APPROVED BY THE ENGINEER BEFORE REMOVAL..
6. DISPOSE OF ALL REMOVAL MATERIAL LEGALLY OFF-SITE.
7. ** DRIVEWAY SAWCUTS AND DRIVEWAY REMOVALS ARE NOT TO BE DONE WITHOUT ENGINEER APPROVAL.



GOPHER STATE ONE CALL
800-252-1166 651-454-0002

UTILITIES:
CENTURYLINK (763) 712-5017
CENTERPOINT ENERGY (763) 323-2760
COMCAST (952) 607-4078
CONNEXUS ENERGY (763) 323-4268
XCEL ENERGY (612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

I HEREBY CERTIFY THAT THIS PLAN 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.
Dan Krueger
DATE 03/06/24 REG. NO. 48768

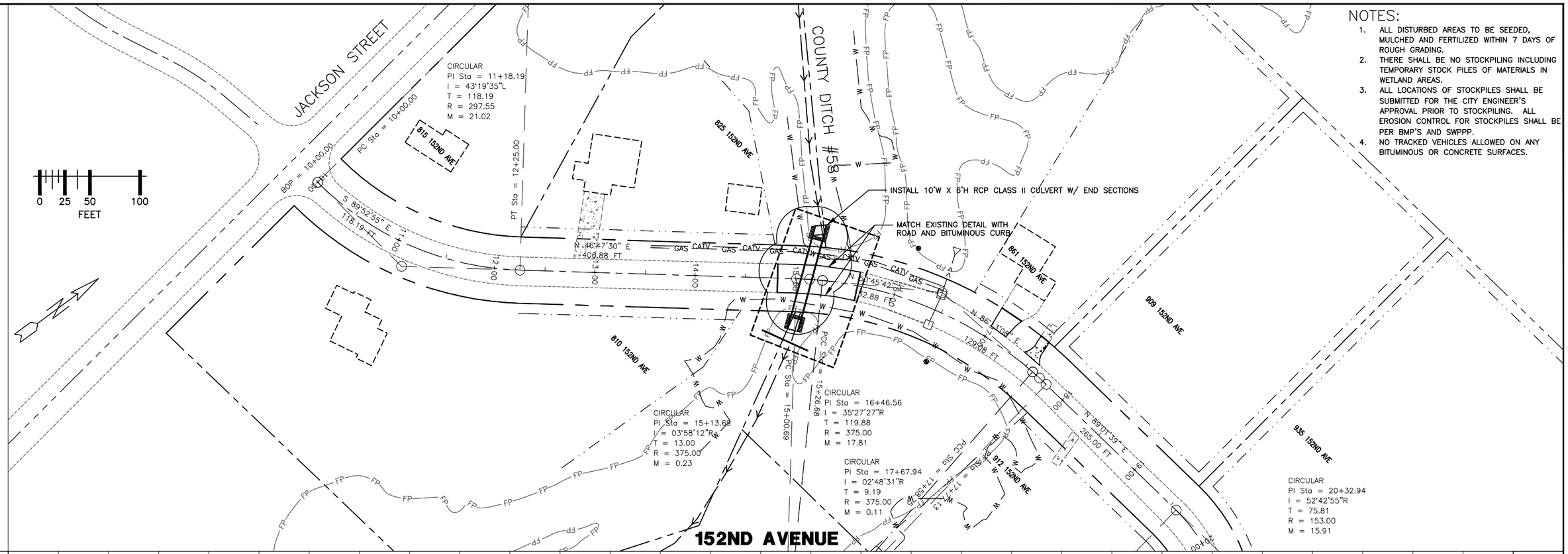
RFC ENGINEERING, INC.
Consulting Engineers

13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

SAP - 197-080-001
COUNTY DITCH #58 CROSS CULVERT
REMOVAL PLAN

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG:2302.038 REMOVAL
DATE: 03/06/24
JOB NUMBER: 2302.038
SHEET: 17 OF 21
FILE: 37-2-166



NOTES:

1. ALL DISTURBED AREAS TO BE SEEDED, MULCHED AND FERTILIZED WITHIN 7 DAYS OF ROUGH GRADING.
2. THERE SHALL BE NO STOCKPILING INCLUDING TEMPORARY STOCK PILES OF MATERIALS IN WETLAND AREAS.
3. ALL LOCATIONS OF STOCKPILES SHALL BE SUBMITTED FOR THE CITY ENGINEER'S APPROVAL PRIOR TO STOCKPILING. ALL EROSION CONTROL FOR STOCKPILES SHALL BE PER BMP'S AND SWPPP.
4. NO TRACKED VEHICLES ALLOWED ON ANY BITUMINOUS OR CONCRETE SURFACES.

GOPHER STATE ONE CALL
800-252-1166 651-454-0002
PLOT DATE: 3/13/2024 14:26

UTILITIES:
CENTURYLINK (763) 712-5017
CENTERPOINT ENERGY (763) 323-2760
COMCAST (952) 607-4078
CONNEXUS ENERGY (763) 323-4268
XCEL ENERGY (612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

I HEREBY CERTIFY THAT THIS PLAN 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.
Dan Krueger
DATE 03/06/24 REG. NO. 48768

RFC ENGINEERING, INC.
Consulting Engineers

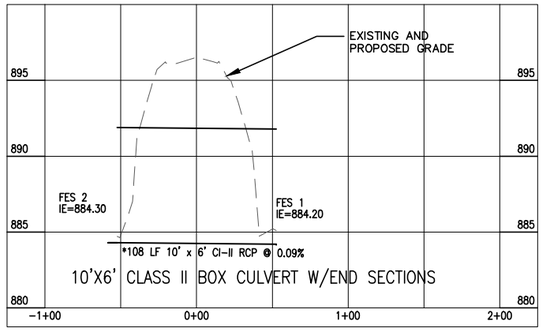
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

SAP – 197-080-001
COUNTY DITCH #58 CROSS CULVERT
BOX CULVERT PLAN AND PROFILE

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG:	RCP01900
DATE:	03/06/24
JOB NUMBER:	2302.038
SHEET:	18 OF 21
FILE:	37-2-167

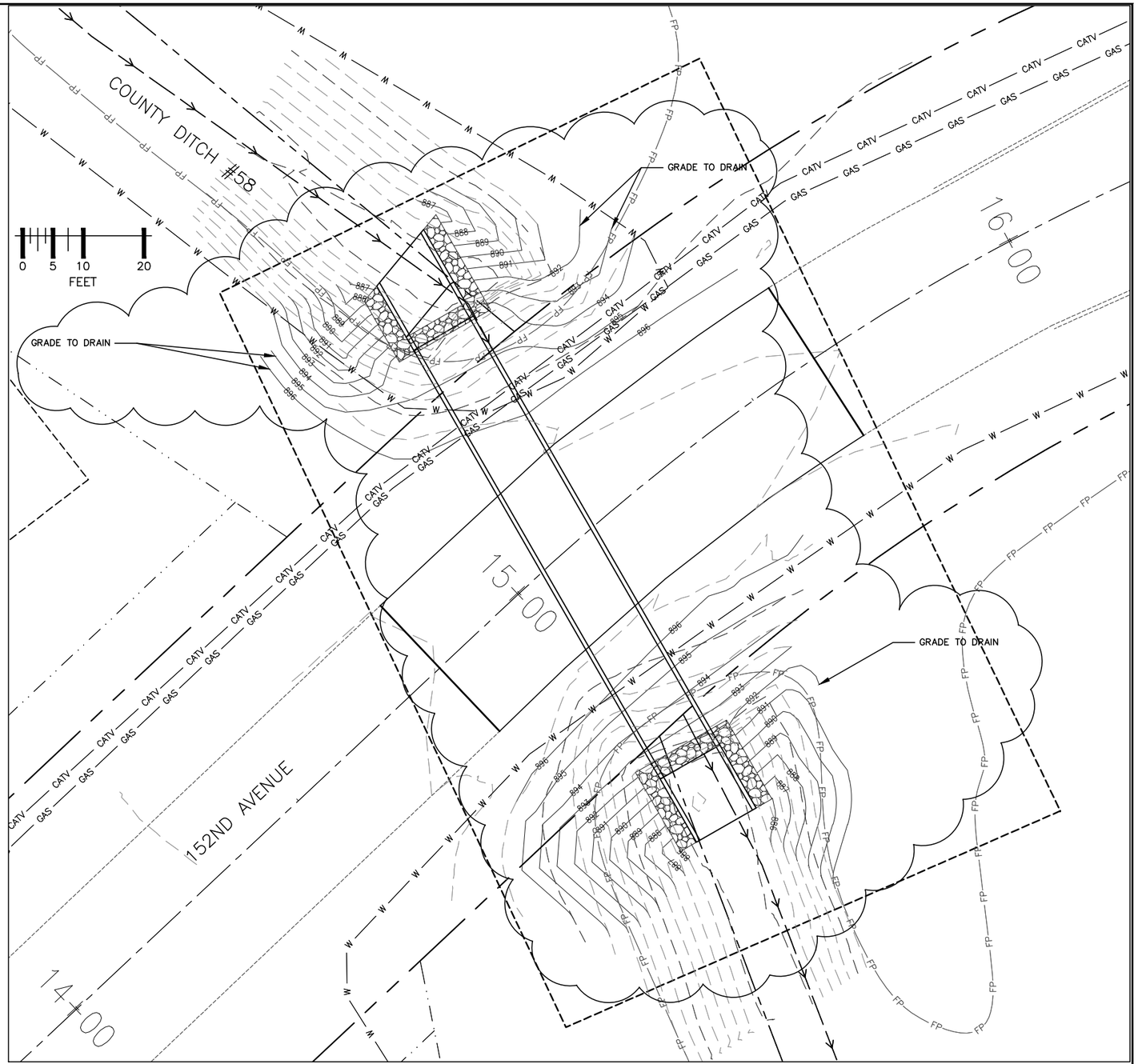
BRIDGE #02J59



84 LF 10' W X 6' H PRECAST CONCRETE BOX CULVERT
WITH TYPE I AND TYPE III END SECTIONS

NOTES:

1. COUNTY DITCH 58 TO BE DEWATERED TO TWO FEET MINIMUM BELOW THE BOTTOM OF THE BOX CULVERT. CONTRACTOR SHALL SUBMIT THEIR DEWATERING PLAN TO COON CREEK WATERSHED DISTRICT FOR REVIEW PRIOR TO ANY DEWATERING.
2. A PHASING AND DIVERSION PLAN MUST BE SUBMITTED BY THE CONTRACTOR AND APPROVED BY COON CREEK WATERSHED DISTRICT PRIOR TO OBTAINING A PERMIT OR BEGINNING CONSTRUCTION.
3. REMOVE ANY ENCOUNTERED UNSUITABLE SOILS SUCH AS ORGANIC SOILS AND LOOSE SILTS FROM UNDER THE PROPOSED BOX CULVERT.
4. BACKFILL UNDER THE PROPOSED BOX CULVERT WITH DRY NATIVE GRANULAR MATERIAL AND COMPACT TO 100 PERCENT.
5. IF BOX CULVERT SETTLES, ADD BACKFILL, RECOMPACT, AND RESET BOX CULVERT.
6. JOINTS IN THE PRECAST CONCRETE BOX CULVERT SHALL BE SEALED USING AN MNDOT APPROVED JOINT SEALER MATERIAL (PREFORMED RUBBER, PREFORMED PLASTIC OR BITUMINOUS MASTIC). SEALANT TO CONFORM WITH MNDOT SPECIFICATIONS 2412.4B.
7. TIES SHALL BE PER MNDOT STANDARD PLATE 3145G FOR RECESSED TIES.
8. DEWATERING, BYPASSING, ADDITIONAL PERMITTING, JOINT SEALER, TIES, CLASS 5, ROCK, GEOTEXTILE FABRIC, RIPRAP, LEAN MIX BACKFILL, AND COMPACTION ARE INCIDENTAL TO BOX CULVERT.
9. NOTIFY COON CREEK WATERSHED DISTRICT ONE WEEK PRIOR TO THE CULVERT PLACEMENT AND NOTIFY ENGINEER TWO HOURS PRIOR TO THE COMPLETION OF EACH CULVERT PLACEMENT TO ALLOW SURVEYING OF INVERT.
10. *CULVERT LENGTH INCLUDES END SECTIONS.



GOPHER STATE ONE CALL
800-252-1166 651-454-0002

UTILITIES:
CENTURYLINK (763) 712-5017
CENTERPOINT ENERGY (763) 323-2760
COMCAST (952) 607-4078
CONNEXUS ENERGY (763) 323-4268
XCEL ENERGY (612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

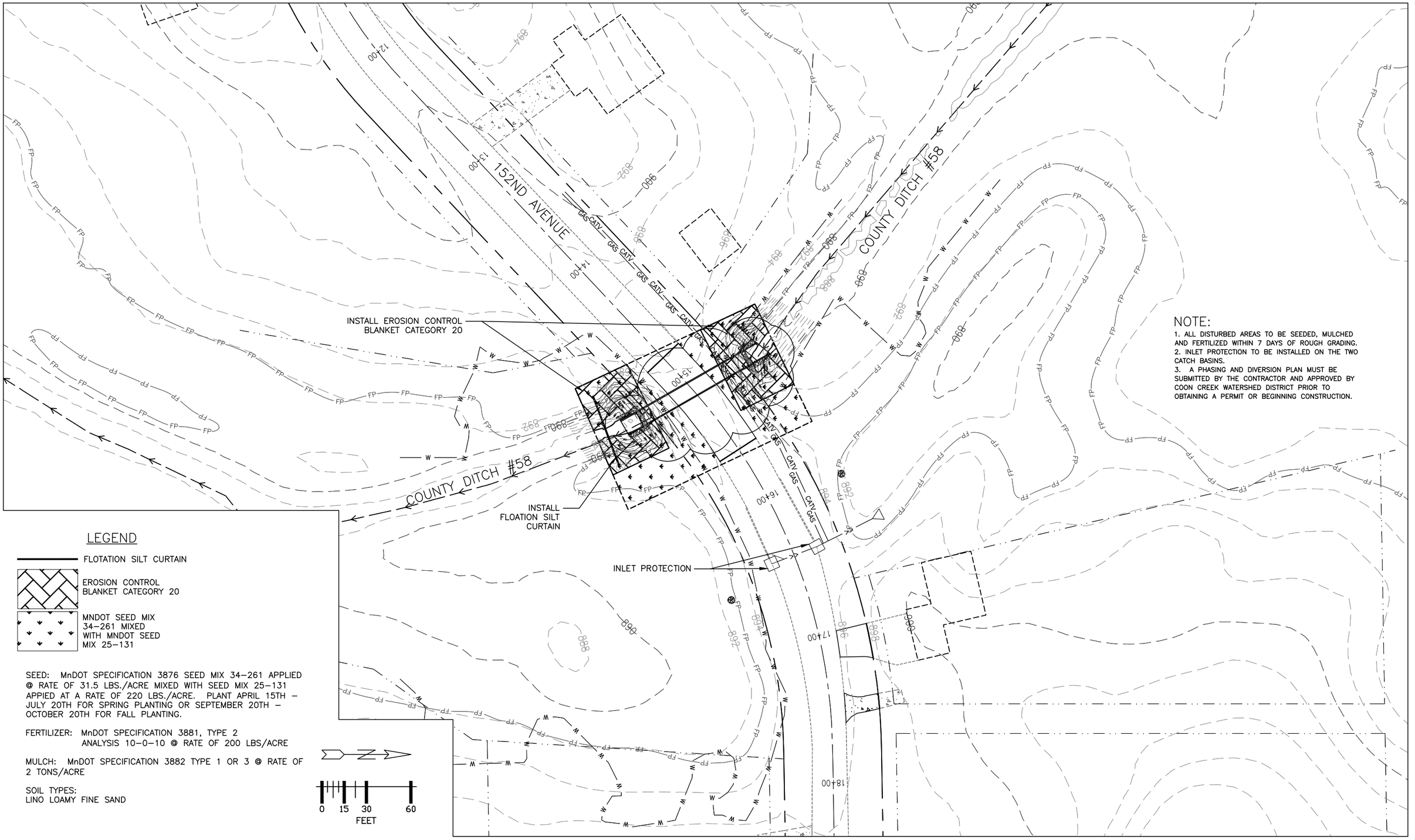
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
Dan Kugler
DATE 03/06/24 REG. NO. 48768

RFC ENGINEERING, INC.
Consulting Engineers
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

SAP - 197-080-001
COUNTY DITCH #58 CROSS CULVERT
STORM DETAIL

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG: 2302.038 STORM1
DATE: 03/06/24
JOB NUMBER: 2302.038
SHEET: 19 OF 21
FILE: 37-2-168



NOTE:

1. ALL DISTURBED AREAS TO BE SEEDED, MULCHED AND FERTILIZED WITHIN 7 DAYS OF ROUGH GRADING.
2. INLET PROTECTION TO BE INSTALLED ON THE TWO CATCH BASINS.
3. A PHASING AND DIVERSION PLAN MUST BE SUBMITTED BY THE CONTRACTOR AND APPROVED BY COON CREEK WATERSHED DISTRICT PRIOR TO OBTAINING A PERMIT OR BEGINNING CONSTRUCTION.

LEGEND

- FLOTATION SILT CURTAIN
- EROSION CONTROL BLANKET CATEGORY 20
- MNDOT SEED MIX 34–261 MIXED WITH MNDOT SEED MIX 25–131

SEED: MnDOT SPECIFICATION 3876 SEED MIX 34–261 APPLIED @ RATE OF 31.5 LBS./ACRE MIXED WITH SEED MIX 25–131 APPIED AT A RATE OF 220 LBS./ACRE. PLANT APRIL 15TH – JULY 20TH FOR SPRING PLANTING OR SEPTEMBER 20TH – OCTOBER 20TH FOR FALL PLANTING.

FERTILIZER: MnDOT SPECIFICATION 3881, TYPE 2 ANALYSIS 10–0–10 @ RATE OF 200 LBS/ACRE

MULCH: MnDOT SPECIFICATION 3882 TYPE 1 OR 3 @ RATE OF 2 TONS/ACRE

SOIL TYPES:
LINO LOAMY FINE SAND

GOPHER STATE ONE CALL
800-252-1166 651-454-0002

UTILITIES:

CENTURYLINK	(763) 712–5017
CENTERPOINT ENERGY	(763) 323–2760
COMCAST	(952) 607–4078
CONNEXUS ENERGY	(763) 323–4268
XCEL ENERGY	(612) 526–4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

I HEREBY CERTIFY THAT THIS PLAN 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.
Dave Krueger
DATE 03/06/24 REG. NO. 48768

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Consulting Engineers

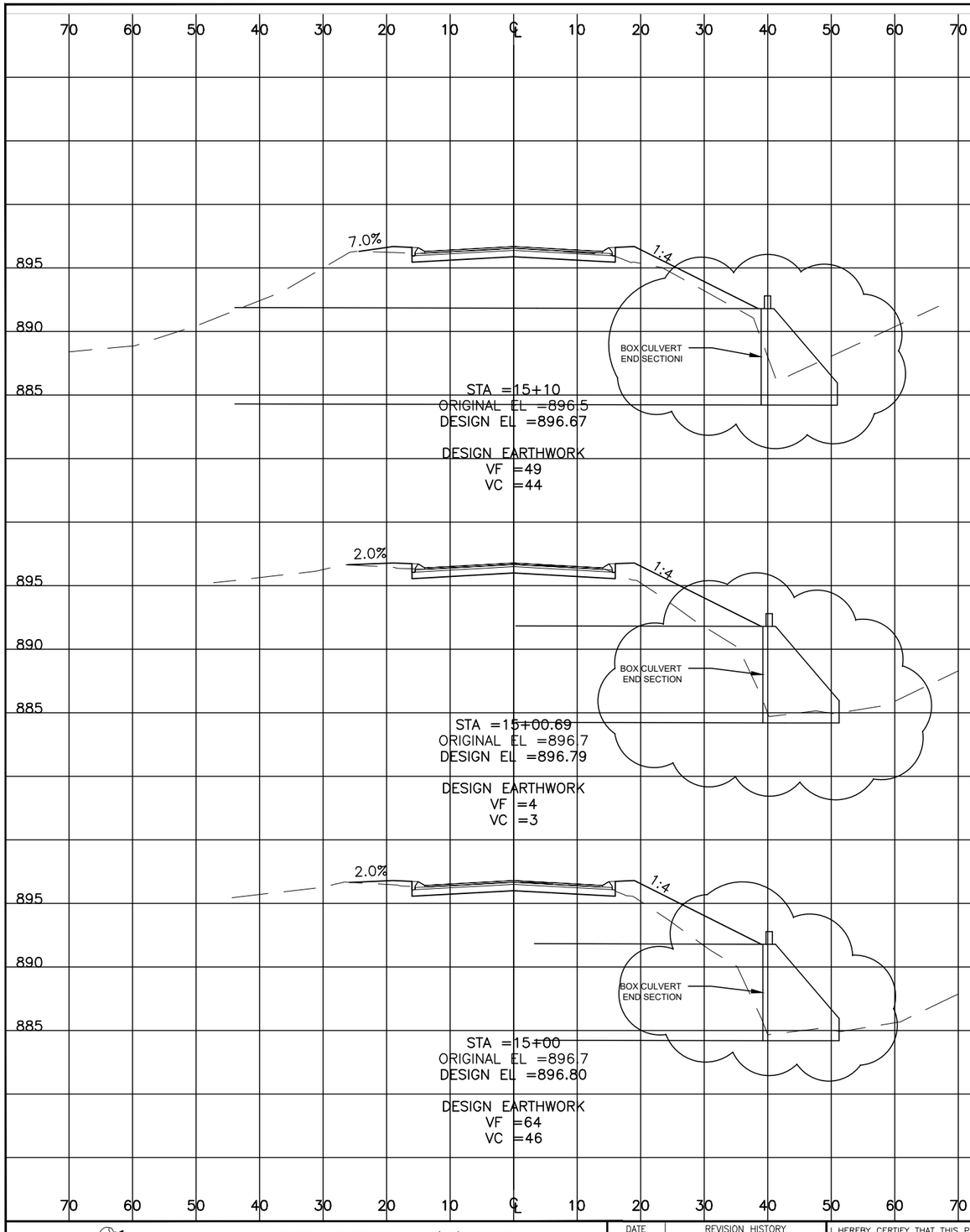
13635 Johnson Street
Ham Lake, MN 55304
Telephone 763–862–8000
Fax 763–862–8042

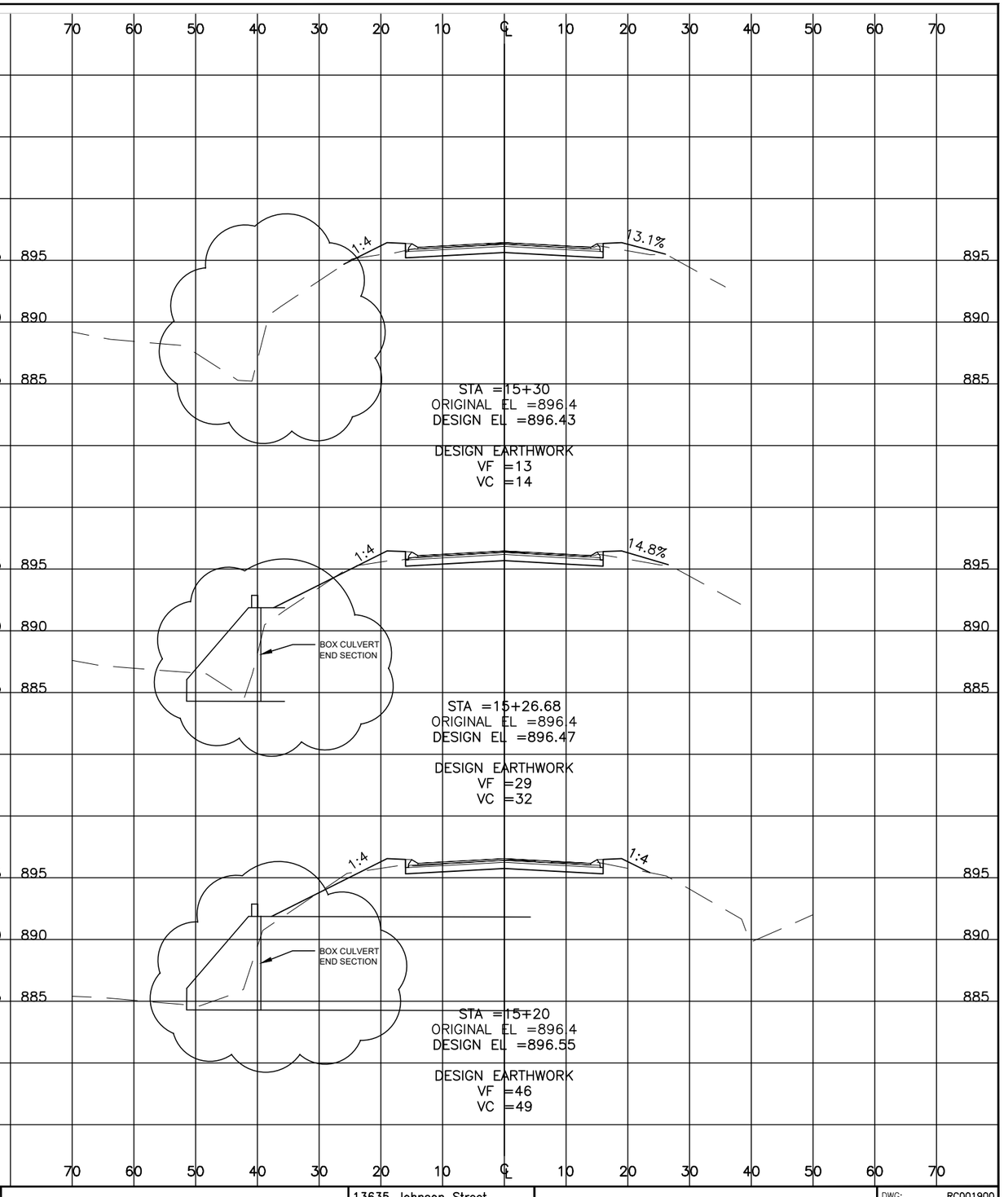
SAP – 197–080–001
COUNTY DITCH #58 CROSS CULVERT

EROSION CONTROL PLAN

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG:	2302.038 SWPPP1
DATE:	03/06/24
JOB NUMBER:	2302.038
SHEET:	20 OF 21
FILE:	37–2–169





SOPHER STATE ONE CALL
800-252-1166 651-454-0002
PLOT DATE: 3/13/2024 14:26

UTILITIES:

CENTURYLINK	(763) 712-5017
CENTERPOINT ENERGY	(763) 323-2760
COMCAST	(952) 607-4078
CONNEXUS ENERGY	(763) 323-4268
XCEL ENERGY	(612) 526-4508

DATE	REVISION HISTORY
03/11/24	BOX CULVERT ALIGNEMNT

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Dave Ruegsegger
DATE 03/06/24 REG. NO. 48768

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Consulting Engineers

13635 Johnson Street
Ham Lake, MN 55304
Telephone 763-862-8000
Fax 763-862-8042

SAP - 197-080-001
COUNTY DITCH #58 CROSS CULVERT

CROSS SECTIONS

DESIGN BY: DAK DRAWN BY: JAB CHECKED BY: TPC

DWG:	RC001900
DATE:	03/06/24
JOB NUMBER:	2302.038
SHEET:	21 OF 21
FILE:	37-2-170