

# MINNESOTA DEPARTMENT OF TRANSPORTATION LINCOLN COUNTY

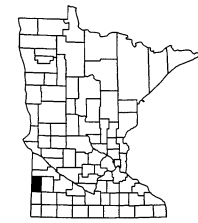
CONSTRUCTION PLAN FOR REPLACEMENT OF BRIDGE NO. L2094 WITH 1 LINE OF 12'x5' R.C. BOX CULVERT

LOCATED ON 170TH AVE. BETWEEN INTERSECTION OF CSAH 13 AND TWP. 200TH ST IN DIAMOND LAKE TOWNSHIP (Geographic description)

FROM WEST 1/4 CORNER OF SEC. 18-T110N-R45W TO NORTHWEST CORNER OF SEC. 18-T110N-R45W (Legal description)

### PLANS SYMBOLS

- STATE LINE
- COUNTY LINE
- TOWNSHIP OR RANGE LINE
- SECTION LINE
- QUARTER LINE
- PRESENT ROW
- NEW ROW
- TEMPORARY EASEMENT
- CONTROL OF ACCESS LINE
- PROPERTY LINES
- VACATED PLATTED PROPERTY
- CORPORATE OR CITY LIMITS
- RETAINING WALL
- RAILROAD
- RAILROAD RIGHT-OF-WAY
- DRAINAGE DITCH
- DRAIN TILE
- CULVERT
- DROP INLET
- GUARD RAIL
- BARBED WIRE FENCE
- WOVEN WIRE FENCE
- CHAIN LINK FENCE
- RAILROAD SNOW FENCE
- SWAMP
- TIMBER
- ORCHARD
- BRUSH
- NURSERY
- CATCH BASIN
- FIRE HYDRANT
- BUILDING (ONE STORY FRAME)
- F - FRAME C - CONCRETE
- S - STONE T - TILE
- B - BRICK ST - STUCCO
- IRON PIPE OR ROD
- MONUMENT (STONE, CONC. OR METAL)
- WOODEN HUB
- GRAVEL PIT
- SAND PIT
- BORROW PIT
- ROCK QUARRY

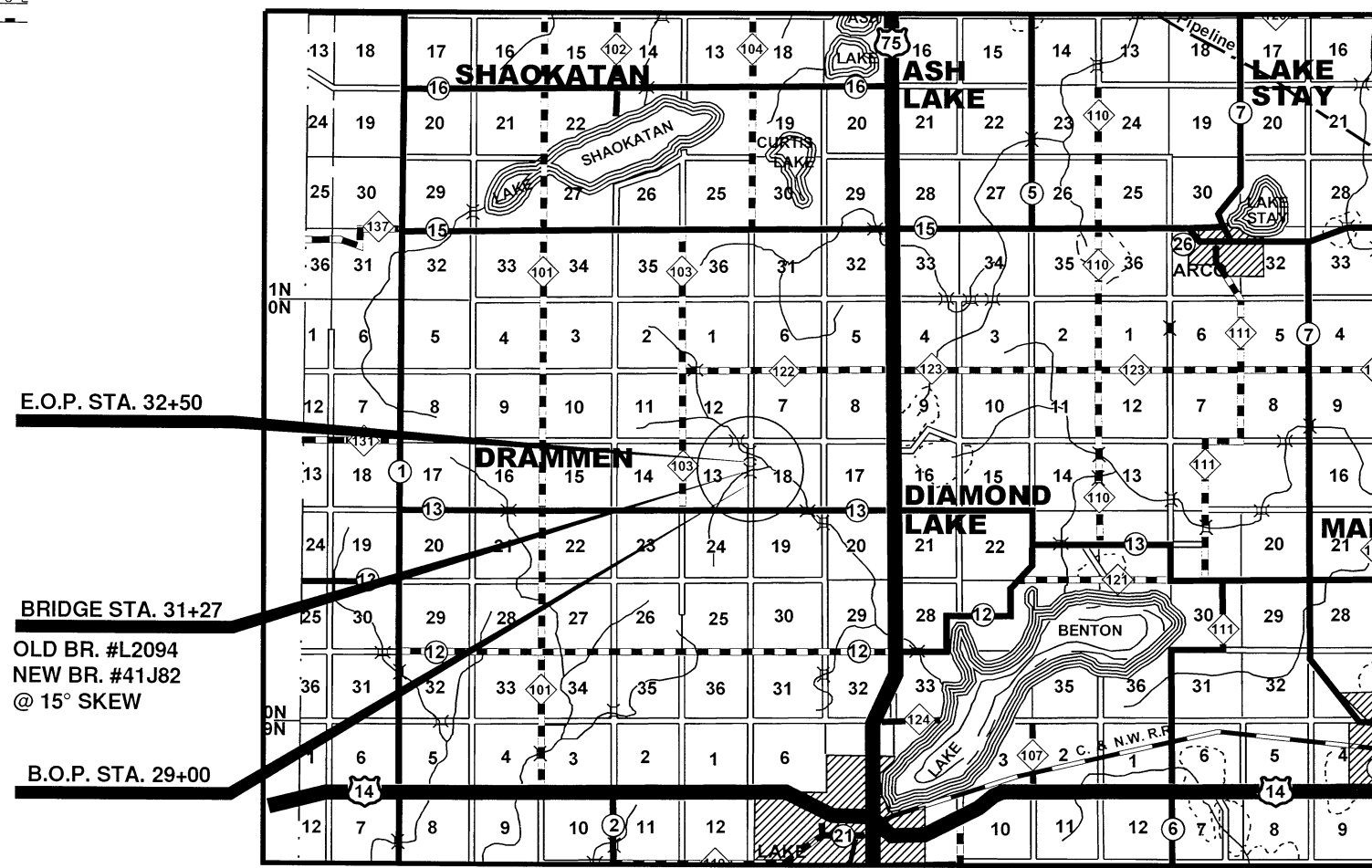


S.A.P. 041-599-066 (BRIDGE)

GROSS LENGTH	350 FT.	0.066 MI.
BRIDGES-LENGTH	0 FT.	0 MI.
EXCEPTIONS-LENGTH	0 FT.	0 MI.
NET LENGTH	350 FT.	0.066 MI.

### UTILITIES SYMBOLS

- POWER POLE LINE
- TELEPHONE LINE
- JOINT TELEPHONE AND POWER LINE
- ANCHOR
- STEEL TOWER
- STREET LIGHT
- PEDESTAL ( TELEPHONE CABLE TERMINAL )
- GAS MAIN
- WATER MAIN
- CONDUIT
- TELEPHONE CABLE IN CONDUIT
- ELECTRIC CABLE IN CONDUIT
- TELEPHONE MANHOLE
- ELECTRIC MANHOLE
- BURIED TELEPHONE CABLE
- BURIED POWER CABLE
- SEWER ( SANITARY OR STORM )
- SEWER MANHOLE
- POWER POLE



FEDERAL PROJECT NO. \_\_\_\_\_

### SPECIFICATIONS

THE 2020 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE "SUPPLEMENTAL SPECIFICATIONS" DATED SEPTEMBER 2022 SHALL GOVERN.

### INDEX

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- 2.) ESTIMATED QUANTITIES
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- 11.) PLAN & PROFILE
- 12.) BRIDGE SURVEY SHEET
- 13.) SWPPP
- 14.) TRAFFIC CONTROL

THIS PLAN CONTAINS 14 SHEETS

### DESIGN DESIGNATION

R-VALUE \_\_\_\_\_  
 ADT (2022) \_\_\_\_\_ LESS THAN 50  
 Proj. ADT (2042) \_\_\_\_\_ LESS THAN 50  
 Proj. HCADT (2042) \_\_\_\_\_  
 Soil Factor \_\_\_\_\_  
 Shoulder Width \_\_\_\_\_ 1.0 FT.  
 OR  
 FUNCTIONAL CLASSIFICATION \_\_\_\_\_ LOCAL  
 NO. OF TRAFFIC LANES 2 NO. OF PARKING LANES 0  
 DESIGN SPEED \_\_\_\_\_ 50 MPH  
 BASED ON STOPPING SIGHT DISTANCE  
 HEIGHT OF EYE 3.5 FT. HEIGHT OF OBJECT 2.0 FT.  
 DESIGN SPEED NOT ACHIEVED AT: \_\_\_\_\_ N/A  
 STA. \_\_\_\_\_ TO STA. \_\_\_\_\_

### LOCAL AGENCY SIGNATURES:

Signature: Joseph M. Wilson Typed or Printed Name: Joseph M. Wilson  
 Design Engineer: 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.

Date: 1-4-23

License Number 54947

Approved: Joseph M. Wilson Date: 1-4-23  
 Lincoln County Engineer

District State-Aid Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Reviewed for Compliance with State-Aid Rules/Policy

State-Aid Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Approved for State Aid Funding

### ESTIMATED QUANTITIES

NOTES	ITEM NO.	ITEM	UNITS	TOTAL PARTICIPATING	TOTAL NON-PARTICIPATING	TOTAL ESTIMATED QUANTITIES
	2021.501	MOBILIZATION	LUMP SUM	1		1
	2104.503	SALVAGE FENCE	LIN FT		68	68
	2106.507	COMMON EMBANKMENT (CV) (P)	CU YD		446	446
1	2118.509	AGGREGATE SURFACING CLASS 1	TON		246	246
2	2412.502	12X5 PRECAST CONCRETE BOX CULVERT END SECTION	EACH	2		2
3,4	2412.503	12X5 PRECAST CONCRETE BOX CULVERT	LIN FT	34		34
5,6	2442.501	REMOVE EXISTING BRIDGE	LUMP SUM		1	1
7	2451.507	COARSE FILTER AGGREGATE (CV) (P)	CU YD	116		116
8	2451.609	GRANULAR BACKFILL	TON	444		444
9,10	2511.509	RANDOM RIPRAP CLASS III	TON	60		60
	2557.603	INSTALL FENCE	LIN FT		68	68
	2563.601	TRAFFIC CONTROL	LUMP SUM	1		1
11	2564.502	INSTALL MARKER	EACH		2	2
	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER	LIN FT		45	45
	2575.504	ROLLED EROSION PREVENTION CATEGORY 20	SQ YD		165	165
12	2575.505	SEEDING	ACRE		0.5	0.5
13	2575.505	DISK ANCHORING	ACRE		0.5	0.5
	2575.508	SEED MIXTURE 21-111	POUND		16	16
	2575.508	SEED MIXTURE 25-142	POUND		23	23
13	2575.509	MULCH MATERIAL TYPE 1	TON		1	1

#### UTILITY CONTACTS

LINCOLN COUNTY ENVIRONMENTAL OFFICE  
221 NORTH WALLACE AVENUE  
P.O. BOX 66  
IVANHOE, MN  
PH:(507)694-1344

ITC INC  
BOX 920  
CLEAR LAKE, SD 57226  
PH:(605)874-8348

LINCOLN PIPESTONE RURAL WATER  
415 EAST BENTON STREET  
LAKE BENTON, MN 56149  
PH:(507)368-4248

#### BASIS FOR PLANNED QUANTITIES

AGGREGATE SURFACING CLASS 1	140 LBS./CUBIC FOOT (CV)
QUARRY RUN RIP-RAP	1.3 TONS/CUBIC YARD
SEED MIXTURE 21-111	31 LBS./ACRE (PLS RATE)
SEED MIXTURE 25-142	45 LBS./ACRE (PLS RATE)
MULCH MATERIAL TYPE 1	2 TONS / ACRE
GRANULAR BACKFILL	1.8 TONS / CUBIC YARD

#### STANDARD PLATES

PLATE NO.	DESCRIPTION
8000 K	CHANNELIZERS TYPE A, TYPE B, TYPE C.
* THESE STANDARD PLATES ARE APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION AND SHALL APPLY ON THIS PROJECT.	

#### GENERAL CONSTRUCTION NOTES:

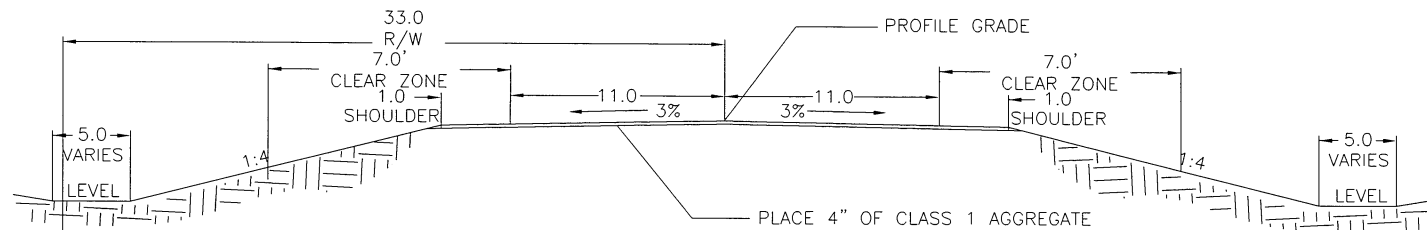
- THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA".
- THE INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.
- CONTRACTOR IS RESPONSIBLE FOR NOTIFYING GOPHER STATE ONE CALL PRIOR TO CONSTRUCTION (PHONE NO. 1-800-252-1166).
- CONTRACTOR SHALL COORDINATE WORK WITH OTHER UTILITY CONTRACTORS, WORK MAY BE ADJACENT AND WITHIN THE PROJECT LIMITS. NO COMPENSATION WILL BE MADE FOR THE COORDINATION WITH THE UTILITIES.
- CONTRACTOR SHALL MAINTAIN CONSTRUCTION WORK WITHIN THE PROJECT LIMITS AS SHOWN ON THE PLANS. ANY DAMAGE OUTSIDE THE CONSTRUCTION LIMITS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
- (P) INDICATES PLANNED QUANTITY.

#### NOTES:

1. QUANTITY FOR AGGREGATE SURFACING CLASS 1 IS CALCULATED AT 4" IN THICKNESS BETWEEN STATIONS 29+00 TO 32+50 AND INCLUDES AN ADDITIONAL 50 TON TO ACCOUNT FOR NECESSARY ROAD REPAIRS DUE TO DAMAGE DONE DURING CONSTRUCTION.
2. PRECAST CONCRETE BOX CULVERT END SECTIONS SHALL BE CLASS III FOR A 15' SKEW.
3. MASTIC JOINT SEALER SHALL BE APPLIED TO THE ENTIRE JOINT AREA AND TO LIFT HOLE PLUGS. GEOTEXTILE MATERIAL SHALL ALSO BE INSTALLED ON THE ENTIRE JOINT AREA OF THE PIPE. MASTIC JOINT SEALER, GEOTEXTILE MATERIAL, AND PIPE TIES SHALL BE INCLUDED IN THE BID PRICE FOR PRECAST CONCRETE BOX CULVERTS.
4. ALL EXCESS EXCAVATION SHALL BE DISPOSED OF BY THE CONTRACTOR. COST OF SAID DISPOSAL SHALL BE INCLUDED IN THE BID PRICE FOR PRECAST CONCRETE BOX CULVERT.
5. PRIOR TO PERFORMING EXCAVATION AND EMBANKMENT OPERATIONS WITHIN THE PROJECT LIMITS THE CONTRACTOR SHALL SALVAGE AND STOCKPILE THE TOPSOIL IN A LOCATION OF THE CONTRACTOR'S CHOICE, ON THE PROJECT SITE. UPON COMPLETION OF ALL GRADING OPERATIONS, THE CONTRACTOR SHALL DEPOSIT AND SPREAD THE TOPSOIL IN A UNIFORM LAYER ON THE SUBSOIL. THIS WORK SHALL BE INCLUDED IN THE BID PRICE FOR REMOVAL OF THE EXISTING STRUCTURE. ANY EXCAVATED ROCK IS INCLUDE IN THE BID PRICE FOR THE REMOVAL OF THE BRIDGE.
6. EXISTING BRIDGE BECOMES THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF OFF SITE. THE CONCRETE AND TIMBER SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED LANDFILL OR REUSED/RECYCLED ACCORDING TO LOCAL, STATE, AND FEDERAL REQUIREMENTS.
7. THE GRADATION FOR COARSE FILTER AGGREGATE SHALL CONFORM TO SPEC 3149.2H.
8. BACKFILLING SHALL OCCUR IN LIFTS NOT EXCEEDING 0.5 FEET IN DEPTH. THE CONTRACTOR SHALL USE HAND OPERATED COMPACTION EQUIPMENT AROUND THE PIPE CULVERT TO ATTAIN DENSITY.
9. INSTALLATION SHALL BE IN ACCORDANCE WITH SPECS. 2511 & 3601. TYPE 7 GEOTEXTILE FILTER SHALL CONFORM TO SPEC. 3733. THIS ITEM IS INCLUDED IN THE BID PRICE FOR THE PLACEMENT OF RIP RAP.
10. THE CONTRACTOR SHALL USE QUARRY RUN RIP RAP.
11. CULVERT MARKER TO BE FURNISHED BY THE COUNTY.
12. THE AREAS TO BE SEEDED SHALL BE COMPRISED OF ALL DISTURBED AREAS WITHIN THE PROJECT LIMITS. PRIOR TO THE SEEDING OPERATION THE AREAS SHALL BE CLEARED OF ALL DEBRIS (INCLUDING TREE ROOTS, WEEDS, ROCKS, ETC.). ANY DEBRIS ENCOUNTERED WHILE PREPARING THE AREAS FOR SEEDING SHALL BE DISPOSED OF BY THE CONTRACTOR OFF THE PROJECT IN A SUITABLE DISPOSAL AREA PROVIDED BY THE CONTRACTOR AS APPROVED BY THE ENGINEER. THE PREPARATION FOR SEEDING, REMOVAL AND HAULING OF DEBRIS IS INCLUDED IN THE BID PRICE FOR SEEDING.
13. MULCH MATERIAL TYPE 1 SHALL BE USED IN DISTURBED AREAS IN WHICH BLANKET IS NOT USED AND SHALL BE DISK ANCHORED.

### PROPOSED TYPICAL SECTION TOWNSHIP ROAD

NO SCALE



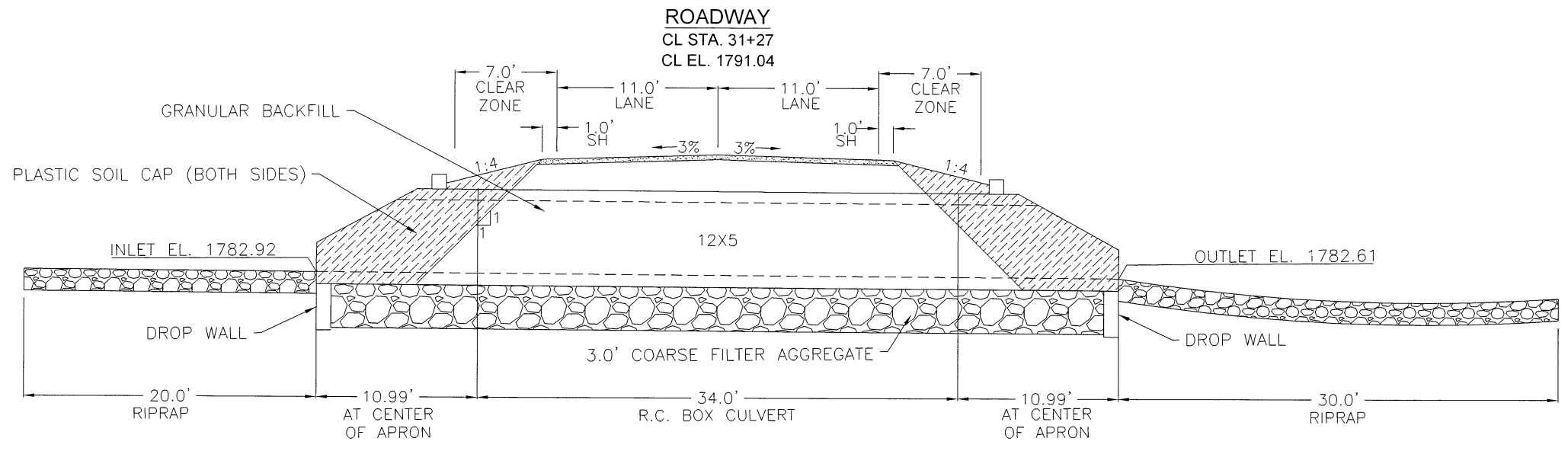
## ESTIMATED QUANTITIES

CERTIFIED BY Joseph M. [Signature] LIC. NO. 54947 DATE: 1-13-23  
LICENSED ENGINEER

S.A.P. NO. 041-599-066 SHEET NO. 2 OF 14

NO SCALE  
WEST ← EAST

ELEVATION VIEW



DESIGN DATA

DESIGNED IN ACCORDANCE WITH 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

HL-93 LIVE LOAD  
 BARREL INSIDE WIDTH = 12 FT  
 BARREL INSIDE HEIGHT = 5 FT  
 BARREL LENGTH = 34 FT EACH  
 EST. MIN. FILL DEPTH (A) = 2.10 FT AT SHOULDER  
 EST. MAX. FILL DEPTH (B) = 2.56 FT AT CENTERLINE  
 SKEW ANGLE = 15°

DESIGN SPEED = 50 MPH  
 CURRENT ADT (2022) = <50  
 PROJECTED ADT (2042) = <50

HL-93 LRFD  
 BRIDGE OPERATING RATING FACTOR RF = 1.3

LIST OF SHEETS

NO.	DESCRIPTION
1.	TITLE SHEET
2.	ESTIMATED QUANTITIES
3.	GENERAL PLAN AND ELEVATION
4.	STAKEOUT
5-7.	BARREL & END SECTION DETAILS
8.	EMBANKMENT PROTECTION
9.	EROSION & SEDIMENT CONTROL PLAN
10.	EROSION & SEDIMENT CONTROL DETAILS
11.	PLAN & PROFILE
12.	BRIDGE SURVEY SHEET
13.	SWPPP
14.	TRAFFIC CONTROL

CONSTRUCTION NOTES:

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

ALL EXPOSED CONCRETE EDGES SHALL BE FORMED WITH A 1/2" OR 3/4" CHAMFER UNLESS OTHERWISE NOTED.

CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPEC. 2411 AND 2412, EXCEPT AS NOTED.

REFER TO REMAINDER OF GRADING PLAN FOR SUPERSTRUCTURE EXCAVATION AND BACKFILL. SPEC. 2451.

THE BAR SIZES SHOWN IN THIS PLAN ARE IN U.S. CUSTOMARY DESIGNATIONS.

REFER TO ESTIMATED QUANTITIES SHEET FOR THE SUBSURFACE UTILITY INFORMATION.

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: *Joseph M. Wilson* DATE: 1-13-23  
 LICENSED PROFESSIONAL ENGINEER  
 NAME: JOSEPH M. WILSON LIC NO. 54947

BRIDGE NO. 41J82  
 LOCATION: TWNS. 120  
 MAIN 12 x 5 MNDOT STD. PRECAST CONCRETE CULVERT

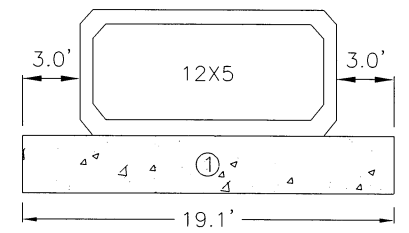
IDENTIFICATION NO. 513  
 GENERAL PLAN AND ELEVATION  
 SEC. 18- T 110 N- R 45 W  
 TOWNSHIP: DIAMOND LAKE, LINCOLN COUNTY

DES:	DR:
CHK:	CHK:

NO SCALE  
SOUTH ← NORTH

DROP WALL DETAILS

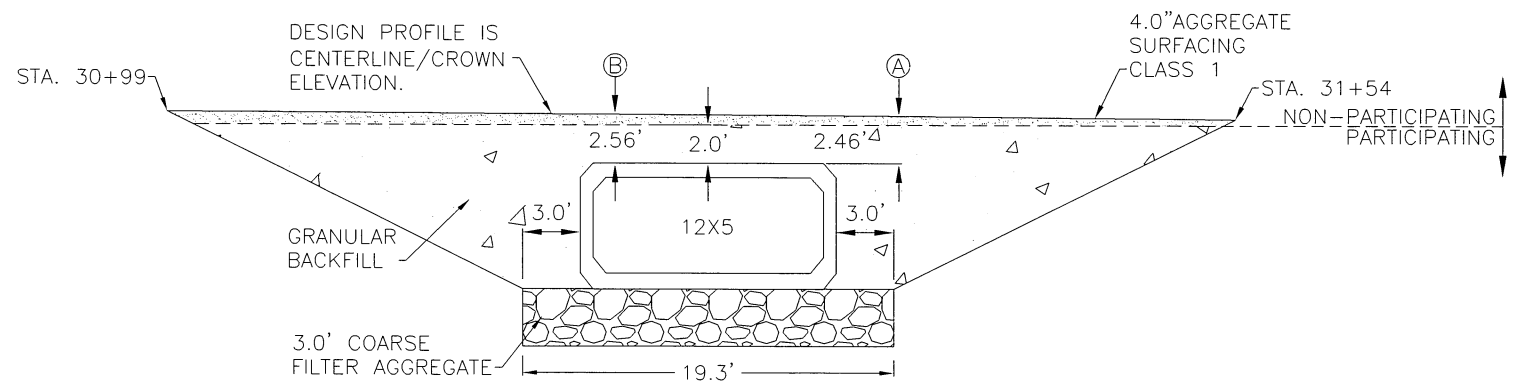
- NOTES:
- DROP WALL ON 12 X 5 END SECTIONS SHALL EXTEND 3' BEYOND THE WALLS OF THE END SECTION ON THE OUTERMOST SIDE. THE PLACEMENT OF THE DROP WALL SHALL BE INCLUDED IN THE BID PRICE FOR PRECAST CONCRETE END SECTION.



NO SCALE  
SOUTH ← NORTH

ELEVATION VIEW

- NOTES:
- BACKFILLING UP TO 2' ABOVE THE PIPE IS INCLUDED IN THE BID PRICE FOR GRANULAR BACKFILL.
- BACKFILLING OVER 2' ABOVE THE PIPE IS INCLUDED IN THE BID PRICE FOR THE REMOVAL OF THE BRIDGE.



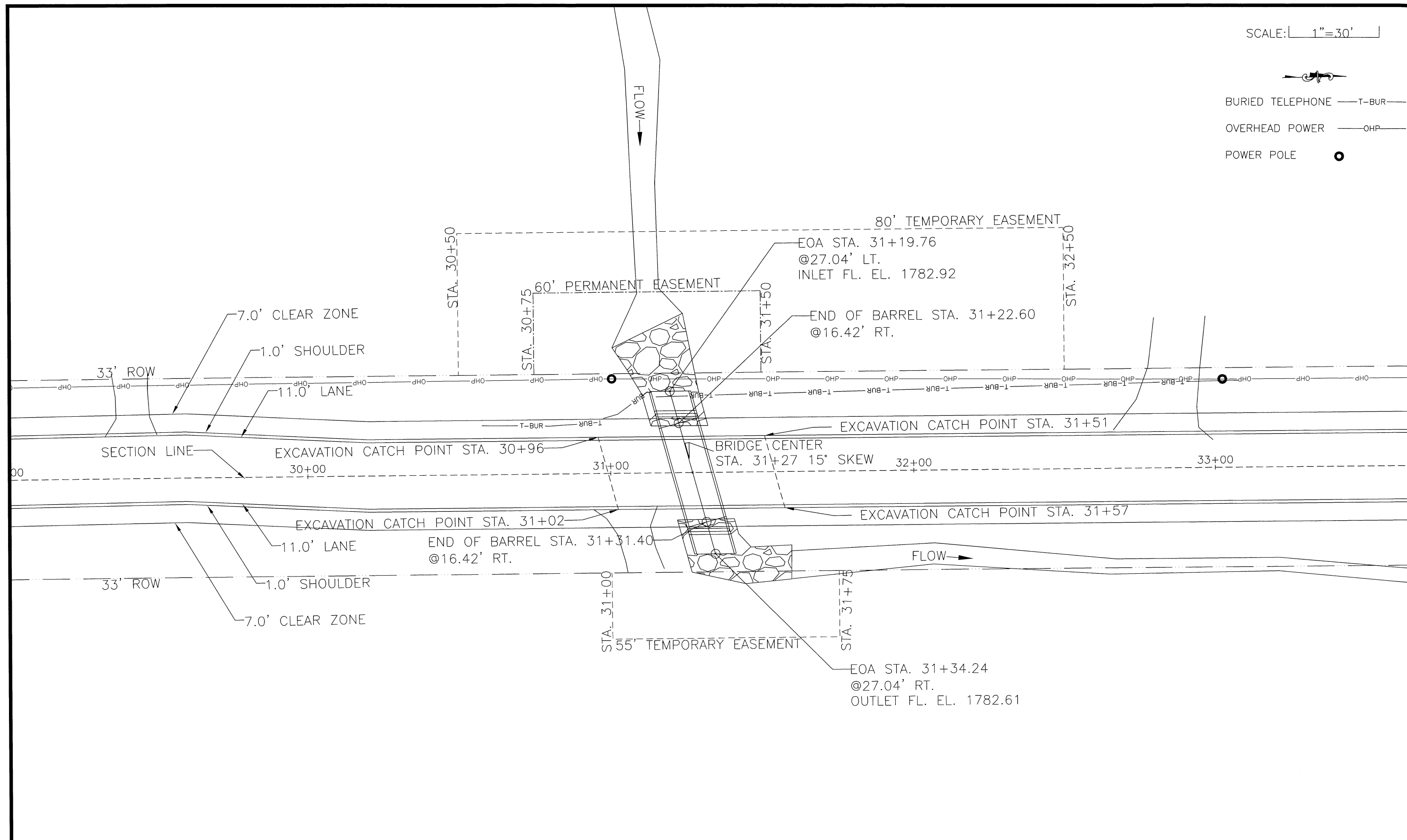
SCALE: 1"=30'



BURIED TELEPHONE —T-BUR—

OVERHEAD POWER —OHP—

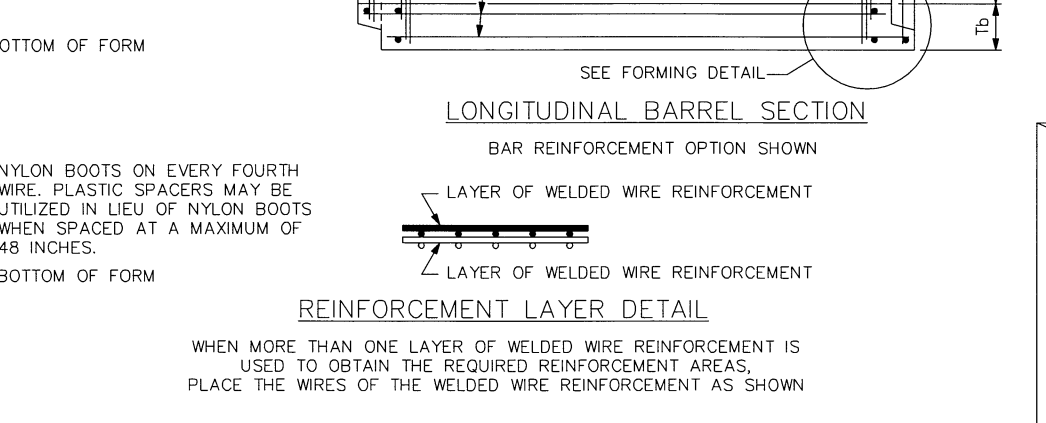
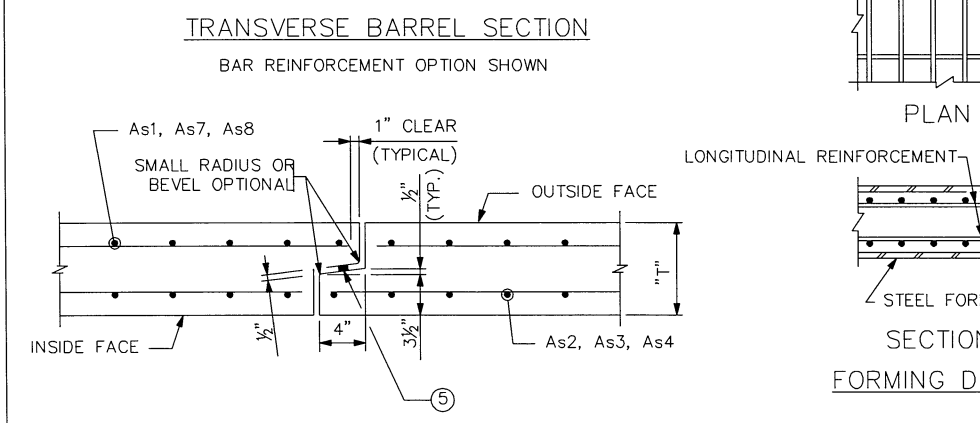
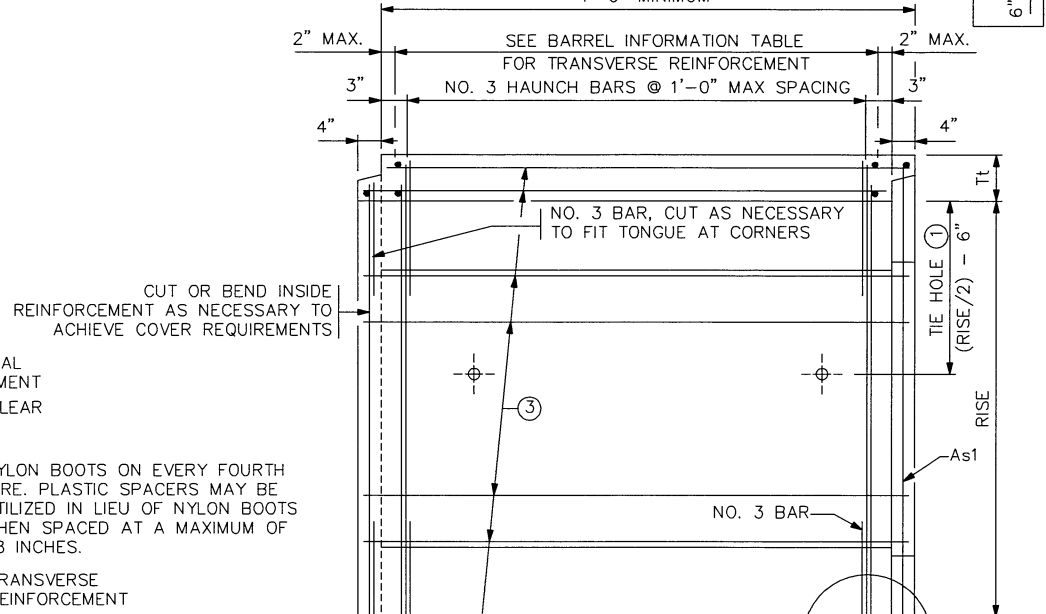
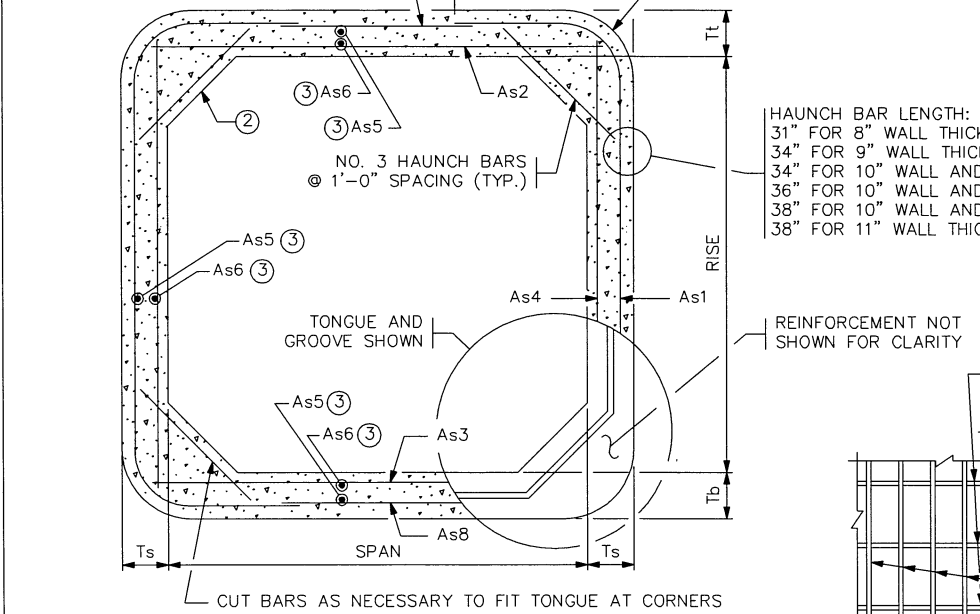
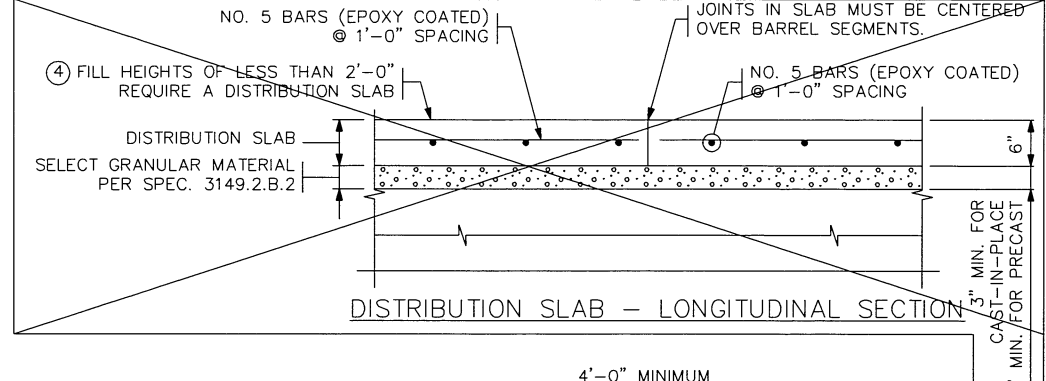
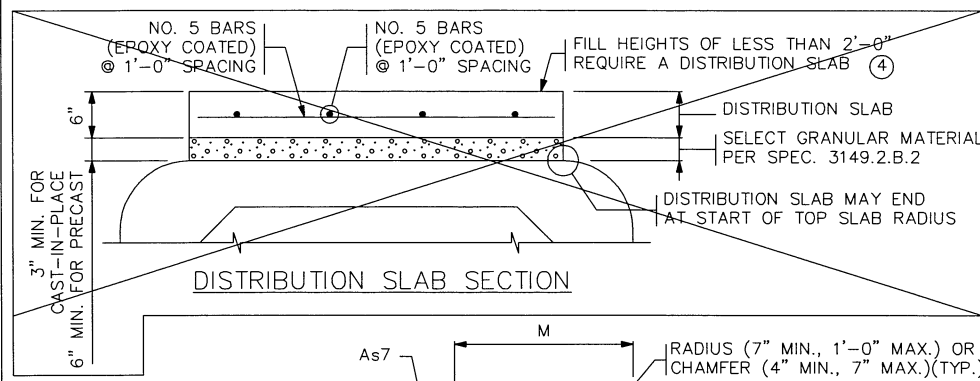
POWER POLE ●



# STAKEOUT

CERTIFIED BY *Joseph M. Little* LIC. NO. 54947 DATE: 11-29-22  
 LICENSED ENGINEER

S.A.P. NO. 041-599-066 SHEET NO. 4 OF 14



**CONSTRUCTION NOTES**

CONSTRUCT CULVERTS PER 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 PER THE APPLICABLE REQUIREMENTS OF AASHTO M259.

1 1/2" 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 PER SPEC. 3238.2.A 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 As5 AND 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 3552.

PLACE CAST-IN-PLACE DISTRIBUTION SLABS WITH 3" MIN. SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 BETWEEN BARREL AND DISTRIBUTION SLAB.

PRECAST DISTRIBUTION SLABS MAY BE USED FOR FILL HEIGHTS OVER 1'-0". PROVIDE 6" MINIMUM SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 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 CONSIDERED INCIDENTAL.

- 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												
							SPAN (FT.)	RISE (FT.)	Tt (IN.)	Tb (IN.)	Ts (IN.)		As1		As2		As3		As4		As7		As8		
													AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	
31+27	12'X5'	1	5000	<3	NO	NO	12'	5'	9"	10"	8"	4475	0.83	13'-6"	3'-9"	0.72	12'-6"	0.71	12'-6"	0.20	5'-6"	0.24	8'-10"	0.24	8'-10"
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* 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: FEBRUARY 22, 2018

APPROVED: MARCH 24, 2011

*Nancy A. Rubenberger*  
STATE BRIDGE ENGINEER

STATE AID PROJ. NO. 041-599-066 (170TH AVE.) STA. 31+27

FIG. 5-395.101(A)

CERTIFIED BY *Joseph M. Wilson* 11-29-22  
LICENSED PROFESSIONAL ENGINEER DATE

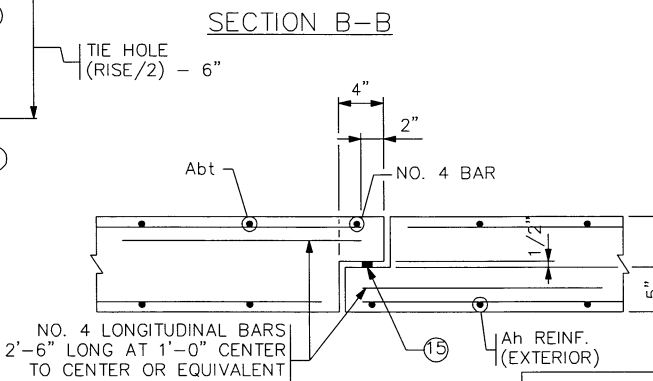
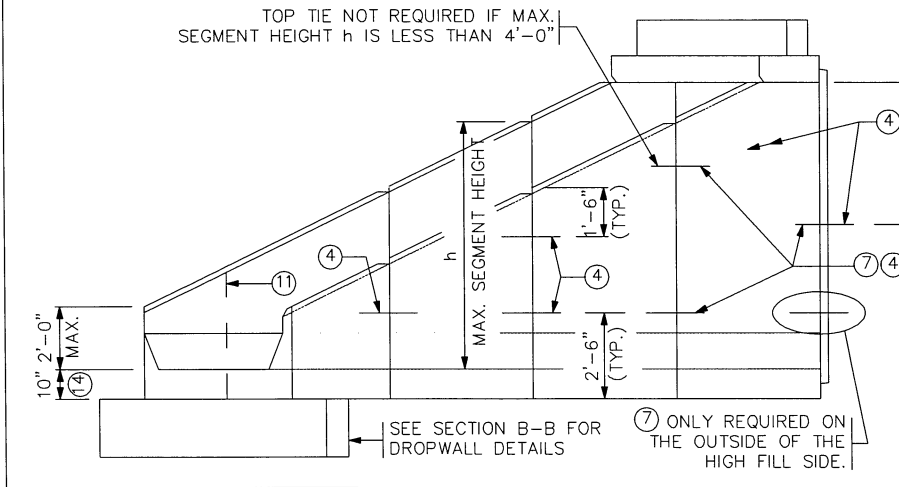
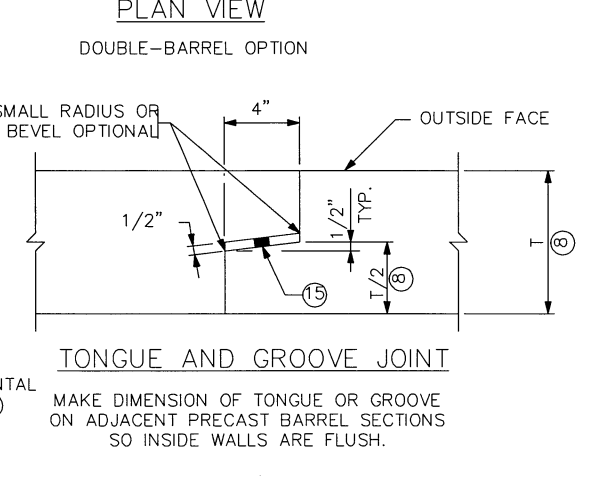
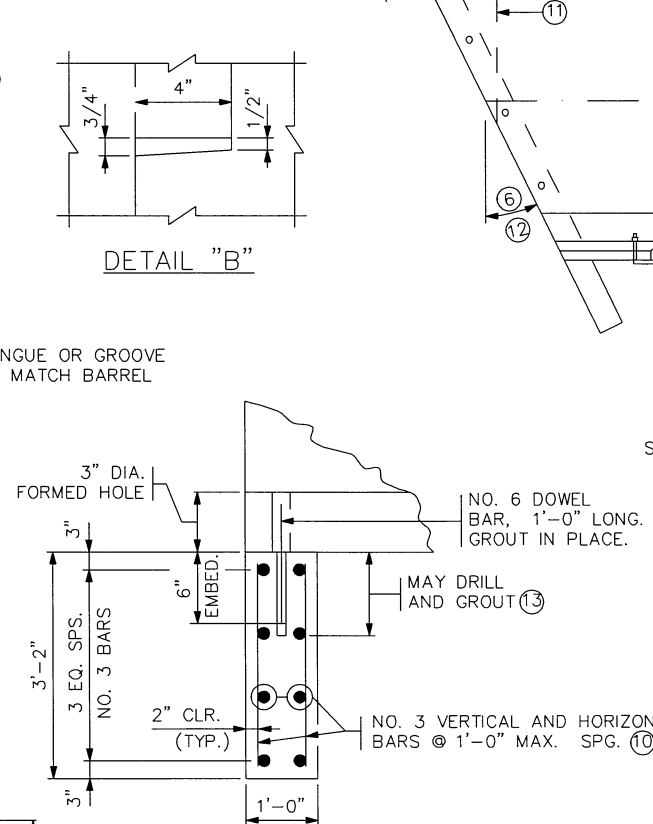
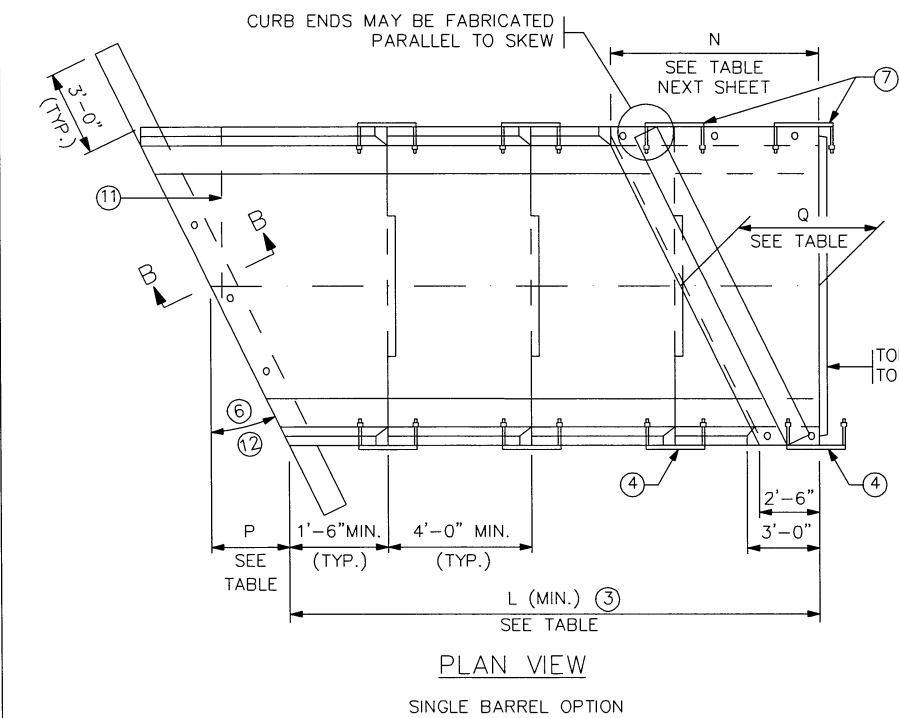
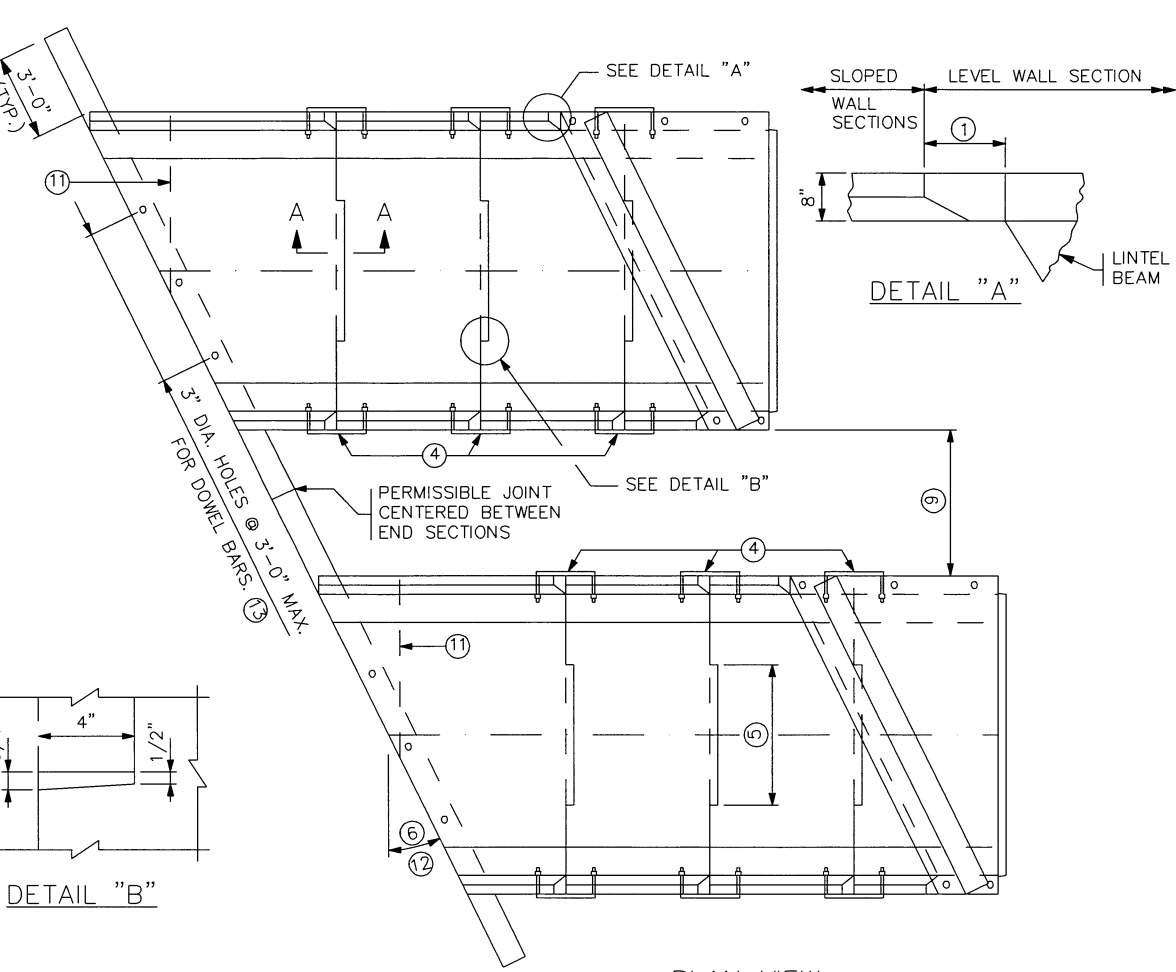
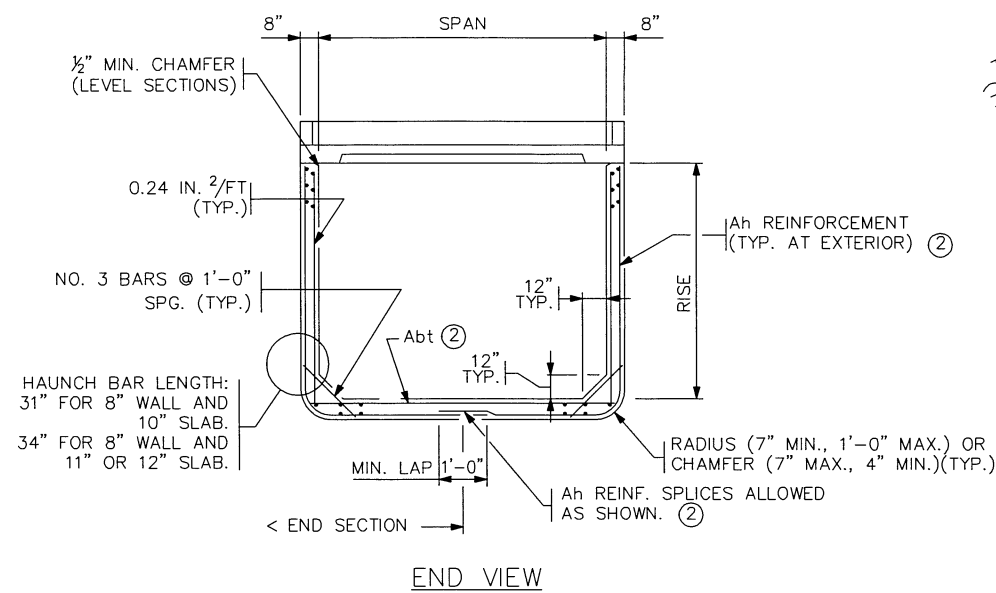
NAME: JOSEPH M. WILSON LIC. NO. 54947

DES: \_\_\_\_\_ DR: \_\_\_\_\_ APPROVED: \_\_\_\_\_  
CHK: \_\_\_\_\_ CHK: \_\_\_\_\_

PRECAST CONCRETE BARREL DETAILS

SHEET NO. 5 OF 14 SHEETS

BRIDGE NO. 41J82



**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 1/2" OR 3/4" 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 81/8" @ 15"; 105/8" @ 30"; 1'-2" @ 45"
- ② SEE STANDARD FIG. 5-395.110(B) 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 71/2' UP TO 221/2', USE A 15' SKEW END SECTION. FOR SKEW ANGLES OVER 221/2' UP TO 371/2', USE A 30' SKEW END SECTION. FOR SKEW ANGLES OVER 371/2' 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(B) 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 1 1/2" MIN., 2" MAX.
- ⑮ REFER TO SPEC, 2412 FOR SEALANT REQUIREMENTS.

LENGTH P				
SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW	
6	0'-113/4"	2'-13/8"	3'-8"	
8	1'-3"	2'-83/8"	4'-8"	
10	1'-61/4"	3'-31/4"	5'-8"	
12	1'-93/8"	3'-101/4"	6'-8"	
14	2'-05/8"	4'-51/8"	7'-8"	
16	2'-37/8"	5'-0"		⑫

MIN. LENGTH L				
RISE (FT.)	15° SKEW	30° SKEW	45° SKEW	
4	7'-13/4"	7'-73/8"	8'-77/8"	
5	9'-21/2"	9'-111/8"	11'-57/8"	
6	11'-33/8"	12'-27/8"	14'-33/4"	
7	13'-41/4"	14'-65/8"	17'-13/4"	
8	15'-51/8"	16'-101/4"	19'-115/8"	
9	17'-57/8"	19'-2"	22'-95/8"	
10	19'-63/4"	21'-53/4"	25'-71/2"	
11	21'-75/8"	23'-93/8"	28'-51/2"	
12	23'-81/2"	26'-11/8"	31'-33/8"	
13	25'-93/8"	28'-47/8"	34'-13/8"	
14	27'-101/8"	30'-81/2"	36'-111/4"	

LENGTH Q				
SPAN (FT.)	15° SKEW	30° SKEW	45° SKEW	
6	3'-53/4"	4'-73/8"	6'-2"	
8	3'-9"	5'-23/8"	7'-2"	
10	4'-0"	5'-91/4"	8'-2"	
12	4'-33/8"	6'-41/8"	9'-2"	
14	4'-65/8"	6'-111/8"	10'-2"	
16	4'-97/8"	7'-61/8"		⑫

REVISION: FEBRUARY 22, 2018

APPROVED: MARCH 24, 2011  
*Nancy S. Subenberger*  
 STATE BRIDGE ENGINEER

**ELEVATION**

STATE AID PROJ. NO. 041-599-066 (170TH AVE.) STA. 31+27

FIG. 5-395.110(A)

CERTIFIED BY *Joseph M. Wilson* 11-29-22  
 LICENSED PROFESSIONAL ENGINEER DATE  
 NAME: JOSEPH M. WILSON LIC. NO. 54947

TYPE III - SINGLE OR DOUBLE BARREL  
 FOR SKEWS 7 1/2' TO 45'

DES: \_\_\_\_\_ DR: \_\_\_\_\_  
 CHK: \_\_\_\_\_ CHK: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_  
 SHEET NO. 6 OF 14 SHEETS

BRIDGE NO. 41J82

Ah REINFORCEMENT		
HEIGHT h (FT.)	Ah (IN <sup>2</sup> /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

Abt REINFORCEMENT	
SPAN (FT.)	Abt (IN <sup>2</sup> /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'-33/8"	6'-41/4"	9'-2"
8	4'-97/8"	7'-6"	11'-2"
10	5'-41/4"	8'-77/8"	13'-2"
12	5'-103/4"	9'-93/4"	15'-2"
14	6'-51/8"	10'-115/8"	17'-2"
16	6'-115/8"	12'-11/2"	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".

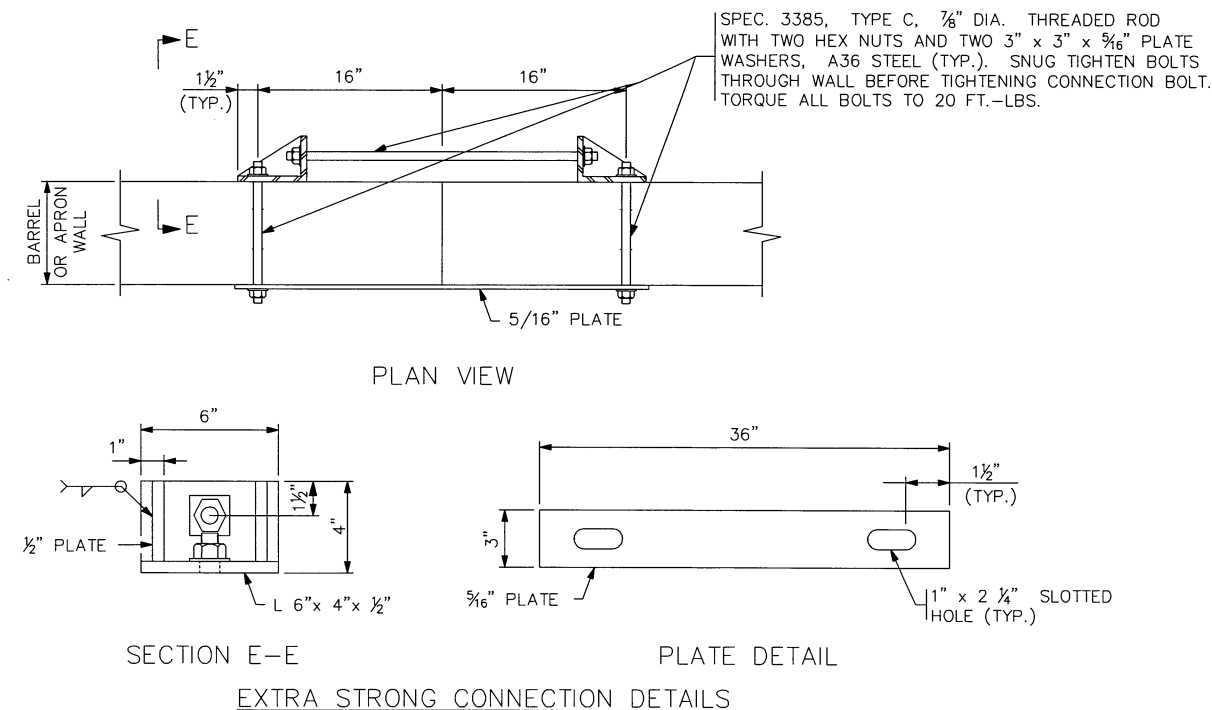
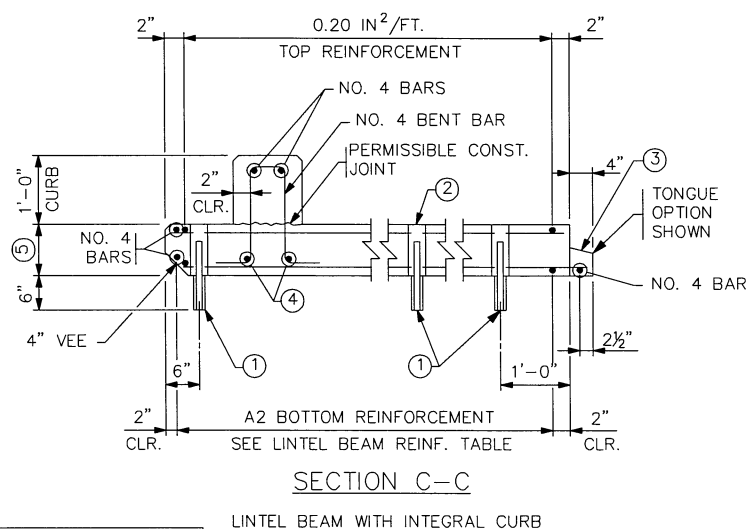
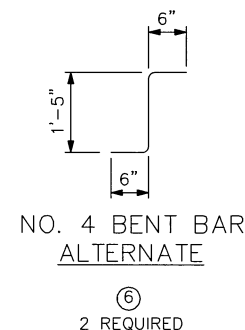
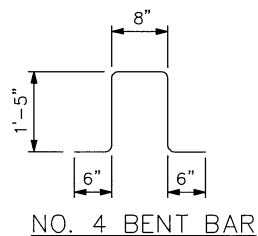
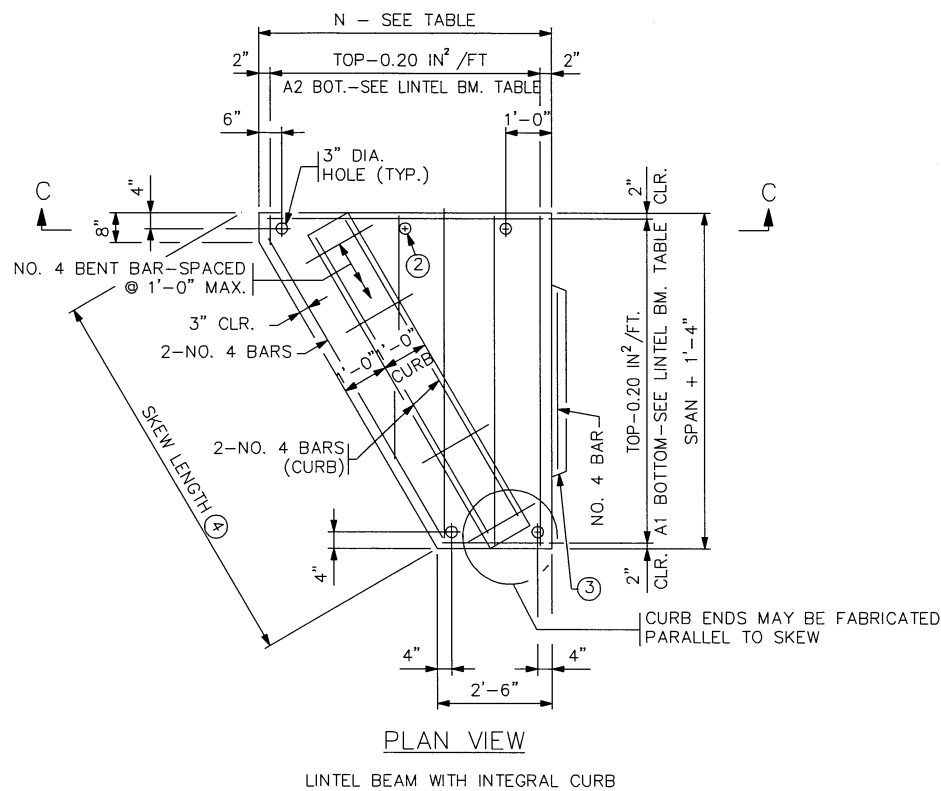
STRUCTURAL STEEL PER SPEC. 3306.

WELDING PER SPEC. 2471.

GALVANIZE STRUCTURAL STEEL PER SPEC. 3394.

GALVANIZE BOLTS, NUTS AND WASHERS PER SPEC. 3392.

- 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.
- PROVIDE ADDITIONAL 3" HOLES AT 4'-0" MAXIMUM SPACING WHEN SIDE OF LINTEL BEAM IS OVER 6 FT.
- CHECK THE LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED. TONGUE AND GROOVE TO TERMINATE AT CULVERT RADIUS.
- 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.
- SEE LINTEL BEAM THICKNESS TABLE ON THIS SHEET. USE LINTEL BEAMS WITH 5000 PSI 3W82 CONCRETE UNLESS OTHERWISE SPECIFIED.
- ALTERNATE BAR BEND MAY BE USED FOR NO. 4 BENT BARS.
- FOR CULVERTS WITH SPANS OF 16' THE MAXIMUM SKEW IS 30'.
- ALTERNATIVELY A 9" THICKNESS MAY BE USED WITH 6500 PSI 3W82 CONCRETE.



REVISION: 10-09-2015  
 APPROVED: MARCH 24, 2011  
 Nancy Rubenberger  
 STATE BRIDGE ENGINEER

STATE AID PROJ. NO. 041-599-066 (170TH AVE.) STA. 31+27		FIG. 5-395.110(B)	
CERTIFIED BY: Joseph M. Wilson LICENSED PROFESSIONAL ENGINEER	DATE: 11-29-22	TITLE: PRECAST CONCRETE END SECTION TYPE III - SINGLE OR DOUBLE BARREL FOR SKEWS 7 1/2 TO 45°	DES: _____ CHK: _____
NAME: JOSEPH M. WILSON	LIC. NO. 54947	SHEET NO. 7 OF 14 SHEETS	APPROVED: _____ BRIDGE NO. 41J82

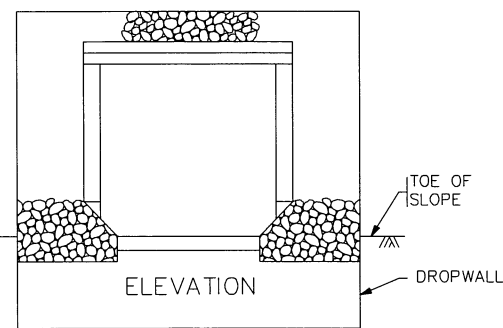
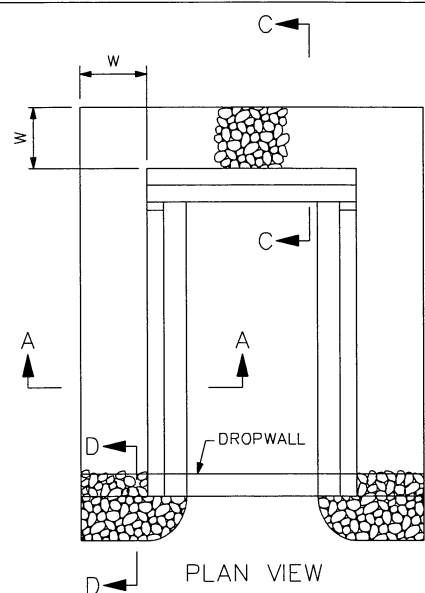
**CONSTRUCTION NOTES**

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

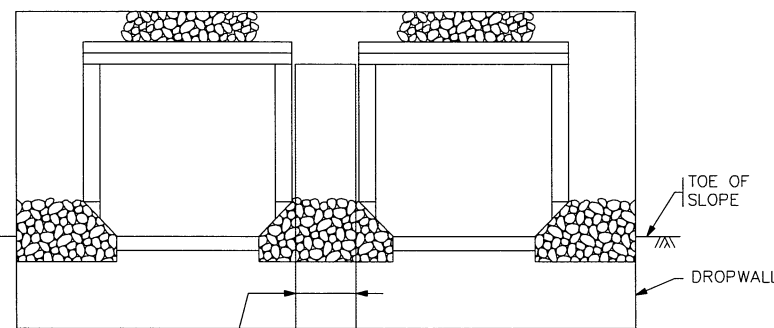
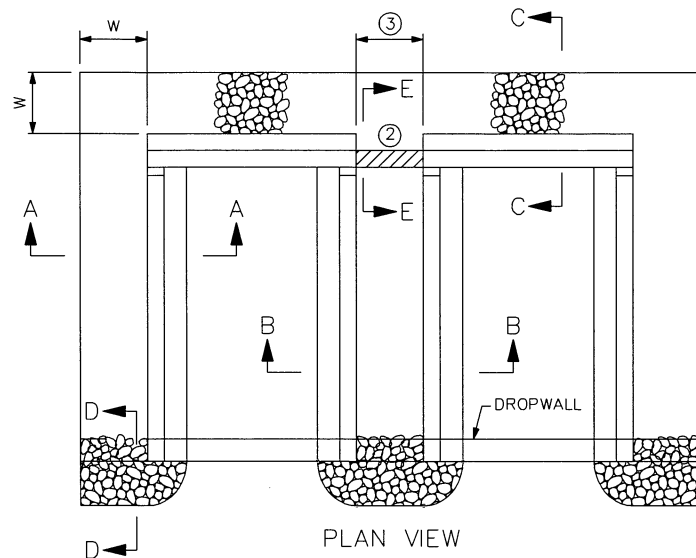
PROVIDE RIPRAP IN ACCORDANCE WITH SPECS. 2511 AND 3601.

EMBANKMENT PROTECTION, INCLUDING MATERIAL PLACED BETWEEN BARRELS THAT ARE LESS THAN 2'-0" APART, IS INCIDENTAL.

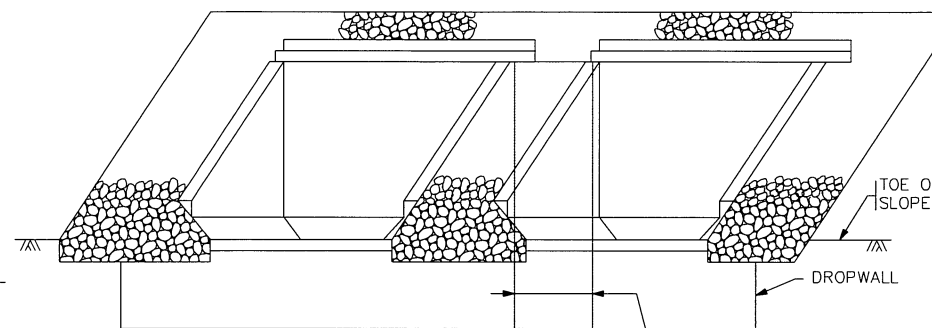
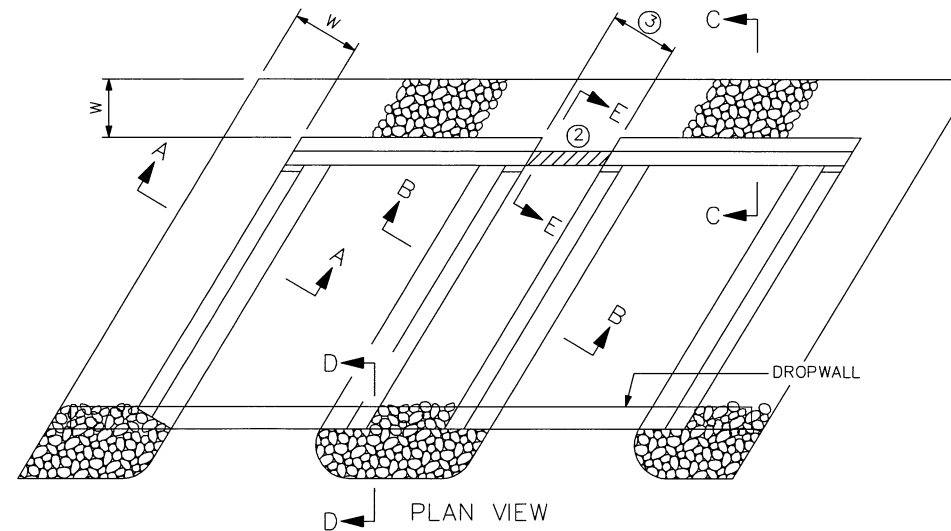
- ① PROVIDE TYPE 7 GEOTEXTILE IN ACCORDANCE WITH SPEC. 3733. PROVIDE GEOTEXTILE STRIPS CONTINUOUS WITHOUT OVERLAPS, EXCEPT FOR THE TOP STRIP, WHICH SHOULD SHINGLE VERTICAL STRIPS. BURY THE TOP EDGE TO PREVENT UNDERMINING.
- ② IF THE DISTANCE BETWEEN DOUBLE BARRELS IS LESS THAN 2'-0" USE EITHER PEA ROCK 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.



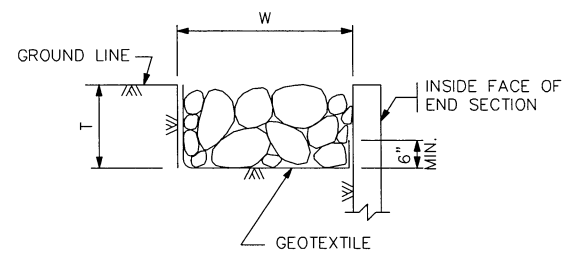
**SINGLE BARREL**  
CLASS III OR IV SHOWN FOR SKEWS UP TO 7 1/2'



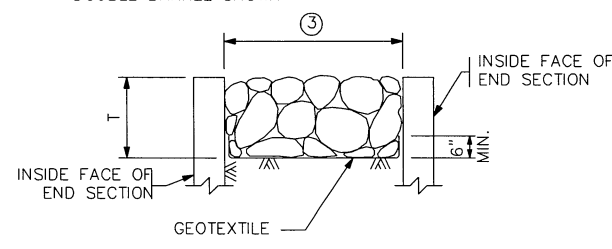
**MULTIPLE BARREL**  
FOR SKEWS UP TO 7 1/2'  
CLASS III OR IV SHOWN  
DOUBLE BARREL SHOWN



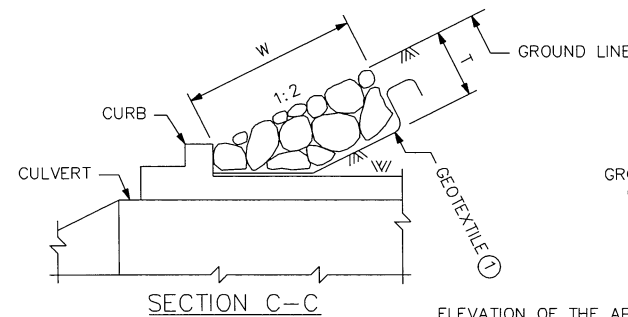
**MULTIPLE BARREL**  
FOR SKEWS OVER 7 1/2'  
CLASS III OR IV SHOWN  
DOUBLE BARREL SHOWN,  
OTHER BARREL CONFIGURATIONS SIMILAR.



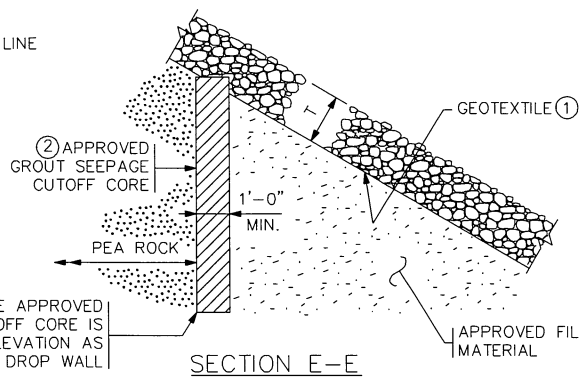
**SECTION A-A**



**SECTION B-B**

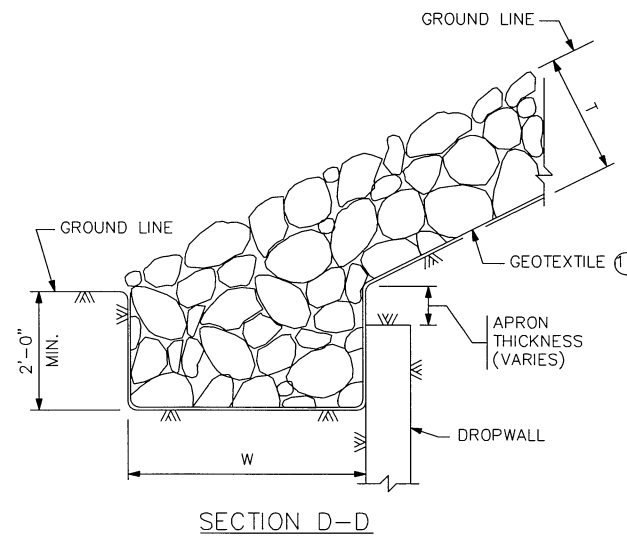


**SECTION C-C**



**SECTION E-E**

ELEVATION OF THE APPROVED GROUT SEEPAGE CUTOFF CORE IS TO BE THE SAME ELEVATION AS THE BOTTOM OF THE DROP WALL



**SECTION D-D**

**RIPRAP CLASS**

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

REVISION: FEBRUARY 08, 2022

APPROVED: SEPTEMBER 11, 2014

*Nancy Saubenberg*  
STATE BRIDGE ENGINEER

STATE AID PROJ. NO. 041-599-066 (170TH AVE.) STA. 31+27

FIG. 5-395.115

CERTIFIED BY *Joseph M. Wilson* 11-29-22  
LICENSED PROFESSIONAL ENGINEER DATE  
NAME: JOSEPH M. WILSON LIC. NO. 54947


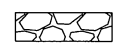

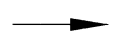
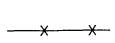
EMBANKMENT PROTECTION FOR BOX CULVERTS

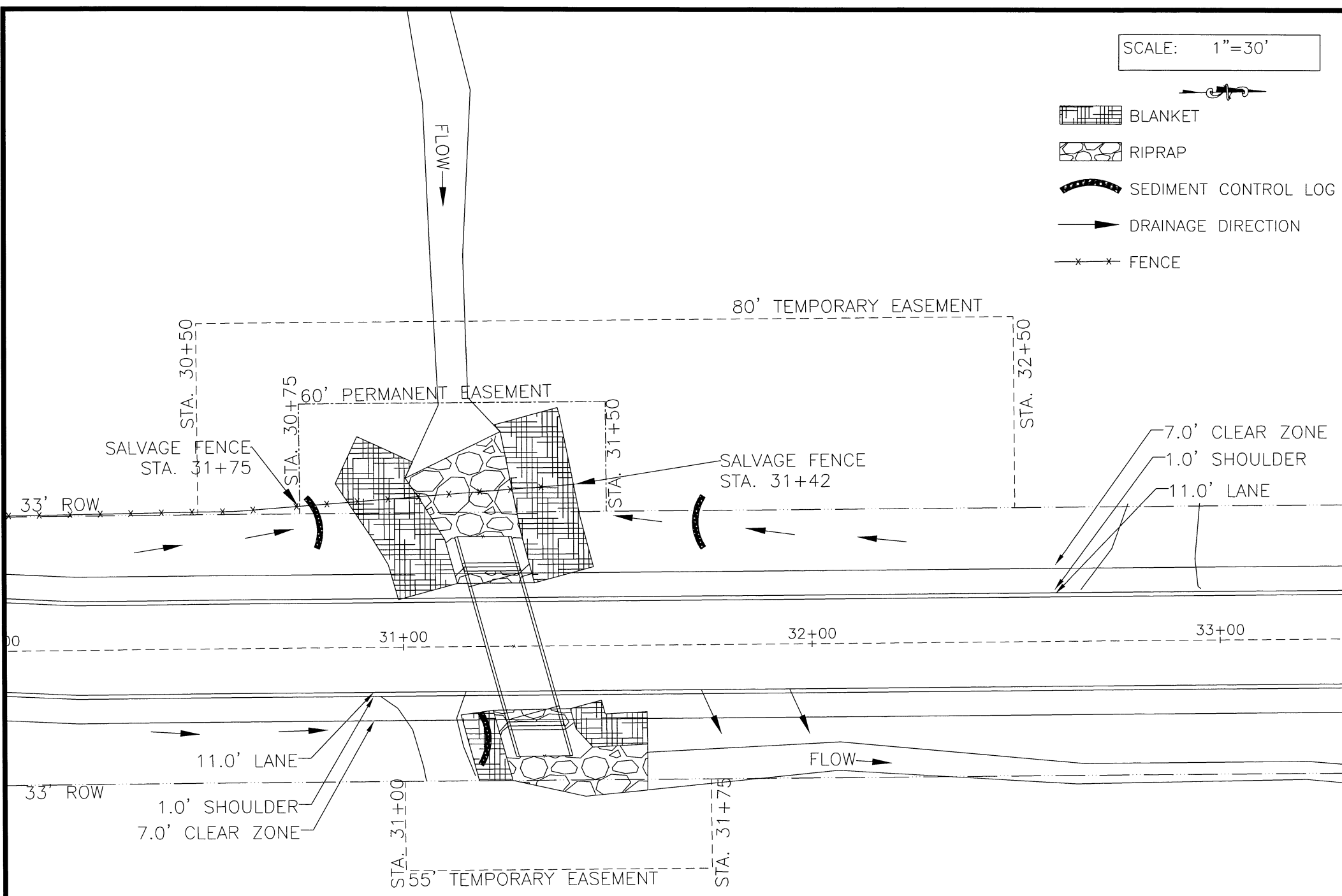
DES: DR: APPROVED:  
CHK: CHK: SHEET NO. 8 OF 14 SHEETS

BRIDGE NO. 41J82



SCALE: 1"=30'

-  BLANKET
-  RIPRAP
-  SEDIMENT CONTROL LOG
-  DRAINAGE DIRECTION
-  FENCE



RANDOM RIPRAP CLASS III			
STATION	SIDE	REMARKS	QUANTITY
31+01 TO 31+32	LT.	INLET	24 TONS
31+21 TO 31+60	RT.	OUTLET	36 TONS
TOTAL			60 TONS
*1.3 TONS PER CUBIC YARD			

ROLLED EROSION PREVENTION , CATEGORY 20			
STATION	SIDE	REMARKS	SQ. YD.
30+84 TO 31+47	LT.	INLET	133
31+14 TO 31+60	RT.	OUTLET	32
TOTAL			165
*QUANTITIES MAY BE ADJUSTED BY ENGINEER IN THE FIELD			

SEEDING			
STATION	SIDE	REMARKS	ACRE
30+50 TO 31+50	LT.	INLET	0.3
31+01 TO 31+75	RT.	OUTLET	0.2
TOTAL			0.5
*QUANTITIES MAY BE ADJUSTED BY ENGINEER IN THE FIELD			

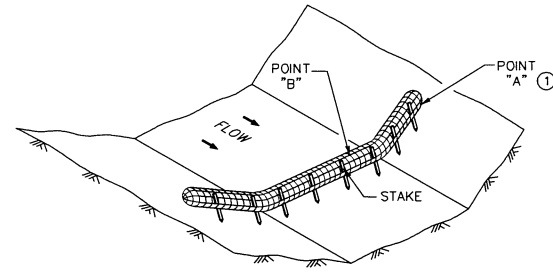
SEED MIXTURE 21-111		SEED MIXTURE 25-142	
SIDE	POUNDS	SIDE	POUNDS
LT. (OUTLET)	9.0	LT. (INLET)	13.0
RT. (INLET)	7.0	RT. (OUTLET)	10.0
TOTAL	16.0	TOTAL	23.0
*QUANTITIES MAY BE ADJUSTED BY ENGINEER IN THE FIELD			

MULCH MATERIAL, TYPE 1		DISK ANCHORING	
SIDE	TONS	SIDE	ACRE
LT. (INLET)	0.75	LT. (INLET)	0.35
RT. (OUTLET)	0.25	RT. (OUTLET)	0.15
TOTAL	1.0	TOTAL	0.5
*QUANTITIES MAY BE ADJUSTED BY ENGINEER IN THE FIELD			

FENCING				
STATION	SIDE	SALVAGE	INSTALL	TEMP
31+75 TO 31+42	LT.	68	68	--
--	--	--	--	--
TOTALS		68	68	--
*QUANTITIES MAY BE ADJUSTED BY ENGINEER IN THE FIELD				

**EROSION & SEDIMENT CONTROL PLAN**

CERTIFIED BY *Joseph M. Patton* LIC. NO. 54947 DATE: 11-29-22  
 LICENSED ENGINEER



SEDIMENT CONTROL LOG TYPE WOOD FIBER, OR TYPE COMPOST ② ③

NOTES:

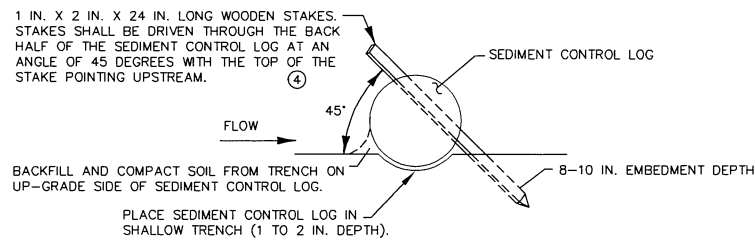
SEE SPECS. 2573, 3601, 3733, 3885, & 3886.

FOR DITCH CHECKS, PLACE SEDIMENT CONTROL LOG PERPENDICULAR TO FLOW AND IN A CRESCENT SHAPE WITH THE ENDS FACING UPSTREAM.

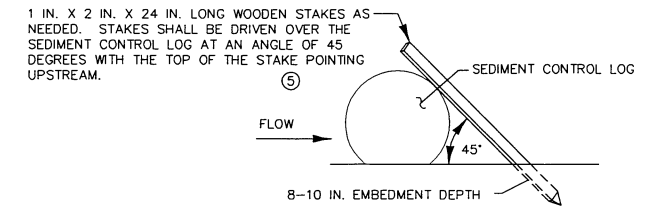
APPROXIMATE SPACING BETWEEN EACH DITCH CHECK SHOULD BE DETERMINED FROM THE FOLLOWING SPACING FORMULA:

$$\text{APPROXIMATE SPACING OF DITCH CHECKS (FT.)} = Y = \frac{\text{DITCH CHECK HEIGHT (FT)}}{\% \text{ CHANNEL SLOPE}} \times 100$$

- ① POINT "A" MUST BE A MINIMUM OF 6 INCHES HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.
- ② DITCH GRADE 1.5% - 3%, MAX. FLOW VELOCITY 4.5 FT./SEC. (SEDIMENT CONTROL LOG WITH EROSION CONTROL BLANKET)
- ③ DITCH GRADE 1.5% - 3%, MAX. FLOW VELOCITY 1.5 FT./SEC. (SEDIMENT CONTROL LOG WITHOUT EROSION CONTROL BLANKET)



TYPES: STRAW, WOOD FIBER, OR COIR

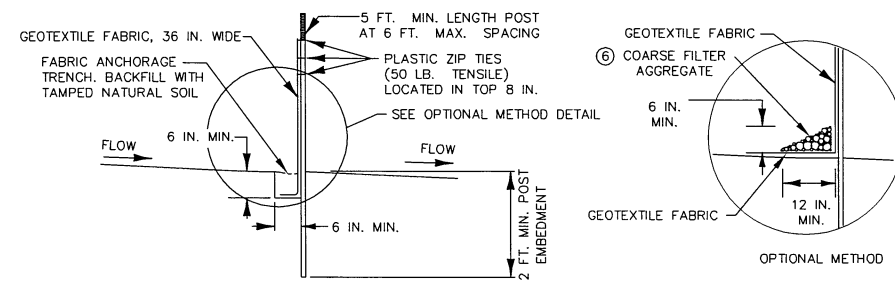


TYPES: WOOD CHIP, COMPOST, OR ROCK

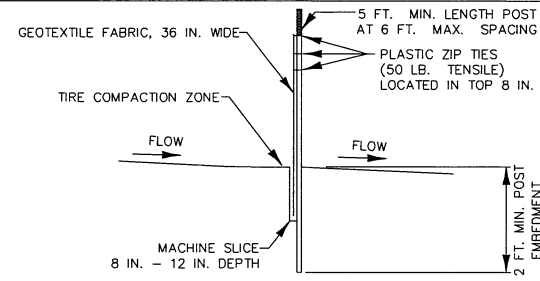
NOTES:

SEE SPECS. 2573, 3149, 3874, 3882, 3886, & 3897.

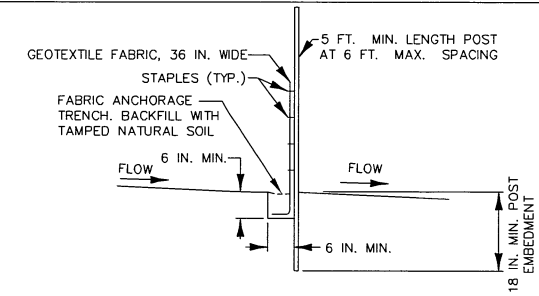
- ④ SPACE BETWEEN STAKES SHALL BE A MAXIMUM OF 1 FOOT FOR DITCH CHECKS OR 2 FEET FOR OTHER APPLICATIONS.
- ⑤ PLACE STAKES AS NEEDED TO PREVENT MOVEMENT OF SEDIMENT CONTROL LOGS PLACED ON SLOPES OR AS NEEDED DUE TO OTHER FACTORS. STAKES SHALL BE INCIDENTAL.



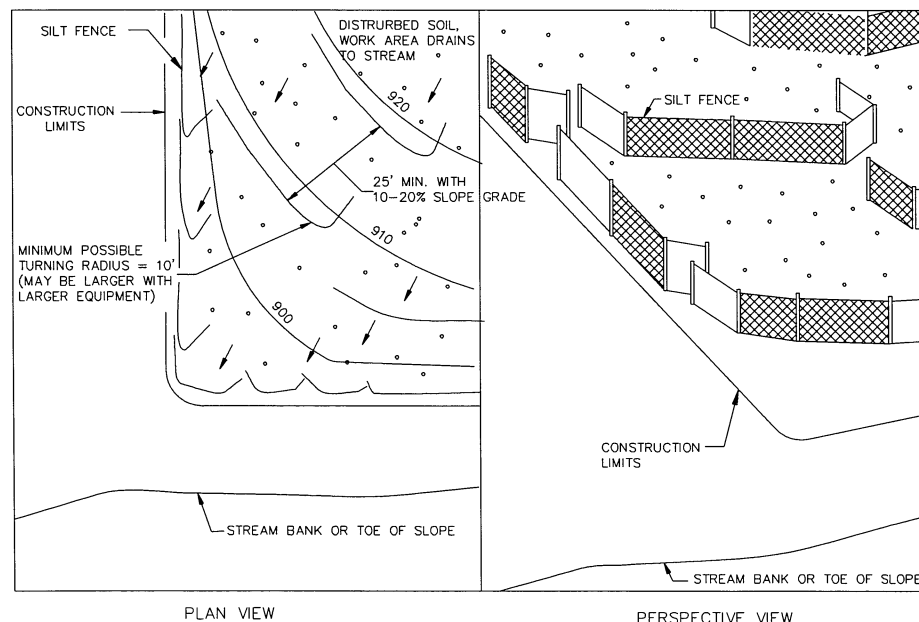
SILT FENCE TYPE HI ⑦ (HAND INSTALLED)



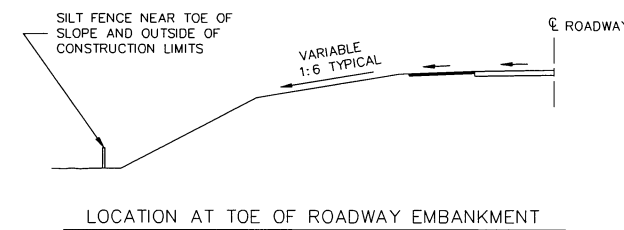
SILT FENCE TYPE MS ⑦ (MACHINE SLICED)



SILT FENCE TYPE PA ⑧ (PREASSEMBLED)



J-HOOK INSTALLATION

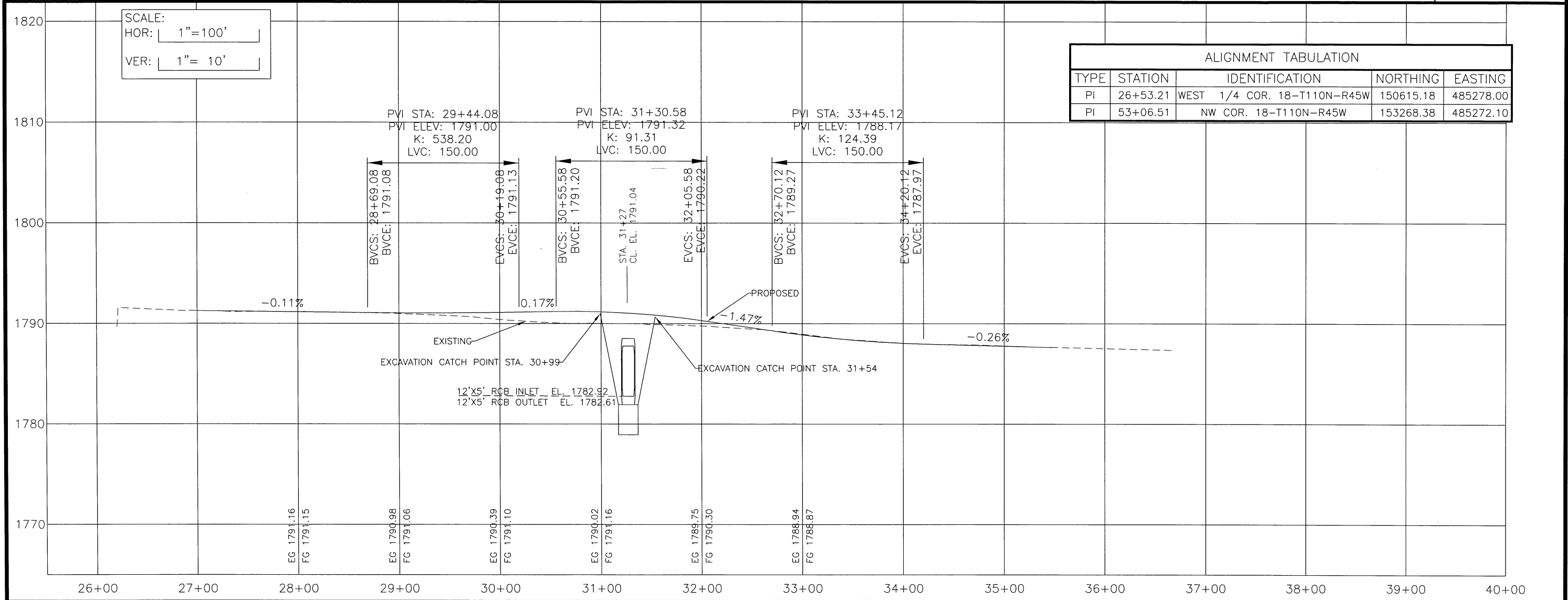
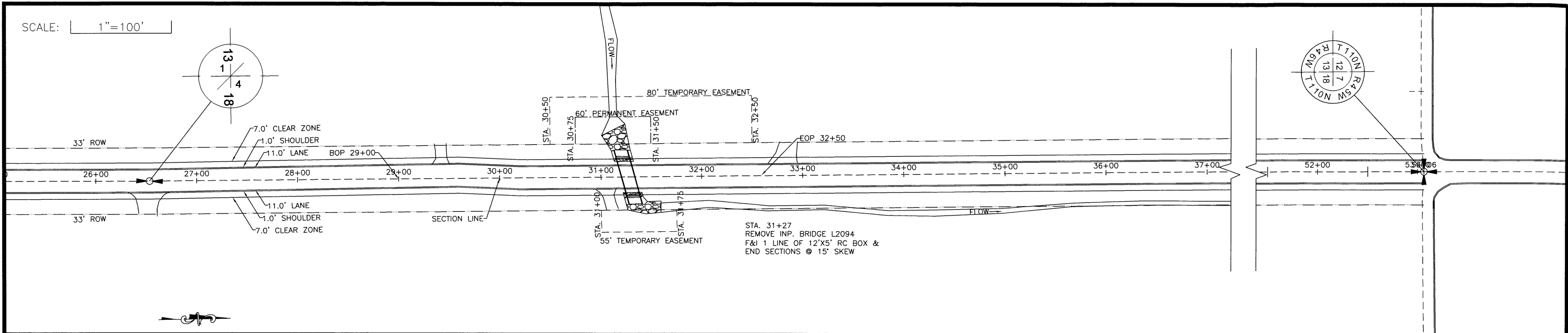


LOCATION AT TOE OF ROADWAY EMBANKMENT

NOTES:

SEE SPECS. 2573, 3149 & 3886.

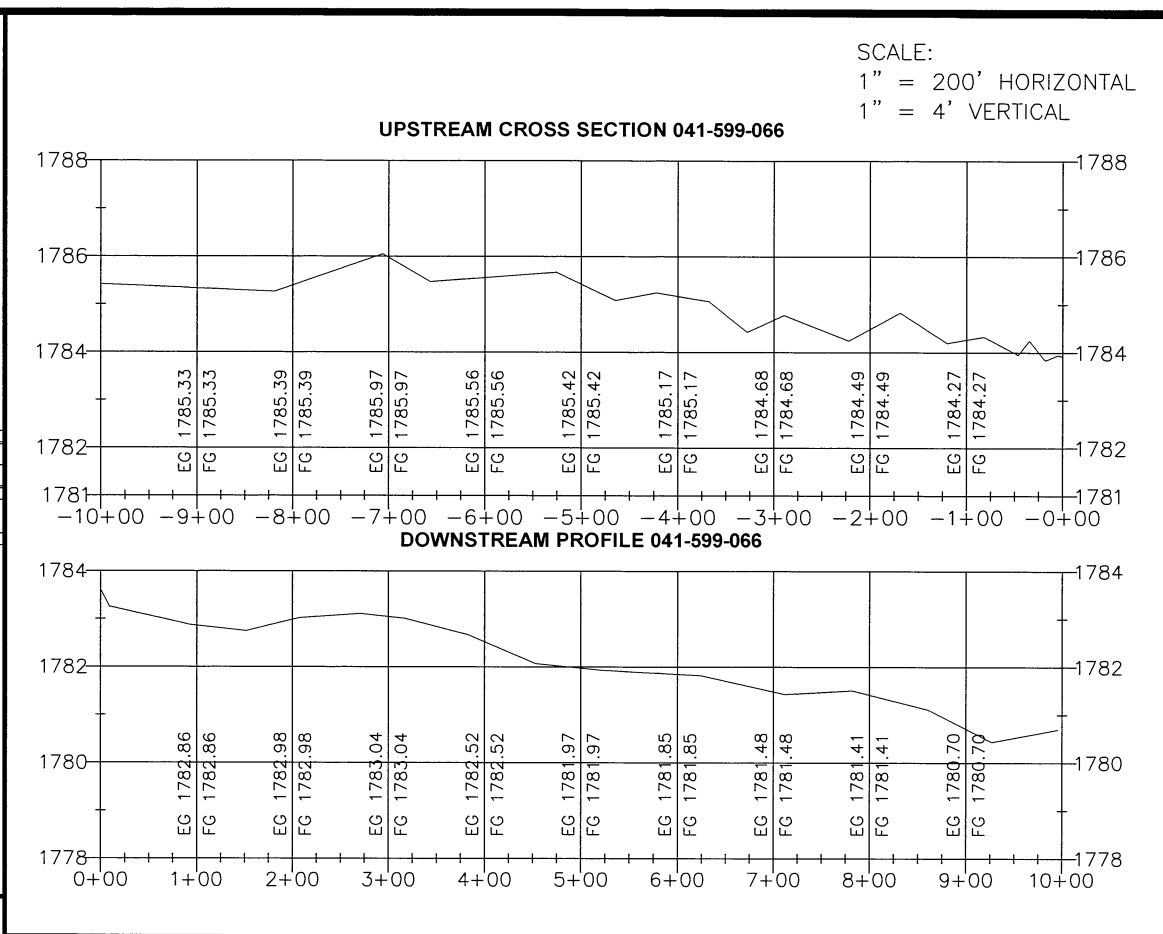
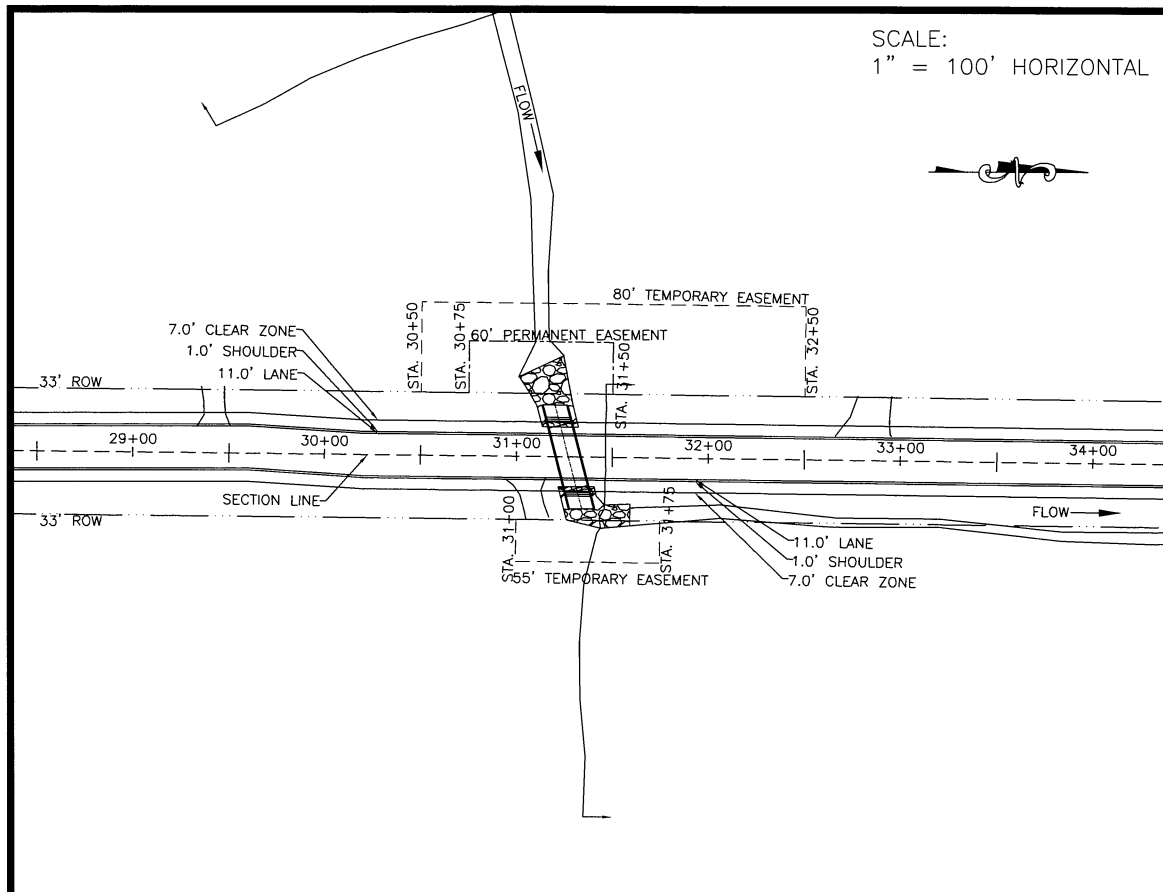
- ⑥ COARSE FILTER AGGREGATE (SPEC. 3149) SHALL BE INCIDENTAL.
- ⑦ TO PROTECT AREAS FROM SHEET FLOW. MAXIMUM CONTRIBUTING AREA: 1 ACRE.
- ⑧ TO PROTECT AREAS FROM SHEET FLOW. MAXIMUM CONTRIBUTING AREA: 0.25 ACRE.



# PLAN & PROFILE

CERTIFIED BY *Joseph M. Hinton* LIC. NO. 54947 DATE: 11-29-22  
LICENSED ENGINEER

S.A.P. NO. 041-599-066 SHEET NO. 11 OF 14



**FEDERAL PROJ. NO.**

**LOCATION ENGINEER'S OBSERVATION AT CULVERT SITE**

- SPECIAL FEATURES: WATERFALLS, DAMS, FLOODS, ICE DEBRIS, ETC...
- OTHER BRIDGES OR CULVERTS OVER THE SAME STREAM. GIVEN LOCATION, TYPE, ETC...
- APPARENT HIGH WATER ELEVATION \_\_\_\_\_ OBTAINED FROM \_\_\_\_\_
- OTHER DATA: APPROX. VELOCITY OF WATER AT TIME OF SURVEY \_\_\_\_\_

**HYDRAULIC ENGINEER'S RECOMMENDATION**

DATE: NOVEMBER 18, 2019

STREAM OR DITCH DESIGNATION UNNAMED STREAM

DRAINAGE AREA 4.25 SQ. MI.

MAX. FLOOD ON RECORD UNK. DESIGN HEADWATER ELEV. 694 CFS

MAX. OBSERVED HIGHWATER ELEV. UNK. DESIGN HEADWATER ELEV. 1788.65

DESIGN MEAN VELOCITY THROUGH STRUCTURE 1.2 FPS (AVG.)

LOW SUPERSTRUCTURE AT OR ABOVE ELEVATION 1787.61 FT

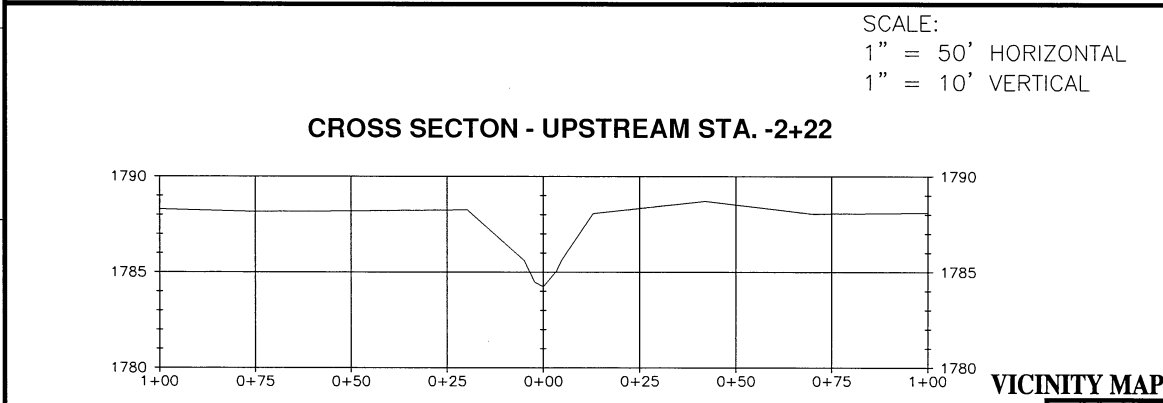
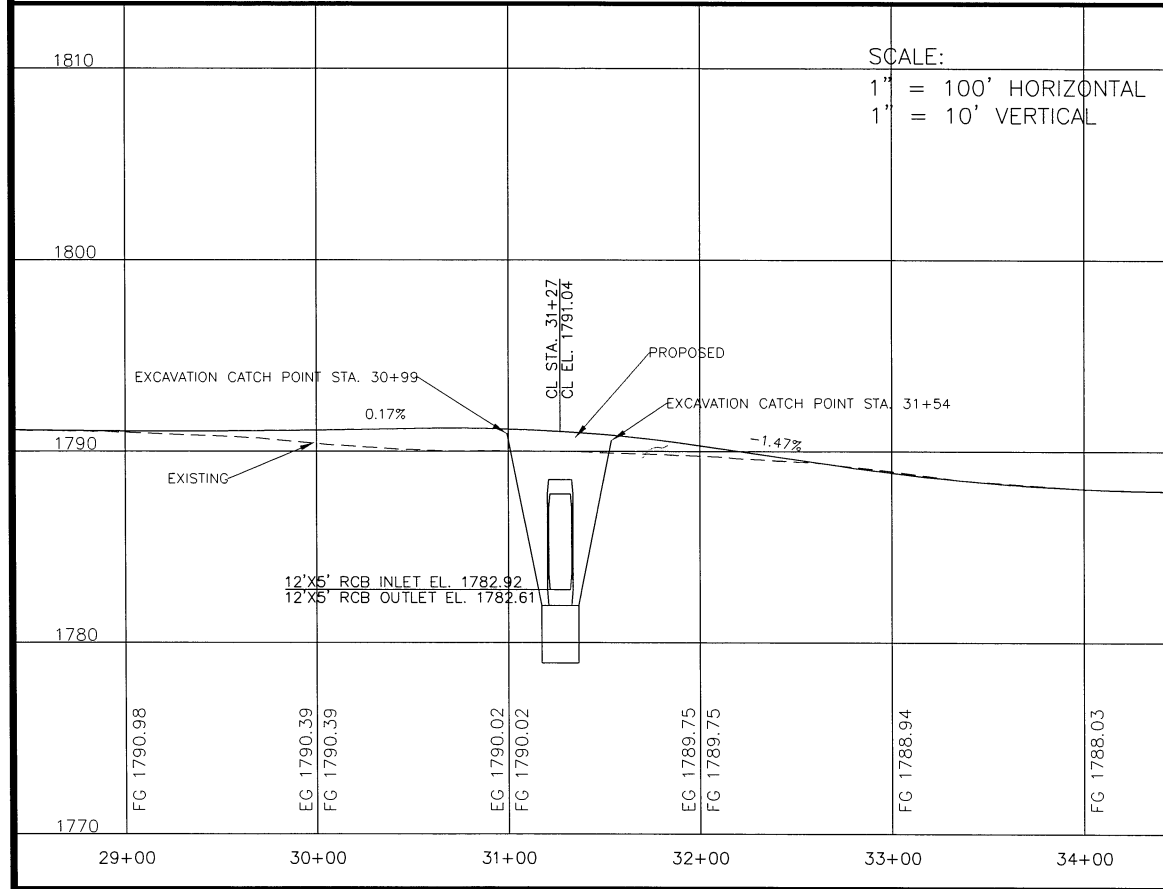
FLOWLINE ELEVATION 1782.77 FT SKEW ANGLE 15°

BASIC FLOOD (100 YR. FREQ.): 694 CFS

BASIC HEADWATER ELEVATION: 1698.0 FT

GREATEST/OVERTOPPING FLOOD (500 YR FREQ.) 830 FPS

GREATEST/OVERTOPPING HEADWATER ELEVATION: 1700.2 FT



**ENGINEER'S RECOMMENDATION**

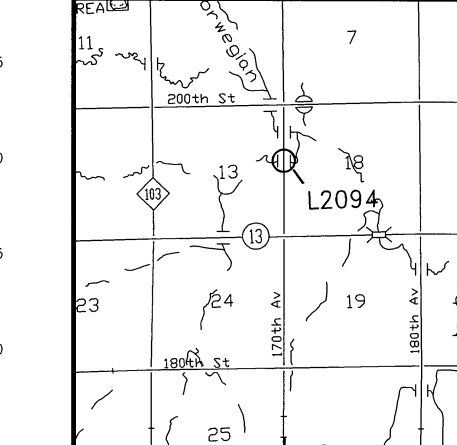
INSTALL 1 LINE 12'X5' RC BOX CULVERT AT A 15° SKEW. 1 LINE OF 12'X5' RC BOX CULVERT SET 1' BELOW THE NATURAL CHANNEL FLOWLINE, TO ALLOW FOR FISH PASSAGE.

BRIDGE SURVEY SHEETS MADE FROM 4108 J  
LINCOLN COUNTY HIGHWAY DEPARTMENT SURVEY

BENCHMARK ELEVATION 1787.71

LOCATION 4.4 MILES NORTH ALONG TH 75 FROM THE INT. OF TH 75 & TH 14 IN LAKE BENTON.

DATUM NAD 83 - LINCOLN CO. COORDINATE SYSTEM



**STATE OF MINNESOTA  
DEPARTMENT OF TRANSPORTATION**

**BRIDGE SURVEY**

AT STATION 31+27 ON 170TH AVE.

PROPOSED BRIDGE LOCATION 0.6 MILES NORTH OF THE INT. OF 170TH AVE. & CSAH 13

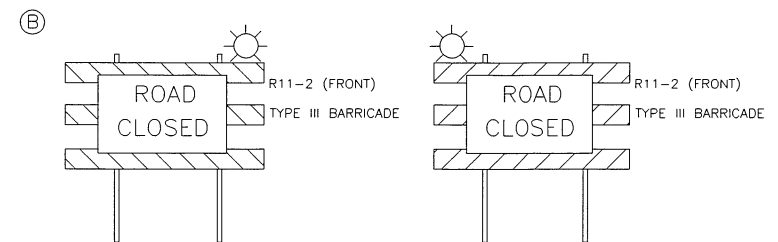
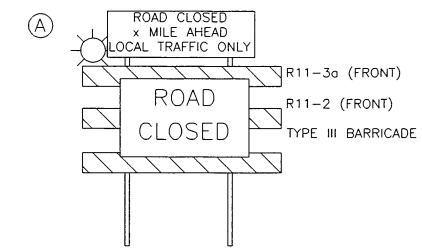
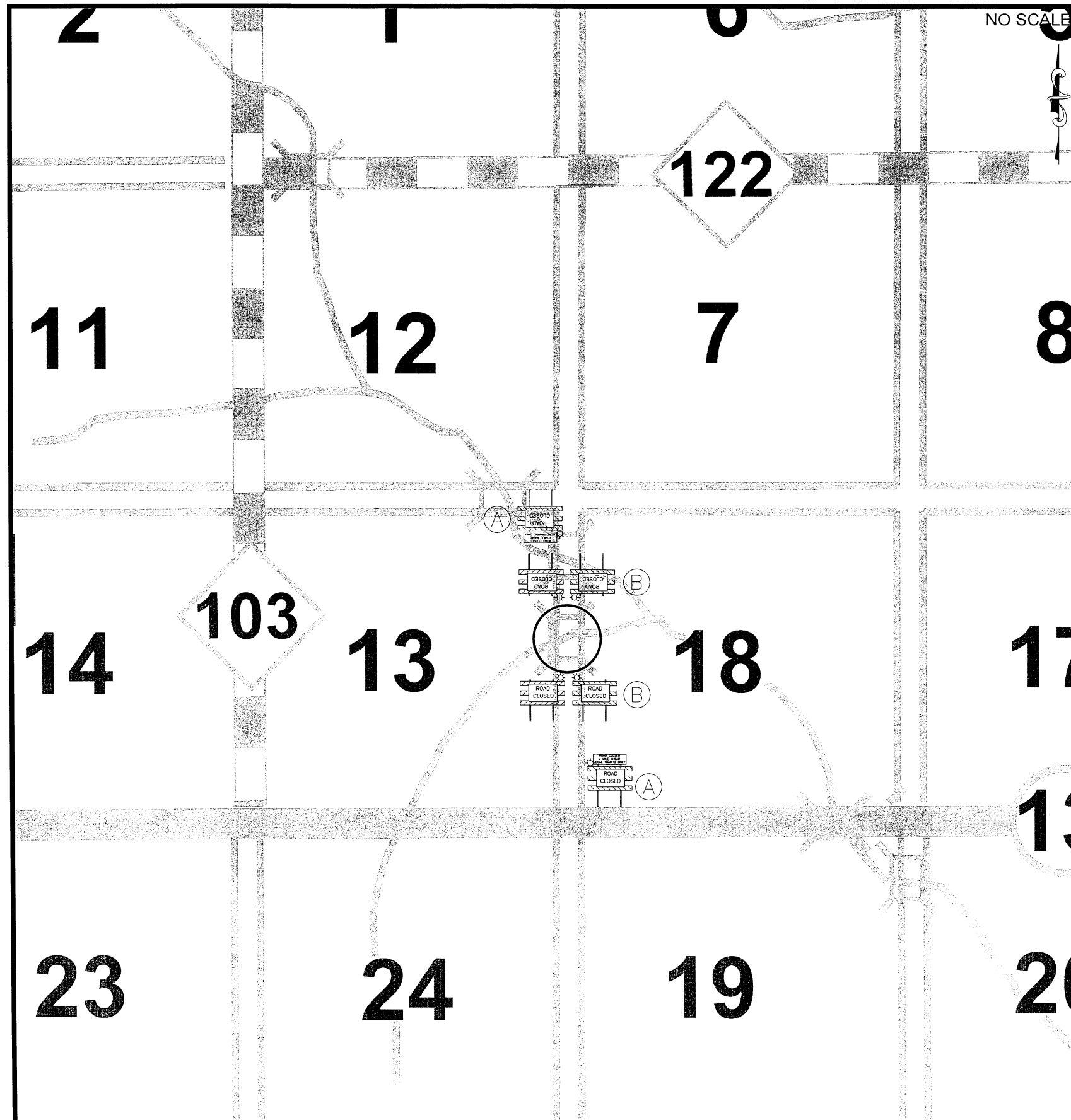
SEC. 18&13 TWP. 110N RNG. 45W/46W

TOWNSHIP: DIAMOND LAKE/ DIAMOND LAKE

COUNTY: LINCOLN EXISTING BRIDGE NO.: L2094

PROPOSED BRIDGE NO. 41J82





NOTE:  
 CONTRACTOR SHALL INSTALL AND MAINTAIN ORANGE SAFETY FENCE OR OTHER MATERIAL ACCEPTED BY THE ENGINEER AS TO COMPLETELY BLOCK THE ROADWAY FROM SHOULDER PI TO SHOULDER PI AT THE BARRICADE (B) LOCATION.

SIGN	SIGN NO.	QUANTITY	SIZE	COLOR	FLASHERS
	TYPE III BARRICADE	6	60" X 48"	ORANGE ON WHITE	6
	R11-2	6	48" X 30"	BLACK ON WHITE	
	R11-3a	2	60" X 30"	BLACK ON WHITE	

ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MINNESOTA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND THE LATEST EDITION OF THE TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS FIELD MANUAL.

ALL NECESSARY TRAFFIC CONTROL DEVICES ON THIS PROJECT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

# TRAFFIC CONTROL

CERTIFIED BY Joseph M. Blom LIC. NO. 54947 DATE: 11-29-22  
 LICENSED ENGINEER

S.A.P. NO. 041-599-066 SHEET NO. 14 OF 14