

PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	1	44

CASS COUNTY HIGHWAY DEPARTMENT

PLANS

FOR COUNTY PROJECT NO. TB1206 BRIDGE NO. 09-139-21.0

GOVERNING SPECIFICATIONS:

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION, OCTOBER 2008: STANDARD DRAWINGS CURRENTLY IN EFFECT: AND OTHER CONTRACT PROVISIONS SUBMITTED HEREIN.

TABLE OF CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-3	NOTES
4	BASIS OF ESTIMATE & QUANTITIES
5-6	TYPICAL SECTIONS
7	ROAD PLAN AND PROFILE SHEET
8	BRIDGE SURVEY SHEET
9	BRIDGE PLAN AND PROFILE SHEET
10	BRIDGE LAYOUT
11-16	SOIL BORINGS
17	SCREED ELEVATIONS
18	BEAM FRAMING AND PILE LAYOUT
19-20	ABUTMENT DETAILS
21-22	PIER DETAILS
23-24	BOX BEAM DETAILS
25-26	SUPERSTRUCTURE DETAILS
27-28	SLAB LAYOUT
29	ABUTMENT UNDER DRAIN DETAILS
30-32	CONCRETE BARRIER DETAILS
33-34	GUARDRAIL DETAILS
35-36	EROSION CONTROL
37-38	TRAFFIC CONTROL
39-44	CROSS SECTIONS

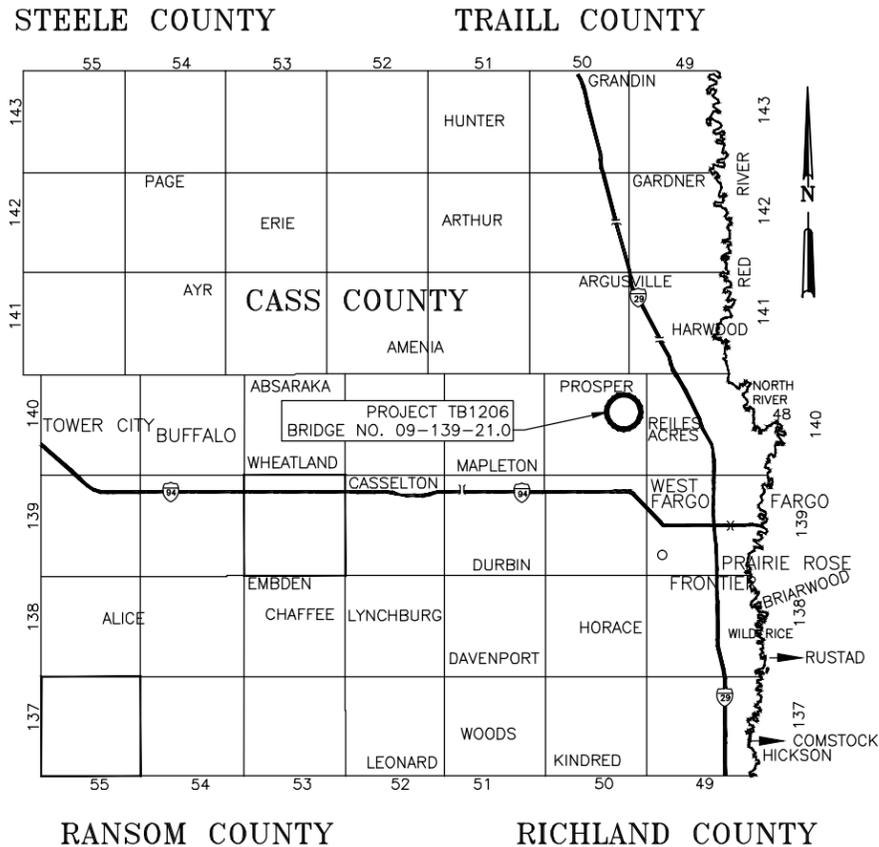
STANDARD DRAWINGS

D-622-1	PILE SPLICE DETAILS
D-704-7	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS PERFORATE TUBE
D-704-8	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS CONSTRUCTION SIGN DETAIL
D-704-10,11,12	BARRICADE DETAILS AND CHANNELIZING DEVICES
D-704-13	CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS
D-704-14	ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS
D-714-04	PIPE EXCAVATION AND INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE OR PIPE NOT UNDER THE ROADWAY
D-714-27	PAVEMENT MARKING
D-762-04	W-BEAM GUARDRAIL - GENERAL DETAILS
D-764-01	ET-PLUS
D-764-04	SEQUENTIAL KINKING TERMINAL
D-764-05	W-BEAM GUARDRAIL WITH APPROACHES NEAR BRIDGE FOR LOW VOLUME LOW SPEED ROADWAYS
D-764-13	TYPICAL GRADING AT BRIDGE ENDS WITH W-BEAM GUARDRAIL
D-764-22	BRIDGE BENCH MARKS
D-900-1	

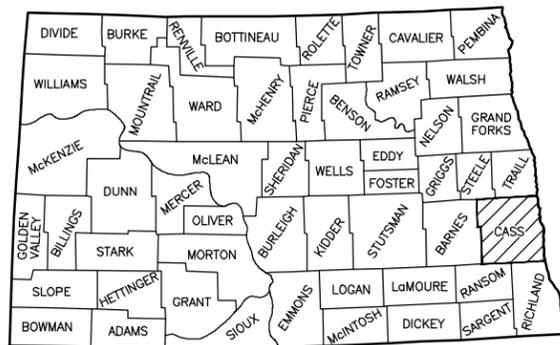
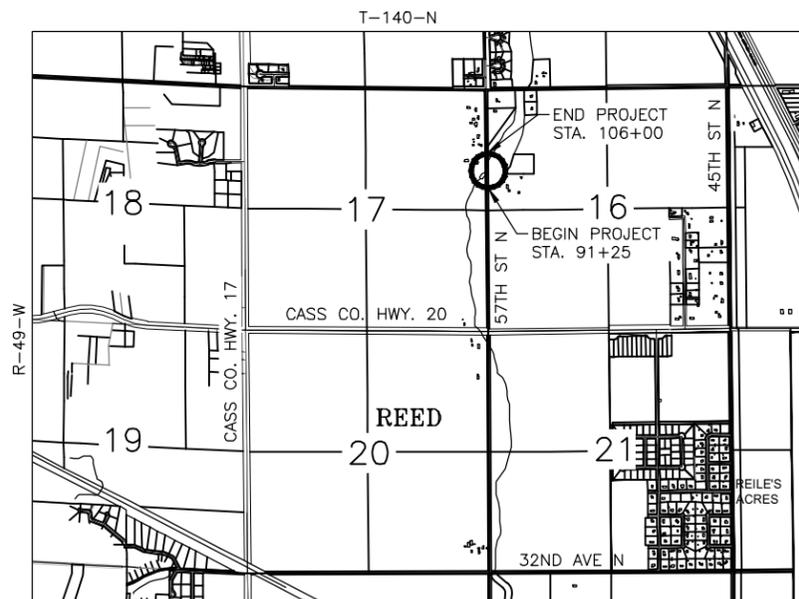
THE STANDARD DRAWINGS ARE INCLUDED IN THE BACK OF THE PLANS

LENGTH OF PROJECT = 0.279 MILES

SURVEY OCTOBER, 2013
DESIGN MARCH, 2014



PROJECT CONSISTS OF CONSTRUCTION OF A
375'-0" LONG PRESTRESSED BOX BEAM BRIDGE WITH
A CAST-IN-PLACE DECK ON 57TH STREET NORTH
ROAD GRADING, CHANNEL REPAIR & INCIDENTALS.



SKETCH MAP OF NORTH DAKOTA
SHOWING COUNTIES

DESIGN DATA FOR BRIDGE 09-139-21.0				
Traffic	Average Daily			Max.Hr.
Current 2014	Pass: 115	Trucks:	Total: 115	
Forecast 2034	Pass: 127	Trucks:	Total: 127	
Clear Zone Distance: 10 FT	Design Speed: 40			
Minimum Sight Dist. for Stopping: 305 FT				
Minimum Sight Dist. for Safe Passing:				
Sight Dist. for No Passing Zone: 600 FT				
Pavement Design Life 20 (years)				

APPROVED BY CASS COUNTY ENGINEER:

JASON BENSON /S/
JASON BENSON N.D. REG. NO. PE-7490
DATE: APRIL 17, 2014



Fargo

P: 701.237.5065
F: 701.237.5101

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Houston Engineering Inc.

NOTES:

- 100 DESIGN DATA:**
 HL-93 LOADING
 INCLUDES 15 P.S.F. FOR FUTURE WEARING SURFACE
 CLASS AE-3 CONCRETE - f'c = 3,000 P.S.I.
 CLASS AAE-3 CONCRETE - f'c = 4,000 P.S.I.
 REINFORCING STEEL (GRADE 60) - Fy = 60,000 P.S.I.
- 100-P01 INDIVIDUAL ITEMS:** THE COST OF THOSE ITEMS SHOWN ON PLANS BUT NOT LISTED IN THE ESTIMATE OF QUANTITIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR VARIOUS PAY ITEMS.
- 100-P02 SURVEY & CONSTRUCTION TESTING:** ALL SURVEYING AND CONSTRUCTION TESTING SHALL BE PROVIDED BY THE OWNER.
- 102-P01 GEOTECHNICAL REPORT:** THE FULL GEOTECHNICAL REPORT IS AVAILABLE UPON REQUEST.
- 105-P01 UTILITIES:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ANY UTILITY RELOCATION NECESSARY DURING CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR VERIFYING UTILITY LOCATIONS, CONTRACTING THE UTILITY COMPANIES, AND HAVING UTILITIES MARKED AND FLAGGED PRIOR TO CONSTRUCTION. FOR THE STATE OF NORTH DAKOTA, THE LOCATE NUMBER IS 1-800-795-0555.
- 105-P02 PLAN LOCATION:** PLAN LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR.
- 107-P01 HAUL ROAD RESTRICTIONS:** THE CONTRACTOR SHALL CONTACT THE APPROPRIATE COUNTY, TOWNSHIP, NDDOT AND CITY OFFICIALS TO DETERMINE IF THERE ARE ANY "NO HAUL ROUTES" PRIOR TO PREPARING A BID FOR THIS PROJECT.
- 200-P01 WETLAND MITIGATION:** THE CONTRACTOR SHALL EXCAVATE MATERIAL AS DIRECTED BY THE ENGINEER TO MITIGATE AREA OF FILL PLACED IN A WETLAND LOCATED EAST AND WEST OF THE BRIDGE. ALL WORK ON THIS PROJECT, INCLUDING WORK IN THE WETLAND AND ANY MITIGATION NECESSARY, IS SUBJECT TO THE LIMITATIONS SET FORTH IN U.S. ARMY CORPS OF ENGINEERS PERMIT #NWO-2013-2440-BIS. A COPY OF THIS PERMIT IS ON FILE AT THE CASS COUNTY ENGINEER'S OFFICE. ALL COST ASSOCIATED WITH THIS WORK SHALL BE INCLUDED IN THE PRICE BID FOR COMMON EXCAVATION TYPE A.
- 202-P01 REMOVAL OF EXISTING STRUCTURE:** THE CONTRACTOR IS TO REMOVE THE EXISTING 42' SINGLE SPAN STEEL GIRDER BRIDGE WITH TIMBER DECK. THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL AND PROPER DISPOSAL OF ALL PORTIONS OF THE STRUCTURE. THE DISPOSAL SITE SHALL BE AT A LOCATION OFF SITE AND APPROVED BY THE ENGINEER. THE ABUTMENT PILING SHALL BE REMOVED TO TWO FEET BELOW THE FINAL GRADE LINE AND SHALL BE INCLUDED IN THE BID FOR "REMOVAL OF STRUCTURE."
- 202-P02 REMOVAL OF CULVERTS - ALL TYPES AND SIZES:** THE "REMOVAL OF CULVERTS - ALL TYPES AND SIZES" ITEM SHALL BE FULL COMPENSATION FOR ALL LABOR AND MATERIALS NECESSARY TO REMOVE ANY SURFACING, EXCAVATE AND REMOVE ANY TYPE OF PIPE, BACKFILL TRENCH, AND RESTORE EXISTING ROAD TO ITS ORIGINAL CONDITIONS. ANY SURFACING USED SHALL BE PAID FOR UNDER THE PARTICULAR SURFACING MATERIAL USED. ALL REMOVALS SHALL BECOME PROPERTY OF THE CONTRACTOR, UNLESS NOTED OTHERWISE. DISPOSAL SHALL BE AT A LOCATION OFF SITE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
- REMOVAL OF FLARED END SECTIONS AND/OR FLAP GATES SHALL BE INCLUDED IN THE BID FOR "REMOVAL OF PIPE - ALL TYPES AND SIZES."
- 203-P01 SHRINKAGE:** 30 PERCENT ADDITIONAL VOLUME IS INCLUDED FOR SHRINKAGE IN EMBANKMENT QUANTITIES.
- 203-P02 EMBANKMENT:** EMBANKMENT QUANTITIES ARE LISTED FOR INFORMATIONAL PURPOSES ONLY. COSTS TO HAUL, PLACE AND COMPACT EMBANKMENT TO BE INCLUDED IN THE PRICE BID FOR "BORROW-EXCAVATION".

- 203-P03 SCARIFYING AND RECOMPACTION OF EMBANKMENT AREAS:** UNDER ALL EMBANKMENT AREAS, AN ADDITIONAL 12" (BEYOND ANY TOPSOIL STRIPPING IF REQUIRED) SHALL BE SCARIFIED AND RECOMPACTED. THIS WORK SHALL BE INCLUDED IN THE BID ITEM FOR "BORROW-EXCAVATION" ALL AREAS UNDER THE ROADWAY SHALL BE COMPACTED BEFORE PLACEMENT OF AGGREGATE BASE OR BITUMINOUS SURFACING.
- 203-P04 EMBANKMENT CONSTRUCTION:** ALL CHANNEL AND ROADWAY EMBANKMENT SHALL BE COMPACTED TO THE REQUIREMENTS OF SECTIONS 203.02 A AND 203.02 G.
- THE SUITABILITY OF THE MATERIAL FROM ON-SITE EXCAVATIONS FOR USE IN EMBANKMENTS WILL BE DETERMINED BY THE FIELD ENGINEER. EMBANKMENT CONSTRUCTED FROM MATERIAL EXCAVATED ON-SITE WILL NOT BE MEASURED FOR PAYMENT, BUT WILL BE CONSIDERED INCLUDED IN THE BID ITEM "COMMON EXCAVATION-TYPE A". EMBANKMENT WILL BE REQUIRED FOR THE CONSTRUCTION OF THE CHANNEL, APPROACHES, AND ROADWAY. IF MATERIAL IS NOT SUITABLE FOR THE ROADBED ITSELF, IT MAY BE USED ON SLOPE AREAS AS DETERMINED BY THE ENGINEER.
- 203-P05 COMPACTION AND DENSITY CONTROL:** SUB-SURFACE MATERIAL SHALL BE COMPACTED WITH A SHEEPS FOOT ROLLER.
- MOISTURE AND DENSITY CONTROLS SHALL BE IN ACCORDANCE WITH SECTION 203.02 G OF THE STANDARD SPECIFICATIONS AASHTO T-99 EXCEPT AS STATED BELOW.
- FILL MATERIAL SHALL BE SPREAD AND COMPACTED IN LOOSE LIFTS OF 4-8 INCHES. COMPACTION SHALL MEET THE FOLLOWING REQUIREMENTS:
- | | | |
|--------------------|--|---|
| REFERENCE | RELATIVE COMPACTION, PERCENT (ASTM D 698 STANDARD PROCTOR) | MOISTURE CONTENT VARIANCE FROM OPTIMUM, PERCENTAGE POINTS |
| GRANULAR MATERIALS | ≥ 95 | SANDS (+/- 3) |
| CLAY MATERIALS | ≥ 95 | CLAYS (-1 TO +3) |
- ALL COSTS ASSOCIATED WITH SUBGRADE COMPACTION SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS.
- 203-P06 TOPSOIL - WETLAND:** THE CONTRACTOR SHALL STRIP A MINIMUM OF 6 INCHES OF TOPSOIL FROM WETLAND AREAS. THE CONTRACTOR SHALL CONSTRUCT A SEPARATE STOCKPILE SITE FOR THE WETLAND TOPSOIL THAT IS NO GREATER THAN 3 FEET HIGH.
- THE CONTRACTOR SHALL PLACE AND SPREAD A MINIMUM OF 6 INCHES OF WETLAND TOPSOIL AT THE MITIGATION SITES. IF THE WETLAND TOPSOIL HAS BEEN STOCKPILED FOR MORE THAN 30 DAYS, THE CONTRACTOR SHALL PLACE, SPREAD, AND SEED THE WETLAND TOPSOIL WITH ONE OF THE FOLLOWING SEED MIXTURES:
- | Grass | | | Full Seeding Rate PLS/Acre | % Species in Mix | PLS lbs./Ac |
|-----------------------|--------------------------|-----------|----------------------------|------------------|-------------|
| Common Name | Scientific Name | Variety | | | |
| Prairie Cord Grass | Spartina pectinata | Red River | 7 | 15 | 1.1 |
| American Slough Grass | Beckmannia syzigachne | Common | 0.9 | 20 | 0.2 |
| Virginia Wild-rye | Elymus virginicus | Omaha | 10 | 20 | 2 |
| Fowl Blue Grass | Poa palustris | Common | 1 | 20 | 0.2 |
| Fox Sedge | Carex vulpinoidea | Common | 1 | 15 | 0.2 |
| American Manna Grass* | Glyceria grandis | Common | 1.5 | 10 | 0.2 |
| Fowl Manna Grass* | Glyceria striata | Common | 1 | 10 | 0.1 |
| Bluejoint Grass** | Calamagrostis canadensis | Common | 1 | 10 | 0.1 |
| | | | Total | 120 | 3.9 |
- * AMERICAN, FOWL, OR BOTH MAY BE USED. IF ONLY ONE IS USED THE SEEDING RATE OF OTHER SPECIES DOES NOT NEED TO BE INCREASED.
 ** SEED MAY NOT BE AVAILABLE AND CAN BE REMOVED WITHOUT INCREASING THE SEEDING RATE OF OTHER SPECIES
- THE CONTRACTOR SHALL INCLUDE ALL COSTS FOR REMOVAL, STOCKPILING, SEEDING, AND PLACEMENT OF WETLAND TOPSOIL IN THE PRICE BID FOR "TOPSOIL - WETLAND."
- 203-P07 EXCAVATION AND FILL ELEVATIONS:** ALL DITCH GRADES AND CONTOURS ARE GIVEN AT THE TOP OF THE TOPSOIL. ALL ELEVATIONS SHOWN IN THE CROSS SECTIONS ARE TO THE TOP OF THE FINISHED GRADE.

- 203-P08 BORROW:** BORROW FOR THE ROADWAY AND EMBANKMENTS SHALL COME FROM THE SITE IDENTIFIED IN THE PLANS SOUTHWEST OF THE BRIDGE. BORROW SHALL CONFORM TO THE REQUIREMENTS OF SECTION 203.02E. PAY QUANTITY SHALL BE DETERMINED FROM CROSS SECTIONING, PER SECTION 203.03A. ALL COSTS ASSOCIATED WITH OBTAINING THE SITE AND THE BORROW, INCLUDING BUT NOT LIMITED TO THE CULTURAL RESOURCE INVENTORY AND THE UTILITY ADJUSTMENT OR RELOCATIONS, SHALL BE INCLUDED IN THE PRICE BID FOR BORROW.
- 203-P09 TOPSOIL:** ALL DISTURBED EMBANKMENT AREAS SHALL REQUIRE REMOVAL AND REPLACEMENT OF THE TOPSOIL (QUANTITY ESTIMATED AT 4"). REMOVED TOPSOIL SHALL BE STOCKPILED WITH THE RIGHT-OF-WAY AT DESIGNATED OR ACCEPTABLE LOCATIONS OUTSIDE THE GRADING LIMITS. THIS WORK SHALL BE INCLUDED IN THE BID ITEM FOR TOPSOIL.
- 210-P01 SELECT BACKFILL:** SELECT BACKFILL SHALL BE PLACED, MOISTENED OR DRIED AS REQUIRED, AND THOROUGHLY COMPACTED WITH MECHANICAL TAMPING EQUIPMENT IN MAXIMUM 6" LIFTS. MOISTURE CONTENT OF MATERIAL SHALL BE NEAR OPTIMUM MOISTURE AS DETERMINED BY THE ENGINEER. SELECT BACKFILL SHALL MEET THE REQUIREMENTS OF SECTION 816.03 - CLASS 3 MATERIAL.
- MATERIAL SHALL BE PAID PER PLAN QUANTITY BASED ON LIMITS SHOWN.
- 210-P02 CHANNEL EXCAVATION:** TYPICAL CHANNEL CROSS-SECTION TO EXTEND 50 FEET EITHER SIDE OF THE BRIDGE CENTERLINE. TRANSITION TO MEET EXISTING GRADE AT 100 FEET FROM CENTERLINE. EXISTING ELEVATIONS WILL BE MAINTAINED AND EXTENDED AS NEEDED TO CONNECT TO GRADES AT WING WALLS. ITEM SHALL BE INCLUDED IN THE BID PRICE FOR "CHANNEL EXCAVATION." DISPOSAL OF EXCESS EXCAVATED OR WASTE MATERIALS SHALL BE IN AREAS ARRANGED BY THE COUNTY. THE DISPOSAL SITE SHALL BE ROUGH GRADED AS DIRECTED BY THE ENGINEER.
- 210-P03 CLASS 2 EXCAVATION:** EXCAVATION SHALL EXTEND FROM THE BOTTOM OF THE FOOTING TO THE UPPER LIMITS AS SHOWN ON THE BRIDGE LAYOUT SHEET AT THE PIERS. EXCAVATION IS BELOW THE DATUM LINE OF 886.00.
- 210-P04 FOUNDATION PREPARATION:** THE LUMP SUM PAY ITEM FOR "FOUNDATION PREPARATION" SHALL INCLUDE THOSE ITEMS LISTED IN SECTION 210.04 B. ROOTS OR OTHER VEGETATION MORE THAN 1" IN THICKNESS BELOW THE FINISHED SURFACE OF EXCAVATED SECTIONS SHALL BE REMOVED TO A DEPTH OF 6" BELOW THE FINISHED SURFACE. ALL COST TO DEWATER SHALL BE INCLUDED IN THE PRICE BID FOR "FOUNDATION PREPARATION".

This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department	CASS COUNTY HIGHWAY DEPARTMENT MAPLE RIVER BRIDGE NO. 09-139-21.0 NOTES PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY
---	--

PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	3	44

NOTES:

302-P01 SURFACE TOLERANCE: SURFACE TOLERANCE TYPE A (MAX. VARIANCE 0.08') SHALL BE USED ON AGGREGATE BASE MATERIAL.

408-P01 HOT BITUMINOUS PAVEMENT (HBP) CLASS 27: THE CONTRACTOR SHALL HAVE AN INDEPENDENT TESTING LABORATORY RUN A 50-BLOW MARSHALL MIX DESIGN USING AASHTO T-245 AND SECTION 408.04 B OF THE STANDARD SPECIFICATIONS. IF DURING THE PROJECT IT BECOMES APPARENT THAT THE MIX BEING PRODUCED DEVIATES FROM THE INITIAL MIX DESIGN OR PRODUCES SUBSTANDARD PERFORMANCE IN THE FIELD, THE ENGINEER RESERVES THE RIGHT TO HAVE THE CONTRACTOR PERFORM ADDITIONAL MIX DESIGNS UNTIL AN ACCEPTABLE PRODUCT IS PRODUCED. THE ENGINEER HAS THE AUTHORITY TO IMMEDIATELY SUSPEND THE WORK WHOLLY OR IN PART IF IT IS DETERMINED THAT FURTHER PLACEMENT OF THE MIX WILL PRODUCE AN UNACCEPTABLE FINISHED PRODUCT.

THE MIX SHALL MEET THE FOLLOWING REQUIREMENTS:

STABILITY (MIN.)	1200
FLOW (MAX.) .01 IN.	18
PERCENT VOIDS	3 TO 5

IN ADDITION TO THE AGGREGATE GRADATION TESTS REQUIRED BY SECTION 408.04B, THE CONTRACTOR SHALL PERFORM TESTS FOR PHYSICAL PROPERTIES AT THE FOLLOWING MINIMUM FREQUENCY: ONE TEST OF AGGREGATE FOR EVERY 1,000 TONS PRODUCED.

THE COMPACTION OF MAINLINE PAVING ON ALL COURSES SHALL BE IN ACCORDANCE WITH SECTION 408.04 1.3-SPECIFIED DENSITY. THE PAVEMENT SHALL BE PAVER LAID IN APPROXIMATELY EQUAL LIFTS NOT TO EXCEED 3" PER LIFT.

NO RUMBLE STRIPS WILL BE REQUIRED.

ALL COSTS ASSOCIATED WITH THIS ITEM SHALL BE INCIDENTAL TO THE PRICE BID FOR "HOT BITUMINOUS PAVEMENT CL 27".

602-P01 CONCRETE: ALL SUPERSTRUCTURE CONCRETE SHALL BE CLASS AAE-3 CONCRETE.

CONCRETE FOR ABUTMENTS SHALL BE CLASS AE-3 CONCRETE.

SURFACE FINISH "D" (SECTION 602.03 1-5) WILL BE REQUIRED FOR ALL EXPOSED WING SURFACES OR OTHER SURFACES THAT ARE VISIBLE TO THE MOTORING PUBLIC. THE COST OF SURFACE FINISH "D" SHALL BE INCLUDED IN THE PRICE BID FOR CLASS AAE-3 CONCRETE.

BEAMS AND GIRDERS HAVE SLIGHT VARIATIONS IN THE ANTICIPATED CAMBER. TO BUILD THE DECK TO THE DESIGNATED THICKNESS WILL REQUIRE SLIGHT ADJUSTMENTS IN DECK ELEVATION AND/OR RISER DIMENSIONS. THESE ADJUSTMENTS RESULT IN MINOR CONCRETE QUANTITY DISCREPANCIES. THE CONTRACTOR SHALL CONSIDER THE QUANTITY DISCREPANCY WHEN HE/SHE BIDS THE UNIT PRICE FOR SUPERSTRUCTURE CONCRETE.

IF THE DEPTH OF THE CONCRETE RISERS BETWEEN THE TOPS OF THE GIRDERS AND THE BOTTOM OF THE DECK SLAB EXCEEDS THE THEORETICAL DIMENSIONS, THE ADDITIONAL CONCRETE SHALL BE CONSIDERED INCIDENTAL.

DEFLECTION OF THE DECK SHORING SHALL BE COMPUTED USING THE TOTAL DEAD LOAD PLUS THE WEIGHT OF THE FINISHING MACHINE. THE FORMING SHALL BE ADJUSTED PROPERLY TO ACCOMMODATE THE DEFLECTION AND THEREBY MAINTAIN THE TOTAL SLAB THICKNESS SPECIFIED IN THE PLANS.

THE COST OF FURNISHING AND PLACING CONCRETE INSERTS, TIE WIRE, BAR SPACERS, BAR SUPPORTS, AND OTHER MISCELLANEOUS ITEMS SHALL BE INCLUDED IN THE PRICE BID FOR CLASS AE-3 CONCRETE OR CLASS AAE-3 CONCRETE.

602-P02 END BEAMS AND PIER DIAPHRAGMS: END BEAM AND PIER DIAPHRAGM CONCRETE SHALL BE PLACED AT THE SAME TIME AS THE DECK.

602-P03 DECK CURING: NO WORK SHALL BE DONE ON THE DECK WHILE THE WET CURE IS IN PROGRESS, INCLUDING RAIL WORK.

602-P04 PENETRATING WATER REPELLENT TREATMENT: PENETRATING WATER REPELLENT SHALL BE APPLIED TO THE DRIVING SURFACE OF THE CONCRETE DECK.

612-P01 STRUCTURAL STEEL: STRUCTURAL STEEL SHALL BE AASHTO M 270, GRADE 36, EXCEPT THE REQUIREMENTS FOR CHARPY V-NOTCH TEST IS WAIVED FOR THE ICE NOSE AND ARMOR ANGLE. THE ICE NOSE AND ARMOR ANGLE SHALL BE GALVANIZED ACCORDING TO AASHTO M 111.

612-P02 REINFORCING STEEL: ALL REINFORCING STEEL SHALL BE GRADE 60. BARS ENDING WITH THE SUFFIX "E" SHALL BE EPOXY COATED. BARS ENDING WITH THE SUFFIX "S" INDICATE A SERIES.

DIMENSIONS FOR REINFORCING STEEL BARS ARE GIVEN AS OUT TO OUT UNLESS OTHERWISE NOTED.

THE FIRST DIGIT OR THE FIRST TWO DIGITS OF EACH BAR INDICATES THE BAR SIZE.

616-P01 SHOP DRAWINGS: SHOP DRAWINGS, INCLUDING THOSE FOR THE PRESTRESSED BOX BEAMS, METAL PROTECTION ANGLE AND METAL ICE NOSE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

622-P01 PILING: THE CONTRACTOR WILL CHECK TO SEE IF EXISTING PILING OR SPREAD FOOTINGS WILL INTERFERE WITH PILING TO BE DRIVEN. IF AN INTERFERENCE WILL RESULT, THEN IT MAY REQUIRE THE RESPACING OF PILING AS DETERMINED BY THE ENGINEER IN THE FIELD AND ENGINEERING FIRM.

PILING SHALL BE DRIVEN WITH A STEAM, AIR, OR DIESEL HAMMER WITH A RATED ENERGY AND RAM WEIGHT NOT LESS THAN 41,867 FOOT-POUND-TONS, AS COMPUTED BY THE FORMULA $W(E - 14014) + .598E$, WHERE W IS THE WEIGHT OF THE RAM IN TONS, AND E IS THE RATED HAMMER ENERGY. IN NO CASE SHALL THE RAM WEIGHT BE LESS THAN 3000 POUNDS.

NO PILING SHALL BE DRIVEN ON THE PROJECT SITE WITHIN 72 HOURS OF CONCRETE PLACEMENT OR UNTIL 70% OF THE DESIGN STRENGTH OF THE CONCRETE IS REACHED.

PILE TIPS SHALL BE REQUIRED FOR ALL PILE.

708-P01 LOOSE ROCK RIPRAP: RIPRAP SHALL BE PLACED ON PREPARED SLOPES. EXACT PLACEMENT LIMITS SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.

RIPRAP SHALL CONFORM TO SECTION 708.04 OF THE STANDARD SPECIFICATIONS.

708-P02 SEEDING: CONTRACTOR WILL SEED AND MULCH AREAS DISTURBED BY CONSTRUCTION ACTIVITY. CONTRACTOR SHALL PROVIDE EROSION CHECKS UNTIL TURF IS ESTABLISHED AS DIRECTED BY THE ENGINEER IN THE FIELD.

MATERIALS FOR MULCHING SHALL CONSIST OF HAY OR THE STRAW FROM OATS OR BARLEY AS NOTED IN SECTION 708.02.B.3.b.

PLAN QUANTITY FOR SEEDING SHALL BE PAY QUANTITY.

SEEDING - TYPE B CLASS V (MIX 2) SHALL BE USED AS SHOWN IN THE TURF ESTABLISHMENT AND EROSION CONTROL PLANS. THE CONTRACTOR MAY CHOOSE TO APPLY SEEDING AS STATED IN THE STANDARD SPECIFICATIONS OR AS STATED IN THIS PLAN NOTE. THE SEED MIXTURE SHALL BE AS FOLLOWS:

CLASS V	POUNDS OF LIVE SEEDS PER ACRE
BLUEGRASS (2 KINDS)	120
CREeping RED FESCUE	20
PERENNIAL RYE	20
TOTAL:	160

A GRASS DRILL USED TO SEED LAWNS SHALL BE USED TO APPLY THE SEED INTO THE SEEDBED. FERTILIZER SHALL BE A MIXTURE OF 5-10-5 APPLIED AT THE RATE OF 100 LBS PER ACRE. HYDROMULCH APPLICATION RATE SHALL BE AS SHOWN IN STANDARD SPECIFICATIONS 708.02 B.3.a. THE HYDROMULCHED AREA SHALL BE SPRINKLED FOR THE FIRST 5 DAYS AND THEN PERIODICALLY FOR THE NEXT 10 DAYS TO KEEP THE SOIL MOIST FOR A DEPTH OF THREE INCHES. ALL COST FOR LABOR, EQUIPMENT, AND MATERIALS NECESSARY TO COMPLETE THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "SEEDING-TYPE B-CLASS V".

708-P03 TEMPORARY EROSION CONTROL: THE CONTRACTOR SHALL SUBMIT A TEMPORARY EROSION CONTROL PLAN IN ACCORDANCE WITH SECTION 110 OF THE STANDARD SPECIFICATIONS AND STANDARD DRAWING D-708-2.

710-P01 DETOUR: THE BRIDGE SHALL BE CLOSED DURING CONSTRUCTION. NO OFFICIAL DETOUR SHALL BE MARKED. TEMPORARY LOCAL ACCESS SHALL BE MAINTAINED AT ALL TIMES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE ROADWAY AND DRIVEWAYS SO THAT THEY REMAIN ACCESSIBLE TO LOCAL RESIDENTS AND EMERGENCY VEHICLES AT ALL TIMES DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE A MEANS OF MAINTAINING LOCAL TRAFFIC DURING THE INSTALLATION OF CULVERTS.

714-P01 CULVERTS: APPROACH CULVERTS TO BE REMOVED AT THE LOCATIONS DESIGNATED ON THE PLANS. ALL ITEMS ASSOCIATED WITH PLACEMENT OF NEW CULVERTS, EXCLUDING REPLACEMENT OF SURFACING MATERIALS, SHALL BE INCLUDED IN THE BID PRICE FOR PIPE CORR. STEEL .064IN 24IN.

CULVERT LENGTHS GIVEN ON THE PLAN AND PROFILE SHEETS ARE ACTUAL CULVERT LENGTH. FLARED END SECTIONS ARE NOT INCLUDED IN TOTAL LENGTH.

754-P01 SIGNS AND DELINEATORS: ANY EXISTING SIGNS AND DELINEATOR POSTS SHALL BE REMOVED AND RESET BY THE CONTRACTOR. THIS ITEM OF WORK IS NOT A SEPARATE PAY ITEM BUT IS INCIDENTAL TO OTHER ITEMS.

764-P01 GUARDRAIL: THE GUARDRAIL CONNECTION TO THE CONCRETE BARRIER AT THE BRIDGE ENDS SHALL BE INCLUDED IN THE BID FOR W-BEAM GUARDRAIL.

FLARED END TERMINALS WILL NOT BE ACCEPTABLE. REFER TO THE STANDARD DETAILS LISTED ON THE COVER SHEET FOR ALLOWABLE GUARDRAIL TERMINALS.

<p>This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department</p>	<p>CASS COUNTY HIGHWAY DEPARTMENT MAPLE RIVER BRIDGE NO. 09-139-21.0 NOTES PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY</p>
---	---

BASIS OF ESTIMATE

MATERIAL

HOT BITUMINOUS PAVEMENT CLASS 27	2 TON/CY
PG58-28*	(TO BE DETERMINED IN MIX DESIGN)
SS2H, CSS2H, OR MS1 EMULSIFIED ASPHALT*	0.05 GAL/SY
MC70 OR 250 LIQUID ASPHALT*	0.25 GAL/SY
SELECT BACKFILL	1.875 TON/CY
AGGREGATE CL 5	1.875 TON/CY
SEEDING	ALL DISTURBED AREAS OUTSIDE OF ROADBED
TOPSOIL QUANTITY BASED ON 4" DEPTH	

WATER FOR COMPACTION

EMBANKMENT	10 GAL/CY
AGGREGATE BASE CLASS 5	20 GAL/TON
ADDITIONAL INCLUDED AS DUST PALLIATIVE	10 M GAL/MILE

EARTHWORK

QUANTITY	
TOTAL EMBANKMENT*	= 14,880 CY
LOOSE VOLUME REQUIRED*	= 19,344 CY (BASED ON 130% COMPACTION)
COMMON EXCAVATION VOLUME	= 3,145 CY
WETLAND MITIGATION EXCAVATION VOLUME	= 6,682 CY
CHANNEL EXCAVATION VOLUME (WASTE)	= 1,242 CY
USABLE MATERIAL FROM CHANNEL EXC.	= 0 CY
BORROW EXCAVATION REQUIRED (BORROW EXCAVATION)	= 9,517 CY

*NOT A PAY ITEM (INCLUDED IN BID ITEM HOT BITUMINOUS PAVEMENT CL 27)
 **COMMON EXCAVATION-TYPE A SHALL INCLUDED ALL EXCAVATION AS SHOWN AS COMMON EXCAVATION AND WETLAND MITIGATION EXCAVATION.

ENVIRONMENTAL COMMITMENTS

COMMITMENT NO. 1: A CONCRETE STRUCTURE OR BRIDGE WILL BE DEMOLISHED AS A PART OF THIS PROJECT. SFN 17987 ASBESTOS NOTIFICATION OF DEMOLITION AND RENOVATION IS REQUIRED.

ACTION TAKEN/REQUIRED: THE CONTRACTOR WILL COMPLETE AND SUBMIT SFN 17987 TO THE NORTH DAKOTA DEPARTMENT OF HEALTH 10 DAYS PRIOR TO BEGINNING THE ACTIVITY.

COMMITMENT NO. 2: ACTIVE MIGRATORY BIRD NESTS WITH EGGS OR CHICKS ARE PROTECTED BY THE FEDERAL MIGRATORY BIRD TREATY ACT. DEMOLITION ON BRIDGES OR BOX CULVERTS WITH ACTIVE NESTING CAN NOT START UNTIL NESTING SEASON IS OVER UNLESS MEASURES ARE TAKEN TO PREVENT NESTING.

ACTION TAKEN/REQUIRED: THE CONTRACTOR SHALL NOT REMOVE ANY EXISTING BRIDGE OR BOX CULVERT IF ACTIVE NESTS ARE PRESENT. THE CONTRACTOR CAN LEGALLY REMOVE INACTIVE NESTS PRIOR TO THE NESTING SEASON. AFTER INACTIVE NESTS ARE REMOVED THE CONTRACTOR CAN USE NETS OR TARPS SECURED TO THE STRUCTURE TO DISCOURAGE NESTING. PLEASE ALSO REFER TO THE BRIDGE NOTE SECTION OF THE PLANS.

SUMMARY OF QUANTITIES				
SPEC	CODE	DESCRIPTION	QUANTITY	UNIT
201	0330	CLEARING & GRUBBING	1	L SUM
202	0104	REMOVAL OF STRUCTURE	1	EA
202	0174	REMOVAL OF PIPE ALL TYPES & SIZES	110	LF
203	0101	COMMON EXCAVATION-TYPE A	9,827	CY
203	0109	TOPSOIL	1,097	CY
203	0121	TOPSOIL-WETLAND	476	CY
203	0140	BORROW-EXCAVATION	9,517	CY
210	0111	CLASS 2 EXCAVATION (230 C.Y.)	1	L SUM
210	0126	CHANNEL EXCAVATION	1,242	CY
210	0198	SELECT BACKFILL (P)	675	TON
210	0411	FOUNDATION PREPARATION	1	L SUM
216	0100	WATER	211	M GAL
302	0120	AGGREGATE BASE COURSE CL 5	2,973	TON
408	0176	HOT BITUMINOUS PAVEMENT CL 27	367	TON
602	0130	CLASS AAE-3 CONCRETE	331.5	CY
602	1130	CLASS AE-3 CONCRETE	255.4	CY
602	1208	CONCRETE BRIDGE BARRIER	749.3	LF
602	1250	PENETRATING WATER REPELLENT TREATMENT	1,228.4	SY
604	9620	PRESTRESSED BOX BEAM-33IN	1,473.3	LF
612	0115	REINFORCING STEEL-GRADE 60	20,862	LBS
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	75,695	LBS
616	5890	STRUCTURAL STEEL	1	L SUM
622	0012	STEEL H-PILE TIPS 10 X 42	10	EA
622	0020	STEEL PILING HP 10 X 42	850	LF
622	0040	STEEL PILING HP 12 X 53	2,100	LF
622	9999	STEEL H-PILE TIPS 12 X 53	28	EA
702	0100	MOBILIZATION	1	L SUM
704	1000	TRAFFIC CONTROL SIGNS	398	UNITS
704	1052	TYPE III BARRICADE	7	EA
708	1020	RIPRAP-LOOSE ROCK	929	CY
708	1375	FLOTATION SILT CURTAIN	555	LF
708	1376	REMOVAL FLOTATION SILT CURTAIN	555	LF
708	1430	FIBER ROLLS 12IN	1,490	LF
708	1431	REMOVAL FIBER ROLLS 12IN	745	LF
708	2260	SEEDING-TYPE B-CL IV (P)	3.74	ACRE
708	2280	SEEDING-TYPE B-CL V (P)	3.74	ACRE
708	5500	MULCHING (P)	7.48	ACRE
714	3150	HEADWALL - PRECAST CONCRETE 4IN	2	EA
714	5035	PIPE CORR STEEL .064IN 24IN	90	LF
714	5820	END SECT CORR STEEL .064IN 24IN	4	EA
714	9720	UNDERDRAIN PIPE PVC PERFORATED 4IN	70	LF
714	9770	UNDERDRAIN PIPE PVC NON-PERFORATED 4IN	104	LF
764	0131	W-BEAM GUARDRAIL	233	LF
764	0145	W-BEAM GUARDRAIL END TERMINAL	4	EA

NOTES:

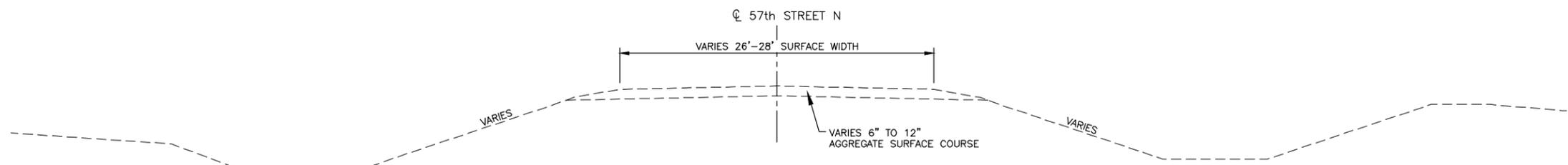
- WHERE A SPEC AND CODE ITEM DESCRIPTION IS FOLLOWED BY A (P), THE PLAN QUANTITY SHALL BE THE FINAL PAY QUANTITY.

No.	Revision	Date	By
1	UPDATED CODE NUMBER FOR 33" BOX BEAM	4/21/14	CVW

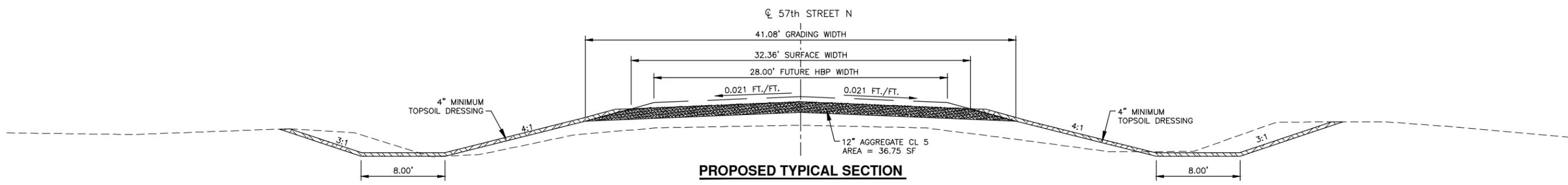
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/21/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
BASIS OF ESTIMATE
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

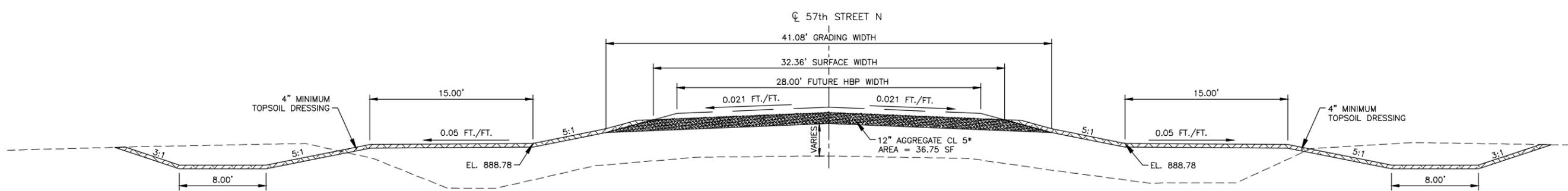
PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	5	44



EXISTING TYPICAL SECTION
 STA. 91+25.00 TO STA. 99+10.36
 STA. 99+50.37 TO STA. 106+00.00



PROPOSED TYPICAL SECTION
 STA. 91+25.00 TO STA. 95+52.80
 STA. 103+95.00 TO STA. 106+00.00



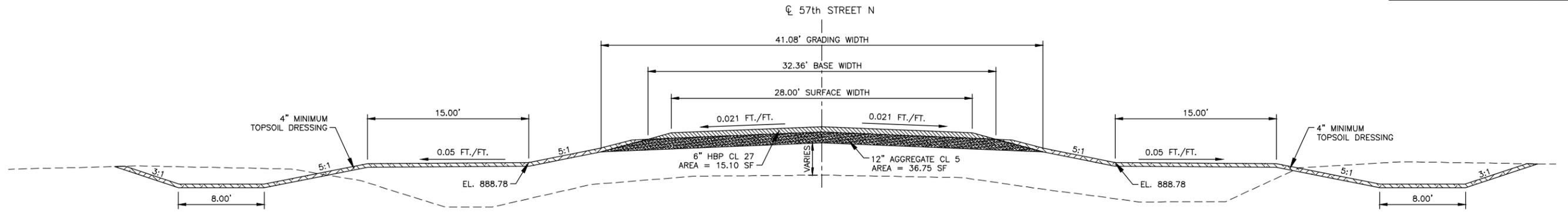
PROPOSED TYPICAL SECTION
 STA. 95+52.80 TO STA. 96+68.60

*AGGREGATE SURFACE THICKNESS SHALL TRANSITION FROM 12" TO 18" FROM STA 96+18.60 TO STA 96+68.60 TO TIE INTO 6" HBP AND 12" BASE SECTION.

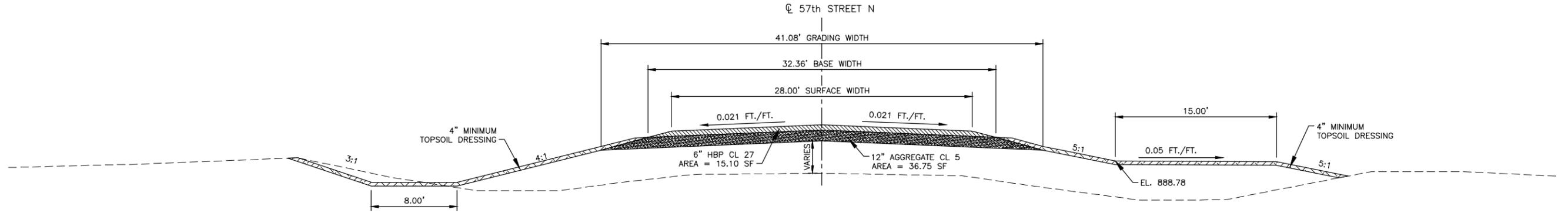
Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\TYPICAL SECTION.dwg - Layout1-11x17-4/17/2014 2:31 PM - (shanson)

<p>This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department</p>	<p>CASS COUNTY HIGHWAY DEPARTMENT LAKE SHURE BRIDGE NO. 09-139-21.0 TYPICAL SECTIONS PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY</p>
--	---

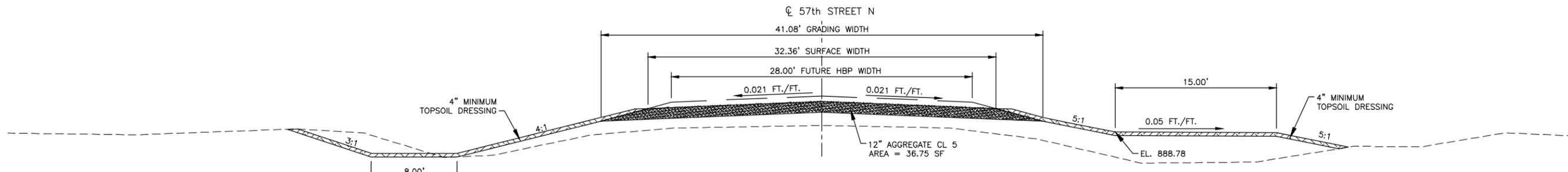
PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	6	44



PROPOSED TYPICAL SECTION
STA. 96+68.60 TO STA. 98+12.50



PROPOSED TYPICAL SECTION
STA. 101+87.50 TO STA. 103+31.52



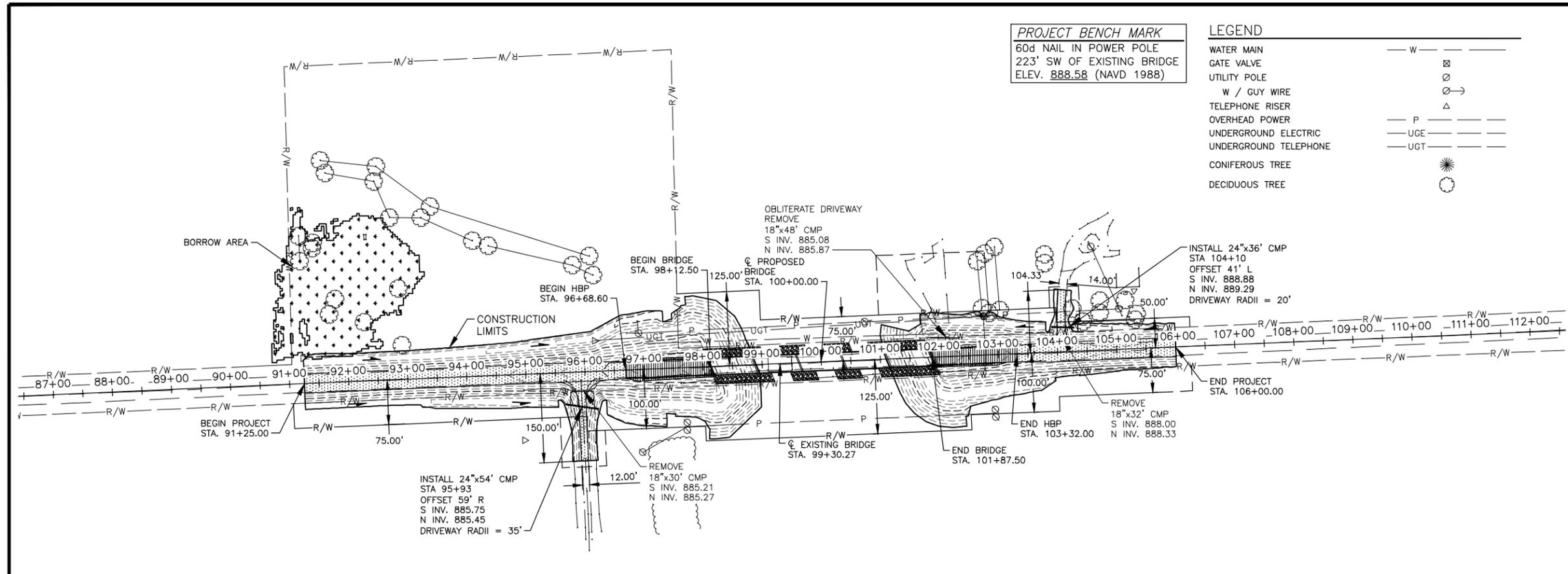
PROPOSED TYPICAL SECTION
STA. 103+31.52 TO STA. 103+95.00

*AGGREGATE SURFACE THICKNESS SHALL TRANSITION FROM 18" TO 12" FROM STA 103+12.00 TO STA 103+62.00 TO TIE INTO 6" HBP AND 12" BASE SECTION.

<p>This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department</p>	<p>CASS COUNTY HIGHWAY DEPARTMENT LAKE SHURE BRIDGE NO. 09-139-21.0 TYPICAL SECTIONS PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY</p>
---	--

Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\TYPICAL SECTION.dwg - Layout1-11x17 (2) - 4/17/2014 2:31 PM - (shanson)

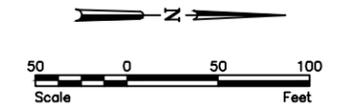
Z:\6001\6006\12_6006_02 - Lake Shure\Cad\Plans\Road Plan and Profiling\ROAD PP SHEET-4/17/2014 2:42 PM (hanson)



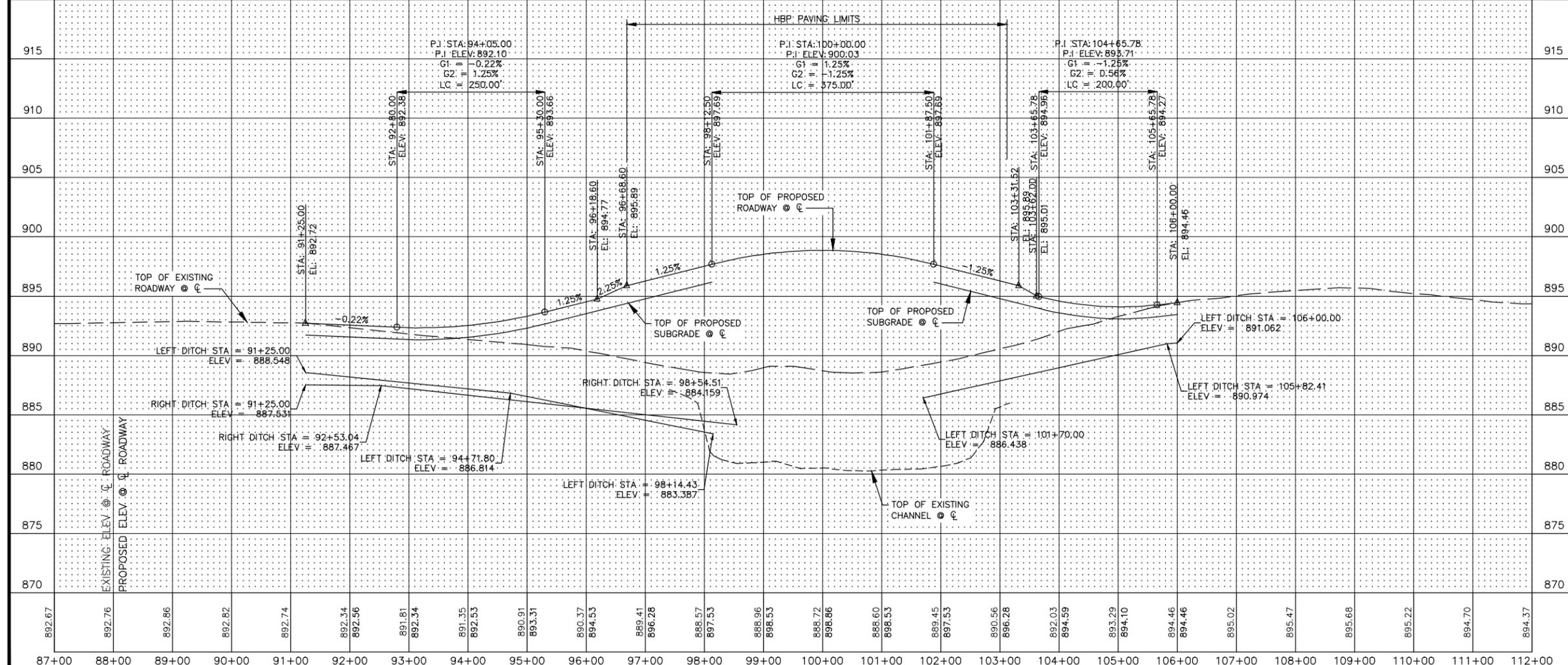
PROJECT BENCH MARK
 60d NAIL IN POWER POLE
 223' SW OF EXISTING BRIDGE
 ELEV. 888.58 (NAVD 1988)

LEGEND

WATER MAIN	— W —
GATE VALVE	⊗
UTILITY POLE	⊙
W / GUY WIRE	— W —
TELEPHONE RISER	△
OVERHEAD POWER	— P —
UNDERGROUND ELECTRIC	— UGE —
UNDERGROUND TELEPHONE	— UGT —
CONIFEROUS TREE	⊗
DECIDUOUS TREE	⊙



Item	Description	Quantity	Unit
202-0174	REMOVAL OF PIPE ALL TYPES AND SIZES	110	LF
714-5035	PIPE CORR STEEL .064IN 24IN	90	LF
714-5820	END SECT .064IN 24IN	4	LF



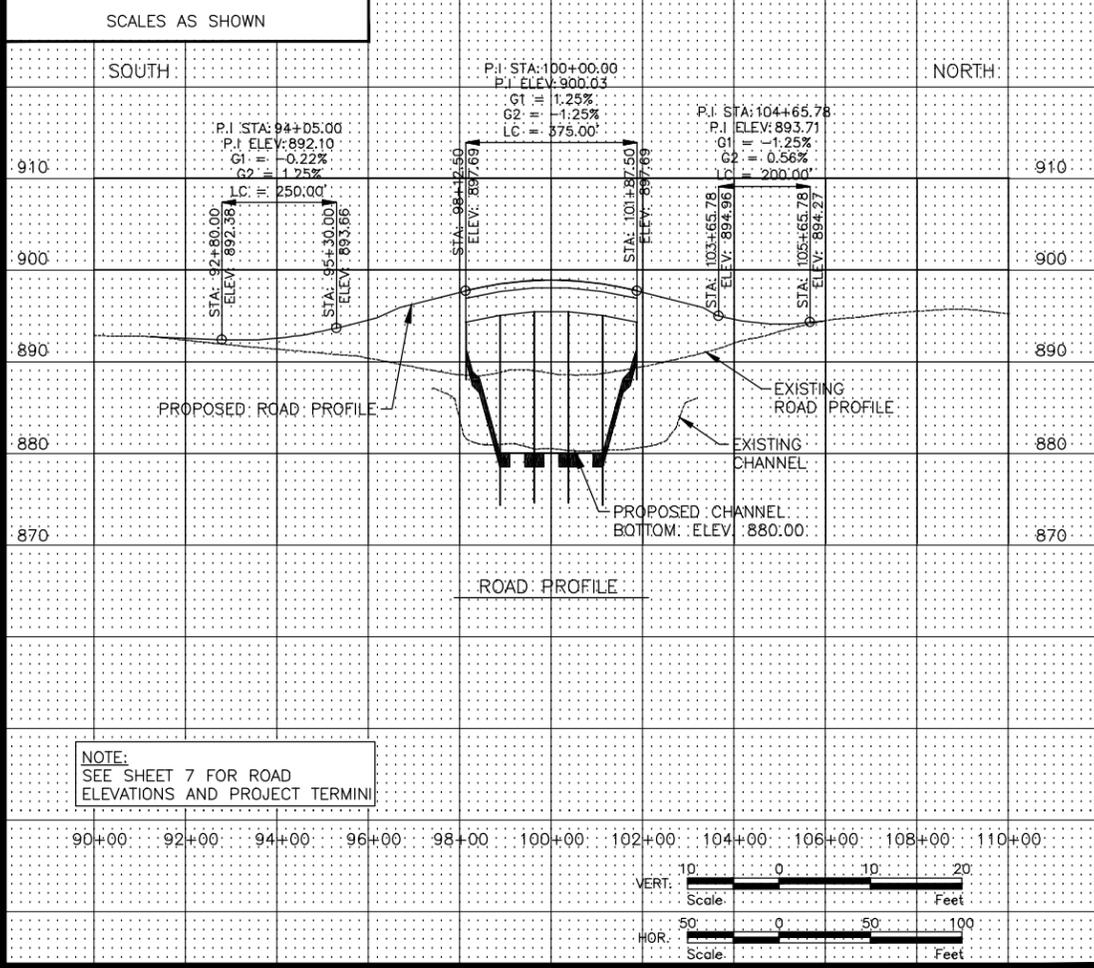
AGGREGATE SURFACING SHALL TRANSITION FROM 12" TO 18" DEPTH FROM STA. 96+68.60 TO STA. 96+68.60. SURFACING DEPTH SHALL TRANSITION FROM 18" TO 12" DEPTH FROM STA. 103+12.00 TO STA. 103+62.00

ALL COSTS ASSOCIATED WITH OBLITERATING THE EXISTING DRIVEWAY SHALL NOT BE PAID FOR SEPARATELY BUT INCLUDED IN THE PRICE BID FOR COMMON EXCAVATION—TYPE A.

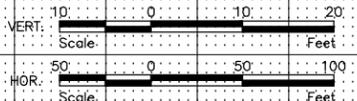
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
ROAD PLAN AND PROFILE
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

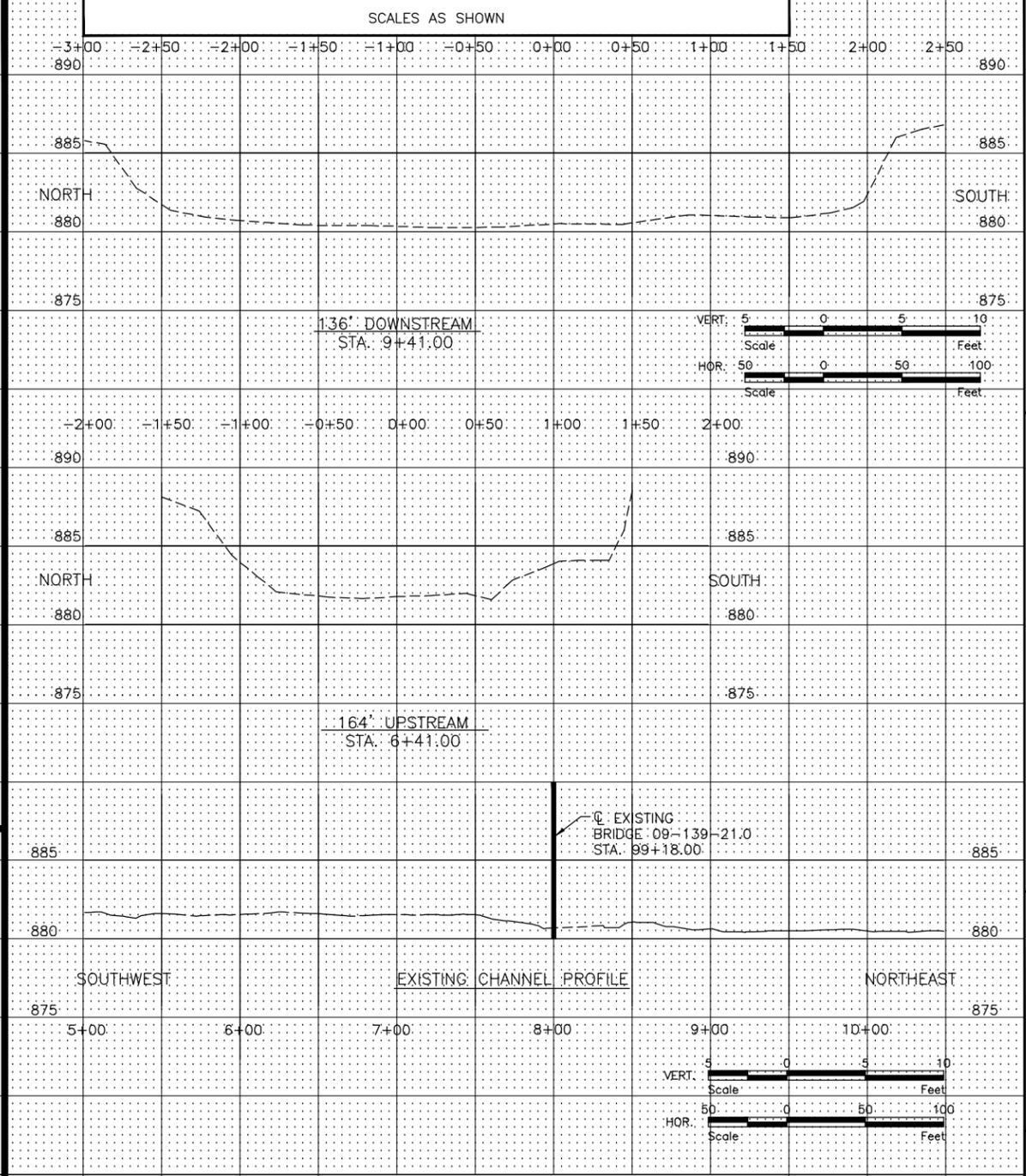
CONTRACTED PROFILE



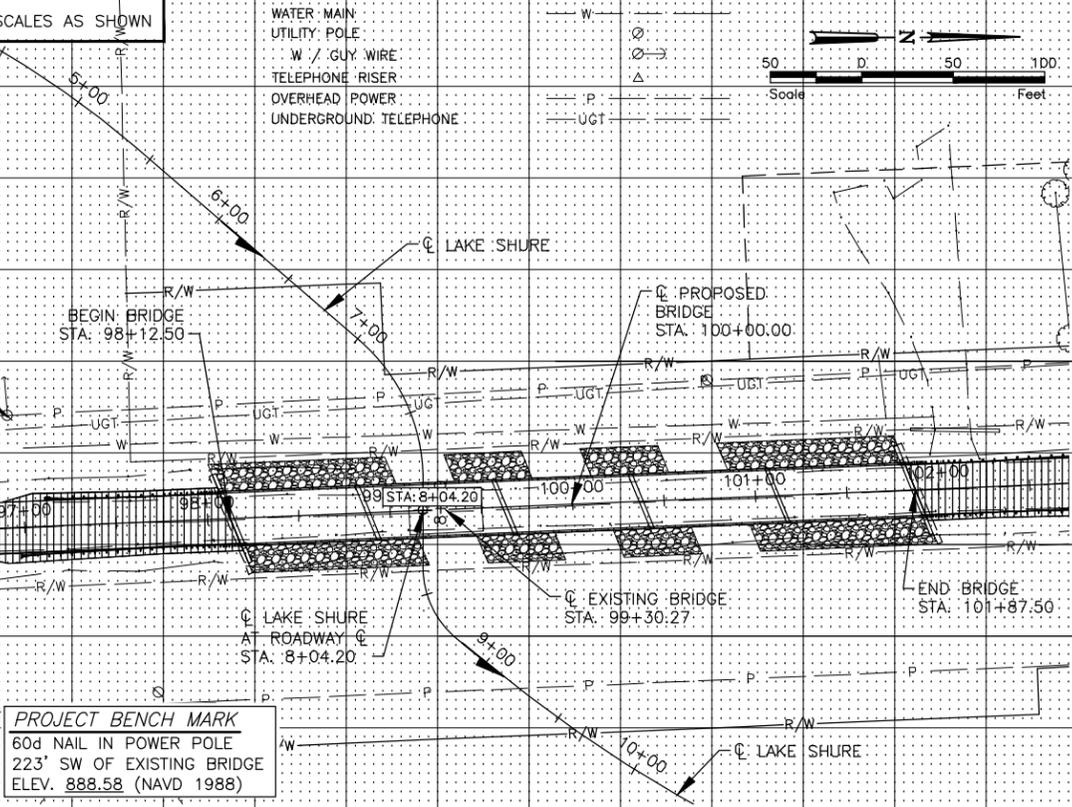
NOTE:
SEE SHEET 7 FOR ROAD
ELEVATIONS AND PROJECT TERMINI



TYPICAL SECTIONS & PERTINENT DATA

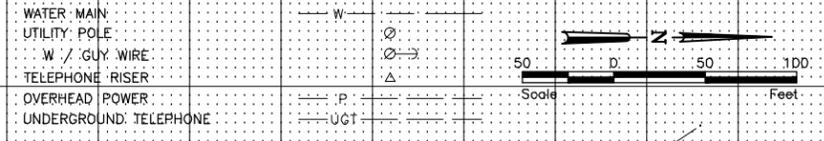


PLAT



PROJECT BENCH MARK
60d NAIL IN POWER POLE
223' SW OF EXISTING BRIDGE
ELEV. 888.58 (NAVD 1988)

LEGEND



LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

- Special Features: Waterfalls, dams, floods, ice, debris, sliding banks, recreational boating. NONE
- Other bridges or culverts over the same stream (particularly structures which carry highwater without overflow of roadway): Given locations, type, length, height above highwater, cross-sectional area, etc.
APPROX. 3/4 MILE UPSTREAM, 30'W x 45'L TWO-SPAN
TOTAL WATERWAY AREA = 286 SQ. FT.
APPROX. 1/2 MILE DOWNSTREAM, 25'W x 28'L TWO-SPAN TIMBER
TOTAL WATERWAY AREA = 200 SQ. FT.
- Apparent highwater elevation N/A Obtained from _____
- Other data: Approx. velocity of water at time of survey N/A

HYDRAULIC ENGINEER'S RECOMMENDATION
DATE DECEMBER 2013

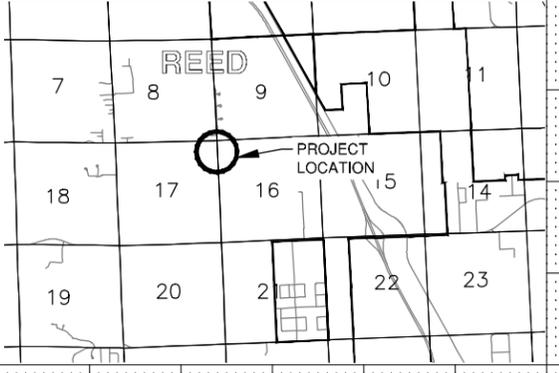
STREAM OR DITCH DESIGNATION CASS COUNTY DRAIN 45
DRAINAGE AREA N/A
MAX FLOOD OF RECORD UNKNOWN DESIGN FLOOD 100 YR
MAX OBSERVED HIGHWATER ELEVATION NONE DESIGN HIGH WATER 893.18
DESIGN MEAN VELOCITY THROUGH STRUCTURE 1.5 F.P.S.
LOW SUPERSTRUCTURE AT OR ABOVE ELEVATION 893.80
FLOWLINE ELEVATION 880.00 SKEW ANGLE 0
WATERWAY AREA REQUIRED BELOW ELEVATION 893.18 = 4160 SQ. FL AT
RIGHT ANGLES TO CHANNEL N/A
IN THE INTEREST OF FLOOD PLAIN ZONING THE REGIONAL FLOOD (100 YR.) IS
6100 C.F.S. AT STAGE 893.80 AND MEAN VELOCITY OF 0.8 F.P.S. WITH
20.1 FT. SWELLHEAD. THE ABOVE RECOMMENDATION WILL PROVIDE A
STRUCTURE OF ADEQUATE WATERWAY TO PASS THE REGIONAL FLOOD WITHIN
CRITERIA ESTABLISHED BY THE DEPARTMENT OF NATURAL RESOURCES & FEMA.

FOUNDATION ENGINEER'S RECOMMENDATION
DATE DEC 5, 2013

FROM MIDWEST TESTING LAB REPORT NO. M11135009 RECOMMEND THE
PROPOSED BRIDGE BE SUPPORTED BY A DEEP PILE FOUNDATION SYSTEM,
SUGGEST USING H-PILE DRIVEN TO REFUSAL IN THE HARD, SANDY, LEAN
CLAYS FIRST ENCOUNTERED AT DEPTHS OF APPROXIMATELY 74 TO 77 FEET
BELOW EXISTING GRADE. PRACTICAL REFUSAL IS ESTIMATED AT DEPTHS OF
APPROXIMATELY 80 TO 95 FEET BELOW EXISTING GROUND. THIS CORRESPONDS
TO TIP ELEVATIONS OF 793 TO 809. DUE TO THE PRESENCE OF NUMEROUS
COBBLES AND BOULDERS, RECOMMEND PILE TIPS BE PROVIDED FOR ALL PILE.
RECOMMEND THE SLOPES OF THE CHANNEL BELOW THE BRIDGE BE 5:1H:1V.

Bridge survey sheets made from: HOUSTON ENGINEERING INC.

Bench mark elevation 888.58 (NAVD 1988)
Location: 60d NAIL IN POWER POLE
223' SW OF EXISTING BRIDGE



This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on **04/17/14** and the original document is stored at
Cass County Highway Department

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE SURVEY

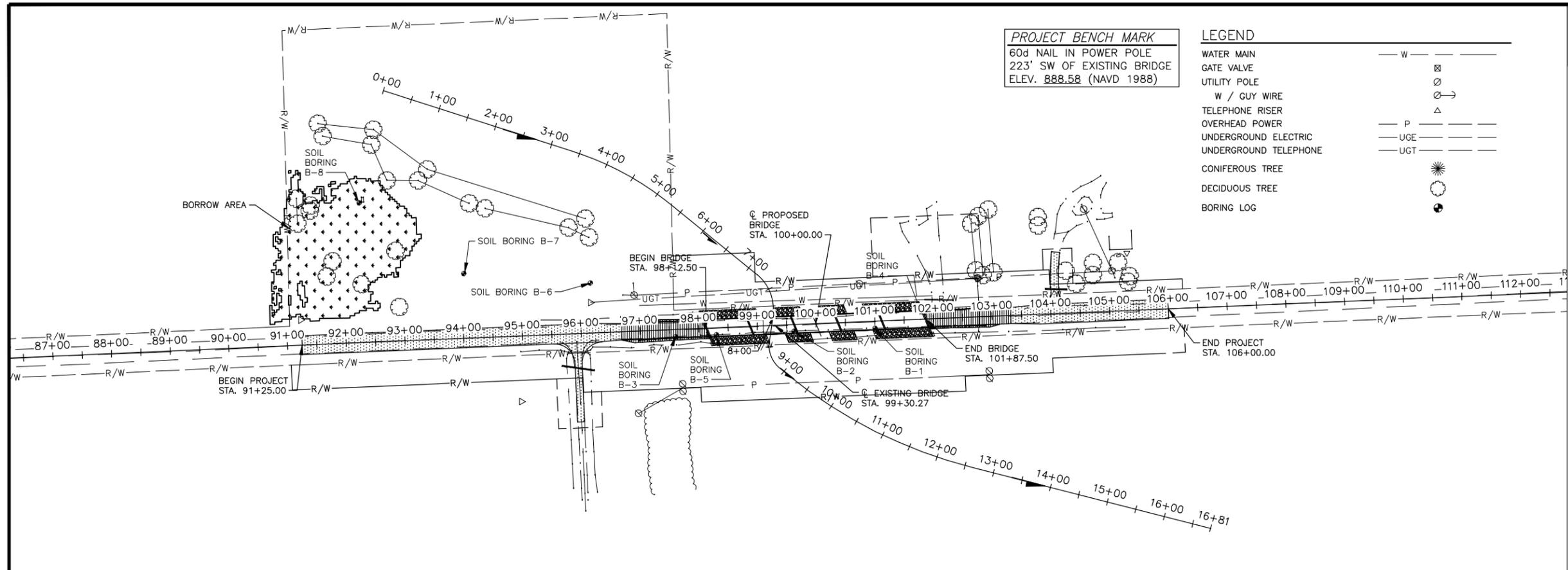
OVER LAKE SHURE
(T.H., C.S.A.H., C.R. etc.)
PROPOSED BRIDGE LOCATED
1.5 MILES NW OF REILE'S ACRES

SEC. 17/16 TWP. 140N R. 49 W

TOWNSHIP REED COUNTY CASS

BRIDGE NO. 09-139-21.0

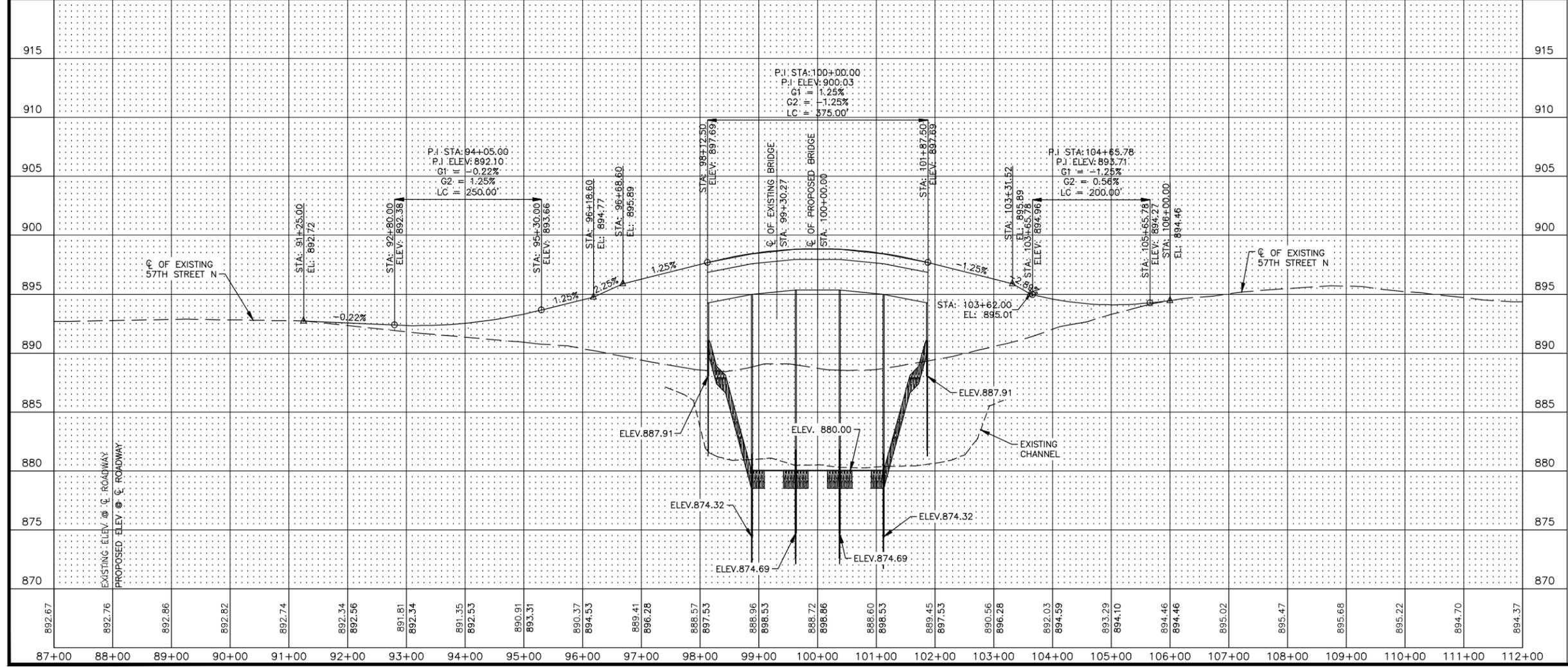
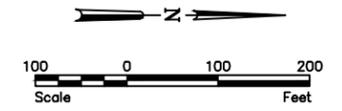
Z:\6000\6006\12_0006_002 - Lake Shure\CAD\Plan\BRIDGE SURVEY.dwg - Bridge Survey - 4/17/2014 2:43 PM - (hanson)



PROJECT BENCH MARK
 60d NAIL IN POWER POLE
 223' SW OF EXISTING BRIDGE
 ELEV. 888.58 (NAVD 1988)

LEGEND

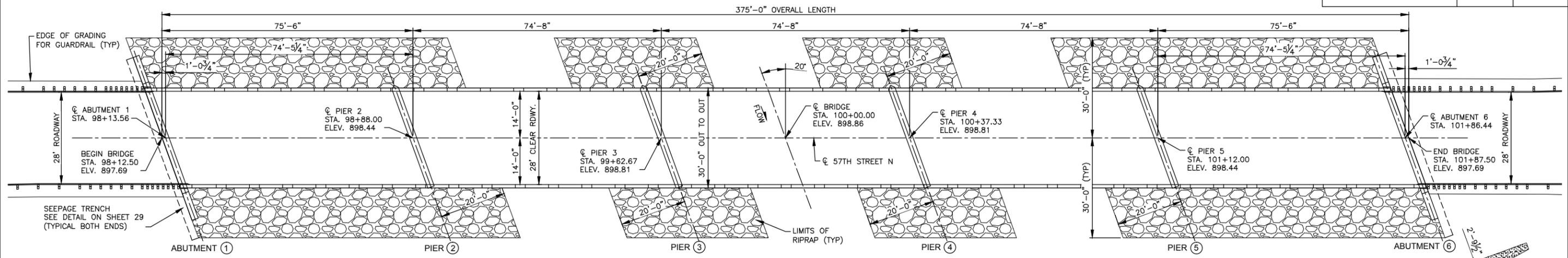
WATER MAIN	— W —
GATE VALVE	⊠
UTILITY POLE	⊙
W / GUY WIRE	⊙—>
TELEPHONE RISER	△
OVERHEAD POWER	— P —
UNDERGROUND ELECTRIC	— UGE —
UNDERGROUND TELEPHONE	— UGT —
CONIFEROUS TREE	⊛
DECIDUOUS TREE	⊙
BORING LOG	⊕



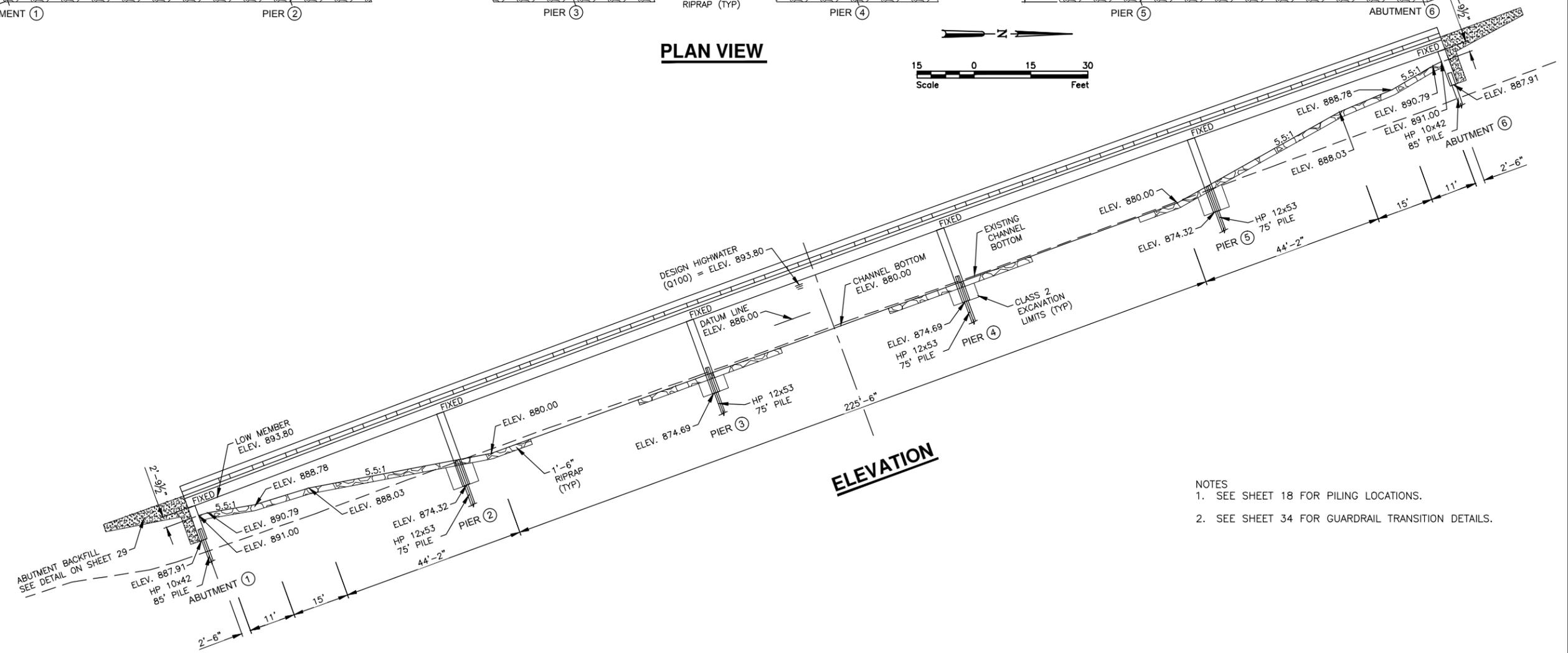
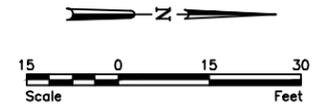
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
BRIDGE PLAN AND PROFILE
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

Z:\600\6006\12_6006_02 - Lake Shure\CAD\Plans\Bridges\Plan and Profile\Bridges-BRIDGE PP SHEET-4/17/2014 2:43 PM - (hanson)



PLAN VIEW



ELEVATION

- NOTES
- SEE SHEET 18 FOR PILING LOCATIONS.
 - SEE SHEET 34 FOR GUARDRAIL TRANSITION DETAILS.

HYDRAULIC DESIGN DATA		GIRDER DATA												
DRAINAGE AREA	N/A	LENGTH "L"	SPACE BETWEEN BEAMS	THICKNESS OF SLAB BETW. BMS	THICKNESS OF SLAB ON TOP BMS	BOX BEAM DEPTH	LIVE LOAD	FINAL STRESSING FORCE AT MIDSPAN						
50 YR DESIGN DISCHARGE	4250 CFS							A	KIPS	A	KIPS	A	KIPS	WEIGHT TONS
STREAM GRADIENT	0.02%	73'-8"	8'-3"	8"	9"	33"	HL-93	2.50	787.3	2.75	796.7	3.00	806.3	23.8
50 YR DESIGN STAGE	893.30	DETENSIONING STRENGTH 6,000 PSI					ACCEPTANCE STRENGTH 6,500 PSI							
50 YR STREAM VELOCITY AT BRIDGE	0.6 FPS	BENCH MARKS												
100 YR DESIGN DISCHARGE	7600 CFS	NO.	DESCRIPTION	LOC.	ELEV.									
100 YR FLOOD STAGE	893.80	1	60d NAIL IN POWER POLE	223' SW OF EXISTING BRIDGE	888.58									
100 YR VELOCITY	0.9 FPS													

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
BRIDGE LAYOUT
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

BORING LOG NO. B-1											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	LL-PL-PI
1.8		See Exhibit A-2	888.3								
5			886.5								
8.0			880.5								
12.0			876.5								
16.0			872.5				2280	46			
20											
25							1430	58			
30											
35											
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 94.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 0' Frozen soil conditions to 4'					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13' Initially observed before HSA removal. Water level influenced by drilling fluid.			 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/19/2013		Boring Completed: 3/19/2013			
						Drill Rig: Mobile B-53		Driller: DW			
						Project No.: M1135009		Exhibit: A-4			

BORING LOG NO. B-1											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	LL-PL-PI
		See Exhibit A-2	888.3								
40							1480	63			
50											
60											
70											
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 94.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes:					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13' Initially observed before HSA removal. Water level influenced by drilling fluid.			 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/19/2013		Boring Completed: 3/19/2013			
						Drill Rig: Mobile B-53		Driller: DW			
						Project No.: M1135009		Exhibit: A-5			

BORING LOG NO. B-1											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	LL-PL-PI
		See Exhibit A-2	888.3								
75											
80			811.5								
85											
90											
94.5			794								
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 94.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 94.5' SPT sampler refusal on a boulder					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13' Initially observed before HSA removal. Water level influenced by drilling fluid.			 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/19/2013		Boring Completed: 3/19/2013			
						Drill Rig: Mobile B-53		Driller: DW			
						Project No.: M1135009		Exhibit: A-6			

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORING 1

PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

BORING LOG NO. B-2											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTENBERG LIMITS	LL-PL-PI
1.3		See Exhibit A-2	887.6								
		Surface Elev.: 888.9 (FT.)									
		ELEVATION (FT.)									
1.3		FILL - 6" Gravel and 9" Sand, brown, frozen	887.6								
		FILL - FAT CLAY (CH), gray to dark gray and black, frozen to 6"									
5											
9.0		TOPSOIL (OH), with wood, black, soft	880								
14.0		FAT CLAY (CH), dark gray, medium stiff	875								
20.0		FAT CLAY (CH), dark brownish gray mottled, medium stiff to soft	869								
25											
35											
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 19.5' then Tricone & Drilling Fluid to 99.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 0': Frozen soil conditions to 6'					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 14' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/20/2013 Boring Completed: 3/20/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009 Exhibit: A-7					

BORING LOG NO. B-2											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTENBERG LIMITS	LL-PL-PI
38.0		See Exhibit A-2	851								
		Surface Elev.: 888.9 (FT.)									
		ELEVATION (FT.)									
38.0		FAT CLAY (CH), dark brownish gray mottled, medium stiff to soft (continued)	851								
		FAT CLAY (CH), gray, soft									
40											
45											
50											
55											
60											
65											
70											
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 19.5' then Tricone & Drilling Fluid to 99.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 0': Frozen soil conditions to 6'					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 14' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/20/2013 Boring Completed: 3/20/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009 Exhibit: A-8					

BORING LOG NO. B-2											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTENBERG LIMITS	LL-PL-PI
74.0		See Exhibit A-2	815								
		Surface Elev.: 888.9 (FT.)									
		ELEVATION (FT.)									
74.0		FAT CLAY (CH), gray, soft (continued)	815								
		SANDY LEAN CLAY (CL), trace gravel, gray, very stiff to hard, with occasional cobbles/boulders									
75											
80											
85											
90											
95											
99.5			789.5								
Stratification lines are approximate. In-situ, the transition may be gradual.											
Hammer Type: Mobile Downhole											
Advancement Method: Hollow Stem Auger to 19.5' then Tricone & Drilling Fluid to 99.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 99.5': SPT sampler refusal on a boulder					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 14' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/20/2013 Boring Completed: 3/20/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009 Exhibit: A-9					

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORING 2
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

BORING LOG NO. B-3										Page 1 of 3	
PROJECT: Proposed Bridge Replacement					CLIENT: Cass County Highway Department West Fargo, North Dakota						
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		
1.0	[Hatched pattern]	See Exhibit A-2	Surface Elev.: 888.5 (FL.) ELEVATION (FL.)						LL-PL-PI		
1.0										FILL - 12" Gravel, brown, frozen	
										FILL - FAT CLAY (CH), dark gray and black, frozen to 6'	
5.0											
5.0				14	3-4-7 N=11		32				
										FAT CLAY (CH), light grayish brown mottled, medium stiff	
9.0				16	2-3-4 N=7						
										FAT CLAY (CH), gray and brown mottled, stiff, with lenses of silt	
15.0				16	4-4-5 N=9	2640	47				
										FAT CLAY (CH), gray and brown mottled, medium stiff to soft	
18.0				18	2-3-4 N=7						
										FAT CLAY (CH), gray and brown mottled, medium stiff to soft	
25.0						2010	62				
										FAT CLAY (CH), gray, soft	
30.0				18	2-2-2 N=4						
										FAT CLAY (CH), gray, soft	
35.0											
Stratification lines are approximate. In-situ, the transition may be gradual.										Hammer Type: Mobile Downhole	
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 89.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes: 0': Frozen soil conditions to 6'					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13.9' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/13/2013 Boring Completed: 3/14/2013		Drill Rig: Mobile B-53 Driller: DW		Project No.: M1135009 Exhibit: A-10	

BORING LOG NO. B-3										Page 2 of 3	
PROJECT: Proposed Bridge Replacement					CLIENT: Cass County Highway Department West Fargo, North Dakota						
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		
	[Hatched pattern]	See Exhibit A-2	Surface Elev.: 888.5 (FL.) ELEVATION (FL.)						LL-PL-PI		
										FAT CLAY (CH), gray, soft (continued)	
40.0				18	1-2-2 N=4						
						1280	64			FAT CLAY (CH), gray, soft (continued)	
45.0											
50.0				18	1-1-2 N=3		77				
										FAT CLAY (CH), gray, soft (continued)	
60.0				18	1-1-1 N=2		57				
										FAT CLAY (CH), gray, soft (continued)	
70.0											
Stratification lines are approximate. In-situ, the transition may be gradual.										Hammer Type: Mobile Downhole	
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 89.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes:					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13.9' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/13/2013 Boring Completed: 3/14/2013		Drill Rig: Mobile B-53 Driller: DW		Project No.: M1135009 Exhibit: A-11	

BORING LOG NO. B-3										Page 3 of 3	
PROJECT: Proposed Bridge Replacement					CLIENT: Cass County Highway Department West Fargo, North Dakota						
SITE: TB1206 Cass County, North Dakota											
DEPTH (FT.)	GRAPHIC LOG	LOCATION	WATER LEVEL OBSERVATIONS	RECOVERY (in.)	FIELD TEST RESULTS	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		
	[Hatched pattern]	See Exhibit A-2	Surface Elev.: 888.5 (FL.) ELEVATION (FL.)						LL-PL-PI		
										FAT CLAY (CH), gray, soft (continued)	
75.0				18	1-2-1 N=3			57			
										FAT CLAY (CH), gray, soft (continued)	
75.0				10	6-6-30 N=36		16				
										SANDY LEAN CLAY (CL), trace gravel, gray, hard, with occasional cobbles/boulders, layer of cobbles/boulders from 76' to 79'	
80.0				16	N=100 for 12"		18				
										SANDY LEAN CLAY (CL), trace gravel, gray, hard, with occasional cobbles/boulders, layer of cobbles/boulders from 76' to 79'	
85.0				10	N=100 for 10"		18				
										SANDY LEAN CLAY (CL), trace gravel, gray, hard, with occasional cobbles/boulders, layer of cobbles/boulders from 76' to 79'	
90.0				0	N=100 for 6"						
										Sampler refusal on boulder at 90 Feet	
Stratification lines are approximate. In-situ, the transition may be gradual.										Hammer Type: Mobile Downhole	
Advancement Method: Hollow Stem Auger to 39.5' then Tricone & Drilling Fluid to 89.5'			See Exhibit A-3 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).			Notes:					
Abandonment Method: Reversed auger upon completion. Borings backfilled with soil cuttings upon completion.			See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS 13.9' Initially observed before HSA removal Water level influenced by drilling fluid.			Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota			Boring Started: 3/13/2013 Boring Completed: 3/14/2013		Drill Rig: Mobile B-53 Driller: DW		Project No.: M1135009 Exhibit: A-12	

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORING 3

PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

BORING LOG NO. B-4												Page 1 of 2	
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota							
SITE: TB1206 Cass County, North Dakota													
DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
0.5	889.0	FILL - CLAYEY SAND WITH GRAVEL					3-4-4 N=8						
		FILL - FAT CLAY WITH TOPSOIL, black with brown					3-4-4 N=8						
5							3-4-5 N=9						
8.5	883.0	FAT CLAY (CH), brown, medium stiff, with lenses of silt					3-3-3 N=6						
							2-3-3 N=6	2500 (HP)		43			
							2-3-3 N=6						
14.0	875.5	FAT CLAY (CH), grayish brown mottled, stiff					3-4-4 N=8	3500 (HP)		41		101-38-63	
18.0	871.5	FAT CLAY (CH), dark gray, soft					1-2-2 N=4	1500 (HP)		65			
25							24			64	59	118-45-73	

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger 0-49.5'

Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion

Notes: 25: See Appendix B for consolidated undrained triaxial compression test results
27: See Appendix B for complete unconfined compression test results

Water Level Observations: Not measurable before HSA removal.

Midwest Testing LABORATORY, INC. A TERRACON COMPANY
4102 7th Ave. North Fargo, North Dakota

Boring Started: 9/30/2013 Boring Completed: 9/30/2013
Drill Rig: Mobile B-53 Driller: DW
Project No.: M1135009.1 Exhibit: A-13

BORING LOG NO. B-4												Page 2 of 2	
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota							
SITE: TB1206 Cass County, North Dakota													
DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
		FAT CLAY (CH), dark gray, soft (continued)						2000 (HP)	1120	56	66		
30							2-2-2 N=4	1500 (HP)		62			
35										60	62	99-40-59	
								2000 (HP)	1790	60	69		
40							1-2-2 N=4	1500 (HP)		63			
45							1-2-2 N=4	1500 (HP)		66			
50							1-1-2 N=3	1500 (HP)		62			
51.0	838.5	Boring Terminated at 51 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger 0-49.5'

Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion

Notes: 33: See Appendix B for consolidated undrained triaxial compression test results
35: See Appendix B for complete unconfined compression test results

Water Level Observations: Not measurable before HSA removal.

Midwest Testing LABORATORY, INC. A TERRACON COMPANY
4102 7th Ave. North Fargo, North Dakota

Boring Started: 9/30/2013 Boring Completed: 9/30/2013
Drill Rig: Mobile B-53 Driller: DW
Project No.: M1135009.1 Exhibit: A-14

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORING 4
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

BORING LOG NO. B-5												Page 1 of 2	
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota							
SITE: TB1206 Cass County, North Dakota													
DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	LABORATORY TORQUE/HP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
0.5	888.5	FILL - CLAYEY SAND WITH GRAVEL FILL - FAT CLAY WITH TOPSOIL, black with brown	10				3-3-4 N=7						
			12				3-4-5 N=9						
5	883	ORGANIC SOIL, black, medium stiff to soft	10				2-3-3 N=6						
			18				2-2-3 N=5	2500 (HP)		44			
10	878	FAT CLAY (CH), brown, medium stiff, lenses of silt	18				1-2-2 N=4						
			16				2-3-3 N=6						
15		FAT CLAY (CH), dark gray, soft	18				2-3-4 N=7	2500 (HP)		56			
			24					1600 (HP)		65			
20	870	FAT CLAY (CH), dark gray, soft	24					1500 (HP)	1150	56	65		
			24										
25		FAT CLAY (CH), dark gray, soft	18				1-2-2 N=4	1500 (HP)		64			

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger 0-49.5' See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion. See Appendix C for explanation of symbols and abbreviations.

Notes: 20: See Appendix B for complete unconfined compression test results

WATER LEVEL OBSERVATIONS Not measurable before HSA removal.	Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota	Boring Started: 9/30/2013 Drill Rig: Mobile B-53 Project No.: M1135009.1	Boring Completed: 9/30/2013 Driller: DW Exhibit: A-15
---	--	--	---

BORING LOG NO. B-5												Page 2 of 2	
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota							
SITE: TB1206 Cass County, North Dakota													
DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	LABORATORY TORQUE/HP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
		FAT CLAY (CH), dark gray, soft (continued)											
30			18				1-2-2 N=4	1000 (HP)		68			
35		FAT CLAY (CH), dark gray, soft (continued)	18				1-2-1 N=3	1000 (HP)		74			
			24					1000 (HP)		67			
40		FAT CLAY (CH), dark gray, soft (continued)	24					1000 (HP)		70			
			18				2-1-1 N=2	1000 (HP)		67			
45		FAT CLAY (CH), dark gray, soft (continued)	18				1-1-1 N=2	1000 (HP)		67			
50		FAT CLAY (CH), dark gray, soft (continued)	18				1-1-1 N=2	1000 (HP)		67			
51.0	838	Boring Terminated at 51 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger 0-49.5' See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion. See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS Not measurable before HSA removal.	Midwest Testing LABORATORY, INC. A TERRACON COMPANY 4102 7th Ave. North Fargo, North Dakota	Boring Started: 9/30/2013 Drill Rig: Mobile B-53 Project No.: M1135009.1	Boring Completed: 9/30/2013 Driller: DW Exhibit: A-16
---	--	--	---

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORING 5

PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

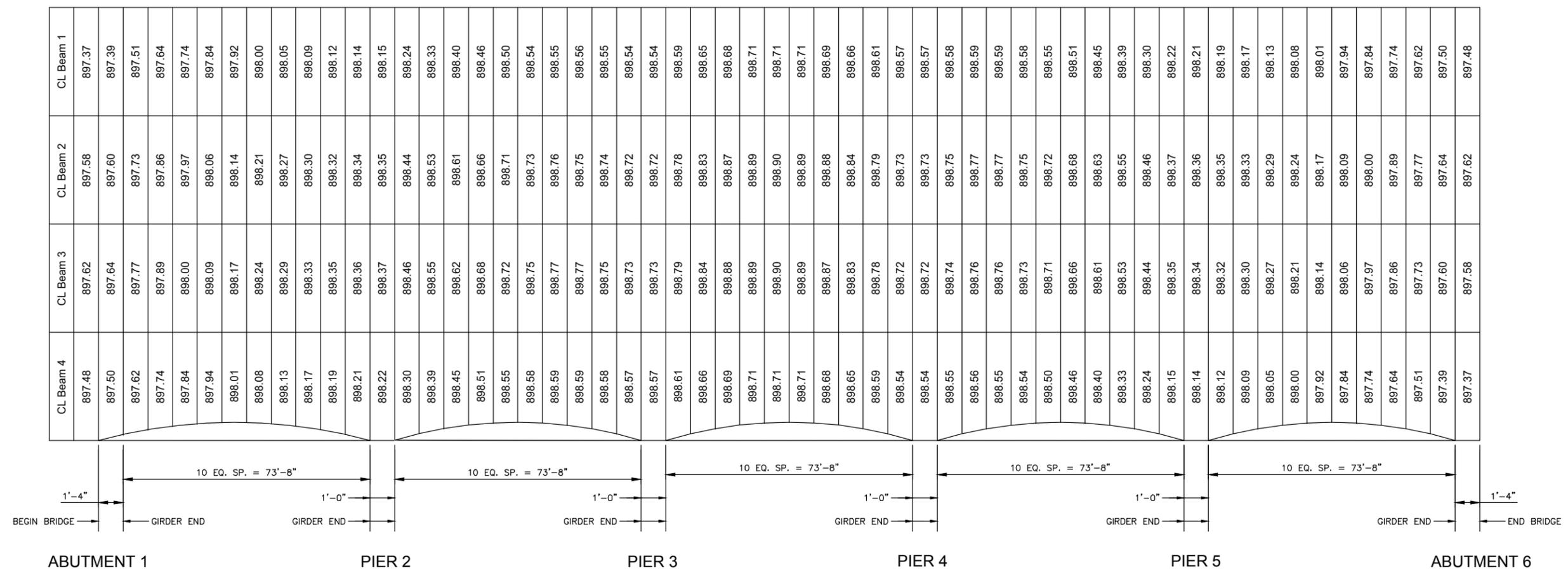
BORING LOG NO. B-6											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	LABORATORY TORVANEHP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	See Exhibit A-2 Latitude: 46.94284° Longitude: -96.88287° Surface Elev.: 888.1 (FL)										LL-PL-PI
0.3	TOPSOIL, black	888									
1.5	FAT CLAY (CH), dark gray	886.5			10	4-4-5 N=9			30		78-29-49
	FAT CLAY (CH), seams of silt, gray with brown mottled, stiff to medium stiff				15	4-5-6 N=11			30		
					18	2-3-3 N=6					
					18	2-3-3 N=6			51		
11.0	FAT CLAY (CH), grayish brown, medium stiff	877			18	3-2-3 N=5			47		
14.0	FAT CLAY (CH), dark gray, medium stiff	874			18	2-3-3 N=6			46		
16.0	Boring Terminated at 16 Feet	872									
Stratification lines are approximate. In-situ, the transition may be gradual.						Hammer Type: Mobile Downhole					
Advancement Method: Hollow Stem Auger 0-15.0'		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).		Notes: 1-4: Bag sample collected for moisture-density relationship testing. See Appendix B for results.							
Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion.		See Appendix C for explanation of symbols and abbreviations.									
WATER LEVEL OBSERVATIONS Not measurable before HSA removal.		 4102 7th Ave. North Fargo, North Dakota		Boring Started: 11/26/2013 Boring Completed: 11/26/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009.1 Exhibit: A-17							

BORING LOG NO. B-7											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	LABORATORY TORVANEHP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	See Exhibit A-2 Latitude: 46.94225° Longitude: -96.88298° Surface Elev.: 890.1 (FL)										LL-PL-PI
0.3	TOPSOIL, black	890									
	FAT CLAY (CH), dark grayish brown, very stiff				10	7-9-12 N=21			23		77-27-50
					12	5-6-7 N=13			32		
					12	2-3-3 N=6			42		
					15	2-3-3 N=6			45		
9.0	FAT CLAY (CH), seams of silt, grayish brown, medium stiff to soft	881			15	2-2-2 N=4			50		
14.0	FAT CLAY (CH), dark gray, stiff	876			15	2-3-6 N=9					
16.0	Boring Terminated at 16 Feet	874									
Stratification lines are approximate. In-situ, the transition may be gradual.						Hammer Type: Mobile Downhole					
Advancement Method: Hollow Stem Auger 0-15.0'		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).		Notes: 1-4: Bag sample collected for moisture-density relationship testing. See Appendix B for results.							
Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion.		See Appendix C for explanation of symbols and abbreviations.									
WATER LEVEL OBSERVATIONS Not measurable before HSA removal.		 4102 7th Ave. North Fargo, North Dakota		Boring Started: 11/26/2013 Boring Completed: 11/26/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009.1 Exhibit: A-18							

BORING LOG NO. B-8											
PROJECT: Proposed Bridge Replacement						CLIENT: Cass County Highway Department West Fargo, North Dakota					
SITE: TB1206 Cass County, North Dakota											
GRAPHIC LOG	LOCATION	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	LABORATORY TORVANEHP (pcf)	UNCONFINED COMPRESSIVE STRENGTH (pcf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	See Exhibit A-2 Latitude: 46.94172° Longitude: -96.88349° Surface Elev.: 891.5 (FL)										LL-PL-PI
0.3	TOPSOIL, black	891.5									
	FAT CLAY (CH), dark gray, stiff				10	4-5-8 N=13			34		
					15	4-8-10 N=18			28		
					15	3-3-3 N=6			40		
					15	2-3-3 N=6					
11.5	FAT CLAY (CH), seams of silt, dark grayish brown, stiff	880			18	2-3-3 N=6			44		
14.0	FAT CLAY (CH), dark gray, stiff	877.5			18	2-2-3 N=5			43		
16.0	Boring Terminated at 16 Feet	875.5									
Stratification lines are approximate. In-situ, the transition may be gradual.						Hammer Type: Mobile Downhole					
Advancement Method: Hollow Stem Auger 0-15.0'		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).		Notes: 1-4: Bag sample collected for moisture-density relationship testing. See Appendix B for results.							
Abandonment Method: Borings backfilled with soil cuttings. Reversed auger upon completion.		See Appendix C for explanation of symbols and abbreviations.									
WATER LEVEL OBSERVATIONS Not measurable before HSA removal.		 4102 7th Ave. North Fargo, North Dakota		Boring Started: 11/26/2013 Boring Completed: 11/26/2013 Drill Rig: Mobile B-53 Driller: DW Project No.: M1135009.1 Exhibit: A-19							

NOTE:
SEE SHEET 9 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
SOIL BORINGS 6-8
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

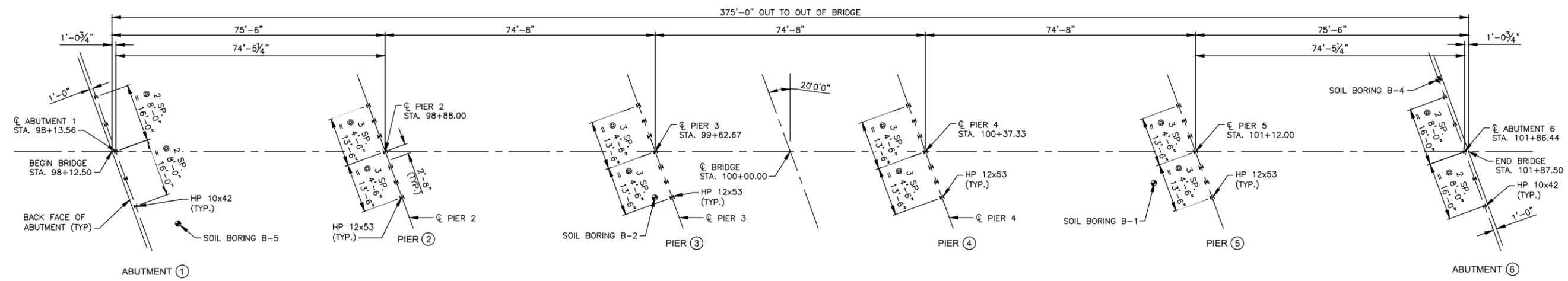


SCREED ELEVATIONS
NOT TO SCALE

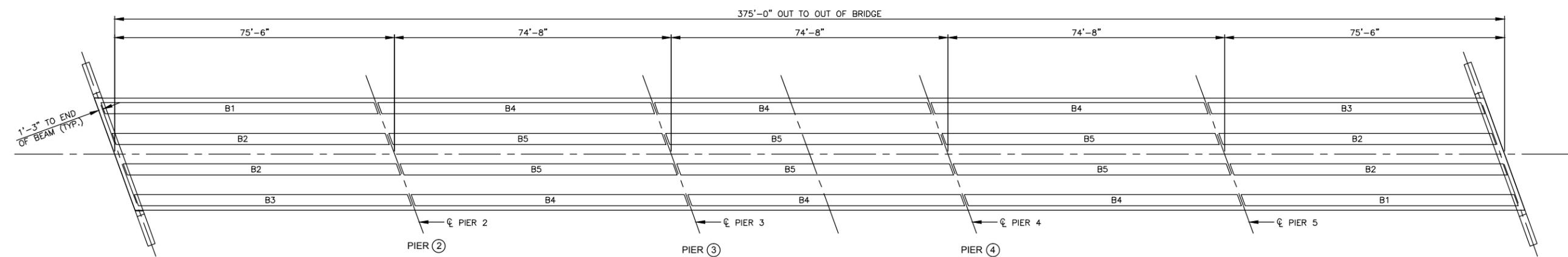
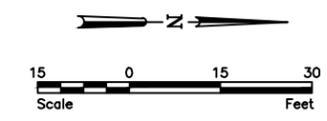
- NOTES:
- ELEVATIONS ARE TO TOP OF FINISHED ROADWAY.
 - WEIGHT OF SCREED NOT INCLUDED IN CALCULATION OF DEFLECTIONS.
 - BEAM 1 IS WEST EXTERIOR BEAM.

<p>This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department</p>	<p>CASS COUNTY HIGHWAY DEPARTMENT LAKE SHURE BRIDGE NO. 09-139-21.0 SCREED ELEVATIONS PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY</p>
--	--

Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\SCREED ELEVATIONS.dwg -SCREED ELEVATIONS-4/17/2014 2:47 PM -jshanson



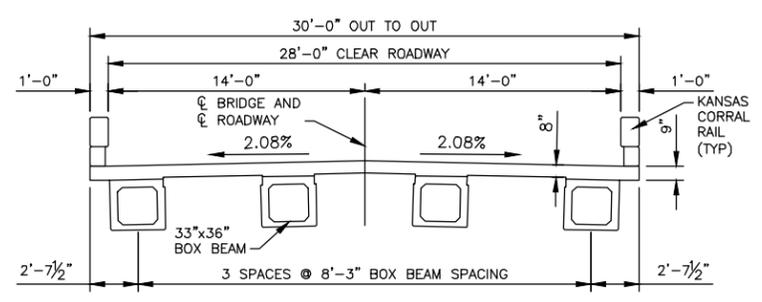
PILING LAYOUT PLAN



BEAM FRAMING PLAN

- NOTES:
- FOR DOUBLE OR SINGLE ACTING DIESEL HAMMERS, THE SAFE BEARING SHALL BE DETERMINED BY THE FOLLOWING FORMULA:

$$P = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$
 - SEE STANDARD DRAWING D-622-1 FOR PILE SPLICE DETAILS.
 - PILES SHALL BE DRIVEN TO THE FOLLOWING LOADING TO ACCOUNT FOR ADDITIONAL LOADING DUE TO DOWNDRAG.
 HP10x42 ~ 105 TONS
 HP12x53 ~ 130 TONS

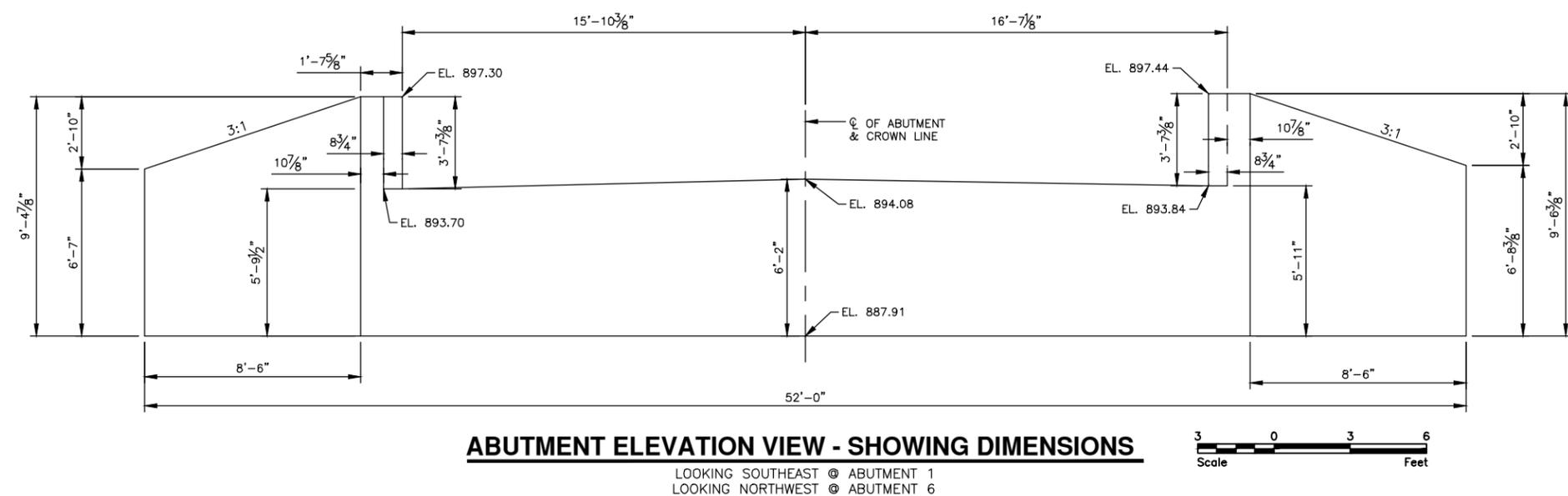
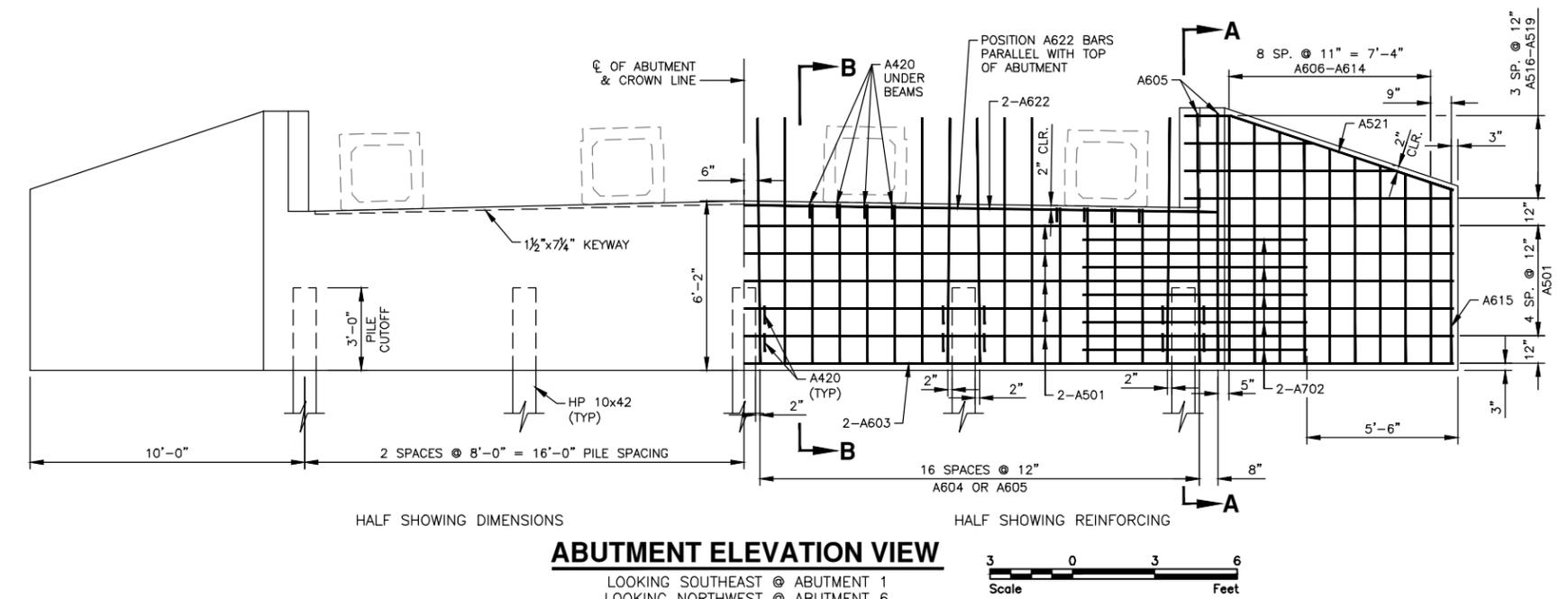
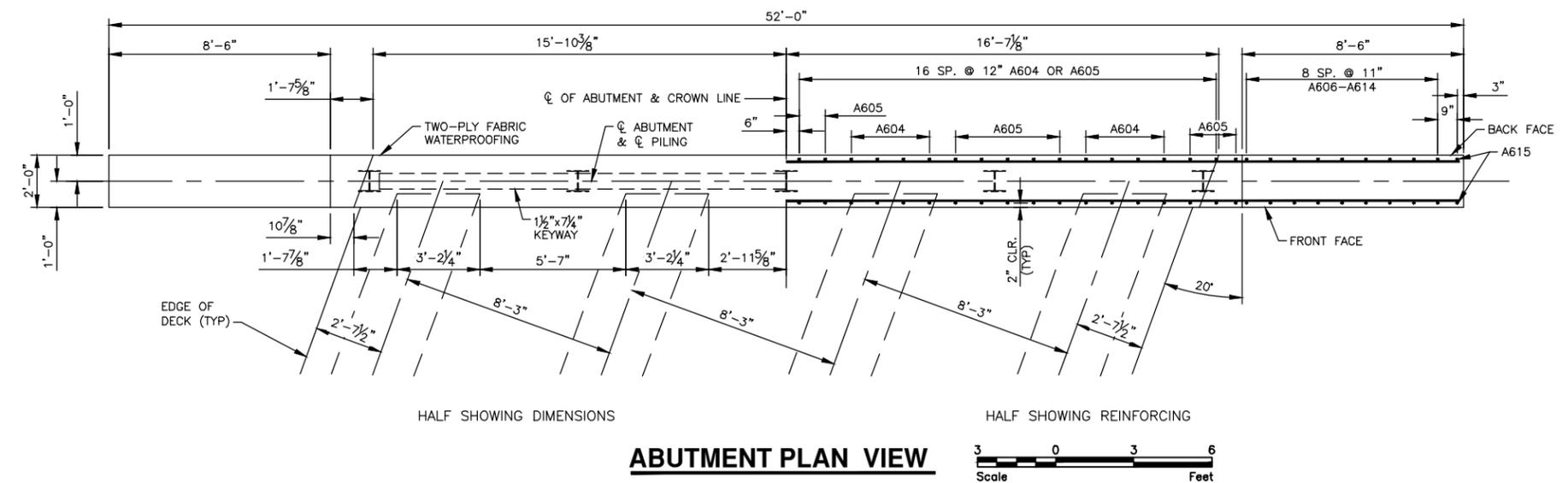


BEARING SEAT ELEVATIONS					PILE LOADING (TONS)			
GIRDER HT. = 33"	POSI-RISER = 2"	DECK = 8"	TOTAL = 3.61'		LOCATION	DEAD LOAD	LIVE LOAD	DESIGN LOAD
FILLER = 3/8"					ABUTMENT 1	49.1	28.9	78.0
BEAM LOCATION	WEST FACIA	WEST INTERIOR	EAST INTERIOR	EAST FACIA	PIER 2	67.3	38.3	105.6
ABUTMENT 1	893.77	893.97	894.01	893.88	PIER 3	67.3	36.6	103.9
PIER 2	894.53	894.72	894.75	894.60	PIER 4	67.3	36.6	103.9
PIER 3	894.92	895.10	895.11	894.94	PIER 5	67.3	38.3	105.6
PIER 4	894.94	895.11	895.10	894.92	ABUTMENT 6	49.1	28.9	78.0
PIER 5	894.60	894.75	894.72	894.53				
ABUTMENT 6	893.88	894.01	893.98	893.77				

This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department

CASS COUNTY HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
PILING LAYOUT AND BEAM FRAMING
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure CAD\Plans\PILING AND BEAM FRAMING -4/17/2014 2:46 PM - (shanson)



QUANTITIES & PROPERTIES ABUTMENT 1 & 6 (PER ABUTMENT)	
CLASS AE-3 CONCRETE	26.3 C.Y.
CONCRETE STRENGTH	3,000 PSI
REINFORCING STEEL	2,783 LBS
REINFORCEMENT STRENGTH	60,000 PSI
PILING (SEE LAYOUT - SHEET 18)	

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Cass County Highway Department

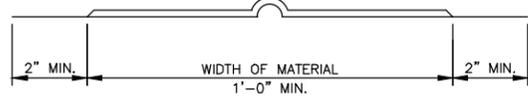
CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
**ABUTMENT DETAILS
AND REINFORCEMENT**
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure CAD\Plans\ABUTMENT DETAILS AND REINFORCEMENT - 19 ABUTMENT DETAILS AND REINFORCEMENT - 4/17/2014 2:46 PM - (shanson)

BILL OF REINFORCEMENT (PER ABUTMENT)

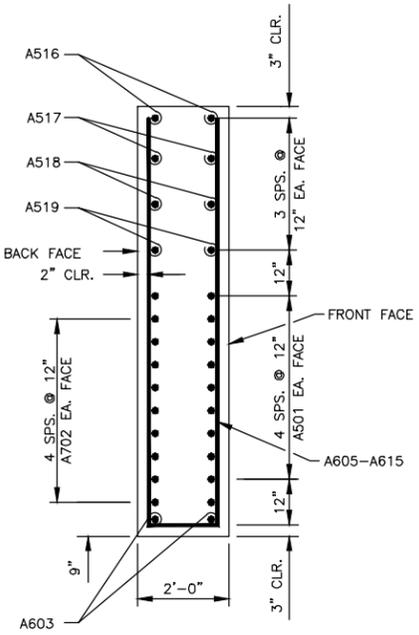
MARK	NO.	SIZE	LENGTH	SHAPE
A501	10	5	51' - 8"	STRT.
A702	20	7	8' - 4"	STRT.
A603	2	6	51' - 8"	STRT.
A604	16	6	15' - 8"	BENT
A605	20	6	18' - 10"	BENT
A606-A614	2 SETS	6	154' - 6"	BENT
A615	2	6	14' - 2"	BENT
A516-A519	4 SETS	5	23' - 0"	STRT.
A420	36	4	2' - 8"	BENT
A521	4	5	8' - 6"	STRT.
A622	2	6	34' - 6"	STRT.

NOTE:
SEE PLAN & ELEVATION VIEW ON SHEET
19 FOR BAR LOCATION & SPACING

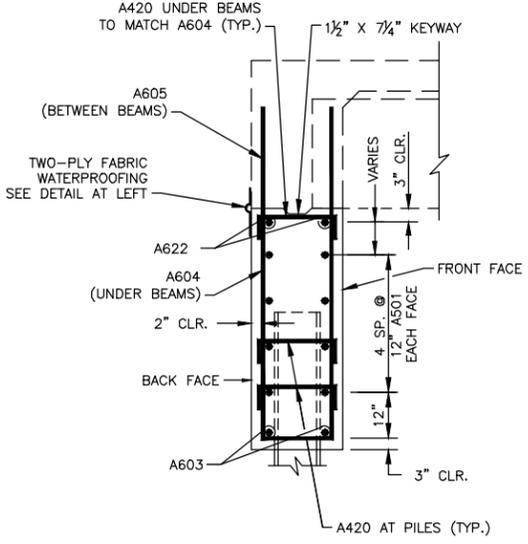


NOTE: ALL MATERIAL AND WORK SHALL BE INCLUDED IN THE BID ITEM OF CLASS AE-3 CONCRETE.

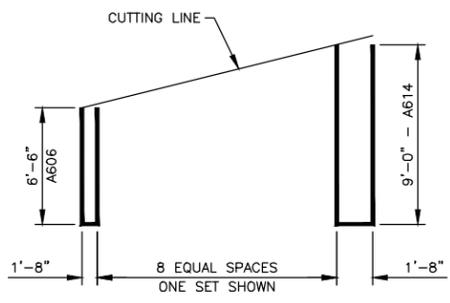
TWO-PLY FABRIC WATERPROOFING DETAIL
NOT TO SCALE



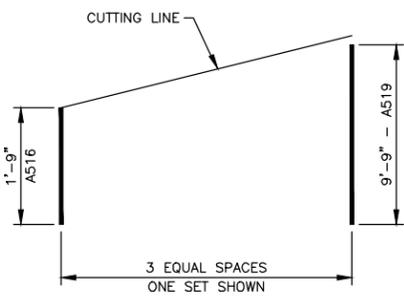
SECTION A-A
NOT TO SCALE



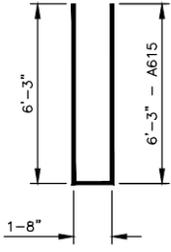
SECTION B-B
NOT TO SCALE



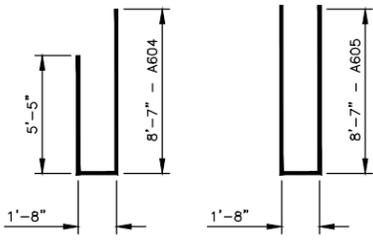
A606-A614



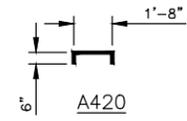
A516-A519



A615



A604 & A605



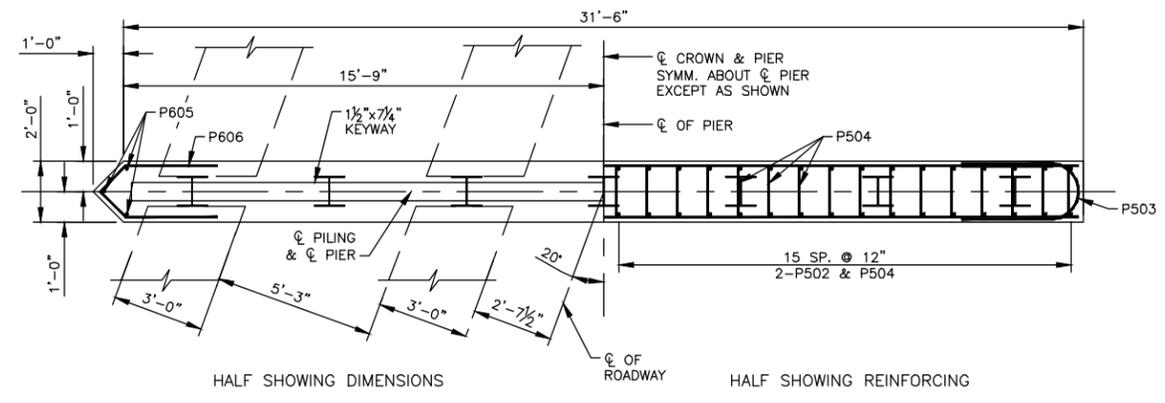
A420

BAR CUTTING DETAIL
NOT TO SCALE

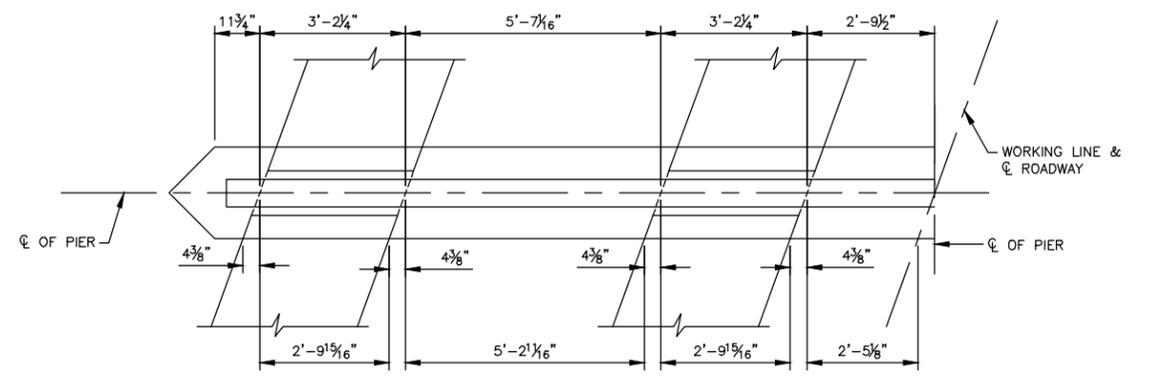
BENT BAR DETAILS
NOT TO SCALE - DIMENSIONS ARE OUT TO OUT

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Cass County Highway Department

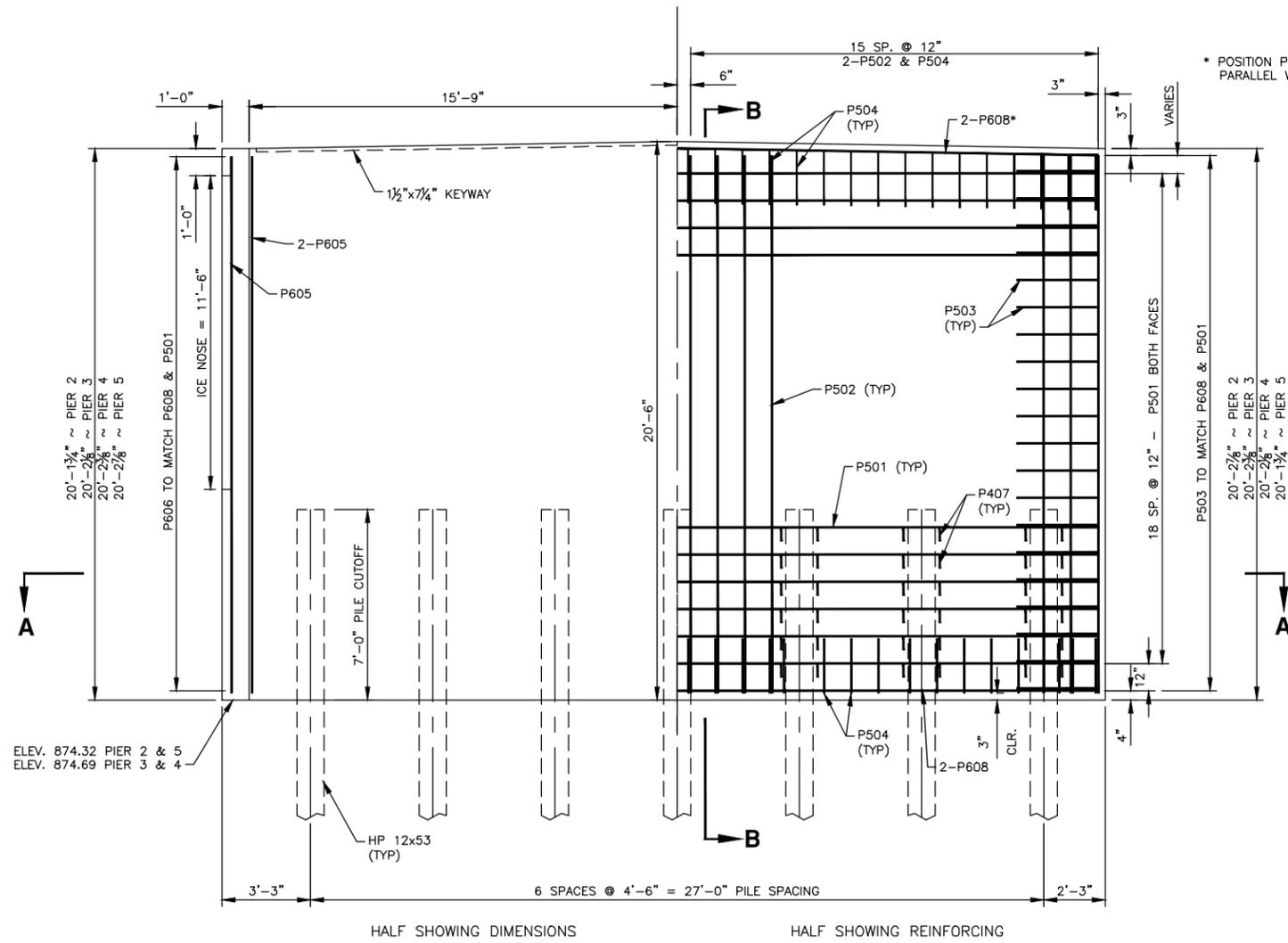
CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
ABUTMENT DETAILS AND REINFORCEMENT
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY



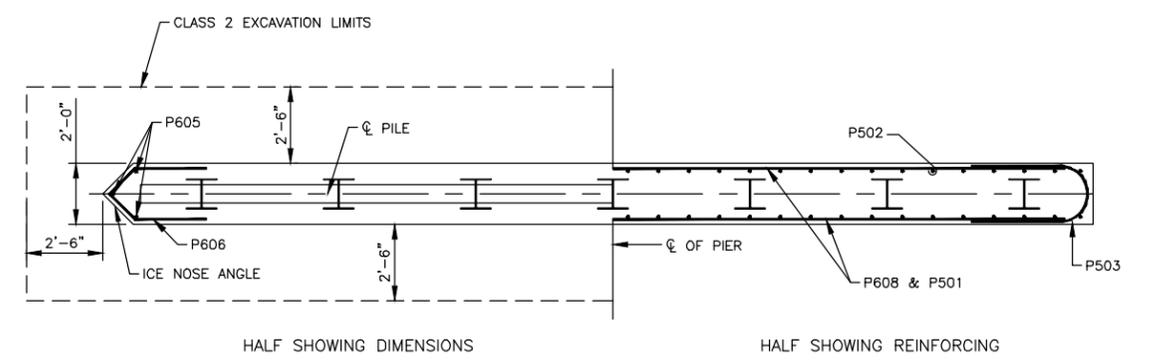
PIER PLAN VIEW



BOX BEAM DIMENSIONING DETAIL
NOT TO SCALE



PIER ELEVATION VIEW
LOOKING NORTHWEST



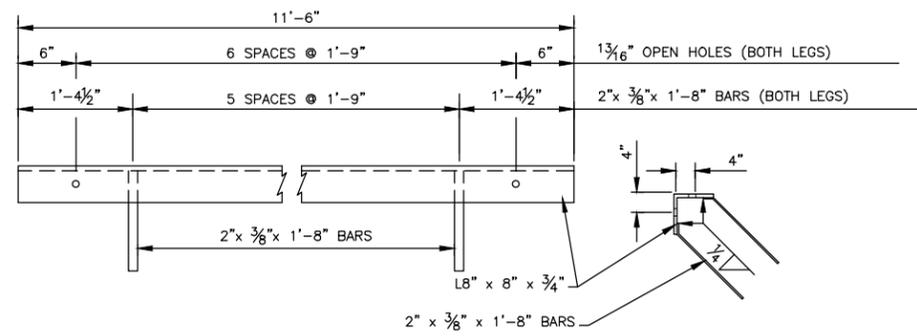
SECTION A-A

QUANTITIES & PROPERTIES (PER PIER)	
CLASS AE-3 CONCRETE	50.7 C.Y.
CONCRETE STRENGTH	3,000 PSI
REINFORCING STEEL	3,824 LBS
REINFORCEMENT STRENGTH	60,000 PSI
PILING (SEE LAYOUT - SHEET 18)	

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

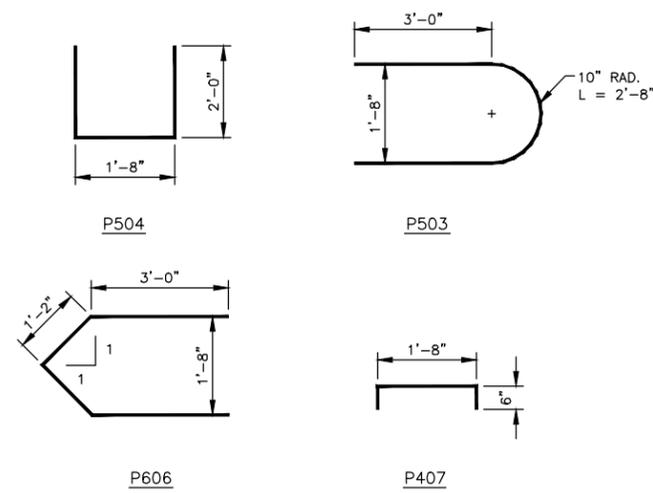
CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
PIER 2-5 DETAILS AND REINFORCEMENT
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure\CAVD\Plans\PIER GEOMETRICS.dwg - Layout1-11x17 - 4/17/2014 2:49 PM - (shanson)



ICE NOSE DETAIL

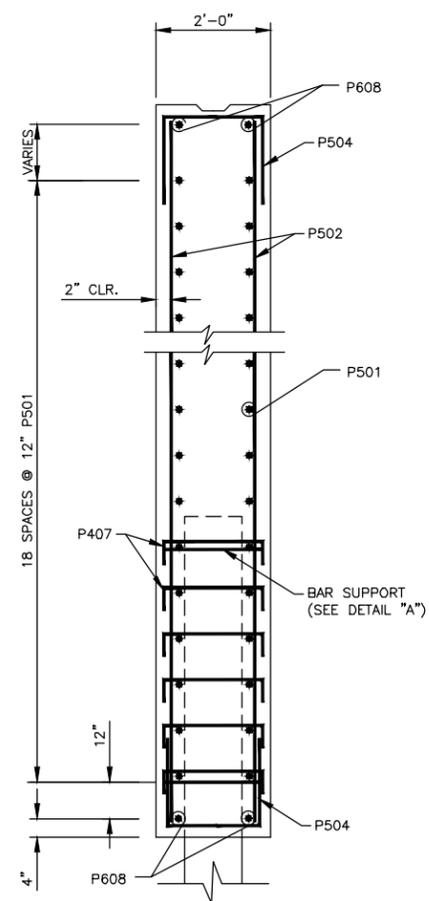
NOT TO SCALE



BENT BAR DETAILS

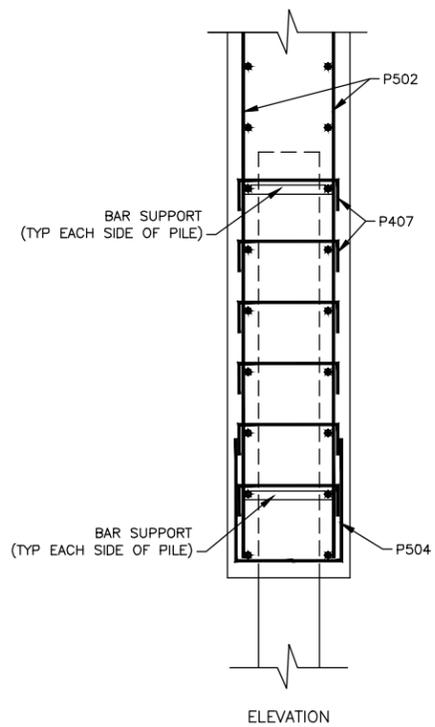
DIMENSIONS SHOWN ARE OUT TO OUT
NOT TO SCALE

BILL OF REINFORCEMENT (PER PIER)				
MARK	NO.	SIZE	LENGTH	SHAPE
P501	38	5	31' - 4"	STRT.
P502	64	5	19' - 10"	STRT.
P503	21	5	8' - 8"	BENT
P504	64	5	5' - 8"	BENT
P605	3	6	19' - 10"	STRT.
P606	21	6	8' - 4"	BENT
P407	84	4	2' - 8"	BENT
P608	4	6	31' - 4"	STRT.



SECTION B-B

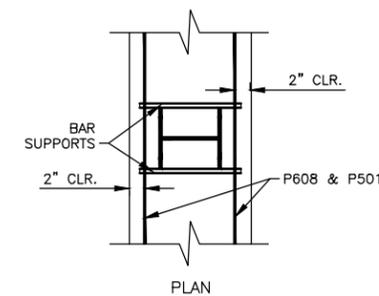
NOT TO SCALE



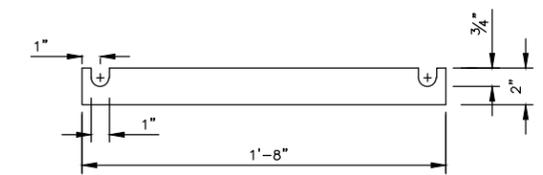
ELEVATION

DETAIL "A"

NOT TO SCALE



PLAN



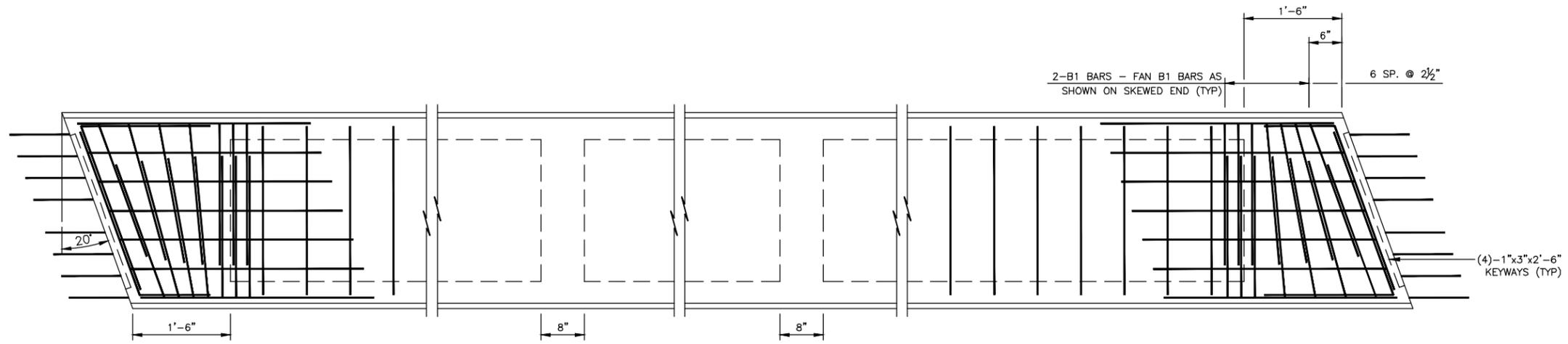
NOTE:
2" x 3/8" FLAT BAR TO BE INCIDENTAL TO REINFORCING STEEL.

BAR SUPPORT DETAIL

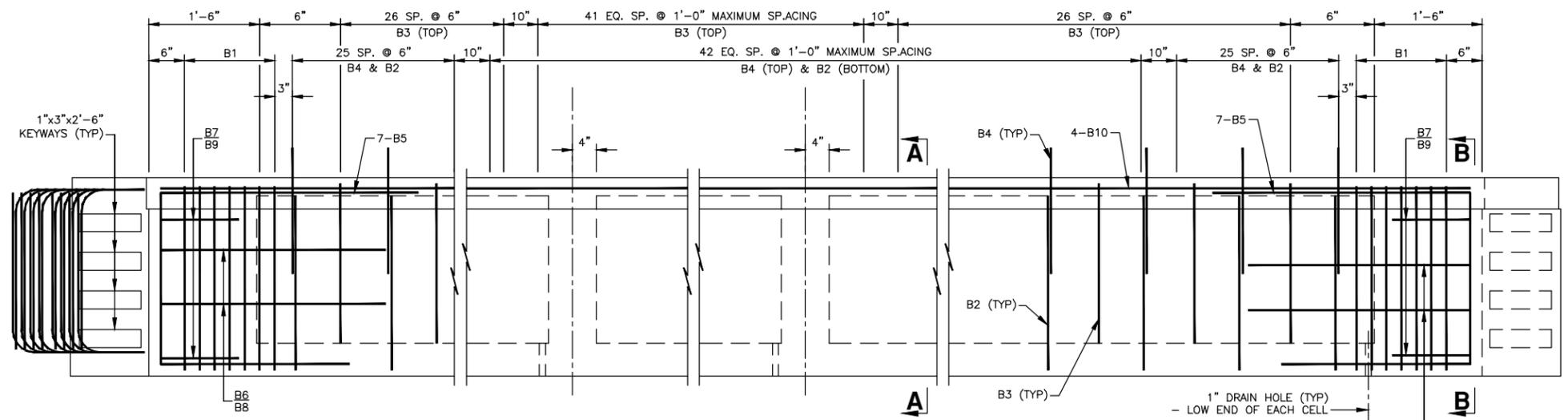
NOT TO SCALE

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Cass County Highway Department

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
PIER DETAILS AND REINFORCEMENT
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY



PLAN



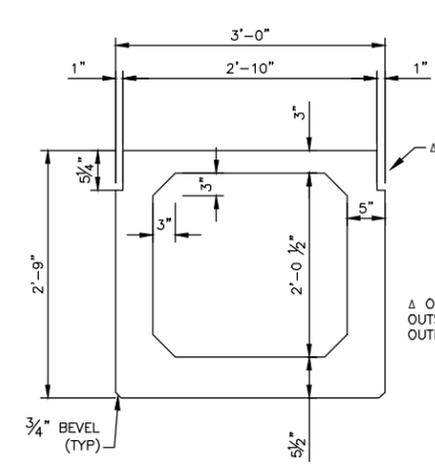
ELEVATION

BEAM SECTION DATA	
WT =	601 LBS/FT + 3275 LBS
CROSS SECTIONAL AREA =	558.0 IN ²
C.G. (FROM BOTTOM) =	14.9 IN
I =	73,588 IN ⁴
SB =	4,949 IN ³

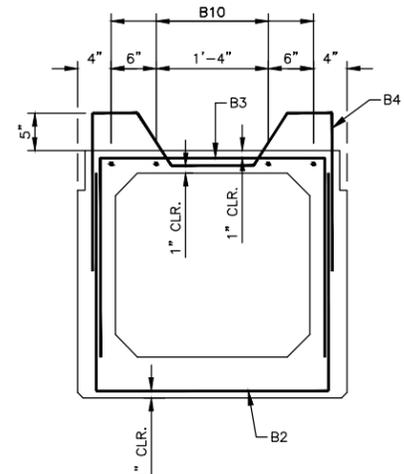
BILL OF REINFORCEMENT (PER BEAM)				
MARK	NO.	SIZE	LENGTH	SHAPE
B1	28	4	6' - 10.5"	BENT
B2*	95	4	7' - 5"	BENT
B3*	96	4	7' - 0"	BENT
B4	95	4	6' - 9"	BENT
B5	14	5	8' - 7"	BENT
B6	4	4	5' - 8"	BENT
B7	4	4	3' - 8"	BENT
B8	4	4	6' - 7"	BENT
B9	4	4	4' - 7"	BENT
B10	4	4	73' - 4"	STRT.
T1**	32	4	4' - 9"	STRT.

* WELDED WIRE REINFORCING WITH MINIMUM CIRCUMFERENTIAL STEEL AREA OF 0.15 SQ IN PER FT MAY BE SUBSTITUTED FOR B2 AND B3 BARS.

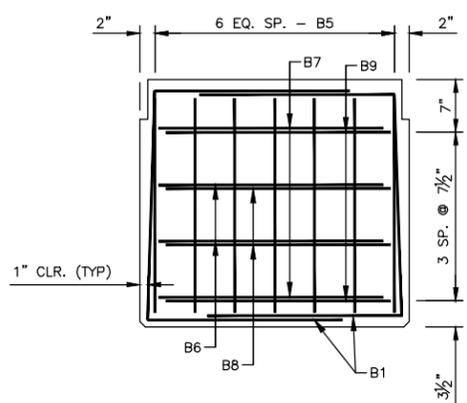
** FIELD BEND AS SHOWN (GRADE 40).



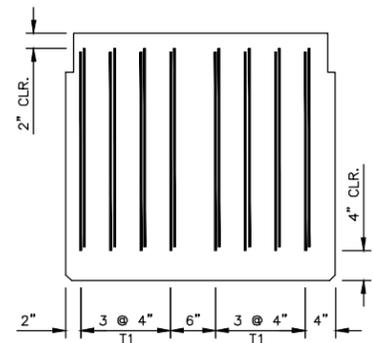
(SHOWING DIMENSIONS)
A - A



(SHOWING REINFORCING)
A - A



B - B



END VIEW

This document was originally issued and sealed by
 Jeremy L. MCLR.ughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
33IN BOX BEAM DETAILS
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

NOTES:

AT LEAST 14 DAYS PRIOR TO THE FORMING AND POURING OF ANY BEAMS, THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. THE SHOP DRAWINGS SHALL INCLUDE THE TOTAL INITIAL PRESTRESS FORCE AND THE LOSSES IN THE PRESTRESS DUE TO ELASTIC SHORTENING, SHRINKING OR CREEPING OF CONCRETE AND THE RELAXATION OF STEEL STRESS AS DETERMINED BY THE CONTRACTOR FOR HIS METHOD OF STRESSING.

SHOP DRAWINGS SHALL SHOW STRAND LAYOUT, PULL DOWN LOCATIONS, TENSIONING FORCES, ELONGATION AND ANY PROPOSED CHANGES IN REINFORCING STEEL.

THE FINAL PRESTRESS FORCE (REMAINING AFTER ALL LOSSES HAVE BEEN ACCOUNTED FOR) AND ITS CORRESPONDING CENTER OF GRAVITY, SHALL BE SELECTED FROM THOSE ON A CURVE DETERMINED BY THE THREE VALUES SHOWN.

THE BEAMS SHALL BE POURED IN ALL STEEL FORMS.

ALL REINFORCING STEEL SHALL HAVE A CLEARANCE OF 1" UNLESS OTHERWISE NOTED.

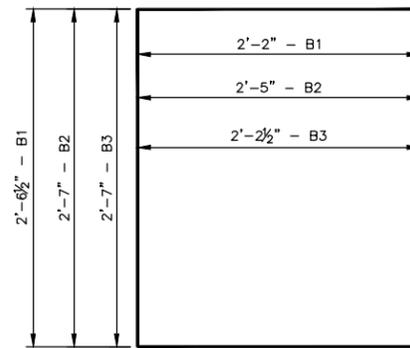
MINOR CHANGES TO THE SHAPE OF THE BEAM AND TO REINFORCING STEEL MAY BE MADE TO ACCOMMODATE THE FORMS OF VARIOUS CONTRACTORS AND THEIR CONSTRUCTION METHODS WITH THE APPROVAL OF THE ENGINEER.

THE TOPS OF THE BEAMS SHALL BE ROUGH FLOATED AND BROOMED TRANSVERSELY FOR BOND.

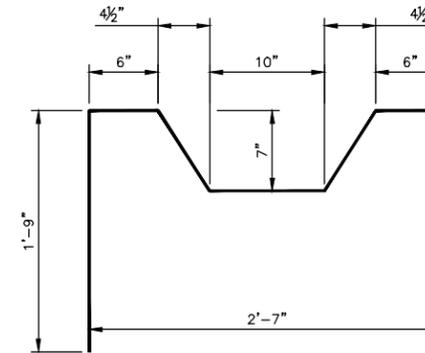
PROVIDE HANDLING HOOKS OR DEVICES AS REQUIRED BY THE CONTRACTOR. HOOKS OR DEVICES PROVIDED WILL BE SUBJECT TO APPROVAL BY THE ENGINEER AND SHALL BE INSTALLED WITHIN 4'-0" OF THE END OF BEAM.

HOLES AND INSERTS TO ACCOMMODATE THE DIAPHRAGM BARS SHALL BE PROVIDED IN THE BEAMS AT LOCATIONS AS SHOWN AT NO ADDITIONAL COST TO OWNER.

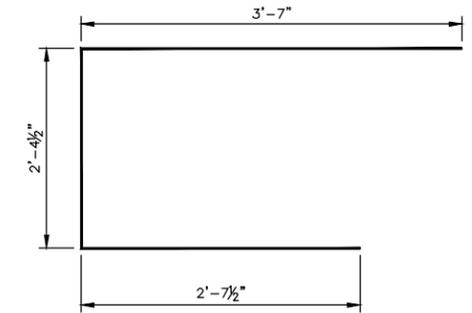
BEAMS SHALL BE CAST NO MORE THAN 6 MONTHS BEFORE BEAM PLACEMENT ON THE PROJECT.



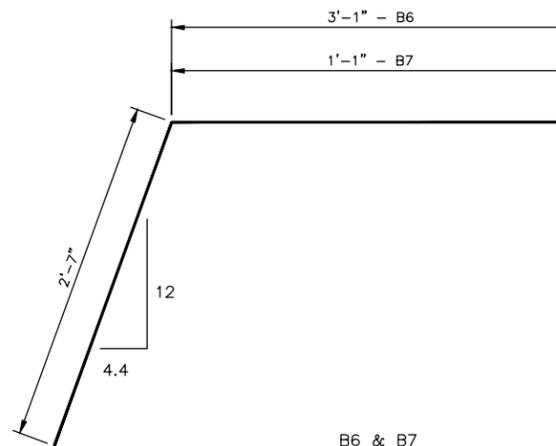
B1, B2, & B3



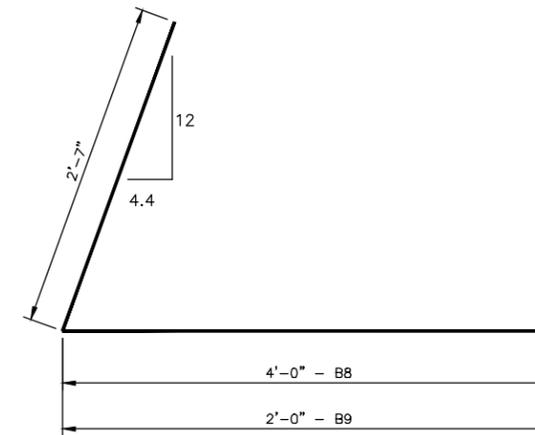
B4



B5



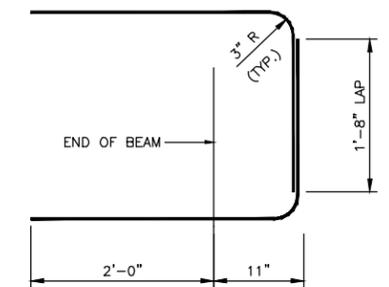
B6 & B7



B8 & B9

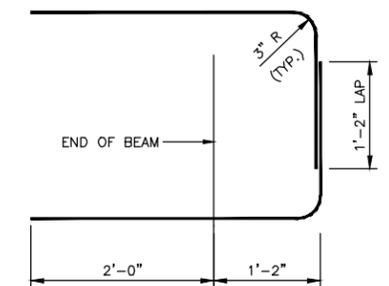
(DIMENSIONS SHOWN ARE OUT TO OUT)

BENT BAR DETAILS



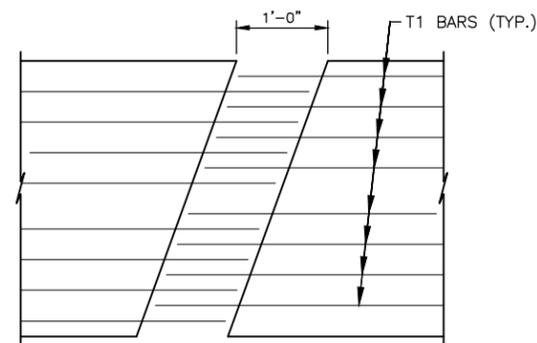
(AT PIERS)

T1



(AT ABUTMENTS)

T1



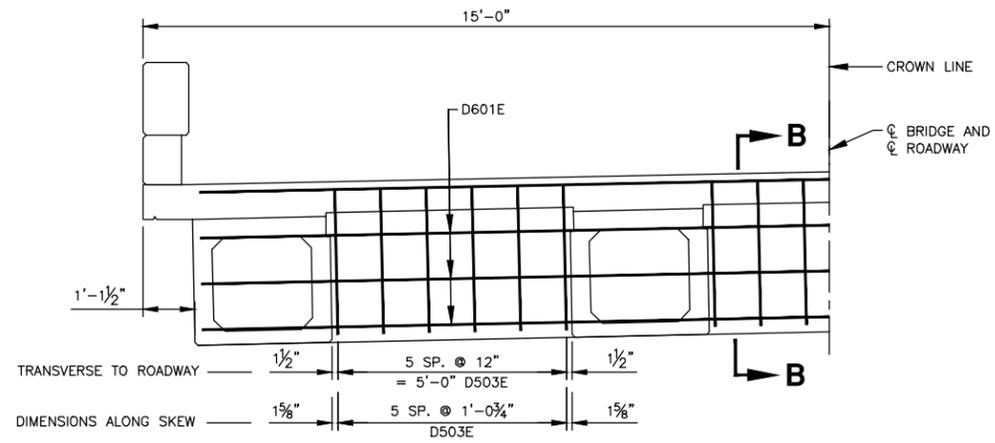
BEAM END PLAN AT PIER

PRESTRESSING DATA					
C.G.	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT (TONS)	BEAM LENGTH
2.50	787.3 k	6000 psi (Min)	6500 psi (Min)	23.8	73'-8"
2.75	796.7 k				
3.00	806.3 k				

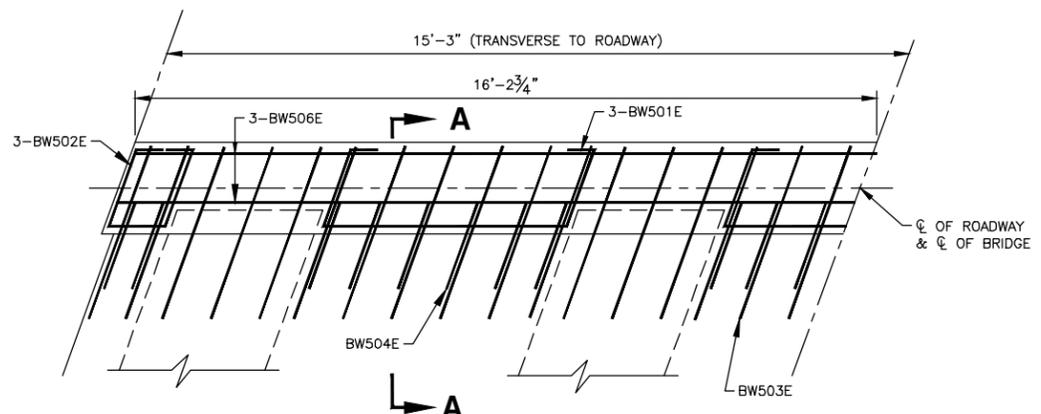
This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department

CASS COUNTY HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
BOX BEAM REBAR

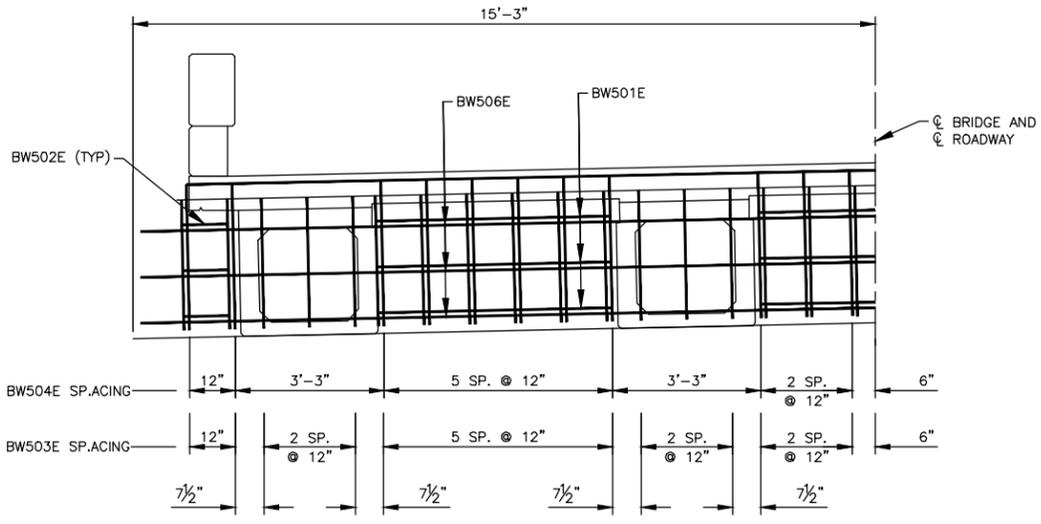
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY



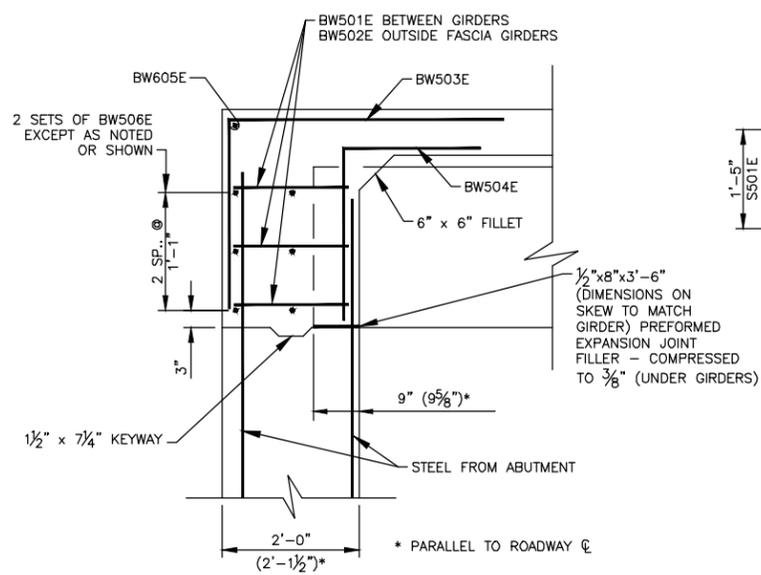
HALF SLAB SECTION AT PIER



HALF END BEAM - PLAN VIEW

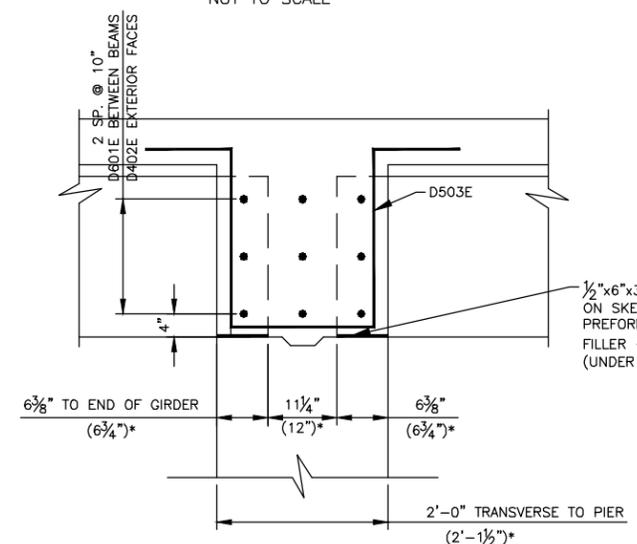


HALF END BEAM - ELEVATION VIEW



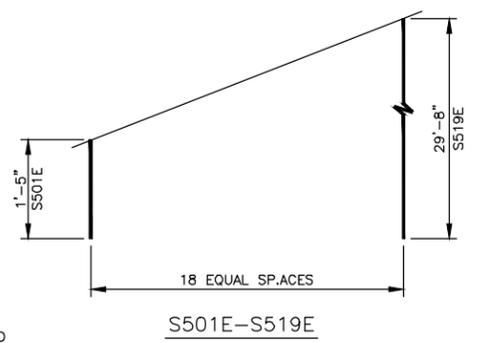
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE

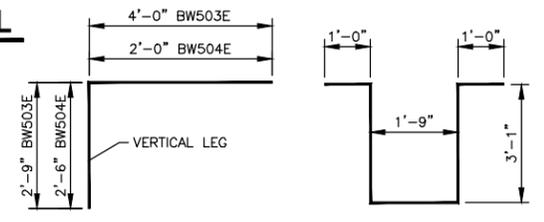
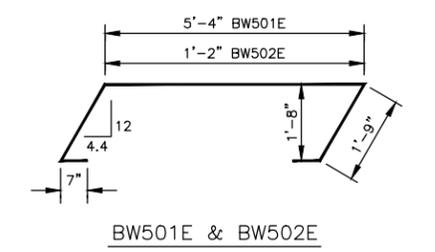


BAR CUTTING DETAIL

NOT TO SCALE

NOTES:

- FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE C.R.S.I. MANUAL OF STANDARD PRACTICE.
- ALL DIMENSIONS ARE OUT TO OUT OF BARS.
- NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
- AN "E" FOLLOWING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.



BW503E & BW504E

D503E

BENT BAR DETAILS

NOT TO SCALE

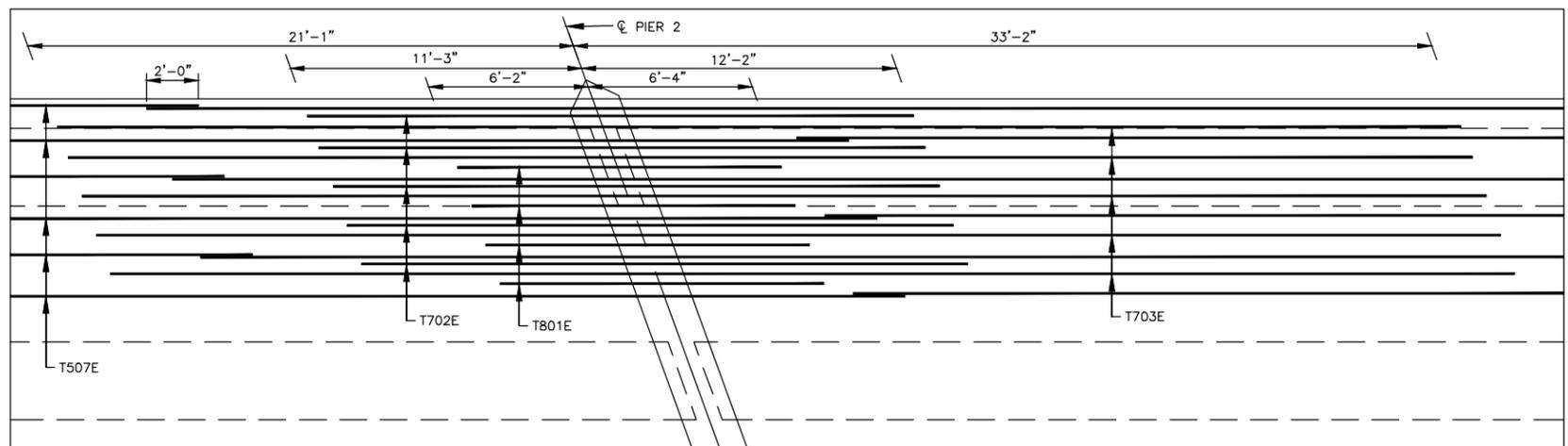
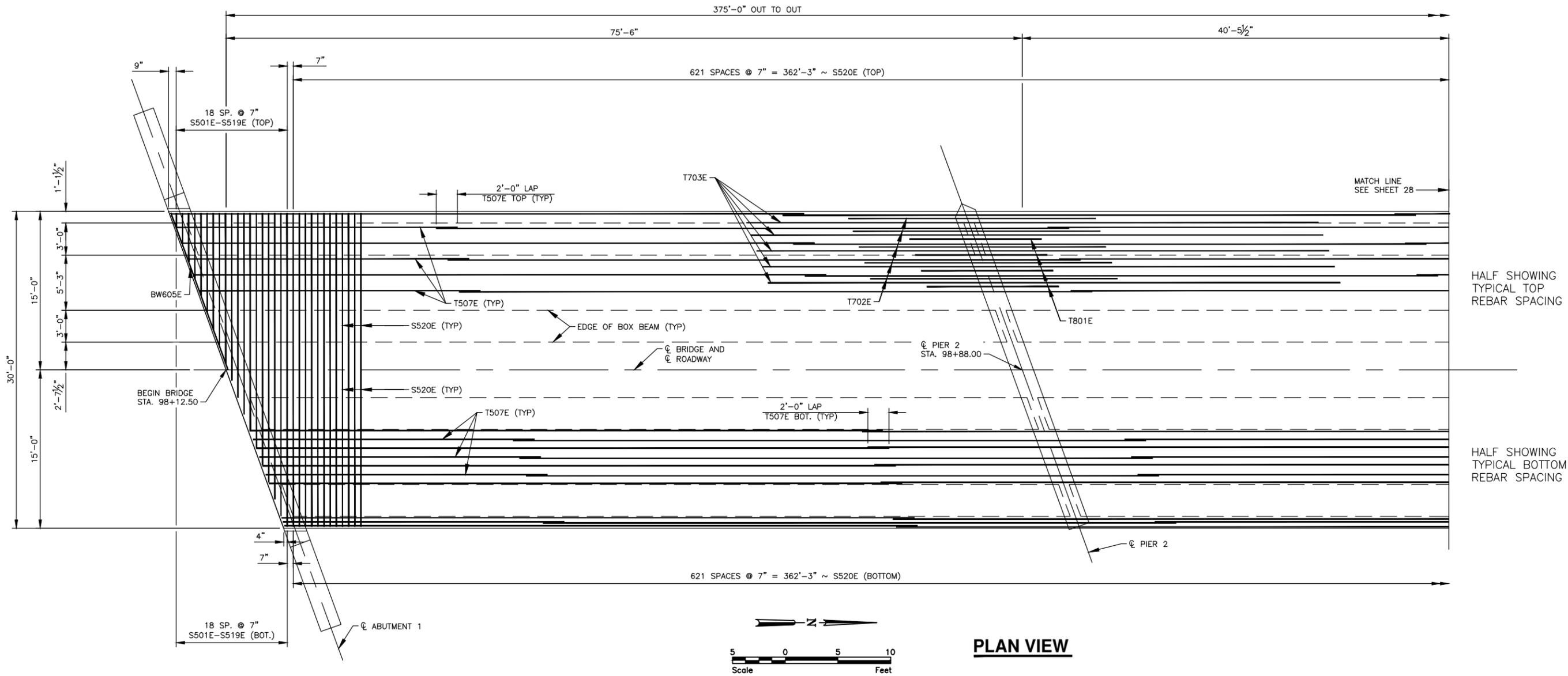
SUPERSTRUCTURE				
BILL OF REINFORCEMENT				
MARK	NO.	SIZE	LENGTH	SHAPE
BW501E	18	5	10' - 0"	BENT
BW502E	12	5	5' - 10"	BENT
BW503E	68	5	6' - 9"	BENT
BW504E	44	5	4' - 6"	BENT
BW605E	2	6	31' - 7"	STRT.
BW506E	12	5	32' - 2"	STRT.
D601E	12	6	29' - 2"	STRT.
D402E	72	4	5' - 3"	STRT.
D503E	72	5	9' - 11"	BENT
S501E-S519E	4 SETS	5	295' - 3"	STRT.
S520E	1244	5	29' - 8"	STRT.
T801E	36	8	12' - 6"	STRT.
T702E	40	7	23' - 5"	STRT.
T703E	40	7	54' - 3"	STRT.
T804E	36	8	8' - 10"	STRT.
T705E	40	7	20' - 3"	STRT.
T706E	40	7	43' - 11"	STRT.
T507E	48	5	386' - 8"	STRT.

- 2'-0" SP.LICE LENGTH
- SEE SHEET 28 FOR DETAIL

QUANTITIES & PROPERTIES	
CLASS AAE-3 CONCRETE	331.5 C.Y.
CONCRETE STRENGTH	4,000 PSI
REINFORCING STEEL - EPOXY	75,695 LBS
REINFORCEMENT STRENGTH	60,000 PSI

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
SUPERSTRUCTURE DETAILS
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

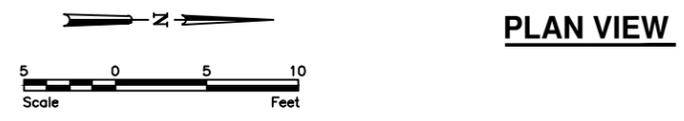
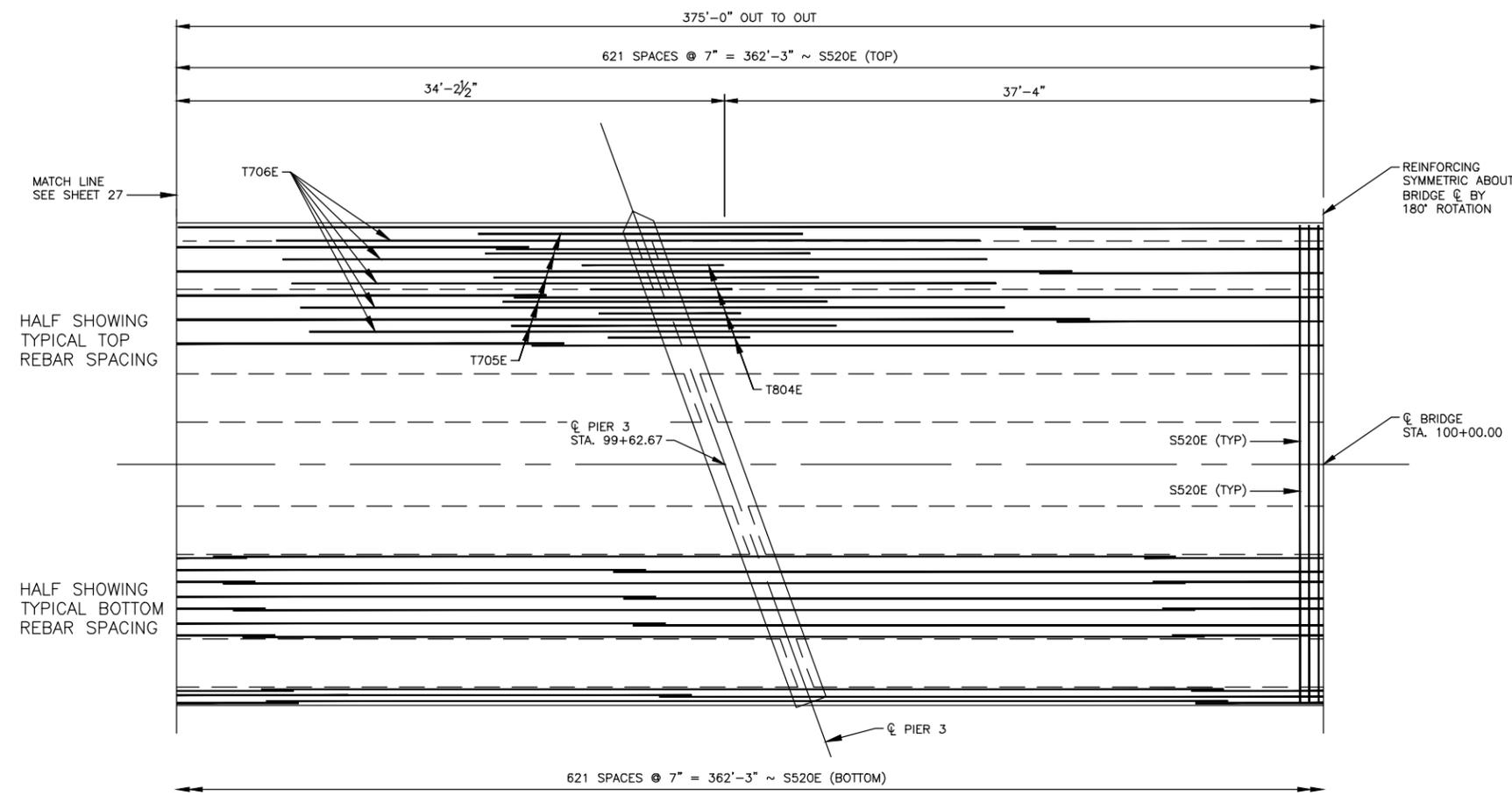


PIER 2 DETAIL
(SYMMETRIC BY 180° ROTATION @ PIER 5)

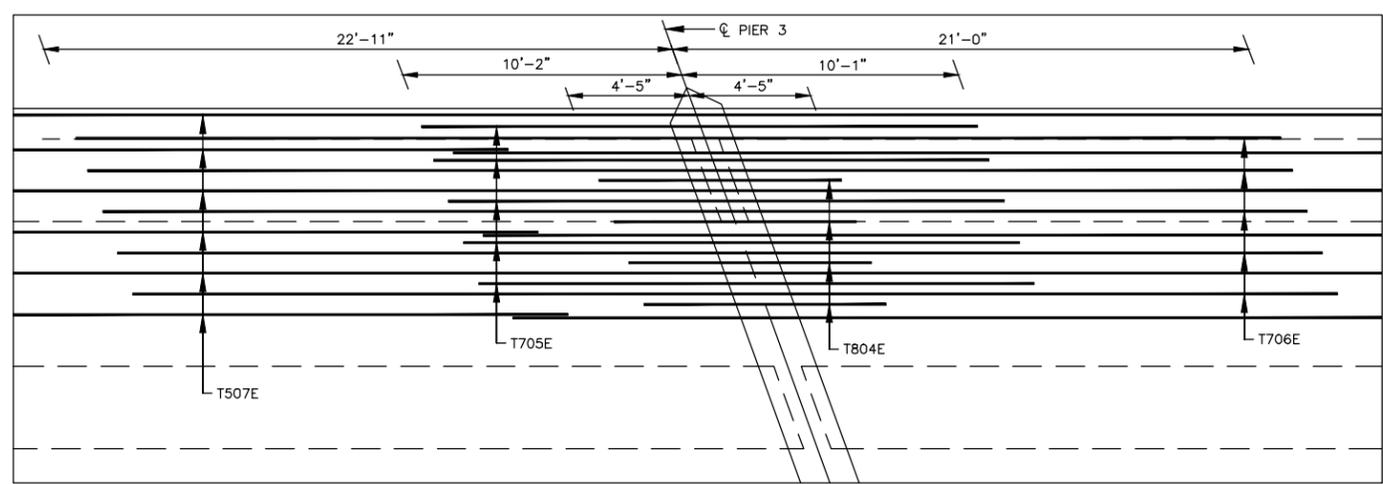
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
SLAB LAYOUT
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

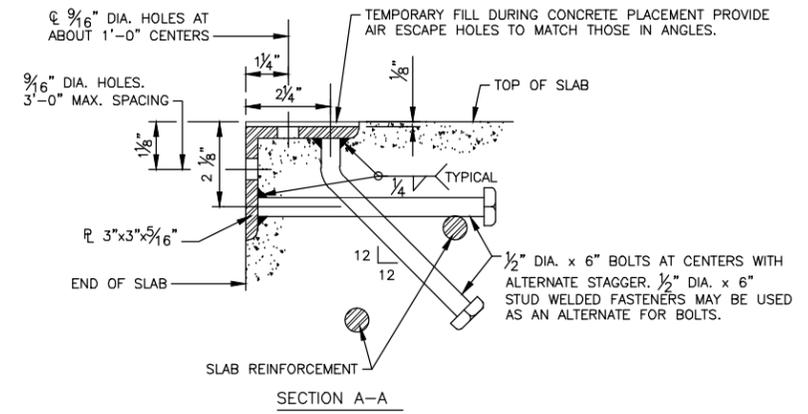
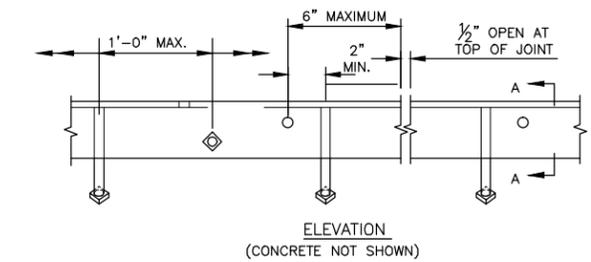
Z:\6000\6006\12_6006_052 - Lake Shure\CAVD\Plans\SLAB LAYOUT.dwg -11x17-4/17/2014 2:34 PM -shanson



PLAN VIEW

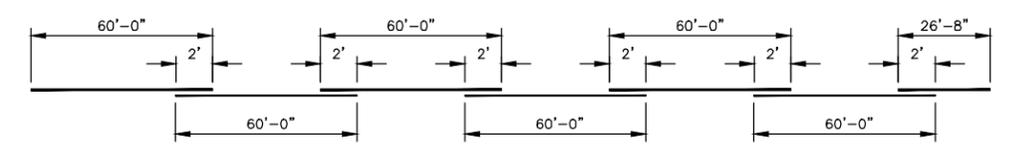


PIER 3 DETAIL
 (SYMMETRIC BY 180° ROTATION @ PIER 4)



PROTECTION PLAN DETAIL
 NOT TO SCALE

- NOTES:
1. ANGLES SHALL EXTEND FULL WIDTH OF ROADWAY WITH A 1/2" OPEN JOINT AT EACH BREAK IN CROWN PROFILE. MAXIMUM LENGTH 18'-1".
 2. ANGLES SHALL BE STRAIGHTENED TO A TOLERANCE OF 1/16" IN 10 FEET AFTER GALVANIZING.
 3. MATERIAL: STRUCTURAL STEEL PER NDDOT 834, GALVANIZED AFTER FABRICATION PER AASHTO M111 (ASTM A123).
 4. SET ANGLE TO PROPER GRADE AND CROWN.
 5. ALL MATERIAL WILL BE PAID FOR AS STRUCTURAL STEEL.



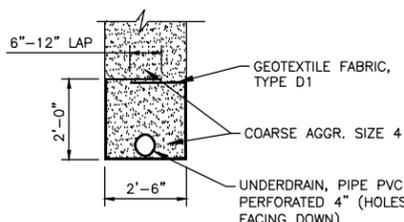
T507E DETAIL
 NOT TO SCALE

- NOTE:
 TURN END FOR END SO THAT SPLICE LOCATIONS ARE STAGGERED.

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

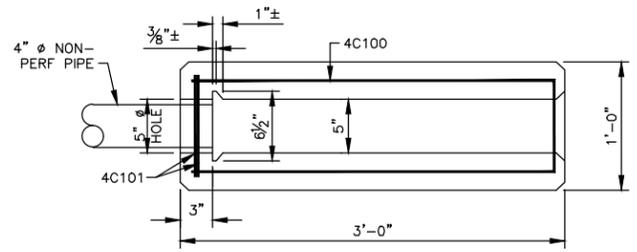
CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
SLAB LAYOUT
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\SLAB LAYOUT.dwg -11x17 (2) -4/17/2014 2:34 PM -(shanson)

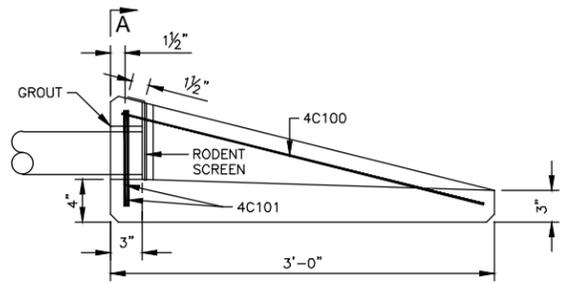


NOTE:
 GEOTEXTILE FABRIC - TYPE D1,
 COARSE AGGR SIZE 4 AND
 GEOTEXTILE FABRIC - TYPE R1
 SHALL BE INCIDENTAL TO THE
 PRICE BID SELECT BACKFILL.

TRENCH DETAIL
 NOT TO SCALE

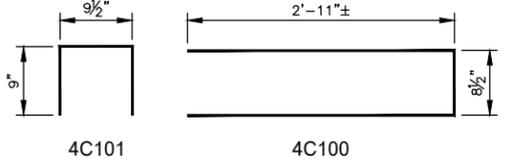


PLAN

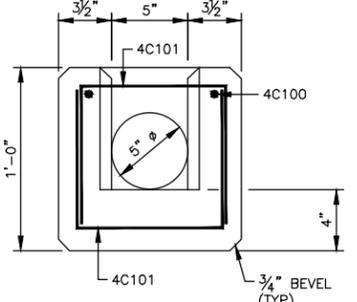


ELEVATION

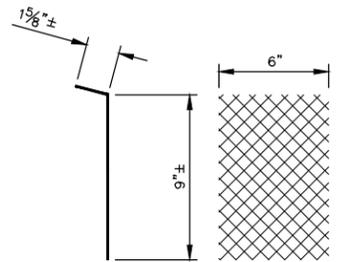
PRECAST CONCRETE HEADWALL DETAILS



BENT BAR DETAILS



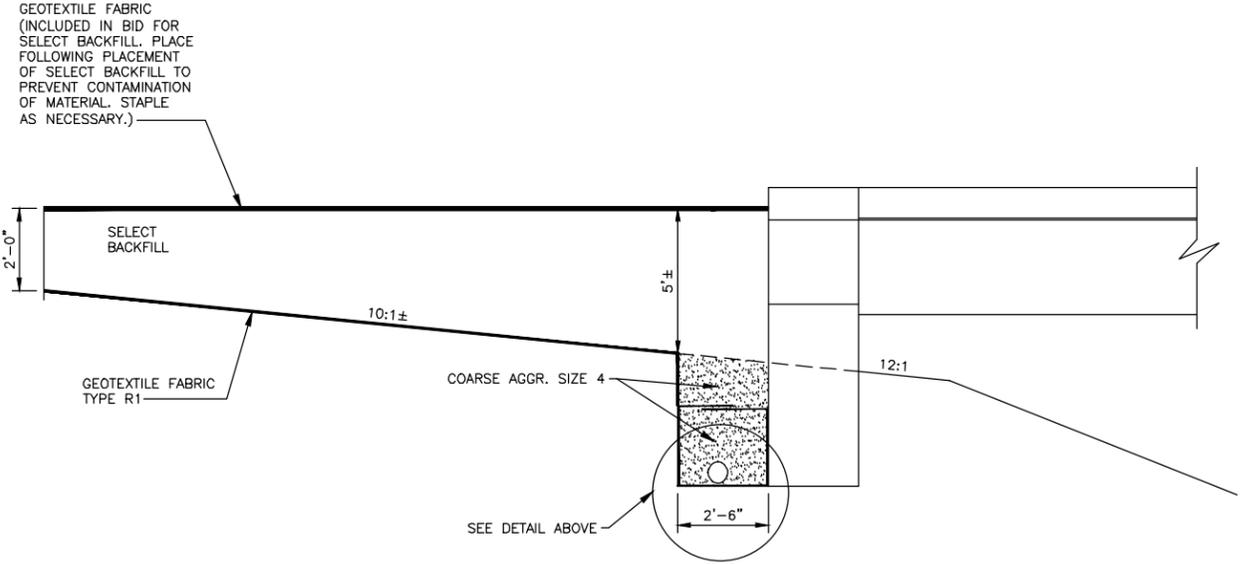
SECTION A-A



SIDE VIEW FRONT VIEW

RODENT SCREEN DETAILS

NOTES:
 THE DIMENSIONS FOR THE RODENT SCREEN ARE APPROXIMATE TO ALLOW FOR BENDING AND A SNUG FIT INTO THE SLOT IN THE HEADWALL.
 THE RODENT SCREEN SHALL BE FABRICATED FROM FLATTENED, EXPANDED METAL WITH SCREEN OPENINGS OF APPROXIMATELY 0.25 SQUARE INCHES. THE SCREEN SHALL BE 16 GAGE METAL AND BE HOT DIP GALVANIZED AFTER FABRICATION.



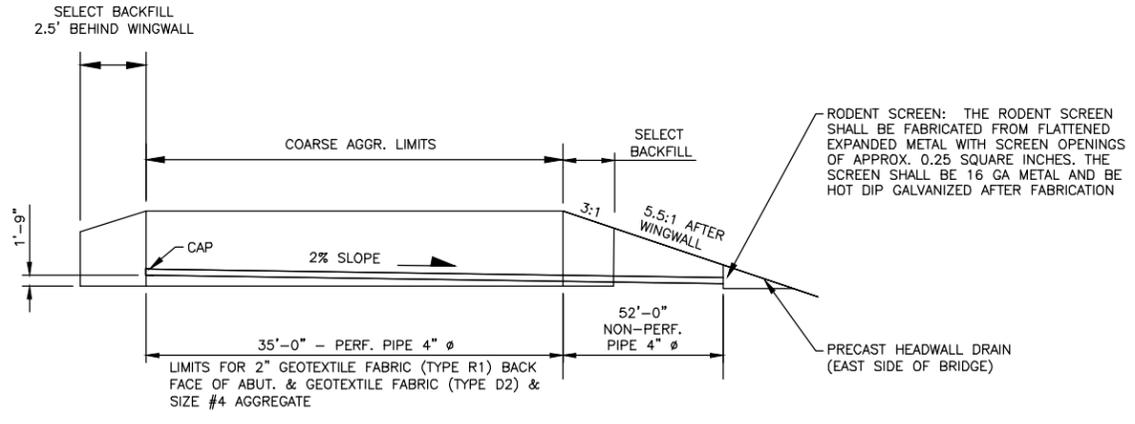
DETAIL AT ABUTMENT

SEEPAGE TRENCH DETAILS

NOT TO SCALE

NOTES:
 ALL MATERIAL, EQUIPMENT, AND LABOR REQUIRED TO PLACE THE SELECT BACKFILL, COARSE AGGREGATE, AND GEOTEXTILE FABRIC SYSTEM SHALL BE INCLUDED IN THE BID FOR SELECT BACKFILL.

PAY QUANTITY = PLAN QUANTITY



BACK FACE OF ABUTMENT

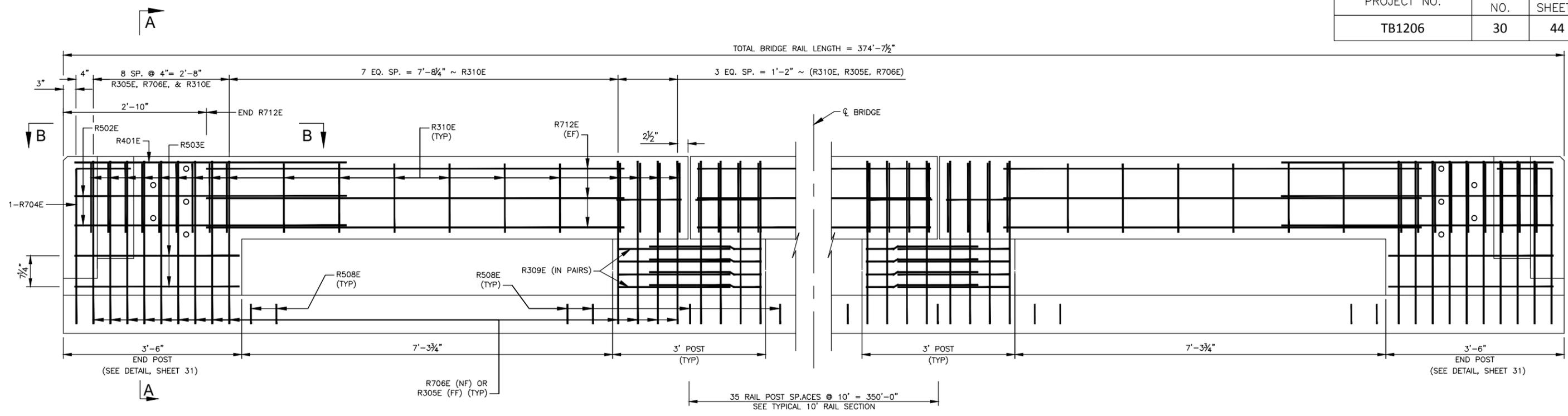
NOT TO SCALE

RODENT SCREEN: THE RODENT SCREEN SHALL BE FABRICATED FROM FLATTENED EXPANDED METAL WITH SCREEN OPENINGS OF APPROX. 0.25 SQUARE INCHES. THE SCREEN SHALL BE 16 GA METAL AND BE HOT DIP GALVANIZED AFTER FABRICATION

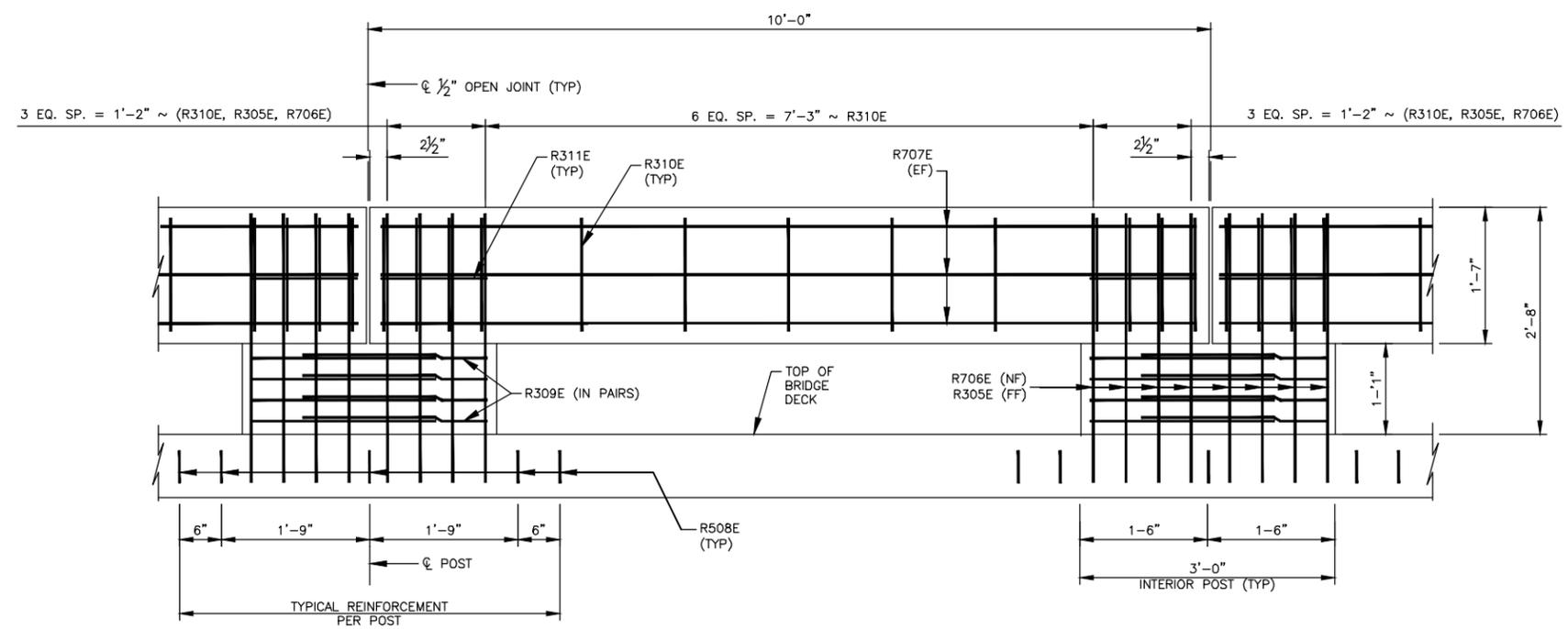
PRECAST HEADWALL DRAIN (EAST SIDE OF BRIDGE)

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
**ABUTMENT UNDERDRAIN
 DETAILS**
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY



BRIDGE RAIL ELEVATION VIEW
NOT TO SCALE



TYPICAL 10' RAIL SECTION
NOT TO SCALE

LEGEND	
NF	= NEAR FACE
FF	= FAR FACE
EF	= EACH FACE

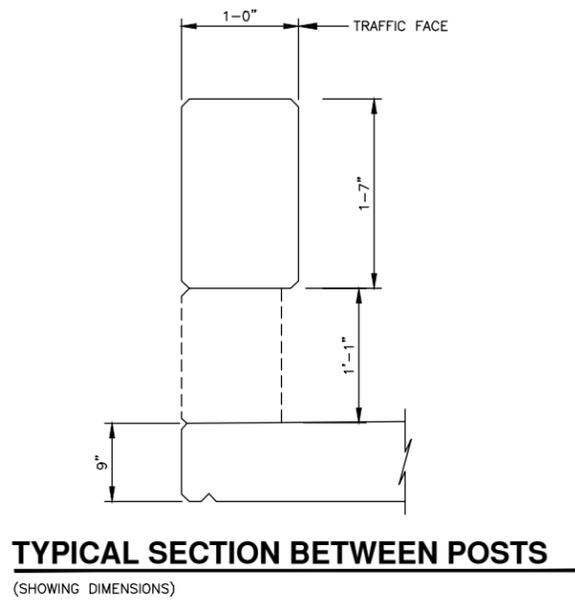
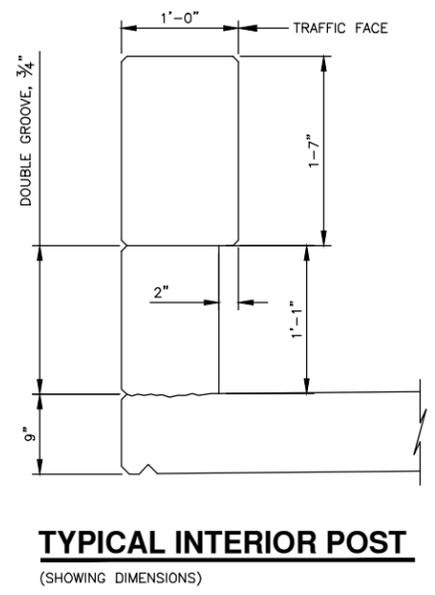
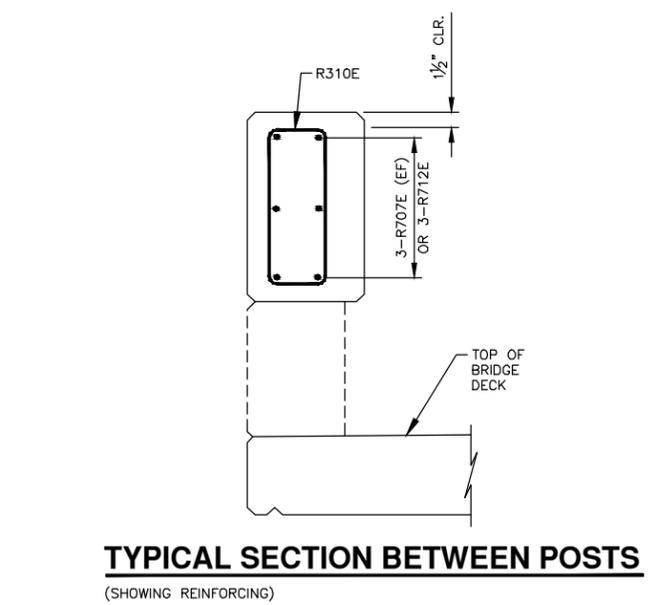
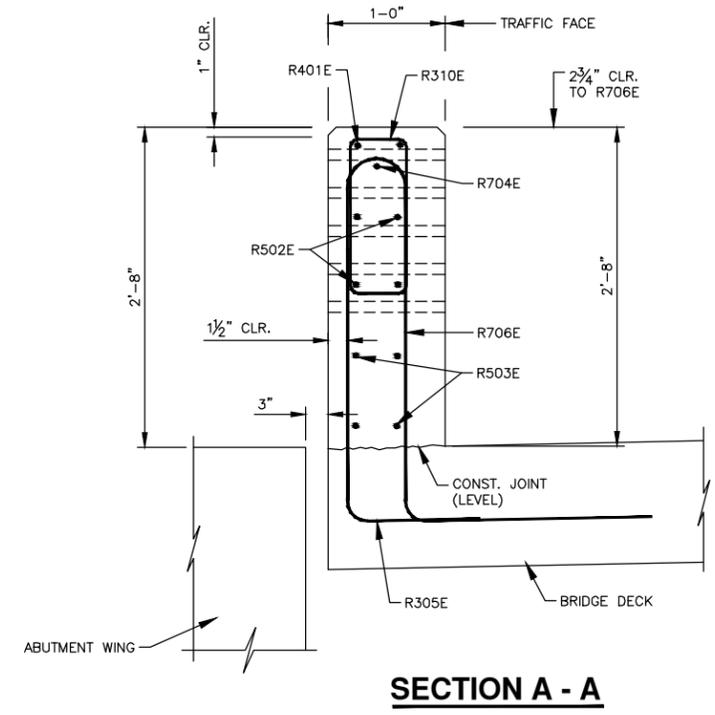
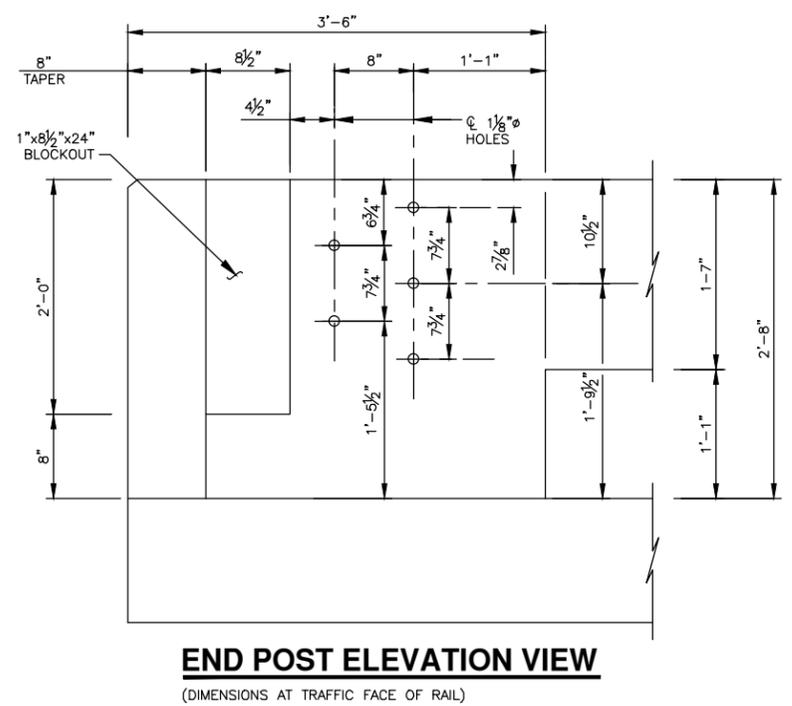
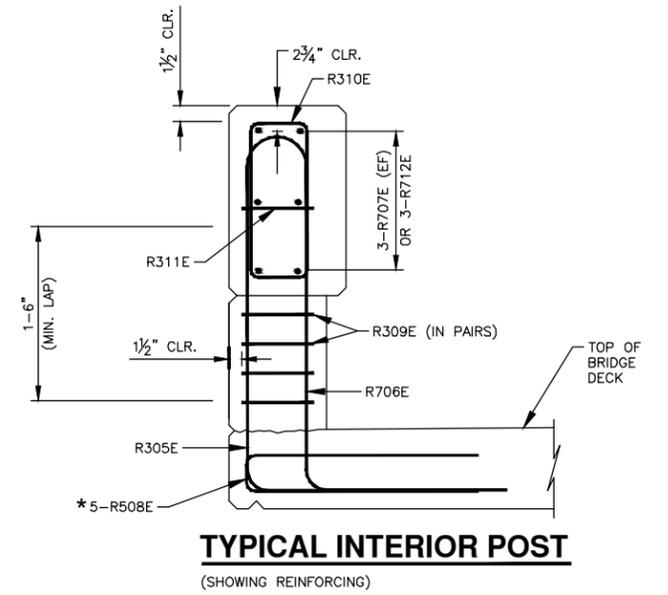
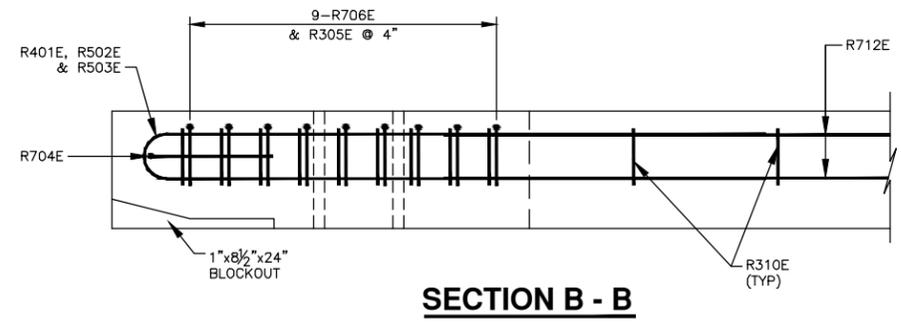
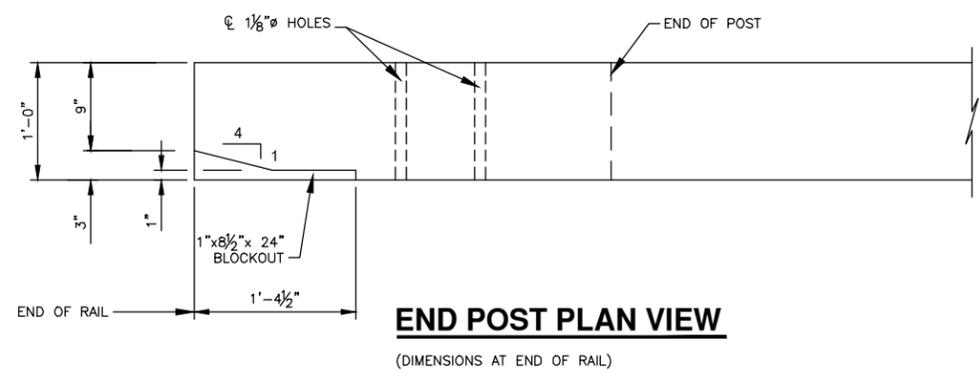
- NOTES:
1. REINFORCING STEEL AND CONCRETE FOR KANSAS CORRAL RAIL ARE QUANTIFIED ON SHEET 32.
 2. VIEWS A-A, AND B-B ARE SHOWN ON SHEET 31.
 3. REINFORCING SYMMETRIC ABOUT BRIDGE ϕ UNLESS OTHERWISE NOTED.

This document was originally issued and sealed by
Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
**CONCRETE BRIDGE
 BARRIER**
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure\CAVD\Plans\CONCRETE BARRIER.dwg -11x17-4/17/2014 2:53 PM - (shanson)

PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	31	44



- NOTES:
1. REINFORCING STEEL AND CONCRETE FOR KANSAS CORRAL RAIL ARE QUANTIFIED ON SHEET 32.
 2. * THE HOOK MAY BE CANTED TO PROVIDE CLEARANCE AND/OR FIT BETWEEN REINFORCING.

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Cass County Highway Department

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
**CONCRETE BARRIER
DETAILS**
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

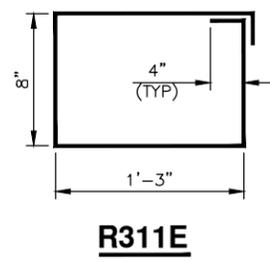
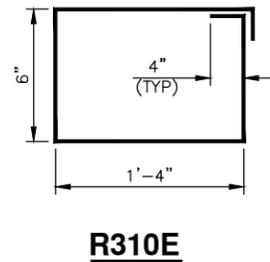
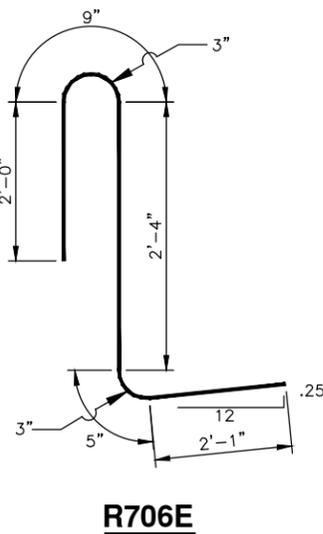
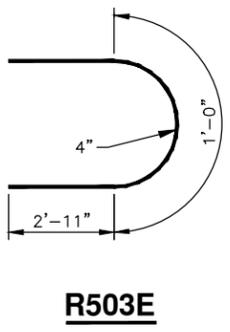
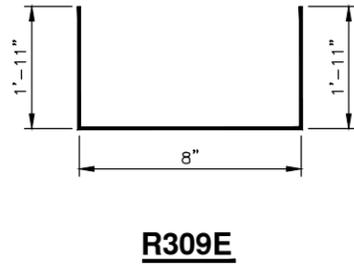
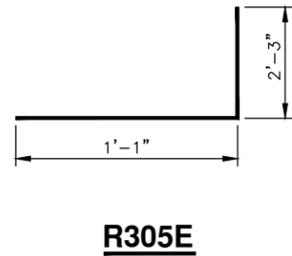
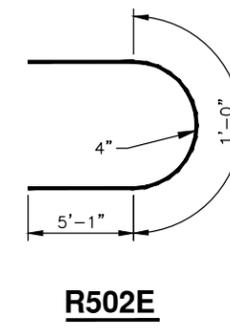
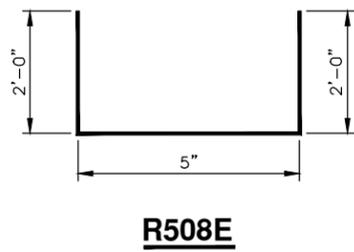
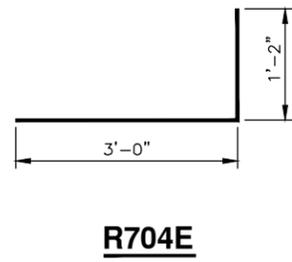
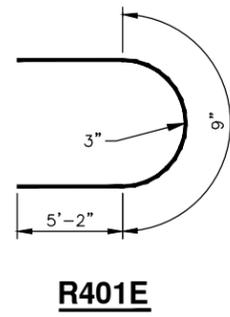
Z:\6000\6006\12_6006_052 - Lake Shure\CAVD\Plans\CONCRETE BARRIER DETAILS.dwg -11x17-4/17/2014 2:54 PM - (shanson)

PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	32	44

BILL OF REINFORCEMENT (ONE RAIL)				
MARK	NO.	SIZE	LENGTH	SHAPE
R401E	2	4	11' - 1"	BENT
R502E	4	5	11' - 2"	BENT
R503E	4	5	6' - 10"	BENT
R704E	2	7	4' - 2"	BENT
R305E	306	3	3' - 4"	BENT
R706E	306	7	7' - 7"	BENT
R707E	210	7	9' - 8"	STRT.
R508E	184	5	4' - 5"	BENT
R309E	288	3	4' - 6"	BENT
R310E	493	3	4' - 4"	BENT
R311E	72	3	4' - 6"	BENT
R712E	12	7	8' - 3"	STRT.

NOTES:

1. THE ESTIMATED MATERIAL QUANTITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. ALL MATERIALS, INCLUDING CONCRETE & REINFORCING BARS, AND ALL LABOR REQUIRED TO BUILD THE KANSAS CORRAL RAIL OVER THE DECK SHALL BE INCLUDED IN THE PAY ITEM, "CONCRETE BRIDGE BARRIER". ESTIMATED REINFORCING AND CONCRETE QUANTITIES LISTED ARE FOR BOTH RAILS AND INFORMATIONAL PURPOSES ONLY.
2. FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
3. ALL DIMENSIONS ARE OUT TO OUT OF BARS.
4. NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
5. THE GIVEN DIMENSION FOR ALL BENDS ARE THE BEND RADII.
6. AN "E" FOLLOWING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.
7. THE CONCRETE FOR BRIDGE BARRIER SHALL BE CLASS AAE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

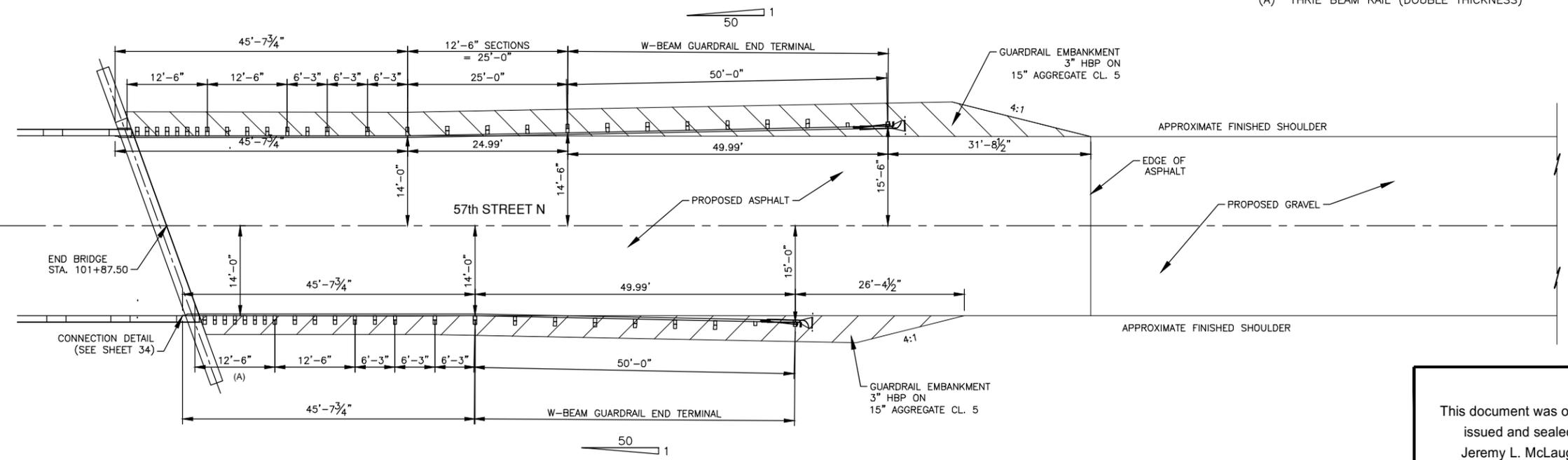
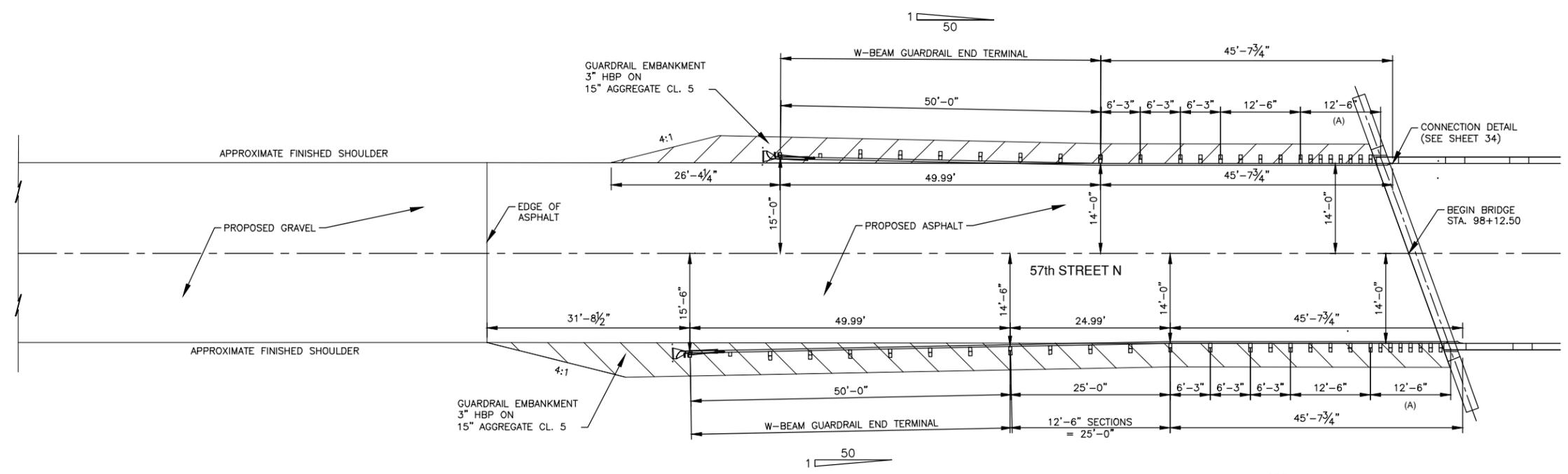


BENT BAR DETAILS

QUANTITIES & PROPERTIES (PER RAIL) (FOR INFORMATION PURPOSES ONLY)	
CLASS AAE-3 CONCRETE	25.9 CY
CONCRETE STRENGTH	4,000 PSI
REINFORCING STEEL	11,875 LBS
REINFORCEMENT STRENGTH	60,000 PSI

This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department

CASS COUNTY HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
CONCRETE BARRIER REBAR DETAILS
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY



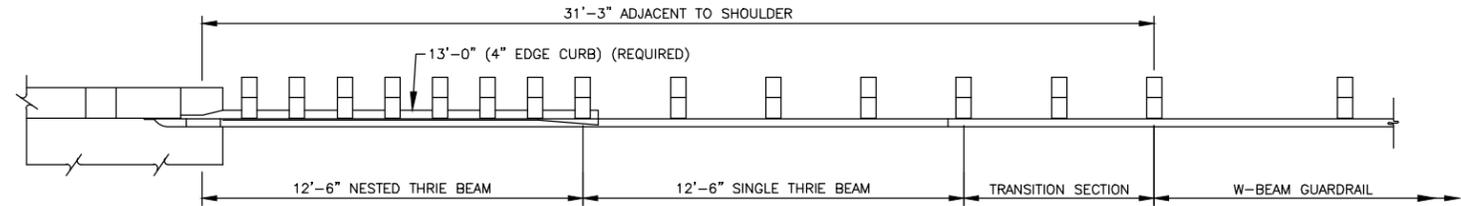
- NOTE:
1. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND THE TYPE A 1 3/4" O.D. WASHER AND NOT MORE THAN 1" BEYOND IT.

BUTTON HEAD "SPlice" BOLTS (ASTM A307) ARE 5/8"Ø WITH A 5/8"Ø RECESSED NUT (ASTM A563).
 2. ALL HARDWARE (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH THE AASHTO M232. HARDWARE SHALL NOT BE MEASURED FOR SEPARATE PAYMENT BUT SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "W-BEAM GUARDRAIL".
 3. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE.
 4. REFER TO STANDARD DRAWING D-764-1 FOR ADDITIONAL DETAILS EXCEPT AS FOLLOWS. OMIT STANDARD DRAWING D-764-1 POST LENGTH OF 6'-0" AND USE 6'-6" POST LENGTH FOR ALL POSTS. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF STANDARD DRAWING D-764-1.
- (A) THRIE BEAM RAIL (DOUBLE THICKNESS)

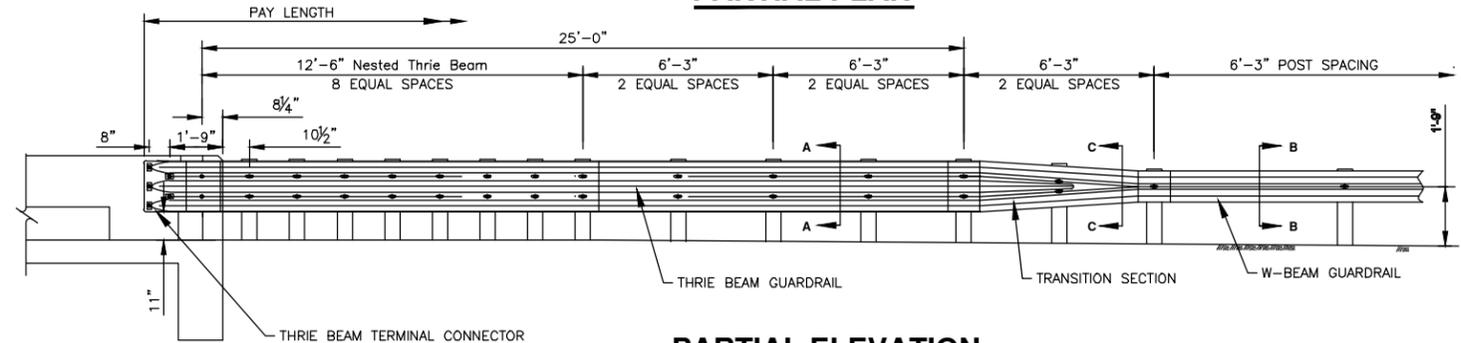
<p>This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 04/17/14 and the original document is stored at Cass County Highway Department</p>	<p>CASS COUNTY HIGHWAY DEPARTMENT LAKE SHURE BRIDGE NO. 09-139-21.0 GUARDRAIL DETAILS PROJECT NO. TB1206 57TH STREET N 1.5 MI NW OF REILE'S ACRES CASS COUNTY</p>
--	--

Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\GUARDRAIL DETAILS.dwg - 11/17/17 2:01:42:56 PM - (shanson)

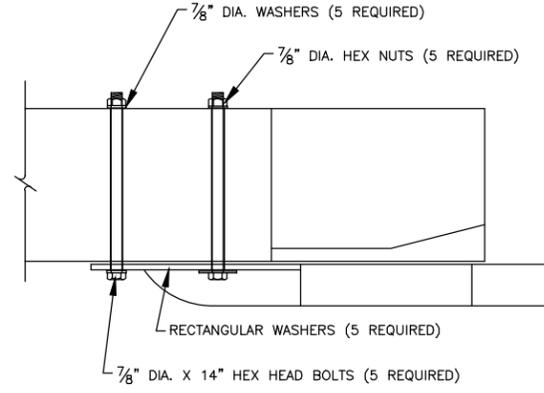
PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	34	44



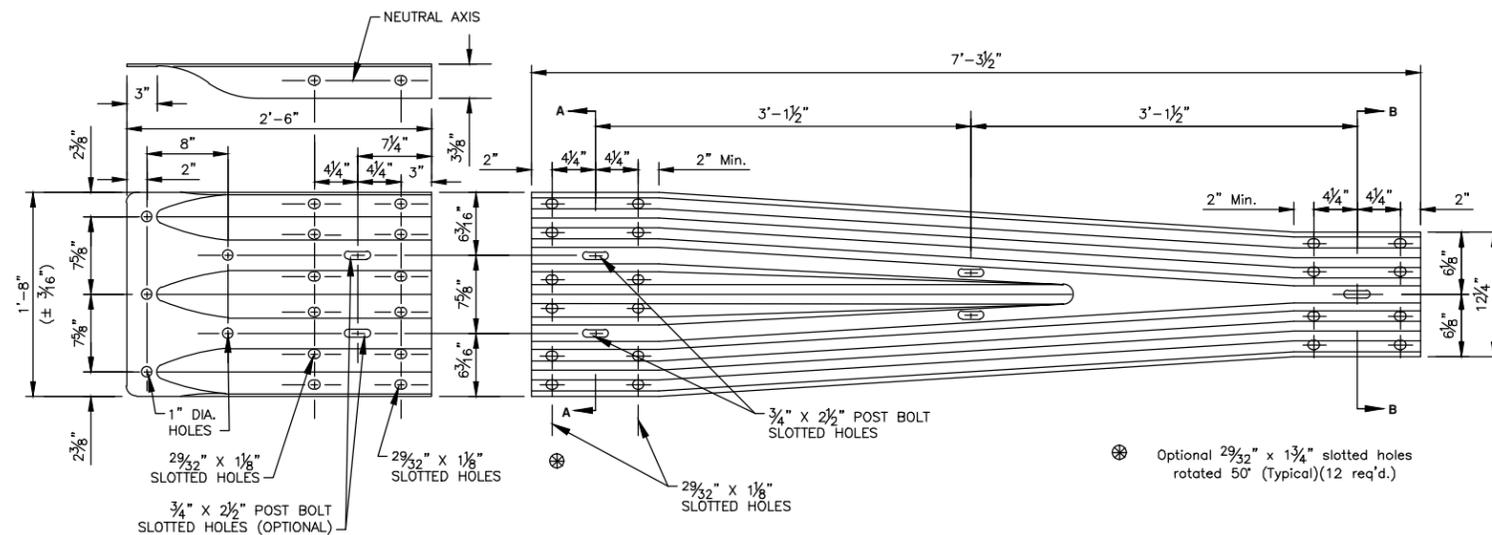
PARTIAL PLAN



PARTIAL ELEVATION



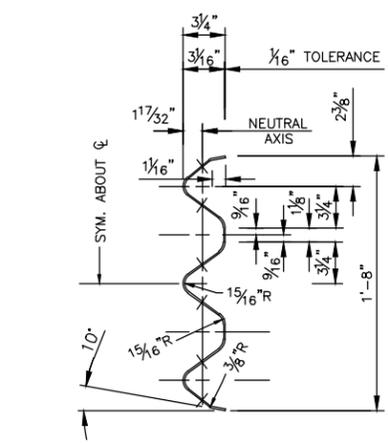
DETAIL BRIDGE ATTACHMENT



TERMINAL CONNECTOR

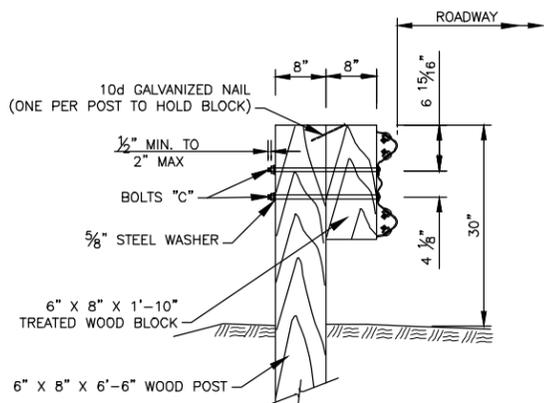
ELEVATION - TRANSITION SECTION

(FROM THRIE BEAM TO W-BEAM RAIL)

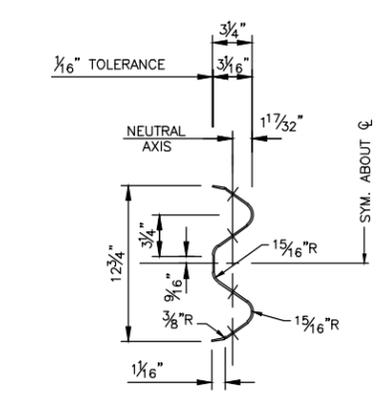


SECTION A-A THRU RAIL ELEMENT

TYPICAL THRIE BEAM

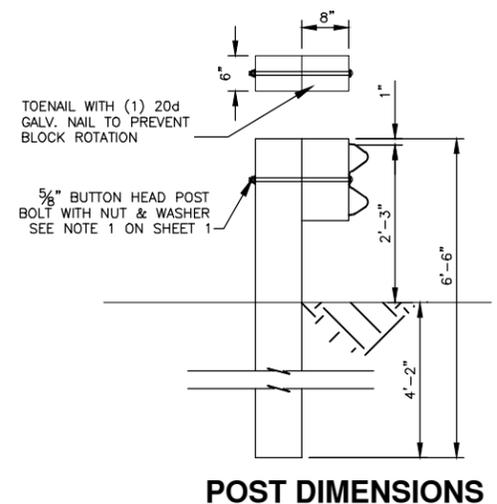


SECTION C-C (WOOD POST)

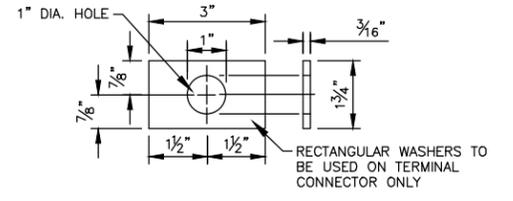


SECTION B-B THRU RAIL ELEMENT

TYPICAL W-BEAM



POST DIMENSIONS



RECTANGULAR WASHER

(Other Approved Washer May Be Used)

GENERAL NOTES:

RAIL ELEMENT SHALL BE #10 OR #12 U.S. STANDARD GAUGE EXCEPT WHERE SPECIFIC GAUGE IS REQUIRED, SUCH AS AT END TERMINAL OR BULLNOSE SECTIONS.

GALVANIZED STEEL RAIL ELEMENTS SHALL BE USED. ALL POST RAIL FITTINGS AND ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH STANDARD SPECIFICATIONS.

GUARDRAIL PARTS FURNISHED UNDER THIS SPECIFICATION SHALL BE INTERCHANGEABLE WITH SIMILAR PARTS REGARDLESS OF THE SOURCE OR MANUFACTURER.

WHEN RADIUS IS LESS THAN 150', RAILS ARE TO BE SHOP CURVED.

TERMINAL CONNECTOR SHALL BE 10 GAUGE STEEL. THE CONNECTOR HAS THE SAME SECTION AS THRIE BEAM GUARDRAIL. TERMINAL CONNECTOR SHALL BE SUBSIDIARY TO THE BID ITEM "W-BEAM GUARDRAIL".

ALL GUARDRAIL SPLICES, INCLUDING SPECIAL END SHOES, SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC. WHERE TRAFFIC IS TEMPORARILY CARRIED IN THE DIRECTION OPPOSITE OF THE FINAL CONFIGURATION, THE RAIL SPLICES SHALL BE LAPPED IN THE DIRECTION OF THE PERMANENT TRAFFIC.

BRIDGE RAIL TRANSITION SHALL CONSIST OF ONE 25'-0" THRIE BEAM SECTION, ONE 12'-6" THRIE BEAM SECTION NESTED IN BACK OF 25'-0" SECTION, AND ONE THRIE BEAM TO W-BEAM TRANSITION SECTION, POSTS LOCATED AS SHOWN, AND ALL ASSOCIATED HARDWARE. THE REMAINDER OF THE GUARDRAIL SHALL BE W-BEAM WITH 6'-3" POST SPACING AND MAY BE FURNISHED IN EITHER 12'-6" OR 25'-0" SECTIONS.

ALL MATERIAL AND WORK REQUIRED FOR THIS CONSTRUCTION SHALL BE INCLUDED IN THE PAY ITEM "W-BEAM GUARDRAIL."

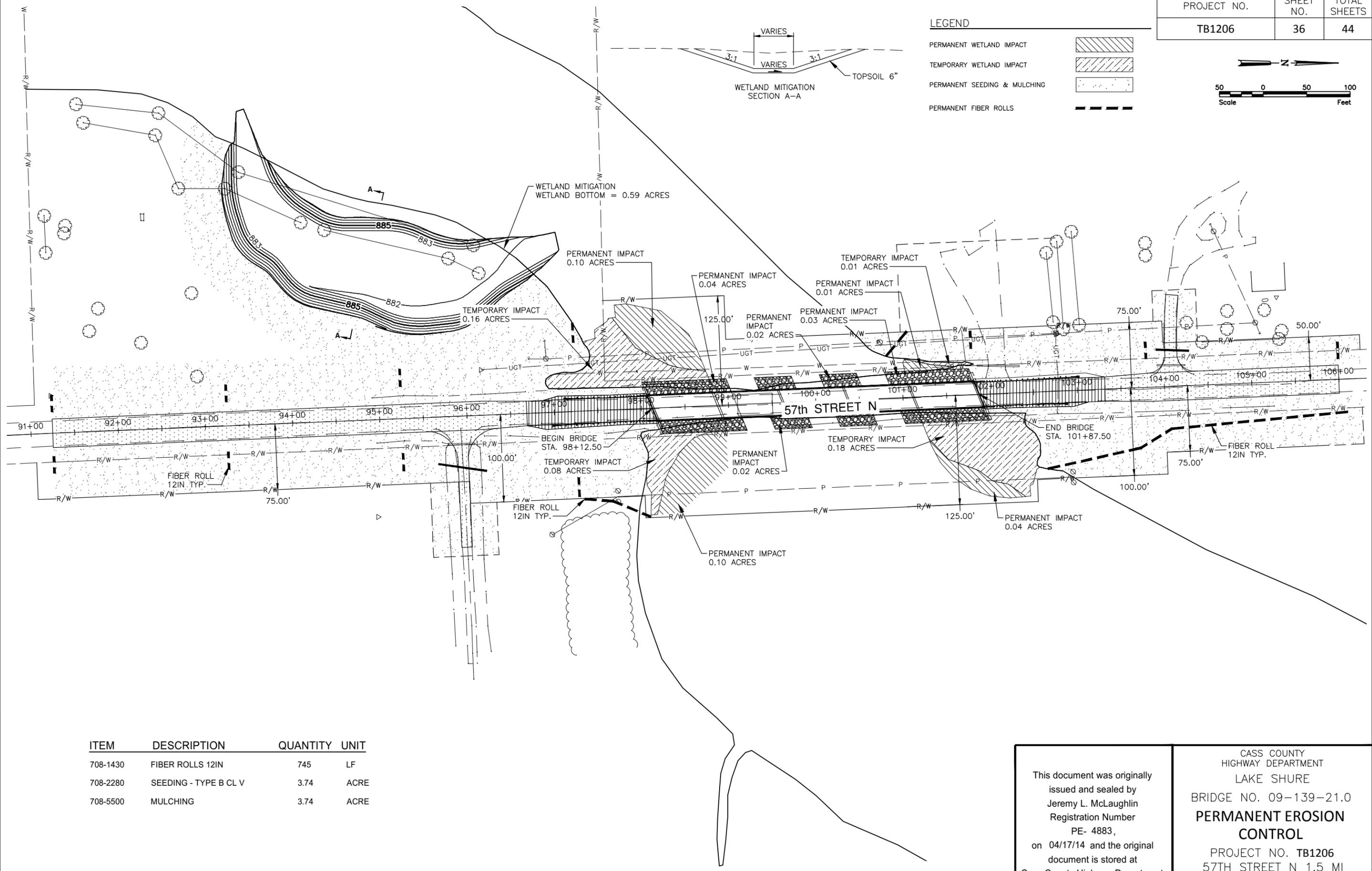
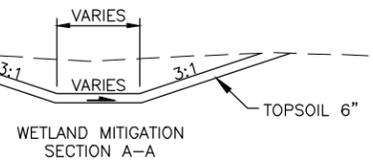
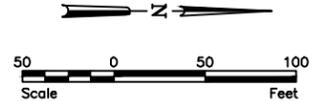
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
GUARDRAIL TRANSITION
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure CAD\Plans\GUARDRAIL TRANSITION.dwg -11x17-4/17/2014 2:56 PM - (shanson)

LEGEND

- PERMANENT WETLAND IMPACT
- TEMPORARY WETLAND IMPACT
- PERMANENT SEEDING & MULCHING
- PERMANENT FIBER ROLLS

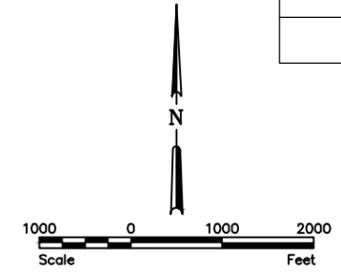


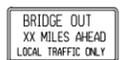
ITEM	DESCRIPTION	QUANTITY	UNIT
708-1430	FIBER ROLLS 12IN	745	LF
708-2280	SEEDING - TYPE B CL V	3.74	ACRE
708-5500	MULCHING	3.74	ACRE

This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
PERMANENT EROSION CONTROL
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

PROJECT NO.	SHEET NO.	TOTAL SHEETS
TB1206	37	44



(A)  - 2
R11-3b-60
BARRICADE MOUNTED

(B)  - 2
W20-3-48
POST MOUNTED

(C)  - 2
W20-3-48
POST MOUNTED

(D)  - 2
R11-2-48
BARRICADE MOUNTED

(E)  - 2
W20-3-48
W16-2-24
POST MOUNTED

This document was originally issued and sealed by
Jeremy L. McLaughlin
Registration Number
PE- 4883,
on 04/17/14 and the original document is stored at
Cass County Highway Department

CASS COUNTY
HIGHWAY DEPARTMENT
LAKE SHURE
BRIDGE NO. 09-139-21.0
TRAFFIC CONTROL
PROJECT NO. TB1206
57TH STREET N 1.5 MI
NW OF REILE'S ACRES
CASS COUNTY

Z:\6000\6006\12_6006_052 - Lake Shure\CA\Drawings\TrafficControl.dwg -Layout1-1x17 -4/17/2014 2:59 PM (shanson)

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1a-60	60"x24"	ROAD WORK NEXT ___ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2a-48	48"x24"	END ROAD WORK		19	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT ___ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT ___ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT (Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-1a-18	18"x18"	STOP and SLOW PADDLE Back to Back		5	
R1-2-60	60"x60"	YIELD		29	
R2-1-48	48"x60"	SPEED LIMIT		39	
R2-1a-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)		10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED	2	28	56
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3b-60	60"x30"	BRIDGE OUT ___ MILES AHEAD LOCAL TRAFFIC ONLY	2	31	62
R11-3c-60	60"x30"	STREET CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ___ FT.		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ___ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	___ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W16-2-24	48"x48"	ROAD WORK AHEAD or ___ FT or ___ MILE	2	35	70
W20-2-48	48"x48"	DETOUR AHEAD or ___ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ___ FT.	6	35	210
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or ___ FT.		35	
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or ___ FT.		35	
W20-7a-48	48"x48"	FLAGGING SYMBOL		35	
W20-7k-24	24"x18"	___ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT ___ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ___ FT		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or ___ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or ___ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

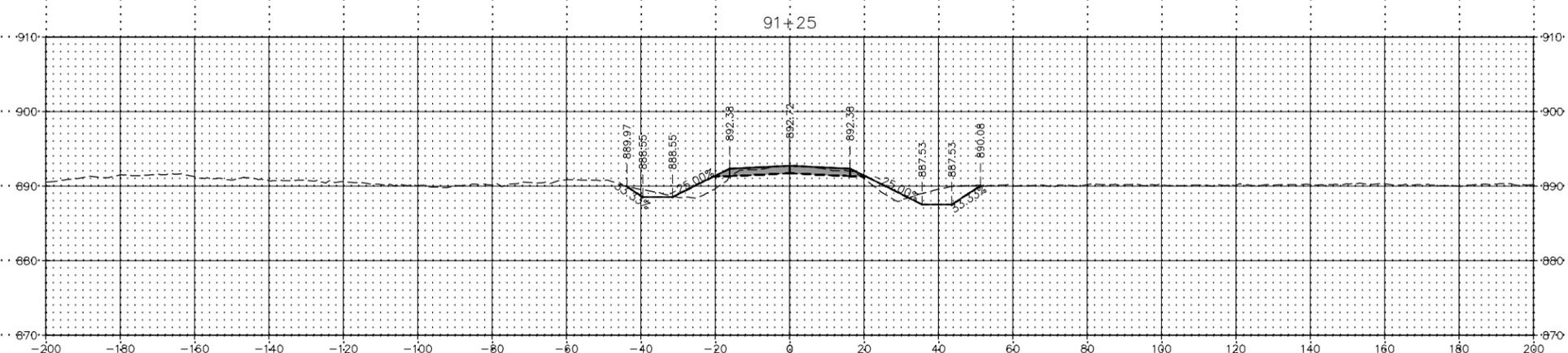
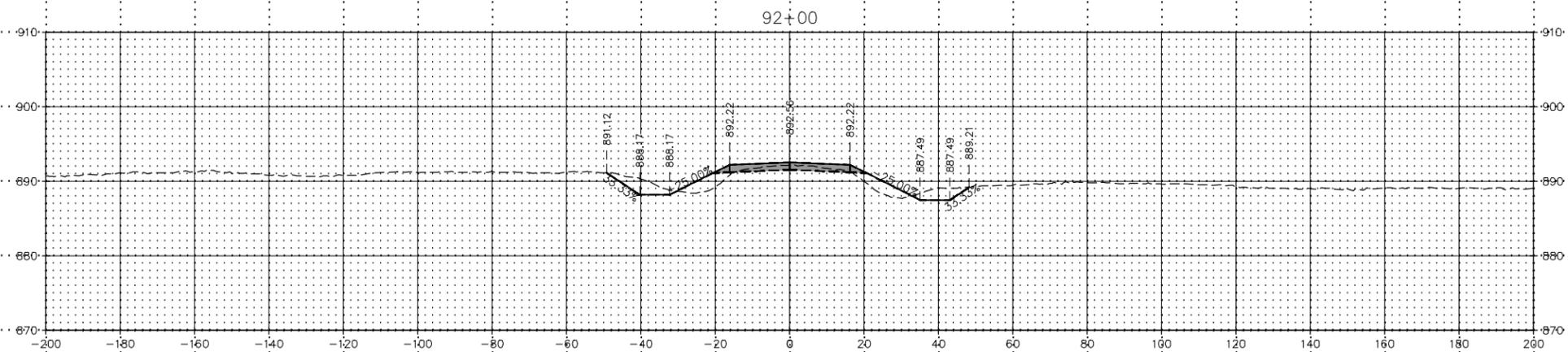
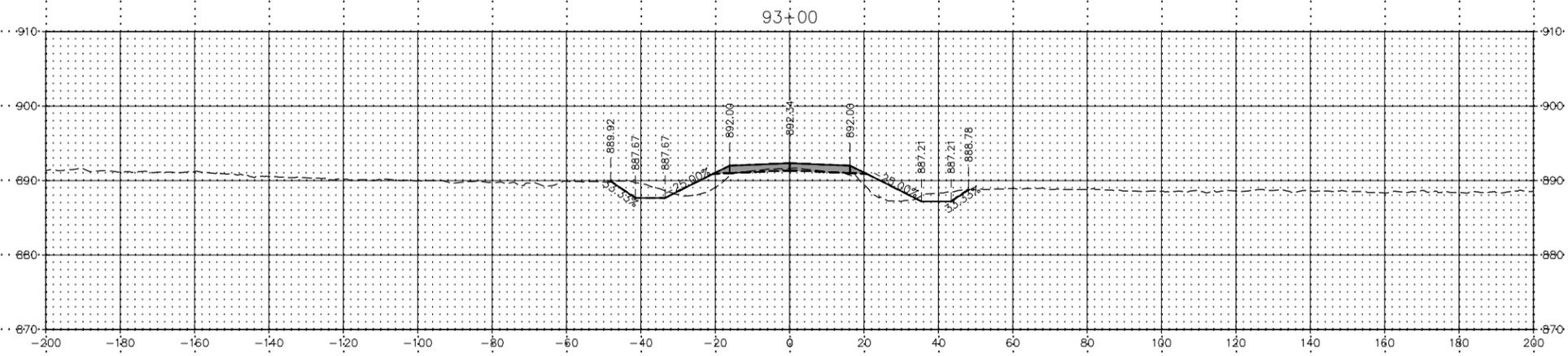
SPECIAL SIGNS	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL

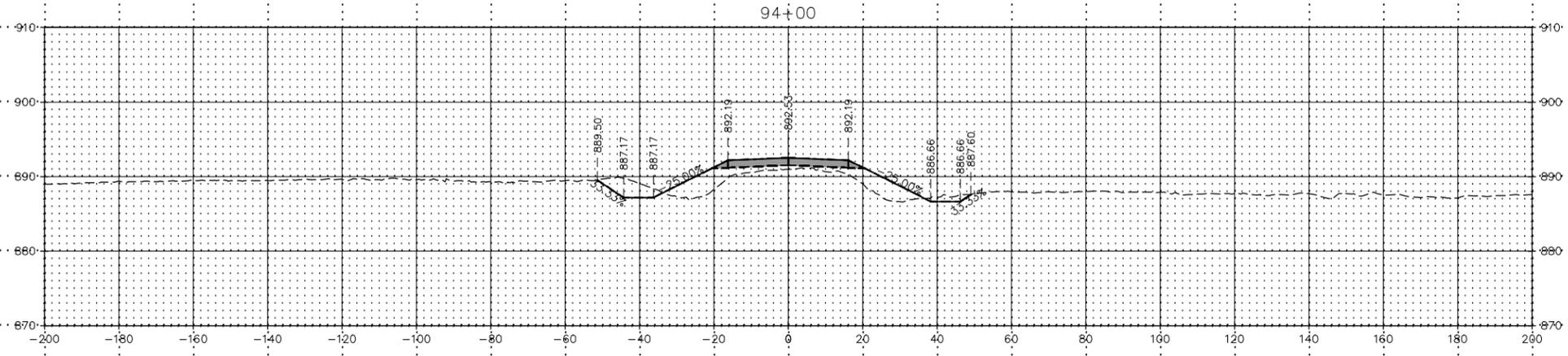
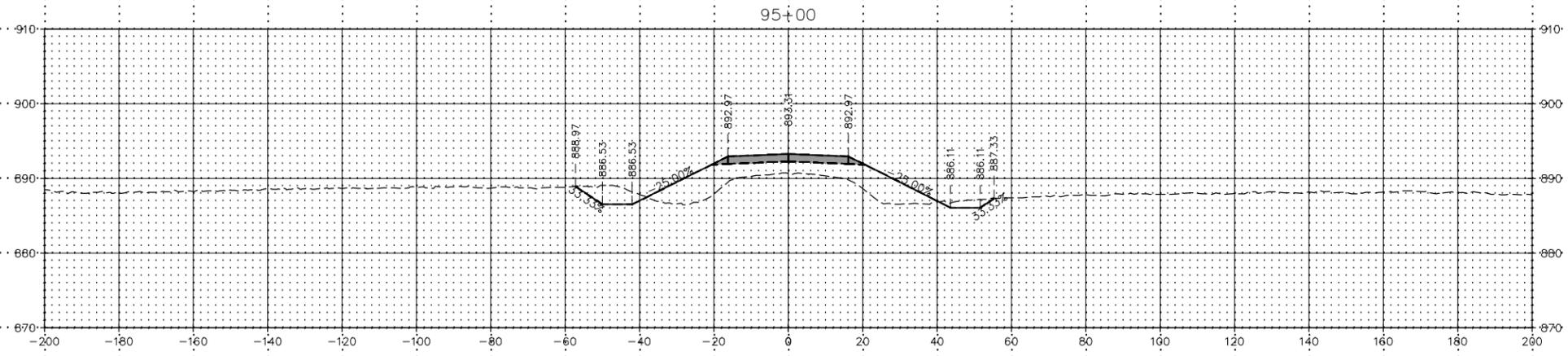
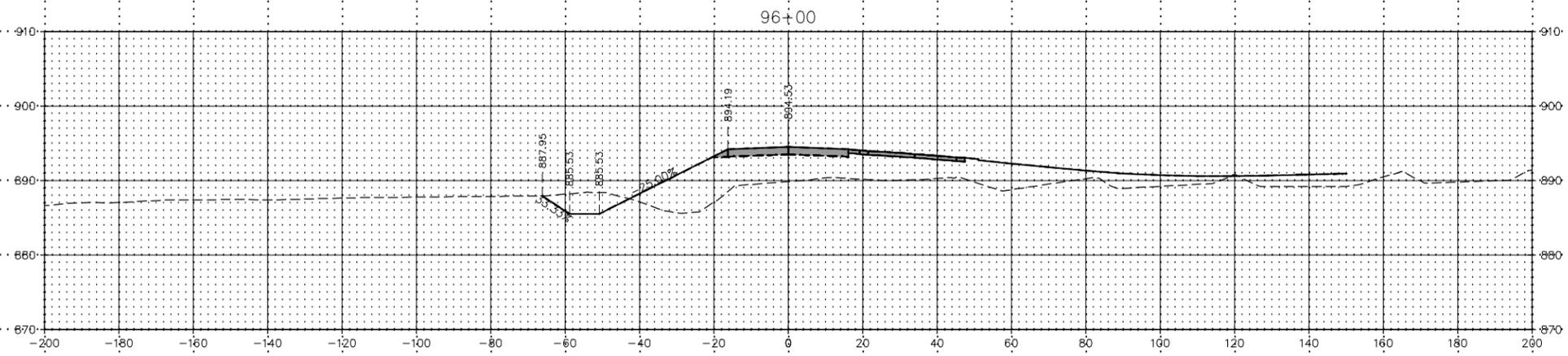
SPEC & CODE	DESCRIPTION	UNITS SUB TOTAL
704-1000	TRAFFIC CONTROL SIGNS	398

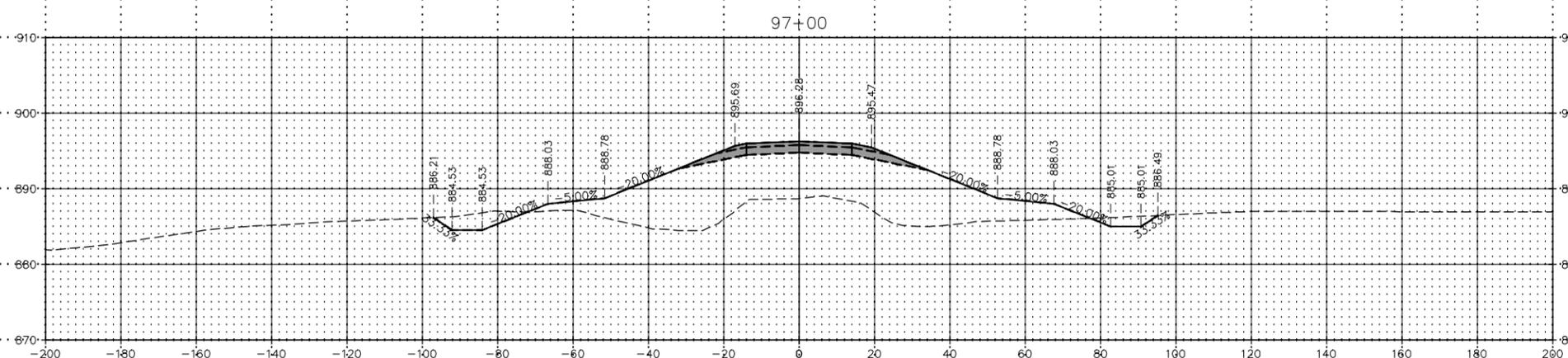
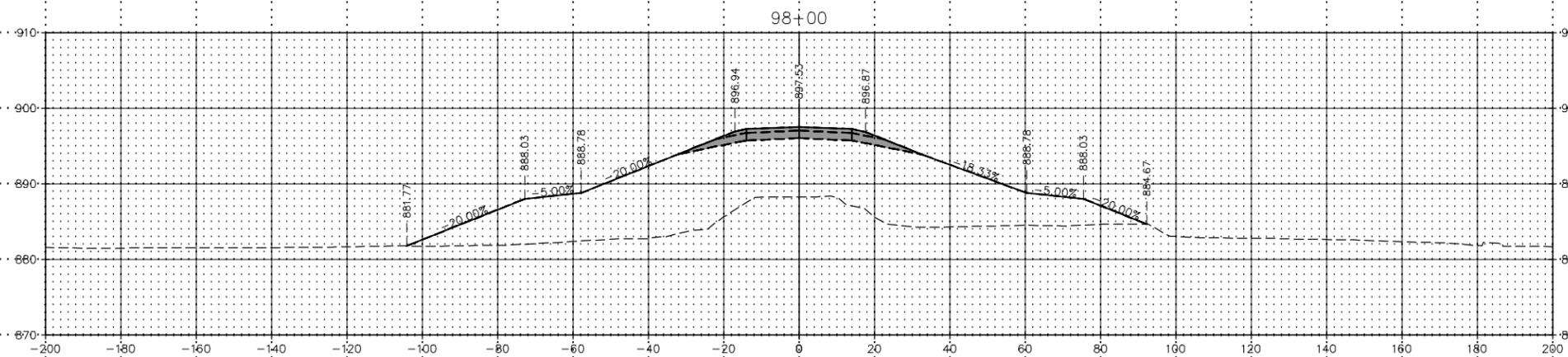
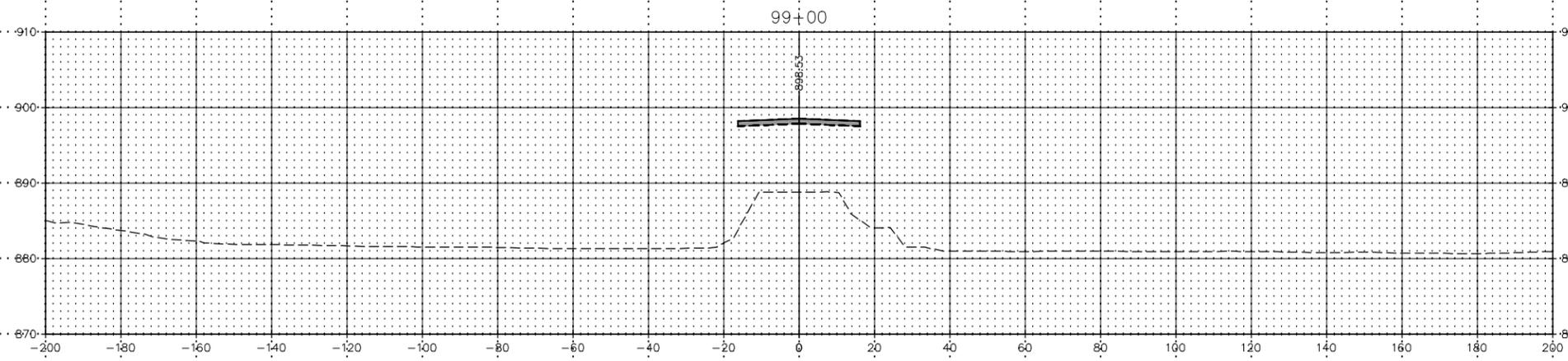
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	7
704-1060	DELINEATOR DRUMS	EACH	
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
762-1500	OBLITERATION OF PVMT MK	SF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

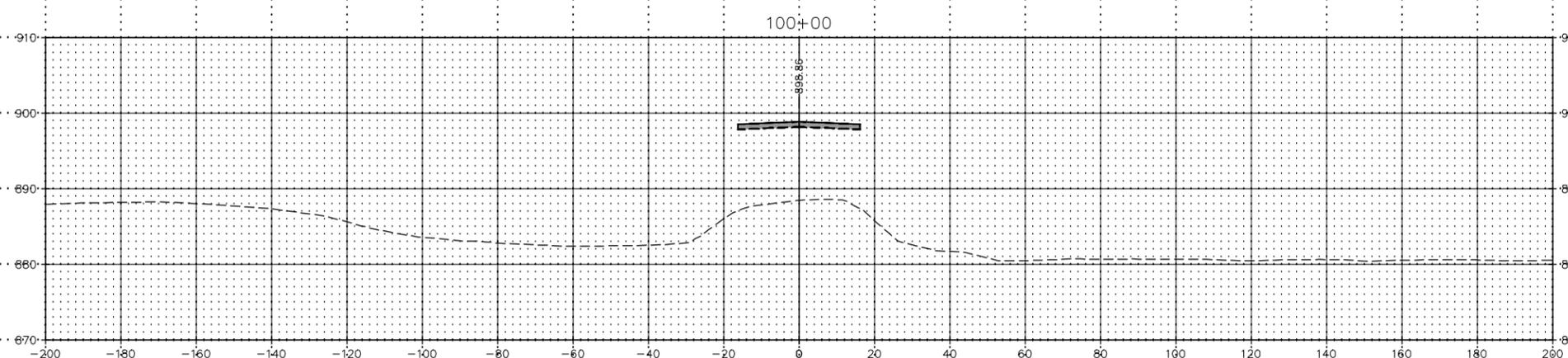
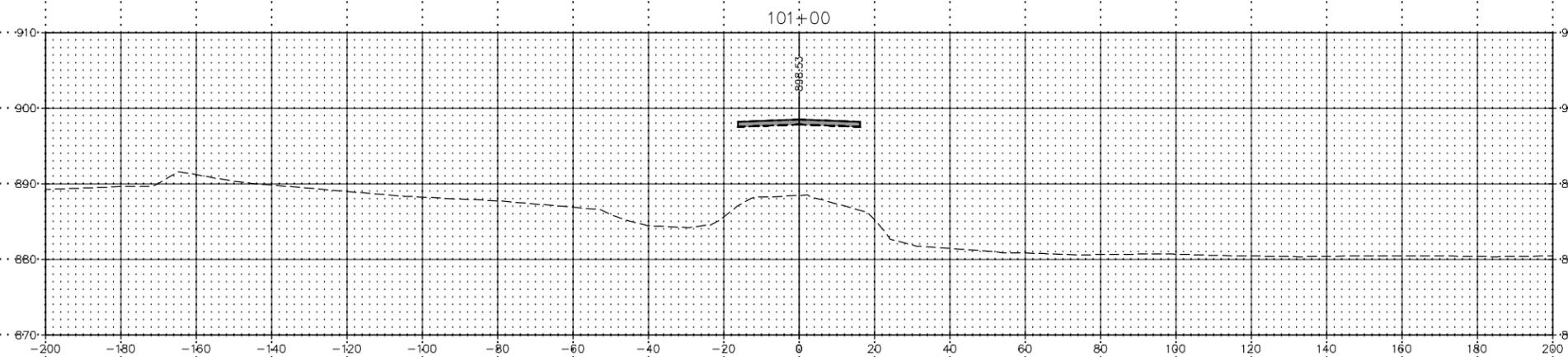
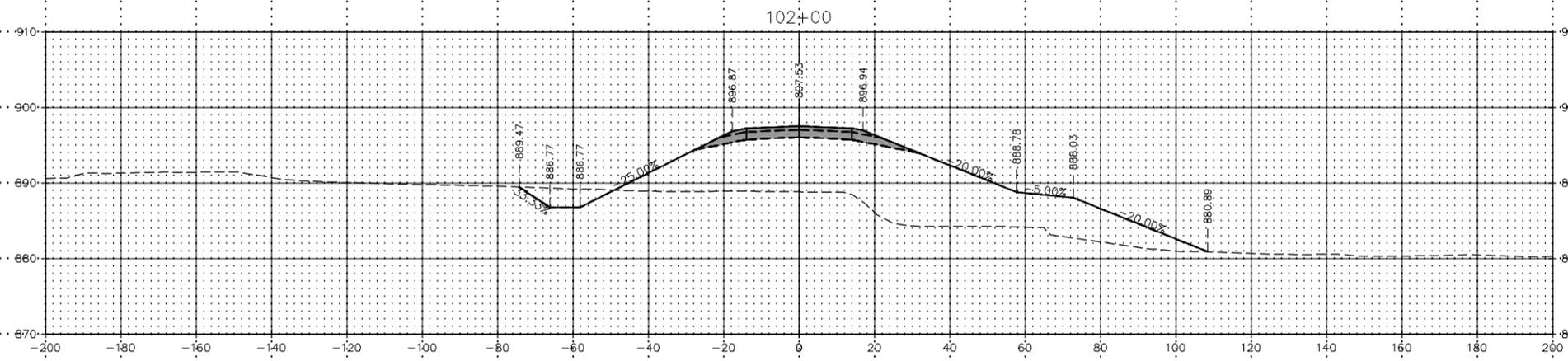
This document was originally issued and sealed by
 Jeremy L. McLaughlin
 Registration Number
 PE- 4883,
 on 04/17/14 and the original document is stored at
 Cass County Highway Department

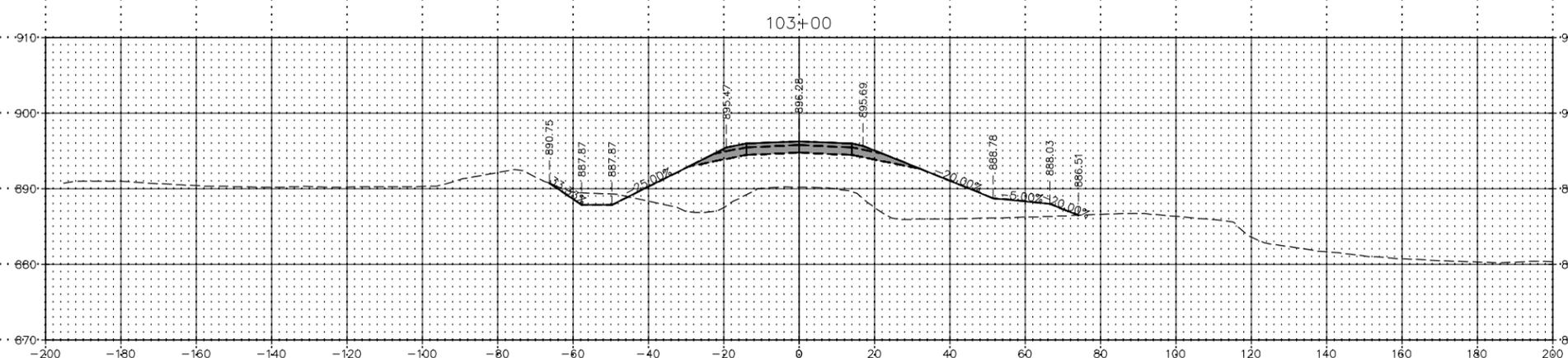
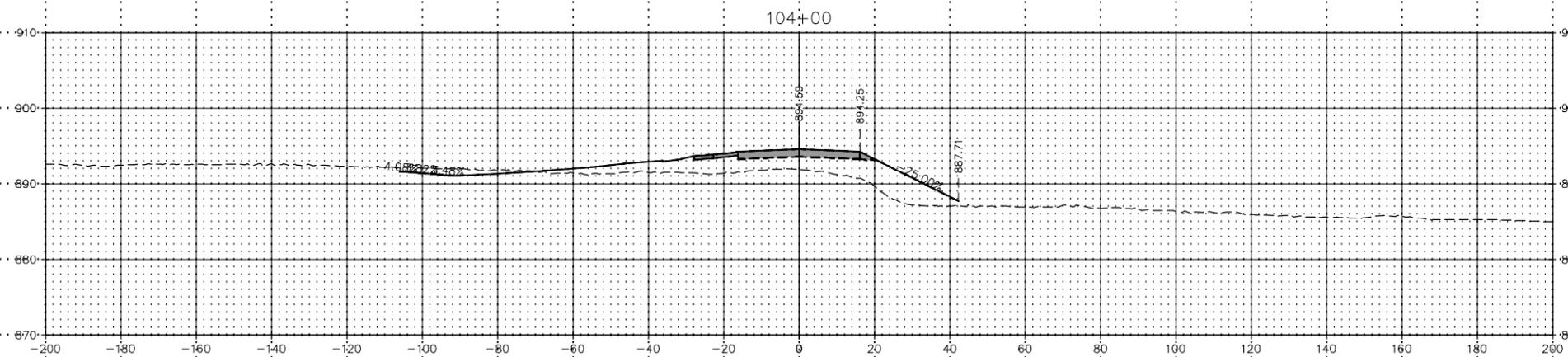
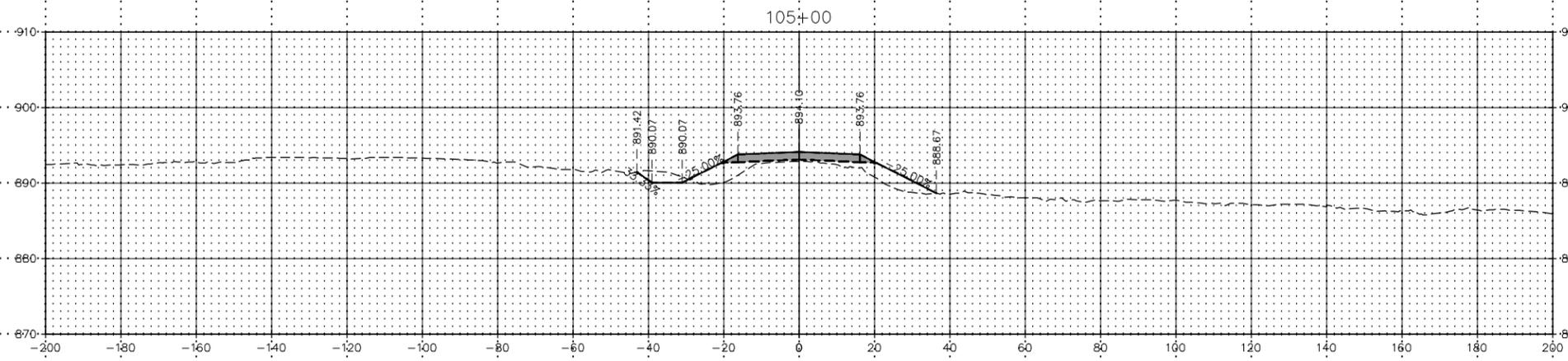
CASS COUNTY
 HIGHWAY DEPARTMENT
 LAKE SHURE
 BRIDGE NO. 09-139-21.0
**TRAFFIC CONTROL
 DEVICE LIST**
 PROJECT NO. TB1206
 57TH STREET N 1.5 MI
 NW OF REILE'S ACRES
 CASS COUNTY

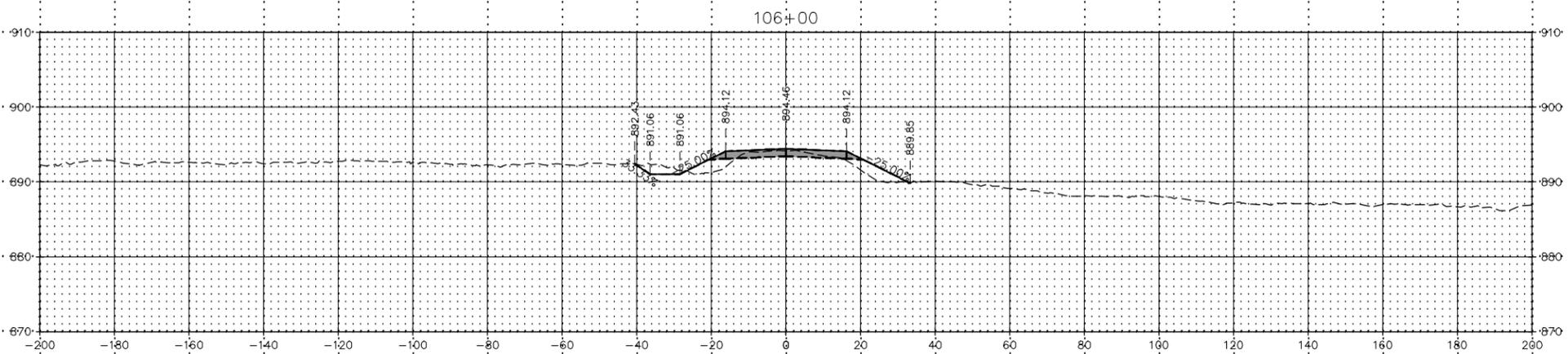




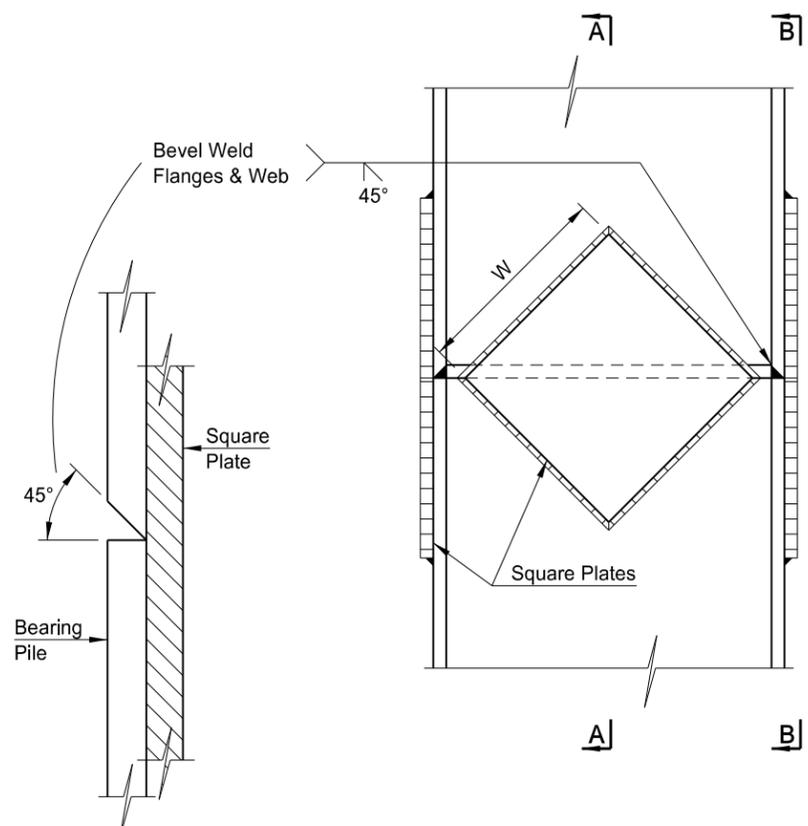




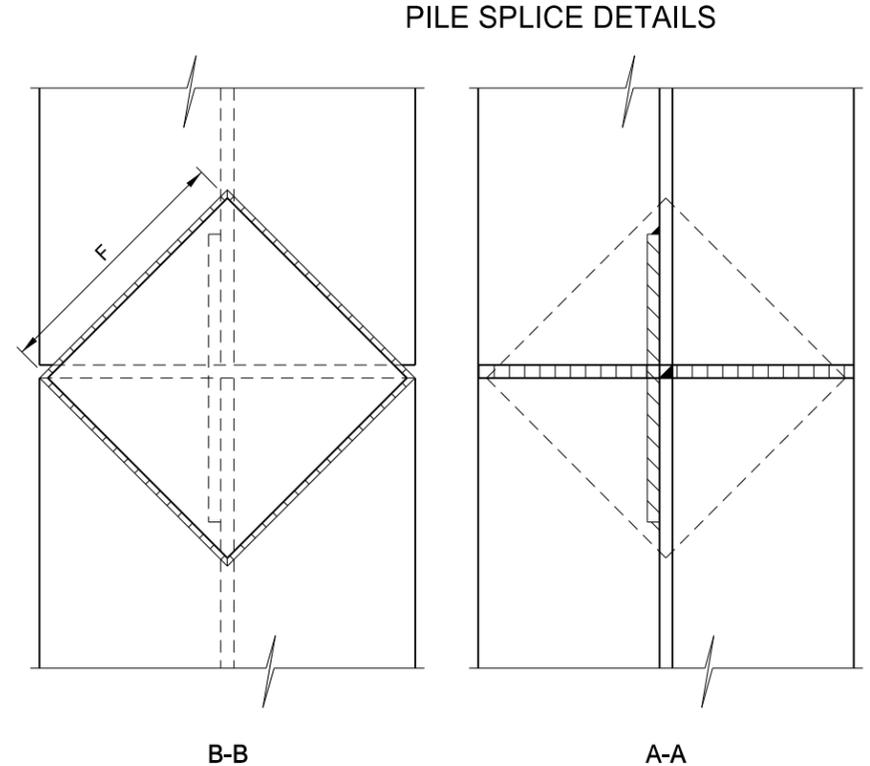




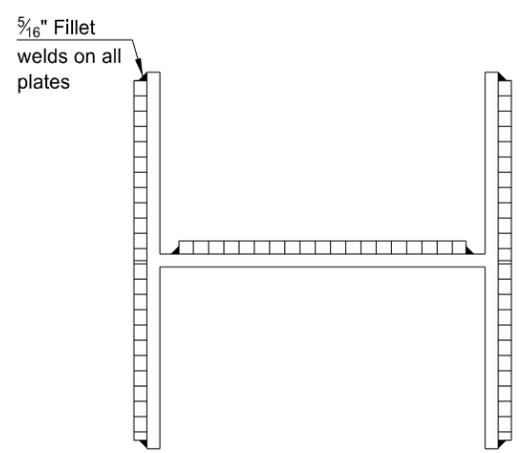
PILE SPLICE DETAILS



ENLARGED VIEW

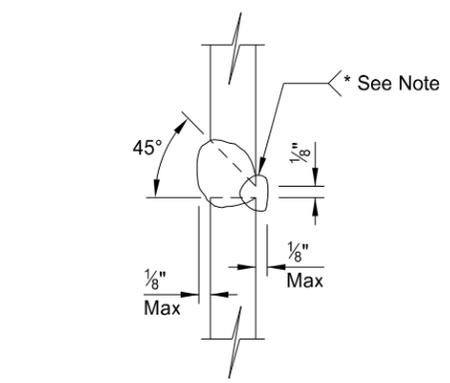


Flame scarf inside of both flanges and one side of web of upper section.



PILE	8"	10"	12"	14"
"F" FLANGE	5"	6 1/2"	8"	10"
"W" WEB	4"	5 1/2"	6 1/2"	8"

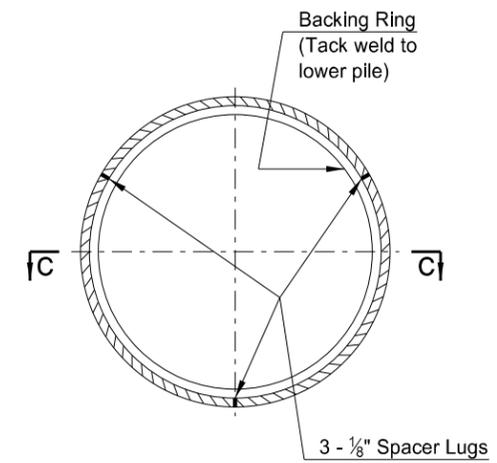
H-PILE SPLICE DETAIL



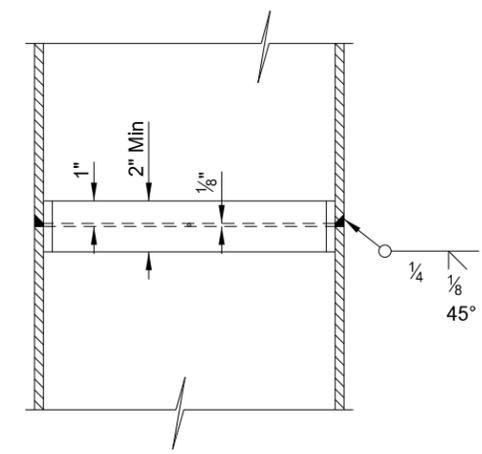
ALTERNATE H-PILE SPLICE DETAIL

NOTES:

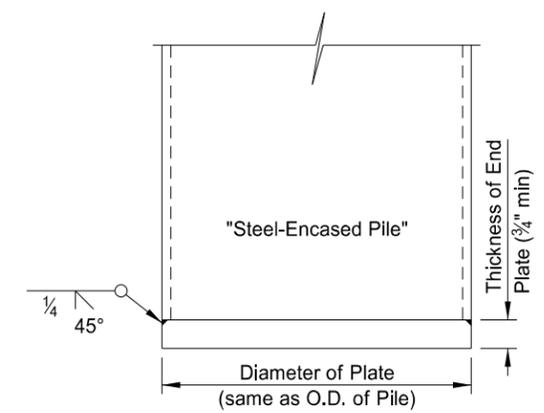
- Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the reinforcing plates.
- AWS classification E70XX Low Hydrogen Electrodes shall be used.
- * Welds made without the use of backing material shall have the root gouged to sound metal and welded from the second side.
- All welding shall conform to the current AASHTO/AWS D1.5 Bridge Welding Code.
- The thickness of the steel square plates shall at a minimum be as thick as the flanges and web of the pile being spliced.



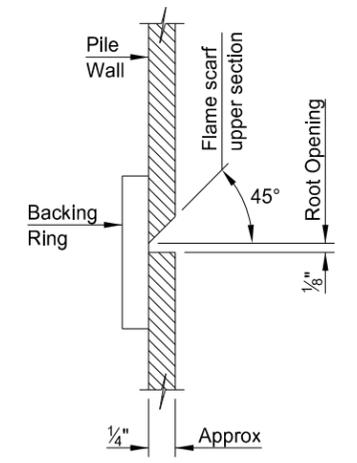
Backing Ring may be made from pile cut-offs or other material of a like quality.



STEEL-ENCASED CONCRETE PILE SPLICE DETAIL



END PLATE DETAIL



ENLARGED VIEW

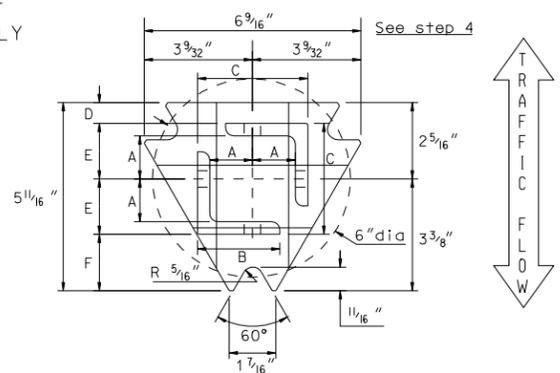
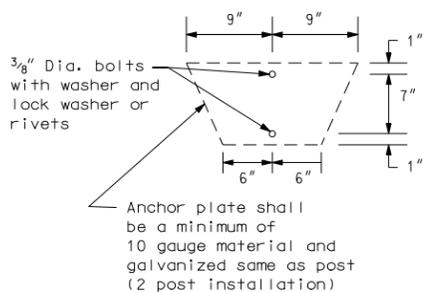
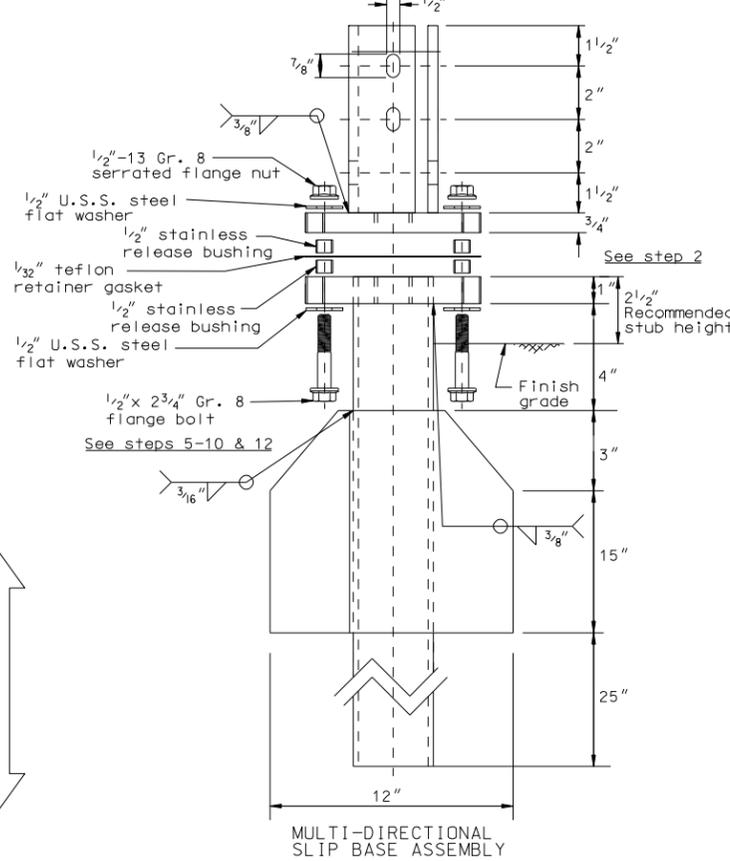
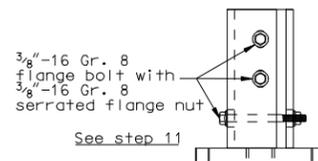
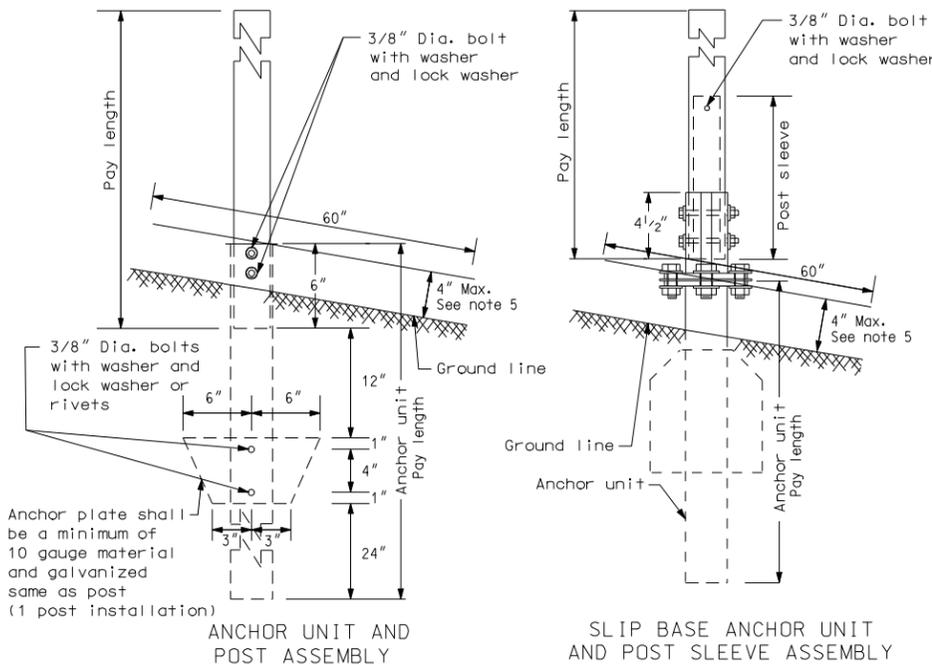
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 09/14/11 and the original document is stored at the North Dakota Department of Transportation

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

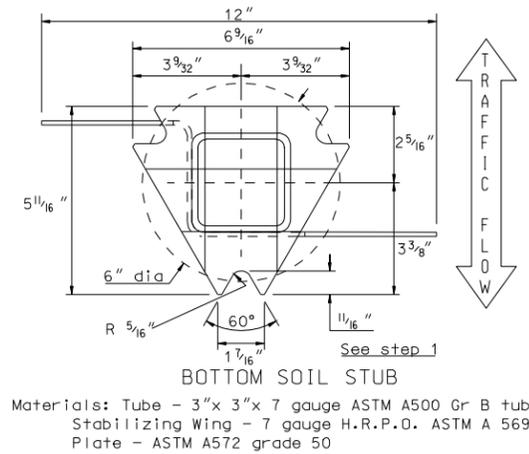
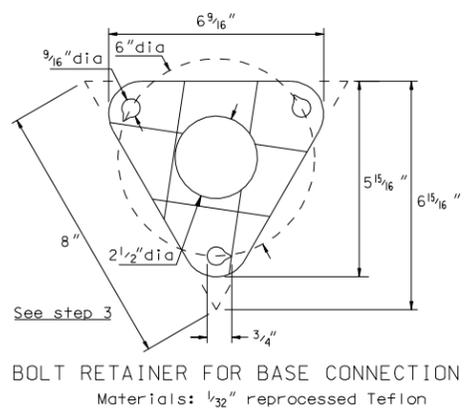
PERFORATED TUBE



TOP POST RECEIVER DATA TABLE

Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 3/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

2 3/16" x 10 gauge may be inserted into 2 1/2" x 10 gauge for additional wind load.



- Notes
- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
 - Anchor for 2", 2 1/4", and 2 1/2" posts.
 - Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
 - 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 - When used in concrete sidewalk, anchor shall be the same except without the wings.
 - Four post signs shall have over 8' between the first and fourth posts.

Telescoping Perforated Tube

Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	10			Yes	
2	2 1/4	12	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

B - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2" flat washer on to 1 each inverted 1/2"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8"-16 gr. 8 flange bolts and 3 each 3/8"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

Telescoping Perforated Tubes

Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. 4	Cross Sect. Area In. 2	Section Modulus In. 3
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 11-21-02
REVISIONS

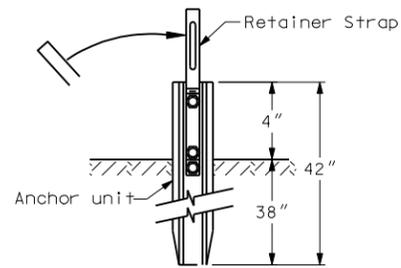
DATE	CHANGE
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

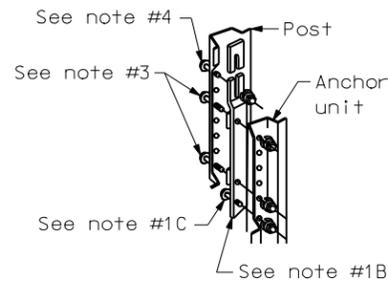
FLANGED CHANNEL



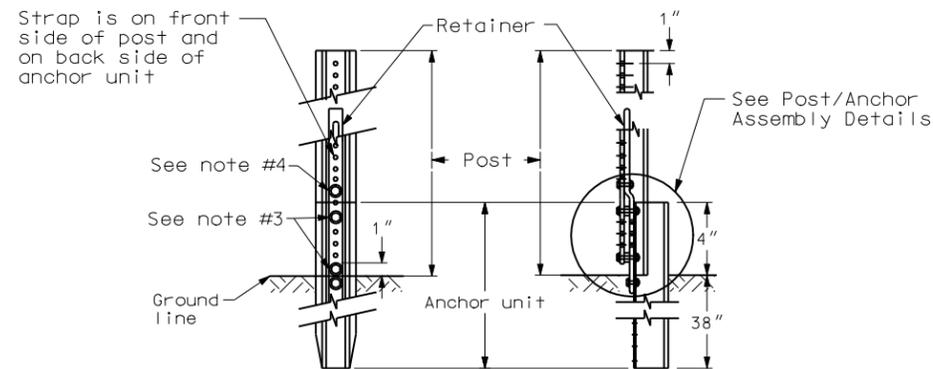
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

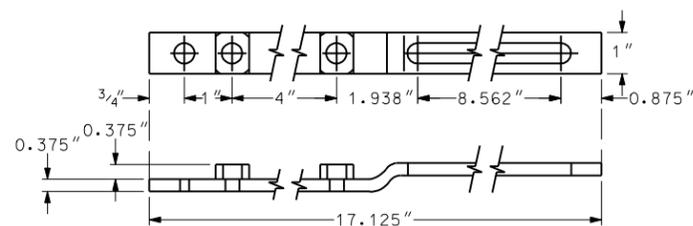
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4" dimension.
B) Rotate strap to vertical position.
3. A) Place 3/8"-16 UNC x 2" bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4" slot in the strap).
B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8"-16 UNC x 2" long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap and sign post at the bolts have full contact across the entire width.



Post/Anchor Assembly Details



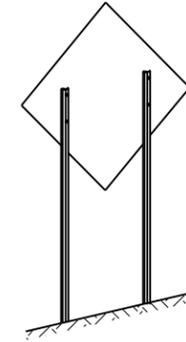
Front View Side View Sign Post Assembly Detail



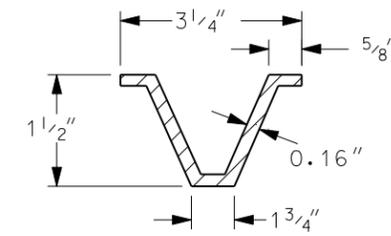
Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN. 4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN. 3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

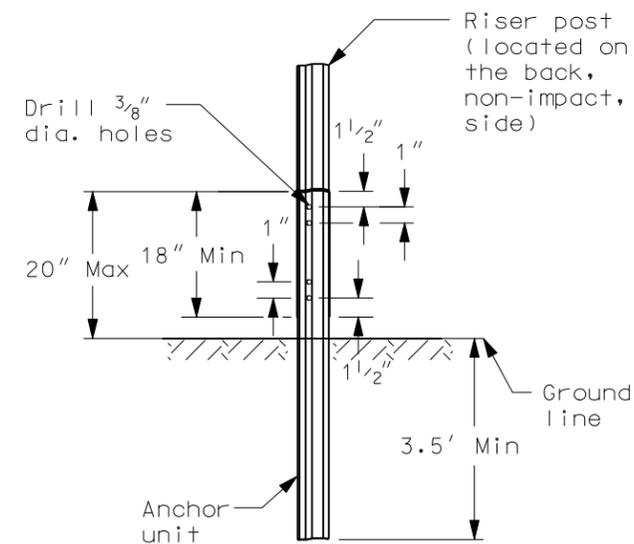
3 LB/FT U POSTS



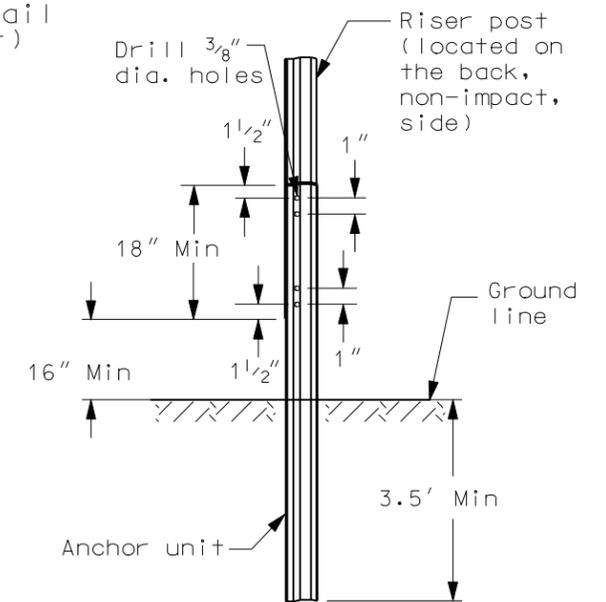
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

Notes

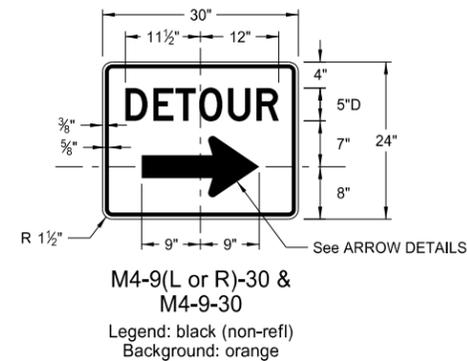
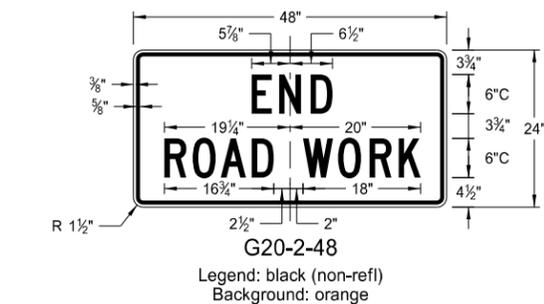
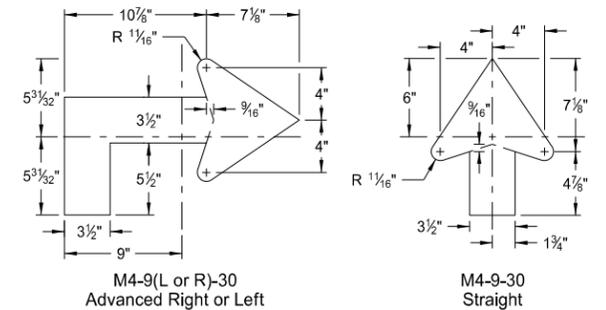
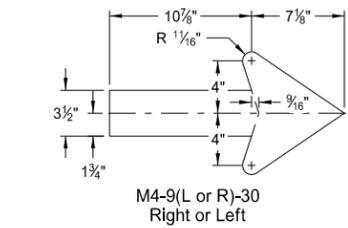
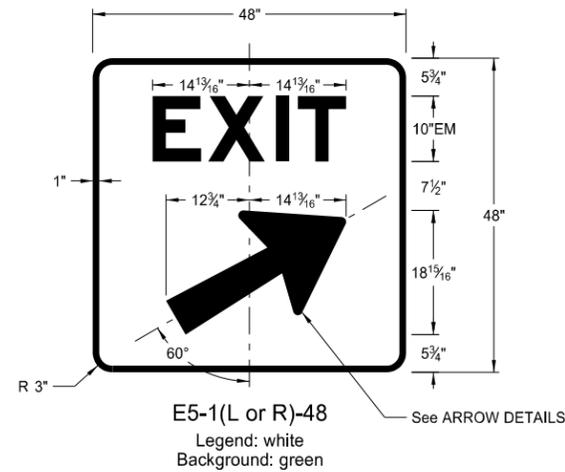
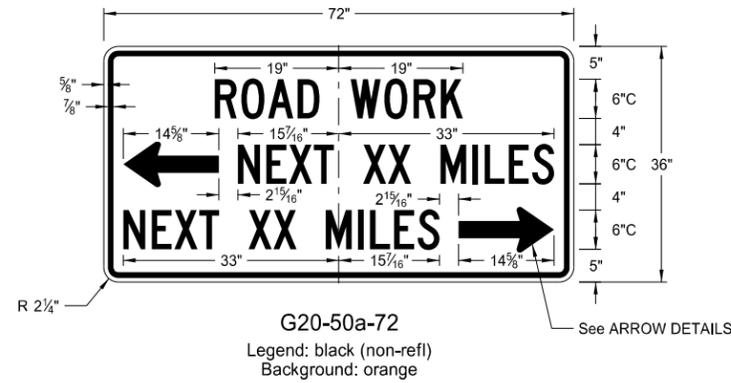
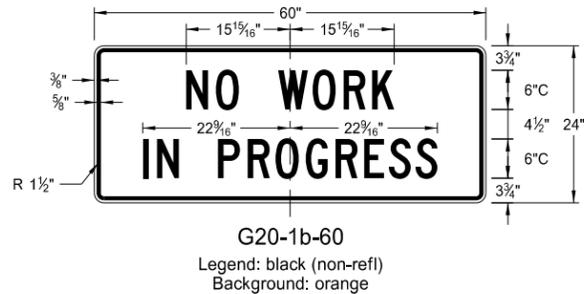
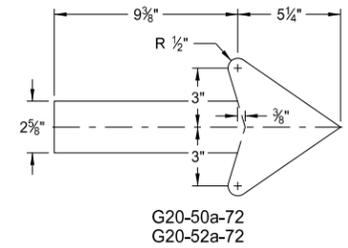
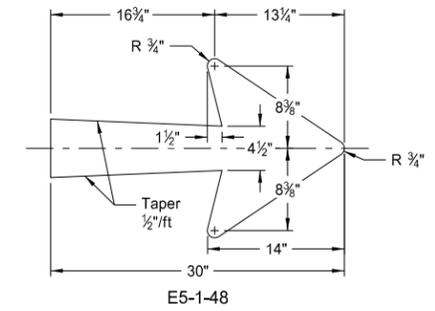
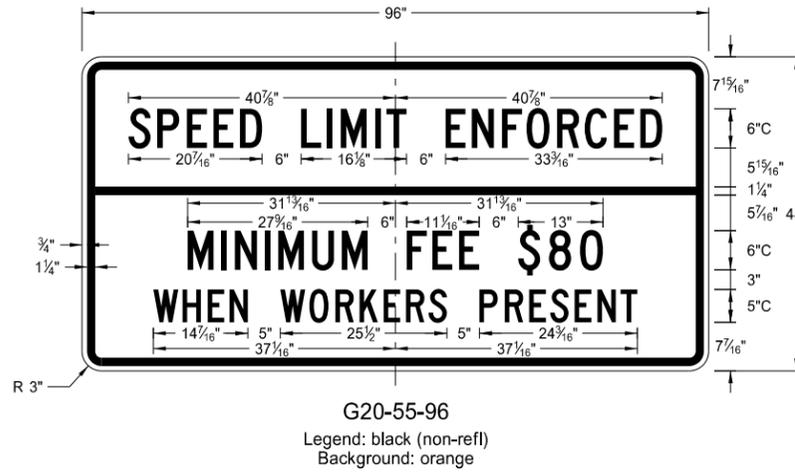
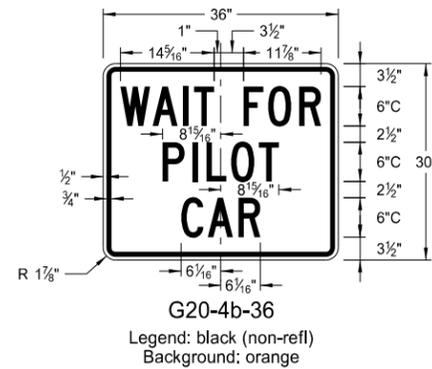
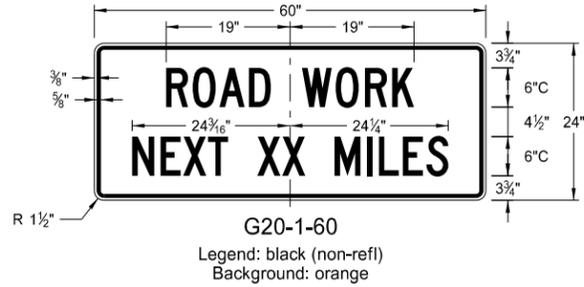
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4" above ground and embedded at least 3.5'.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS

NOTES:

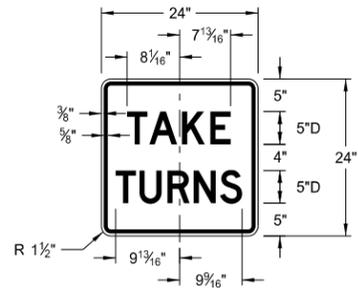
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

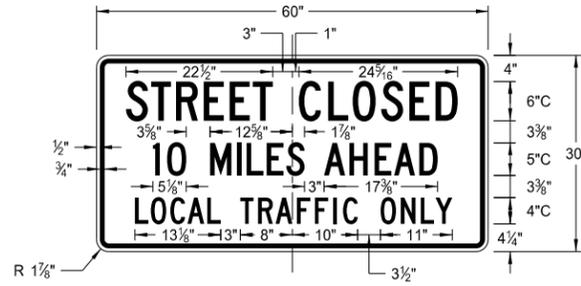
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

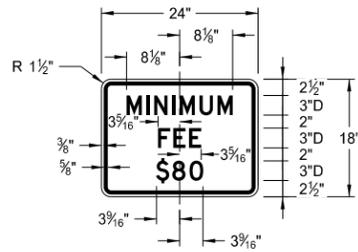
D-704-10



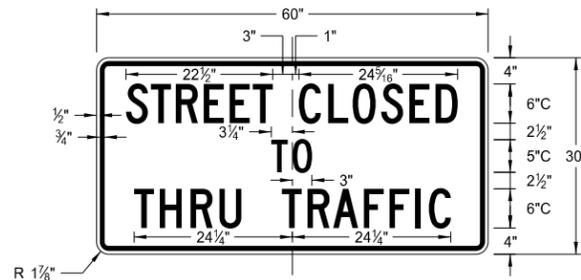
R1-50-24
Legend: black (non-refl)
Background: white



R11-3c-60
Legend: black (non-refl)
Background: white



R2-1a-24
Legend: black (non-refl)
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white



R11-2a-48
Legend: black (non-refl)
Background: white

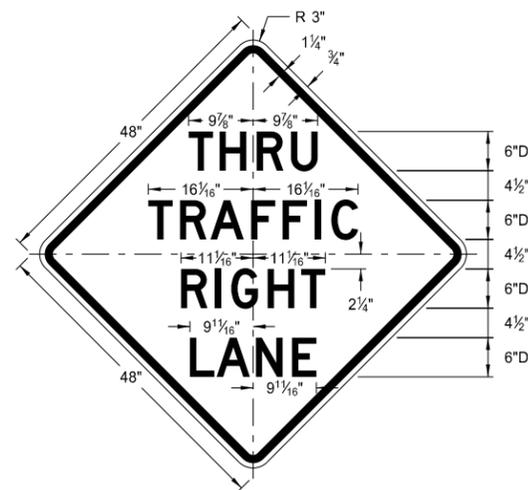
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

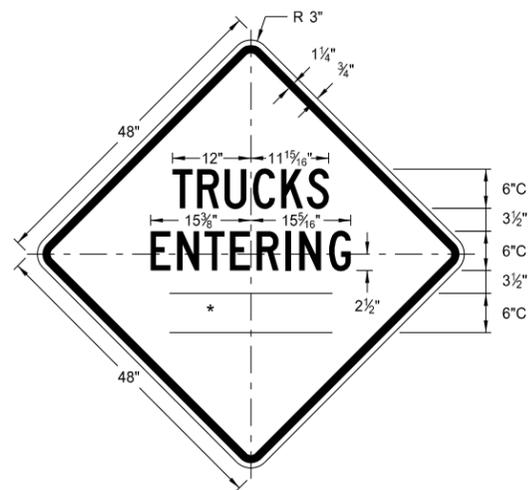
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

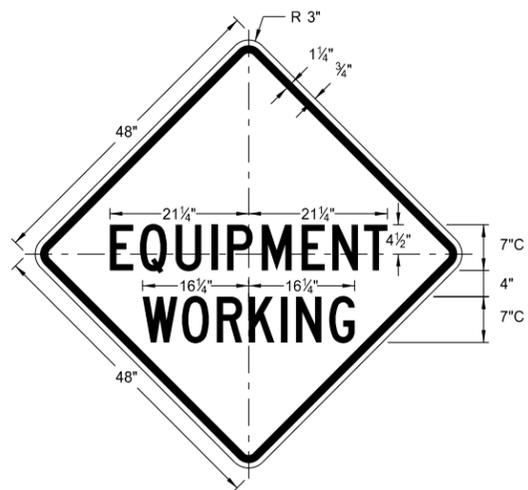
* DISTANCE MESSAGES



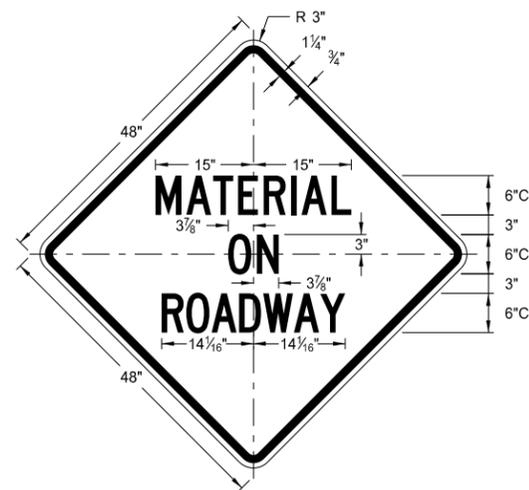
W5-8-48
Legend: black (non-refl)
Background: orange



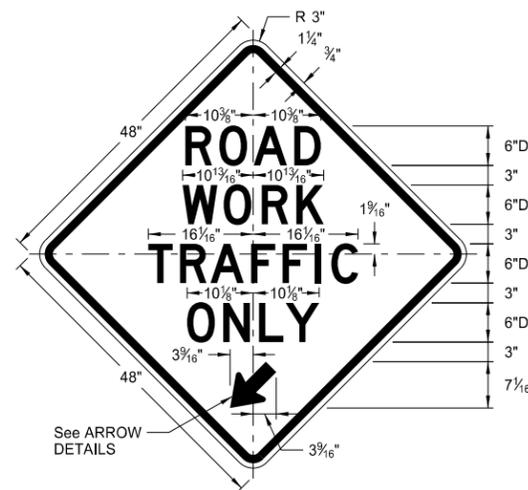
W8-54-48
Legend: black (non-refl)
Background: orange



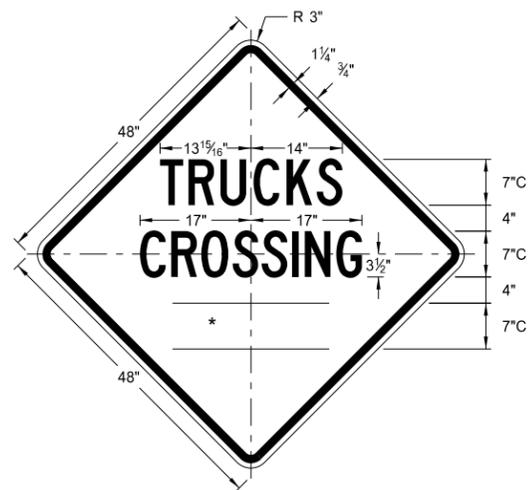
W20-51-48
Legend: black (non-refl)
Background: orange



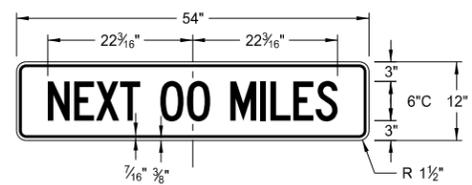
W21-51-48
Legend: black (non-refl)
Background: orange



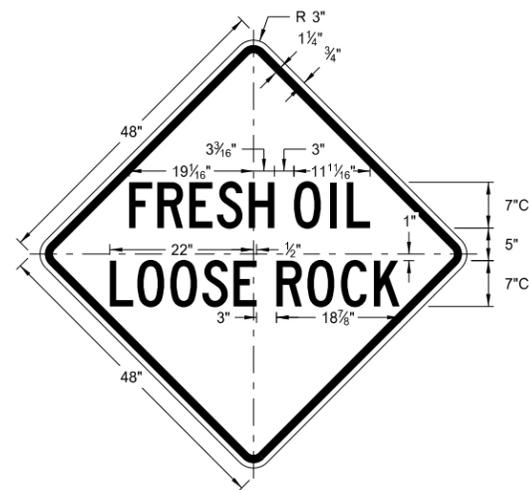
W5-9-48
Legend: black (non-refl)
Background: orange



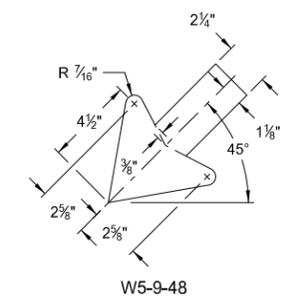
W8-55-48
Legend: black (non-refl)
Background: orange



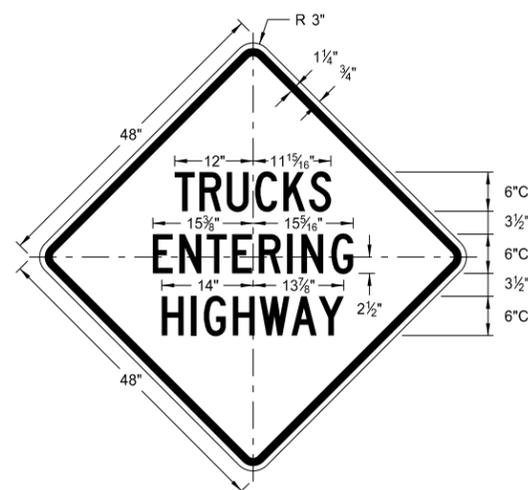
W20-52-54
Legend: black (non-refl)
Background: orange



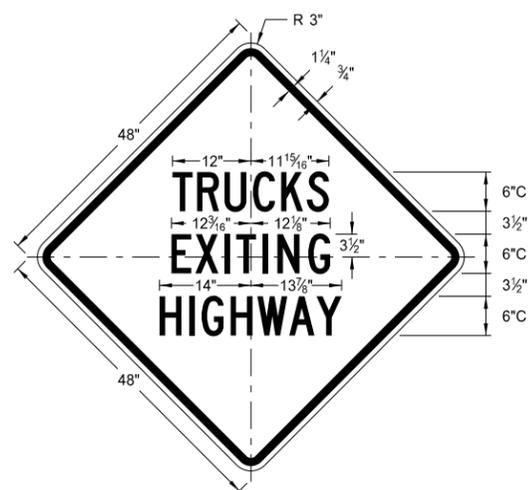
W22-8-48
Legend: black (non-refl)
Background: orange



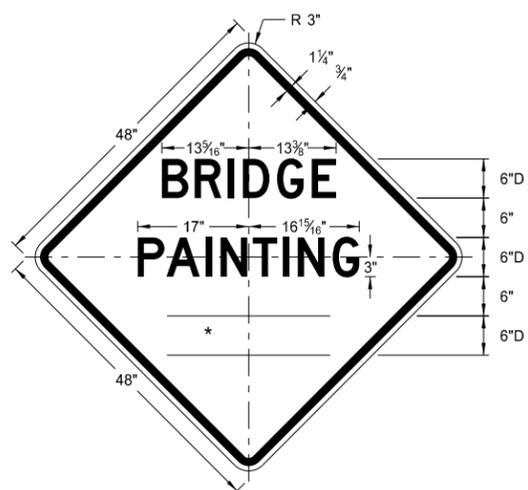
W5-9-48
ARROW DETAILS



W8-53-48
Legend: black (non-refl)
Background: orange



W8-56-48
Legend: black (non-refl)
Background: orange



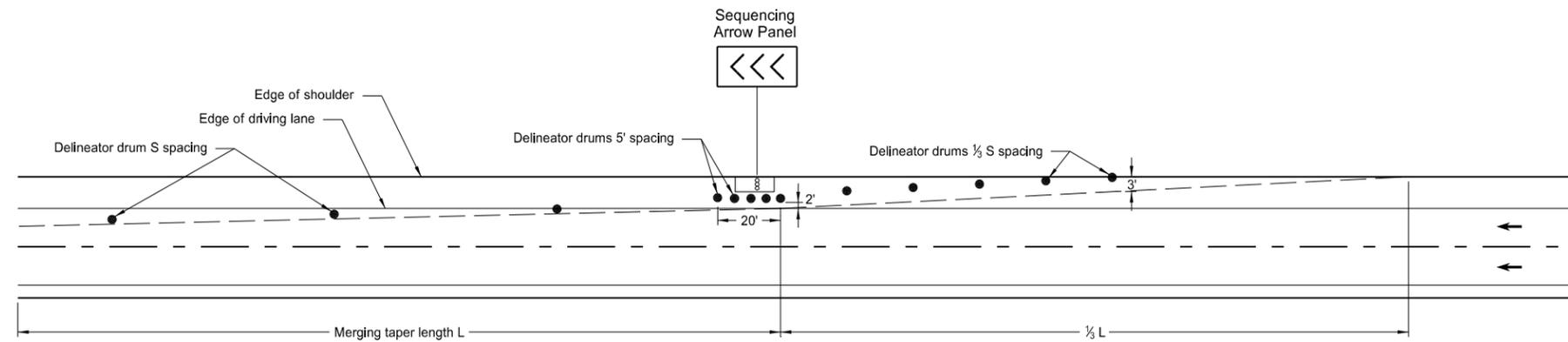
W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

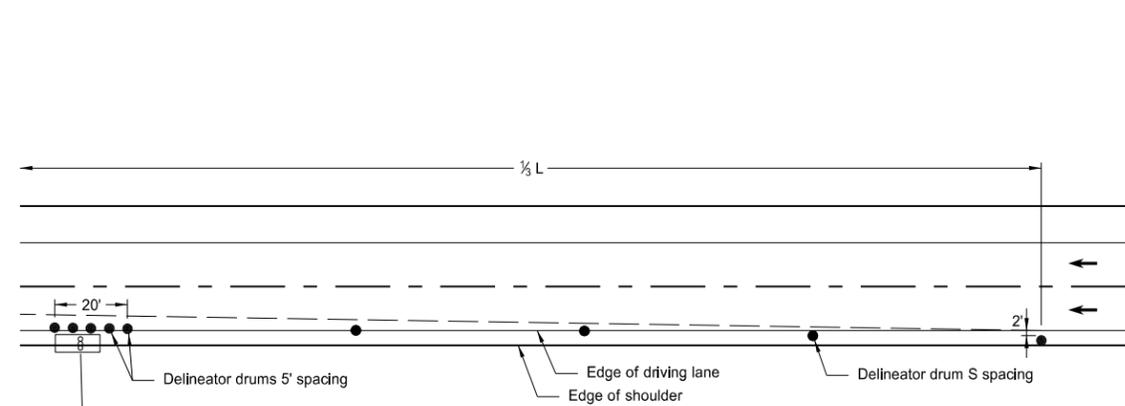
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURE TAPERS

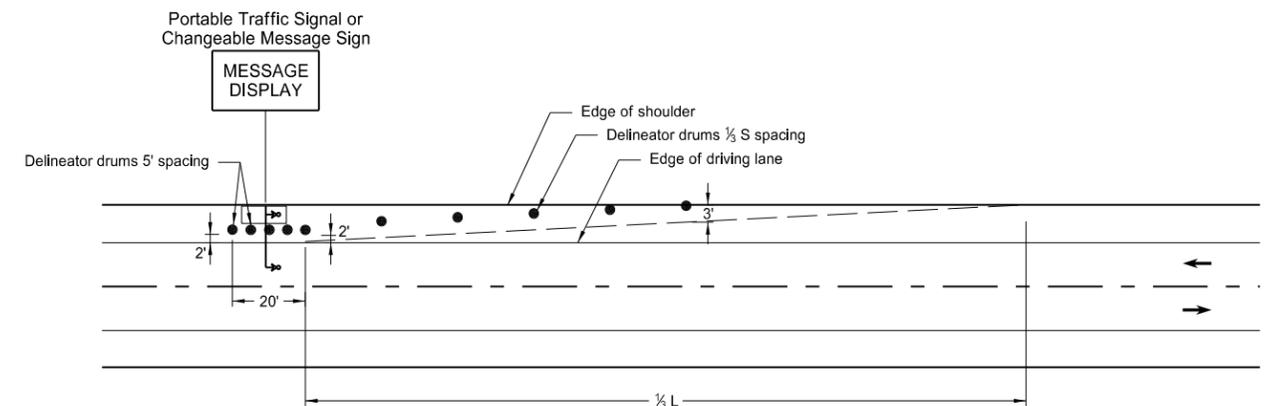
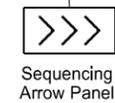
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY	
● Delineator Drum	∞ Sequencing Arrow Panel
• Message Display	↳ Portable Traffic Signal

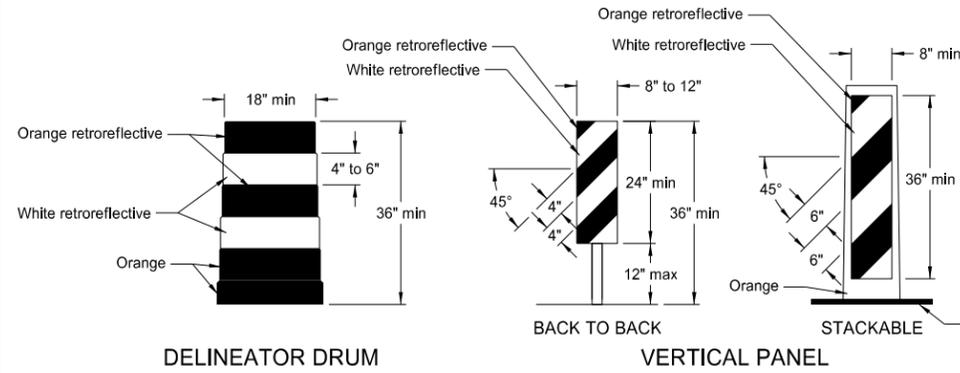
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = $WS^2/60$ (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately $1/3L$. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

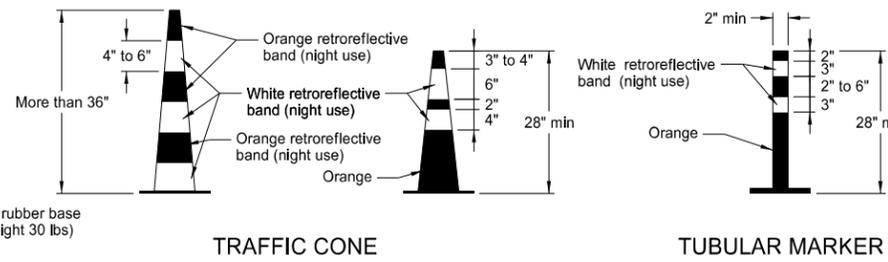
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

BARRICADE AND CHANNELIZING DEVICE DETAILS



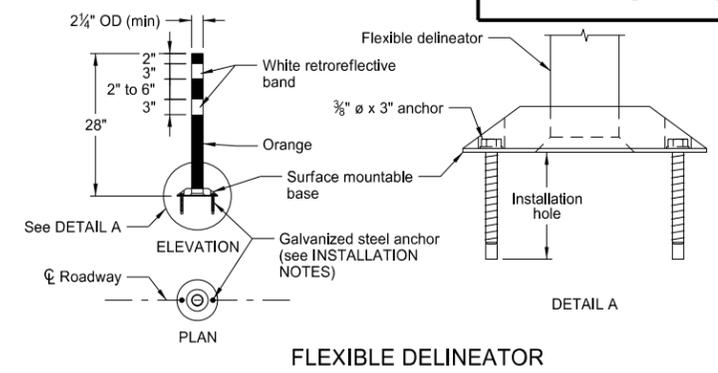
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.



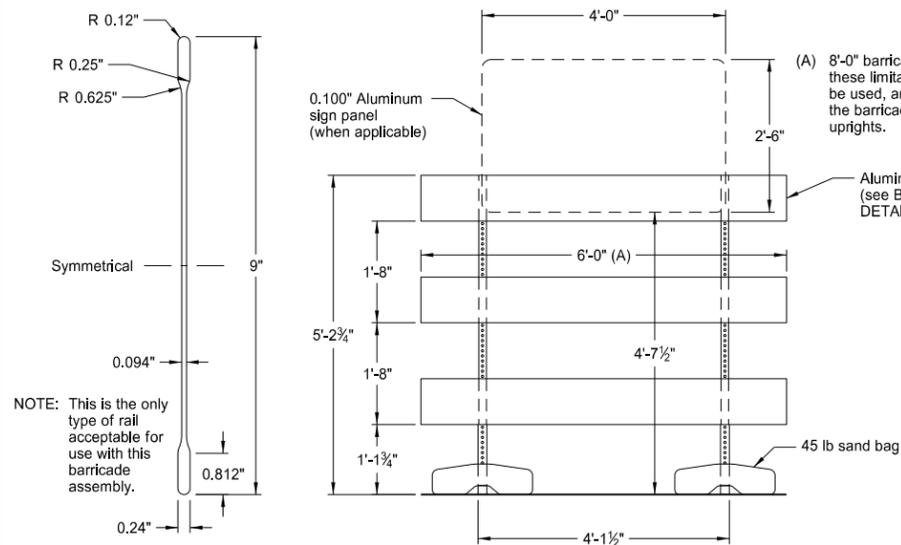
RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.

RetroreflectORIZATION of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



INSTALLATION NOTES:

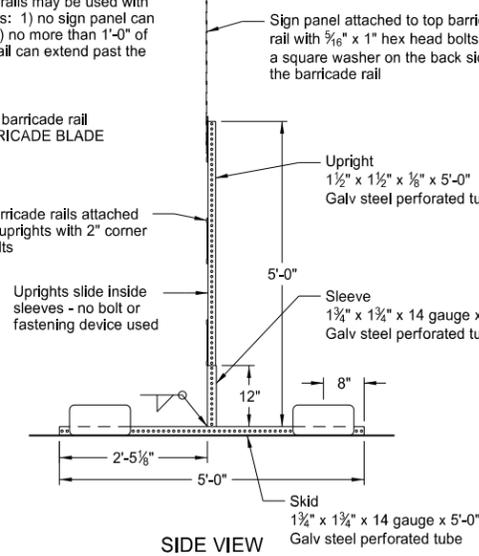
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



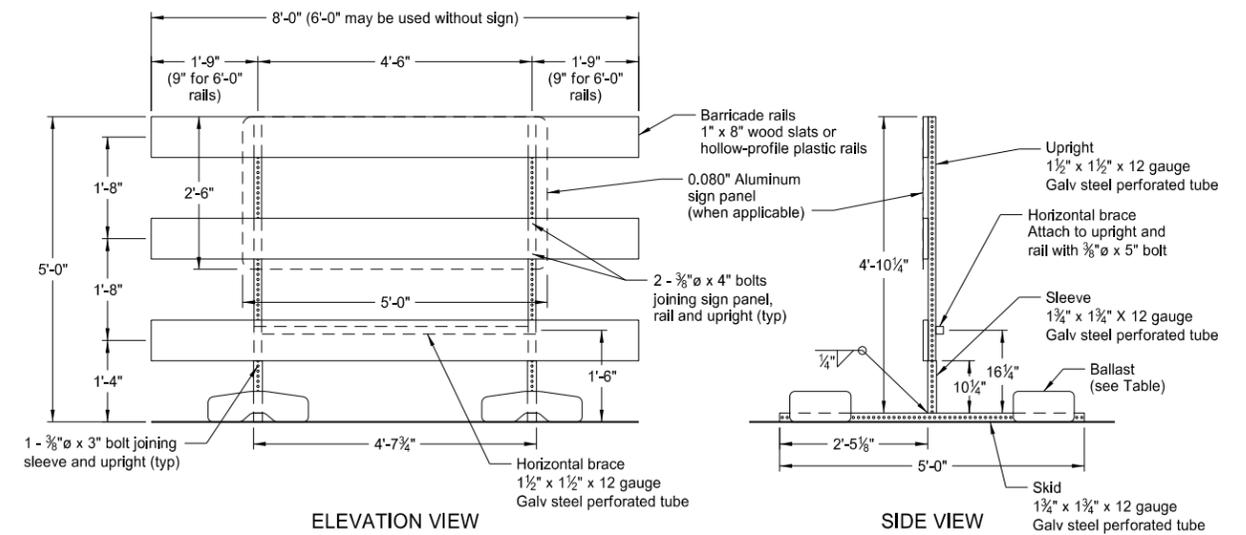
BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



SIDE VIEW

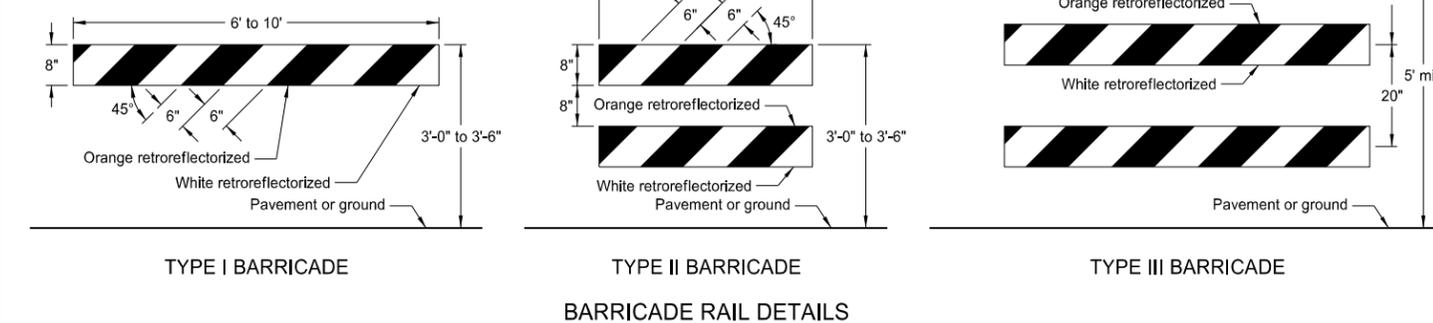


ELEVATION VIEW

SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".

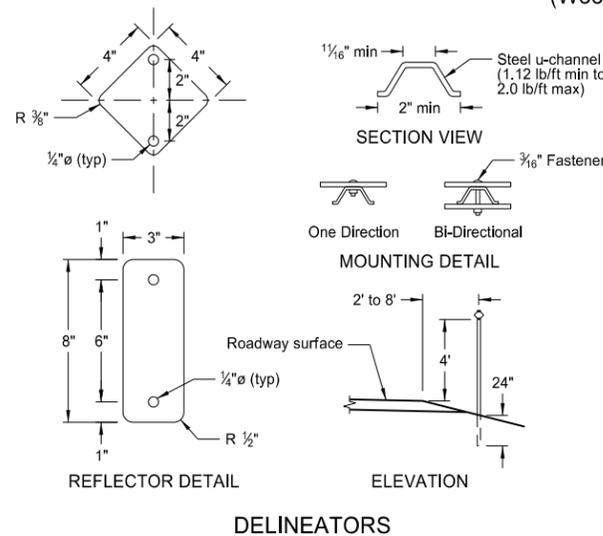


TYPE I BARRICADE

TYPE II BARRICADE

TYPE III BARRICADE

BARRICADE RAIL DETAILS



REFLECTOR DETAIL

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

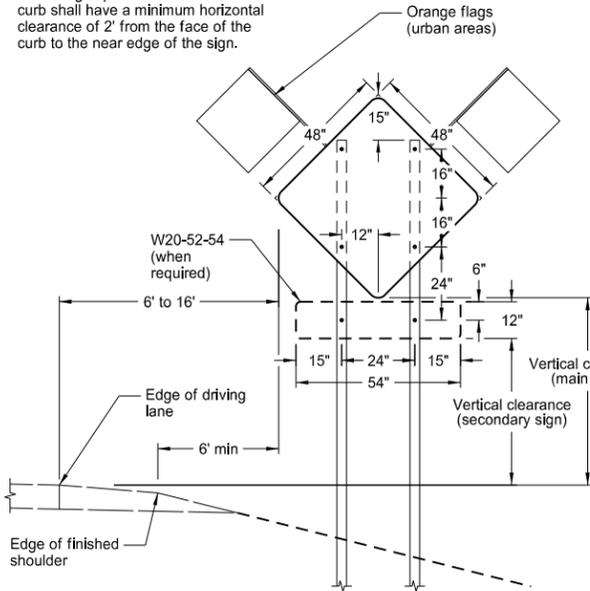
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

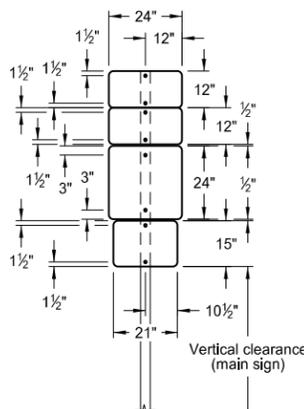
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

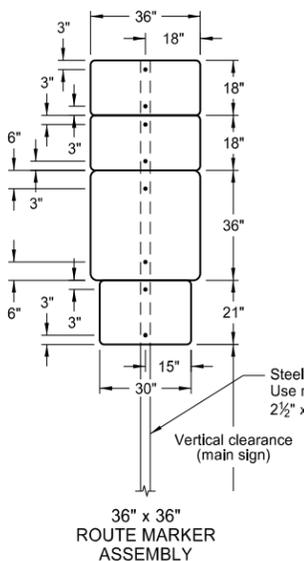
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



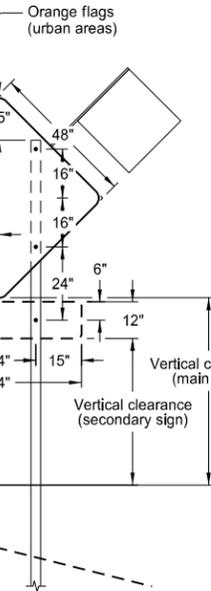
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



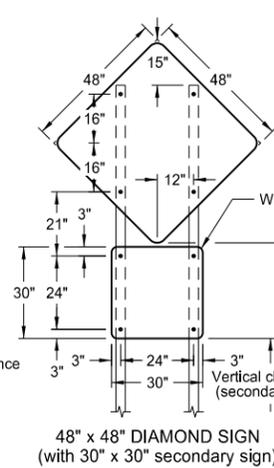
24" x 24" ROUTE MARKER ASSEMBLY



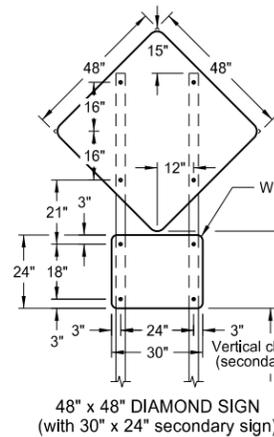
36" x 36" ROUTE MARKER ASSEMBLY



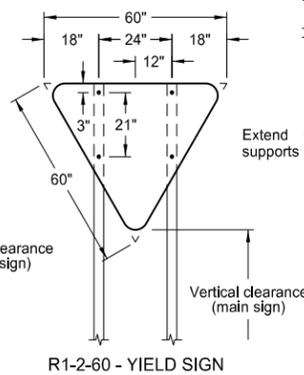
18" x 18" DIAMOND SIGN



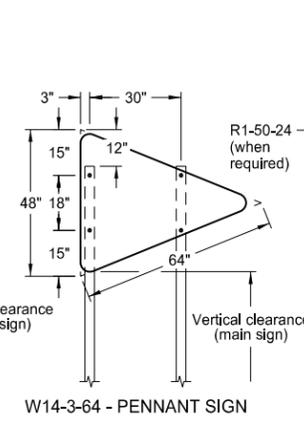
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



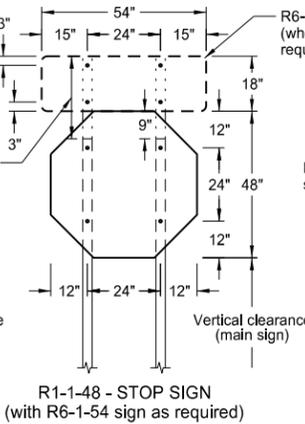
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



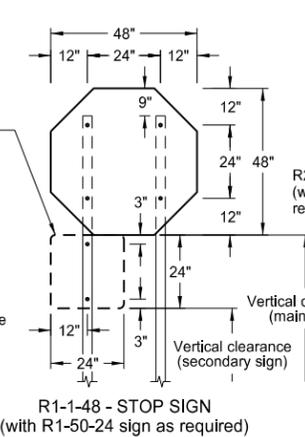
R1-2-60 - YIELD SIGN



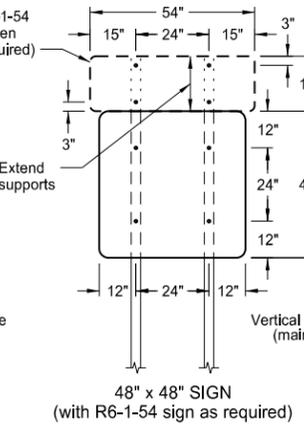
W14-3-64 - PENNANT SIGN



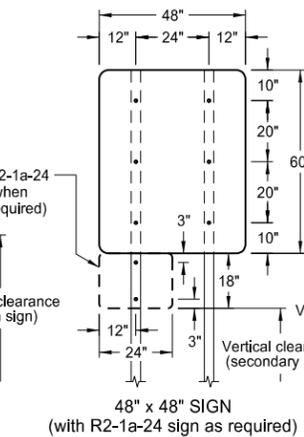
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



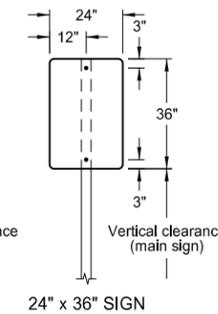
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



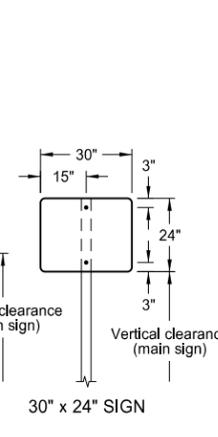
48" x 48" SIGN
(with R6-1-54 sign as required)



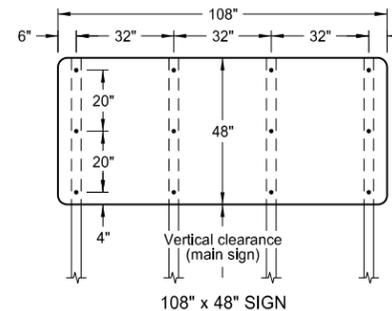
48" x 48" SIGN
(with R2-1a-24 sign as required)



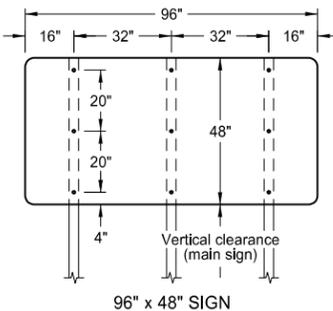
24" x 36" SIGN



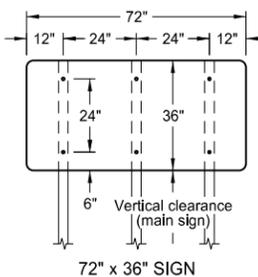
30" x 24" SIGN



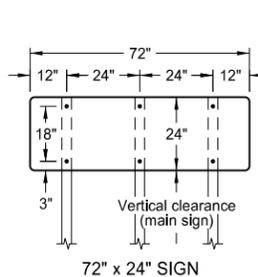
108" x 48" SIGN



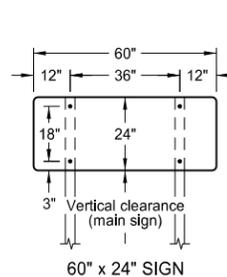
96" x 48" SIGN



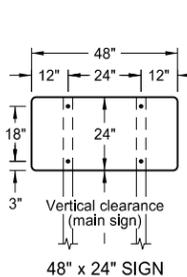
72" x 36" SIGN



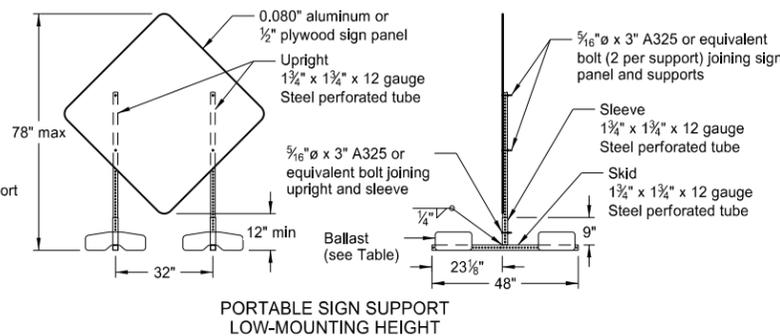
72" x 24" SIGN



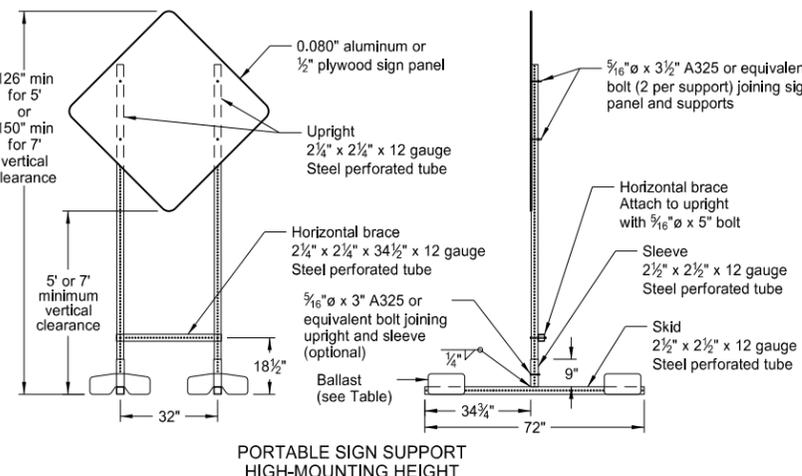
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

- Sign Supports:** Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
- Sign Panels:** Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
- Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
- Route Marker Auxiliary Signs:** Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
- Vertical Clearance:** Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
- Portable Signs:** Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

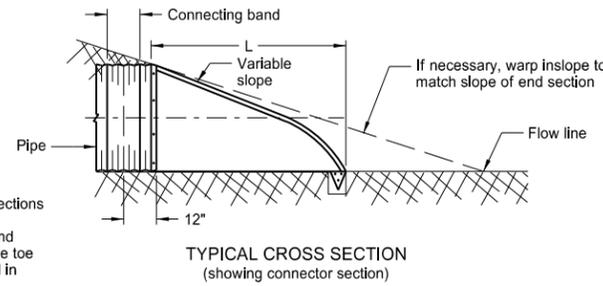
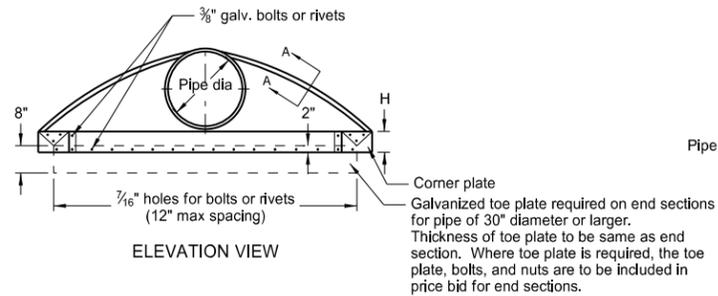
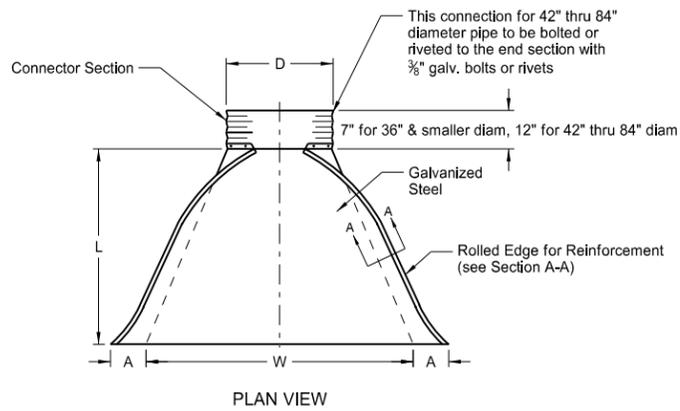
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE-2930,
on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



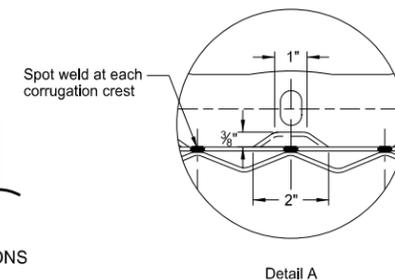
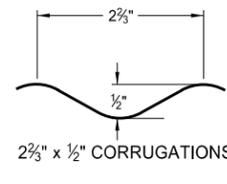
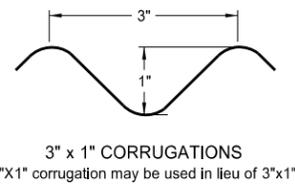
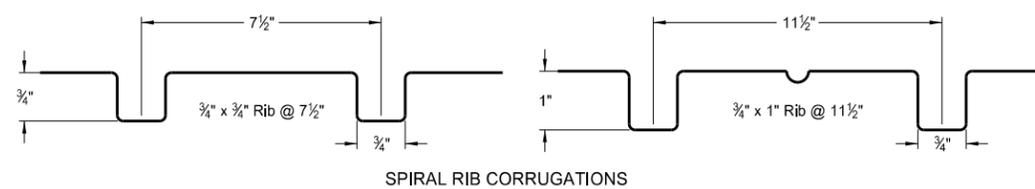
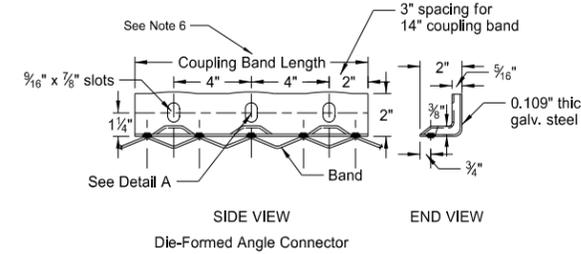
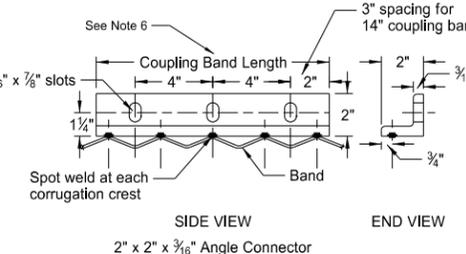
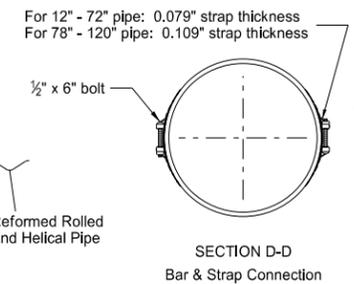
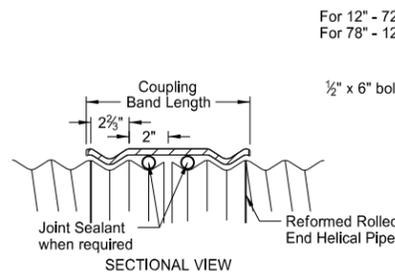
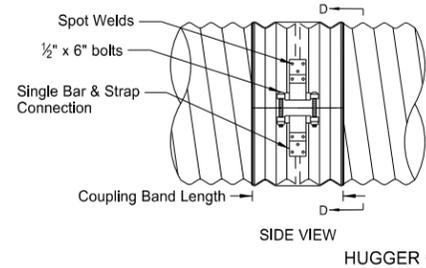
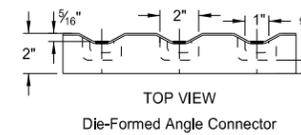
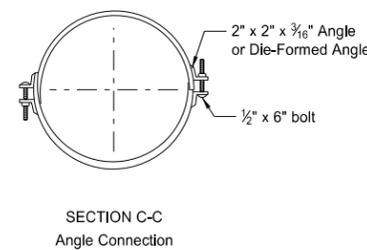
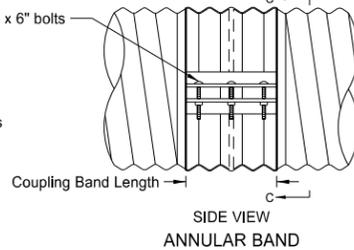
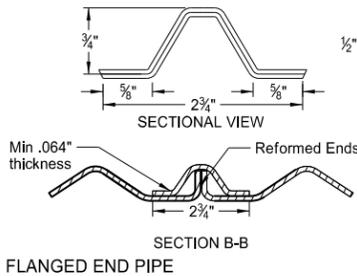
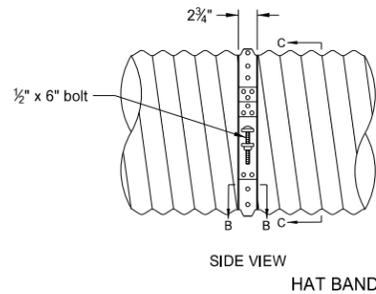
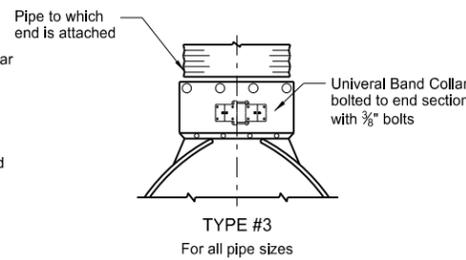
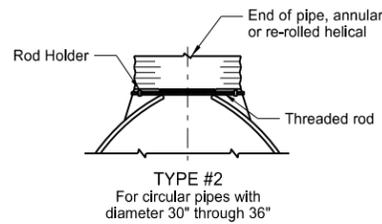
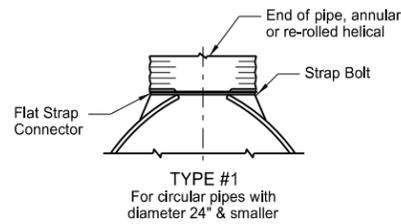
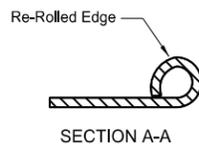
PIPE DIA. IN	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/2:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

- These sizes have 0.109" sides and 0.138" center panels.
 - Pipe diameter is equal to dimension "D" of end section.
- Manufacturers tolerances of above dimensions will be allowed.
- Splices to be the lap riveted type.

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

- NOTES:
1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
 2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
 3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
 4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
 5. 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
 6. Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
 7. Length of spot welds shall be minimum 1/2".

COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 3/8" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 3/8" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 3/8" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

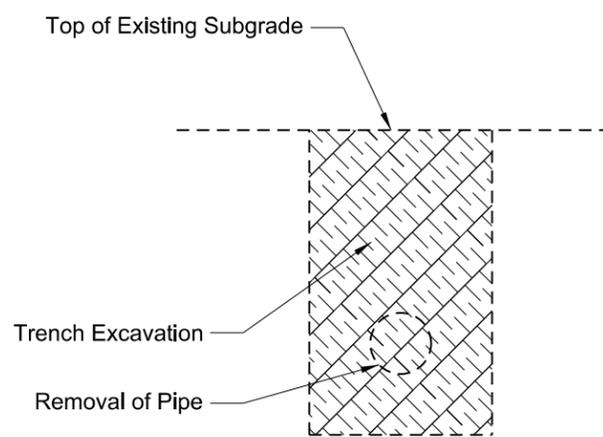


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE

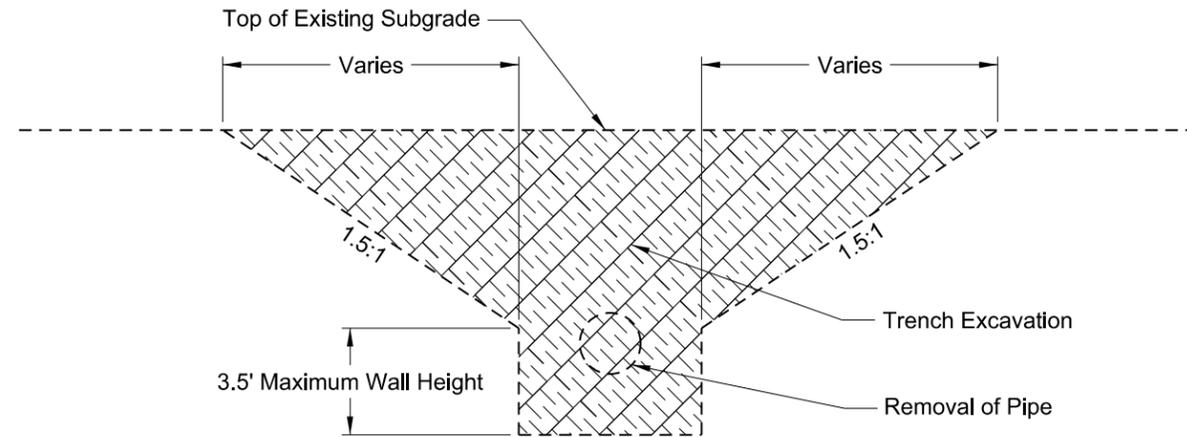
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 08/06/2013 and the original document is stored at the North Dakota Department of Transportation

**PIPE EXCAVATION AND INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE
OR PIPE NOT UNDER THE ROADWAY**

D-714-27



EXCAVATION DETAIL A



EXCAVATION DETAIL B

- Pay Items**
 1) Pipe*
 2) Removal of Pipe (if required)

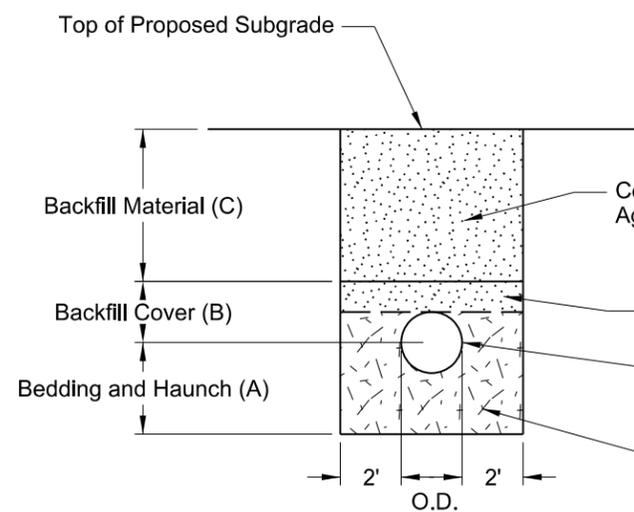
- *Included in Pipe Pay Item**
 1) Pipe
 2) Trench excavation
 3) Aggregate base course CI 3 or CI 5
 4) Common Excavation - Type A
 5) Common Excavation - Type B

- NOTES:**
 1) This drawing does not apply to pipes in approaches.
 2) It is the contractor's option to select Detail A or B.

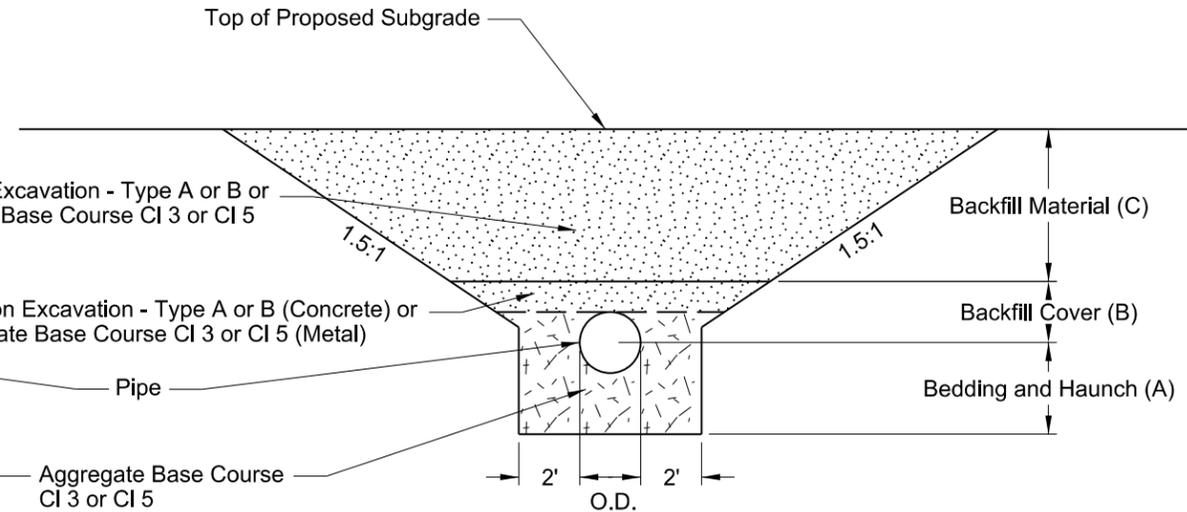
Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 4 Inches
Pipes Under the Roadway = 0.5 O.D. + 2 Feet

Backfill Cover (B)
Concrete Pipe = 0.5 O.D.
Metal Pipe = 0.5 O.D. + 1 Foot
PVC/HDPE = 0.5 O.D. + 1 Foot

Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course CI 3 or CI 5
Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A
Pipe Not Under Roadway = Common Excavation - Type B



BACKFILL DETAIL A

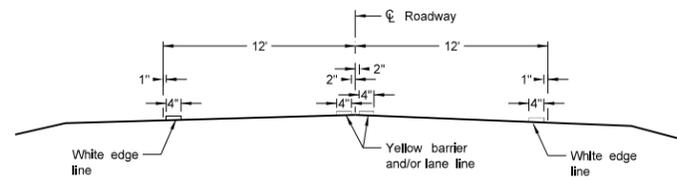


BACKFILL DETAIL B

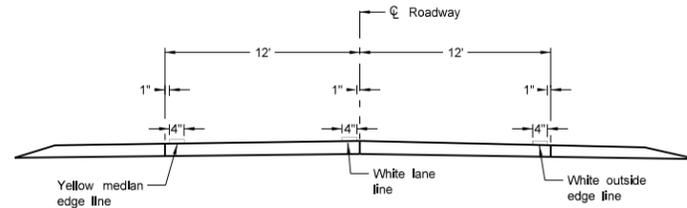
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting

This document was originally issued and sealed by
 Ron Horner,
 Registration Number
 PE-2087,
 on 10/15/13 and the original document is stored at the
 North Dakota Department
 of Transportation

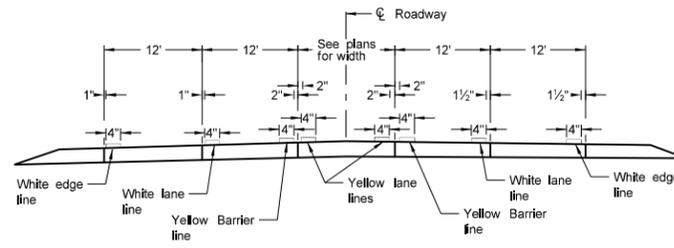
PAVEMENT MARKING



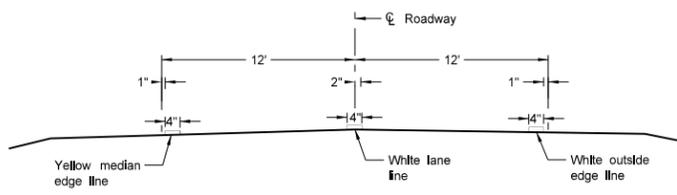
Two Lane Two Way
RURAL ROADWAY



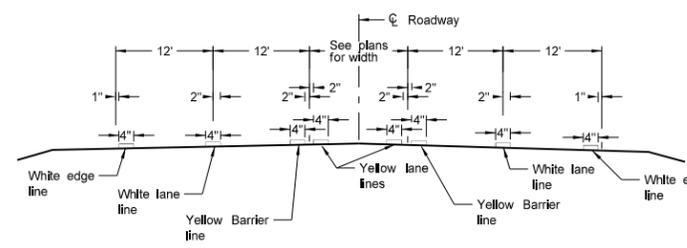
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



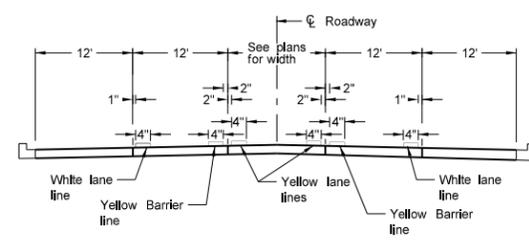
RURAL FIVE LANE ROADWAY
Concrete Section



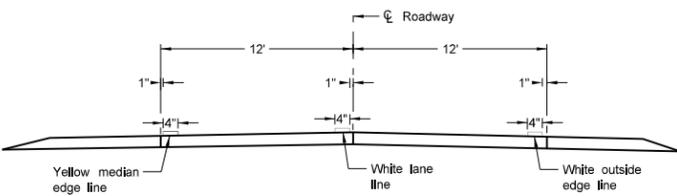
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



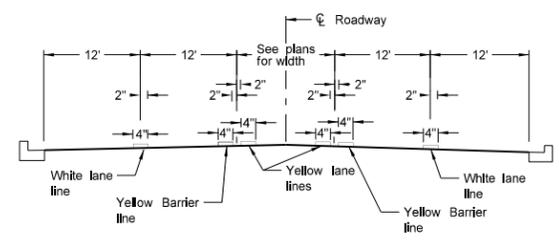
RURAL FIVE LANE ROADWAY
Asphalt Section



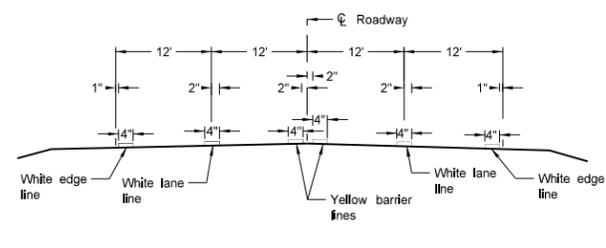
URBAN FIVE LANE SECTION
Concrete Section



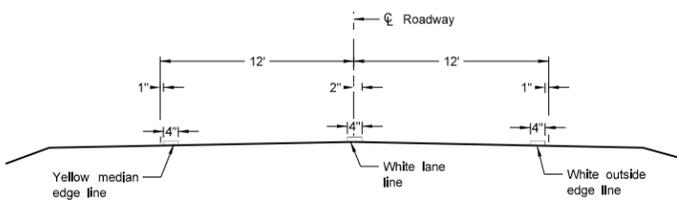
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



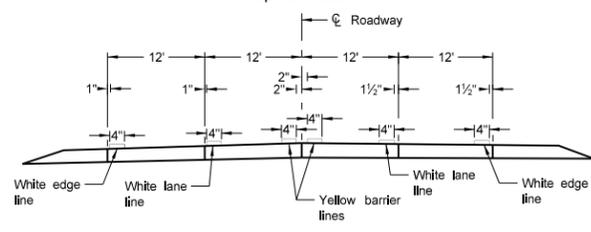
URBAN FIVE LANE SECTION
Asphalt Section



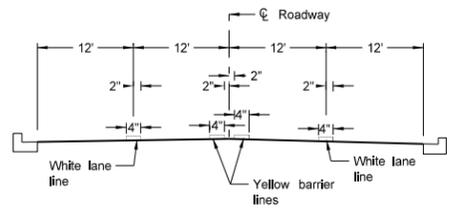
RURAL FOUR LANE ROADWAY
Asphalt Section



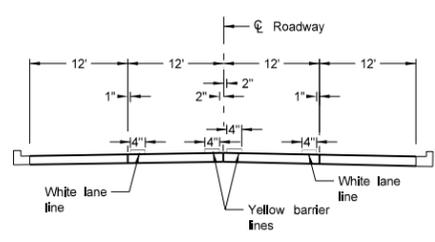
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



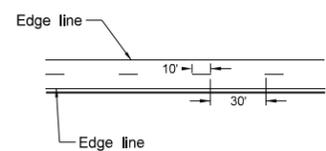
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

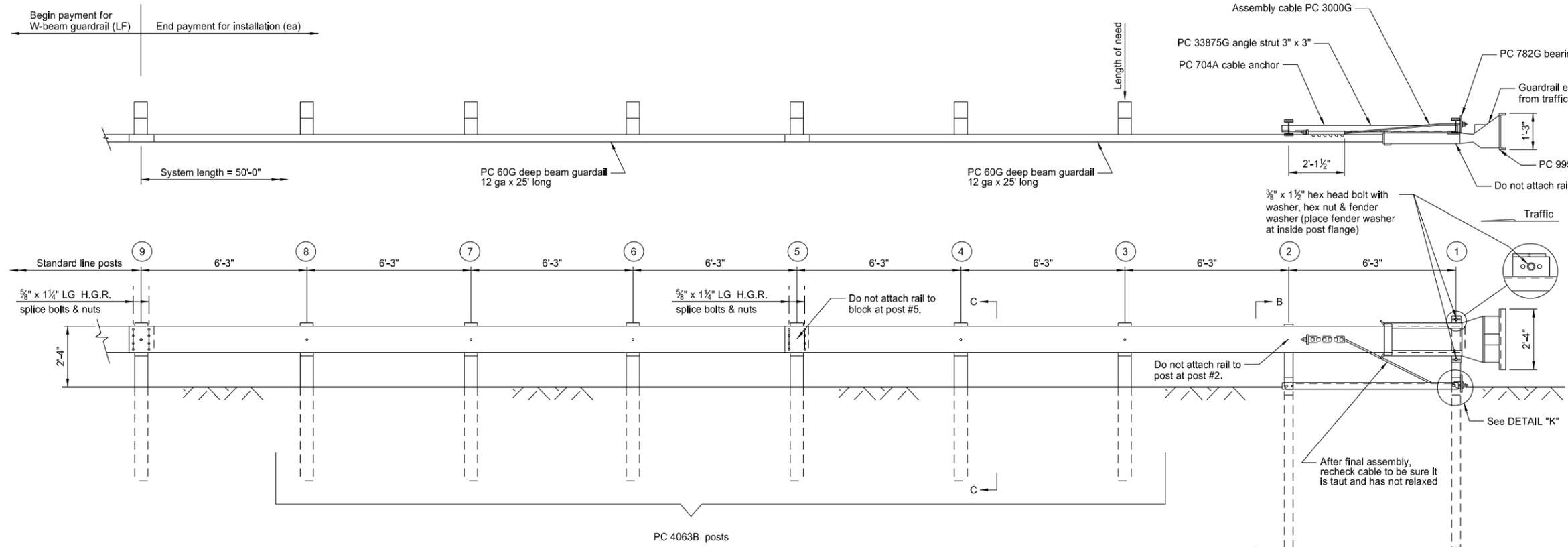
NOTES:
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

ET-PLUS

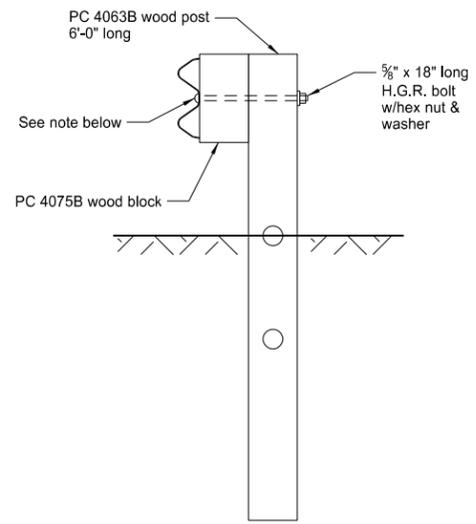
D-764-4



BILL OF MATERIAL		
PC	QTY	DESCRIPTION
60G	1	12/25/6'3"/S (guardrail)
62G	1	12/25/6'3"/S ANC (guardrail)
704A	1	Cable anchor bracket
782G	1	5/8" x 8" x 8" bearing plate
995A	1	ET-plus extruder
3000G	1	Cable 3/4 x 6'-6"
3300G	6	5/8" washer
3340G	22	5/8" hex nut
3360G	16	5/8" x 1 1/4" splice bolt
3580G	6	5/8" x 18" post bolt
3701G	7	3/4" washer
3704G	4	3/4" hex nut
3717G	3	3/4" x 2 1/2" hex head bolt
3718G	1	3/4" x 3" hex head bolt
3900G	2	1" washer
3910G	2	1" hex nut
4063B	6	WD 6'-0" post 6" x 8"
4075B	6	WD block 1'-2" x 6" x 8" DR
4254G	6	3/8" washer
4255G	2	3/8" fender washer (1 1/2 OD)
4258G	4	3/8" lockwasher
4261G	2	3/8" x 1 1/2" hex head bolt
4699G	4	3/4" lockwasher
6321G	4	3/8" x 2" hex head bolt
6405G	6	3/8" hex nut
33871A	1	HBA post #1 top
33872A	1	HBA post #2 top
33873A	2	HBA post #1-#2 bottom
33875G	1	6'-6" angle strut ET HBA

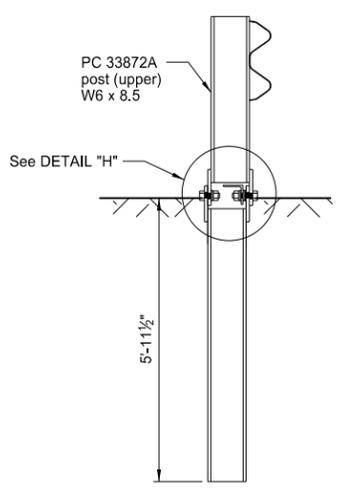
NOTES:

- Wood posts are required from post #3 to post #9.
- All bolts, nuts, cable assembly, cable anchors, and bearing plates shall be galvanized.
- This end terminal shall only be installed at locations where the flare rate is 25:1 or flatter, relative to the traveled way. The end terminal can be flared at a rate of 50:1 for the first 50' of the system to prevent the impact head from encroaching on the shoulder. The 25:1 flare rate is recommended with curb installations. See plans for when taper is used or not.
- Do not attach guardrail to post #1 or post #2.
- Do not attach guardrail to post block at post #5.
- The 5/8" flat washer is used under the nut, behind the post only, no washer is used at the rail.
- An impact head object marker shall be placed.
- The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nails shall be 20 penny and galvanized.

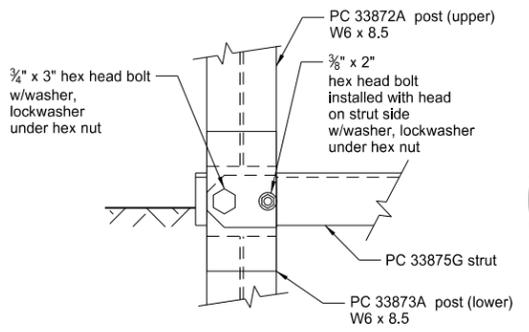


Note:
Section "C-C" is similar at post #5,
but the rail is not attached.

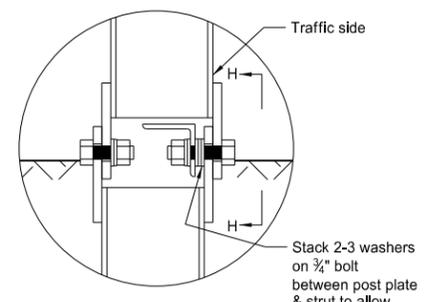
SECTION "C-C"
(TYP @ POSTS #3, 4, 6, 7 & 8)



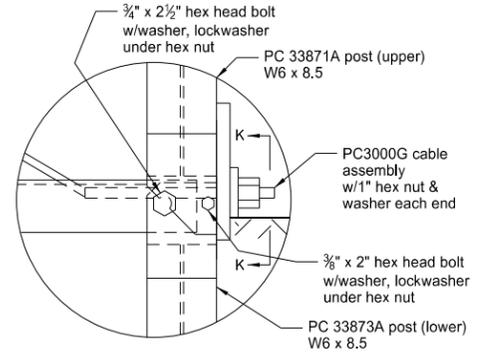
SECTION "B-B"
(POST #2)



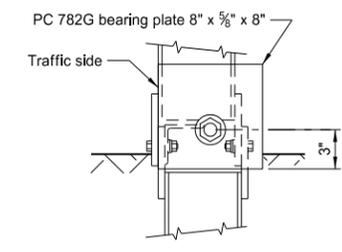
VIEW "H-H"



DETAIL "H"
(POST #2)



DETAIL "K"
(POST #1)



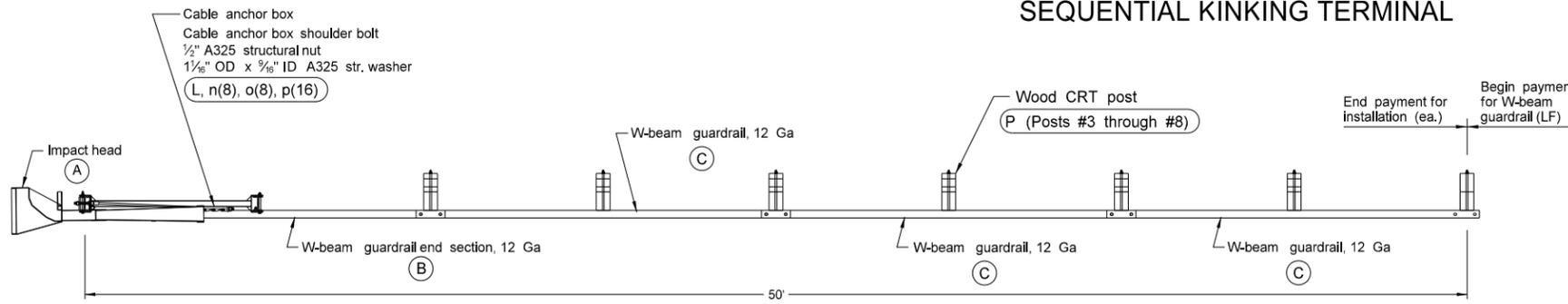
VIEW "K-K"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE

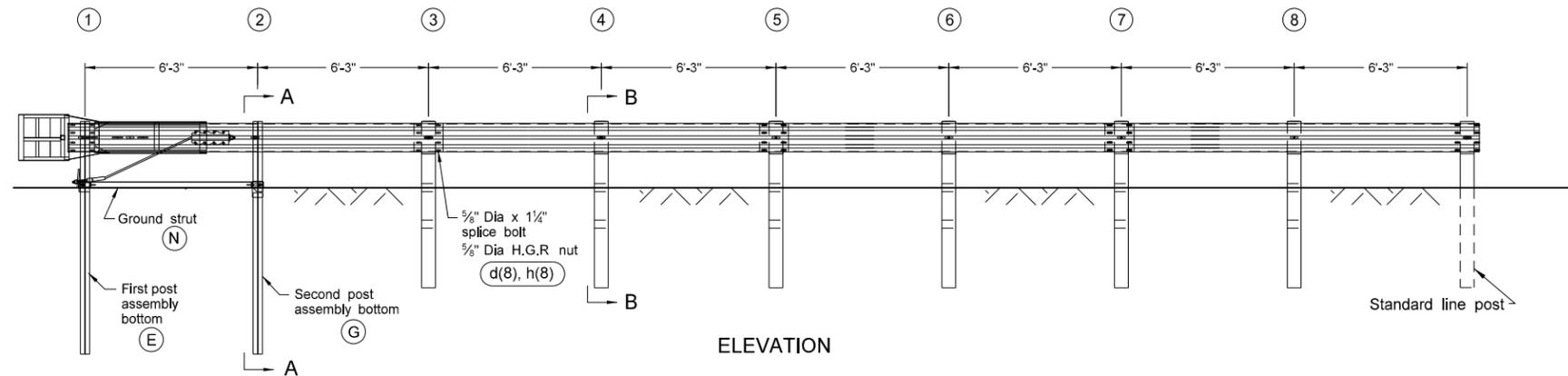
This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE-2930,
on 10/11/13 and the original document is stored at the
North Dakota Department
of Transportation

SEQUENTIAL KINKING TERMINAL

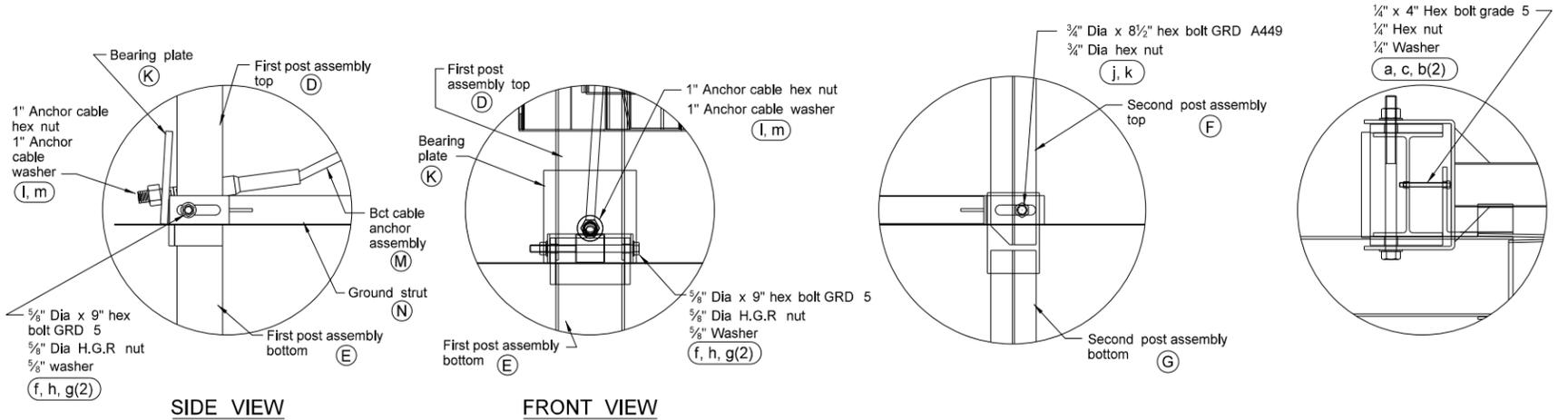
D-764-5



PLAN



ELEVATION



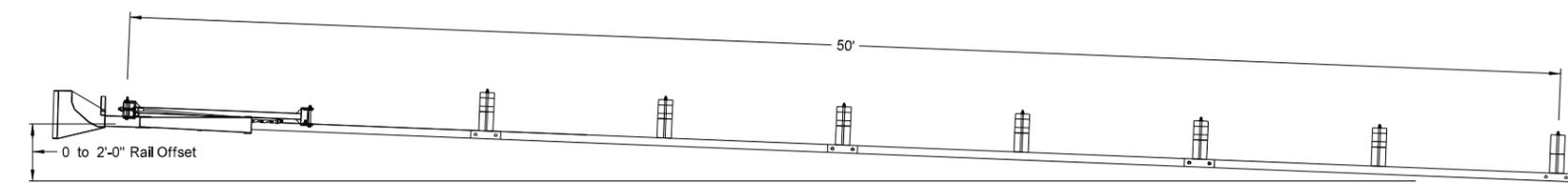
SIDE VIEW

FRONT VIEW

POST #1 CONNECTION DETAILS

SIDE VIEW DETAIL OF POST #2

IMPACT HEAD CONNECTION DETAIL

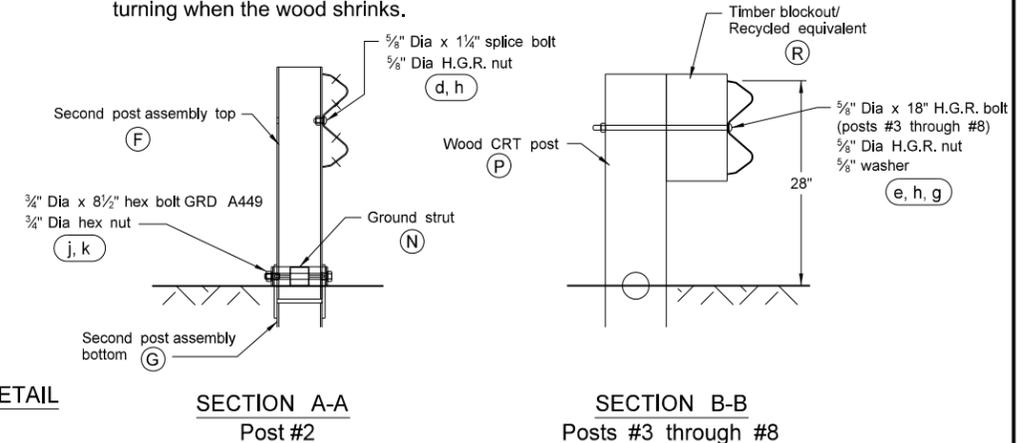


FLARED INSTALLATION
25:1 maximum flare rate

GENERAL NOTES:

- Breakaway posts are required with the SKT.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The SKT can be flared at a rate of up to 25:1 to prevent the impact head from encroaching on the shoulder.
- The lower sections of the posts shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower section of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When rock is encountered, a 10" diameter post hole, 20" into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Posts 1 & 2 can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
- The wood blockouts on post #3 through post #8 should be "toe nailed" with two 20 penny galvanized nails into each rectangular post, to prevent them from turning when the wood shrinks.

ITEM QTY		BILL OF MATERIALS
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
HARDWARE		
a	2	1/4" x 4" HEX BOLT Grade 5
b	4	1/4" WASHER
c	2	1/4" HEX NUT
d	25	5/8" Dia x 1 1/4" SPLICE BOLT, POST #2
e	6	5/8" Dia x 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	5/8" Dia x 9" HEX BOLT GRD 5
g	8	5/8" WASHER
h	32	5/8" Dia H.G.R. NUT
j	1	3/4" Dia x 8 1/2" HEX BOLT GRD A449
k	1	3/4" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	CABLE ANCHOR BOX SHOULDER BOLT
o	8	1/2" A325 STRUCTURAL NUT
p	16	1 1/16" OD x 3/16" ID A325 STR. WASHER



SECTION A-A
Post #2

SECTION B-B
Posts #3 through #8

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-11-13	
REVISIONS	
DATE	CHANGE

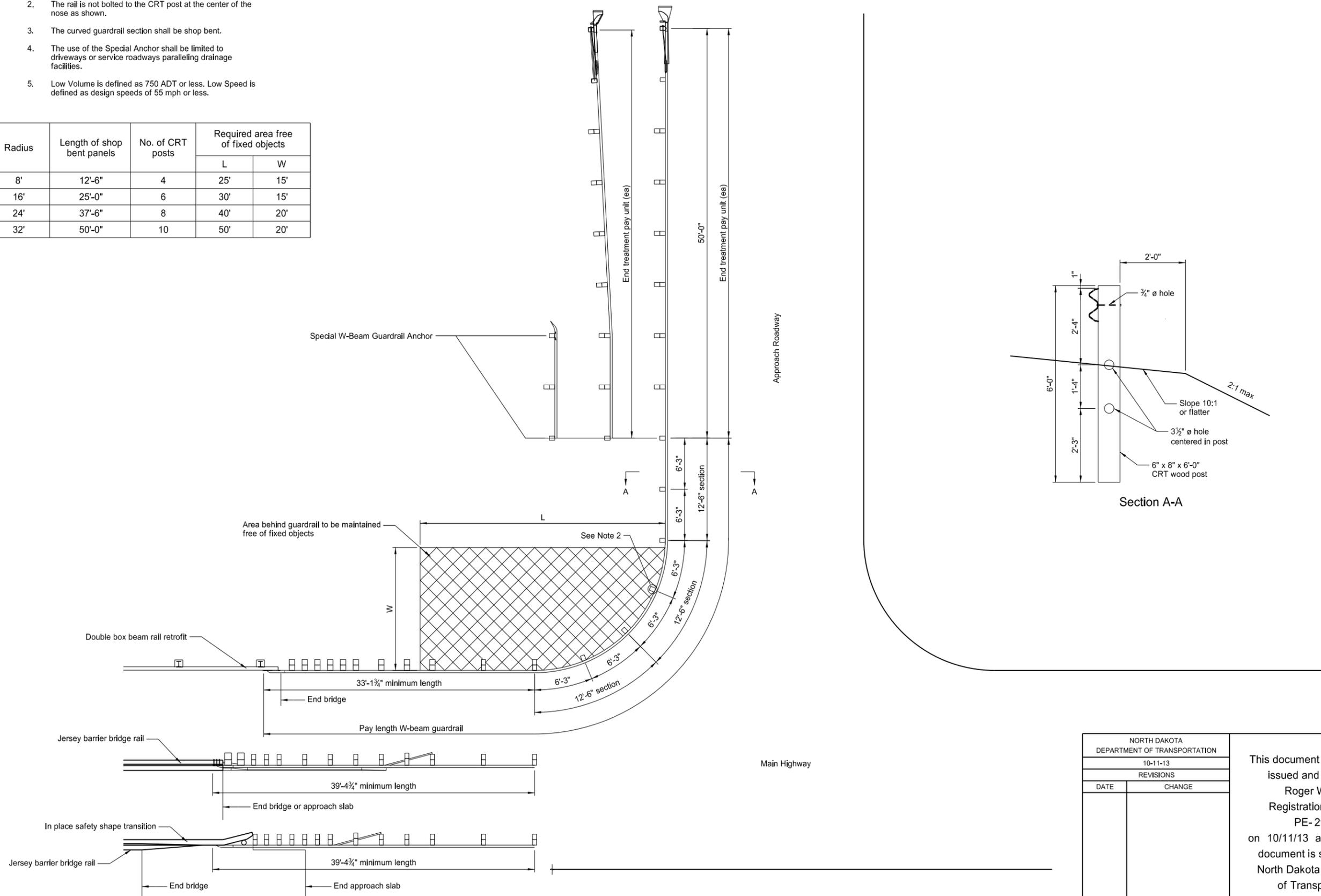
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/11/13 and the original document is stored at the North Dakota Department of Transportation

W-BEAM GUARDRAIL WITH APPROACHES NEAR BRIDGE FOR LOW VOLUME LOW SPEED ROADWAYS

NOTES:

1. No washers are used on the 5/8" guardrail bolts connecting the rail to the Controlled Release Terminal (CRT) posts.
2. The rail is not bolted to the CRT post at the center of the nose as shown.
3. The curved guardrail section shall be shop bent.
4. The use of the Special Anchor shall be limited to driveways or service roadways paralleling drainage facilities.
5. Low Volume is defined as 750 ADT or less. Low Speed is defined as design speeds of 55 mph or less.

Radius	Length of shop bent panels	No. of CRT posts	Required area free of fixed objects	
			L	W
8'	12'-6"	4	25'	15'
16'	25'-0"	6	30'	15'
24'	37'-6"	8	40'	20'
32'	50'-0"	10	50'	20'

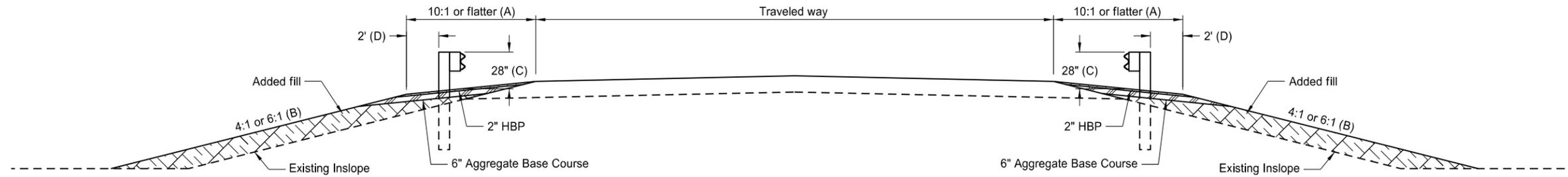


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE

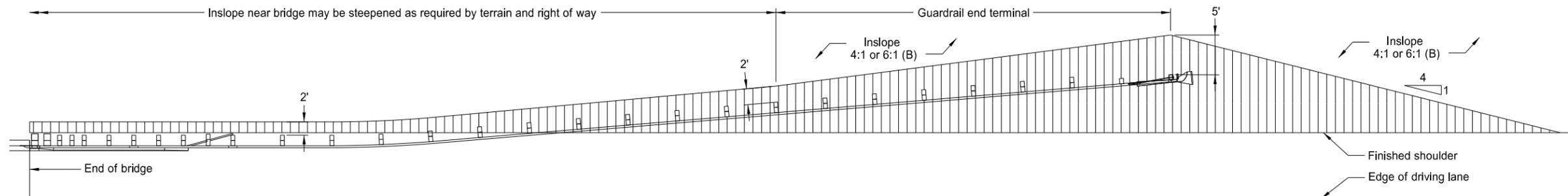
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/11/13 and the original document is stored at the North Dakota Department of Transportation

TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

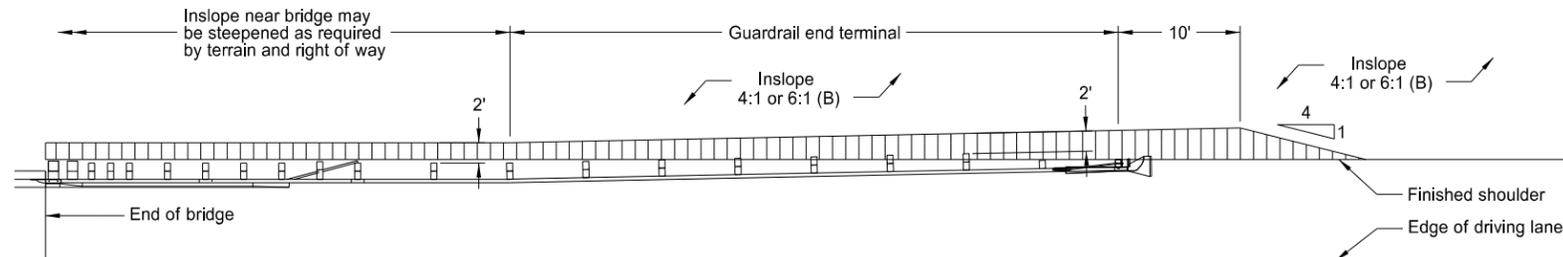
D-764-22



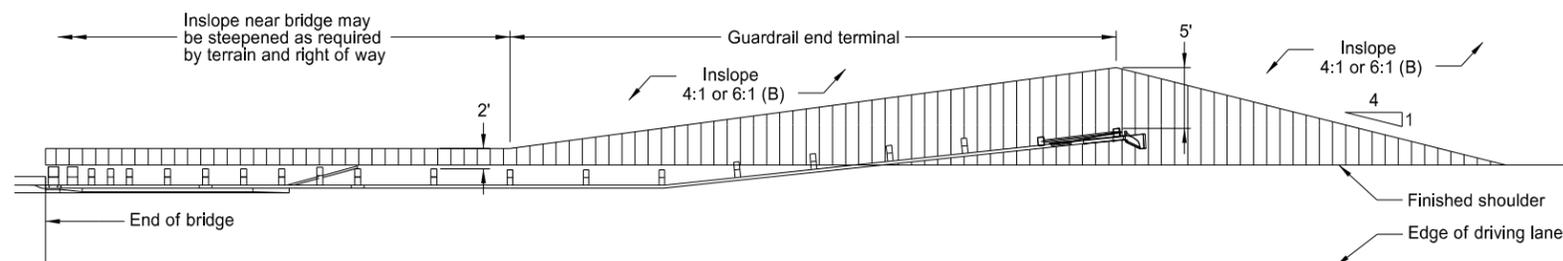
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



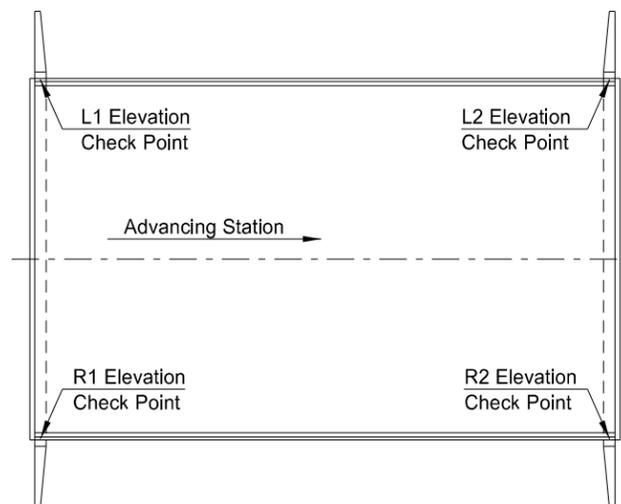
PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

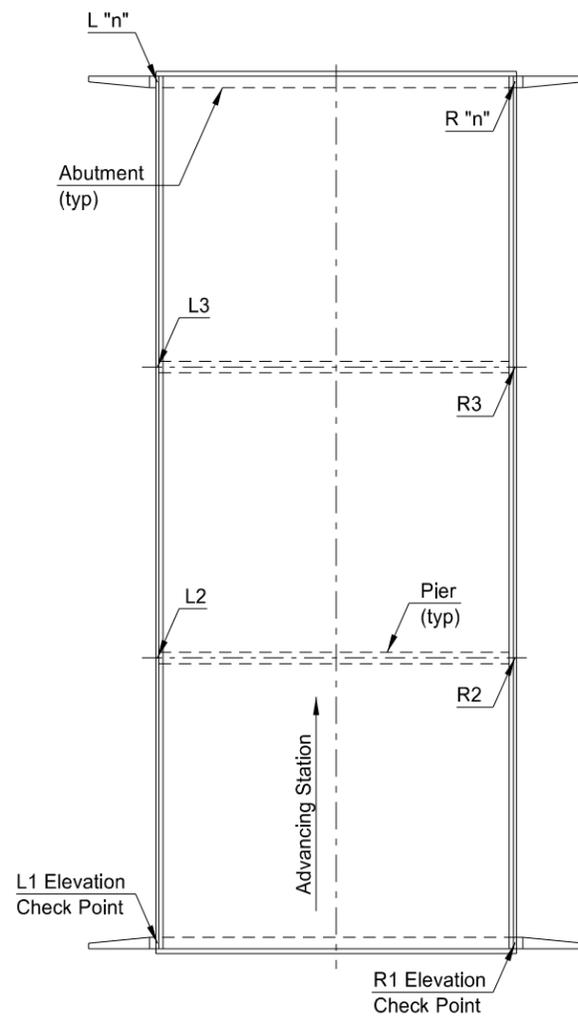
- (A) Slope flatter than 10:1 may be required to provide proper guardrail height.
- (B) Where normal inslope is 4:1 the added fill shall be 4:1. Where normal inslope is 6:1 the added fill shall be 6:1.
- (C) Measured from top of guardrail to top of surfacing at front face of guardrail.
- (D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-3-13 and the original document is stored at the North Dakota Department of Transportation

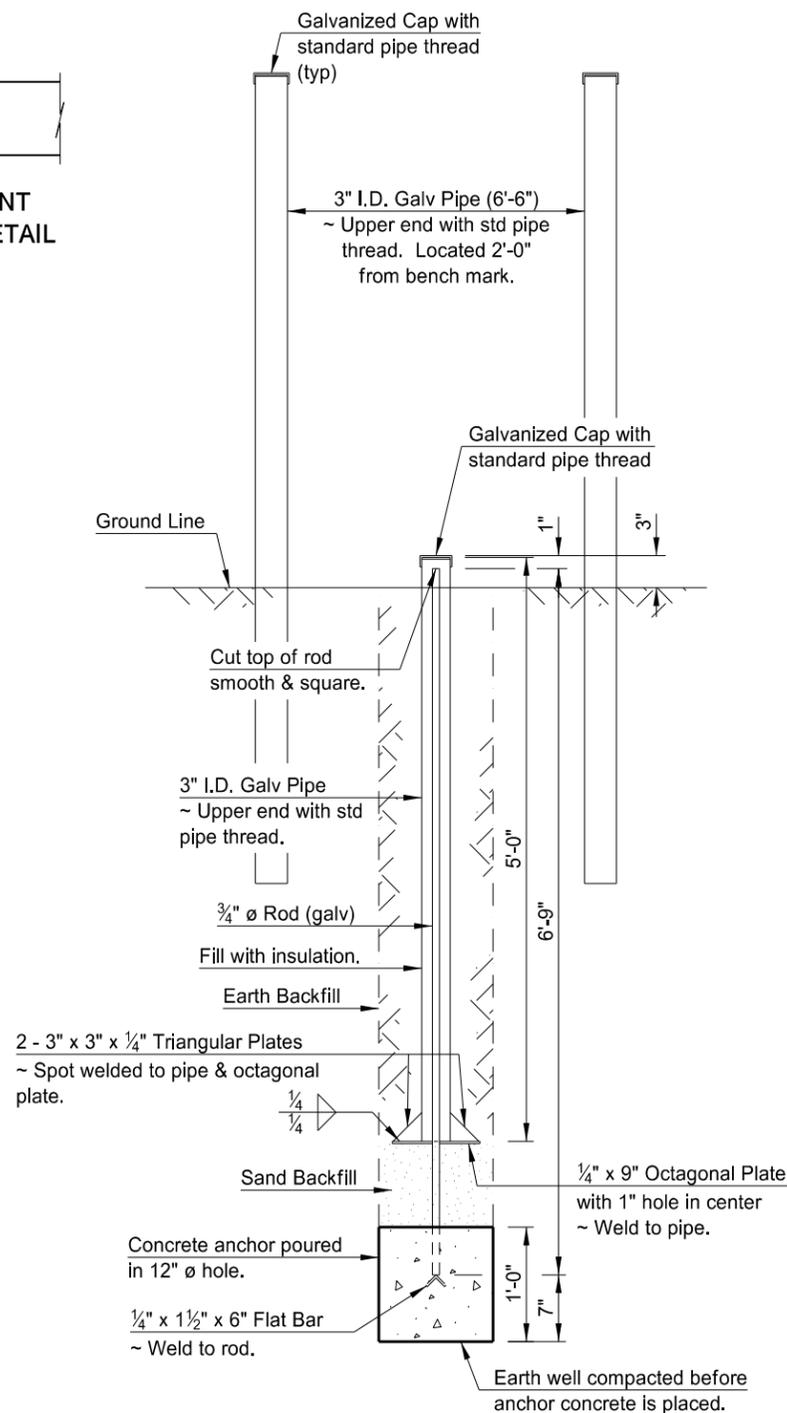
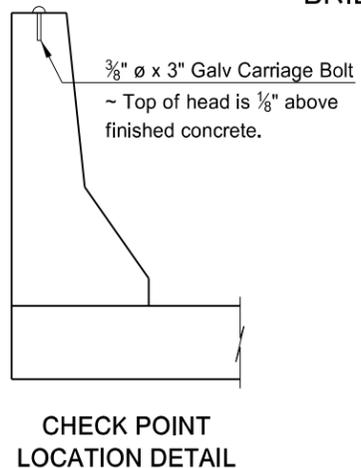


GENERAL LAYOUT FOR SINGLE SPAN



GENERAL LAYOUT FOR MULTIPLE SPAN

BRIDGE BENCH MARKS



BENCH MARK DETAIL

NOTES:

Elevation check points shall consist of $\frac{3}{8}$ " \varnothing x 3" galvanized carriage bolts (or equal) set in the concrete barrier at the points indicated on the General Layout sketches. The top of the bolt head shall project above the finished concrete $\frac{1}{8}$ ". Elevation check points shall be placed on each barrier over each unit of the substructure for each bridge at a structural location.

Two bench marks as detailed hereon shall be set at diagonal opposite positions away from the structure location and at least 300 feet from the nearest point on the bridge or bridges (if more than one at a location). These bench marks shall be constructed as detailed on this sheet and located near the Highway Right of Way lines. The two pipes shall extend 4'-0" above ground and be painted with two coats of white paint suitable for galvanized steel surfaces.

The Project Engineer shall run a set of levels determining the elevation of each check point on the structure and the two bench marks immediately after the completion of the bridge. Bench Mark #1 can be listed as having elevation 1000 or the actual surveyed elevation. This information shall be recorded on SFN 13420 and submitted to the Bridge Engineer with adequate information locating each check point and bench mark.

All metal parts are to be hot dip galvanized after punching, shearing, welding and fabrication.

Threads of cap and pipe are not to be galvanized. At the time of installation these threads are to be coated with synthetic grease with teflon and cap screwed to a snug fit.

METHOD OF MEASUREMENT:

Each set of Bridge Bench Marks consisting of two bench marks and the required number of elevation check points shall be considered as one unit for bidding purposes and the quantity to be paid for shall be the number of sets of bridge bench marks which have been installed complete in place and accepted by the Engineer.

BASIS OF PAYMENT:

Bridge Bench Marks shall be paid for at the contract price bid for each set of Bridge Bench Marks, which price shall be full compensation for all excavation, backfill and clean-up, and for furnishing, hauling and placing all elevation check points, galvanized pipe, caps, rods, sand backfill, concrete, rock equipment, tools and incidentals, including galvanizing and greasing, necessary to complete this item.

GALVANIZING:

After fabrication the complete assembly shall be hot-dip galvanized.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 09/14/11 and the original document is stored at the North Dakota Department of Transportation