

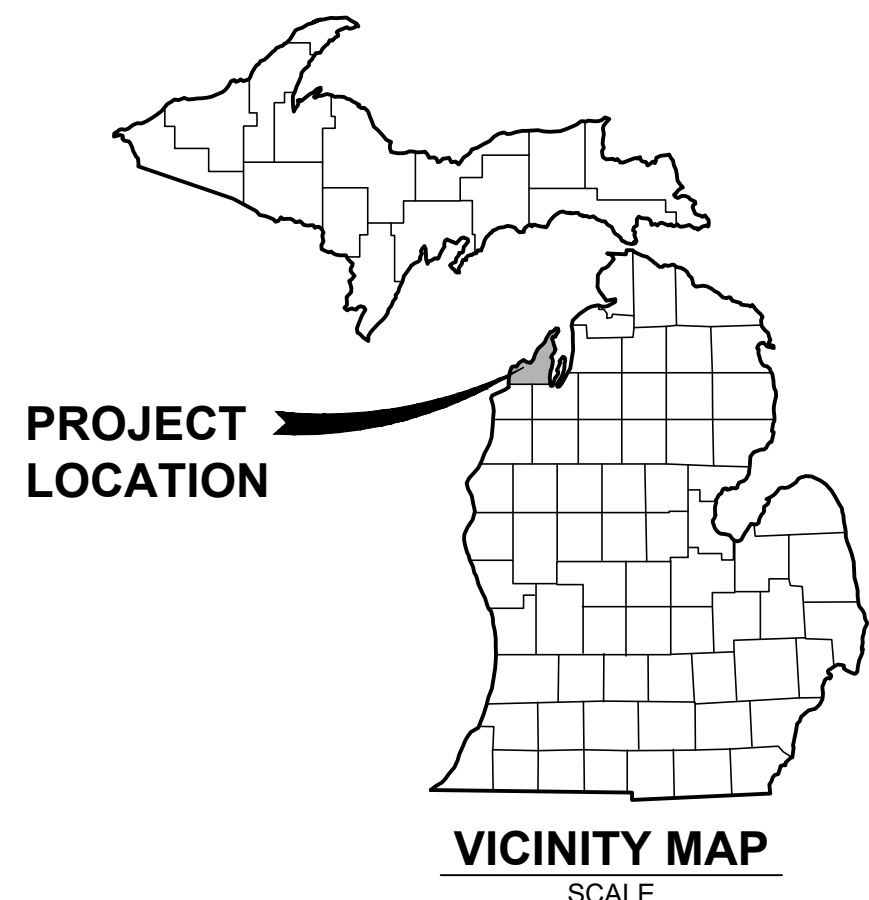
LEELANAU COUNTY ROAD COMMISSION

IN COOPERATION WITH THE

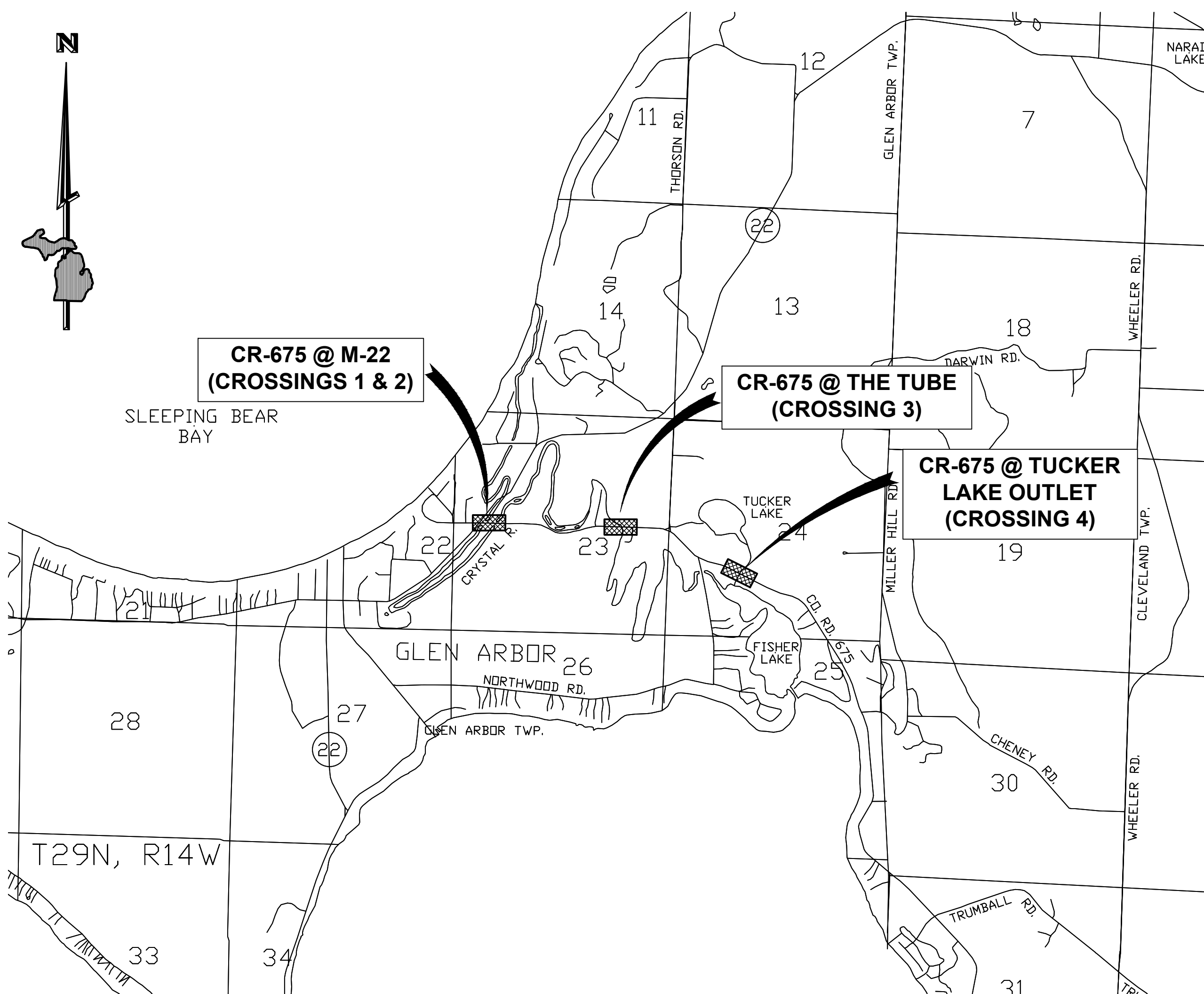
GRAND TRAVERSE BAND OF OTTAWA AND CHIPPEWA INDIANS

PROPOSED PLANS FOR COUNTY ROAD 675 STREAM CROSSINGS PROJECT

PROJECT I.D. NO. F60-47459
IRR ROUTE NO. 5428



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- NOTES:
- THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT ASSHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/800' OF THE SPAN LENGTH.
 - EXCEPT WHERE OTHERWISE INDICATED ON THESE PLANS, OR IN THE PROPOSAL AND SUPPLEMENTAL SPECIFICATIONS CONTAINED HEREIN, ALL MATERIALS AND WORKMANSHIP SHALL BE ACCORDING TO THE MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION 2012 EDITION.
 - PLANS HAVE BEEN PREPARED IN ACCORDANCE WITH AASHTO'S A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, 2011 EDITION.
 - THE STATIONING AS SHOWN ON THESE PLANS IS BASED ON AN ASSUMED LOCAL SYSTEM.
 - ALL EXPOSED CONCRETE CORNERS SHOWN SQUARE ON THE PLANS SHALL BE BEVELED WITH 1/2" TRIANGULAR MOLDINGS EXCEPT AS OTHERWISE NOTED.
 - THE DESIGN OF THE FOUNDATION PILING IS BASED ON MATERIAL OF THE FOLLOWING GRADES AND STRESSES (AND LOSSES):
 CONCRETE: GRADE S1 $f_c = 3,500$ PSI
 STEEL REINFORCEMENT $f_y = 60,000$ PSI
 FOUNDATION PILING (STEEL H-PILING):
 AASHTO M270 $F_y = 50,000$ PSI
 GRADE 50W
 FOUNDATION PILING (TIMBER) $F_{co} = 900$ PSI
 - UNLESS OTHERWISE SHOWN ON THE PLANS PROVIDE MINIMUM CONCRETE CLEAR COVER FOR REINFORCEMENT ACCORDING TO THE FOLLOWING:
 CONCRETE CAST AGAINST EARTH: 3 IN.
 PRESTRESSED BEAMS: 1 IN.
 ALL OTHER UNLESS SHOWN ON PLANS: 2 IN.
 - PLACEMENT OF TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE DONE IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2011 EDITION.

CONTRACT FOR: REMOVAL OF EXISTING CULVERTS, CONSTRUCTION OF PRE-ENGINEERED STEEL STRUCTURE, TIMBER STRUCTURES, AND AN ALUMINUM BOX CULVERT, APPROACHES, AND RELATED WORK AT FOUR STREAM CROSSING LOCATIONS.

LEELANAU COUNTY ROAD COMMISSION APPROVAL

 MANAGING DIRECTOR DATE

NATURAL RESOURCES CONSERVATION SERVICE STATEMENTS
 TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGEMENT AND BELIEF, THE DESIGN, CONSTRUCTION DRAWINGS, AND SPECIFICATIONS MEET APPLICABLE NRCS STANDARDS AND SPECIFICATIONS.

MARTIN A. GRAF, P.E. _____
 DATE

NRCS PRACTICE STANDARDS:
 AQUATIC ORGANISM PASSAGE - 396

NRCS IS ACCEPTING THESE CONSTRUCTION DRAWINGS AND SPECIFICATIONS ON THE BASIS THAT THEY HAVE BEEN SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER. BASED ON THE INFORMATION PROVIDED BY THE PROFESSIONAL ENGINEER, THE CONSTRUCTION DRAWINGS AND SPECIFICATIONS APPEAR TO MEET APPLICABLE NRCS STANDARDS AND SPECIFICATIONS. ANY DEFICIENCIES IN THE DESIGN, CONSTRUCTION DRAWINGS OR SPECIFICATIONS ARE THE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE SEAL APPEARS ON THE CONSTRUCTION DRAWINGS.

NRCS REPRESENTATIVE _____
 DATE

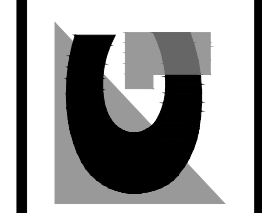
U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF INDIAN AFFAIRS

GREAT LAKES AGENCY	MIDWEST REGION
RECOMMENDED FOR APPROVAL: SUPERVISORY ROAD ENGINEER _____ DATE	APPROVED: REGIONAL ENGINEER _____ DATE REGIONAL DIRECTOR _____ DATE

RESERVATION
GRAND TRAVERSE BAND OF OTTAWA AND CHIPPEWA INDIANS
 BIA REGION
MIDWEST
 FED. ROAD REG. NO.
5

CR-675 STREAM CROSSINGS PROJECT

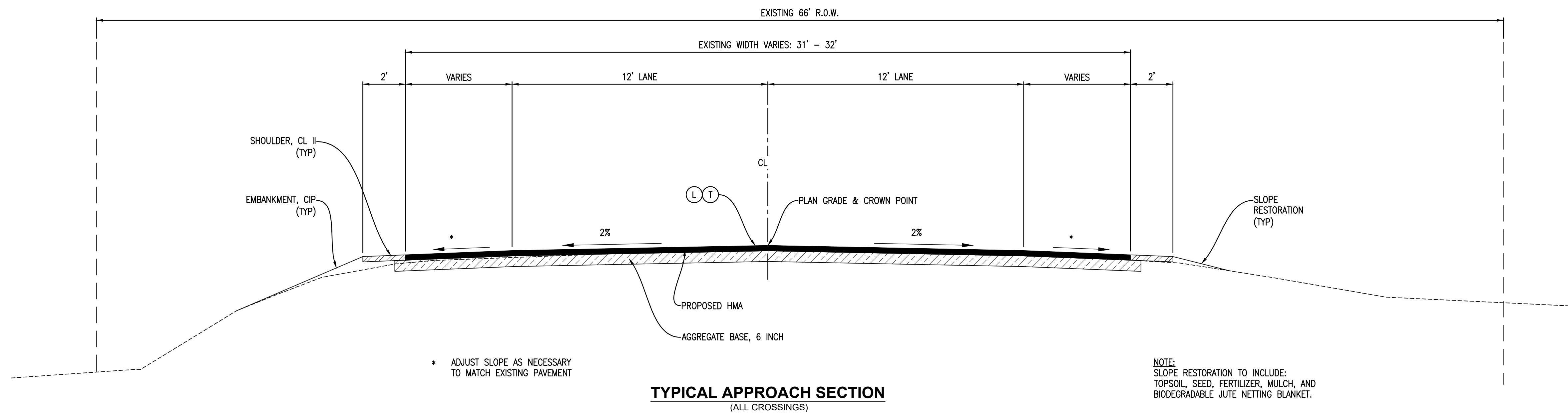
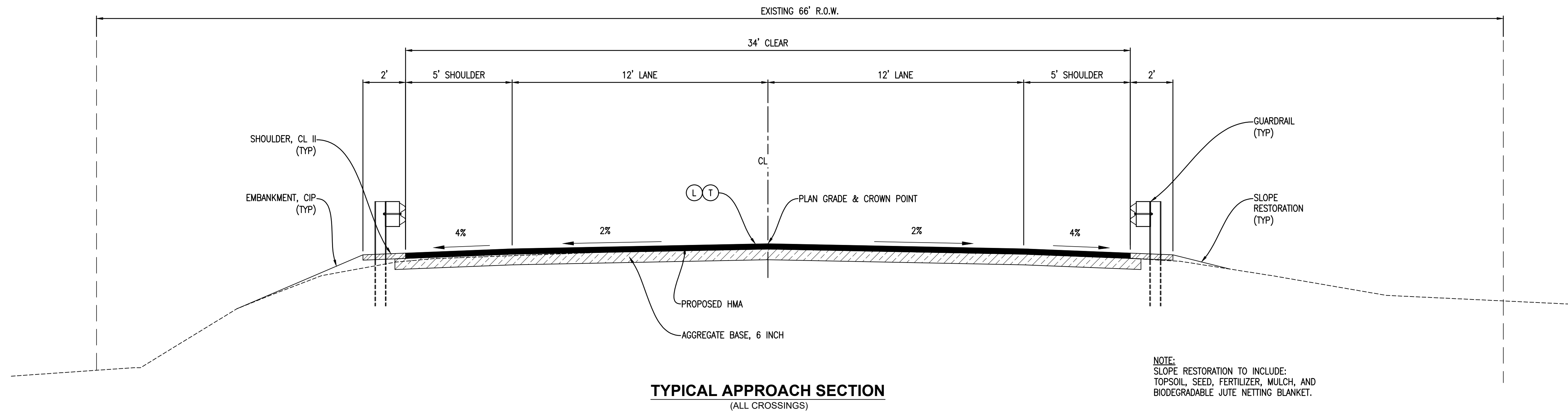
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HMA APPLICATION ESTIMATE

IDENT. NO.	ITEM	RATE PER SYD	PG-GRADE	REMARKS	AWI (MIN.)
L	HMA 4EL	165 LB	58-28	LEVELING COURSE	N/A
T	HMA 4EL	165 LB	58-28	TOP COURSE	220
	BOND COAT	0.05-0.15 GAL		FOR INFORMATION ONLY	

No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

**TYPICAL ROAD CROSS SECTIONS
 CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION**

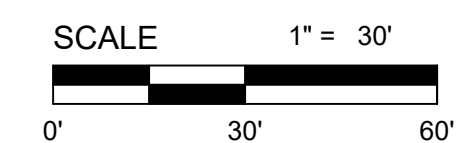
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 SECTIONS 23 & 24
 T29N, R14W
 GLEN ARBOR TOWNSHIP
 LEELANAU COUNTY
 MICHIGAN

Project Number:
 2020430002

Sheet:

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UTILITIES

THE EXISTING UTILITIES LISTED BELOW AND SHOWN ON THESE PLANS REPRESENT THE BEST INFORMATION AVAILABLE. INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO BE SATISFIED AS TO ITS ACCURACY AND THE LOCATION OF EXISTING UTILITIES.

GENERAL PLAN NOTES

1. **UNDERGROUND UTILITIES**
FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.
2. **ADJUSTING MONUMENT BOXES**
ALL GOVERNMENT CORNERS ON THIS PROJECT SHALL BE PRESERVED, WHETHER SHOWN OR NOT. IT MAY BE NECESSARY TO PLACE OR ADJUST MONUMENT BOXES, AS REQUIRED.
3. **TOPSOIL STRIPPING**
STRIP EXISTING TOPSOIL TO THE SLOPE STAKE LINES PRIOR TO PLACING EMBANKMENT OR EXCAVATION OF EARTH. PAYMENT FOR TOPSOIL STRIPPING IS INCLUDED IN OTHER EARTHWORK PAY ITEMS.
4. **SLOPES**
CLASS A SLOPES SHALL BE CONSTRUCTED ON THIS PROJECT.
5. **SOIL EROSION MEASURES**
APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EARTH-DISTURBING ACTIVITIES. PLACE TURF ESTABLISHMENT ITEMS AS SOON AS POSSIBLE ON POTENTIAL ERODABLE SLOPES AS DIRECTED BY THE ENGINEER. CRITICAL DITCH GRADES SHALL BE PROTECTED WITH EITHER SOD OR SEED/MULCH OR MULCH BLANKET AS DIRECTED BY THE ENGINEER.
6. **SOIL BORINGS AND/OR PAVEMENT CORES**
THE SOIL BORING LOGS AND/OR PAVEMENT CORES REPRESENT POINT INFORMATION. NO INFERENCE SHOULD BE MADE THAT SUBSURFACE OR PAVEMENT CONDITIONS ARE THE SAME AT OTHER LOCATIONS.
7. **EARTHWORK**
EARTHWORK QUANTITIES ARE COMPUTED BY THE AVERAGE END AREA METHOD BASED UPON GROUND SURVEY INFORMATION.
8. **PAVEMENT MARKINGS**
ALL PERMANENT PAVEMENT MARKINGS, SHAPES, AND DIMENSIONS SHALL CONFORM WITH MDOT PAVEMENT MARKING STANDARD PLANS AND SPECIAL DETAILS UNLESS SPECIFIED OTHERWISE BY SPECIAL PROVISION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PRESERVING THE LOCATION AND PLACEMENT OF PAVEMENT MARKINGS.
9. **PERMANENT SIGNS**
ANY PERMANENT SIGNS REQUIRING RELOCATION DUE TO CONTRACTOR OPERATIONS SHALL BE SALVAGED AND RESET BY THE CONTRACTOR AT LOCATIONS DESIGNATED BY THE ENGINEER. SIGNS AND POSTS DAMAGED DURING THE REMOVAL AND STORAGE OPERATIONS SHALL BE REPLACED WITH NEW SIGNS AND POSTS. THE COST OF THIS WORK SHALL BE BORNE BY THE CONTRACTOR.

NAME OF OWNER	KIND OF UTILITY
CONSUMER'S ENERGY 821 HASTINGS STREET TRAVERSE CITY, MI 49686 231.929.6265 CONTACT: CURTIS HANSEN	ELECTRIC
CHARTER COMMUNICATIONS 1392 TRADE CENTRE DR TRAVERSE CITY, MI 49696 231.941.3819 CONTACT: DAN BIELACZYC	CABLE TV
CENTURY TELEPHONE 116 CENTURY ROAD MAPLE CITY, MI 49664 989.879.8709 CONTACT: BILL MARCHAND	TELEPHONE
DTE 1250 MICH CON LANE, S.W. P.O. BOX 259 KALKASKA, MI 49646 231.258.3785 CONTACT: MATTHEW LOGAN	GAS

NOTES APPLYING TO TRAFFIC & SAFETY STANDARD PLANS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR ON THE PLANS, OR AS DIRECTED BY THE ENGINEER, THEY ARE TO BE CONSTRUCTED ACCORDING TO THE MDOT STANDARD PLAN GIVEN BELOW OPPOSITE EACH ITEM UNLESS OTHERWISE INDICATED

GROUND DRIVEN SIGN SUPPORTS FOR TEMP SIGNS	WZD-100-A
TEMPORARY TRAFFIC CONTROL DEVICES	WZD-125-E
STANDARD SIGN INSTALLATION	SIGN-100-C

NOTES APPLYING TO PAVEMENT MARKING STANDARD PLANS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR ON THE PLANS, THEY ARE TO BE CONSTRUCTED ACCORDING TO THE MDOT STANDARD PLAN GIVEN BELOW OPPOSITE EACH ITEM UNLESS OTHERWISE INDICATED

LONGITUDINAL LINE TYPES AND PLACEMENT	PAVE-905-E
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NOTES APPLYING TO ROAD STANDARD PLANS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR ON THE PLANS, THEY ARE TO BE CONSTRUCTED ACCORDING TO THE MDOT STANDARD PLAN GIVEN BELOW OPPOSITE EACH ITEM UNLESS OTHERWISE INDICATED

GUARDRAIL AT BRIDGES AND EMBANKMENTS	R-59-E
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8 & MGS-8D	R-60-J
GUARDRAIL APPROACH TERMINALS TYPE 2M	R-62-H
GUARDRAIL DEPARTING TERMINALS TYPES TYPES B, T, MGS	R-66-E
GUARDRAIL LONG SPAN INSTALLATIONS	R-72-D
SOIL EROSION & SEDIMENTATION CONTROL MEASURES	R-96-E
SEEDING, & TREE PLANTING	R-100-H



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NOTES
CR-675 STREAM CROSSINGS PROJECT
LEELANAU COUNTY ROAD COMMISSION

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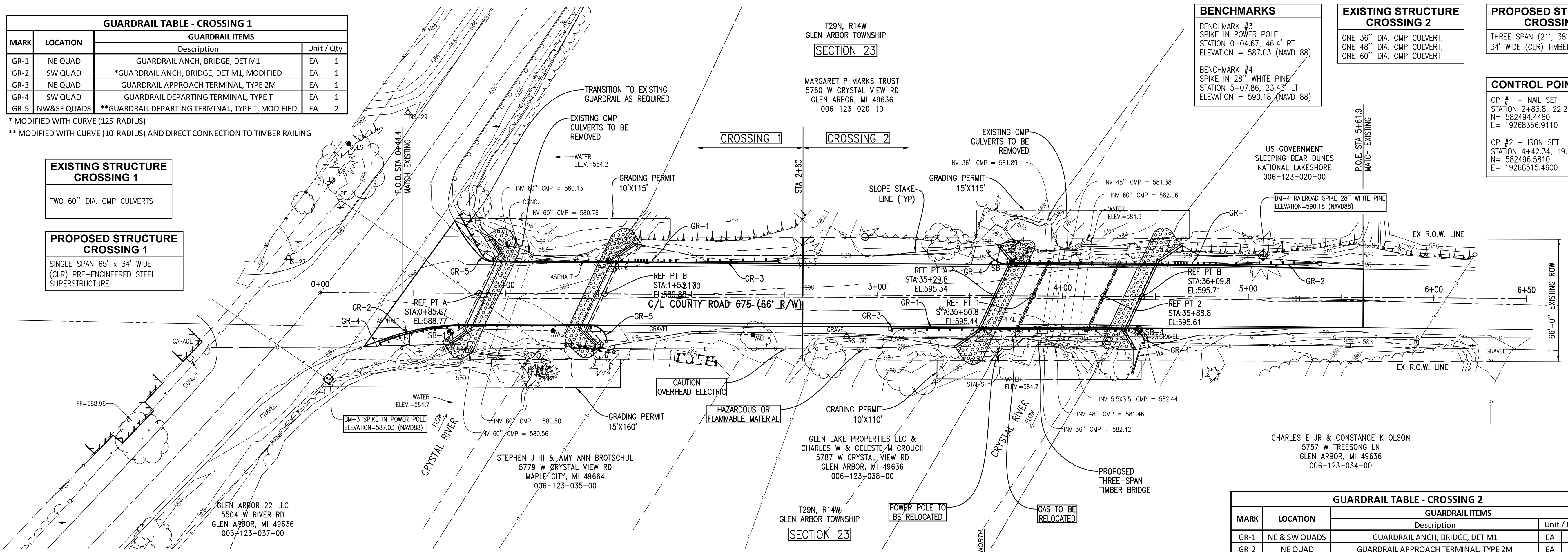
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GUARDRAIL TABLE - CROSSING 1			
MARK	LOCATION	GUARDRAIL ITEMS	
		Description	Unit / Qty
GR-1	NE QUAD	GUARDRAIL ANCH, BRIDGE, DET M1	EA 1
GR-2	SW QUAD	*GUARDRAIL ANCH, BRIDGE, DET M1, MODIFIED	EA 1
GR-3	NE QUAD	GUARDRAIL APPROACH TERMINAL, TYPE 2M	EA 1
GR-4	SW QUAD	GUARDRAIL DEPARTING TERMINAL, TYPE T	EA 1
GR-5	NW&SE QUADS	**GUARDRAIL DEPARTING TERMINAL, TYPE T, MODIFIED	EA 2

* MODIFIED WITH CURVE (125' RADIUS)
 ** MODIFIED WITH CURVE (10' RADIUS) AND DIRECT CONNECTION TO TIMBER RAILING

EXISTING STRUCTURE CROSSING 1
 TWO 60" DIA. CMP CULVERTS

PROPOSED STRUCTURE CROSSING 1
 SINGLE SPAN 65' x 34' WIDE (CLR) PRE-ENGINEERED STEEL SUPERSTRUCTURE



BENCHMARKS	
BENCHMARK #3	SPIKE IN POWER POLE STATION 0+04.67, 46.4' RT ELEVATION = 587.03 (NAVD 88)
BENCHMARK #4	SPIKE IN 28" WHITE PINE STATION 5+07.86, 23.43' LT ELEVATION = 590.18 (NAVD 88)

EXISTING STRUCTURE CROSSING 2
 ONE 36" DIA. CMP CULVERT,
 ONE 48" DIA. CMP CULVERT,
 ONE 60" DIA. CMP CULVERT

PROPOSED STRUCTURE CROSSING 2
 THREE SPAN (21', 38', 21') x
 34' WIDE (CLR) TIMBER BRIDGE

CONTROL POINTS
 CP #1 - NAIL SET
 STATION 2+83.8, 22.25' RT
 N = 582494.4480
 E = 19268356.9110
 CP #2 - IRON SET
 STATION 4+42.34, 19.46' RT
 N = 582496.5810
 E = 19268515.4600

GUARDRAIL TABLE - CROSSING 2			
MARK	LOCATION	GUARDRAIL ITEMS	
		Description	Unit / Qty
GR-1	NE & SW QUADS	GUARDRAIL ANCH, BRIDGE, DET M1	EA 2
GR-2	NE QUAD	GUARDRAIL APPROACH TERMINAL, TYPE 2M	EA 1
GR-3	SW QUAD	GUARDRAIL DEPARTING TERMINAL, TYPE T	EA 1
GR-4	NW & SE QUADS	*GUARDRAIL DEPARTING TERMINAL, TYPE T, MODIFIED	EA 2

* MODIFIED WITH CURVE (10' RADIUS) AND DIRECT CONNECTION TO TIMBER RAILING

THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF THE EXISTING CULVERTS AND GUARDRAIL CONSTRUCTION OF THE PROPOSED BRIDGE AND APPROACHES, RETAINING WALL, SLOPE RESTORATION, RIPRAP SCOUR PROTECTION, HMA PAVING, AND GUARDRAIL.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

COUNTY ROAD 675 TRAFFIC IS TO BE DETOURED OVER OTHER EXISTING ROADS.

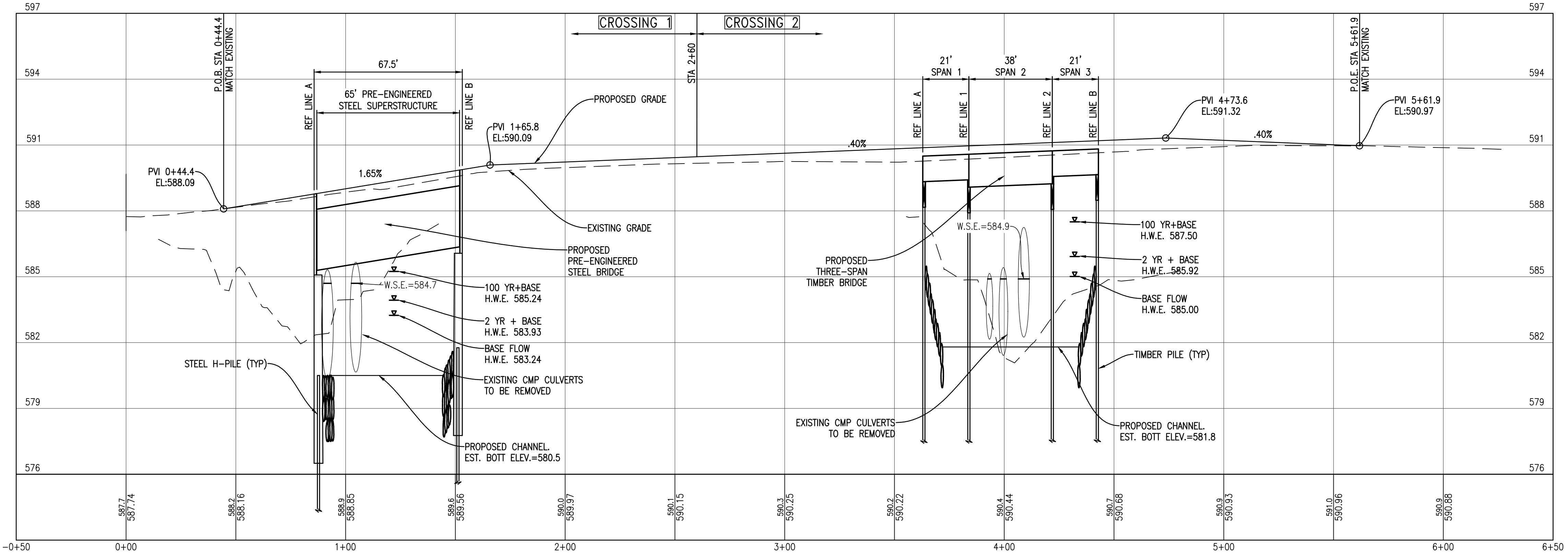
PLAN ELEVATIONS AND COORDINATES ARE BASED ON NAVD (88) AND NAD (83) DATUMS RESPECTIVELY.

WATER LEVEL IS SUBJECT TO CHANGE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING A DETERMINATION OF WATER LEVELS THAT MAY EXIST DURING CONSTRUCTION.

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE. IF DEBRIS FALLS INTO THE WATERWAY, IT SHALL BE REMOVED WITHIN 24 HOURS. SINCE DISTURBANCE OF THE WATERWAY BOTTOM MAY BE AS HARMFUL AS THE DEBRIS ITSELF, THE PREVENTATIVE MEASURES MUST BE EFFECTIVE.

IMMEDIATELY AFTER CONSTRUCTION OF AN ABUTMENT IS COMPLETED, SLOPE PROTECTION AND SEEDING OR SODDING SHALL BE PLACED ON THE ADJACENT SLOPES.

FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THIS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.



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3	12-10-2021	ROAD COMMISSION REVIEW	RNV
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1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RNV

GENERAL PLAN OF SITE - M-22 CROSSINGS 1 & 2
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

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**SOIL BORINGS - CROSSING 1
 CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION**

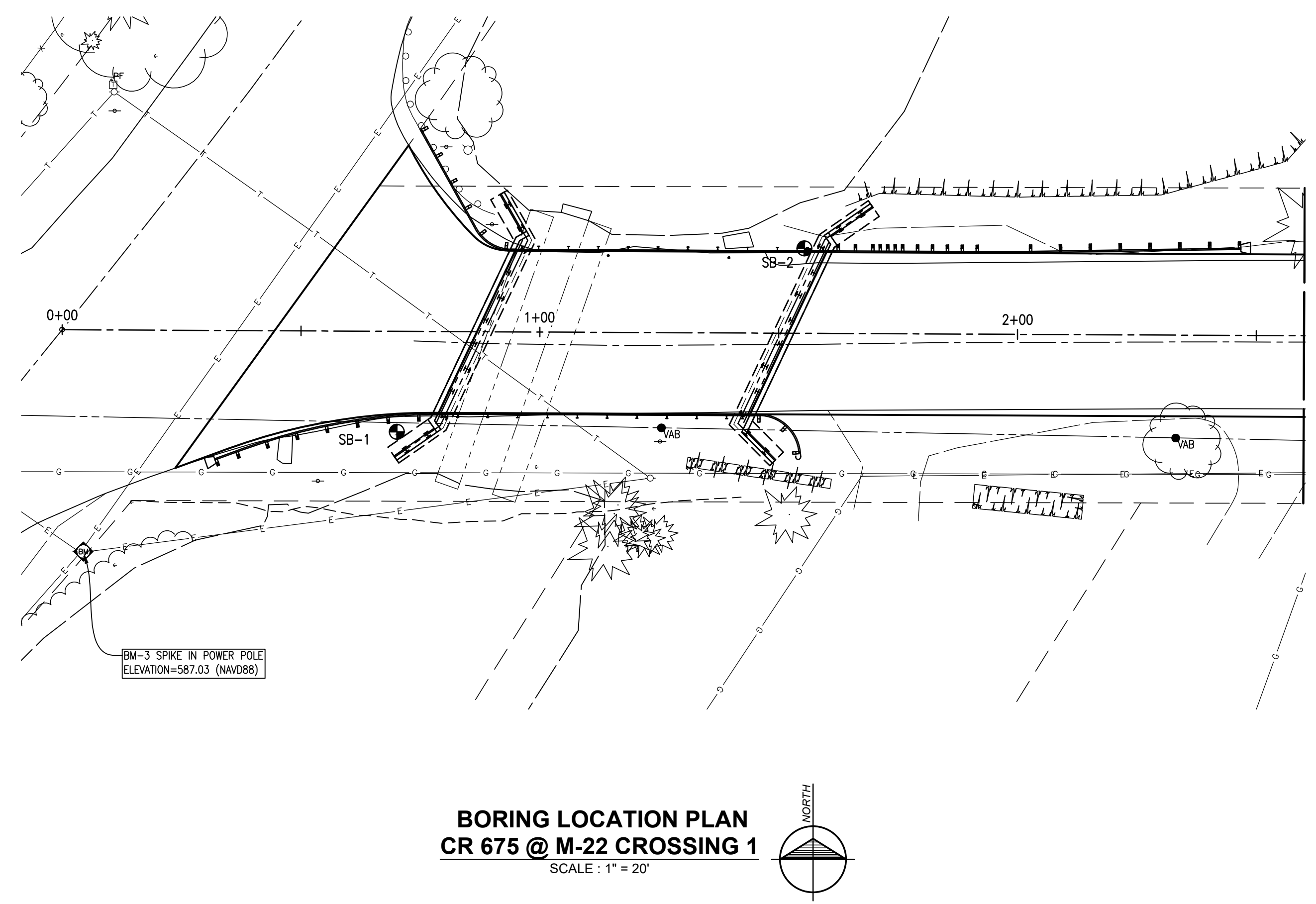
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PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-1								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/10/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): 4.25" TOTAL DEPTH (FT): 30								
DRILLER: M. Allen LOGGED BY: M. Korndorfer		STATIC WATER LEVEL: 2.5 CAVING DEPTH: 2.5								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (psi)	TEST RESULTS
ELEV.=587.4	[Graphic]	Gravelly SAND (SP) - few cobbles - very loose - dark brown - wet below 3-ft bgs	0	SS1	6	6	2	Drove Rock	-	Plastic Limit — Liquid Limit Water Content - X % SPT RESULT - ▲ N Value 10 20 30 40 50
			5	SS2	2	2	1			
STREAM BED ELEV.=580.5	[Graphic]	Fine to coarse SAND (SP) - little fine gravel - loose - brown	6	SS3	2	2	5			
			10	SS4	10	4	5			
ABUT A EST SCOUR ELEV.=575.3	[Graphic]	Fine GRAVEL (GP) - little sand - loose - brown	10	SS5	18	10	15			
			15	SS5	18	10	15			
MIN. PILE TIP ELEV.=565.3 EST. PILE TIP ELEV.=565.3	[Graphic]	Fine to coarse SAND (SP) - occasional gravel seams - medium dense - brown	20	SS6	18	27	26			
			24	SS7	18	10	15			
	[Graphic]	Fine to medium SAND (SP) - little silt - trace coarse sand - medium dense - brown	25	SS7	18	10	15			
			30	SS8	18	24	24			
Boring terminated at 30 ft.										



**BORING LOCATION PLAN
 CR 675 @ M-22 CROSSING 1**
 SCALE: 1" = 20'

NOTES:
 NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1 1/2" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140# HAMMER FALLING 30".

12 1st 6"
 13 2nd 6"
 14 3rd 6"

CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.

THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.

PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-2								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/10/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): 4.25" TOTAL DEPTH (FT): 30								
DRILLER: M. Allen LOGGED BY: M. Korndorfer		STATIC WATER LEVEL: 3 CAVING DEPTH: 3								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (psi)	TEST RESULTS
ELEV.=587.7	[Graphic]	TOPSOIL - sandy - black	0	SS1	10	2				Plastic Limit — Liquid Limit Water Content - X % SPT RESULT - ▲ N Value 10 20 30 40 50
			1	SS1	10	2				
STREAM BED ELEV.=580.5	[Graphic]	Fine to medium SAND (SP) - little silt - trace organics very loose - dark brown	3.5	SS2	14	1				
			5	SS3	18	2				
ABUT B EST SCOUR ELEV.=578.4	[Graphic]	Fine to coarse SAND (SP) - occasional gravelly sand seams - loose to very dense - brown - wet	10	SS4	18	6	6			
			15	SS5	18	15	16			
MIN. PILE TIP ELEV.=568.4 EST. PILE TIP ELEV.=568.4	[Graphic]	Fine to medium SAND (SP) - little silt - trace coarse sand - medium dense - brown	20	SS6	4	2	2			
			24	SS7	18	8	8			
	[Graphic]	Fine to medium SAND (SP) - little silt - trace coarse sand - medium dense - brown	25	SS7	18	14	14			
			30	SS8	0	7	7			
Boring terminated at 30 ft.										

FLOOD DATA	BASE + FLOOD (CFS)	EXISTING				PROPOSED				WATERWAY AREA (SFT) AT D/S FACE	CHANGE IN WS ELEV. U/S OF PROPOSED STRUCTURE (FT)
		WATER SURF. ELEV. (FT)	VELOCITY (FPS)	U/S CHANNEL (200 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)	WATER SURF. ELEV. (FT)	VELOCITY (FPS)	U/S CHANNEL (200 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)		
		U/S FACE OF CULVERTS	D/S FACE OF CULVERTS	U/S FACE OF BRIDGE	D/S FACE OF BRIDGE	U/S FACE OF BRIDGE	D/S FACE OF BRIDGE	U/S CHANNEL (200 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)		
BASE	35	583.36	583.23	0.3	0.6	583.24	583.23	0.3	0.2	146.7	-0.12
2-YR	70	584.20	583.93	0.4	0.9	583.93	583.93	0.4	0.4	215.2	-0.27
50-YR	145	585.71	584.99	0.6	1.6	585.00	584.99	0.7	0.6	242.9	-0.71
100-YR	165	586.18	585.22	0.6	1.7	585.24	585.23	0.7	0.7	256	-0.94

THE BASE + FLOOD FLOW ASSUMES A 35 CFS BASE FLOW FROM WATERSHED.

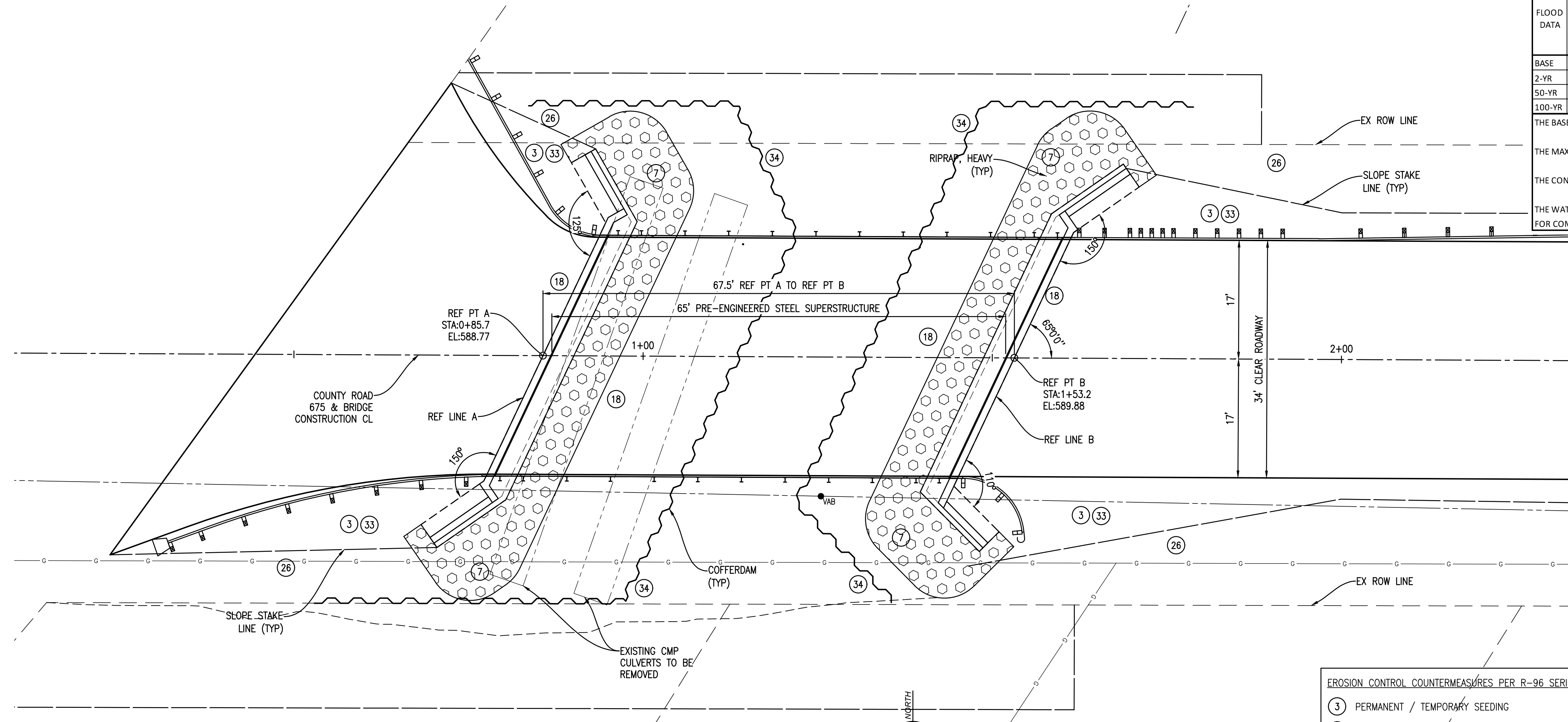
THE MAXIMUM AREA BELOW LOW CHORD IS 335.8.2 SQUARE FEET.

THE CONTRIBUTING DRAINAGE AREA TO THIS CROSSING IS 34.5 SQUARE MILES.

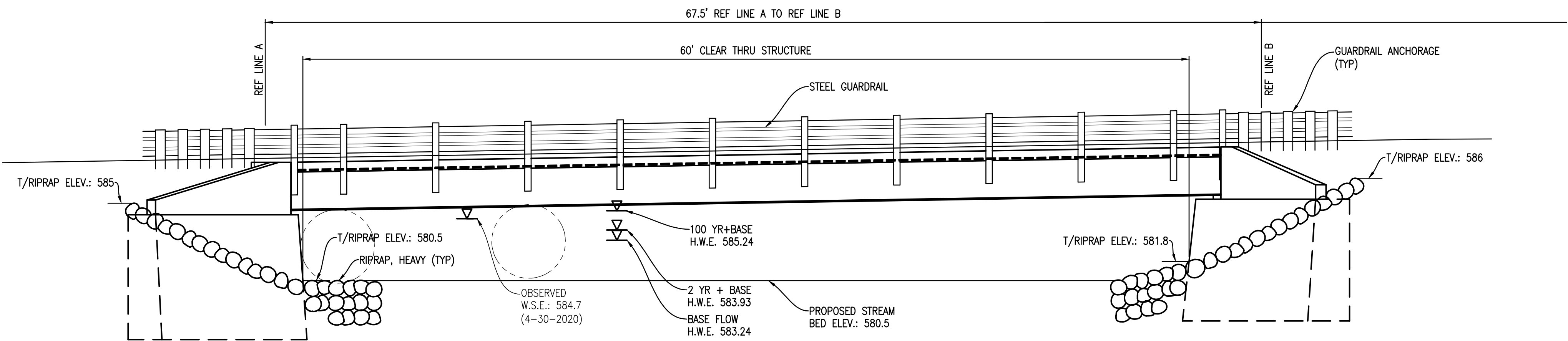
THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON THIS HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOOD PLAIN.

MISCELLANEOUS QUANTITIES	
1	LS MOBILIZATION
1	LS TRAFFIC CONTROL
2	EA CULV. REM. OVER 48 INCH
25	FT GUARDRAIL, REM
50	CYD EMBANKMENT, CIP
900	CYD EXCAVATION, CHANNEL
400	CYD EXCAVATION, EARTH
500	CYD BACKFILL, STRUCTURE, CIP
500	CYD EXCAVATION, FDN
2	EA EROSION CONTROL, FILTER BAG
100	FT EROSION CONTROL, SILT FENCE
700	SYD AGGREGATE BASE, 6 INCH
70	SYD SHOULDER, CL II, 3 INCH
850	SYD HMA SURFACE, REM
230	TON HMA, 4E1
1	LS COFFERDAMS
1	LS PREFABRICATED BRIDGE SUPERSTRUCTURE, FURN
1	LS PREFABRICATED BRIDGE SUPERSTRUCTURE, ERECT
1	EA GUARDRAIL ANCH. BRIDGE, DET M1
1	EA GUARDRAIL ANCH. BRIDGE, DET M1, MODIFIED
1	EA GUARDRAIL APPROACH TERMINAL, TYPE 2M
1	EA GUARDRAIL DEPARTING TERMINAL, TYPE T
2	EA GUARDRAIL DEPARTING TERMINAL, TYPE T, MODIFIED
6	EA GUARDRAIL REFLECTOR
150	SYD RIPRAP, HEAVY
235	SYD SLOPE RESTORATION
1	LS UTILITY POLE RELOCATION

- EROSION CONTROL COUNTERMEASURES PER R-96 SERIES STANDARD PLAN
- (3) PERMANENT / TEMPORARY SEEDING
 - (7) RIPRAP
 - (18) DEWATERING WITH FILTER BAG
 - (26) SILT FENCE
 - (33) MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS
 - (34) COFFERDAMS



STRUCTURE PLAN
 SCALE: 1" = 10'



STRUCTURE ELEVATION
 NO SCALE

THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT ASSHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEN PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/800 OF THE SPAN LENGTH.

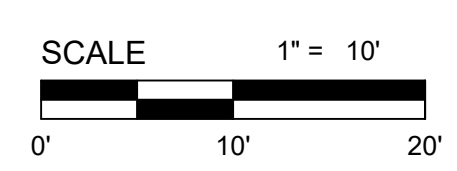
WITHOUT THE PREVENTIVE MEASURES SHOWN ON THESE PLANS, THERE IS A POSSIBILITY THAT STREAM BED SCOUR MAY OCCUR. THE ESTIMATED TOTAL SCOUR DEPTH IS CALCULATED TO BE 5.2 FEET AT ABUTMENT A AND 2.1 FEET AT ABUTMENT B. THESE DEPTHS ARE BASED ON A 500 YEAR RUNOFF EVENT.

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN PAYMENT FOR RIPRAP.

THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED.

THE INTENT OF THE FLOW DIVERSION AND STAGING SEQUENCE DESCRIBED IS TO FACILITATE RIPRAP PLACEMENT, CONTAIN SEDIMENTATION, AND MAINTAIN STREAM FLOW. ALTERNATE METHODS OF STREAM DIVERSION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

RIPRAP SHALL BE NATURAL FIELD STONE.



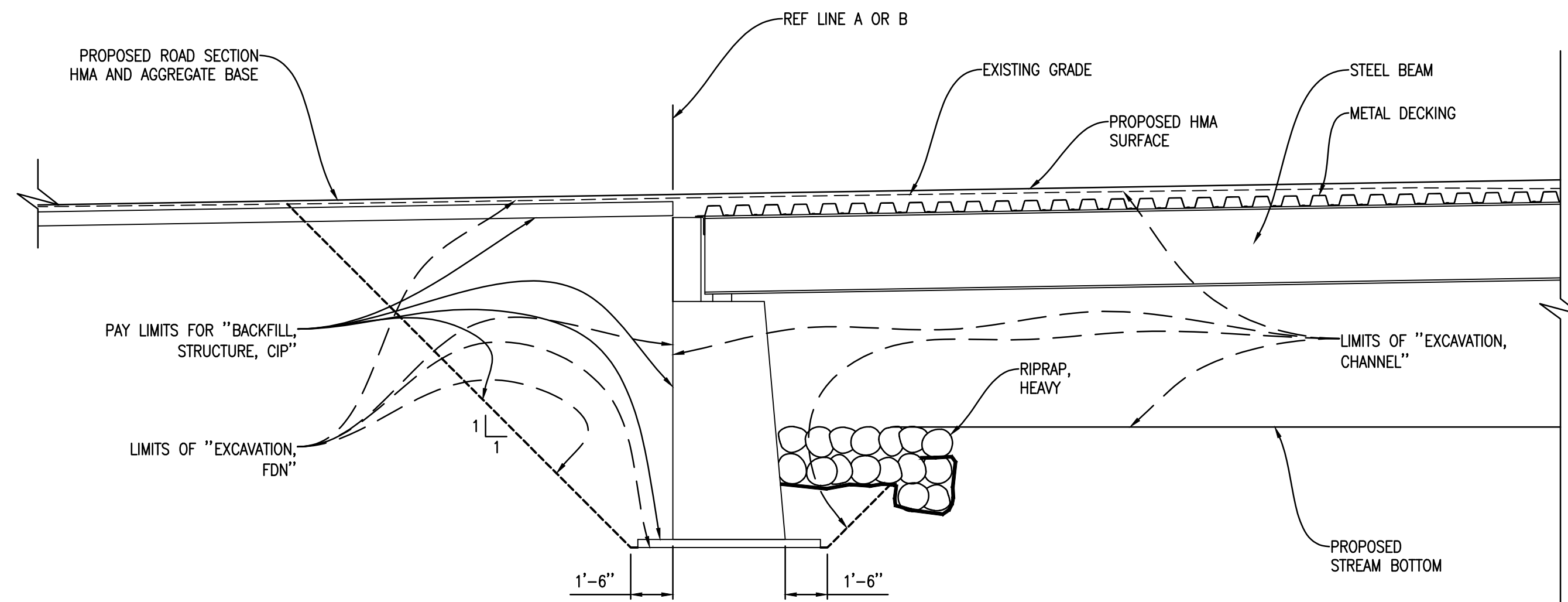
GENERAL PLAN OF STRUCTURE - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
 LEELELANU COUNTY ROAD COMMISSION

Date Issued: 05-27-2022
 Date Surveyed: 04-30-2020
 Designed By: RMV
 Drawn By: RMV
 Checked By: MAG
 Scale: AS NOTED

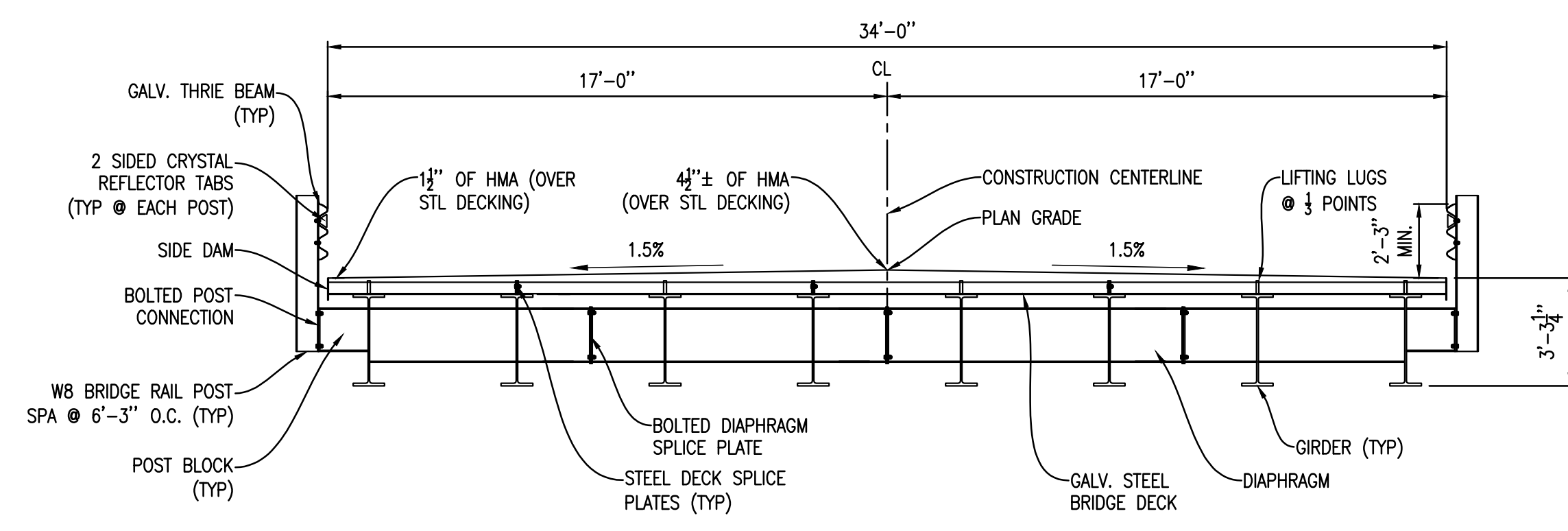
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 SECTIONS 23 & 24
 T29N, R14W
 GLEN ARBOR TOWNSHIP
 LEELELANU COUNTY
 MICHIGAN

Project Number:
 2020430002

Sheet:
C1.3

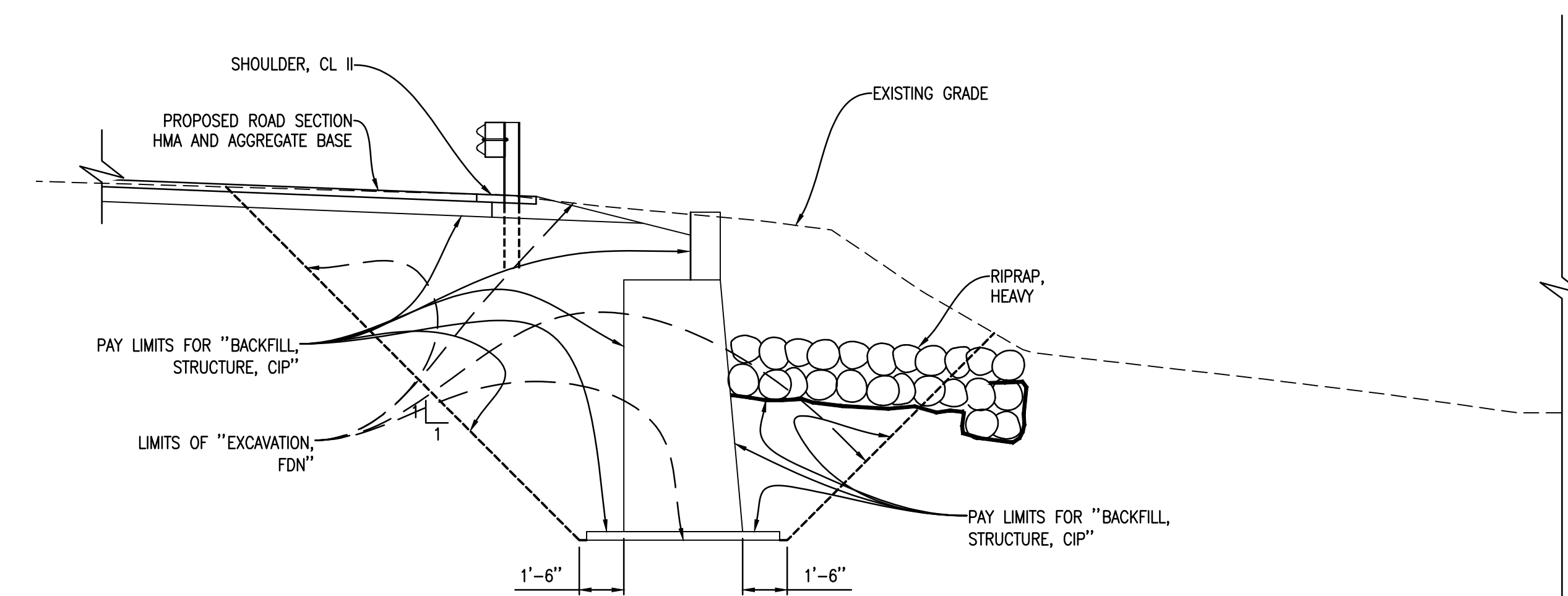


TYPICAL ABUTMENT SECTION

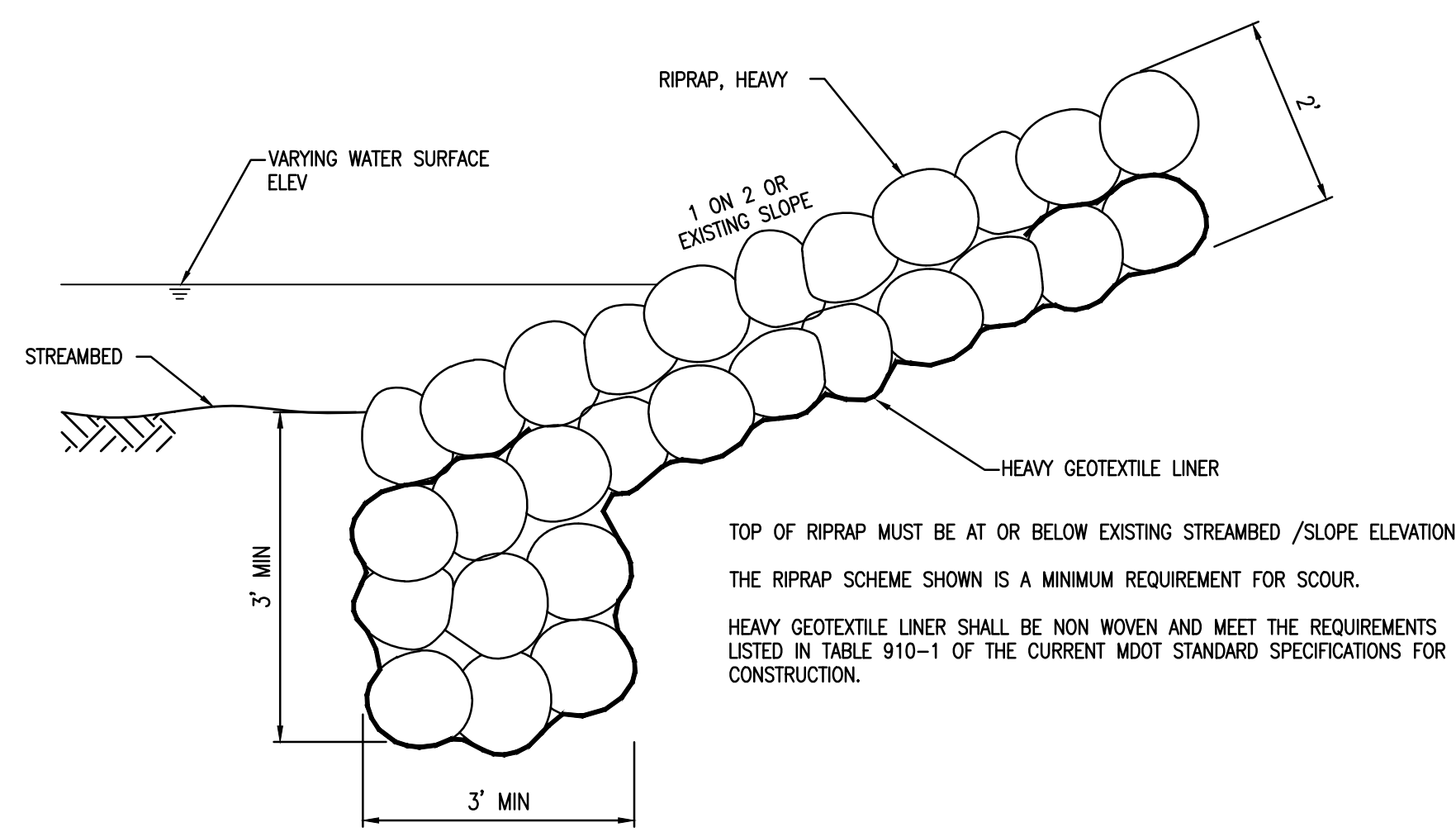


NOTES:
 SEE TYPICAL APPROACH SECTION FOR HMA TYPE
 CONSTRUCT CROWN ACROSS BRIDGE DECK BY FILLING STEEL DECKING AND WEDGING BASE LAYER.
 TRANSITION FROM 2% APPROACH CROSS-SLOPE TO 1.5% DECK CROSS-SLOPE IN 25' LENGTH OF APPROACH AT EACH END OF BRIDGE.

TYPICAL DECK SECTION
 PRE-ENGINEERED STEEL SUPERSTRUCTURE



TYPICAL WINGWALL SECTION



TOP OF RIPRAP MUST BE AT OR BELOW EXISTING STREAMBED /SLOPE ELEVATION.
 THE RIPRAP SCHEME SHOWN IS A MINIMUM REQUIREMENT FOR SCOUR.
 HEAVY GEOTEXTILE LINER SHALL BE NON WOVEN AND MEET THE REQUIREMENTS LISTED IN TABLE 910-1 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

TYPICAL RIPRAP HEADER DETAIL

No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

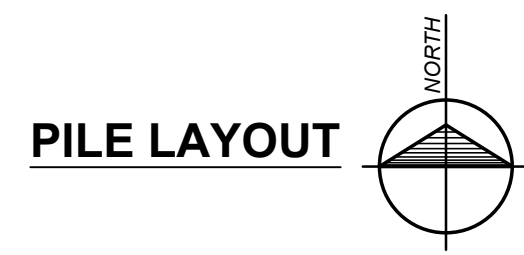
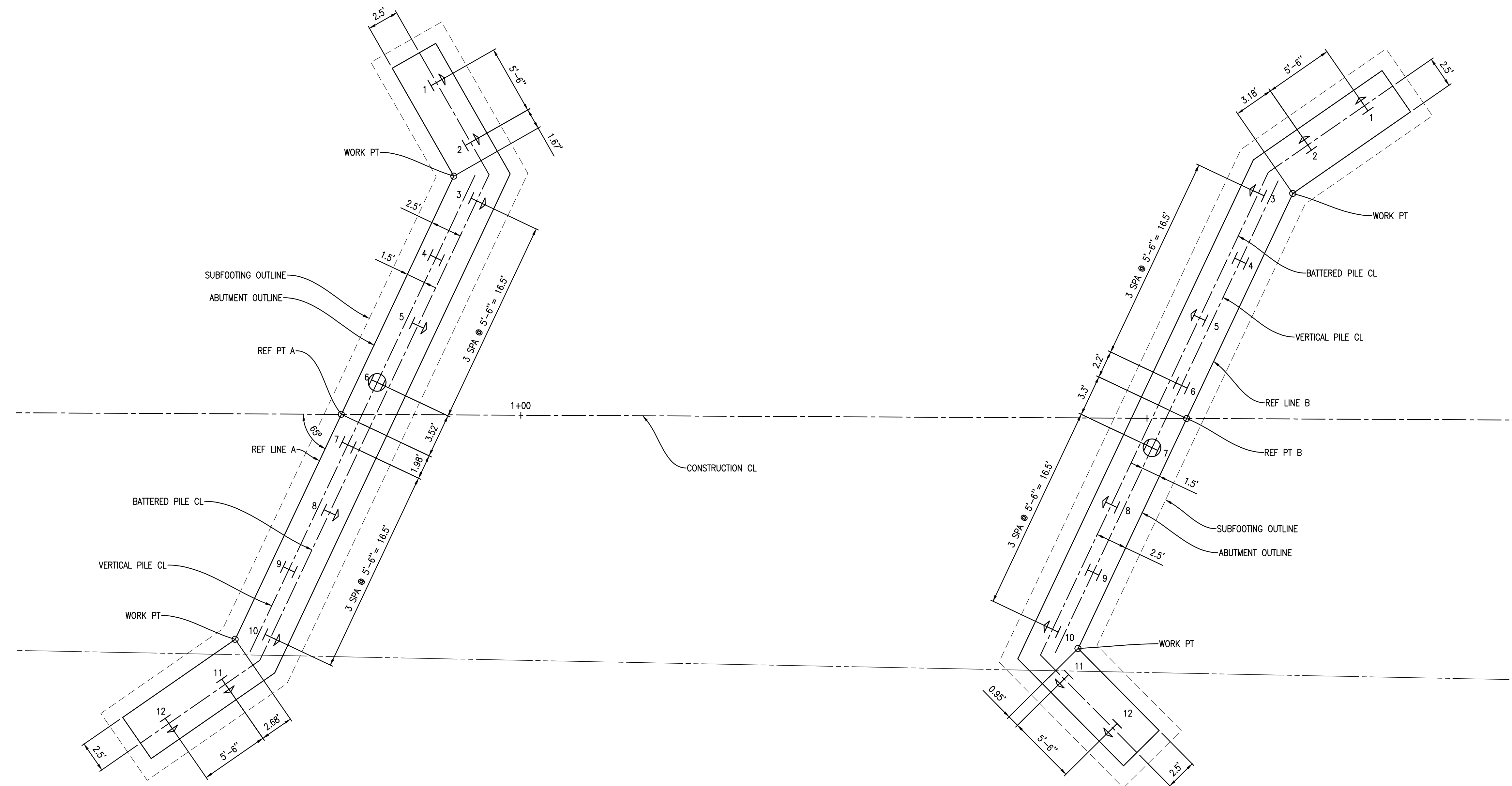
GENERAL PLAN OF STRUCTURE - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

Date Issued: 05-27-2022
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PILE LAYOUT

MISCELLANEOUS QUANTITIES		
1	LS	PILE DRIVING EQUIPMENT, FURN
500	FT	PILE, STEEL, FURN AND DRIVEN, 12 INCH
2	EA	TEST PILE, STEEL, 12 INCH
24	EA	PILE POINT, STEEL

H PILES				
LOCATION	PILE TYPE	NUMBER OF PILES	ESTIMATED LENGH FURNISHED	
			EACH (FT)	TOTAL (FT)
ABUT A	TEST	1	30	30
	VERTICAL	3	20	60
	BATTERED	8	20	160
ABUT B	TEST	1	30	30
	VERTICAL	3	20	60
	WINGWALL	8	20	160
TOTAL		24		500

- H DENOTES VERTICAL PILES.
- H DENOTES BATTERED PILES.
- ⊕ DENOTES TEST PILES.

DRIVE ALL PILES TO A NOMINAL PILE DRIVING RESISTANCE NOT LESS THAN 210 KIPS. DETERMINE NOMINAL PILE DRIVING RESISTANCE (R_{ndr}) USING THE FHWA MODIFIED GATES DYNAMIC FORMULA.

PILES SHALL BE HP12X53

THE ESTIMATED PILE LENGTH IS BASED ON THE STATIC ANALYSIS.

THE ESTIMATED LOSS OF NOMINAL PILE RESISTANCE DUE TO SCOUR AFTER DRIVING IS 6 KIPS.

THE ESTIMATED FACTORED DOWNDRAG AFTER PILE DRIVING IS 0 KIPS.

THE FACTORED PILE RESISTANCE AVAILABLE TO RESIST ALL FACTORED LOADS IS EQUAL TO 50 PERCENT OF NOMINAL PILE DRIVING RESISTANCE THAT IS REDUCED BY THE LOSS DUE TO SCOUR.

No.	Date	Revision	By
4	01-27-2022	ISSUED FOR PERMITS	RMV
3	12-10-2021	ROAD COMMISSION REVIEW	RMV
2	02-05-2021	PARTNER REVIEW/PLAN SET	RMV
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RMV

PILE DETAILS - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

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Sheet:
C1.5

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No.	Date	Revision	By
4	01-27-2022	ISSUED FOR PERMITS	RNV
3	12-10-2021	ROAD COMMISSION REVIEW	RNV
2	02-05-2021	PARTNER REVIEW PLAN SET	RNV
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RNV

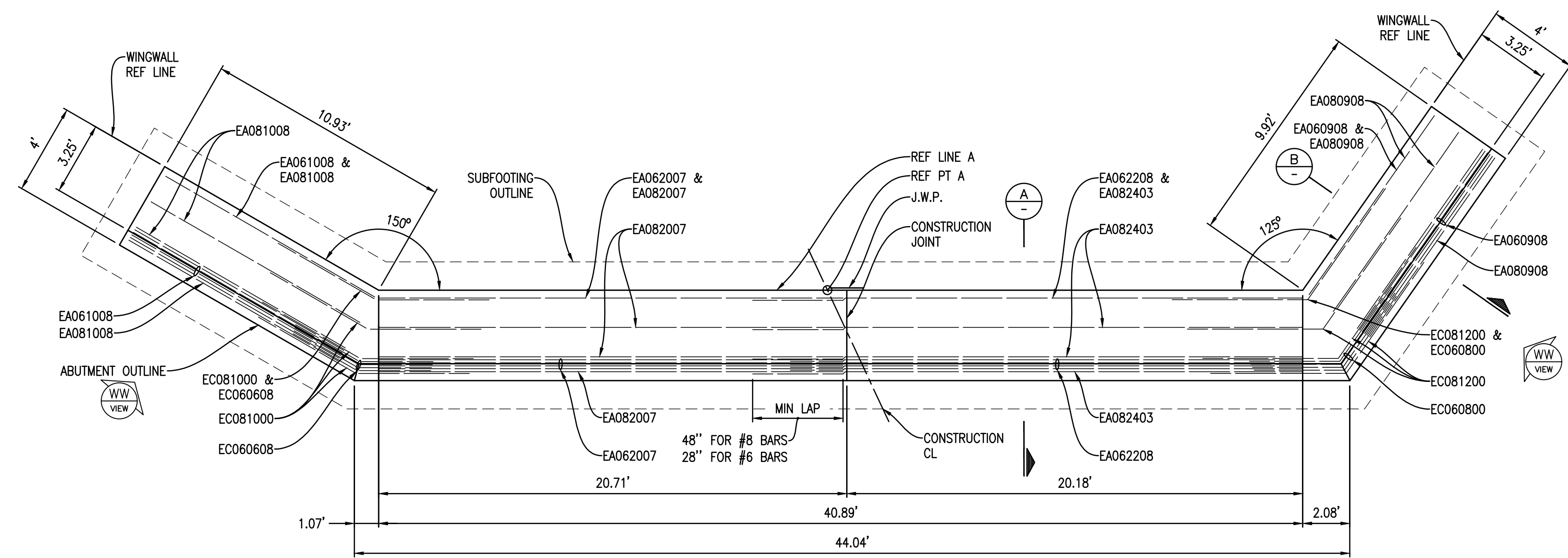
ABUTMENT A DETAILS - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
 LEELENAU COUNTY ROAD COMMISSION

Date Issued: 05-27-2022
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 Designed By: RMV
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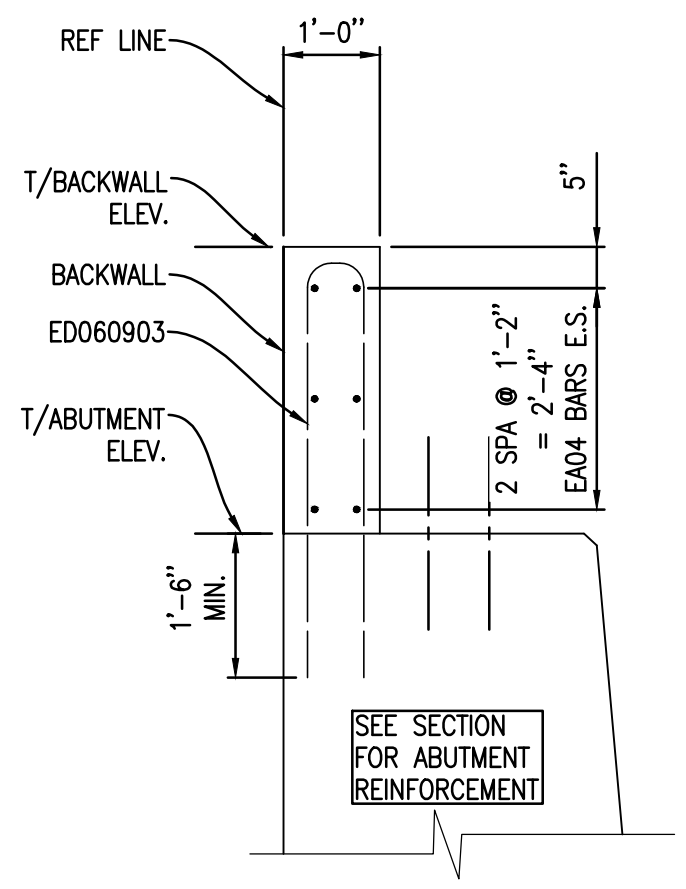
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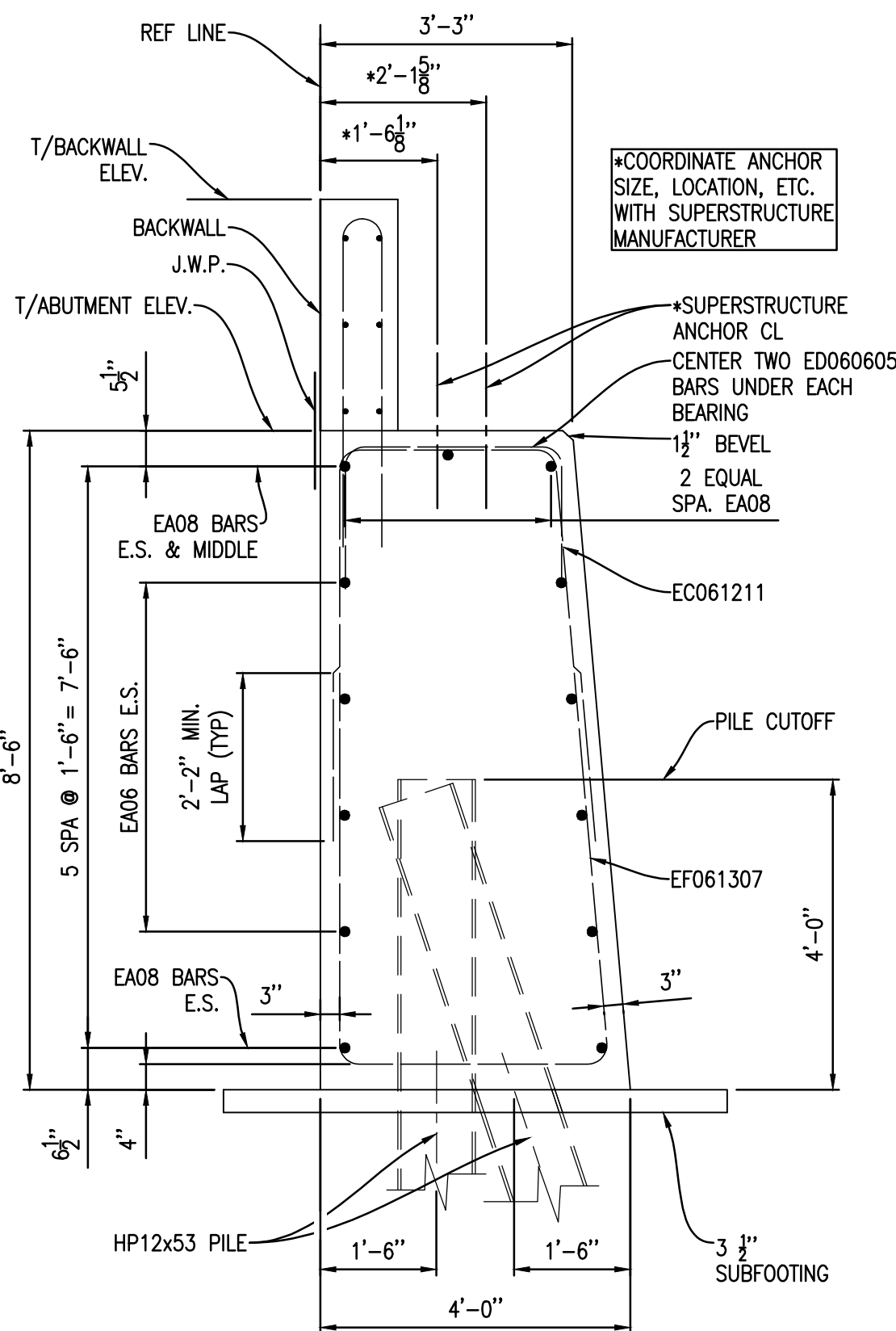
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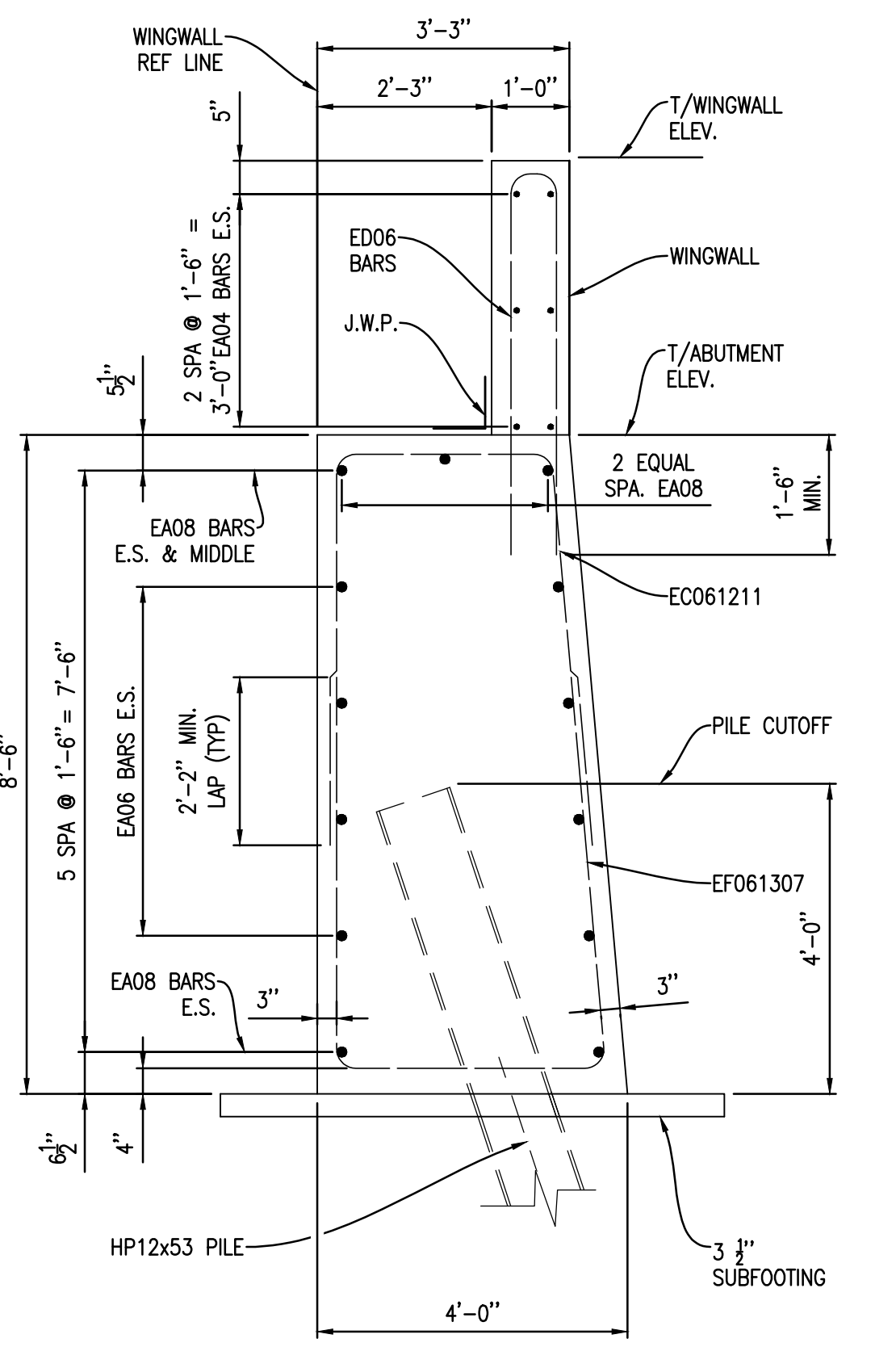
PLAN - ABUTMENT A



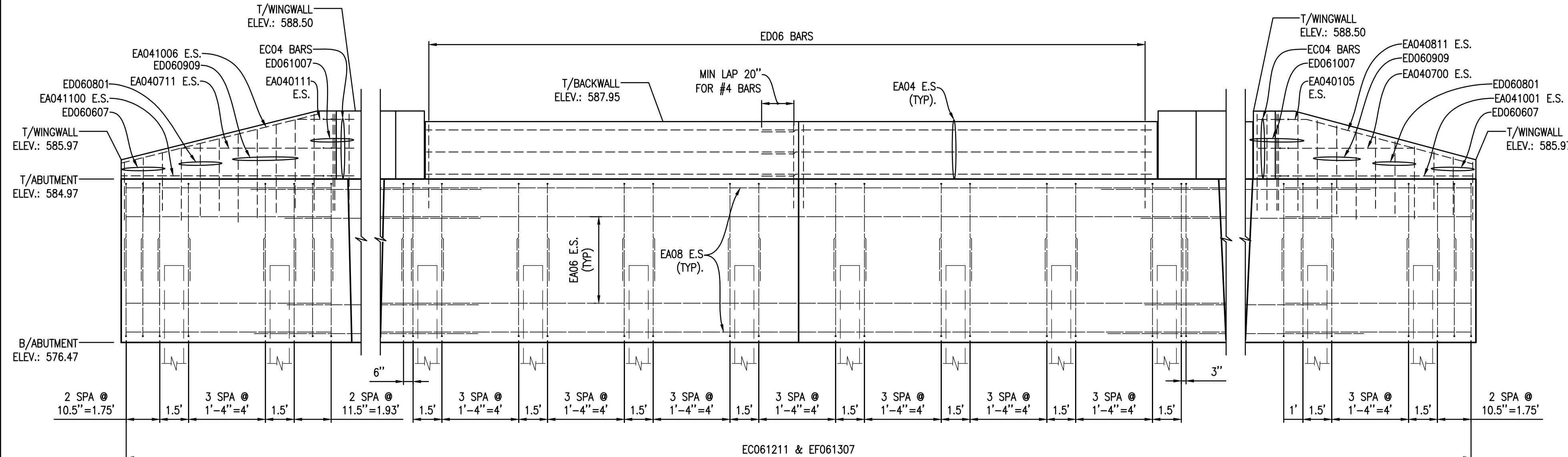
BACKWALL DETAIL SECTION A



SECTION A



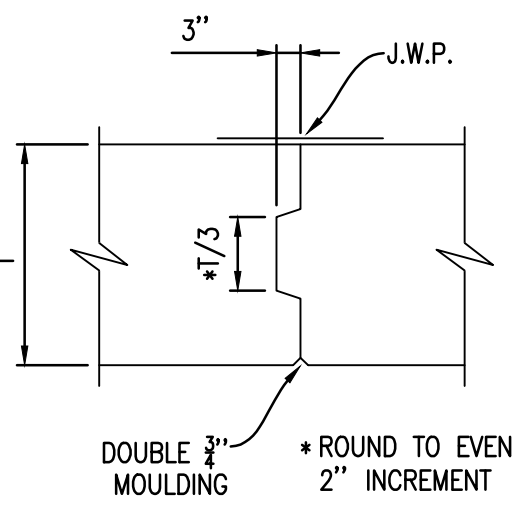
SECTION B



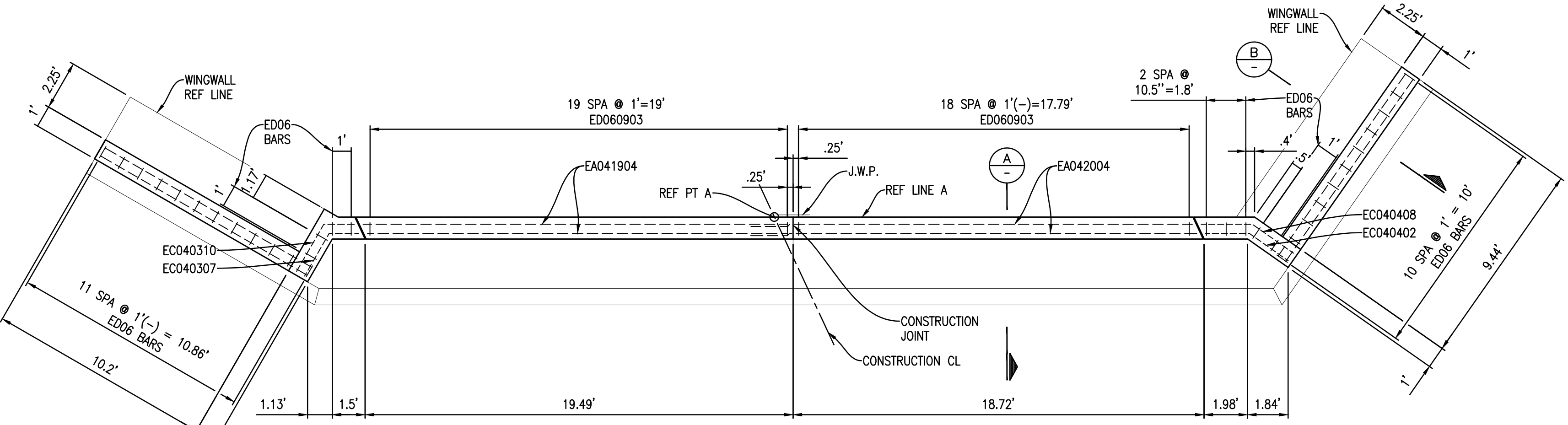
S. WINGWALL ELEVATION VIEW

ABUTMENT A ELEVATION VIEW (LOOKING WEST)

N. WINGWALL ELEVATION VIEW



CONSTRUCTION JOINT DETAIL



PLAN - ABUTMENT A BACKWALL & WINGWALLS

MISCELLANEOUS QUANTITIES

5	CYD	CONC, GRADE S2, SUBFOOTING
80	CYD	SUBSTRUCTURE CONC
10	CYD	SUPERSTRUCTURE CONC
.5	LS	SUPERSTRUCTURE CONC, FORM, FINISH, AND CURE
115	SFT	JOINT WATERPROOFING

No.	Date	Revision	By
4	01-27-2022	ISSUED FOR PERMITS	RNV
3	12-10-2021	ROAD COMMISSION REVIEW	RNV
2	02-05-2021	PARTNER REVIEW/PLAN SET	RNV
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RNV

No.	Date	Revision	By
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RNV

ABUTMENT B DETAILS - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
 LEELELANU COUNTY ROAD COMMISSION

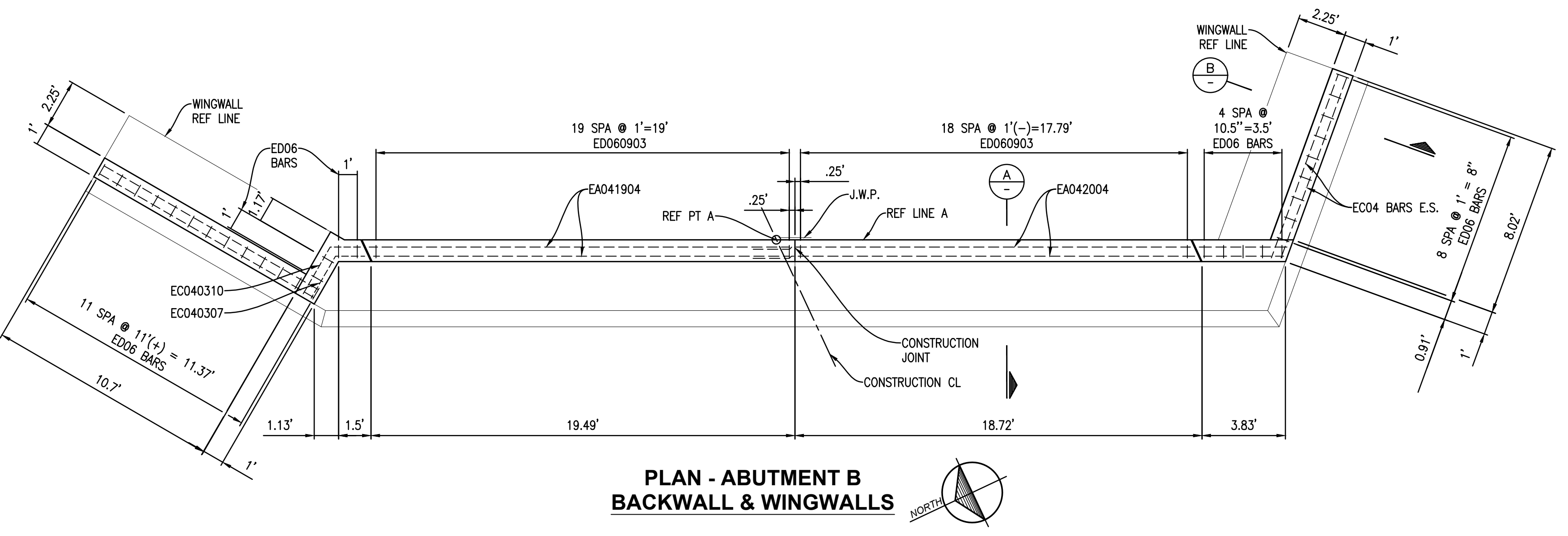
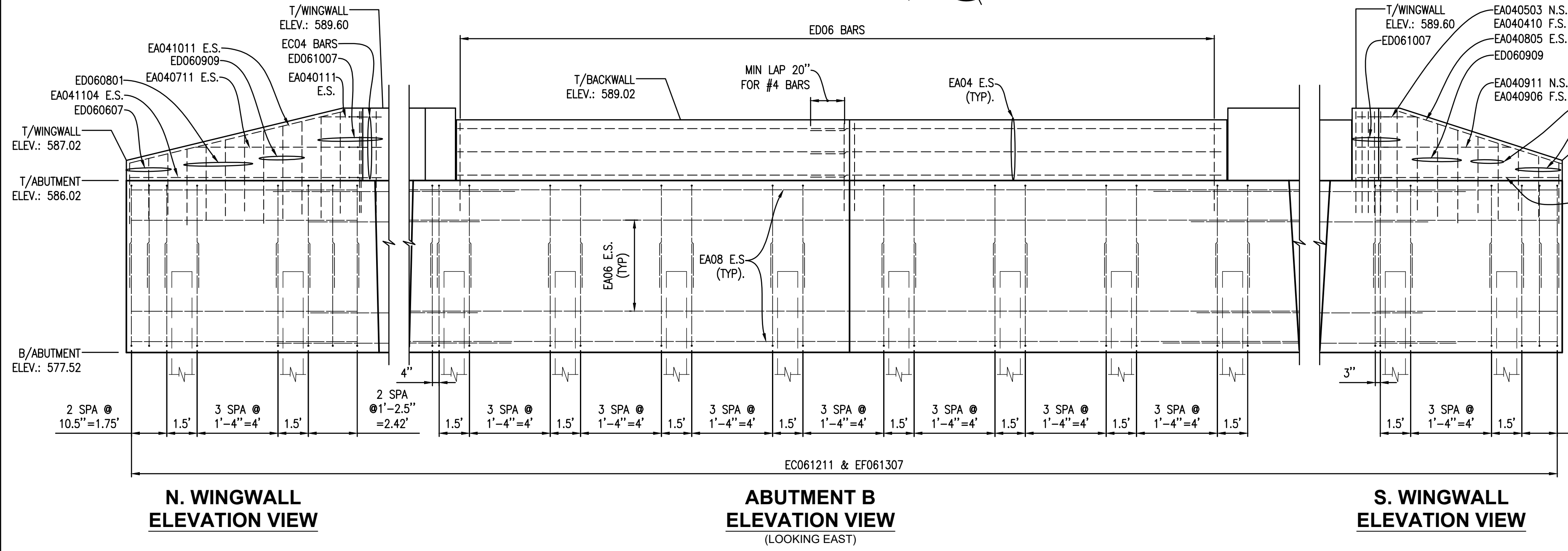
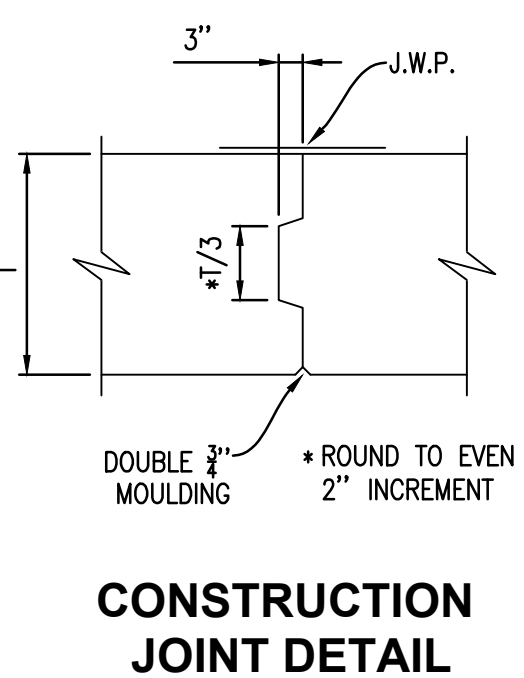
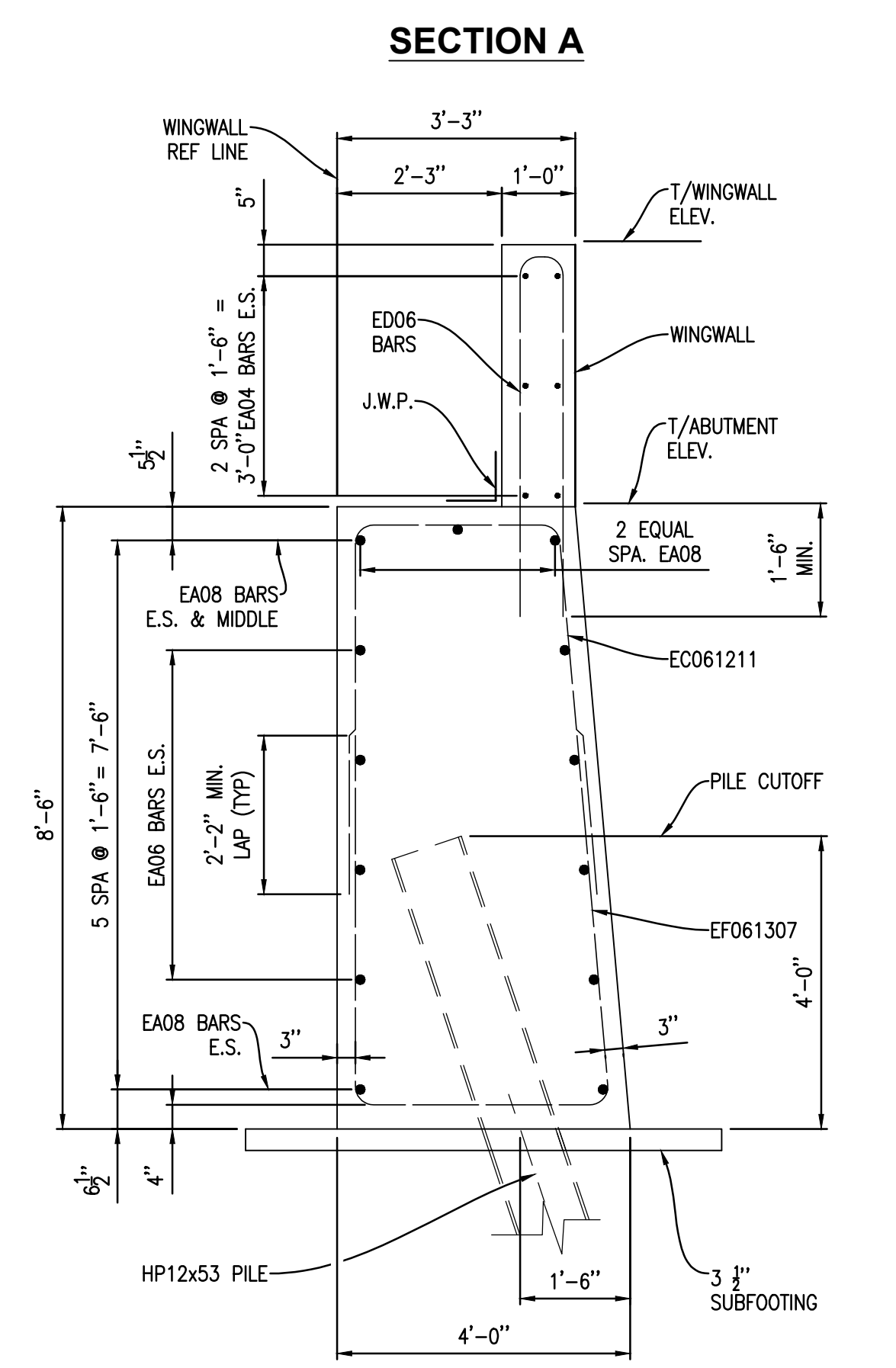
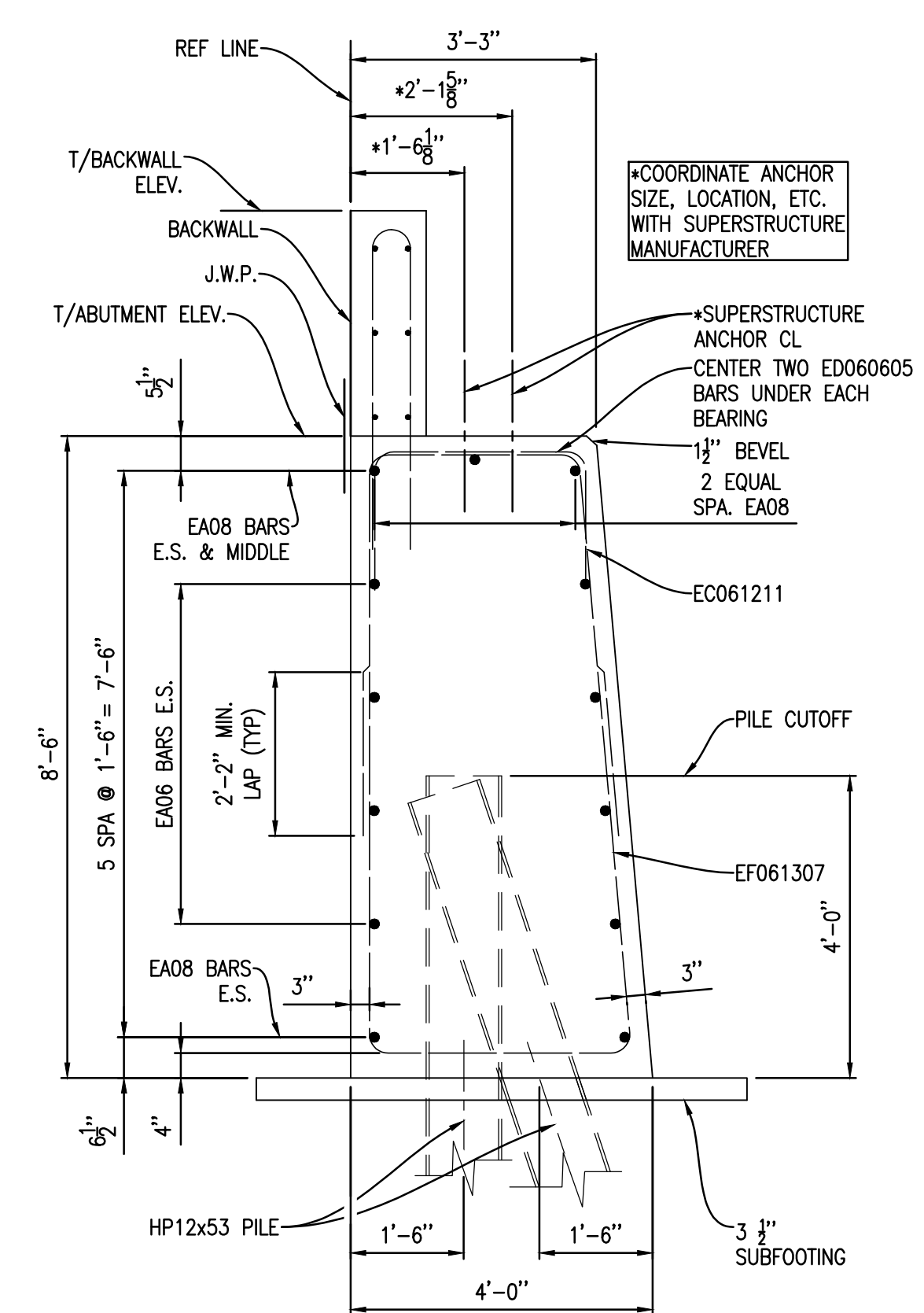
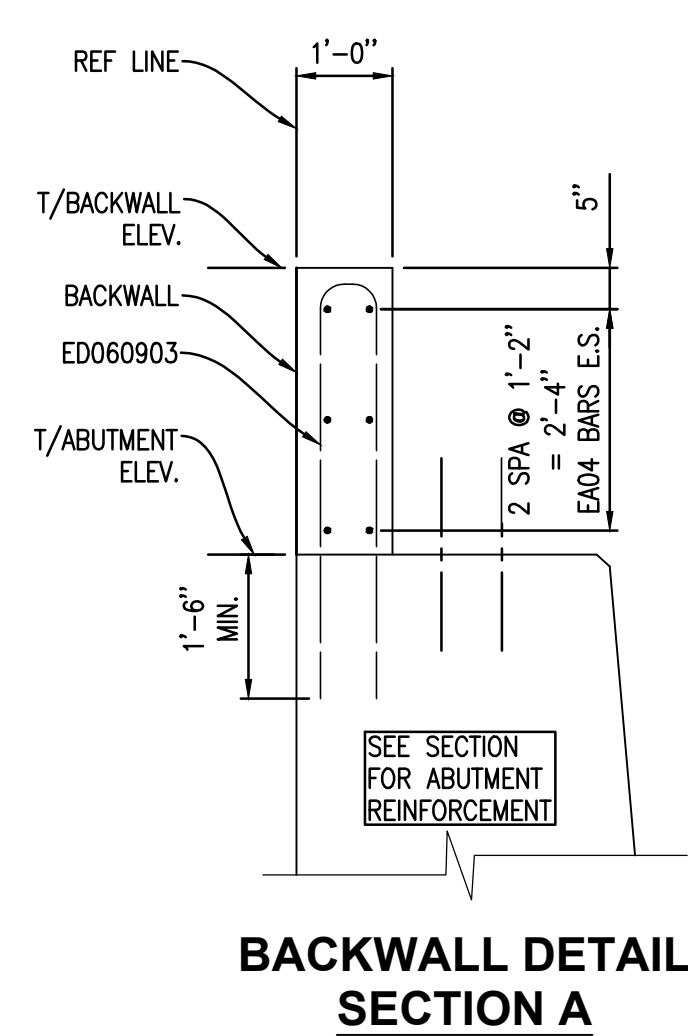
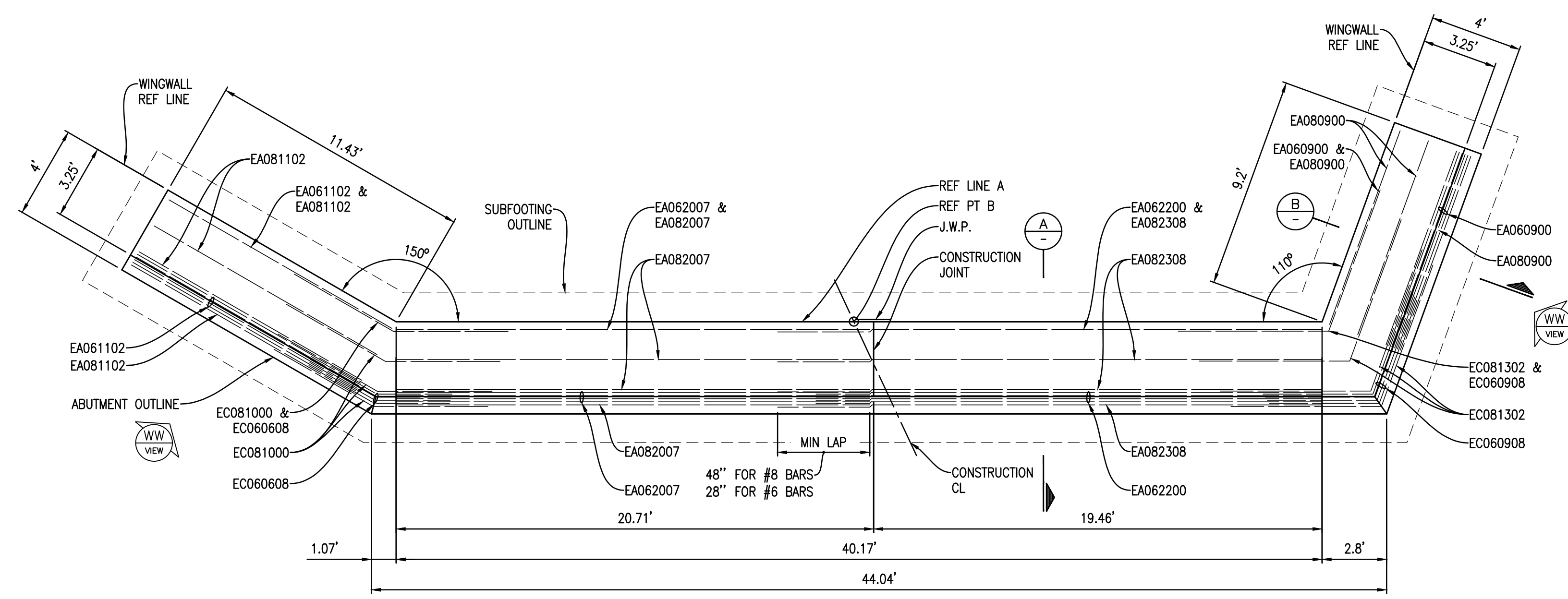
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MISCELLANEOUS QUANTITIES

5	CYD	CONC. GRADE S2, SUBFOOTING
80	CYD	SUBSTRUCTURE CONC
10	CYD	SUPERSTRUCTURE CONC
.5	LS	SUPERSTRUCTURE CONC. FORM, FINISH, AND CURE
115	SFT	JOINT WATERPROOFING

BAR	DIMENSIONS												NO. REQ'D	TOTAL WT.
	a	b	c	d	e	f	g	h	j	k	m	p		
EC061211		2'-9 1/2"	0'-5 1/2"	5'-0 1/2"	5'-1"		5'-0 1/2"						51	989.4
EF061307	3'-5 1/2"			5'-0 1/2"			5'-1"	0'-5 1/2"	5'-0 1/2"				51	1040.5
EA081008	10'-8"												5	142.4
EA082007	20'-7"												5	274.8
EA082403	24'-3"												5	323.7
EA080908	9'-8"												5	129.0
EC081000	4'-4"	5'-0"				2'-6"	5'-0"						5	133.5
EC081200		6'-0"	3'-5 1/2"	4'-11"	6'-0"								5	160.2
EA061008	10'-8"												8	128.2
EA062007	20'-7"												8	247.3
EA062208	22'-8"												8	272.4
EA060908	9'-8"												8	116.1
EC060608	2'-10 1/2"	3'-4"				1'-8"	3'-4"						8	80.1
EC060800		4'-0"	2'-3 1/2"	3'-3 1/2"	4'-0"								8	96.1
ED060605	1'-10"	2'-9"	1'-10"										20	192.8
SUBTOTAL													4326.6	

BACKWALL A														
EA041904	19'-4"												6	77.5
EA042004	20'-4"												6	81.5
ED060903	4'-4"	0'-7"	4'-4"										39	541.8
SUBTOTAL													700.8	

EA040111	1'-11"												2	2.6
EA040711	7'-11"												2	10.6
EA041100	11'-0"												2	14.7
EA041006	10'-6"												2	14.0

WINGWALL CAPS A														
EC040310	0'-8 1/2"	2'-5 1/2"			1'-2 1/2"	1'-4 1/2"							3	7.7
EC040307	0'-8"	2'-3"			1'-2"	1'-4"							3	7.2
EC040402	1'-7 1/2"	2'-2"			1'-2"	2'-0"							3	8.3
EC040408	1'-11"	2'-4"			1'-4"	2'-4"							3	9.4
EA040105	1'-5"												2	1.9
EA040700	7'-0"												2	9.4
EA041001	10'-1"												2	13.5
EA040811	8'-11"												2	11.9

ED061007	5'-0"	0'-7"	5'-0"										13	206.6
ED060909	4'-7"	0'-7"	4'-7"										7	102.5
ED060801	3'-9"	0'-7"	3'-9"										6	72.8
ED060607	3'-0"	0'-7"	3'-0"										6	59.3
SUBTOTAL													552.4	

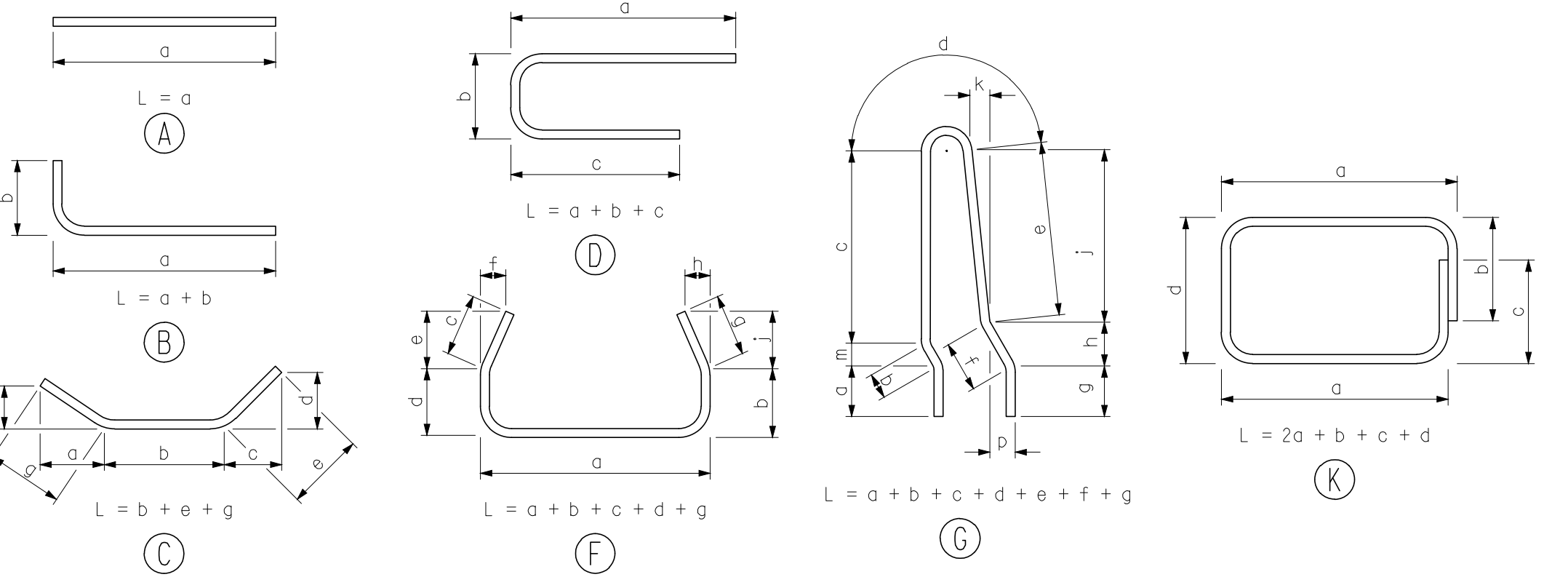
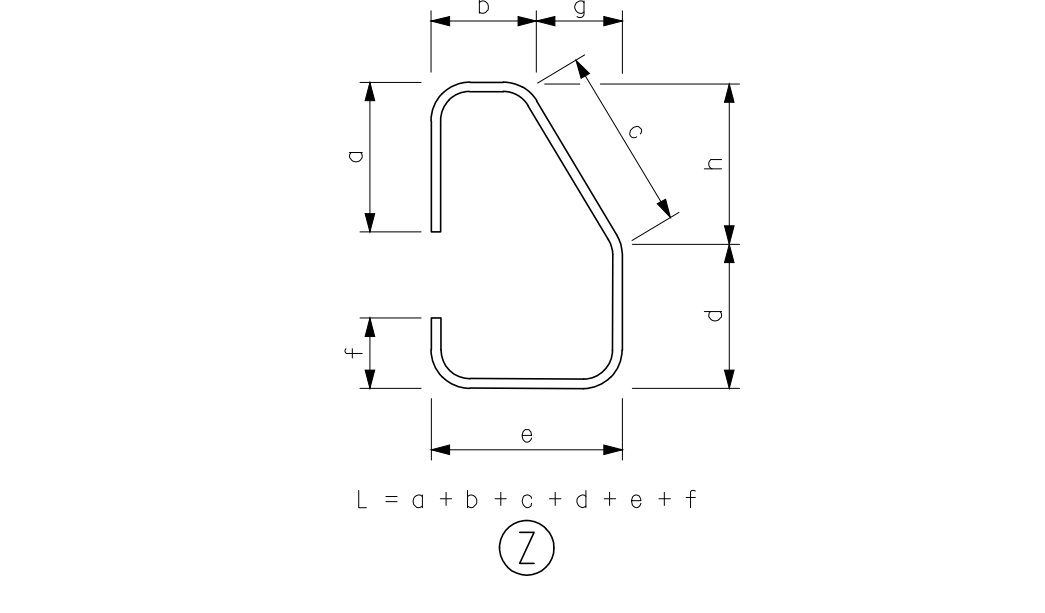
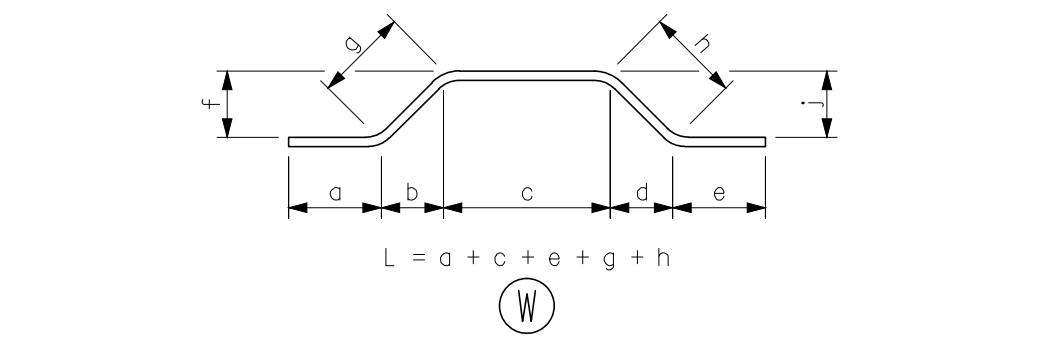
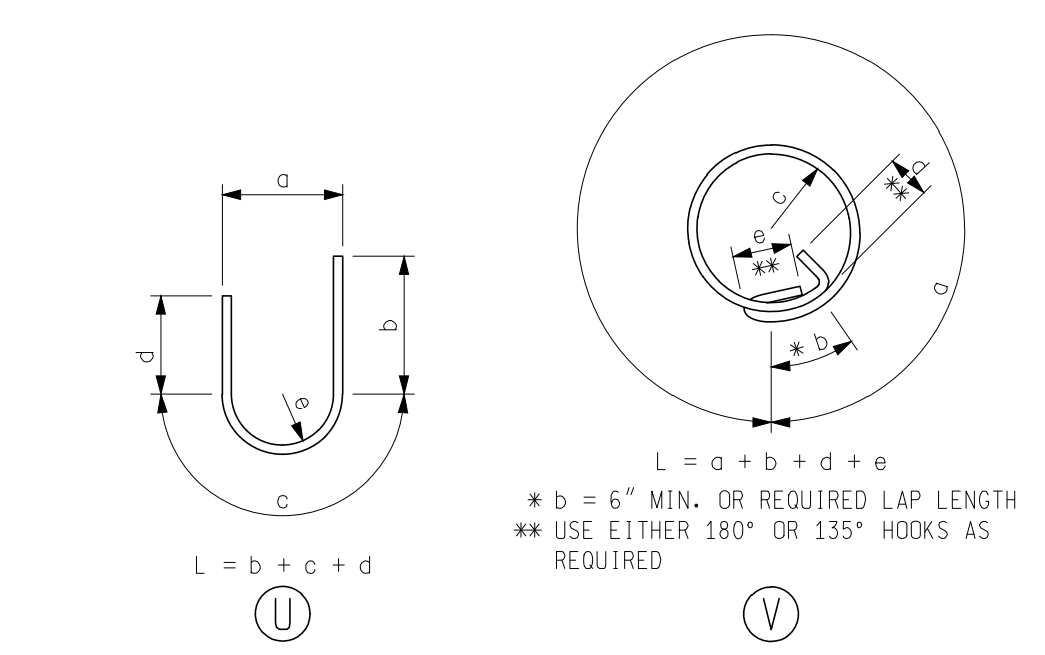
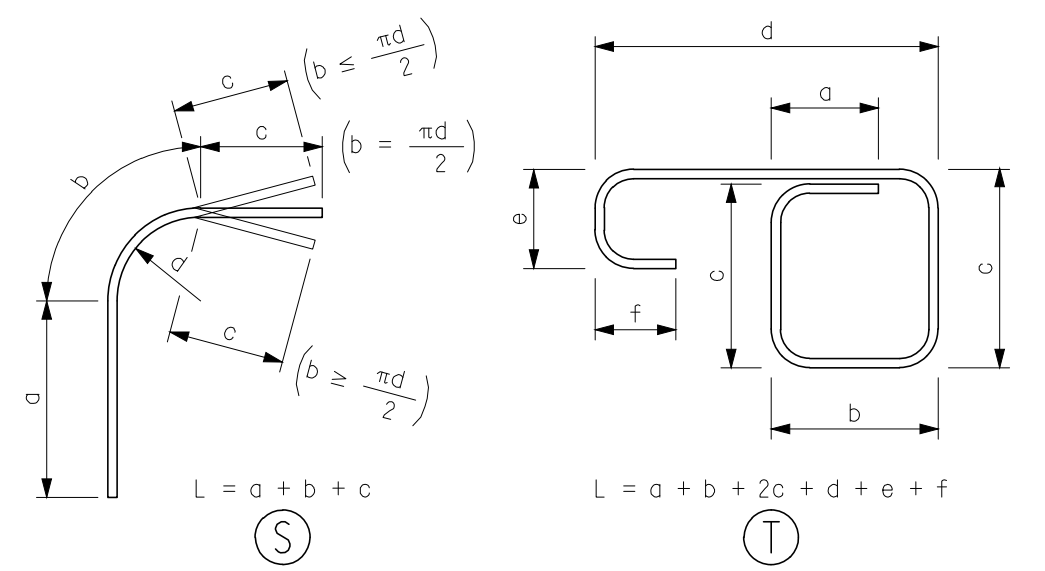
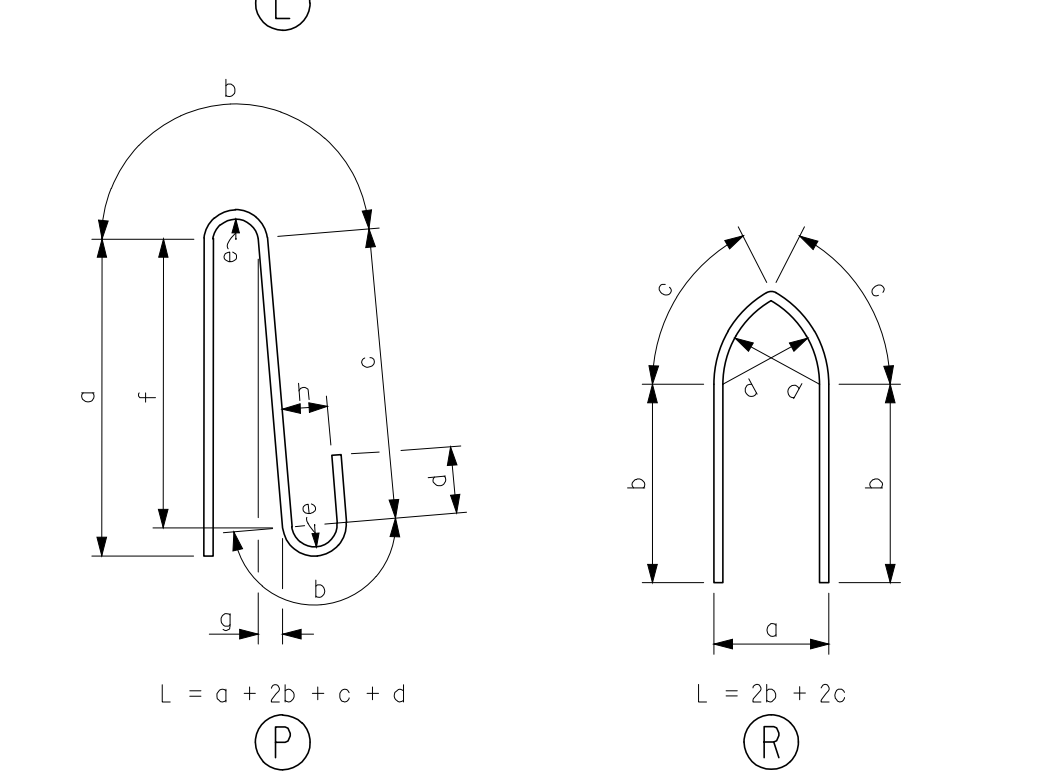
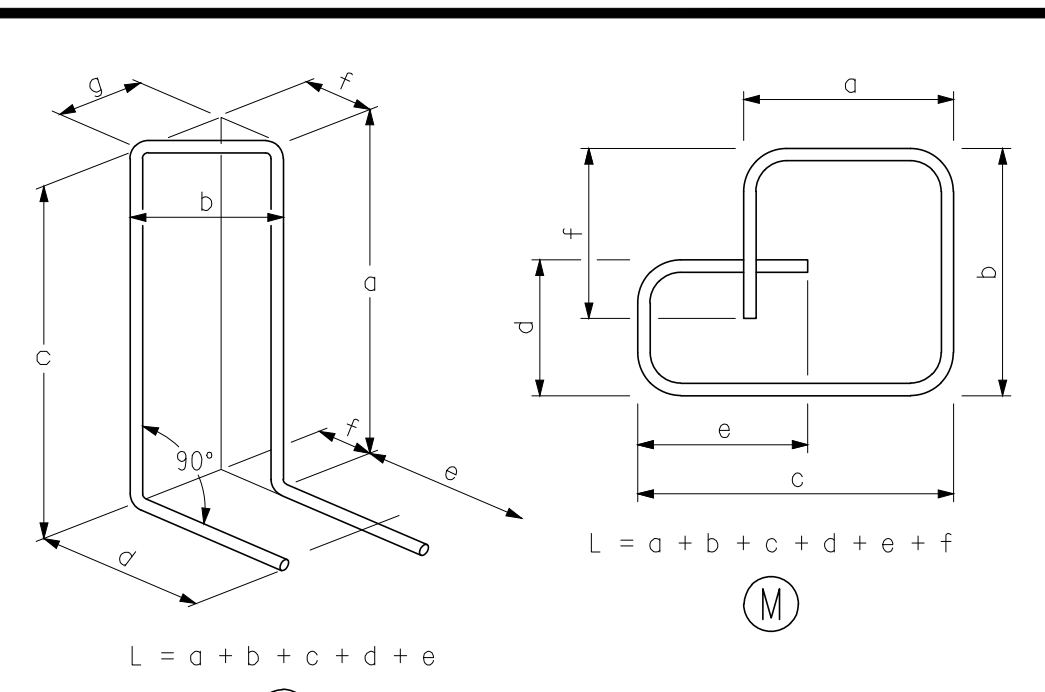
BAR	DIMENSIONS												NO. REQ'D	TOTAL WT.
	a	b	c	d	e	f	g	h	j	k	m	p		
EC061211		2'-9 1/2"	0'-5 1/2"	5'-0 1/2"	5'-1"		5'-0 1/2"						51	989.4
EF061307	3'-5 1/2"			5'-0 1/2"			5'-1"	0'-5 1/2"	5'-0 1/2"				51	1040.5
EA081102	11'-2"												5	149.1
EA082007	20'-7"												5	274.8
EA082308	23'-8"												5	316.0
EA080900	9'-0"												5	120.2
EC081000	4'-4"	5'-0"				2'-6"	5'-0"						5	133.5
EC081302		6'-7"	2'-3"	6'-2"	6'-7"								5	175.8
EA061102	11'-2"												8	134.2
EA062007	20'-7"												8	247.3
EA062200	22'-0"												8	264.4
EA060900	9'-0"												8	108.1
EC060608	2'-10 1/2"	3'-4"				1'-8"	3'-4"						8	80.1
EC060908		4'-10"	1'-8"	4'-6 1/2"	4'-10"								8	116.1
ED060605	1'-10"	2'-9"	1'-10"										20	192.8
SUBTOTAL													4342.2	

BACKWALL B														
EA041904	19'-4"												6	77.5
EA042004	20'-4"												6	81.5
ED060903	4'-4"	0'-7"	4'-4"										39	541.8
SUBTOTAL													700.8	

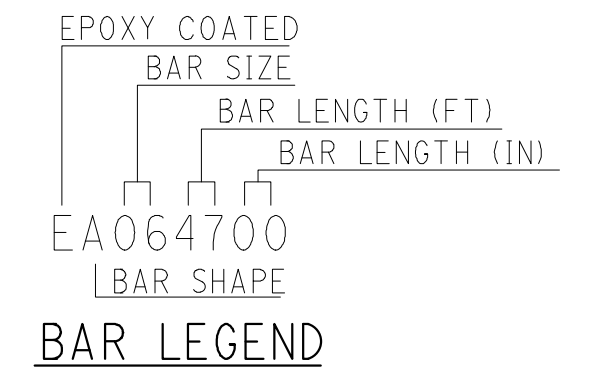
EA040111	1'-11"												2	2.6
EA040801	8'-1"												2	10.8
EA041104	11'-4"												2	15.1
EA041011	10'-11"												2	14.6

WINGWALL CAPS B														
EC040310	0'-8 1/2"	2'-5 1/2"			1'-2 1/2"	1'-4 1/2"							3	7.7
EC040307	0'-8"	2'-3"			1'-2"	1'-4"							3	7.2
EA040805	8'-5"												2	11.2
EC041111	1'-2 1/2"	8'-5"			3'-3 1/2"	3'-6"							1	8.0
EC040906	1'-2 1/2"	6'-0"			3'-3 1/2"	3'-6"							1	6.3
EC040410	1'-2 1/2"	1'-4"			3'-3 1/2"	3'-6"							1	3.2
EC041204	1'-3"	8'-9"			3'-4 1/2"	3'-7"							1	8.2
EC040911	1'-3"	6'-4"			3'-4 1/2"	3'-7"							1	6.6
EC040503	1'-3"	1'-8"			3'-4 1/2"	3'-7"							1	3.5

ED061007	5'-0"	0'-7"	5'-0"										13	206.6
ED060909	4'-7"	0'-7"	4'-7"										7	102.5
ED060801	3'-9"	0'-7"	3'-9"										6	72.8
ED060607	3'-0"	0'-7"	3'-0"										6	59.3
SUBTOTAL													531.8	



MISCELLANEOUS QUANTITIES	
11,155	Lb Reinforcement, Steel, Epoxy Coated



NOTES:
REINFORCEMENT SHALL BE BUNDLED AND TAGGED AS TO THE LOCATION AS SHOWN ON THIS SHEET.

Gosling Czubak
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1280 Business Park Dr.
Traverse City, Michigan
231-946-9191 phone
info@goslingczubak.com
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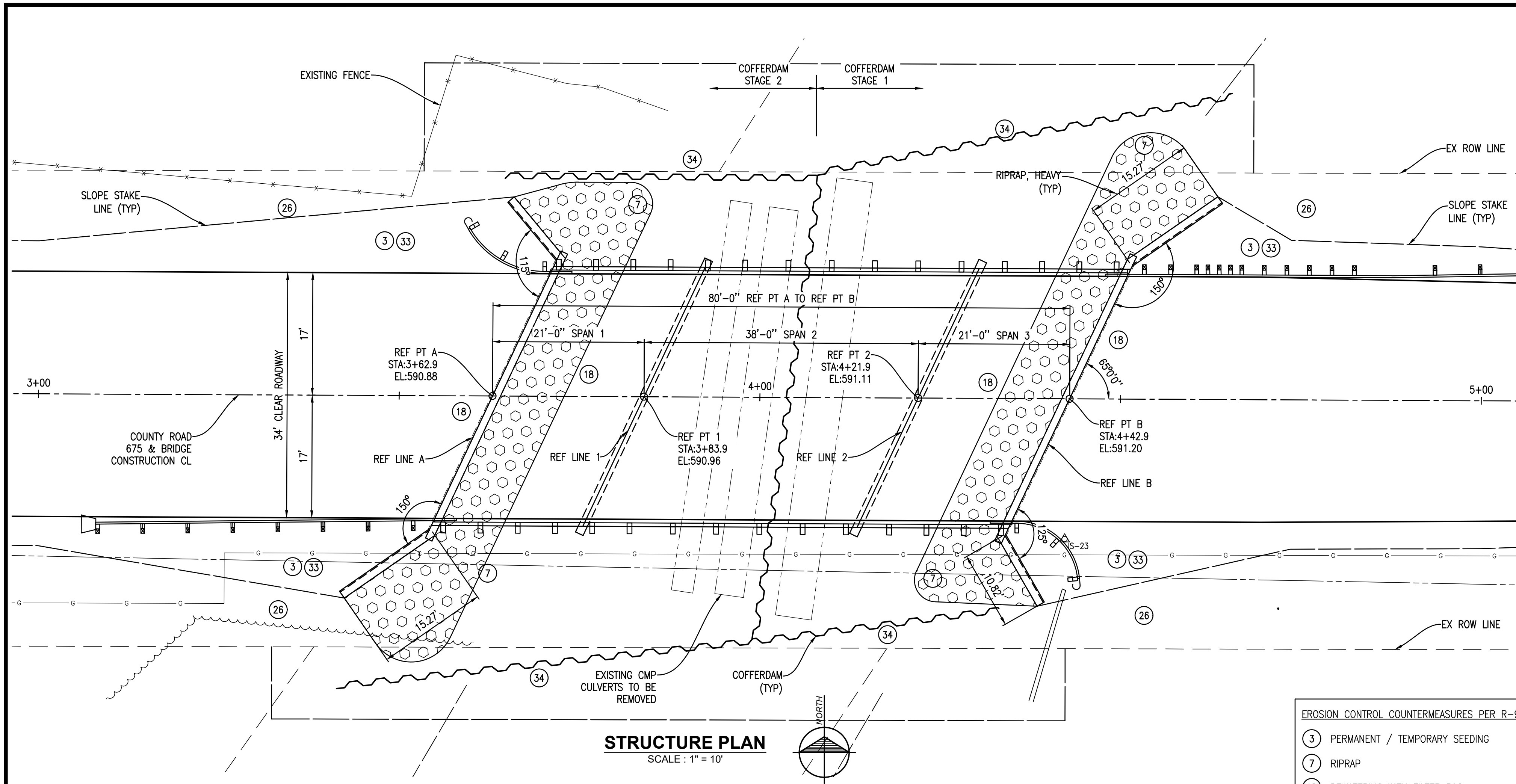
STEEL REINFORCEMENT DETAILS - CROSSING 1
CR-675 STREAM CROSSINGS PROJECT
LEELANAU COUNTY ROAD COMMISSION

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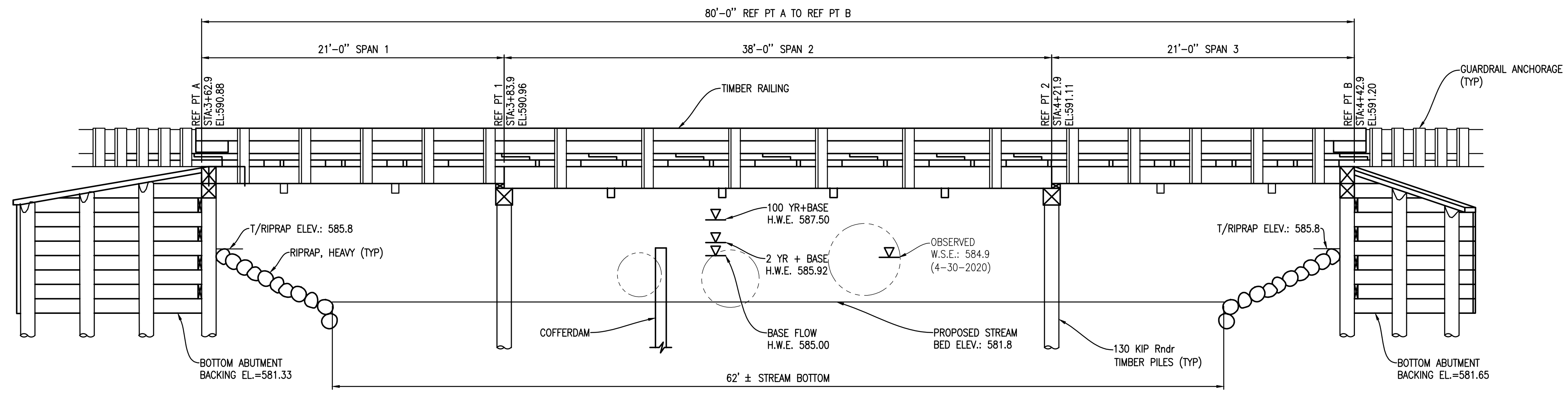
Project Number:
2020430002

Sheet:
C1.8



STRUCTURE PLAN
SCALE: 1" = 10'

- EROSION CONTROL COUNTERMEASURES PER R-96 SERIES STANDARD PLAN**
- (3) PERMANENT / TEMPORARY SEEDING
 - (7) RIPRAP
 - (18) DEWATERING WITH FILTER BAG
 - (26) SILT FENCE
 - (33) MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS
 - (34) COFFERDAMS



STRUCTURE ELEVATION
NO SCALE

SUMMARY OF HYDRAULIC ANALYSIS											
FLOOD DATA	BASE + FLOOD (CFS)	EXISTING				PROPOSED				CHANGE IN WS ELEV. U/S OF PROPOSED STRUCTURE (FT)	
		U/S FACE OF CULVERTS	D/S FACE OF CULVERTS	U/S CHANNEL (170 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)	U/S FACE OF BRIDGE	D/S FACE OF BRIDGE	U/S CHANNEL (170 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)		WATERWAY AREA (SFT) AT D/S FACE
BASE	35	585.00	584.93	0.3	0.5	585.00	584.93	0.3	0.3	204.2	0.00
2-YR	70	586.03	585.78	0.4	0.8	585.92	585.75	0.4	0.4	241	-0.11
50-YR	145	588.17	587.15	0.6	1.3	587.23	586.99	0.6	0.6	629.9	-0.94
100-YR	165	588.92	587.49	0.7	1.4	587.50	587.26	0.7	0.7	344.4	-1.42

THE BASE + FLOOD FLOW ASSUMES A 35 CFS BASE FLOW FROM WATERSHED.

THE MAXIMUM AREA BELOW LOW CHORD IS 513.2 SQUARE FEET.

THE CONTRIBUTING DRAINAGE AREA TO THIS CROSSING IS 34.5 SQUARE MILES.

THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON THIS HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOOD PLAIN.

MISCELLANEOUS QUANTITIES

- 1 LS MOBILIZATION
- 1 LS TRAFFIC CONTROL
- 2 EA CULV. REM, 24 INCH TO 48 INCH
- 1 EA CULV. REM, OVER 48 INCH
- 150 FT GUARDRAIL, REM
- 50 CYD EMBANKMENT, CIP
- 650 CYD EXCAVATION, CHANNEL
- 800 CYD EXCAVATION, EARTH
- 200 CYD BACKFILL, STRUCTURE, CIP
- 200 CYD EXCAVATION, FDN
- 2 EA EROSION CONTROL, FILTER BAG
- 100 FT EROSION CONTROL, SILT FENCE
- 900 SYD AGGREGATE BASE, 6 INCH
- 55 SYD SHOULDER, CL II, 3 INCH
- 1090 SYD HMA SURFACE, REM
- 200 TON HMA, 4E1
- 1 LS TEMPORARY STREAM CONTROL
- 1 LS STRUCTURE, TIMBER, 34' X 80', FURN
- 1 LS STRUCTURE, TIMBER, 34' X 80', INSTALL
- 2 EA GUARDRAIL ANCH, BRIDGE, DET M1
- 1 EA GUARDRAIL APPROACH TERMINAL, TYPE 2M
- 1 EA GUARDRAIL DEPARTING TERMINAL, TYPE T
- 2 EA GUARDRAIL DEPARTING TERMINAL, TYPE T, MODIFIED
- 6 EA GUARDRAIL REFLECTOR
- 150 SYD RIPRAP, HEAVY
- 290 SYD SLOPE RESTORATION
- 1 LS UTILITY POLE RELOCATION

THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT ASSHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/800 OF THE SPAN LENGTH.

WITHOUT THE PREVENTIVE MEASURES SHOWN ON THESE PLANS, THERE IS A POSSIBILITY THAT STREAM BED SCOUR MAY OCCUR. THE ESTIMATED TOTAL SCOUR DEPTH IS CALCULATED TO BE 1 FEET AT ABUTMENT A, 1.6 FEET AT PIER 1, 1.6 FEET AT PIER 2, AND 1.1 FEET AT ABUTMENT B. THESE DEPTHS ARE BASED ON A 500 YEAR RUNOFF EVENT.

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN PAYMENT FOR RIPRAP.

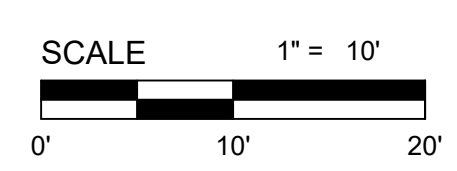
THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED.

THE INTENT OF THE FLOW DIVERSION AND STAGING SEQUENCE DESCRIBED IS TO FACILITATE RIPRAP PLACEMENT, CONTAIN SEDIMENTATION, AND MAINTAIN STREAM FLOW. ALTERNATE METHODS OF STREAM DIVERSION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

RIPRAP SHALL BE NATURAL FIELD STONE.

PROPOSED CONSTRUCTION STAGING SEQUENCE:

- STAGE 1:**
- REMOVE ROAD EMBANKMENT OVER EXISTING CULVERTS TO TOP OF CULVERTS.
 - PLACE STAGE 1 COFFERDAM BETWEEN EXISTING CULVERTS ISOLATING EAST CULVERT FROM THE STREAM. MAINTAIN STREAM FLOW THROUGH WEST CULVERTS.
 - REMOVE THE EAST CULVERT AND EXCAVATE WEST PART OF STREAM CHANNEL.
 - CONSTRUCT ABUTMENT B AND PIER 2, AND PLACE RIPRAP AT ABUTMENT B.
- STAGE 2:**
- REMOVE FLOW DIVERSION ISOLATING THE EAST SIDE AND PLACE IN THE WEST PART OF THE STREAM ISOLATING THE WEST CULVERT FROM THE STREAM. MAINTAIN STREAM FLOW THROUGH THE EAST SIDE OF THE NEWLY EXCAVATED CHANNEL.
 - REMOVE THE WEST CULVERT AND EXCAVATE WEST PART OF STREAM CHANNEL.
 - CONSTRUCT ABUTMENT A AND PIER 1, AND PLACE RIPRAP AT ABUTMENT A.
 - REMOVE FLOW DIVERSION.
 - CONSTRUCT THE SUPERSTRUCTURE AND APPROACHES.



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1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS	RNV

GENERAL PLAN OF STRUCTURE - CROSSING 2
CR-675 STREAM CROSSINGS PROJECT
LEELANAU COUNTY ROAD COMMISSION

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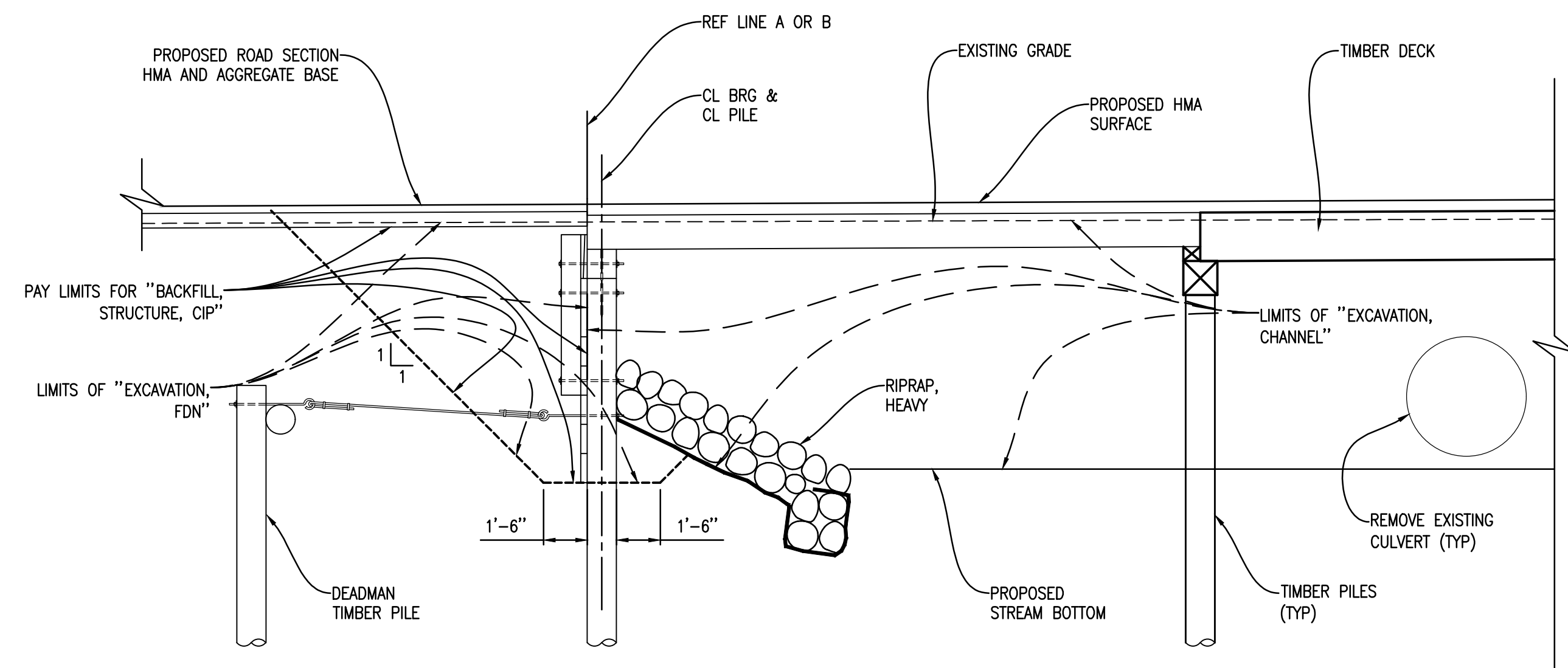
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LEELANAU COUNTY
MICHIGAN

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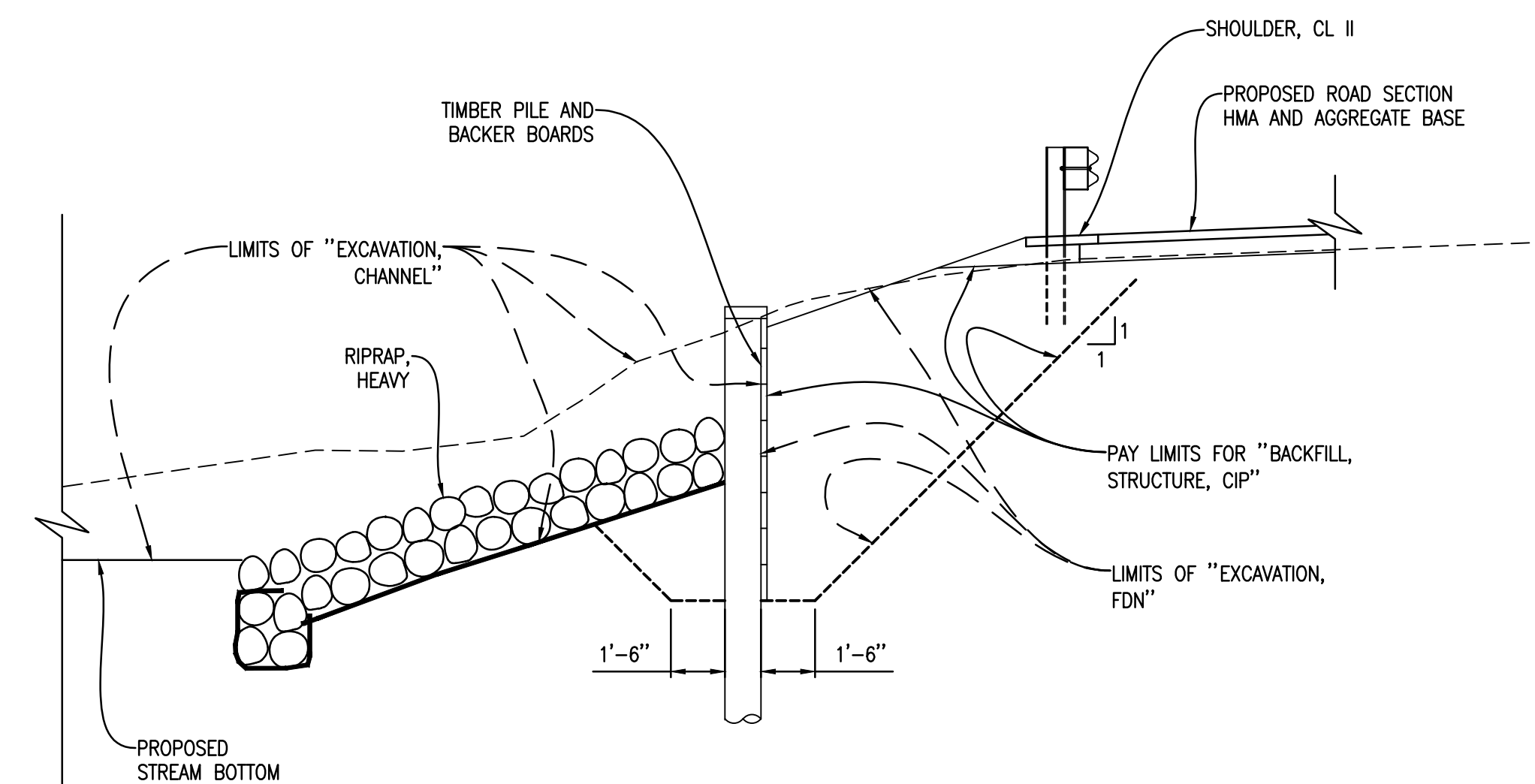


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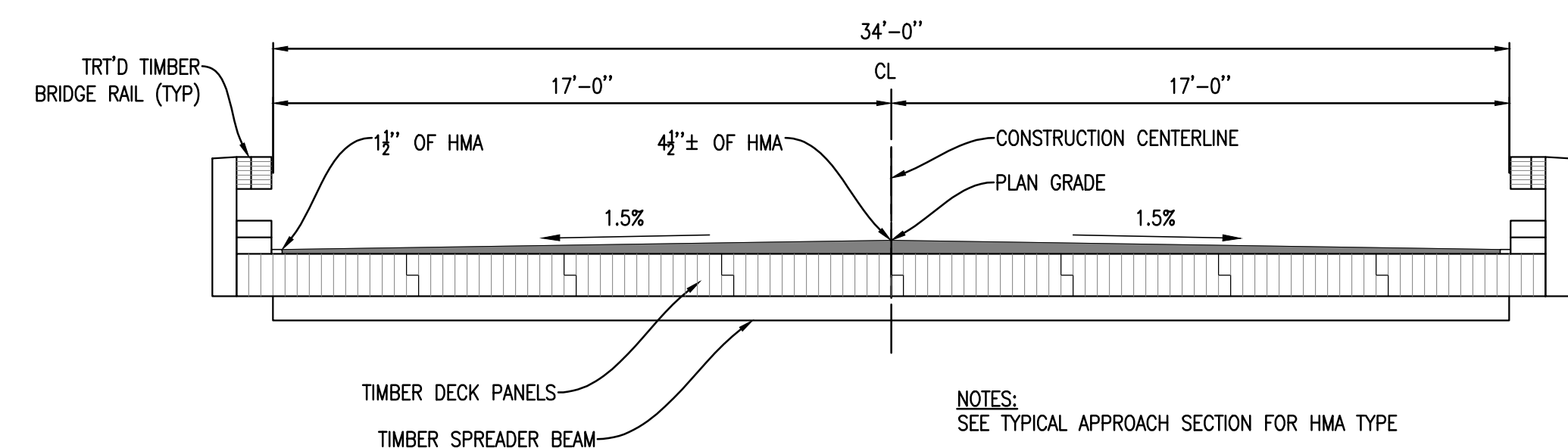
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TYPICAL ABUTMENT SECTION

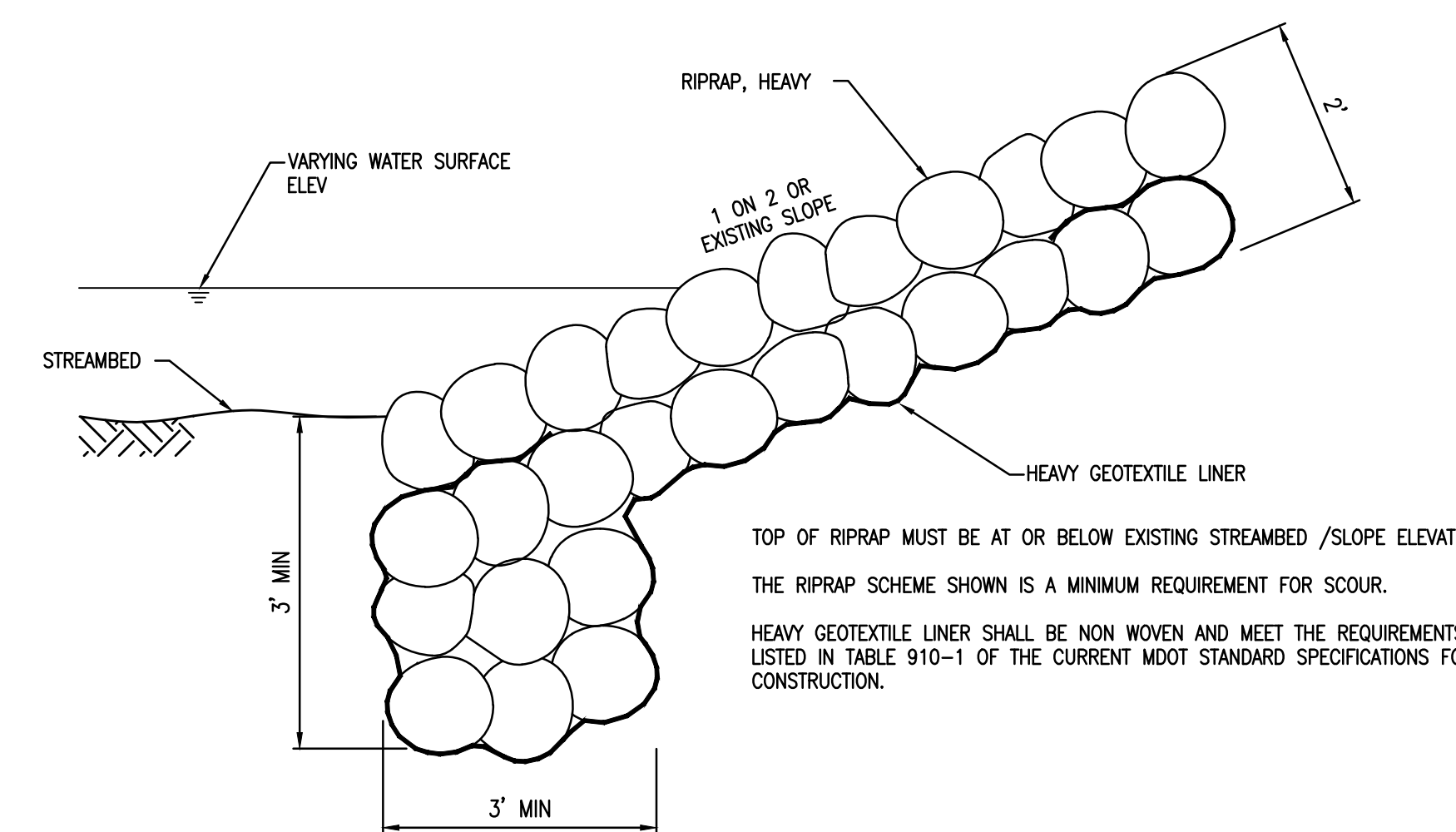


TYPICAL WINGWALL SECTION



NOTES:
 SEE TYPICAL APPROACH SECTION FOR HMA TYPE.
 CONSTRUCT CROWN ACROSS BRIDGE DECK BY WEDGING BASE LAYER.
 TRANSITION FROM 2% APPROACH CROSS-SLOPE TO 1.5% DECK CROSS-SLOPE IN 25' LENGTH OF APPROACH AT EACH END OF BRIDGE.

TYPICAL DECK SECTION



TOP OF RIPRAP MUST BE AT OR BELOW EXISTING STREAMBED /SLOPE ELEVATION.
 THE RIPRAP SCHEME SHOWN IS A MINIMUM REQUIREMENT FOR SCOUR.
 HEAVY GEOTEXTILE LINER SHALL BE NON WOVEN AND MEET THE REQUIREMENTS LISTED IN TABLE 910-1 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

TYPICAL RIPRAP HEADER DETAIL

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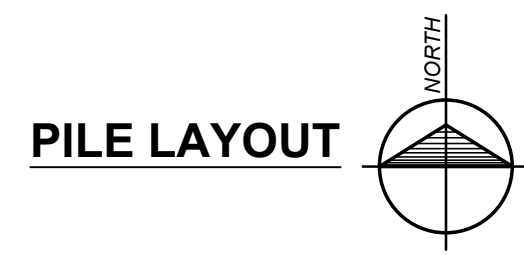
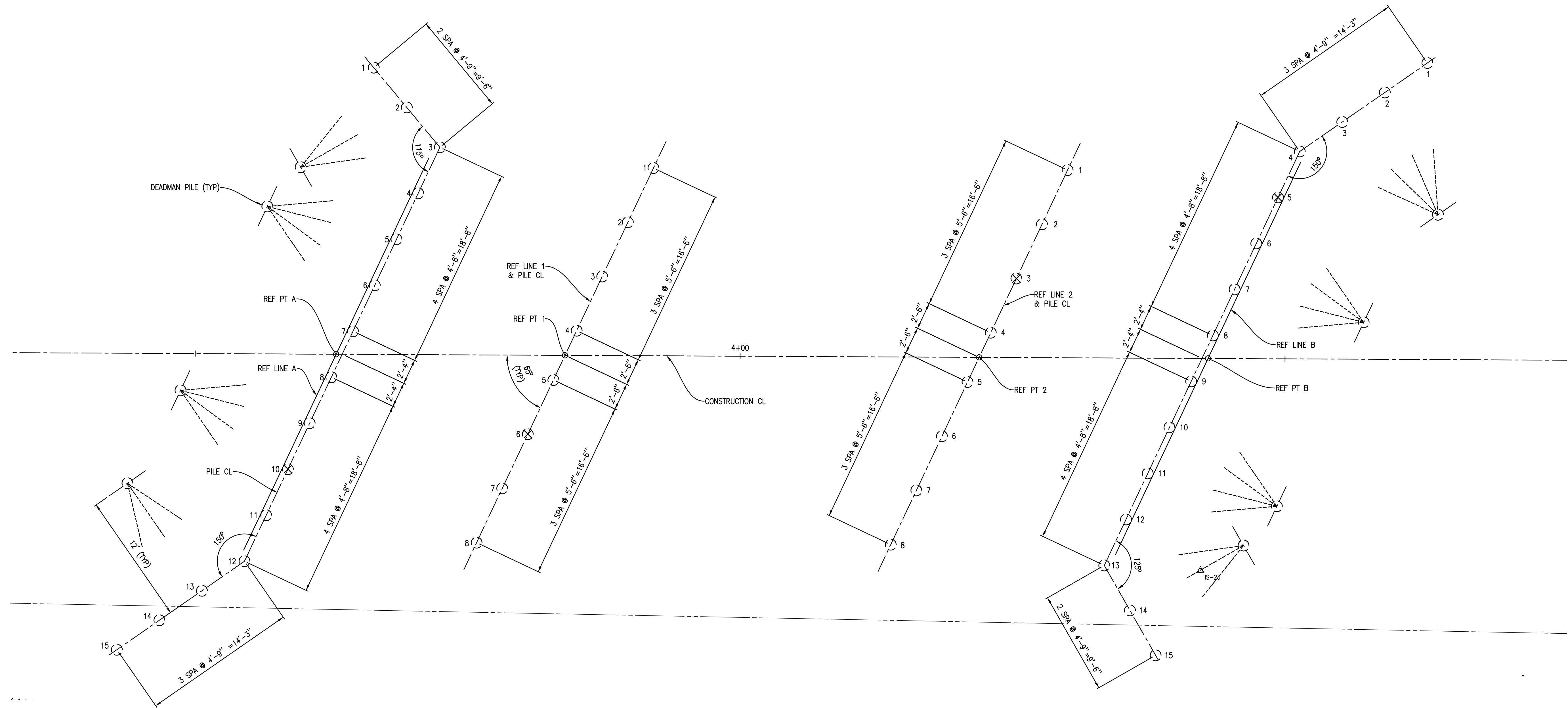
**GENERAL PLAN OF STRUCTURE - CROSSING 2
 CR-675 STREAM CROSSINGS PROJECT
 LEELELANU COUNTY ROAD COMMISSION**

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MISCELLANEOUS QUANTITIES			
1	LS	PILE DRIVING EQUIPMENT, FURN	
1380	FT	PILE, TREATED TIMBER, FURN	
1380	FT	PILE, TREATED TIMBER, DRIVEN	
4	EA	TEST PILE, TREATED TIMBER	

TREATED TIMBER PILES				
LOCATION	PILE TYPE	NUMBER OF PILES	ESTIMATED LENGTH FURNISHED	
			EACH (FT)	TOTAL (FT)
ABUT A	TEST	1	35	35
	VERTICAL	9	25	225
	WINGWALL	5	20	100
PIER 1	DEADMAN	4	20	80
	TEST	1	40	40
	VERTICAL	7	30	210
PIER 2	TEST	1	40	40
	VERTICAL	7	30	210
	TEST	1	35	35
ABUT B	VERTICAL	9	25	225
	WINGWALL	5	20	100
	DEADMAN	4	20	80
TOTAL		54		1380

○ DENOTES VERTICAL PILES.
 ⊗ DENOTES VERTICAL TEST PILES.

DRIVE ALL PILES TO A NOMINAL PILE DRIVING RESISTANCE NOT LESS THAN 130 KIPS. DETERMINE NOMINAL PILE DRIVING RESISTANCE (R_{ndr}) USING THE FHWA MODIFIED GATES DYNAMIC FORMULA.

PILES SHALL HAVE A NOMINAL BUTT DIAMETER OF 12 INCHES.

THE ESTIMATED PILE LENGTH IS BASED ON THE STATIC ANALYSIS.

THE ESTIMATED LOSS OF NOMINAL PILE RESISTANCE DUE TO SCOUR AFTER DRIVING IS 2 KIPS.

THE ESTIMATED FACTORED DOWNDRAG AFTER PILE DRIVING IS 0 KIPS.

THE FACTORED PILE RESISTANCE AVAILABLE TO RESIST ALL FACTORED LOADS IS EQUAL TO 50 PERCENT OF NOMINAL PILE DRIVING RESISTANCE THAT IS REDUCED BY THE LOSS DUE TO SCOUR.

PILE SUBSTRUCTURE DESIGN SHOWN IN THESE PLANS, INCLUDING DEADMEN, IS ESTIMATED AND SHALL BE CONFIRMED WITH COMPLETE ENGINEERED TIMBER STRUCTURE CALCULATIONS AND SHOP DRAWINGS PREPARED BY THE BRIDGE SUPPLIER.

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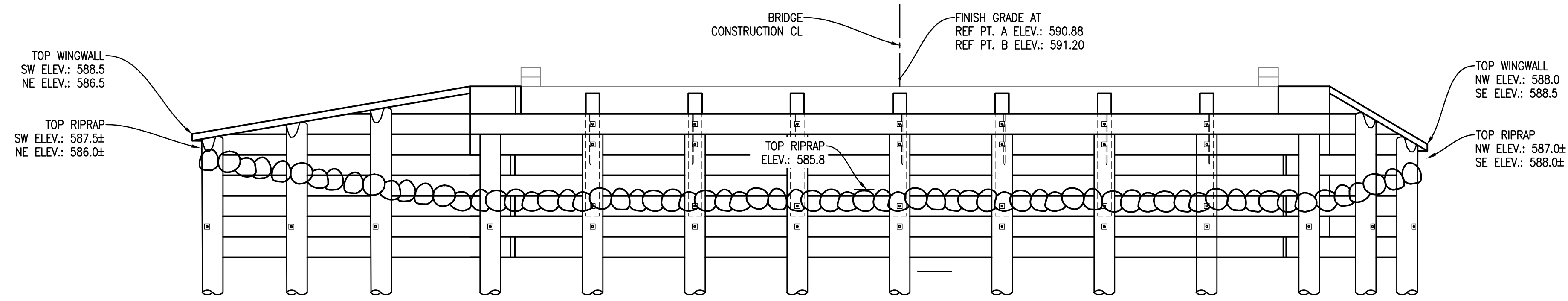
PILE DETAILS - CROSSING 2
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

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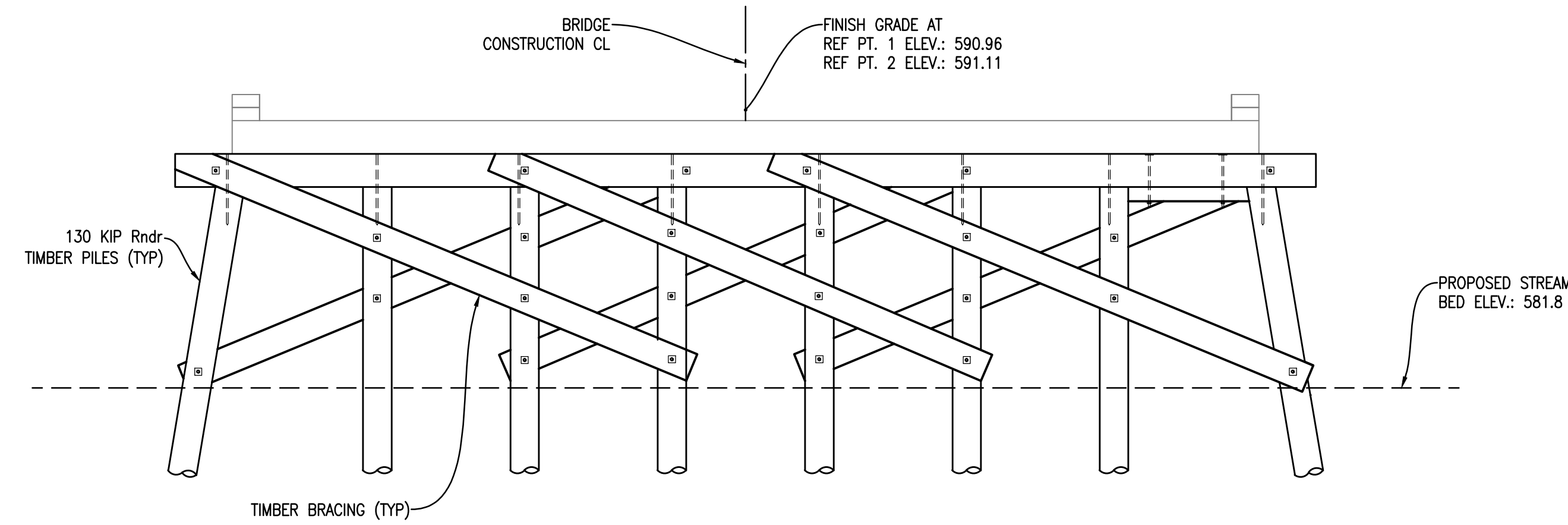
Location:
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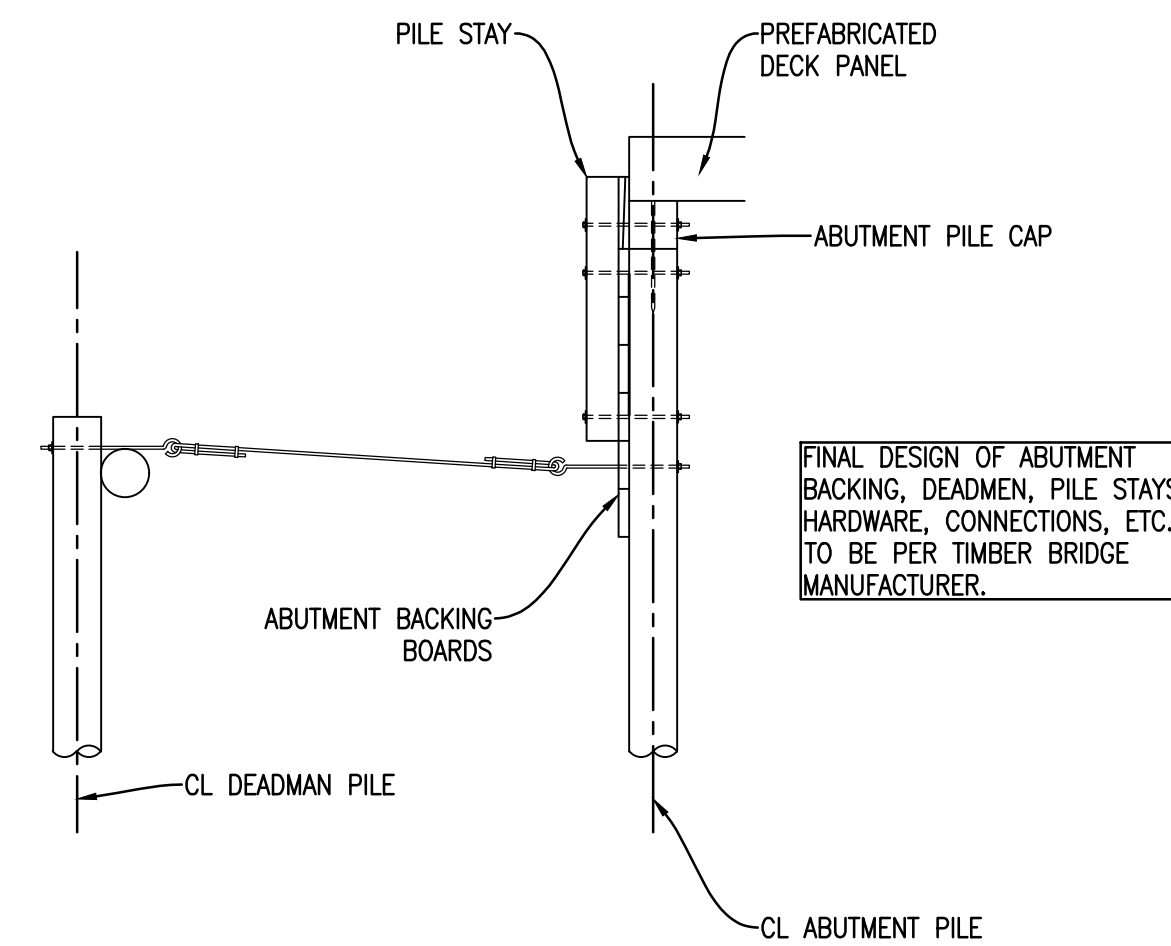
Sheet:
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ABUTMENTS A & B
 (ABUTMENT A - LOOKING WEST)
 (ABUTMENT B - LOOKING EAST)



PIERS 1 & 2



TYPICAL DEADMAN SECTION

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ABUTMENT & PIER DETAILS - CROSSING 2
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

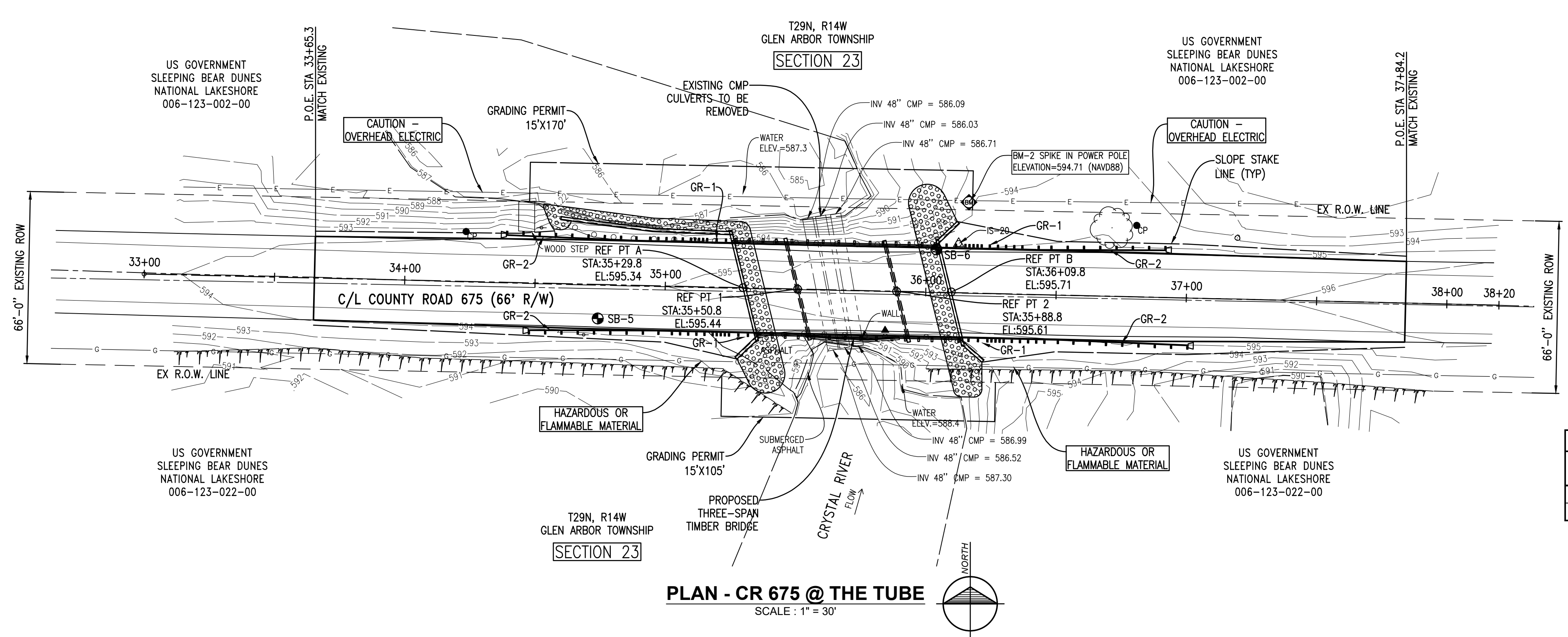
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Sheet:
C2.5

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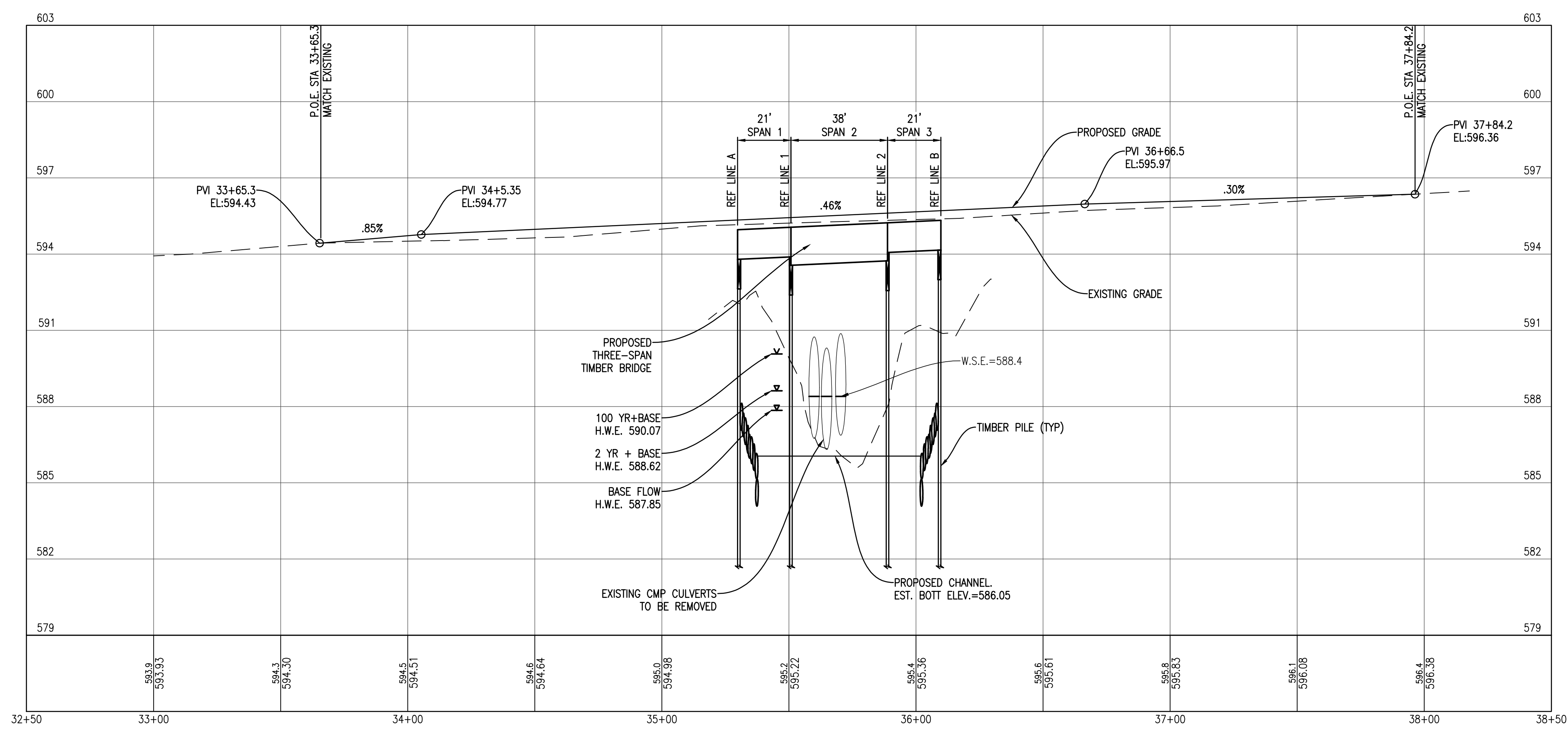
EXISTING STRUCTURE
 THREE 48" DIAMETER CMP CULVERTS

PROPOSED STRUCTURE
 THREE SPAN (21', 38', 21') x 34' WIDE (CLR) TIMBER BRIDGE

BENCHMARKS
 BENCHMARK #2
 SPIKE IN POWER POLE
 STATION 36+15.75, 34.79' LT
 ELEVATION = 594.71 (NAVD 88)

CONTROL POINTS
 CP #1 -
 STATION 34+23.14, 19.12' LT
 N= 582455.2940
 E= 19271437.3240
 CP #2 -
 STATION 36+80.37, 27.37' LT
 N= 582457.6250
 E= 19271694.6790

GUARDRAIL TABLE				
MARK	LOCATION	GUARDRAIL ITEMS		
		Description	Unit / Qty	
GR-1	EACH QUAD	GUARDRAIL ANCH, BRIDGE, DET M1	EA	4
GR-2	EACH QUAD	GUARDRAIL APPROACH TERMINAL, TYPE 2M	EA	4



THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF THE EXISTING CULVERTS AND GUARDRAIL, CONSTRUCTION OF THE PROPOSED BRIDGE AND APPROACHES, RETAINING WALL, SLOPE RESTORATION, RIPRAP SCOUR PROTECTION, HMA PAVING, AND GUARDRAIL.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

COUNTY ROAD 675 TRAFFIC IS TO BE DETOURED OVER OTHER EXISTING ROADS.

PLAN ELEVATIONS AND COORDINATES ARE BASED ON NAVD (88) AND NAD (83) DATUMS RESPECTIVELY.

WATER LEVEL IS SUBJECT TO CHANGE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING A DETERMINATION OF WATER LEVELS THAT MAY EXIST DURING CONSTRUCTION.

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE. IF DEBRIS FALLS INTO THE WATERWAY, IT SHALL BE REMOVED WITHIN 24 HOURS. SINCE DISTURBANCE OF THE WATERWAY BOTTOM MAY BE AS HARMFUL AS THE DEBRIS ITSELF, THE PREVENTATIVE MEASURES MUST BE EFFECTIVE.

IMMEDIATELY AFTER CONSTRUCTION OF AN ABUTMENT IS COMPLETED, SLOPE PROTECTION AND SEEDING OR SODDING SHALL BE PLACED ON THE ADJACENT SLOPES.

FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

**GENERAL PLAN OF SITE - CROSSING 3
 CR-675 STREAM CROSSINGS PROJECT
 LEELEANAU COUNTY ROAD COMMISSION**

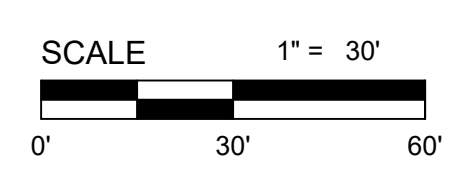
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Project Number:
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C3.1



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**SOIL BORINGS - CROSSING 3
 CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION**

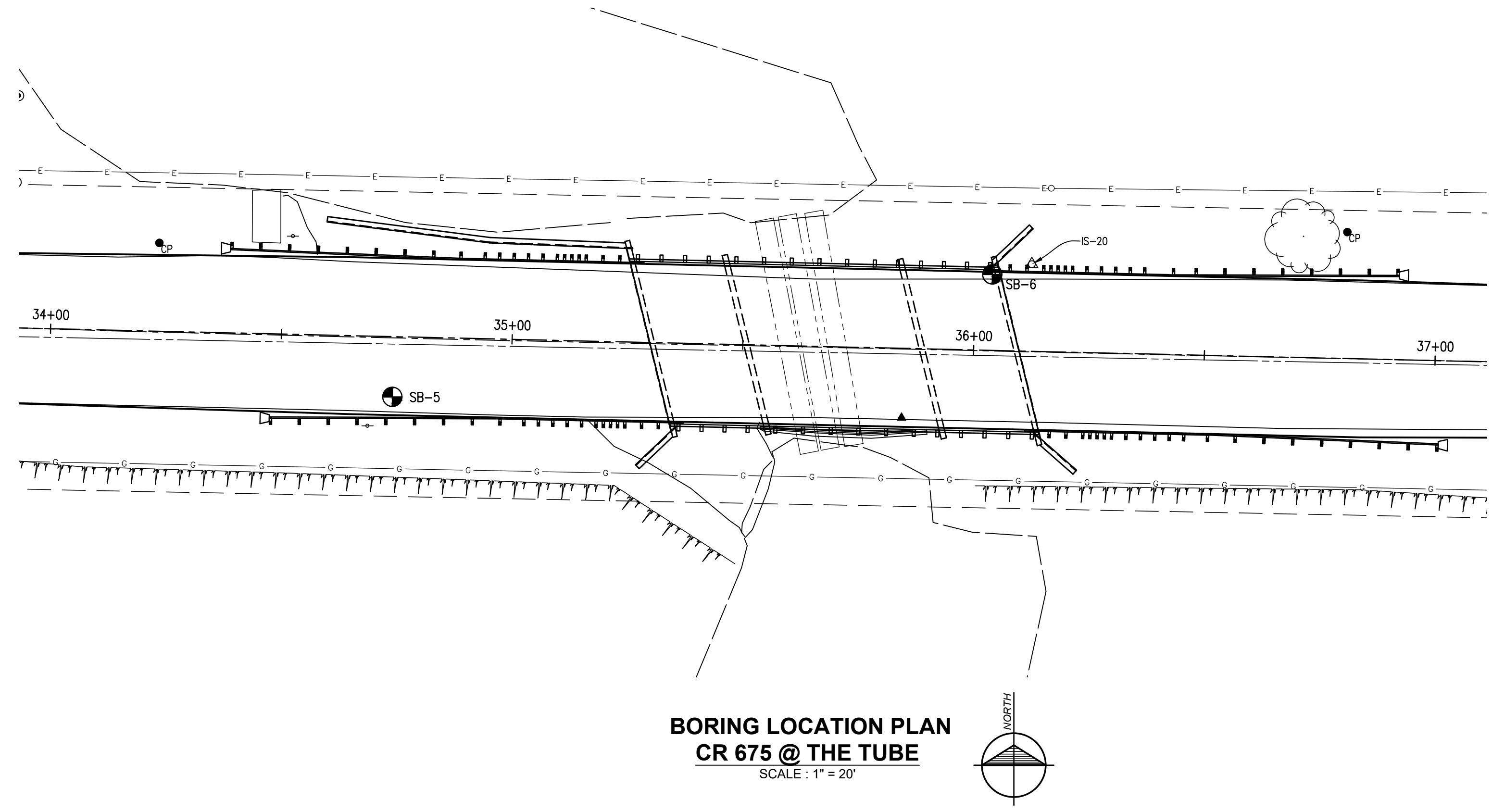
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 MICHIGAN

Project Number:
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Sheet:
C3.2

PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-5								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/11/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): +/- 10" TOTAL DEPTH (FT): 30								
DRILLER: M. Allen LOGGED BY: M. Komdorfer		STATIC WATER LEVEL: 4 CAIVING DEPTH: 4								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (psi)	TEST RESULTS
ELEV.=594.4		Gravelly SAND (SP) - medium dense - dark brown - [FILL]	0	SS1	10	4	6			Plastic Limit — Liquid Limit Water Content - X % SPT RESULT - ▲ N Value
		Fine to medium SAND (SP) - little gravel - little silt - medium dense - dark brown - wet below 5-ft bgs	2.5	SS2	10	6	6			10 20 30 40 50
STREAM BED ELEV.=586.05		Gravelly fine to medium SAND (SP) - trace silt - medium dense - brown	5	SS3	10	7	7			11
		Fine to medium SAND (SP) - little gravel - trace silt - very dense - brown	7	SS4	12	7	10			12
ABUT A/ PIER 1 EST. SCOUR ELEV.=579.55		Silty fine to medium SAND (SM) - occasional gravel - medium dense - light brown	13	SS5	10	23	36			17
			15							53
MIN. PILE PEN. ELEV.=569.05			20	SS6	18	13	14			27
			25	SS7	10	10	15			27
			30	SS8	18	11	14			15
Boring terminated at 30 ft.										



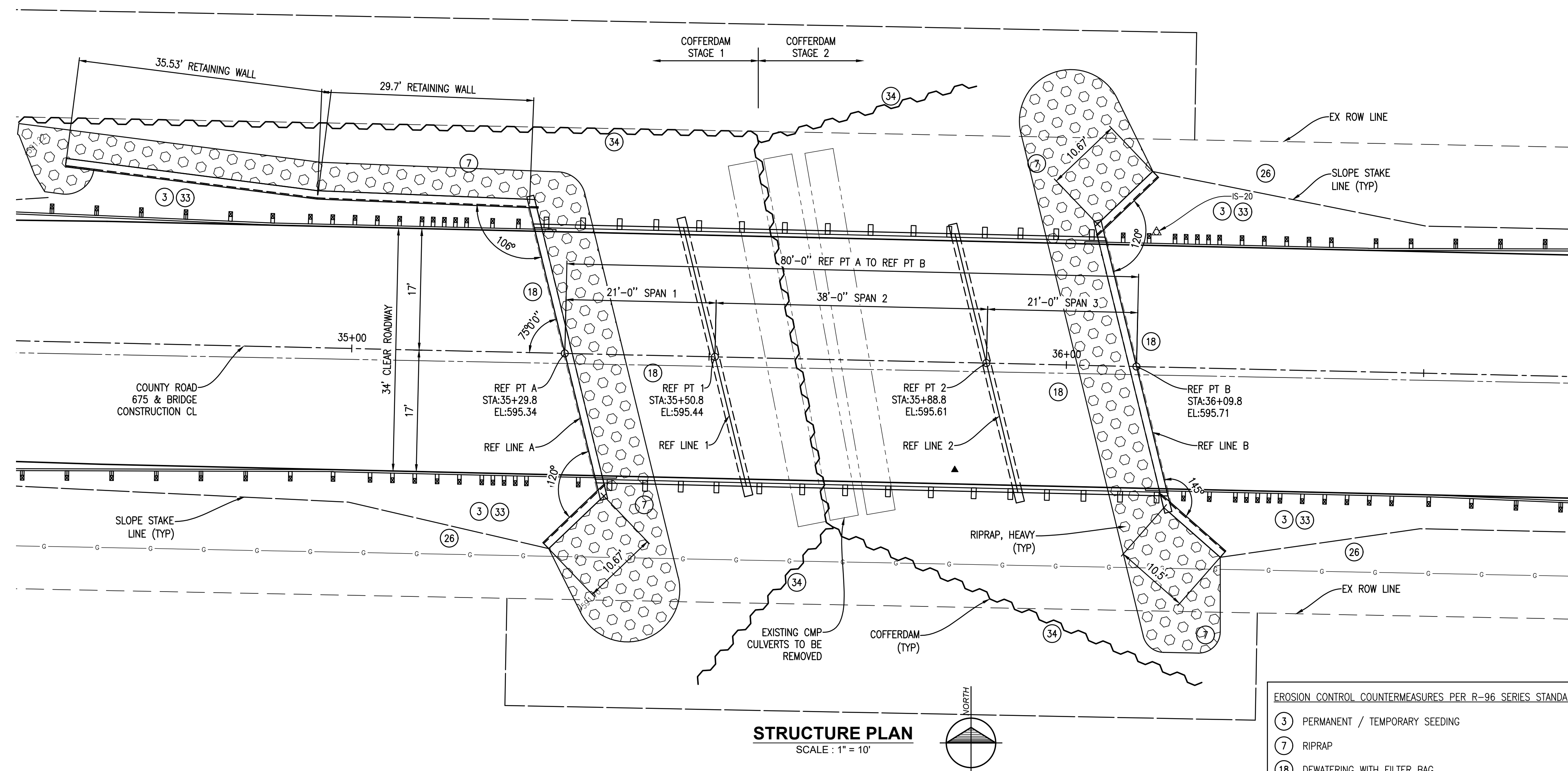
NOTES:
 NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1 1/2" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140# HAMMER FALLING 30".

12 1st 6"
 13 2nd 6"
 14 3rd 6"

CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.

THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.

PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-6								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/11/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): +/- 10" TOTAL DEPTH (FT): 30								
DRILLER: M. Allen LOGGED BY: M. Komdorfer		STATIC WATER LEVEL: 4.5 CAIVING DEPTH: 4.5								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (psi)	TEST RESULTS
ELEV.=594.9		Gravelly SAND (SP) - loose - dark brown	0	SS1	0	11	4	Drove Rock		Plastic Limit — Liquid Limit Water Content - X % SPT RESULT - ▲ N Value
		Fine to medium SAND (SP) - trace coarse sand - very loose - brown - wet below 4.75-ft bgs	4	SS2	10	2	2			15
STREAM BED ELEV.=586.05		Fine to coarse SAND (SP) - little fine gravel - loose - brown	5.5	SS3	18	2	6			4
		Gravelly SAND (SP) - medium dense - brown	9	SS4	18	1	6			1
ABUT B/ PIER 2 EST. SCOUR ELEV.=584.05		Silty fine SAND (SM) - medium dense - light brown	14	SS5	18	10	14			7
		Coarse SAND (SP) - little fine gravel - loose - brown	18	SS6	4	9	4			24
MIN. PILE PEN. ELEV.=574.05		GRAVEL (GP) - little sand - medium dense - brown	22.5	SS7	18	23	12			9
		Gravelly fine to coarse SAND (SP) - medium dense - grayish brown	23.5	SS8	18	12	14			26
		Silty fine SAND (SM) - medium dense - light brown	29	SS8	18	20	8			20
Boring terminated at 30 ft.										



SUMMARY OF HYDRAULIC ANALYSIS

FLOOD DATA	BASE + FLOOD (CFS)	EXISTING				PROPOSED				WATERWAY AREA (SFT) AT D/S FACE	CHANGE IN WS ELEV. IN WS OF PROPOSED STRUCTURE (FT)
		U/S FACE OF CULVERTS	D/S FACE OF CULVERTS	U/S CHANNEL (170 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)	U/S FACE OF BRIDGE	D/S FACE OF BRIDGE	U/S CHANNEL (170 FT) (FPS)	D/S CHANNEL (@ STR) (FPS)		
BASE	35	588.46	587.10	0.5	1.5	587.85	587.11	0.7	0.7	69.9	-0.61
2-YR	70	589.13	587.74	0.7	2.1	588.62	587.75	0.8	1.0	113.4	-0.51
50-YR	145	590.20	588.85	0.9	2.9	589.81	588.88	1.0	1.3	195.1	-0.39
100-YR	165	590.47	589.10	0.9	3.1	590.07	589.14	1.0	1.4	214.1	-0.40

THE BASE + FLOOD FLOW ASSUMES A 35 CFS BASE FLOW FROM WATERSHED.

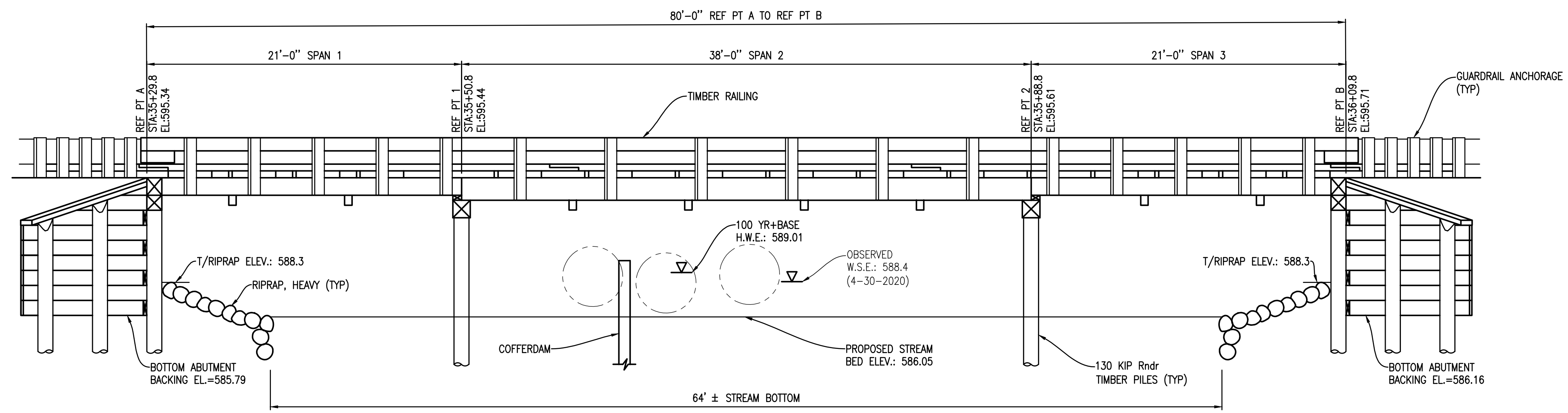
THE MAXIMUM AREA BELOW LOW CHORD IS 556.0 SQUARE FEET.

THE CONTRIBUTING DRAINAGE AREA TO THIS CROSSING IS 34.5 SQUARE MILES.

THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON THIS HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOOD PLAN.

MISCELLANEOUS QUANTITIES

1	LS	MOBILIZATION
1	LS	TRAFFIC CONTROL
3	EA	CULV. REM, 24 INCH TO 48 INCH
245	FT	GUARDRAIL, REM
50	CYD	EMBANKMENT, CIP
735	CYD	EXCAVATION, CHANNEL
700	CYD	EXCAVATION, EARTH
275	CYD	BACKFILL, STRUCTURE, CIP
275	CYD	EXCAVATION, FDN
2	EA	EROSION CONTROL, FILTER BAG
100	FT	EROSION CONTROL, SILT FENCE
1335	SYD	AGGREGATE BASE, 6 INCH
160	SYD	SHOULDER, CL II, 3 INCH
1530	SYD	HMA SURFACE, REM
280	TON	HMA, 4E1
1	LS	TEMPORARY STREAM CONTROL
1	LS	STRUCTURE, TIMBER, 34'X 80', FURN
1	LS	STRUCTURE, TIMBER, 34'X 80', INSTALL
1	LS	TIMBER RETAINING WALL LAGGING
1	LS	TIMBER RETAINING WALL LAGGING INSTALL
4	EA	GUARDRAIL ANCH, BRIDGE, DET M1
4	EA	GUARDRAIL APPROACH TERMINAL, TYPE 2M
10	EA	GUARDRAIL REFLECTOR
170	SYD	RIPRAP, HEAVY
780	SYD	SLOPE RESTORATION



THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT ASSHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/800 OF THE SPAN LENGTH.

WITHOUT THE PREVENTIVE MEASURES SHOWN ON THESE PLANS, THERE IS A POSSIBILITY THAT STREAM BED SCOUR MAY OCCUR. THE ESTIMATED TOTAL SCOUR DEPTH IS CALCULATED TO BE 6.5 FEET AT ABUTMENT A, 2.1 FEET AT PIER 1, 2.1 FEET AT PIER 2, AND 1.8 FEET AT ABUTMENT B. THESE DEPTHS ARE BASED ON A 500 YEAR RUNOFF EVENT.

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN PAYMENT FOR RIPRAP.

THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED.

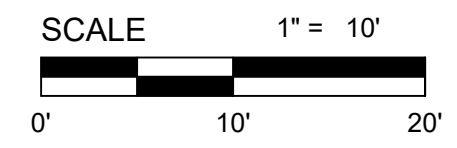
THE INTENT OF THE FLOW DIVERSION AND STAGING SEQUENCE DESCRIBED IS TO FACILITATE RIPRAP PLACEMENT, CONTAIN SEDIMENTATION, AND MAINTAIN STREAM FLOW. ALTERNATE METHODS OF STREAM DIVERSION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

RIPRAP SHALL BE NATURAL FIELD STONE.

PROPOSED CONSTRUCTION STAGING SEQUENCE:

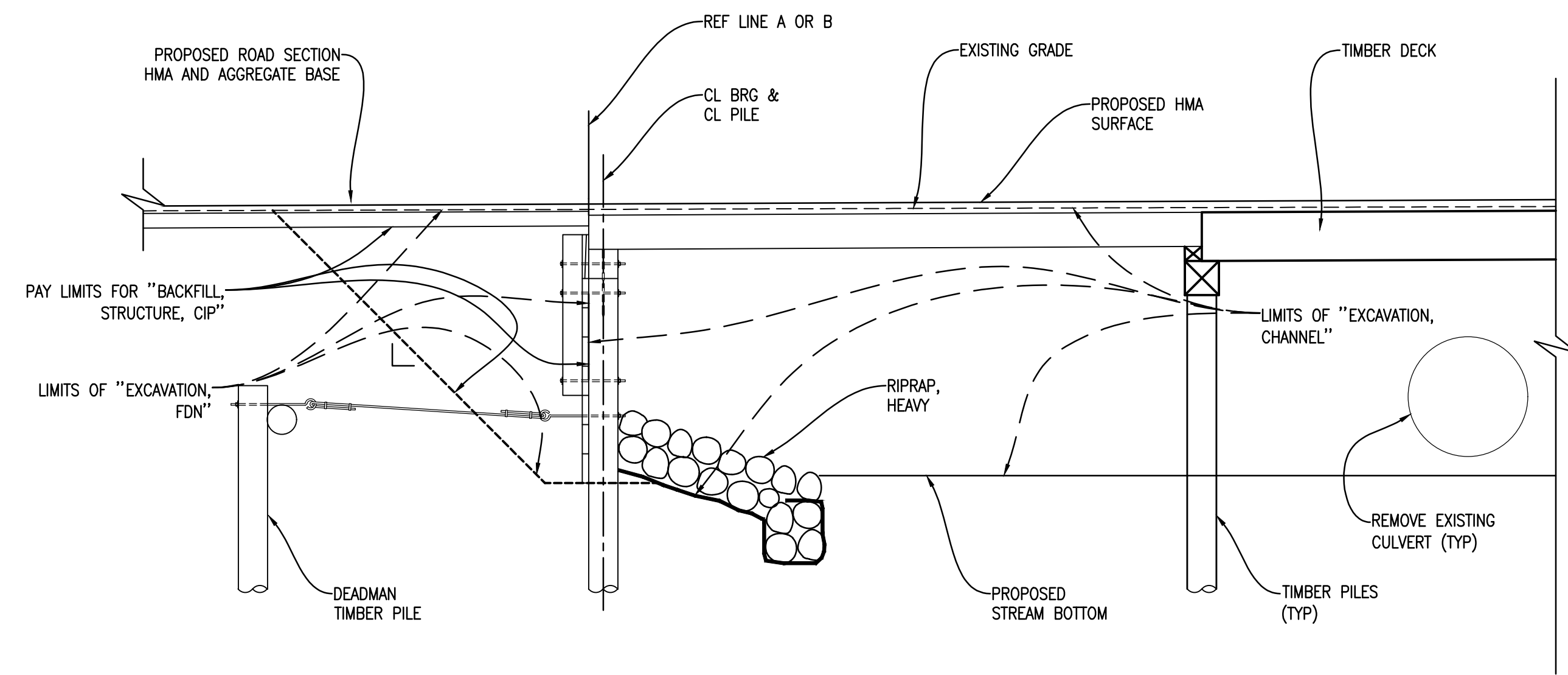
- STAGE 1:**
1. REMOVE ROAD EMBANKMENT OVER EXISTING CULVERTS TO TOP OF CULVERTS.
 2. PLACE STAGE 1 COFFERDAM BETWEEN EXISTING CULVERTS ISOLATING WEST CULVERT FROM THE STREAM. MAINTAIN STREAM FLOW THROUGH EAST CULVERTS.
 3. REMOVE THE WEST CULVERT AND EXCAVATE WEST PART OF STREAM CHANNEL.
 4. CONSTRUCT ABUTMENT A AND PIER 1, AND PLACE RIPRAP AT ABUTMENT A.

- STAGE 2:**
1. REMOVE FLOW DIVERSION ISOLATING THE WEST SIDE AND PLACE IN THE EAST PART OF THE STREAM ISOLATING THE EAST CULVERTS FROM THE STREAM. MAINTAIN STREAM FLOW THROUGH THE WEST SIDE OF THE NEWLY EXCAVATED CHANNEL.
 2. REMOVE THE EAST CULVERTS AND EXCAVATE EAST PART OF STREAM CHANNEL.
 3. CONSTRUCT ABUTMENT B AND PIER 2, AND PLACE RIPRAP AT ABUTMENT B.
 4. REMOVE FLOW DIVERSION.
 5. CONSTRUCT THE SUPERSTRUCTURE AND APPROACHES.

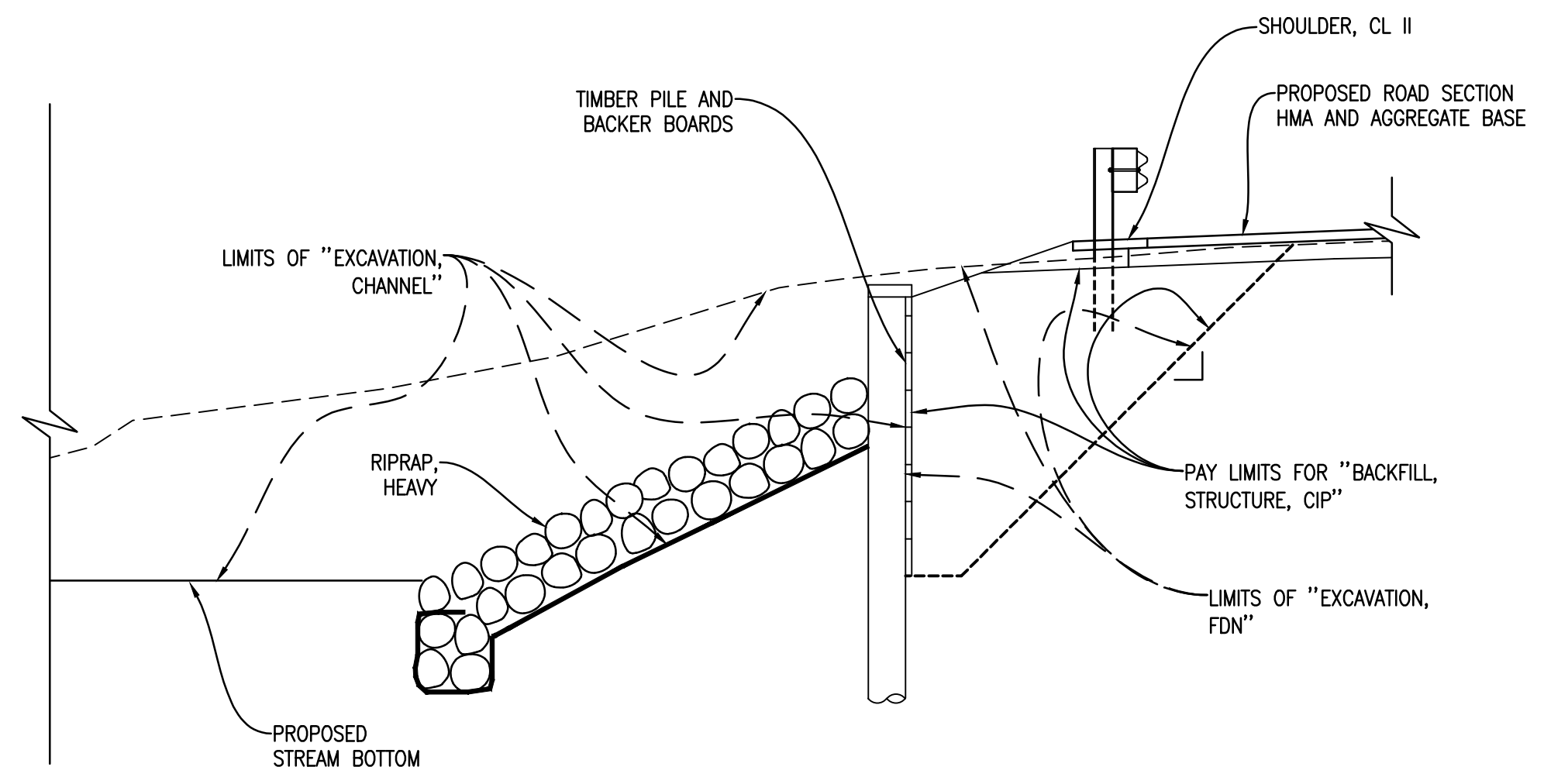


GENERAL PLAN OF STRUCTURE - CROSSING 3
CR-675 STREAM CROSSINGS PROJECT
 LELANAU COUNTY ROAD COMMISSION

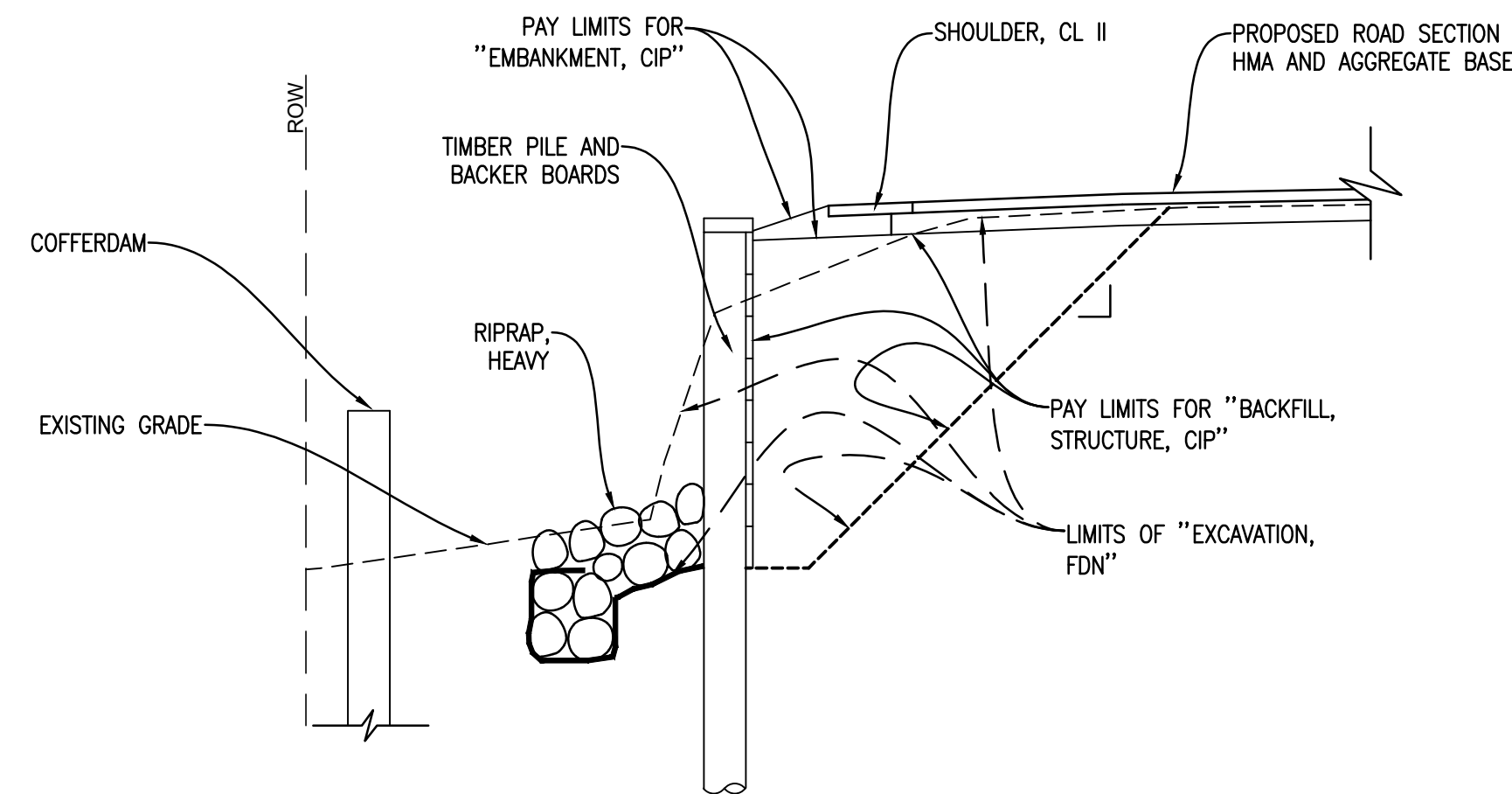
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Date Surveyed:	04-30-2020
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Drawn By:	RMV
Checked By:	MAG
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Original sheet size is 22x34	
Location:	
SECTIONS 23 & 24	
T29N, R14W	
GLEN ARBOR TOWNSHIP	
LELANAU COUNTY	
MICHIGAN	
Project Number:	2020430002
Sheet:	C3.3



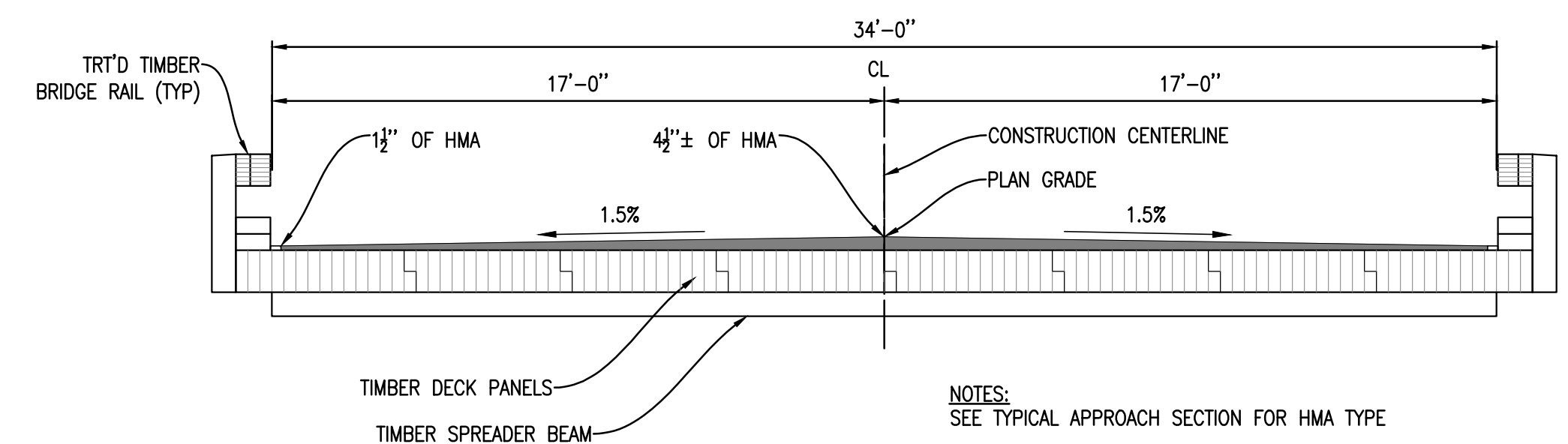
TYPICAL ABUTMENT SECTION



TYPICAL WINGWALL SECTION

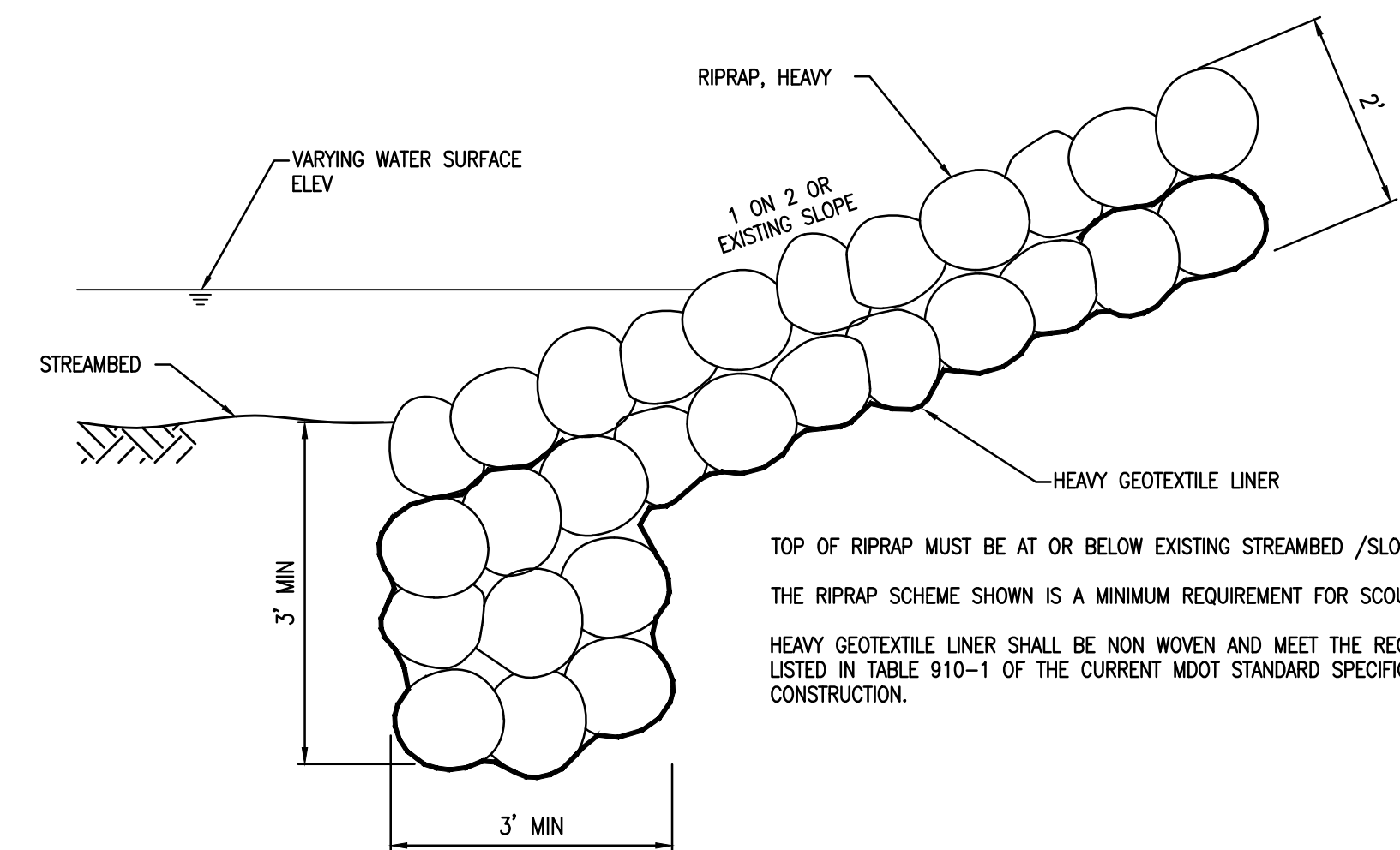


TYPICAL RETAINING WALL SECTION



NOTES:
 SEE TYPICAL APPROACH SECTION FOR HMA TYPE
 CONSTRUCT CROWN ACROSS BRIDGE DECK BY WEDGING BASE LAYER.
 TRANSITION FROM 2% APPROACH CROSS-SLOPE TO 1.5% DECK CROSS-SLOPE IN 25' LENGTH OF APPROACH AT EACH END OF BRIDGE.

TYPICAL DECK SECTION



TOP OF RIPRAP MUST BE AT OR BELOW EXISTING STREAMBED /SLOPE ELEVATION.
 THE RIPRAP SCHEME SHOWN IS A MINIMUM REQUIREMENT FOR SCOUR.
 HEAVY GEOTEXTILE LINER SHALL BE NON WOVEN AND MEET THE REQUIREMENTS LISTED IN TABLE 910-1 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

TYPICAL RIPRAP HEADER DETAIL

No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

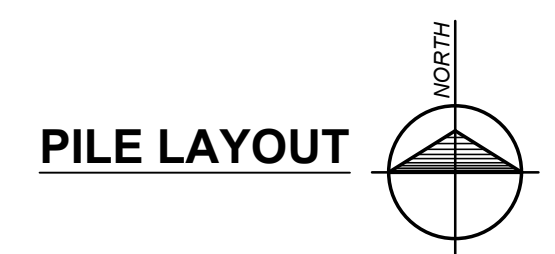
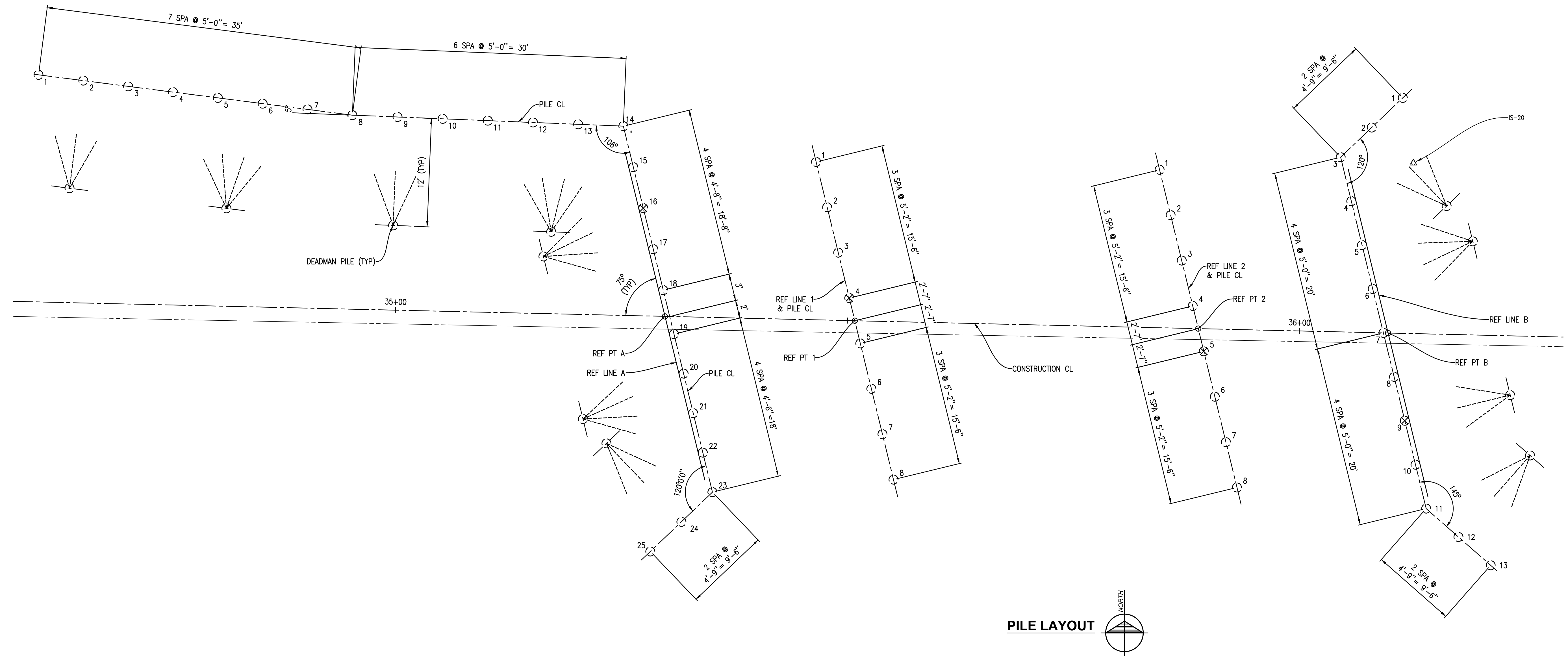
GENERAL PLAN OF STRUCTURE - CROSSING 3
CR-675 STREAM CROSSINGS PROJECT
 LEELELANU COUNTY ROAD COMMISSION

Date Issued: 05-27-2022
 Date Surveyed: 04-30-2020
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Sheet:
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MISCELLANEOUS QUANTITIES

1	LS	PILE DRIVING EQUIPMENT, FURN
1595	FT	PILE, TREATED TIMBER, FURN
1595	FT	PILE, TREATED TIMBER, DRIVEN
4	EA	TEST PILE, TREATED TIMBER

TREATED TIMBER PILES

LOCATION	PILE TYPE	NUMBER OF PILES	ESTIMATED LENGTH FURNISHED	
			EACH (FT)	TOTAL (FT)
ABUT A	TEST	1	35	35
	VERTICAL	9	25	225
	WINGWALL	15	20	300
	DEADMAN	7	20	140
PIER 1	TEST	1	40	40
	VERTICAL	7	30	210
PIER 2	TEST	1	40	40
	VERTICAL	7	30	210
ABUT B	TEST	1	35	35
	VERTICAL	8	25	200
	WINGWALL	4	20	80
	DEADMAN	4	20	80
TOTAL		65		1595

○ DENOTES VERTICAL PILES.
 ⊗ DENOTES VERTICAL TEST PILES.

DRIVE ALL PILES TO A NOMINAL PILE DRIVING RESISTANCE NOT LESS THAN 130 KIPS. DETERMINE NOMINAL PILE DRIVING RESISTANCE (R_{ndr}) USING THE FHWA MODIFIED GATES DYNAMIC FORMULA.

PILES SHALL HAVE A NOMINAL BUTT DIAMETER OF 12 INCHES.

THE ESTIMATED PILE LENGTH IS BASED ON THE STATIC ANALYSIS.

THE ESTIMATED LOSS OF NOMINAL PILE RESISTANCE DUE TO SCOUR AFTER DRIVING IS 2 KIPS.

THE ESTIMATED FACTORED DOWNDRAW AFTER PILE DRIVING IS 0 KIPS.

THE FACTORED PILE RESISTANCE AVAILABLE TO RESIST ALL FACTORED LOADS IS EQUAL TO 50 PERCENT OF NOMINAL PILE DRIVING RESISTANCE THAT IS REDUCED BY THE LOSS DUE TO SCOUR.

PILE SUBSTRUCTURE DESIGN SHOWN IN THESE PLANS, INCLUDING DEADMEN, IS ESTIMATED AND SHALL BE CONFIRMED WITH COMPLETE ENGINEERED TIMBER STRUCTURE CALCULATIONS AND SHOP DRAWINGS PREPARED BY THE BRIDGE SUPPLIER.

**PILE DETAILS - CROSSING 3
 CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION**

Date Issued: 05-27-2022
 Date Surveyed: 04-30-2020
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Project Number:
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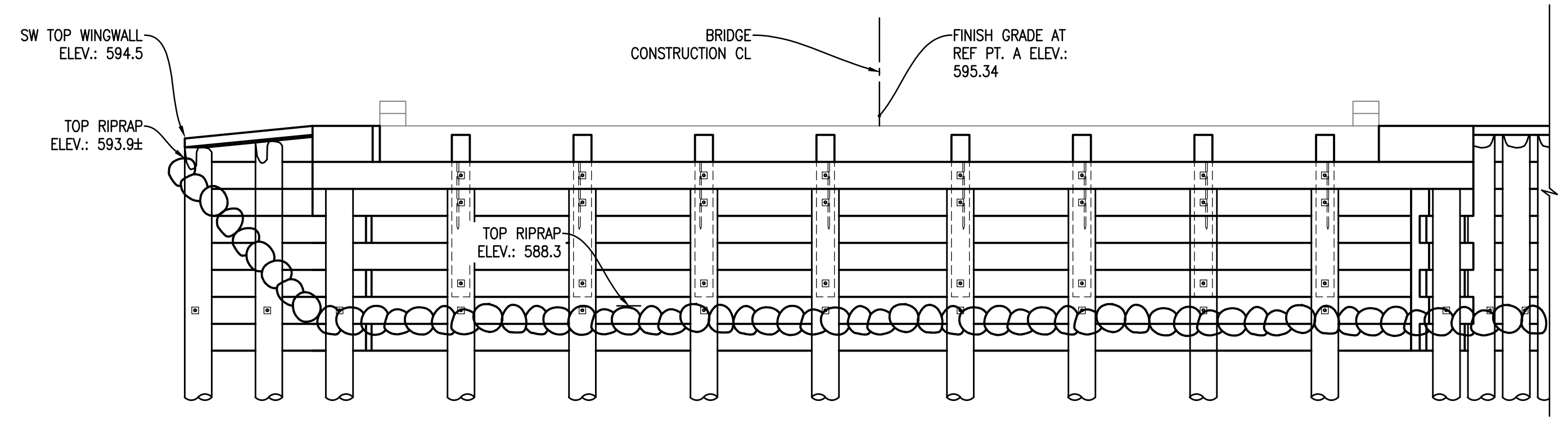
No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

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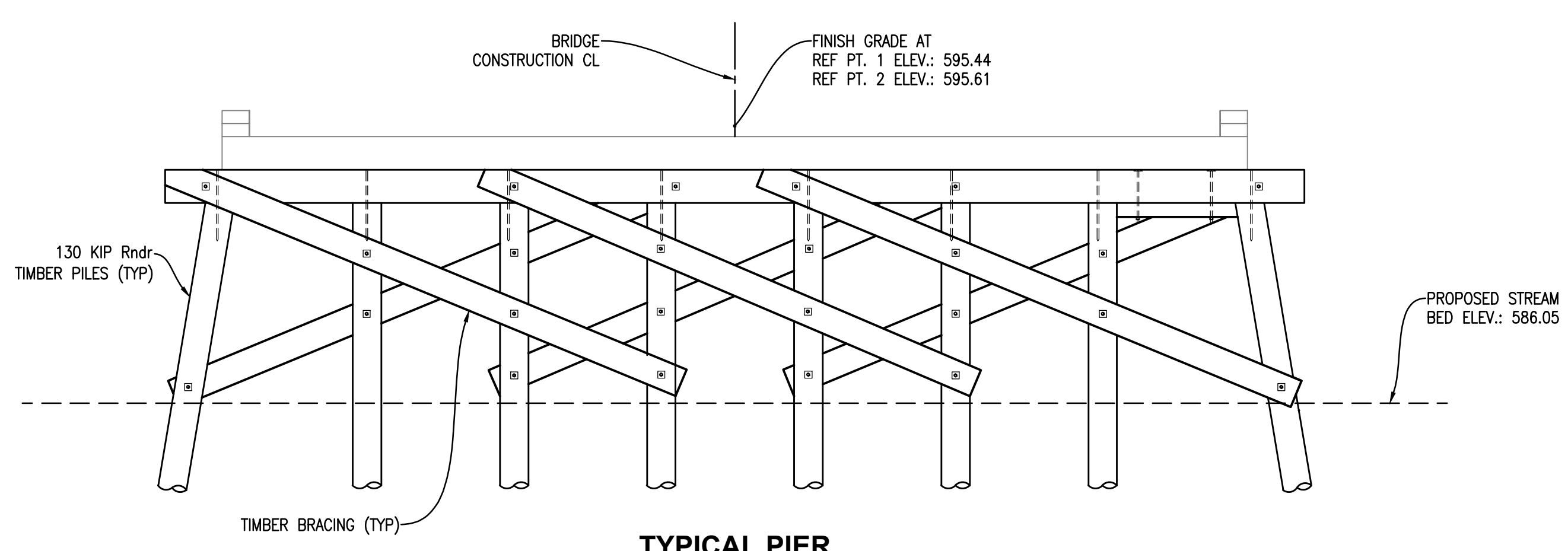


Gosling Czubak
 engineering sciences, inc.
 1280 Business Park Dr.
 Traverse City, Michigan
 231-946-9191 phone
 info@goslingczubak.com
 www.goslingczubak.com

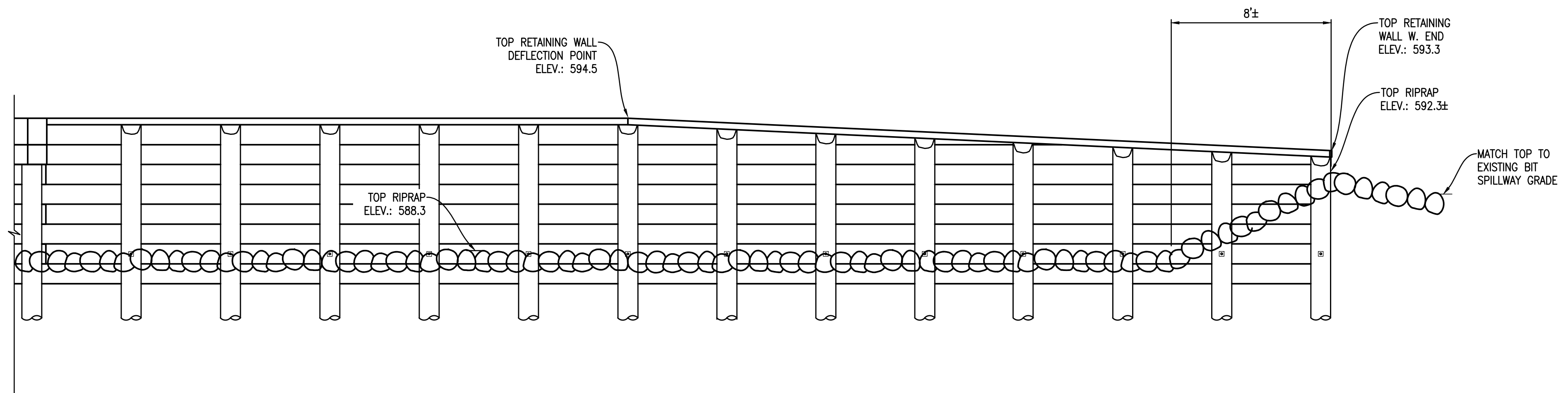
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 SURVEYING
 ENVIRONMENTAL SERVICES
 GEOTECHNICAL
 CONSTRUCTION SERVICES
 DRILLING
 LANDSCAPE ARCHITECTURE



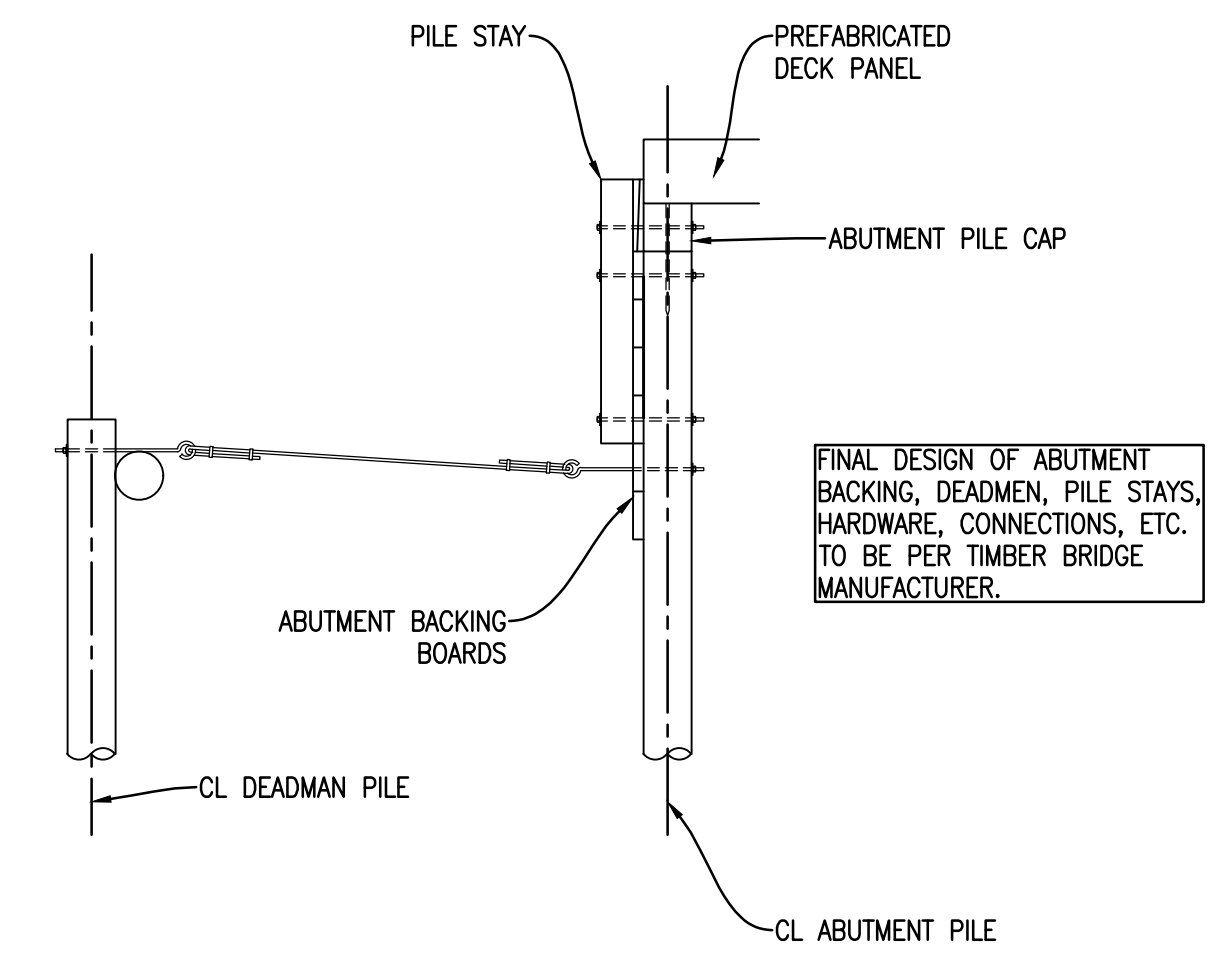
ABUTMENT A
(LOOKING WEST)



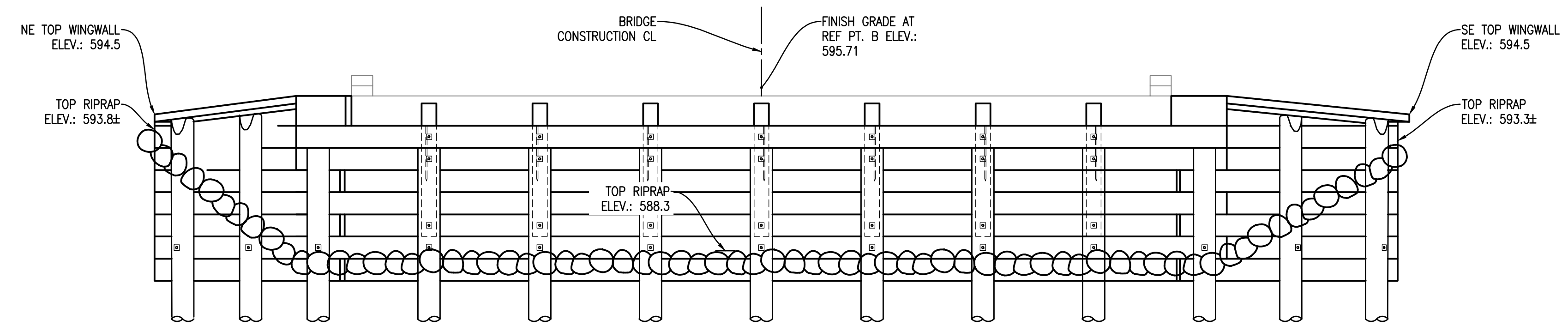
TYPICAL PIER



ABUTMENT A RETAINING WALL
(LOOKING SOUTH)



TYPICAL DEADMAN SECTION



ABUTMENT B
(LOOKING EAST)

No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

ABUTMENT & PIER DETAILS - CROSSING 3
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

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 MICHIGAN

Project Number:
 2020430002

Sheet:
C3.6

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Rev.	Date	Description
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS
2	02-05-2021	PARTNER REVIEW PLAN SET
3	12-10-2021	ROAD COMMISSION REVIEW
4	01-27-2022	ISSUED FOR PERMITS

By	Date	Revision

GENERAL PLAN OF SITE - CROSSING 4
CR-675 STREAM CROSSINGS PROJECT
 LEELEAU COUNTY ROAD COMMISSION

Date Issued: 05-27-2022
 Date Surveyed: 04-30-2020
 Designed By: RMV
 Drawn By: RMV
 Checked By: MAG
 Scale: AS NOTED

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Project Number:
 2020430002

Sheet:
C4.1

EXISTING STRUCTURE 42" DIAMETER CMP CULVERT	PROPOSED STRUCTURE 16'-4" X 6'-8" ALUMINUM BOX CULVERT W/ BURIED INVERT
BENCHMARKS BENCHMARK #1 SPIKE IN 16" CEDAR STATION 68+68.65, 26.6' RT ELEVATION = 599.59 (NAVD 88)	CONTROL POINTS CP #1 - STATION 65+35.44, 23.8' LT N= 581414.0190 E= 19274235.1120 CP #2 - STATION 69+78.33, 25.3' RT N= 581156.6780 E= 19274599.2570

GENERAL NOTES:

THE WORK COVERED BY THESE PLANS GENERALLY INCLUDES REMOVAL OF THE EXISTING CULVERT AND CONSTRUCTION OF THE PROPOSED CULVERT INCLUDING ROAD RECONSTRUCTION, CREEK DIVERSION, REMOVING UNSUITABLE MATERIAL, PLACING AND COMPACTING SAND, SLOPE RESTORATION, RIPRAP, HMA PAVING, AND GUARDRAIL.

WATER LEVEL IS SUBJECT TO CHANGE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING A DETERMINATION OF WATER LEVELS THAT MAY EXIST DURING CONSTRUCTION.

IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED, SLOPE PROTECTION AND SEEDING OR SODDING SHALL BE PLACED ON THE ADJACENT SLOPES.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EARTH-DISTURBING ACTIVITIES. PLACE TURF ESTABLISHMENT ITEMS AS SOON AS POSSIBLE ON POTENTIAL ERODIBLE SLOPES AS DIRECTED BY THE ENGINEER. CRITICAL DITCH GRADES SHALL BE PROTECTED WITH EITHER SOD OR SEED/MULCH OR MULCH BLANKET AS DIRECTED BY THE ENGINEER.

PERMANENT ROAD VEGETATIVE RESTORATION MEASURES SHALL INCLUDE TOPSOIL, CHEMICAL FERTILIZER NUTRIENT CLASS A (228 LB/ACRE), GENERAL ROADSIDE SEED MIX TDS (220 LB/ACRE), MULCH, AND BIODEGRADABLE JUTE NETTING BLANKET. MEASURES SHALL BE SELECTED FROM MDOT QUALIFIED PRODUCTS AND INSTALLED PER MDOT SPECIFICATIONS.

PLAN ELEVATIONS AND COORDINATES ARE BASED ON NAVD (88) AND NAD (83) DATUMS RESPECTIVELY.

MARK	LOCATION	GUARDRAIL ITEMS	
		Description	Unit / Qty
GR-1	NORTH SIDE	GUARDRAIL LONG SPAN, DET MGS-2	EA 1
GR-1	SOUTH SIDE	GUARDRAIL LONG SPAN, DET MGS-2	EA 1
GR-2	NE QUAD	GUARDRAIL, TYPE MGS-8	FT 37.5
GR-2	NW QUAD	GUARDRAIL, TYPE MGS-8	FT 37.5
GR-2	SE QUAD	GUARDRAIL, TYPE MGS-8	FT 37.5
GR-2	SW QUAD	GUARDRAIL, TYPE MGS-8	FT 37.5
GR-3	EACH QUAD	GUARDRAIL DEPARTING TERMINAL, TYPE MGS	EA 4

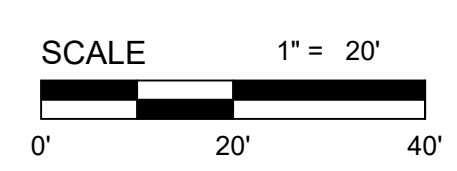
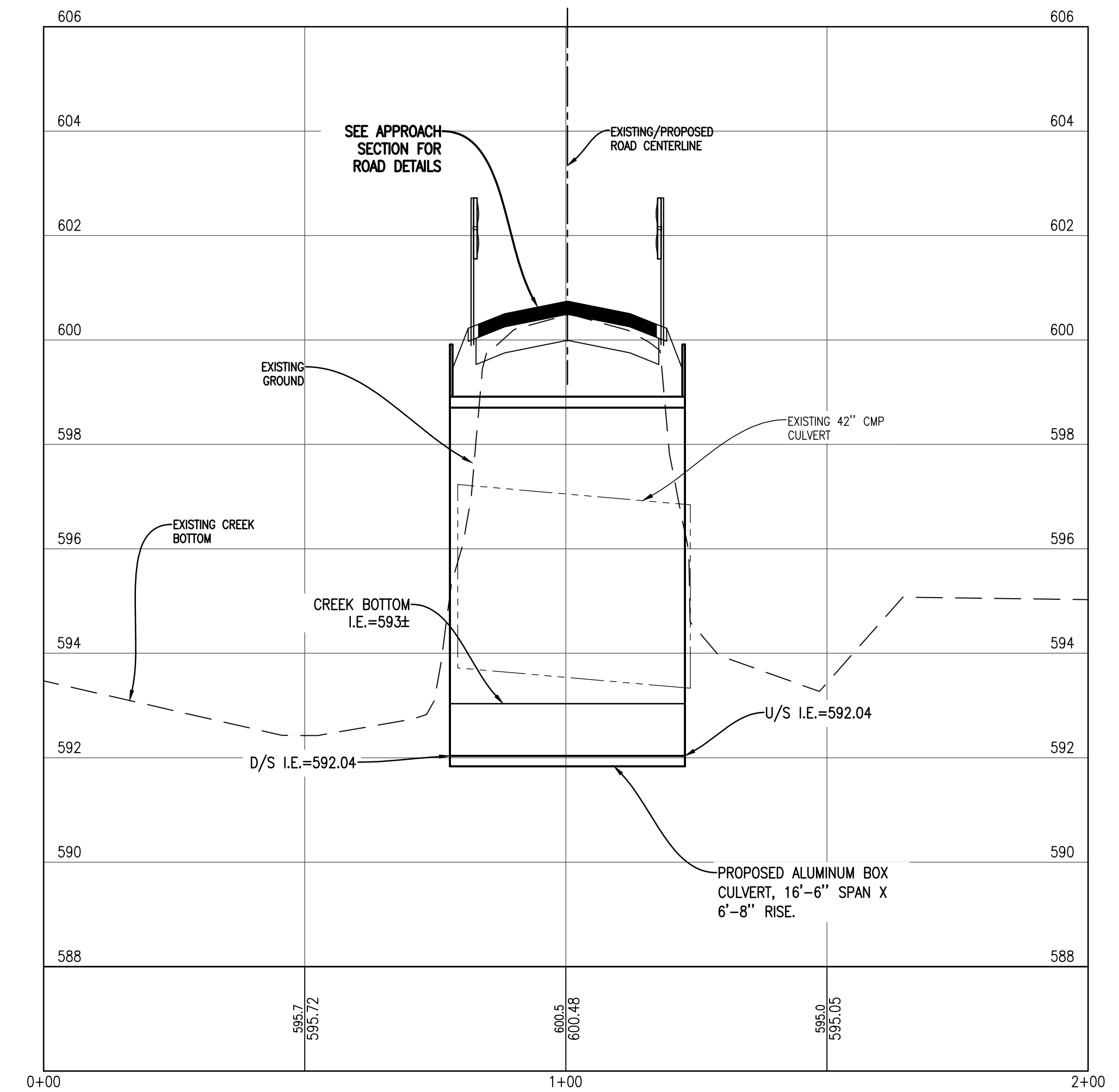
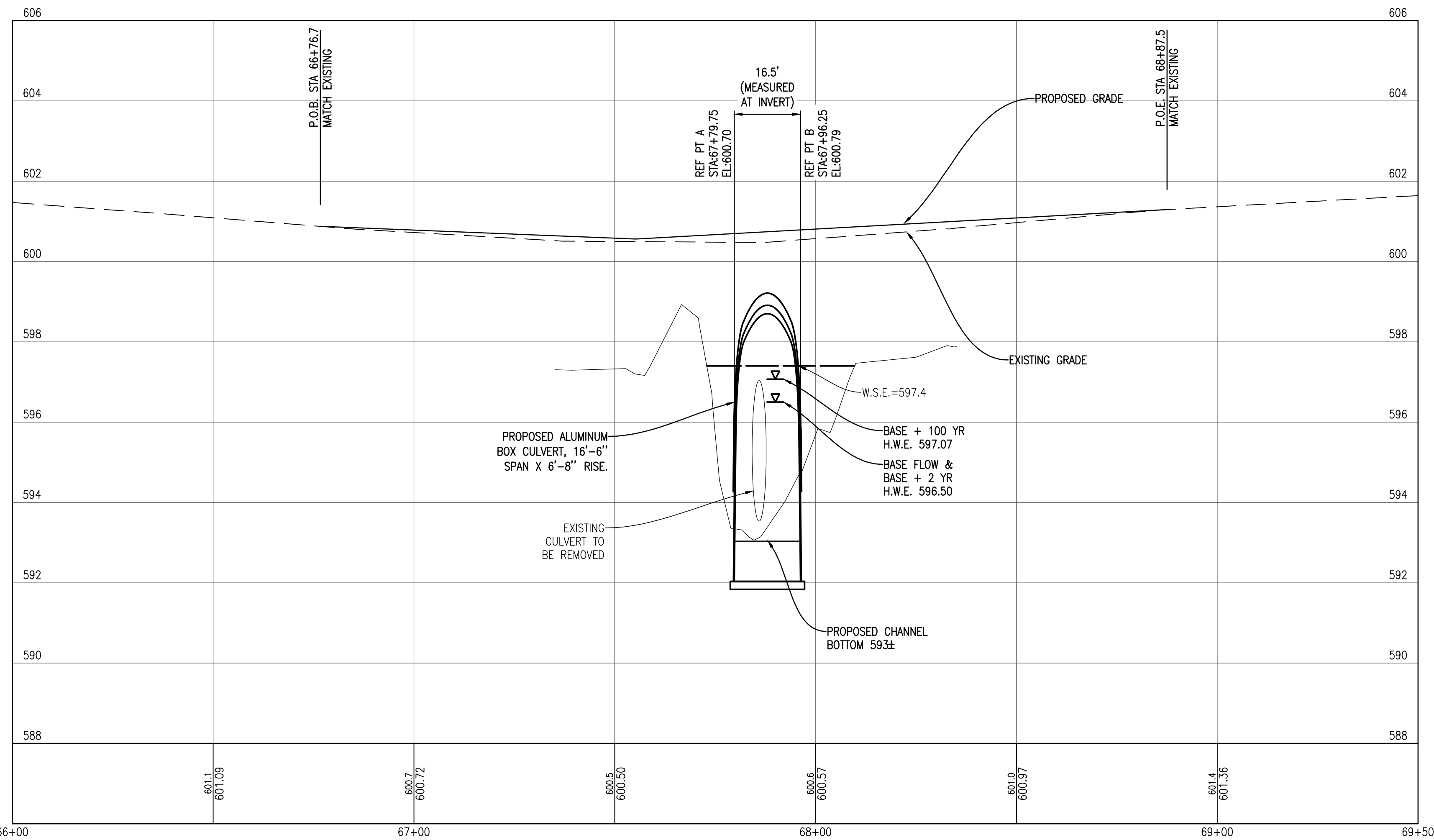
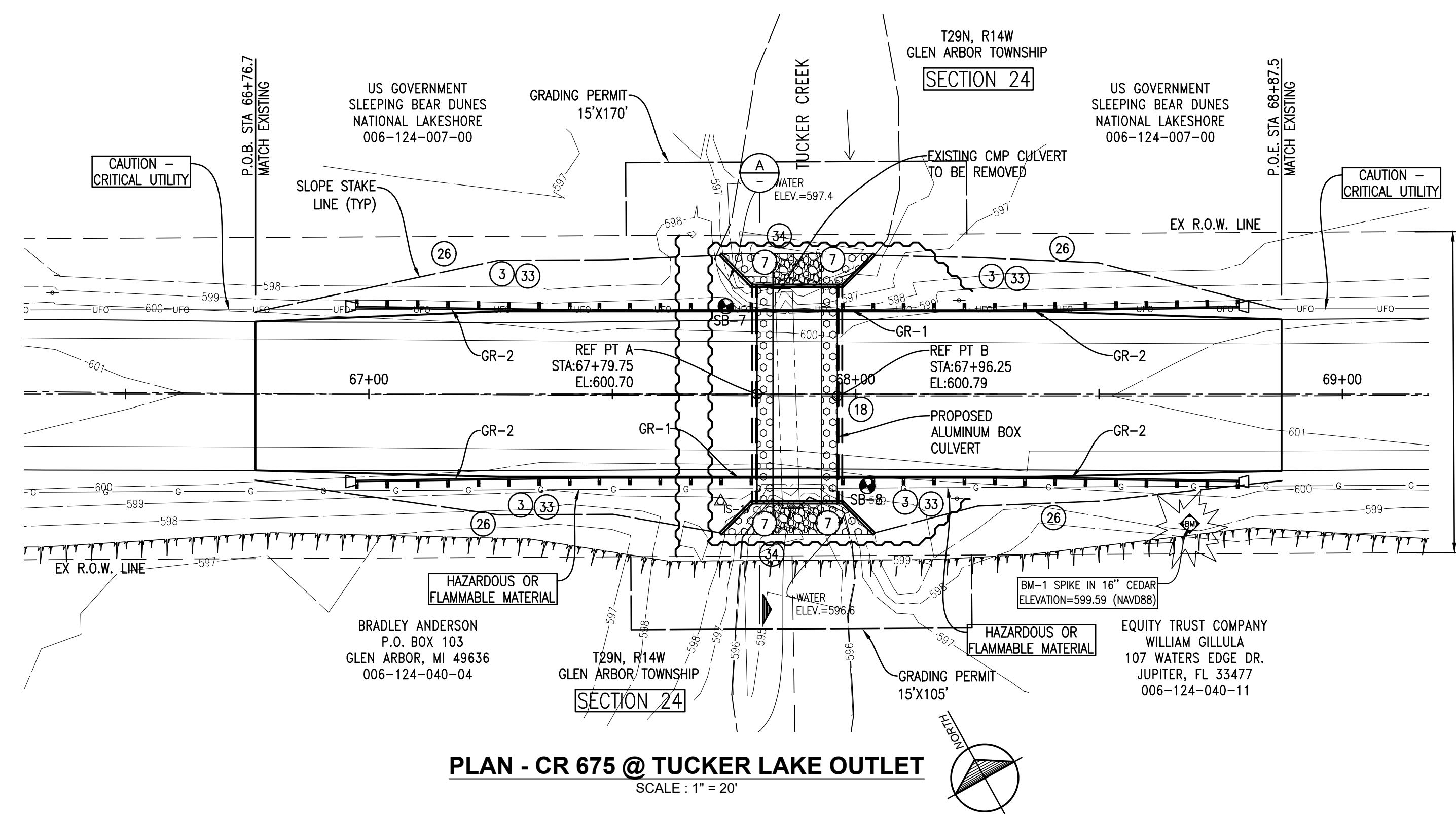
- EROSION CONTROL COUNTERMEASURES PER R-96 SERIES STANDARD PLAN**
- ③ PERMANENT / TEMPORARY SEEDING
 - ⑦ RIPRAP
 - ⑱ DEWATERING WITH FILTER BAG
 - ⑳ SILT FENCE
 - ⑳ MULCH BLANKETS
 - ⑳ COFFERDAMS

CREEK DIVERSION:

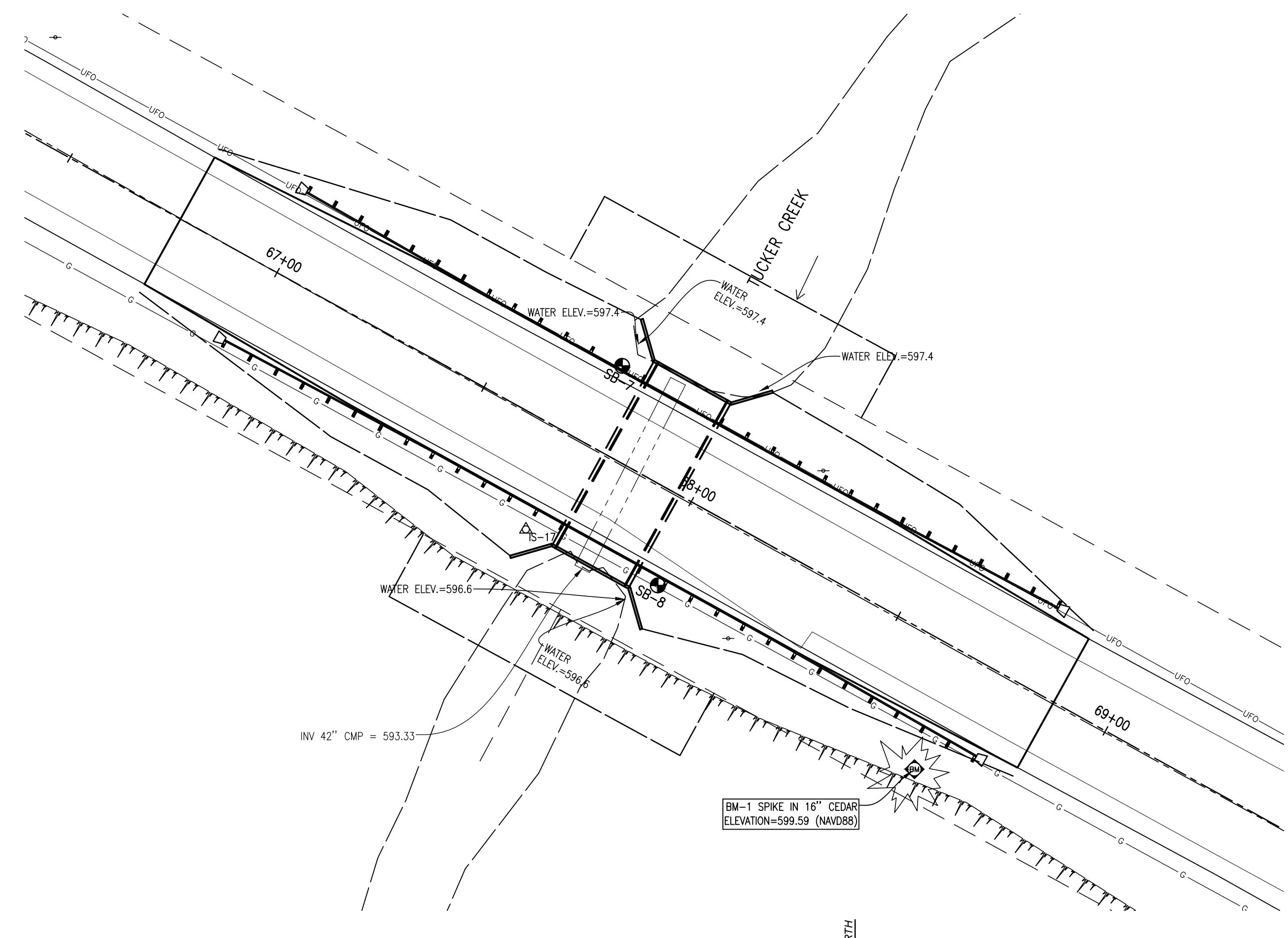
IT IS INTENDED FOR CONSTRUCTION OF THE PROPOSED CULVERT TO BE COMPLETED IN DRY CONDITIONS. CREEK FLOW SHALL BE DIVERTED AND DEWATERING PERFORMED AS NECESSARY TO PROVIDE DRY WORKING CONDITIONS AND FACILITATE REMOVING AND REPLACING UNSUITABLE MATERIAL.

CONCEPTUAL DIVERSION METHOD IS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL PROVIDE A DIVERSION AND DEWATERING PLAN FOR APPROVAL A MINIMUM OF 10 BUSINESS DAYS PRIOR TO CONSTRUCTION COMMENCING.

CREEK DIVERSION PAY ITEM INCLUDES ANY TEMPORARY SHEETING, DEWATERING, DIVERSIONS DITCHING, AND / OR TEMPORARY DRAINAGE PIPE NECESSARY TO MAINTAIN STREAM FLOW DURING CONSTRUCTION.



PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-7								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/11/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): 4.25" TOTAL DEPTH (FT): 35								
DRILLER: M. Allen LOGGED BY: M. Korndorfer		STATIC WATER LEVEL: 3 CAVING DEPTH: 10								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	TEST RESULTS	
									Pocket Penetrometer (psi)	% < #200
ELEV.=600.0		ASPHALT PAVEMENT	0							
		SUB-BASE - gravelly sand - medium dense - brown	0.5	SS1	14	7	7			
		Silty fine SAND (SP) - medium dense - dark brown	2.9							
		PEAT - very loose - black - wet	5	SS2	10	2	4			
CULVERT I.E. ELEV.=592.0		Clayey silty fine SAND (SM/SC) - very loose - gray	8	SS3	0	2	2			
		Silty fine SAND (SM) - loose - light brown	9.5	SS4	18	1	1			
B/EXCAVATION ELEV.=587.0		Silty fine to medium SAND (SM) - trace coarse sand - occasional clayey seams - occasional fine gravel seams - loose - light brown	12	SS5	18	3	5			
			15	SS6	18	2	5			
			20	SS7	18	2	5			
			25	SS8	18	2	5			
			30	SS9	18	2	5			
		Fine to medium SAND (SP) - little gravel - little silt - dense - light brown	34							
		Boring terminated at 35 ft.	35	SS9	18	13	25			



**BORING LOCATION PLAN
CROSSING 4**
SCALE: 1" = 20'

NOTES:
NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1 1/2" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140# HAMMER FALLING 30".

12 1st 6"
13 2nd 6"
14 3rd 6"

CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.

THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.

PROJECT: County Road 675 Culvert Replacement		LOG OF BORING: SB-8								
PROJECT NO.: 2020430002.02		GROUND ELEVATION: DATE: 6/11/2020								
PROJECT LOCATION: Glen Arbor, Michigan		DRILLING LOCATION: Glen Arbor, Michigan								
CLIENT: Leelanau County Road Commission		DRILLING METHOD: 4.25" (ID) Hollow-Stem Auger								
DRILLING COMPANY: Gosling Czubak RIG: CME-75		BOREHOLE DIAMETER (IN): 4.25" TOTAL DEPTH (FT): 30								
DRILLER: M. Allen LOGGED BY: M. Korndorfer		STATIC WATER LEVEL: 3 CAVING DEPTH: 9								
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	TEST RESULTS	
									Pocket Penetrometer (psi)	% < #200
ELEV.=600.2		ASPHALT PAVEMENT	0							
		SUB-BASE - gravelly sand - dense - brown	0.5	SS1	0	30	37	Drove Rock		
		PEAT - loose - black - wet	3	SS2	16	3	2			
			5							
CULVERT I.E. ELEV.=592.0		Fine to medium SAND (SP) - trace coarse sand - trace fine gravel - medium dense - brown	6	SS3	10	4	2			
		Silty fine SAND (SM) - little clay - loose - light brown	4	SS4	18	3	1			
B/EXCAVATION ELEV.=587.0			10							
		Silty fine SAND (SM) - occasional clayey seams - loose light brown	14	SS5	18	6	6			
			15							
		SILT (ML) - little fine sand - medium dense - light brown	19	SS6	18	6	3			
			20							
		Fine to medium SAND (SP) - trace coarse sand - medium dense - light brown	22							
			24.5	SS7	18	11	12			
		Silty fine SAND (SM) - medium dense - light brown	25							
			26							
		Fine to medium SAND (SP) - trace coarse sand - loose light brown	29							
			29	SS8	18	3	3			
		Silty fine SAND (SM) - loose - light brown	30							
		Boring terminated at 30 ft.								

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CIVIL ENGINEERING
SURVEYING
ENVIRONMENTAL SERVICES
GEOTECHNICAL
CONSTRUCTION SERVICES
DRILLING
LANDSCAPE ARCHITECTURE

No.	Date	Revision
4	01-27-2022	ISSUED FOR PERMITS
3	12-10-2021	ROAD COMMISSION REVIEW
2	02-05-2021	PARTNER REVIEW PLAN SET
1	12-22-2020	CROSSINGS 1, 2 & 3 REVISIONS

**SOIL BORINGS - CROSSING 4
CR-675 STREAM CROSSINGS PROJECT
LEELANAU COUNTY ROAD COMMISSION**

Date Issued: 05-27-2022
Date Surveyed: 04-30-2020
Designed By: RMV
Drawn By: RMV
Checked By: MAG
Scale: AS NOTED

Original sheet size is 22x34

Location:
SECTIONS 23 & 24
T29N, R14W
GLEN ARBOR TOWNSHIP
LEELANAU COUNTY
MICHIGAN

Project Number:
2020430002

Sheet:
C4.2

SUMMARY OF HYDRAULIC ANALYSIS							
FLOOD DATA	EXISTING			PROPOSED			CHANGE IN WS ELEV. U/S OF PROPOSED STRUCTURE (FT)
	DISCHARGE (CFS)	WATER SURFACE ELEV. AT L/S FACE OF STRUCTURE (FT)	VELOCITY IN D/S CHANNEL (FPS)	WATER SURFACE ELEV. AT L/S FACE OF STRUCTURE (FT)	VELOCITY IN D/S CHANNEL (FPS)	WATERWAY AREA (SQFT) AT D/S FACE	
BASE	3	596.52	0.2	596.50	0.1	55.0	-0.02
2-YEAR	4	596.53	0.3	596.50	0.1	55.0	-0.03
50-YEAR	38	599.33	1.4	596.75	0.7	58.8	-2.58
100-YEAR	63	600.94	1.9	597.07	1.0	63.6	-3.87

THE CONTRIBUTING DRAINAGE AREA TO THIS CROSSING IS 2.5 SQUARE MILES.

THE MAXIMUM AREA BELOW LOW CHORD IS 78.3 SQUARE FEET.

THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON THIS HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOODPLAIN.

NOTES

THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/425 OF SPAN LENGTH.

CULVERT STRUCTURE SHALL BE ASSEMBLED AND INSTALLED PER THE MANUFACTURERS SPECIFICATIONS AND APPROVED SHOP DRAWINGS.

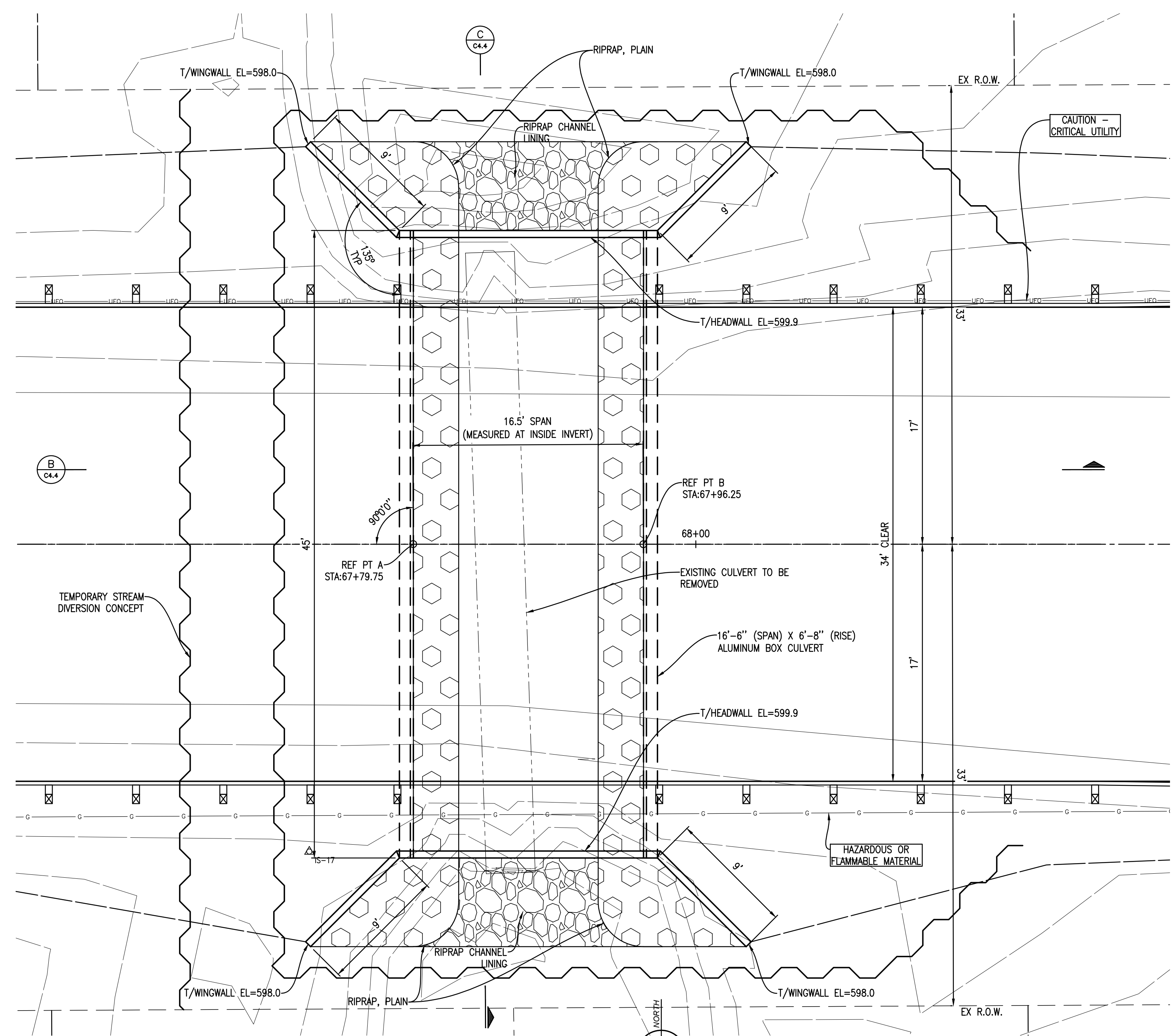
THE PROPOSED CULVERT INVERT IS BURIED BELOW THE EXISTING CREEK BED AND FILLED WITH NATIVE STREAM BED MATERIAL TO PROVIDE A NATURAL BOTTOM FOR FISH PASSAGE.

RIPRAP CHANNEL LINING AT THE INLET AND OUTLET SHALL BE INSTALLED TO PREVENT SCOUR AT THE INVERTS AND UNDERMINING OF THE CULVERT.

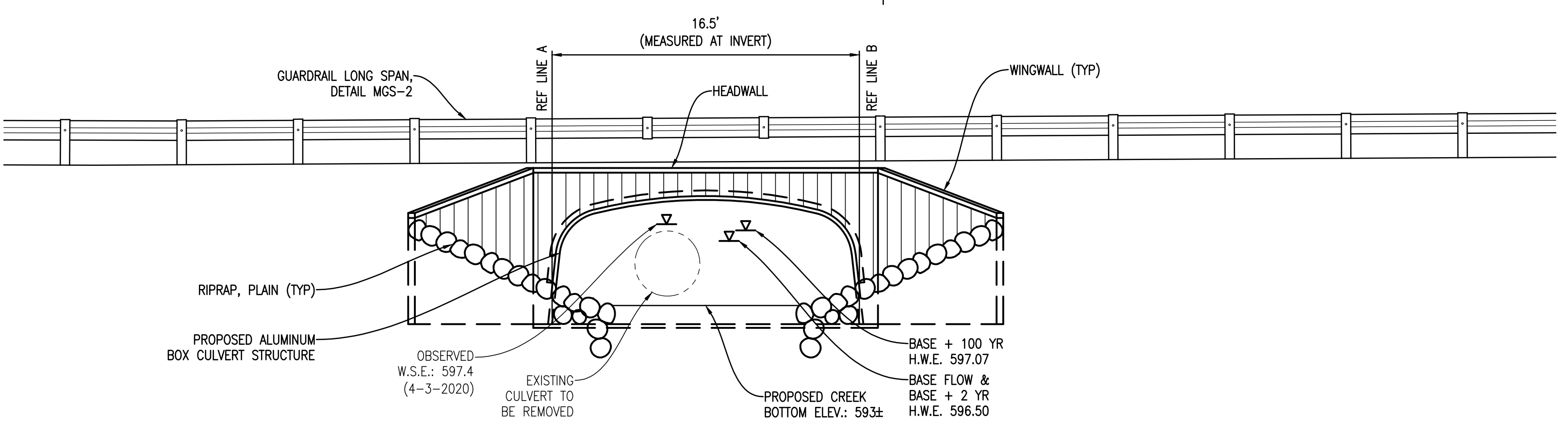
GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN PAYMENT FOR RIPRAP.

MISCELLANEOUS QUANTITIES

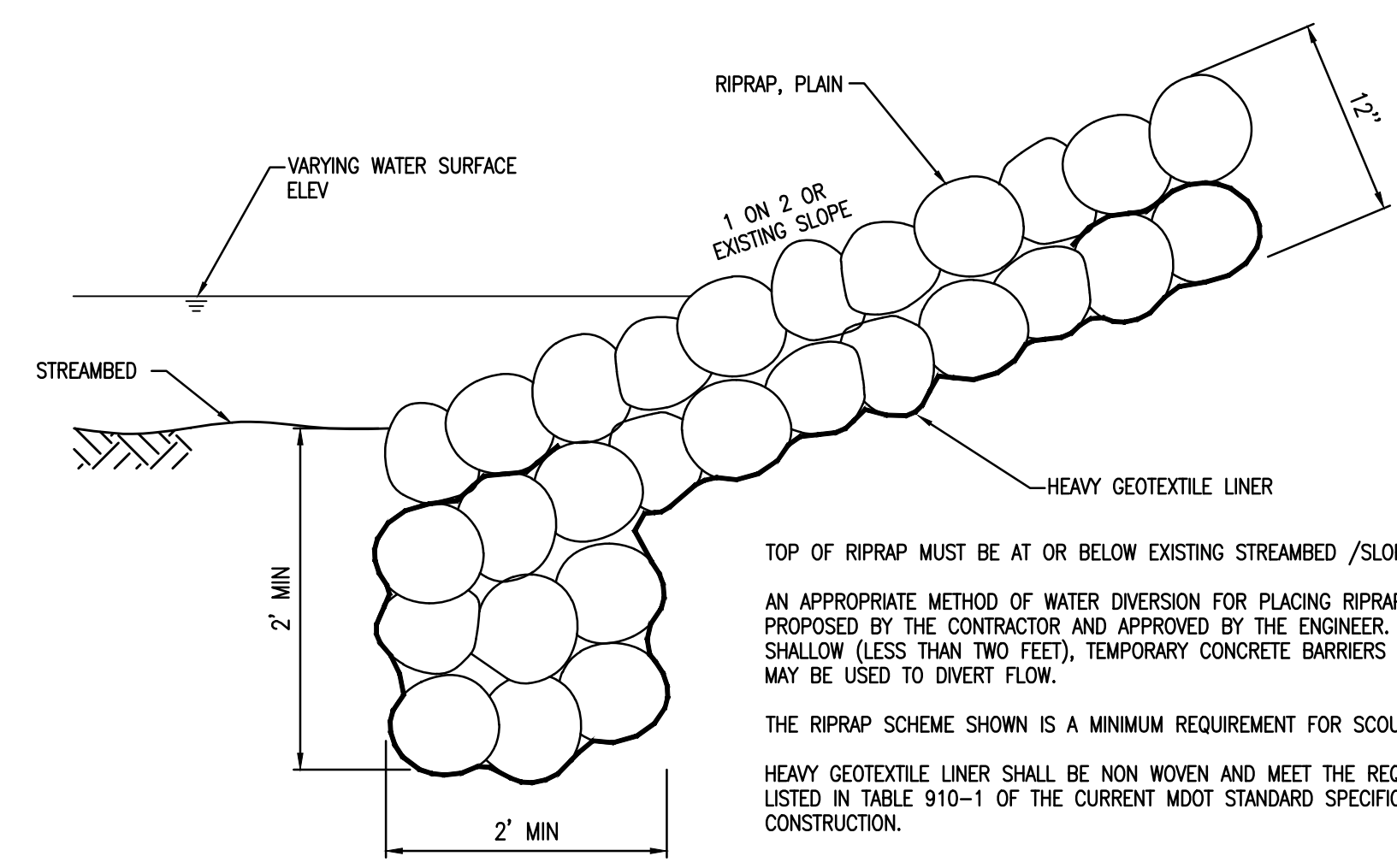
1	LS	MOBILIZATION
1	LS	TRAFFIC CONTROL
1	EA	CULV. REM. 24 INCH TO 48 INCH
50	CYD	EMBANKMENT, CIP
540	CYD	EXCAVATION, EARTH
480	CYD	EXCAVATION, PEAT
760	CYD	BACKFILL, STRUCTURE, CIP
1	EA	EROSION CONTROL, FILTER BAG
150	FT	EROSION CONTROL, SILT FENCE
780	SYD	AGGREGATE BASE, 6 INCH
95	SYD	SHOULDER, CL II, 3 INCH
725	SYD	HMA SURFACE, REM
130	TON	HMA, 4E1
1	LS	CREEK DIVERSION
1	LS	DEWATERING
1	LS	ALUMINUM BOX CULVERT, 16'-6"x6'-8"
1	LS	CULVERT ASSEMBLY AND INSTALLATION
150	FT	GUARDRAIL, TYPE MGS-8
2	EA	GUARDRAIL LONG SPAN, DET MCS-2
4	EA	GUARDRAIL DEPARTING TERMINAL, TYPE MGS
8	EA	GUARDRAIL REFLECTOR
60	SYD	RIPRAP, PLAIN
18	SYD	RIPRAP CHANNEL LINING
265	SYD	SLOPE RESTORATION



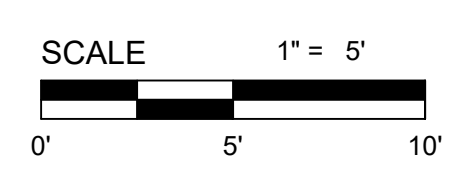
STRUCTURE PLAN
SCALE: 1" = 5'



STRUCTURE ELEVATION
NO SCALE

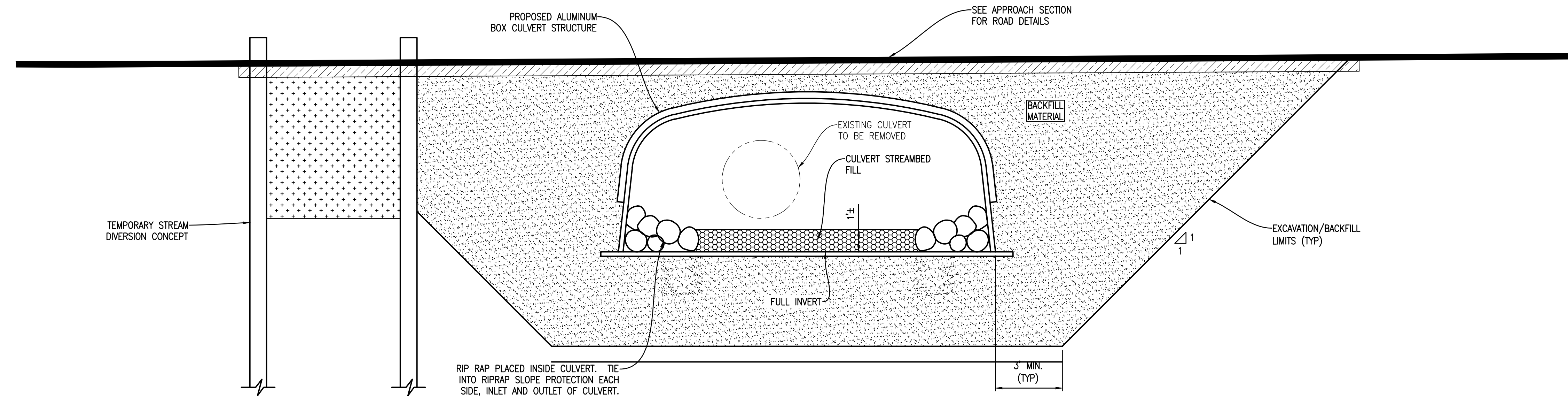


RIPRAP HEADER DETAIL



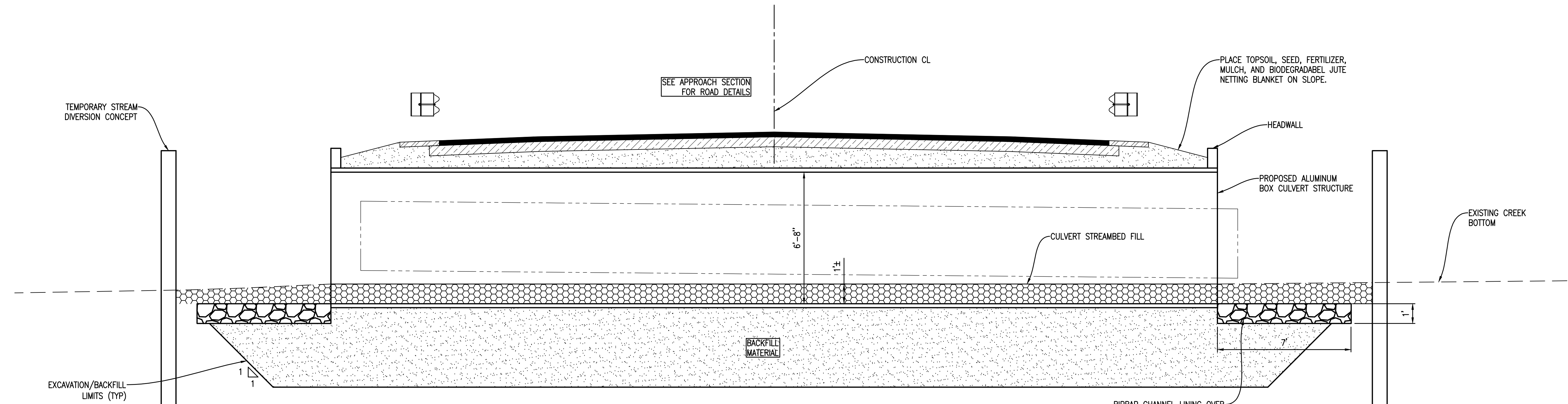
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GENERAL PLAN OF STRUCTURE - CROSSING 4
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION



SECTION B-B
 SCALE: 1"=3'

NOTES:
 CULVERT STREAMBED FILL MATERIAL SHALL BE MIXTURE OF SILTY FINE SAND AND MEDIUM SAND MATERIALS EXCAVATED MATERIAL SALVAGEABLE DURING CONSTRUCTION. IF A SUFFICIENT QUANTITY OF MATERIAL IS NOT SALVAGEABLE, USE CLASS II SAND.
 BACKFILL MATERIAL SHALL BE CLASS II SAND COMPACTED TO MINIMUM 95% OF MAXIMUM DRY UNIT WEIGHT.



SECTION C-C
 SCALE: 1"=3'

RIPRAP CHANNEL LINING GRADATION		
D ₅₀ = 4 inches		
% SMALLER	ROCK DIA., INCHES	
	Min.	Max.
100	6.0	8.0
85	5.2	7.2
50	4.0	6.0
10	3.2	5.2

GENERAL PLAN OF STRUCTURE - CROSSING 4
CR-675 STREAM CROSSINGS PROJECT
 LEELANAU COUNTY ROAD COMMISSION

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No.	Date	Revision	By
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3	12-10-2021	ROAD COMMISSION REVIEW	RMV
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