

**GENERAL NOTES**

**DESIGN SPECIFICATIONS:**

THIS DRAWING CONFORMS TO THE "LRFD BRIDGE DESIGN SPECIFICATION" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, AND THE BRIDGE DESIGN MANUAL.

**DESIGN DATA:** THE FOLLOWING DESIGN DATA IS ASSUMED:

INTERNAL ANGLE OF FRICTION OF BACKFILL SOIL,  $\phi_{bf} = 30^\circ$   
 TOTAL UNIT WEIGHT OF BACKFILL SOIL = 120 PCF  
 INTERNAL ANGLE OF FRICTION (DRAINED), FOUNDATION SOIL,  $\phi_f = 30^\circ$   
 UNDRAINED SHEAR STRENGTH (COHESIVE), FOUNDATION SOIL,  $S_{uf} = 1500$  PSF  
 UNIT WEIGHT OF CONCRETE = 150 PCF  
 SLOPE OF BACKFILL = 2:1 (TYPE A & B HEADWALLS)  
 HEIGHT OF LIVE LOAD SURCHARGE = 2 FT (TYPE C HEADWALLS)

CONCRETE - COMPRESSIVE STRENGTH 4000 PSI  
 (FOOTING, WINGWALL AND FORESLOPE WALL)

REINFORCING STEEL - ASTM A615, A616, OR A617  
 GRADE 60 MINIMUM YIELD STRENGTH  
 60,000 PSI (ALL REINFORCING SHALL BE  
 EPOXY COATED)

BASED ON THE ASSUMED DESIGN DATA, THE WINGWALLS ACHIEVE FACTORED BEARING RESISTANCES THAT ARE GREATER THAN THEIR RESPECTIVE BEARING PRESSURES. IF A BACKFILL MATERIAL WITH A HIGHER INTERNAL ANGLE OF FRICTION OR A LIGHTER TOTAL UNIT WEIGHT IS USED; OR IF A FOUNDATION SOIL WITH A HIGHER DRAINED INTERNAL ANGLE OF FRICTION OR A HIGHER UNDRAINED SHEAR STRENGTH IS ENCOUNTERED; THEN THE STABILITY OF THE WINGWALLS IS SATISFACTORY.

**BASIS OF PAYMENT - CONCRETE & REINFORCING STEEL ITEMS**

ALL LABOR, EQUIPMENT AND INCIDENTALS REQUIRED TO CONSTRUCT THE WINGWALLS SHALL BE INCLUDED WITH ITEM 511 - CLASS QC1 CONCRETE, RETAINING/WINGWALL NOT INCLUDING FOOTING.

ALL LABOR, EQUIPMENT AND INCIDENTALS REQUIRED TO CONSTRUCT THE FOOTINGS AND CUTOFF WALLS SHALL BE INCLUDED WITH ITEM 511 - CLASS QC1 CONCRETE, FOOTING.

ALL LABOR, EQUIPMENT AND INCIDENTALS REQUIRED TO CONSTRUCT THE FORESLOPE WALLS AND CLOSURE POURS SHALL BE INCLUDED WITH ITEM 511 - CLASS QC1 CONCRETE, HEADWALL.

PAYMENT FOR REINFORCING STEEL SHALL BE INCLUDED WITH ITEM 509 - EPOXY COATED STEEL REINFORCEMENT.

POROUS BACKFILL WITH FILTER FABRIC 1'-6" THICK SHALL BE PLACED BEHIND THE WINGWALLS ONLY AND SHALL EXTEND TO 12" BELOW THE EMBANKMENT SURFACE. GEOTEXTILE FABRIC SHALL BE PLACED BETWEEN THE POROUS BACKFILL AND REPLACED EXCAVATION ADJACENT TO THE STRUCTURE. IT SHALL TURN UNDER THE BOTTOM OF THE POROUS BACKFILL AND RETURN 6" ABOVE THE TOP ELEVATION OF THE WEEPHOLE.

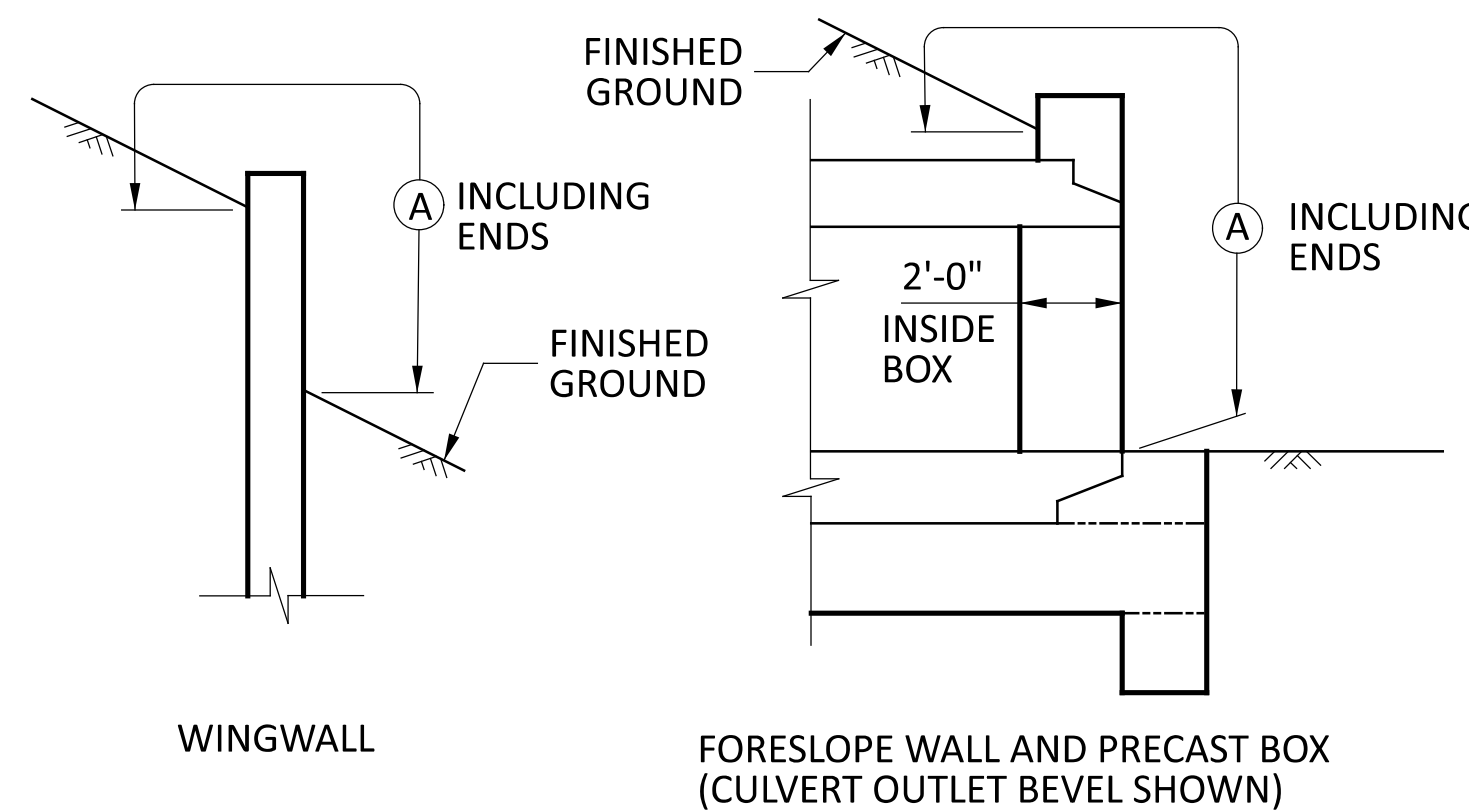
WEEPHOLES SHALL BE PLACED 6" TO 12" ABOVE THE NORMAL WATER ELEVATION OR GROUND LINE AND SHALL HAVE A MAXIMUM SPACING OF 10'-0". A MINIMUM OF ONE WEEPHOLE SHALL BE PROVIDED PER WINGWALL.

**PREFORMED EXPANSION JOINT FILLER:** PREFORMED EXPANSION JOINT FILLER (PEJF) CONFORMING TO CMS 705.03, 1 INCH THICK, SHALL BE PLACED ABOVE THE FOOTING BETWEEN THE SIDES OF THE BOX CULVERT AND THE ENDS OF THE WINGWALLS. PAYMENT FOR MATERIALS AND INSTALLATION SHALL BE INCLUDED WITH ITEM 516 - 1" PREFORMED EXPANSION JOINT FILLER.

**SEALING OF FORESLOPE WALL AND WINGWALLS:** ALL EXPOSED FORESLOPE WALL AND WINGWALL CONCRETE SHALL BE SEALED WITH NON-EPOXY SEALER. THE LIMITS SHALL BE AS SHOWN IN THE DIAGRAMS BELOW. PAYMENT FOR THE NON-EPOXY SEALER SHALL BE PER ITEM 512 - SEALING OF CONCRETE SURFACES.

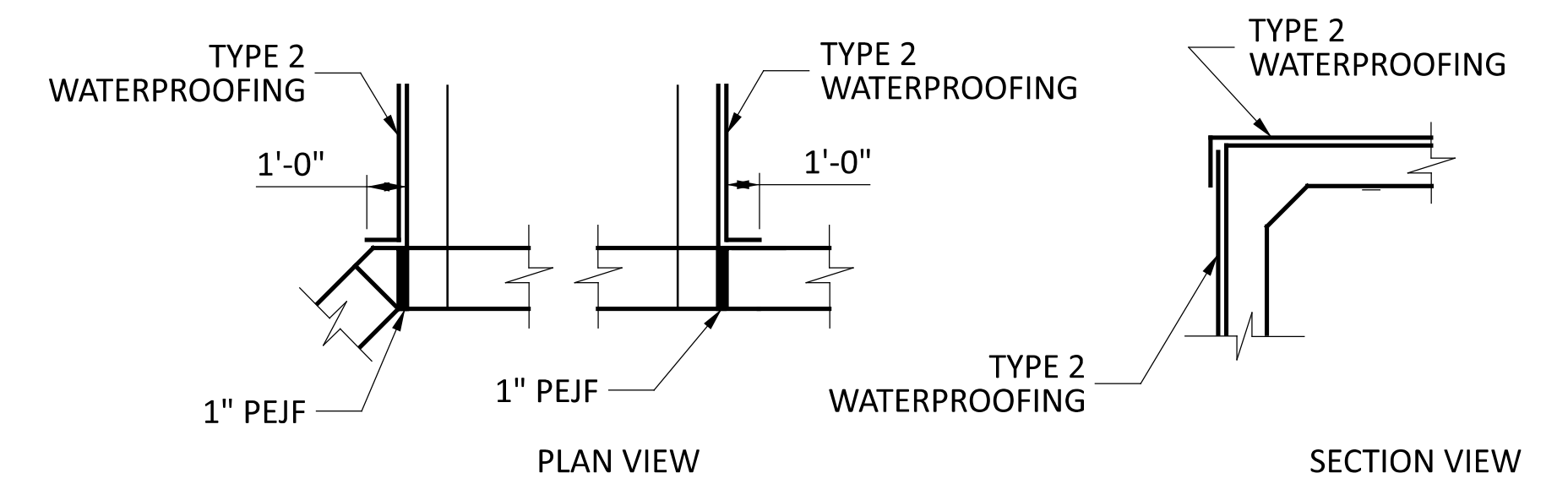
**WATERPROOFING:** TYPE 2 WATERPROOFING, PER CMS 512.09 AND 711.25, SHALL EXTEND VERTICALLY DOWN THE ENTIRE SIDES OF THE PRECAST CULVERT SECTIONS FOR ALL PORTIONS OF THE CULVERT WHICH SHALL BE IN CONTACT WITH THE BACKFILL. PAYMENT FOR THE MEMBRANE WATERPROOFING SHALL BE AT THE CONTRACT PRICE BID PER SQUARE YARD FOR ITEM 512 - TYPE 2 WATERPROOFING.

IF PAVEMENT IS NOT PLACED DIRECTLY ON TOP OF THE CULVERT, TYPE 2 WATERPROOFING, PER CMS 512.09 AND 711.25 SHALL BE APPLIED TO THE ENTIRE TOP SURFACE OF THE PRECAST CULVERT SECTIONS AND SHALL EXTEND ONE FOOT VERTICALLY DOWN THE SIDES FOR ALL PORTIONS OF THE CULVERT WHICH SHALL BE IN CONTACT WITH THE BACKFILL. PAYMENT FOR THE MEMBRANE WATERPROOFING SHALL BE AT THE CONTRACT PRICE BID PER SQUARE YARD FOR ITEM 512 - TYPE 2 WATERPROOFING.



**LIMITS OF ITEM 512-SEALING CONCRETE SURFACES**

(A) - SEAL ENTIRE CONCRETE SURFACE AREA

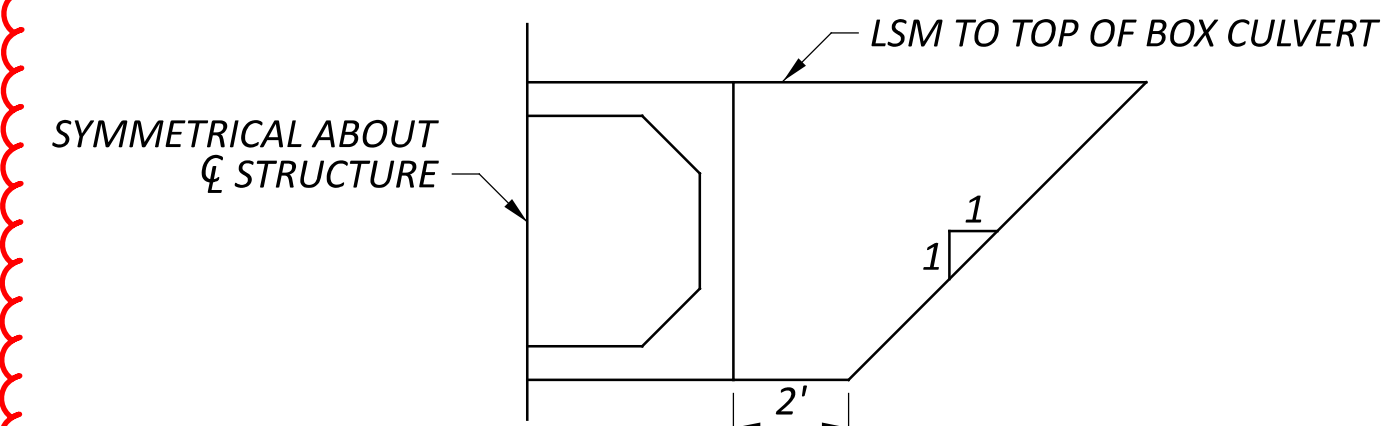


**WATERPROOFING DETAILS**

**ITEM 611 - 6' x 4' CONDUIT, TYPE A, 706.05, AS PER PLAN**

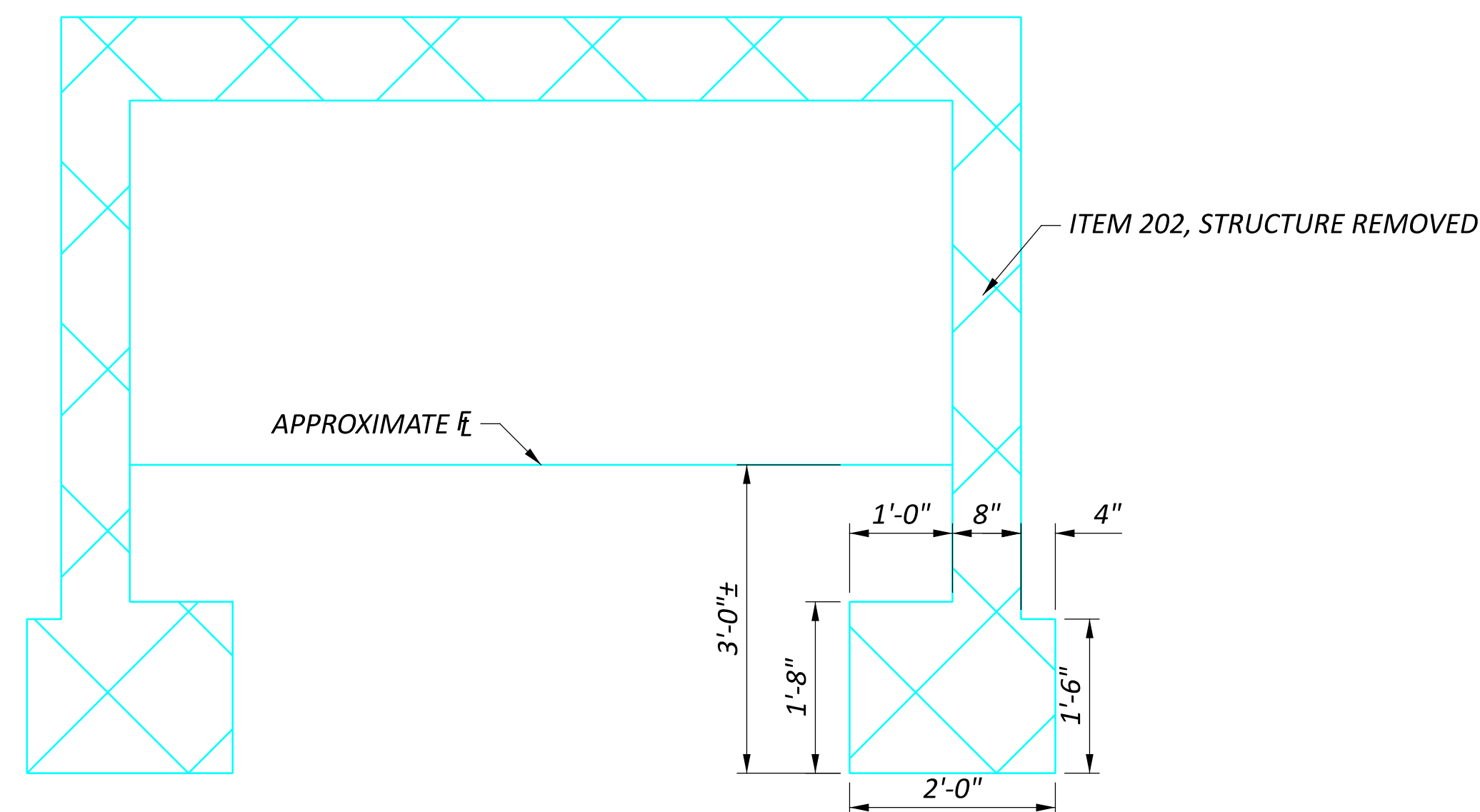
THE CONTRACTOR SHALL FILL THE TOP EXTERIOR, SIDE INTERIOR AND EXTERIOR AND BOTTOM INTERIOR JOINT GAPS WITH MORTAR PRIOR TO APPLYING THE JOINT WRAP AND TYPE 2 WATERPROOFING.

LOW STRENGTH MORTAR BACKFILL (LSM) AS PER CMS 613 SHALL BE PLACED ACCORDING TO THE LIMITS SHOWN AND Laterally TO AT LEAST ONE FOOT BEYOND THE EDGE OF PAVEMENT ON EACH SIDE.



PAYMENT FOR LSM AND THE EXCAVATION REQUIRED TO PLACE THE LSM SHALL BE INCLUDED WITH ITEM 611 - 6' x 4' CONDUIT, TYPE A, 706.05, AS PER PLAN. THE FOLLOWING QUANTITY IS PROVIDED FOR BIDDING PURPOSES ONLY:

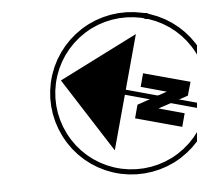
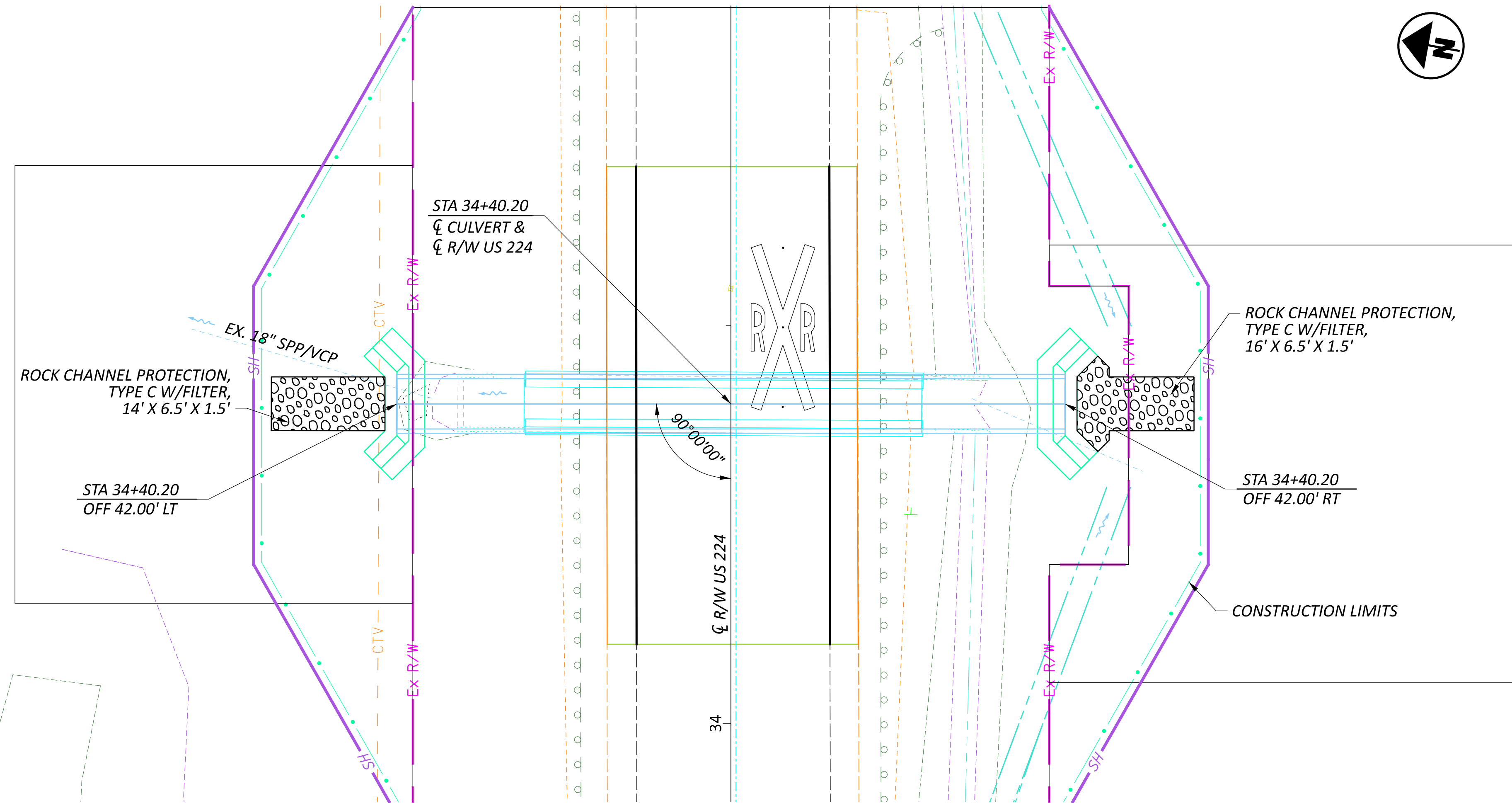
LOW STRENGTH MORTAR BACKFILL 62 CY



**EXISTING CULVERT EXTENSION CROSS SECTION**  
 TYPICAL ALL 4 CULVERT LOCATIONS; DIMENSIONS NOT SHOWN VARY

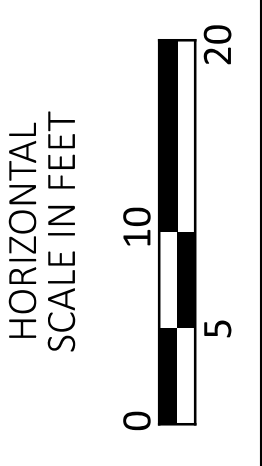
ESTIMATED QUANTITIES				
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LS		STRUCTURE REMOVED
203	35120	25	CY	GRANULAR MATERIAL, TYPE C
503	11100	LS		COFFERDAMS AND EXCAVATION BRACING
503	21300	LS		UNCLASSIFIED EXCAVATION
509	10000	2,946	LB	EPOXY COATED STEEL REINFORCEMENT
511	46010	9	CY	CLASS QC1 CONCRETE, RETAINING/WINGWALL NOT INCLUDING FOOTING
511	46510	18	CY	CLASS QC1 CONCRETE, FOOTING
511	46610	2	CY	CLASS QC1 CONCRETE, HEADWALL
512	10050	32	SY	SEALING OF CONCRETE SURFACES (NON-EPOXY)
512	33000	119	SY	TYPE 2 WATERPROOFING
516	13600	31	SF	1" PREFORMED EXPANSION JOINT FILLER
518	21230	LS		POROUS BACKFILL WITH GEOTEXTILE FABRIC
601	32100	17	CY	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER
611	95701	84	FT	6' X 4' CONDUIT, TYPE A, 706.05, AS PER PLAN





**ESTIMATED QUANTITIES**

ITEM	QUANTITY	UNIT	DESCRIPTION
202	LS		STRUCTURE REMOVED
203	16	CY	GRANULAR MATERIAL, TYPE C
512	15	SY	SEALING OF CONCRETE SURFACES (NON-EPOXY)
518	LS		POROUS BACKFILL WITH GEOTEXTILE FABRIC
601	12	CY	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER
602	21.2	CY	CONCRETE MASONRY
611	84	FT	48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN



**HYDRAULIC DATA**

DRAINAGE AREA = 52 ACRES  
 Q (25) = 33 CFS      V (25) = 8.33 FT/S      HW (25) = 815.75 FT  
 Q (100) = 48 CFS      V (100) = 9.16 FT/S      HW (100) = 816.17 FT  
 ORDINARY HIGH WATER MARK: N/A  
 DESIGN SERVICE LIFE: 75 YEARS  
 ABRASION LEVEL: 1  
 pH: 8.4

**EXISTING STRUCTURE**

TYPE: CONCRETE SLAB TOP WITH EXTENSIONS  
 SIZE: 6'-0" X 4'-0" X 50' LENGTH  
 SKEW: 0°  
 ALIGNMENT: TANGENT  
 DATE BUILT: 1920; EXTENDED: 1955  
 CONDITION: POOR  
 CFN: 1814197

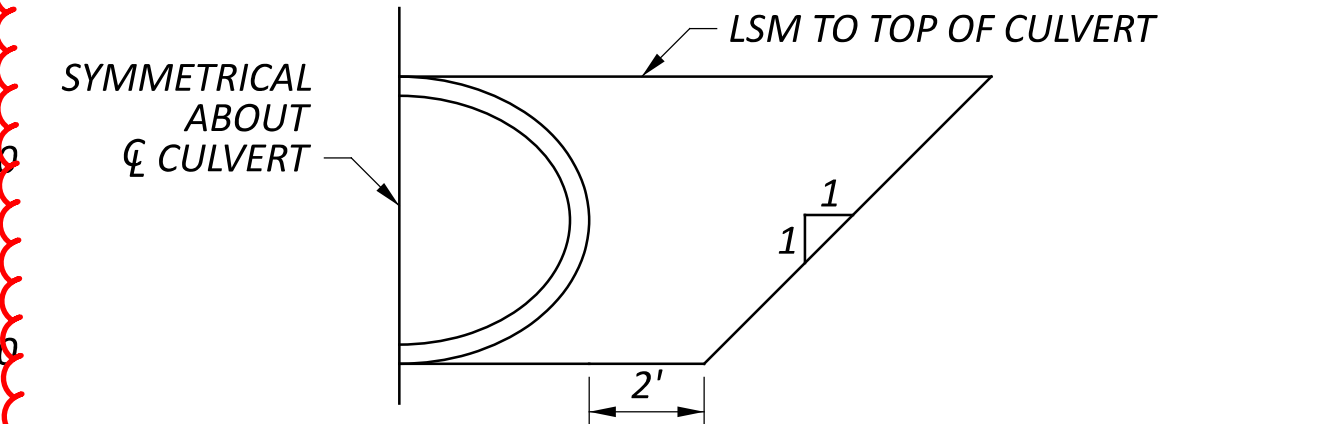
**PROPOSED STRUCTURE**

TYPE: 76" SPAN X 48" RISE REINFORCED CONCRETE ELLIPTICAL PIPE, 706.04, AS PER PLAN, 84' LENGTH  
 SKEW: 0°  
 ALIGNMENT: TANGENT  
 CFN: 1988008

\*CONSTRUCT HEADWALLS PER ODOT STANDARD DRAWING HW-1.1 FOR A 48" DIAMETER PIPE AND THETA = 0° WITH THE FOLLOWING MODIFICATIONS:

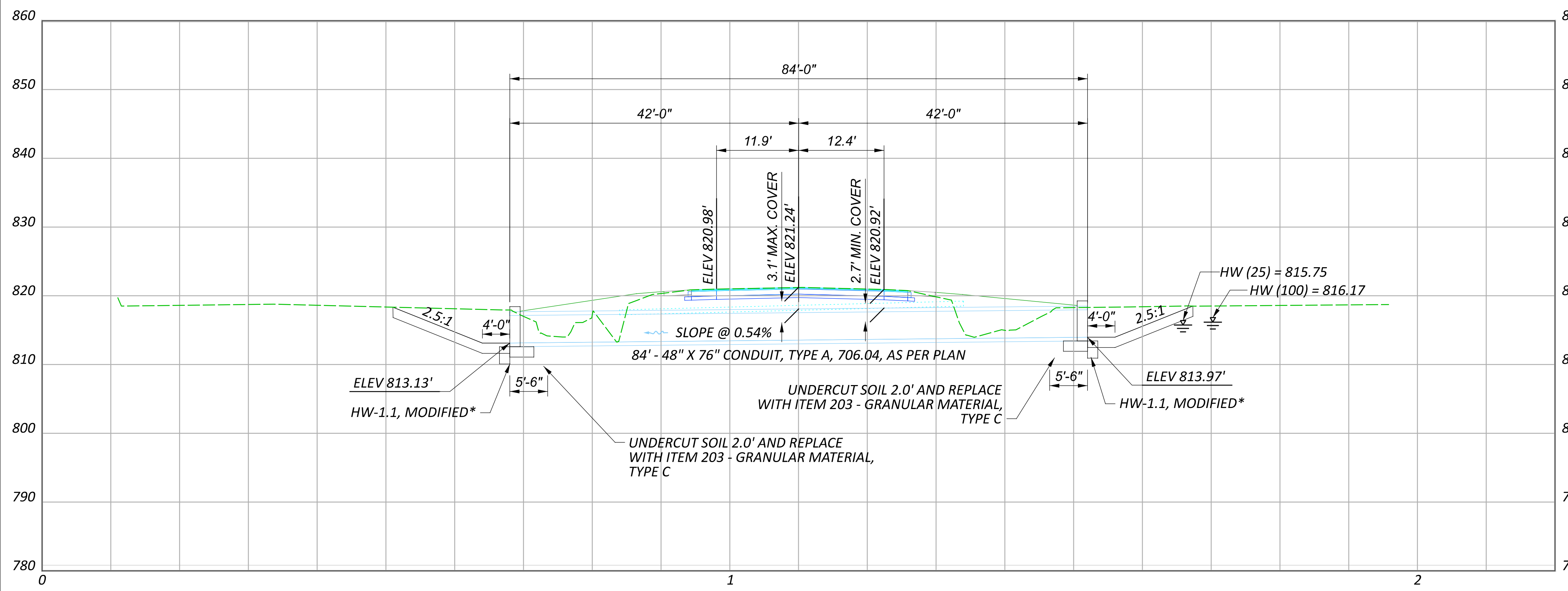
PIPE SIZE	C	CONC. (CY)	STEEL (LBS)
48" X 76"	4'-0"	21.2	1051

**ITEM 611 - 48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN**  
 LOW STRENGTH MORTAR BACKFILL (LSM) AS PER CMS 613 SHALL BE PLACED ACCORDING TO THE LIMITS SHOWN AND Laterally TO AT LEAST ONE FOOT BEYOND THE EDGE OF PAVEMENT ON EACH SIDE.



PAYMENT FOR LSM AND THE EXCAVATION REQUIRED TO PLACE THE LSM SHALL BE INCLUDED WITH ITEM 611 - 48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN. THE FOLLOWING QUANTITY IS PROVIDED FOR BIDDING PURPOSES ONLY:

LOW STRENGTH MORTAR BACKFILL	71 CY
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CULVERT DETAIL  
 STA. 34+40.20

DESIGN AGENCY



DESIGNER

ADB

REVIEWER

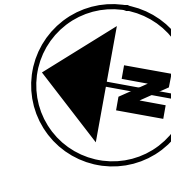
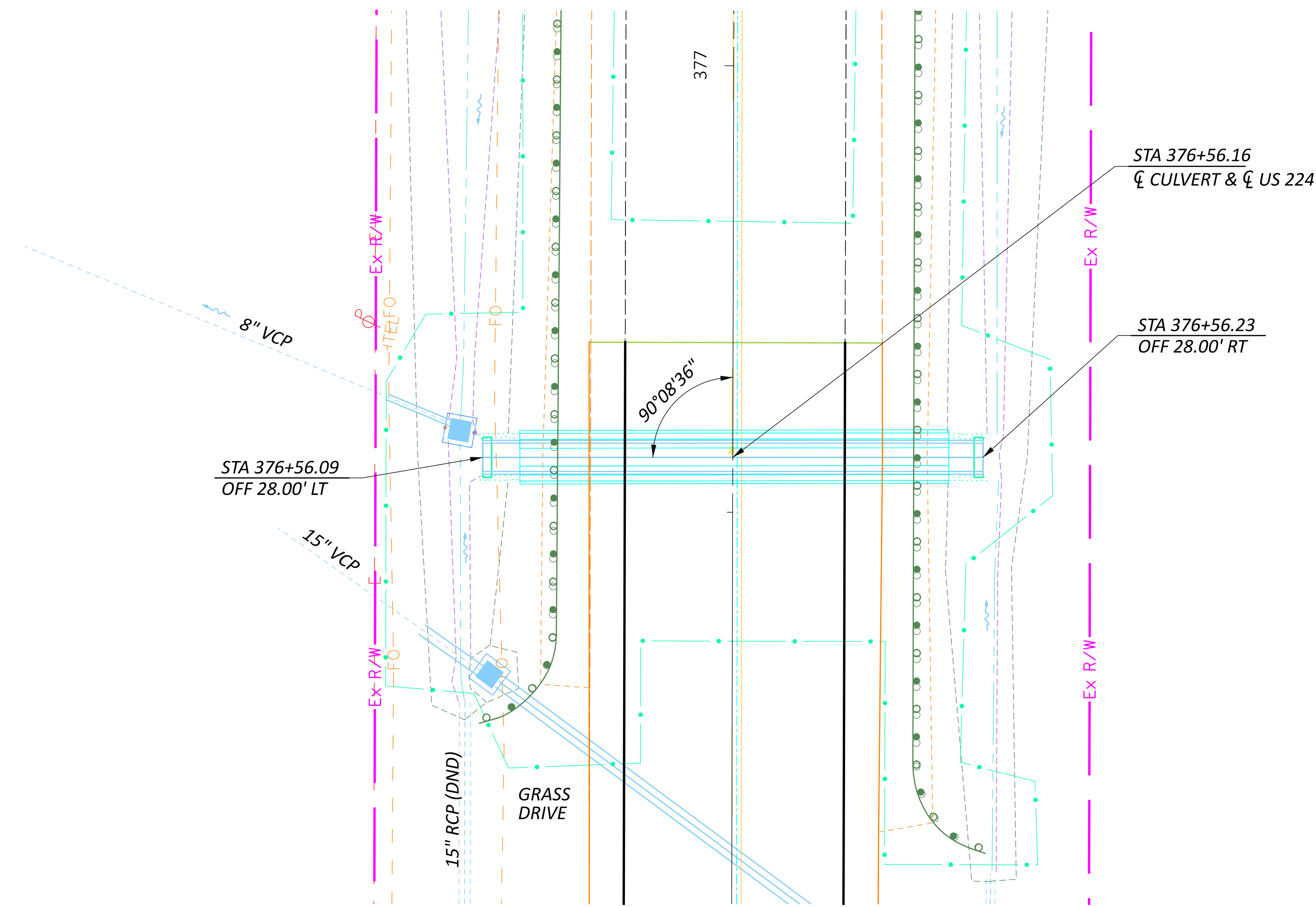
DJG 06-07-24

PROJECT ID

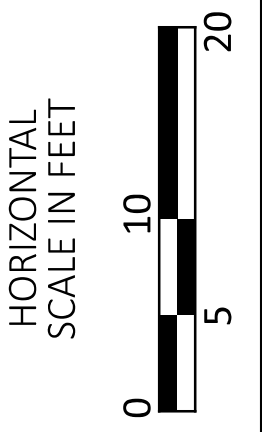
97425

SHEET TOTAL

P.29 31



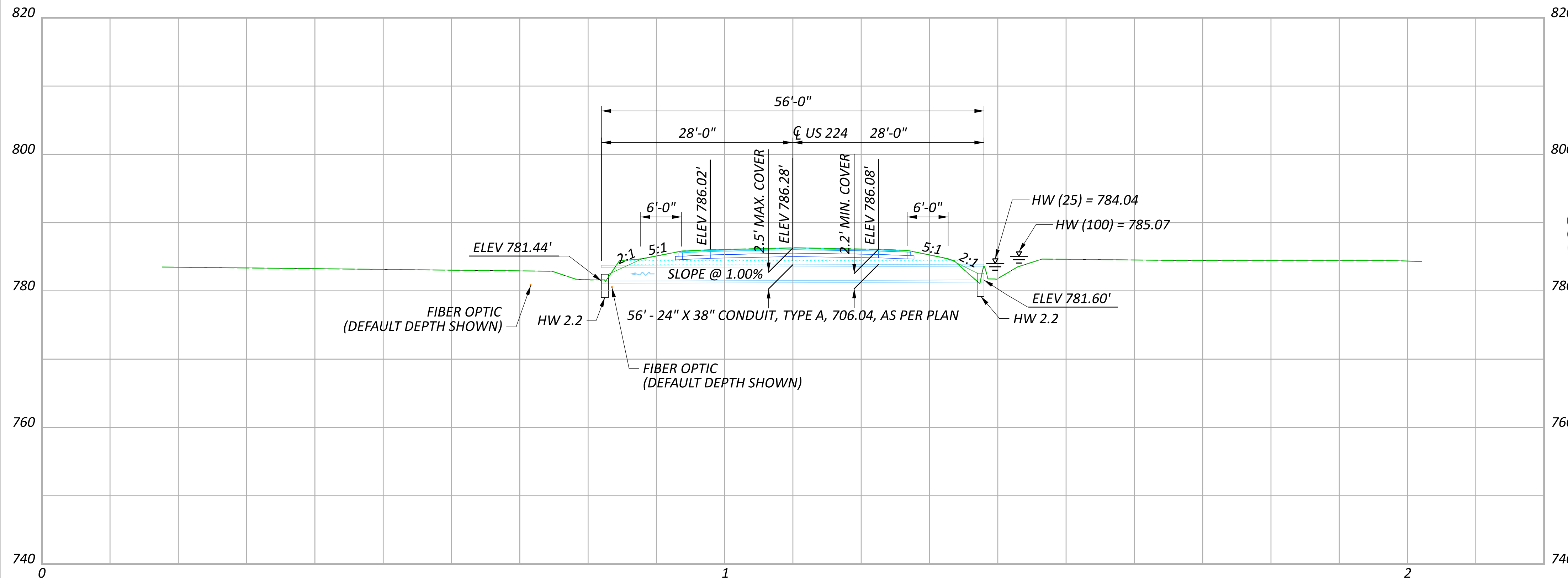
ESTIMATED QUANTITIES			
ITEM	QUANTITY	UNIT	DESCRIPTION
202	LS		STRUCTURE REMOVED
602	0.9	CY	CONCRETE MASONRY
611	56	FT	24" X 38" CONDUIT, TYPE A, 706.04, AS PER PLAN



HYDRAULIC DATA		
DRAINAGE AREA =	38 ACRES	
Q (25) =	26.2 CFS	V (25) = 6.62 FT/S
Q (100) =	37.8 CFS	V (100) = 8.05 FT/S
ORDINARY HIGH WATER MARK:	N/A	
DESIGN SERVICE LIFE:	75 YEARS	
ABRASION LEVEL:	1	
pH:	8.4	

EXISTING STRUCTURE	
TYPE:	CONCRETE SLAB TOP WITH EXTENSIONS
SIZE:	4'-0" X 2'-0" X 49' LENGTH
SKEW:	0°
ALIGNMENT:	TANGENT
DATE BUILT:	1920; EXTENDED: 1955
CONDITION:	POOR
CFN:	1846407

PROPOSED STRUCTURE	
TYPE:	24" RISE X 38" SPAN REINFORCED CONCRETE ELLIPTICAL PIPE, 706.04, AS PER PLAN, 56' LENGTH
SKEW:	0° 8'36" R.F.
ALIGNMENT:	TANGENT
CFN:	1988009



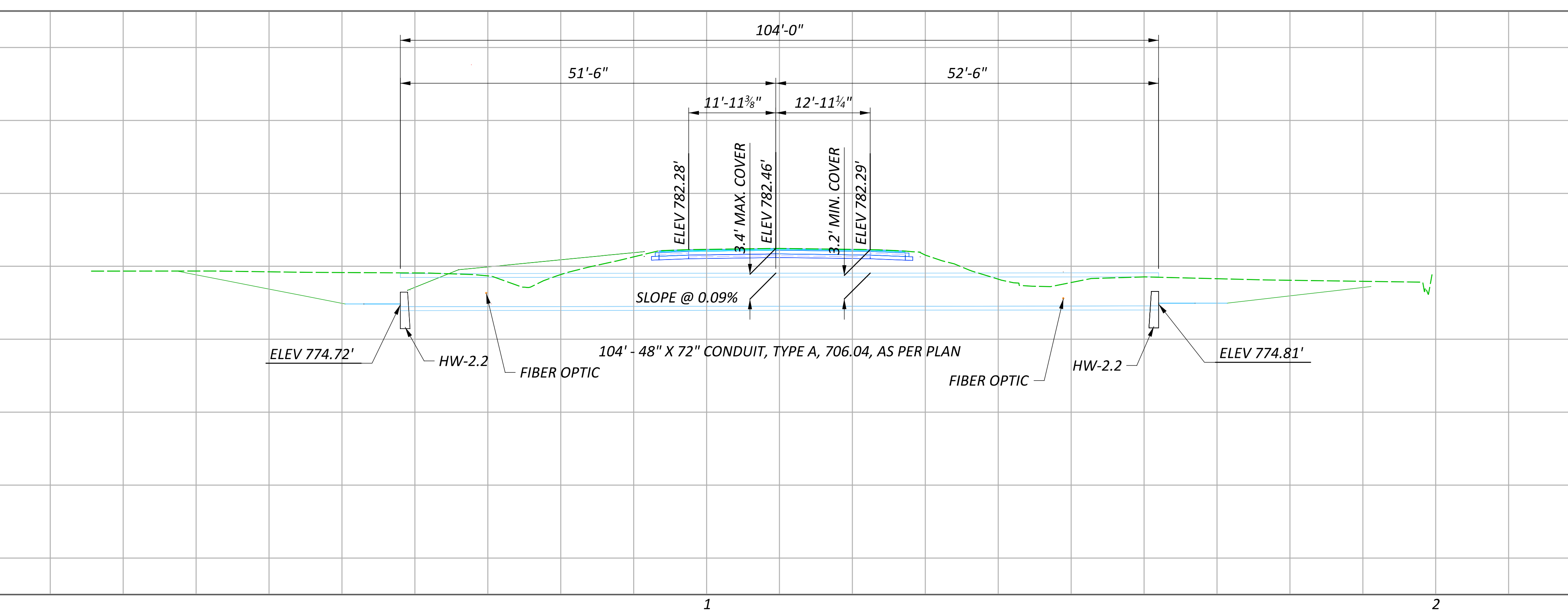
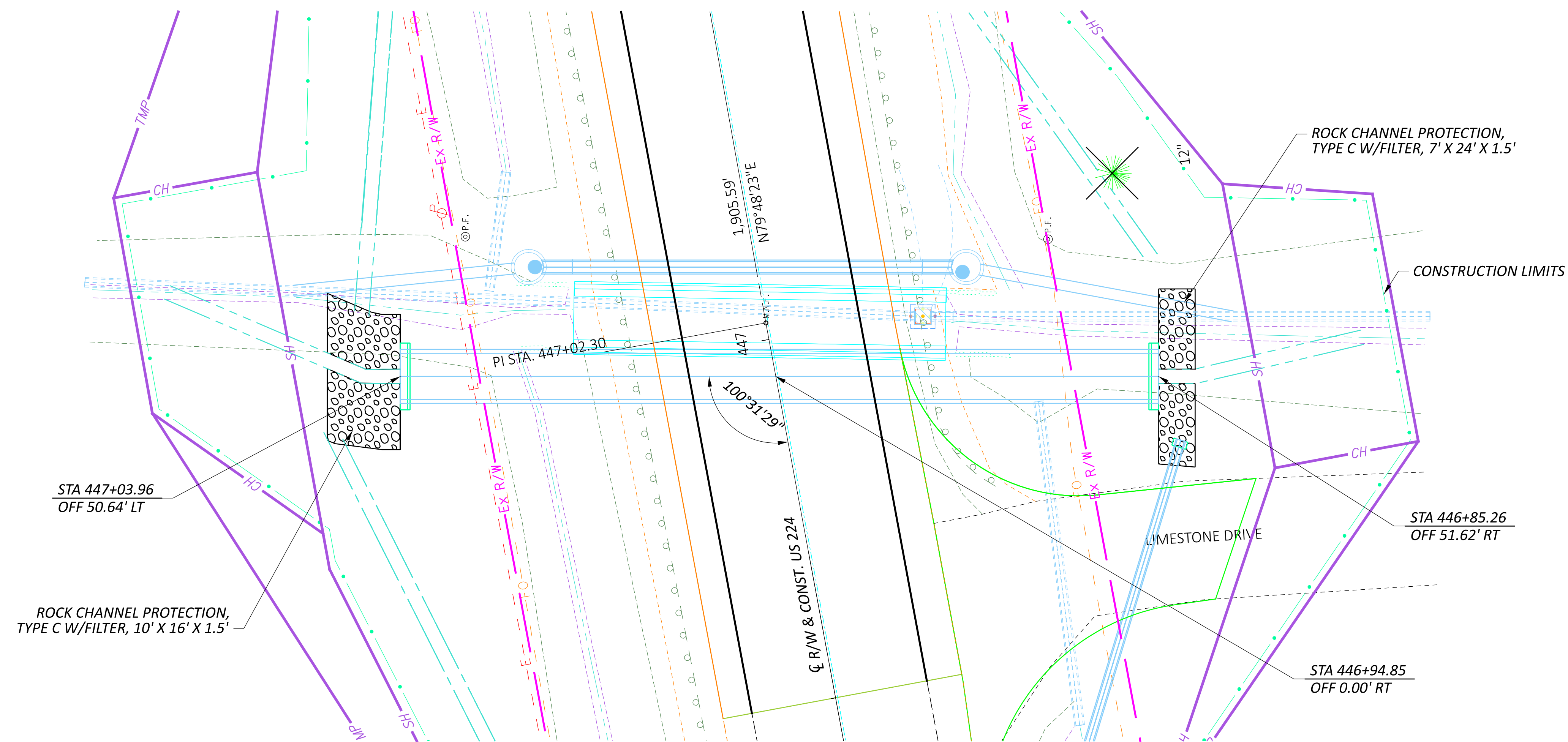
**ITEM 611 - 24" X 38" CONDUIT, TYPE A, 706.04, AS PER PLAN**

LOW STRENGTH MORTAR BACKFILL (LSM) AS PER CMS 613 SHALL BE PLACED ACCORDING TO THE LIMITS SHOWN AND LATERALLY TO AT LEAST ONE FOOT BEYOND THE EDGE OF PAVEMENT ON EACH SIDE.

PAYMENT FOR LSM AND THE EXCAVATION REQUIRED TO PLACE THE LSM SHALL BE INCLUDED WITH ITEM 611 - 24" X 38" CONDUIT, TYPE A, 706.04, AS PER PLAN. THE FOLLOWING QUANTITY IS PROVIDED FOR BIDDING PURPOSES ONLY:

LOW STRENGTH MORTAR BACKFILL	26 CY
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CULVERT DETAIL  
 STA. 376+56.16



ESTIMATED QUANTITIES			
ITEM	QUANTITY	UNIT	DESCRIPTION
202	LS		STRUCTURE REMOVED
601	16	CY	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER
602	2.7	CY	CONCRETE MASONRY
611	104	FT	48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN

HYDRAULIC DATA			
DRAINAGE AREA = 230 ACRES			
Q (25) = 74.1 CFS	V (25) = 3.7 FT/S	HW (25) = 778.96 FT	
Q (100) = 103.0 CFS	V (100) = 5.0	HW (100) = 779.80 FT	
ORDINARY HIGH WATER MARK: N/A			
DESIGN SERVICE LIFE: 75 YEARS			
ABRASION LEVEL: 2			
pH: 8.4			

EXISTING STRUCTURE	
TYPE:	CONCRETE SLAB TOP WITH EXTENSIONS
SIZE:	8'-0" X 3'-6" X 58' LENGTH
SKEW:	10° L.F.
ALIGNMENT:	TANGENT
DATE BUILT:	1920, EXTENDED: 1955
CONDITION:	POOR
CFN:	1839041

PROPOSED STRUCTURE	
TYPE:	48" RISE X 76" SPAN REINFORCED CONCRETE ELLIPTICAL PIPE, 706.04, AS PER PLAN, 104' LENGTH
SKEW:	10° 31' 29" L.F.
ALIGNMENT:	TANGENT
CFN:	1988010

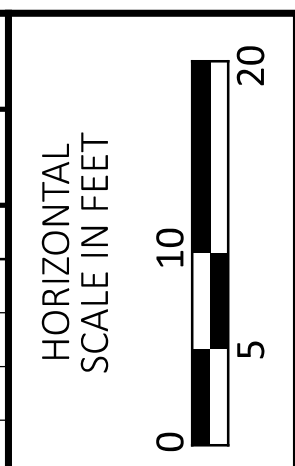
**ITEM 611 - 48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN**

LOW STRENGTH MORTAR BACKFILL (LSM) AS PER CMS 613 SHALL BE PLACED ACCORDING TO THE LIMITS SHOWN AND LATERALLY TO AT LEAST ONE FOOT BEYOND THE EDGE OF PAVEMENT ON EACH SIDE.

SYMMETRICAL ABOUT  $\phi$  CULVERT

PAYMENT FOR LSM AND THE EXCAVATION REQUIRED TO PLACE THE LSM SHALL BE INCLUDED WITH ITEM 611 - 48" X 76" CONDUIT, TYPE A, 706.04, AS PER PLAN. THE FOLLOWING QUANTITY IS PROVIDED FOR BIDDING PURPOSES ONLY:

LOW STRENGTH MORTAR BACKFILL	75 CY
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CULVERT DETAIL  
 STA. 446+94.85

DESIGN AGENCY	
DESIGNER	ADB
REVIEWER	DJG
PROJECT ID	97425
SHEET	P.31
TOTAL	31