

LA CROSSE COUNTY HIGHWAY DEPARTMENT

PLAN OF PROPOSED IMPROVEMENT

BELL COULEE CREEK

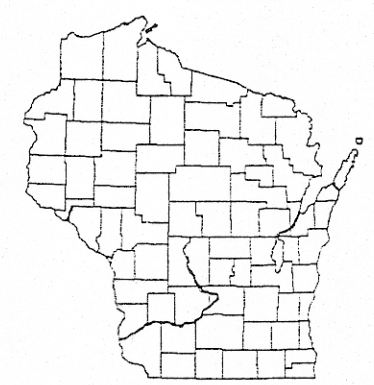
C.T.H. 'DE' AND C.T.H. 'E' LA CROSSE COUNTY

PROJECT NUMBER
CTH DE AND CTH E

INDEX OF SHEETS

Sheet No. 1	Title
Sheet No.	Typical Sections and Details
Sheet No.	Estimate of Quantities
Sheet No.	Miscellaneous Quantities
Sheet No.	Right of Way Plat
Sheet No.	Plan and Profile
Sheet No.	Standard Detail Drawings
Sheet No.	Sign Plates
Sheet No.	Structure Plans
Sheet No.	Computer Earthwork Data
Sheet No.	Cross Sections

TOTAL SHEETS =



DESIGN DESIGNATION

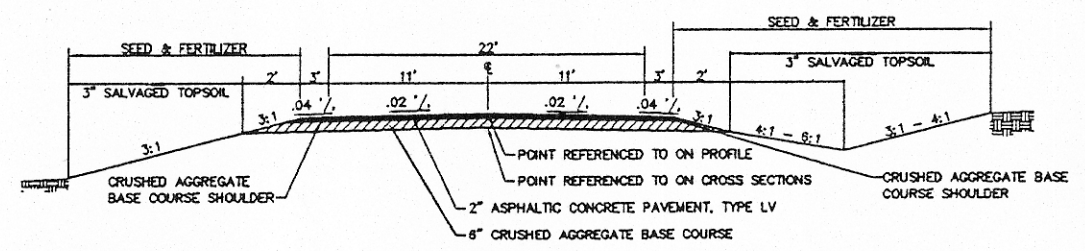
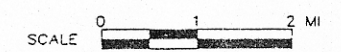
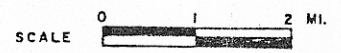
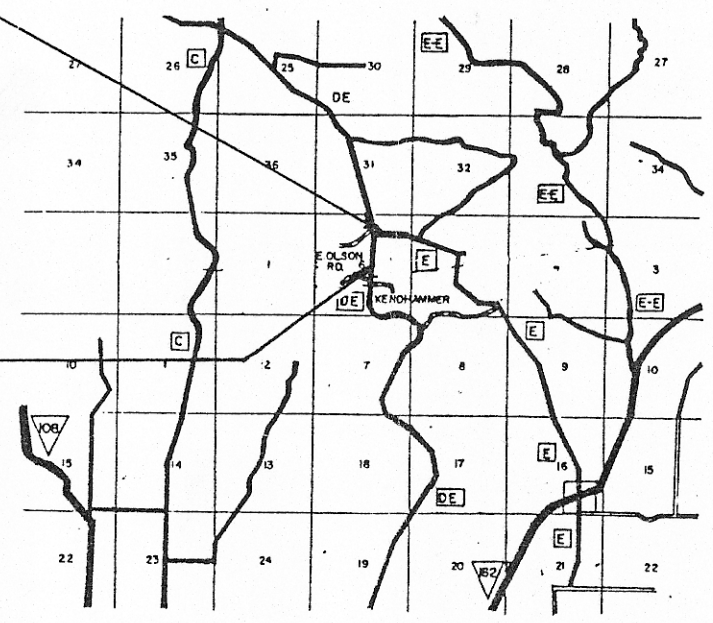
A.D.T.	=
A.D.T.	=
D.H.V.	=
D.	=
T.	=
DESIGN SPEED	=
ESALS	=

CONVENTIONAL SIGNS

COUNTY LINE		COMBUSTIBLE FLUIDS	
CORPORATE LIMITS		UNDERGROUND UTILITIES	
PROPERTY LINE		GAS	
LOT LINE		ELECTRIC	
LIMITED EASEMENT		TELEPHONE OR TELEGRAPH	
EXISTING RIGHT OF WAY		SERVICE PEDESTAL	
PROPOSED OR NEW R/W LINE		CABLE MARKER	
SURVEY LINE		POWER POLE	
SLOPE INTERCEPT		TELEPHONE POLE	
ORIGINAL GROUND		RAILROAD	
MARSH OR ROCK PROFILE		MARSH AREA	
EXISTING CULVERT		WOODED OR SHRUB AREA	
PROPOSED CULVERT (Box or Pipe)			
CULVERT (Profile View)			

PROJECT CTH 'E'

PROJECT CTH 'DE'



TYPICAL FINISHED SECTION
CTH 'DE' and 'E'

UTILITIES

GTE NORTH INC.
43 N. FIRST ST.
BLACK RIVER FALLS, WI
ATTN: MARY MANDORY
(715) 284-4373

BANGOR MUNICIPAL UTILITY
P.O. BOX 130
BANGOR, WI 54614
ATTN: WES K. JOME
(608) 486-2151

DIGGERS HOTLINE
1-800-242-8511
WS. STATUTE 182.0175(1974)
REQUIRES MINIMUM OF THREE (3) WORKDAYS
BEFORE YOU EXCAVATE.

THE LOCATION OF UTILITIES SHOWN ON THE PLANS
ARE APPROXIMATE, THERE MAY BE OTHER UTILITY
INSTALLATIONS WITHIN THE PROJECT AREA
THAT ARE NOT SHOWN.

CONTACT LISA A. FLEMING
(715)-832-8400

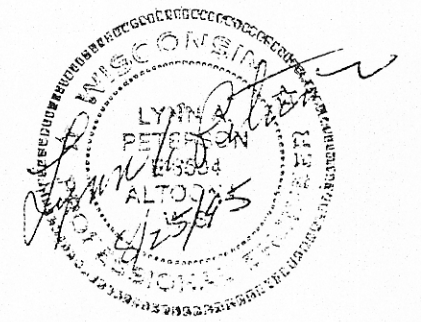
APPROVED FOR
LA CROSSE COUNTY
BY

(Date) _____
LA CROSSE COUNTY HIGHWAY COMMISSIONER
(Signature & Title of Official)

PLANS PREPARED BY



320 DIVISION ST. ALTOONA, WI 54720
715/832-8400

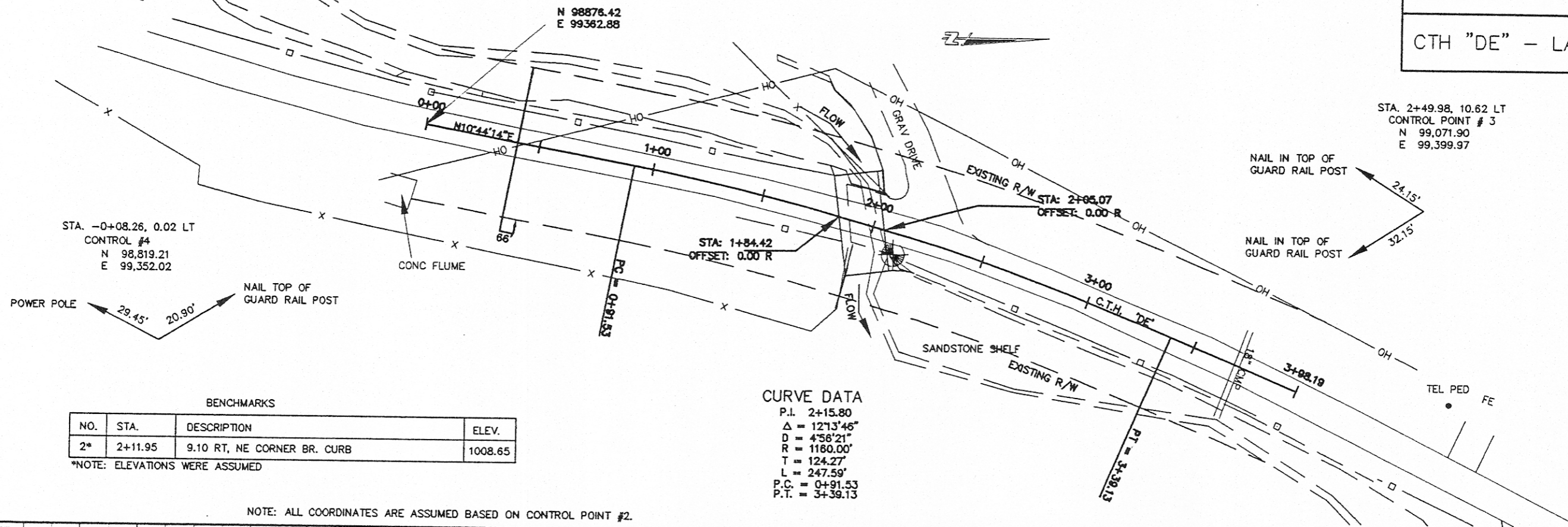


8/25/95
(Date)

LYNN A. PETERSON, P.E.
(Signature)

6 sheets

694



STA. -0+08.26, 0.02 LT
CONTROL #4
N 98,819.21
E 99,352.02

STA. 2+49.98, 10.62 LT
CONTROL POINT # 3
N 99,071.90
E 99,399.97

BENCHMARKS

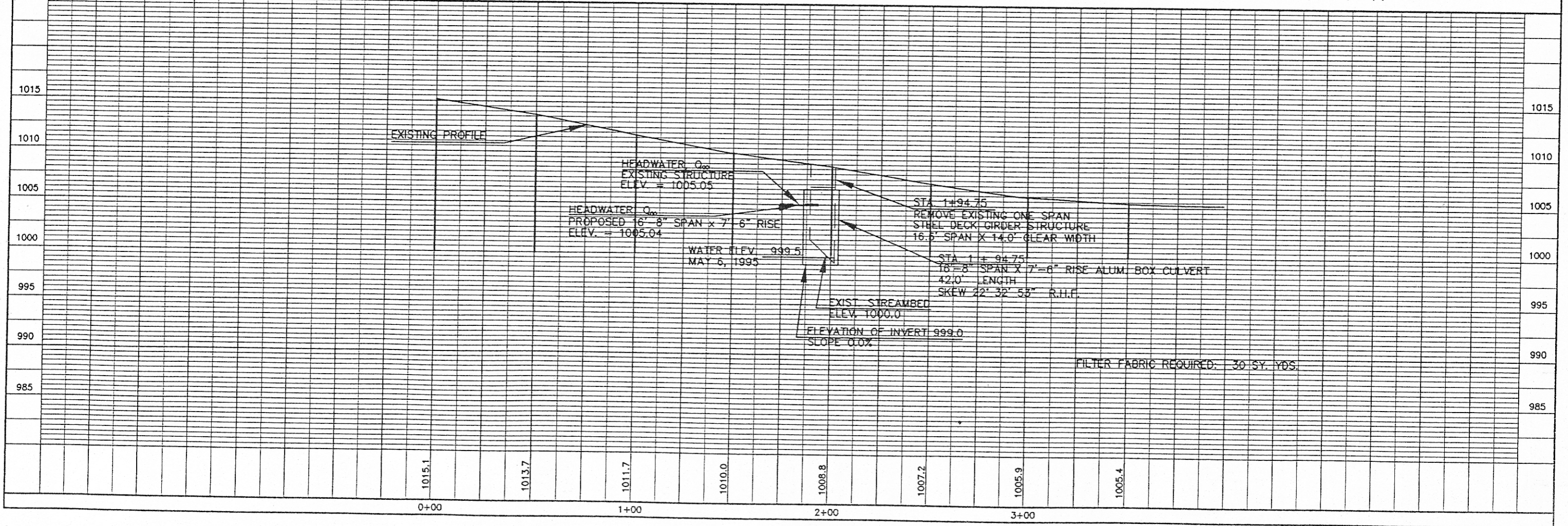
NO.	STA.	DESCRIPTION	ELEV.
2*	2+11.95	9.10 RT, NE CORNER BR. CURB	1008.65

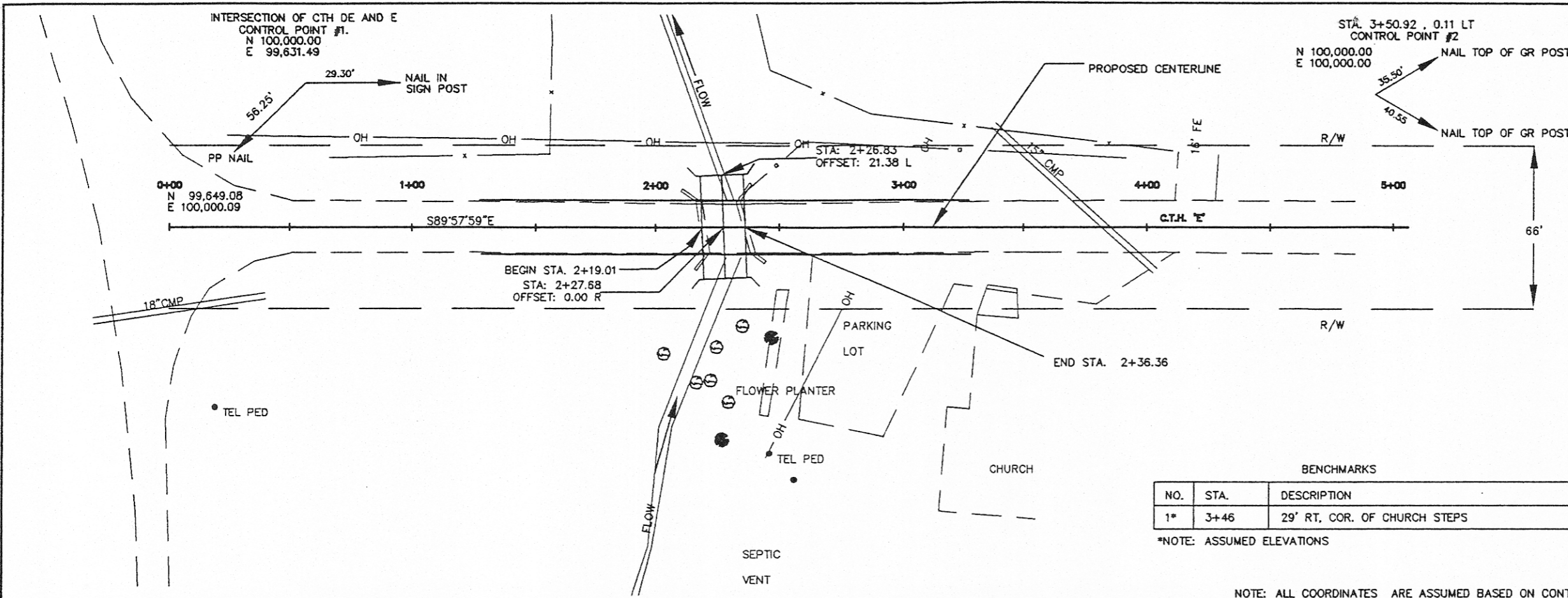
*NOTE: ELEVATIONS WERE ASSUMED

CURVE DATA

P.I. = 2+15.80
 $\Delta = 121^{\circ}3'46''$
 $D = 4^{\circ}56'21''$
 $R = 1180.00'$
 $T = 124.27'$
 $L = 247.59'$
 $P.C. = 0+91.53$
 $P.T. = 3+39.13$

NOTE: ALL COORDINATES ARE ASSUMED BASED ON CONTROL POINT #2.





BENCHMARKS

NO.	STA.	DESCRIPTION	ELEV.
1*	3+46	29' RT, COR. OF CHURCH STEPS	993.75

*NOTE: ASSUMED ELEVATIONS

NOTE: ALL COORDINATES ARE ASSUMED BASED ON CONTROL POINT #2.

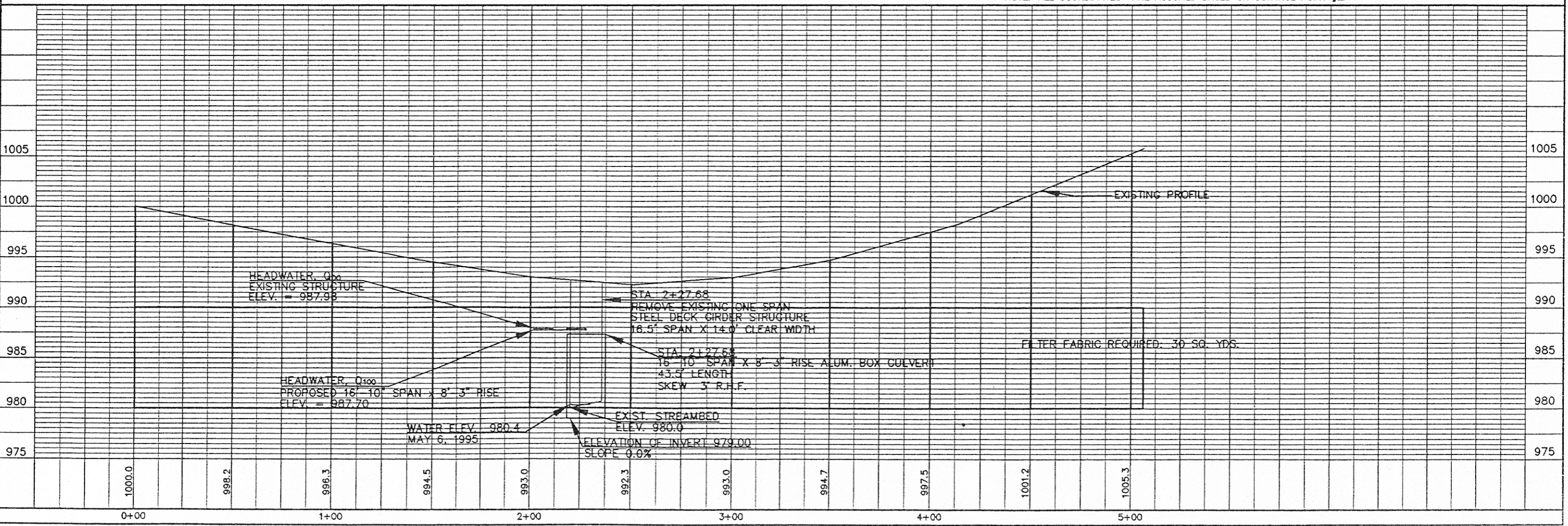


PLATE AND RIB COMBINATIONS WITH ALLOWABLE HEIGHT OF COVER - TABLE 1 (6.7.8)

(3) STRUCT. NUMBER	SPAN "A" (FT-IN)	RISE "B" (FT-IN)	AREA (SQ. FT)	HS-20 LOADING (11)															ADDITIONAL SHELL INFORMATION											
				A			B			C			D			E			(1) CROWN ARC LENGTH "C" (N)	(1) LEG LENGTH "D" (N)	SIDE ANGLE "E" (DEG:MIN)	(1,3) HAUNCH PLATE LENGTH (N)	(1,3) CROWN PLATE LENGTH (N)	MAX. BOLTS /FT. (EA.)	(9) MAX. SHELL WT./FT. (LB.)					
				HG\CG (GA.)	HRS/CRS (IN.)	MIN MAX (FEET)	HG\CG (GA.)	HRS/CRS (IN.)	MIN MAX (FEET)	HG\CG (GA.)	HRS/CRS (IN.)	MIN MAX (FEET)	HG\CG (GA.)	HRS/CRS (IN.)	MIN MAX (FEET)	HG\CG (GA.)	HRS/CRS (IN.)	MIN MAX (FEET)												
26	14-5	3-3	40.0	3\3	27\18	3.0	5.0	4\4	27\18	2.5	5.0	4\4	18\18	1.7	5.0	5\5	18\18	1.4	5.0	13	0.5	9\1	11	8	26.67	137.9				
27	14-8	4-1	51.5	3\4	54\18	3.0	5.0	3\4	27\18	2.5	5.0	3\4	18\18	2.0	5.0	2\4	27\9	1.4	5.0	13	1.5	9\1	8	8	36.00	149.2				
28	14-10	4-10	63.2	2\4	27\18	3.0	5.0	3\5	27\18	2.5	5.0	2\2	27\9	2.0	5.0	2\3	27\9	1.7	5.0	2\5	27\9	1.4	5.0	8	36.67	154.2				
29	15-1	5-8	75.1	2\5	27\18	3.0	5.0	3\5	27\18	2.5	5.0	2\3	27\9	1.7	5.0	2\5	27\9	1.4	5.0	13	3.5	9\1	10	8	37.11	163.0				
30	15-4	6-5	87.2	2\5	27\18	3.0	5.0	3\4	18\18	2.5	5.0	2\3	27\9	2.0	5.0	2\4	27\9	1.7	5.0	3\4	27\9	1.4	5.0	13	4.5	9\1	11	8	37.56	172.9
31	15-6	7-3	99.4	2\5	27\18	3.0	5.0	2\2	27\9	2.5	5.0	2\3	27\9	2.0	5.0	3\3	27\9	1.7	5.0	3\5	27\9	1.4	5.0	13	5.5	9\1	12	8	38.00	182.4
32	15-9	8-0	111.8	3\5	27\18	3.0	5.0	2\2	27\9	2.5	5.0	2\3	18\9	1.7	5.0	2\5	18\9	1.4	5.0	13	6.5	9\1	13	8	43.33	185.8				
33	15-10	3-6	46.8	3\5	27\18	3.0	5.0	3\5	18\18	2.5	5.0	5\5	18\18	2.0	5.0	3\4	27\9	1.7	5.0	2\5	18\9	1.4	5.0	15	0.5	6\10	8	8	42.00	161.1
34	16-0	4-3	59.5	2\5	18\18	3.0	5.0	2\3	27\9	2.5	5.0	3\3	27\9	2.0	5.0	3\4	27\9	1.7	5.0	3\4	18\9	1.4	5.0	15	1.5	6\10	9	8	38.57	174.4
35	16-2	5-1	72.3	2\5	18\18	3.0	5.0	4\5	18\18	2.5	5.0	3\3	27\9	2.0	5.0	3\5	27\9	1.7	5.0	3\4	18\9	1.4	5.0	15	2.5	6\10	10	8	44.22	181.9
36	16-4	5-11	85.2	3\4	18\18	3.0	5.0	3\2	27\9	2.5	5.0	3\3	27\9	2.0	5.0	3\5	27\9	1.7	5.0	3\5	18\9	1.4	5.0	15	3.5	6\10	11	8	44.67	192.2
37	16-6	6-8	98.3	3\5	27\18	3.0	5.0	2\4	27\9	2.5	5.0	3\4	27\9	2.0	5.0	3\4	18\9	1.7	5.0	4\4	18\9	1.4	5.0	15	4.5	6\10	12	8	45.11	200.5
38	16-8	7-6	111.5	3\5	18\18	3.0	5.0	3\3	27\9	2.5	5.0	3\4	27\9	2.0	5.0	3\4	18\9	1.7	5.0	2\3	9\9	1.4	5.0	15	5.5	6\10	13	8	45.56	209.3
39	16-10	8-3	124.8	3\5	18\18	3.0	5.0	2\3	18\9	2.5	5.0	2\5	18\9	2.0	5.0	3\5	18\9	1.7	5.0	4\5	18\9	1.4	5.0	15	6.5	6\10	14	8	46.00	214.7
40	17-9	3-10	54.4	3\3	18\18	3.0	4.5	4\4	18\18	2.5	5.0	2\5	27\9	2.0	5.0	3\3	18\9	1.7	5.0	3\4	18\9	1.4	5.0	17	0.5	14\54	8	10	44.67	176.9
41	18-2	4-7	68.3	3\4	18\18	3.0	4.5	4\5	18\18	2.5	5.0	3\5	27\9	2.0	5.0	3\4	18\9	1.7	5.0	3\5	18\9	1.4	5.0	17	1.5	14\54	9	10	46.00	195.8
42	18-7	5-4	82.5	3\5	18\18	3.0	4.3	2\5	27\9	2.5	5.0	3\3	18\9	2.0	5.0	4\3	18\9	1.7	5.0	4\5	18\9	1.4	5.0	17	2.5	14\54	10	10	46.89	207.6
43	19-0	6-1	97.1	2\3	27\9	3.0	4.7	3\4	27\9	2.5	5.0	3\4	18\9	2.0	5.0	4\4	18\9	1.7	5.0	2\3	9\9	1.4	5.0	17	3.5	14\54	11	10	47.33	225.0
44	19-5	6-11	111.9	2\4	27\9	3.0	4.7	2\4	18\9	2.5	5.0	3\5	18\9	2.0	5.0	2\3	9\9	1.7	5.0	2\3	9\9	1.4	5.0	17	4.5	14\54	12	10	47.78	230.4
45	19-10	7-8	127.1	2\5	27\9	3.0	3.9	2\5	18\9	2.5	5.0	4\5	18\9	2.0	5.0	2\3	9\9	1.7	5.0	2\4	9\9	1.4	5.0	17	5.5	14\54	13	10	60.89	231.6
46	20-3	8-5	142.6	3\3	18\9	3.0	4.8	3\5	18\9	2.5	4.8	2\3	9\9	1.7	5.0	2\4	9\9	1.4	5.0	17	6.5	14\54	14	10	61.33	237.0				

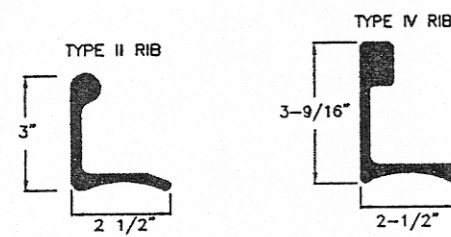
**BOX CULVERT SHELL -
PLATE AND RIB DETAILS**

NOTES - SHELL

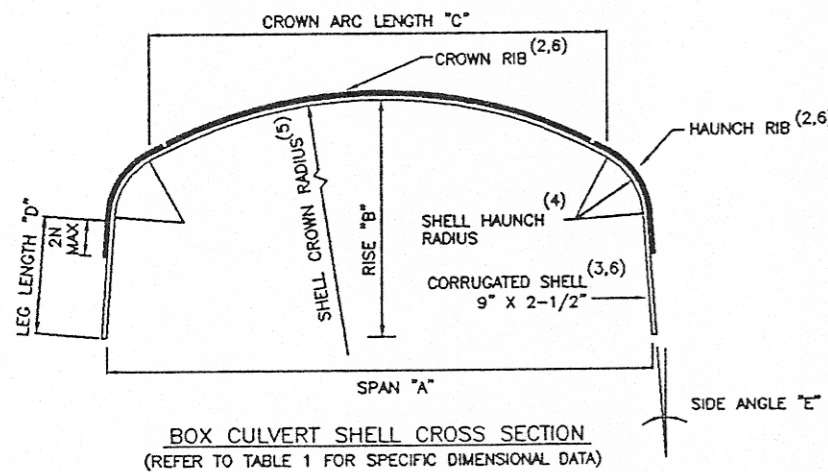
- N = 9.625" OR 9-5/8".
- ALL RIBS ARE TYPE IV, EXCEPT HAUNCH RIBS FOR STRUCTURES 1-39 WHICH ARE TYPE II.
- STRUCTURE 1 IS A ONE-PLATE SHELL. STRUCTURES 2-26 ARE TWO-PLATE SHELLS. STRUCTURES 27-87 ARE THREE-PLATE SHELLS.
- SHELL HAUNCH RADIUS FOR STRUCTURES 1-39 IS 30-1/4". SHELL HAUNCH RADIUS FOR STRUCTURES 40-87 IS 37-3/8".
- SHELL CROWN RADIUS FOR STRUCTURES 1-39 IS 297-1/2". SHELL CROWN RADIUS FOR STRUCTURES 40-87 IS 258-3/4".
- IN SHELL FILL HEIGHT TABLE 1, THE HG\CG DESIGNATION INDICATES THICKNESS OR GAGE OF HAUNCH (HG) AND CROWN (CG) PLATES AS FOLLOWS:
2 = .125", 3 = .150", 4 = .175", 5 = .200", 6 = .225", 7 = .250".
EXAMPLE: 3\6 = .150" HAUNCH AND .225" CROWN PLATE THICKNESS.
THE HRS\CRS DESIGNATION INDICATES THE RIB SPACING ON THE HAUNCH (HRS) AND CROWN (CRS) PLATES.
EXAMPLE: 27\9 = 27" O.C. HAUNCH AND 9" O.C. CROWN.
- ALLOWABLE COVER (MINIMUM AND MAXIMUM) IS MEASURED FROM THE OUTSIDE VALLEY OF CROWN PLATE TO BOTTOM OF FLEXIBLE PAVEMENT OR FROM THE OUTSIDE VALLEY OF CROWN PLATE TO TOP OF RIGID PAVEMENT. MINIMUM COVER IS MEASURED AT THE LOWEST FILL AREA SUBJECT TO POSSIBLE WHEEL LOADS (TYPICALLY AT THE ROADWAY SHOULDER). THE ROADWAY SURFACE MUST BE MAINTAINED TO ENSURE MINIMUM COVER TO PREVENT HIGH-IMPACT LOADS BEING IMPARTED TO THE STRUCTURE. MAXIMUM COVER IS MEASURED AT THE HIGHEST FILL AND/OR PAVEMENT ELEVATION.
- SELECT THE STRUCTURE, WITH THE LOWEST ALPHABET SUB-DESIGNATION AND COVER RANGE, THAT WILL INCLUDE THE ACTUAL MINIMUM AND MAXIMUM COVER.
EXAMPLE: STRUCTURE 51-A IS MORE ECONOMICAL THAN 51-B IF THE COVER IS BETWEEN 3.0 AND 4.5 FEET.
- SHELL WT./FT. SHOWN IS MAXIMUM HANDLING WEIGHT AND IS BASED ON HEAVIEST COMPONENT MAKEUP FOR A SPECIFIC SPAN AND RISE COMBINATION. WEIGHT PER FOOT OF SHELL INCLUDES PLATES, REINFORCING RIBS, RIB SPLICES, BOLTS AND NUTS.
- TOTAL STRUCTURE LENGTH CAN BE ANY DIMENSION, BUT WHENEVER POSSIBLE, IT IS RECOMMENDED TO WORK WITH A MULTIPLE OF 4.5' (NET PLATE WIDTH). THIS PRACTICE USUALLY RESULTS IN LOWER TOTAL STRUCTURE COST.
EXAMPLE: 50' PROPOSED STRUCTURE / 4.5' = 11.1, NEAREST WHOLE NUMBER IS 11, THEREFORE USE 11 X 4.5' = 49.5' FOR TOTAL STRUCTURE LENGTH. WHEN ORDERING A STRUCTURE WITH TOWALLS AND/OR HEADWALLS ON EACH END, TOTAL STRUCTURE LENGTH SHOULD BE A MULTIPLE OF 9'.
- ALUMINUM BOX CULVERTS, AS SHOWN ON THIS DRAWING, ARE DESIGNED TO MEET OR EXCEED THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGE'S SECTION 12.8 FOR STANDARD HIGHWAY HS-20 & HS-25 WHEEL LOADS.

STANDARD SPECIFICATIONS (11)

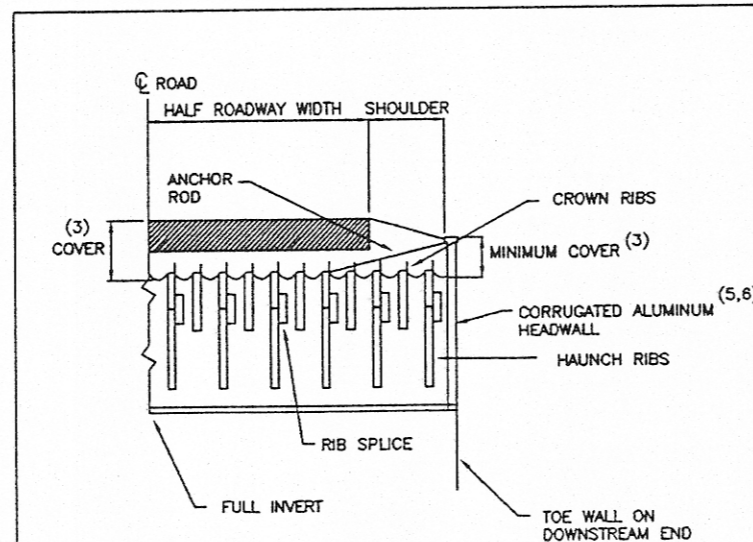
ALL ALUMINUM BOX CULVERT MATERIAL SHALL BE MANUFACTURED IN ACCORDANCE WITH:
A. AASHTO M219 AND ASTM B746.
ADDITIONAL REFERENCE SPECIFICATIONS:
B. ASTM B789 (INSTALLATION)
C. ASTM B790 (DESIGN)
D. AASHTO STANDARD BRIDGE SPECIFICATIONS, SECTION 12.8 (DESIGN).



RIB GEOMETRY (2)



BOX CULVERT SHELL CROSS SECTION
(REFER TO TABLE 1 FOR SPECIFIC DIMENSIONAL DATA)

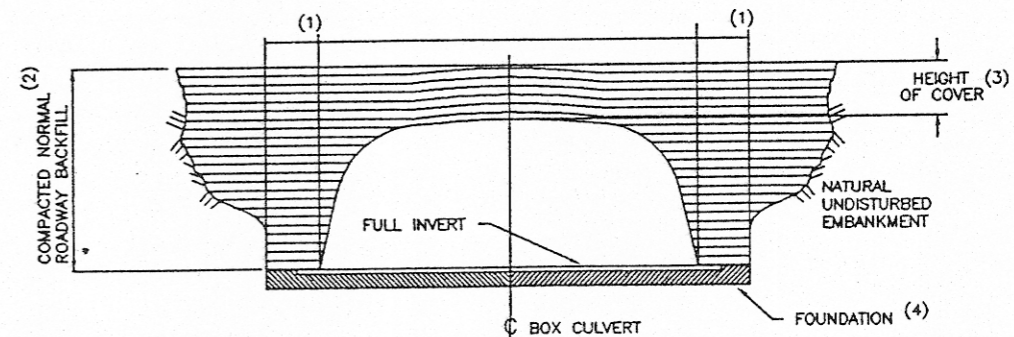


TYPICAL SQUARE END (5,6)
WITH ALUMINUM HEADWALL

INSTALLATION DETAILS

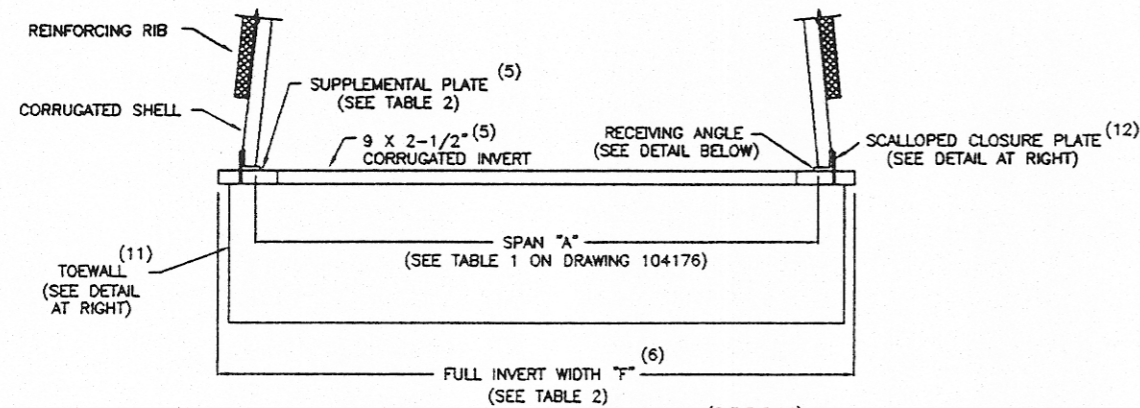
NOTES - INSTALLATION

- X = SUFFICIENT SPACE FOR COMPACTION EQUIPMENT. IF SPACE IS NARROW, SPECIAL EQUIPMENT IS REQUIRED FOR COMPACTION OR CONCRETE GROUT IS REQUIRED.
- BACKFILL TO BE WELL GRADED GRANULAR, A-1, A-3, A-2-4, OR A-2-5, PER AASHTO M145, PLACED IN SIX- TO EIGHT- INCH LIFTS SYMMETRICALLY ON EACH SIDE COMPACTED TO MINIMUM 90% DENSITY PER AASHTO T180. D-4 OR SMALLER TO OPERATE NEAR AND ABOVE STRUCTURE DURING BACKFILLING TO FINISH GRADE. REFER TO ASTM B789 INSTALLATION SPECIFICATION.
- MINIMUM COVER MAY NEED TO BE INCREASED TO HANDLE TEMPORARY CONSTRUCTION VEHICLE LOADS (LARGER THAN D4) BUT NOT TO EXCEED MAXIMUM ALLOWABLE COVER FOR THE SPECIFIC BOX CULVERT DESIGN.
- FOUNDATION TO HAVE MINIMUM 4,000 PSF BEARING BEDDING. IT SHOULD CONSIST OF STABLE, WELL GRADED GRANULAR MATERIAL.
- STANDARD HEADWALLS SHOWN ARE FOR VERTICAL ORIENTATION ONLY. ANY DESIGN, OTHER THAN VERTICAL ORIENTATION, MUST BE REVIEWED BY THE DESIGN ENGINEER.
- THE TYPE AND EXTENT OF END TREATMENT ON THE BOX CULVERT SHOULD BE CHOSEN AND DESIGNED SO AS TO PREVENT THE LOSS OF BACKFILL DUE TO HIGH FLOW CONDITIONS.
- BOLT TORQUE REQUIREMENTS - PLATE LAP MUST BE PROPERLY MATED IN A TANGENT FASHION USING PROPER ALIGNMENT TECHNIQUES AND ADEQUATE BOLT TORQUE TO SEAT THE CORRUGATION. THE RECOMMENDED INSTALLATION BOLT TORQUE FOR ALUMINUM BOX CULVERTS IS 90-115 FT/LBS FOR FULL INVERTS AND 115-135 FT/LBS FOR ALL OTHER COMPONENTS. WHEN SEAM SEALANT TAPE IS USED, BOLTS SHALL BE INSTALLED AND RETIGHTENED TO THESE TORQUE LEVELS AFTER 24 HOURS. TORQUE LEVELS ARE FOR INSTALLATION, NOT RESIDUAL, IN-SERVICE REQUIREMENTS.
- FOR ASSEMBLY INFORMATION, SEE THE MANUFACTURER'S DETAILED ASSEMBLY DRAWINGS AND INSTRUCTIONS.



TYPICAL BACKFILL CROSS SECTION

INVERT AND FOOTING DETAILS



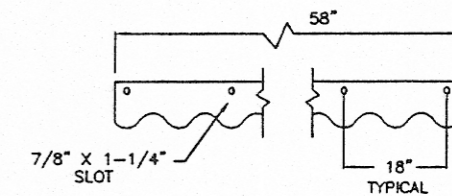
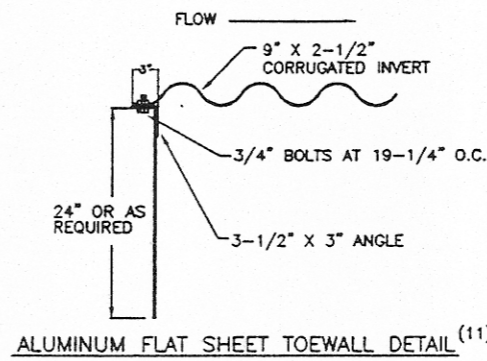
ALUMINUM FULL INVERT OPTION (2,3,5,6,14)

FULL INVERT - TABLE 2⁽³⁾

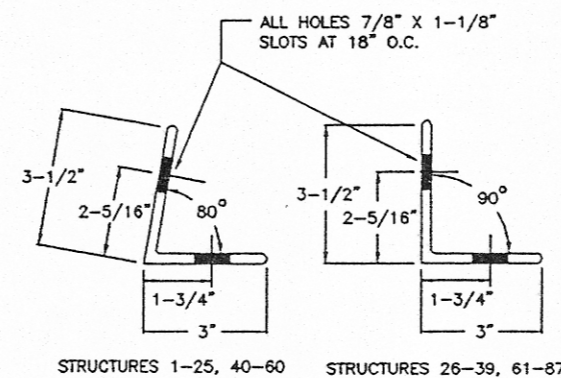
STRUCT. NUMBER	(1) (6) WIDTH "F" (N)	SUPPLEMENTAL PLATES (5)		MAX. BOLTS /FT. (EA.)	(4) MAX. WT./FT. (LB.)
		GAGE (IN.)	(1) WIDTH (N)		
26	20	0.100	2	12.45	46.3
27	21	0.100	2	12.67	47.9
28	21	0.100	2	12.67	47.9
29	21	0.100	2	12.67	47.9
30	21	0.100	2	12.67	47.9
31	22	0.100	2	12.89	49.5
32	22	0.100	2	12.89	49.5
33	22	0.100	2	12.89	49.5
34	22	0.100	2	12.89	49.5
35	23	0.100	2	13.11	51.1
36	23	0.100	2	13.11	51.1
37	23	0.100	2	13.11	51.1
38	23	0.100	2	13.11	51.1
39	24	0.100	3	13.34	55.6
40	25	0.125	3	13.56	61.5
41	25	0.125	3	13.56	61.5
42	26	0.125	3	13.78	63.0
43	26	0.125	3	13.78	63.0
44	27	0.150	3	14.00	64.9
45	27	0.150	3	14.00	64.9
46	28	0.150	3	14.23	66.5

FOOTING PADS - TABLE 3⁽³⁾

STRUCT. NUMBER	HS-20 LOADING		MAX BOLTS /FT. (EA.)	(7) MAX. WT./FT. (LB.)
	(8) GAGE (IN.)	(1) WIDTH (N)		
26	0.125	2	2.67	14.0
27	0.125	2	2.67	14.0
28	0.125	2	2.67	14.0
29	0.125	2	3.56	25.8
30	0.125	2	3.56	25.8
31	0.125	2	3.56	25.8
32	0.125	2	3.56	25.8
33	0.150	2	2.67	14.0
34	0.150	2	2.67	14.0
35	0.150	2	2.67	14.0
36	0.150	2	3.56	25.8
37	0.150	2	3.56	25.8
38	0.150	2	3.56	25.8
39	0.200	3	3.56	34.7
40	0.225	3	2.67	27.4
41	0.225	3	2.67	27.4
42	0.225	3	2.67	27.4
43	0.225	3	3.56	39.2
44	0.250	3	3.56	39.2
45	0.250	3	3.56	39.2
46	0.250	3	3.56	39.2



ALUMINUM SCALLOPED CLOSURE PLATE (12)
(FULL INVERT ONLY)

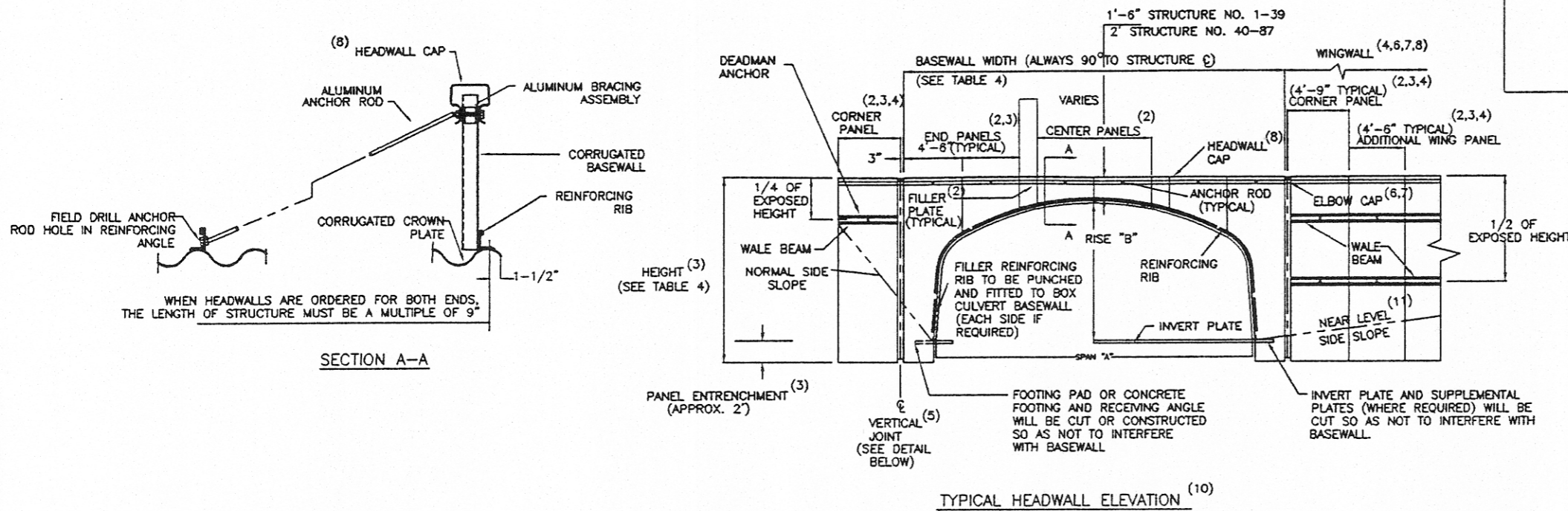


ALUMINUM RECEIVING ANGLES

NOTES - FULL INVERT & FOOTING PADS

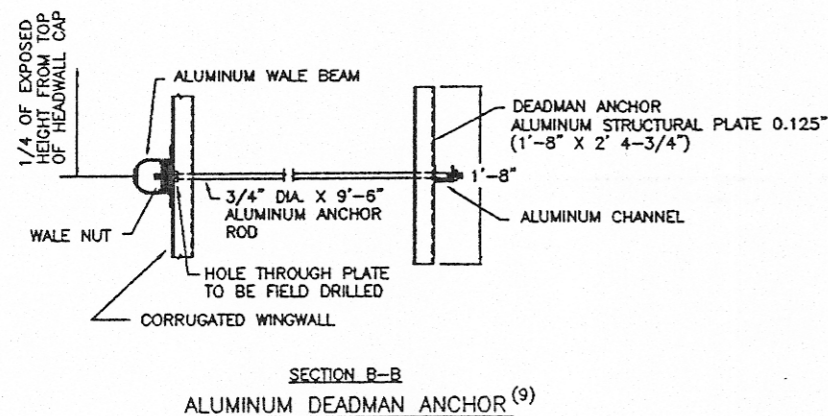
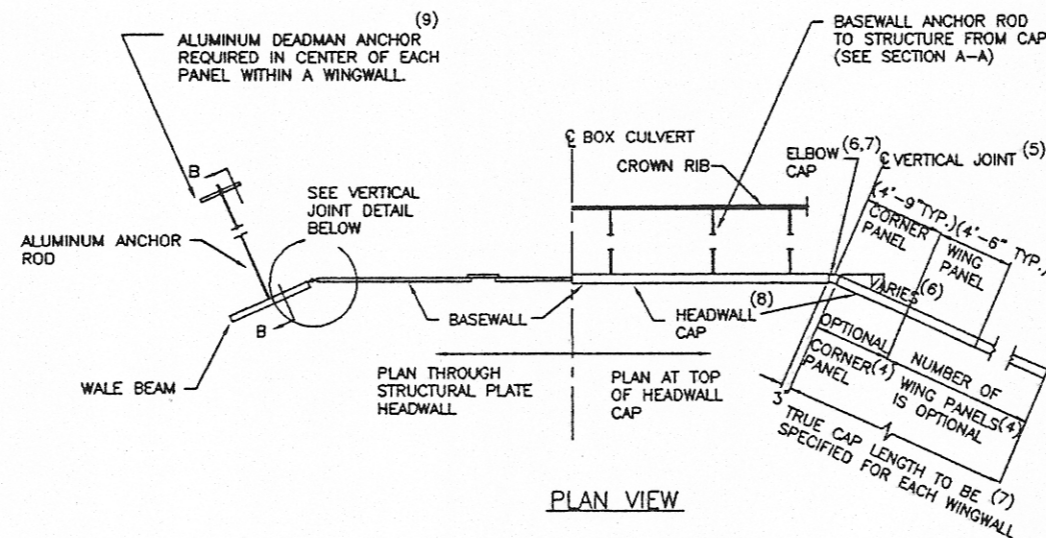
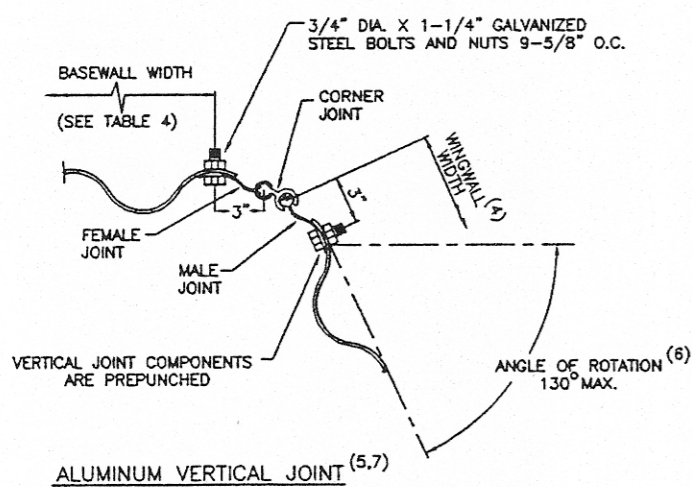
- N = 9.625" OR 9-5/8".
- MINIMUM ALLOWABLE SOIL-BEARING PRESSURE IS 4,000 LB./SQ. FT.
- FULL INVERT AND FOOTING PADS, SHOWN IN TABLES 2 & 3, MAY BE USED ONLY FOR COVERS OVER STRUCTURES OF 4 FEET OR LESS. FOR HIGHER COVERS USE SLOTTED CONCRETE FOOTINGS.
- WEIGHT PER FOOT OF FULL INVERT INCLUDES 3-1/2" X 3" RECEIVING ANGLES, SCALLOPED CLOSURE PLATES, NUTS AND BOLTS, AND ALL PLATES.
- FULL INVERT PLATES ARE 0.100" THICK. WHEN REACTIONS TO THE INVERT REQUIRE ADDITIONAL THICKNESS, SUPPLEMENTAL PLATES OF THE GAGE AND WIDTH LISTED IN TABLE 2 ARE FURNISHED TO BOLT BETWEEN THE FULL INVERT AND THE RECEIVING ANGLE.
- INVERT WIDTHS, 20N AND GREATER, ARE TWO-PIECES.
- WEIGHT PER FOOT OF FOOTING PADS INCLUDES 3-1/2" X 3" RECEIVING ANGLES, NUTS AND BOLTS, PLATES, WALE BEAMS AND NUTS, AND WALE SHEAR KEYS.
- WHEN THE GAGE LISTED IS GREATER THAN 0.250", THE FOOTING PADS WILL BE TWO OR MORE PIECES EQUALLING THE COMPOSITE GAGE REQUIRED. SEE TABLE 3.
- FOR STRUCTURES USING FOOTING PADS WITH LEG LENGTH "D" EQUAL TO 3.5N OR MORE (SEE TABLE 1 ON DRAWING 104176), WALE BEAMS ARE USED TO RESIST LOCALIZED SIDE DEFLECTIONS DURING BACKFILLING.
- A WALE SHEAR KEY IS USED TO CONNECT THE INTERIOR ENDS OF THE WALE BEAMS.
- IT IS STRONGLY RECOMMENDED THAT A FLAT SHEET TOEWALL BE ADDED TO THE UPSTREAM END OF THE FULL CORRUGATED ALUMINUM INVERT TO PREVENT WATER FROM UNDERMINING THE STRUCTURE.
- AN ALUMINUM SCALLOPED CLOSURE PLATE DOES NOT MAKE A JOINT TIGHT ENOUGH TO PREVENT INFILTRATION OF FINE SILTS AND SANDS. IF THE BACKFILL INCLUDES SUCH MATERIAL, SOME ADDITIONAL STEPS SHOULD BE TAKEN AFTER ASSEMBLY, BUT PRIOR TO BACKFILLING. THESE STEPS MAY CONSIST OF INSTALLING A GEOTEXTILE OR SEALANT TAPE.
- GROUT SHOULD BE NON-METALLIC, NON-SHRINK MATERIAL AND SHOULD CONTAIN NO CORROSION-PROMOTING AGENTS.
- THE TOTAL FLOW AREA OF ALL BOX CULVERTS INCLUDES THE AREA FROM THE CROWN TO THE INVERT OR FOOTING PADS. IF THE PADS ARE BURIED, A REDUCTION IN THE TOTAL AREA SHOULD BE TAKEN INTO CONSIDERATION.

HEADWALL DETAILS



HEADWALL - TABLE 4

STRUCT. NUMBER	SPAN "A" (FT-IN)	RISE "B" (FT-IN)	BASEWALL		NO. OF ANCHOR RODS TO STRUCTURE FROM CAP (EA.)	WEIGHT (LB./EA.)	WINGWALL	
			WIDTH (FT-IN)	HEIGHT (FT-IN)			CORNER PANEL (LB./EA.)	WING PANEL (LB./EA.)
26	14-5	3-3	19-4	7-0	4	403	182	148
27	14-8	4-1	19-4	7-10	4	430	196	159
28	14-10	4-10	19-4	8-7	4	457	210	169
29	15-1	5-8	19-4	9-5	4	484	224	180
30	15-4	6-5	19-4	10-2	4	511	238	190
31	15-6	7-3	19-4	11-0	4	538	252	201
32	15-9	8-0	19-4	11-10	4	565	266	211
33	15-10	3-6	20-10	7-10	5	434	196	159
34	16-0	4-3	20-10	8-7	5	459	210	169
35	16-2	5-1	20-10	9-5	5	485	224	180
36	16-4	5-11	20-10	10-2	5	510	238	190
37	16-6	6-8	20-10	11-0	5	536	252	201
38	16-8	7-6	20-10	11-10	5	561	266	211
39	16-10	8-3	20-10	12-7	5	587	280	222
40	17-9	3-10	22-6	7-10	5	468	196	159
41	18-2	4-7	22-6	8-7	5	495	210	169
42	18-7	5-4	22-6	9-5	5	521	224	180
43	19-0	6-1	22-6	10-2	5	548	238	190
44	19-5	6-11	22-6	11-0	5	574	252	201
45	19-10	7-8	22-6	11-10	5	601	266	211
46	20-3	8-5	22-6	12-7	5	628	280	222



NOTES - HEADWALL

1. ALL PANELS ARE FABRICATED FROM ALUMINUM STRUCTURAL PLATE AS SPECIFIED IN ASTM B746.
2. CENTER PANELS ABOVE THE BOX CULVERT CROWN RADIUS ARE 0.100" THICKNESS FOR STRUCTURES 1-39 AND 0.125" FOR STRUCTURES 40-87. ALL OTHER PANELS ARE 0.150" THICKNESS.
3. HEIGHT OF HEADWALL LISTED IN TABLE 4 PERMITS APPROXIMATELY 24" ENTRENCHMENT DEPTH BELOW THE INVERT. ALL HEADWALL PANELS MUST BE TRENCHED INTO EXISTING GROUND. IF STABLE ROCK FOUNDATION IS ENCOUNTERED, THE PANELS MAY BE TRIMMED AND PLACED INTO A CEMENT-GROUTED KEYWAY.
4. NUMBER OF CORNER PANELS AND ADDITIONAL WING PANELS IS OPTIONAL.
5. A VERTICAL JOINT IS USED ONLY WHEN A WINGWALL IS AT AN ANGLE WITH RESPECT TO THE BASEWALL.
6. SPECIFY THE DEGREE OF HORIZONTAL ROTATION ON THE WINGWALL. THIS WILL SET THE PROPER HORIZONTAL ANGLE FABRICATION FOR THE ELBOW CAP.
7. THE TOP OF A BASEWALL AND ITS WINGWALL IS ALWAYS HORIZONTAL, UNLESS BEVELED WINGWALLS ARE REQUIRED. SPECIFY THE VERTICAL DROP IN ELEVATION FOR THE WINGWALL. THIS WILL SET THE PROPER VERTICAL ANGLE FABRICATION FOR THE HEADWALL ELBOW CAP AND THE PROPER OVERALL LENGTH OF THE WINGWALL CAP.
8. HEADWALL CAP MUST BE FIELD-DRILLED AND BOLTED TO THE HEADWALL PANELS. SEE ASSEMBLY DRAWINGS FOR MORE DETAILS.
9. STANDARD SIZE AND GAGE SHOWN FOR DEADMAN ANCHOR. SPECIAL DEADMAN ANCHORS AND ANCHOR ROD LENGTHS CAN BE FABRICATED TO THE ENGINEER'S DESIGN TO RESIST FORCES ACTING ON THE HEADWALL.
10. STANDARD HEADWALLS SHOWN ARE FOR VERTICAL ORIENTATION ONLY. ANY DESIGN, OTHER THAN VERTICAL ORIENTATION, MUST BE REVIEWED BY THE DESIGN ENGINEER.
11. IF SIDE SLOPE IS NEAR LEVEL WITH STREAM BED, EXTRA WALE BEAM SHOULD BE REQUIRED FOR ALL WINGWALL PANELS.
12. FOR ASSEMBLY INFORMATION, SEE THE MANUFACTURER'S DETAILED ASSEMBLY DRAWINGS AND INSTRUCTIONS.