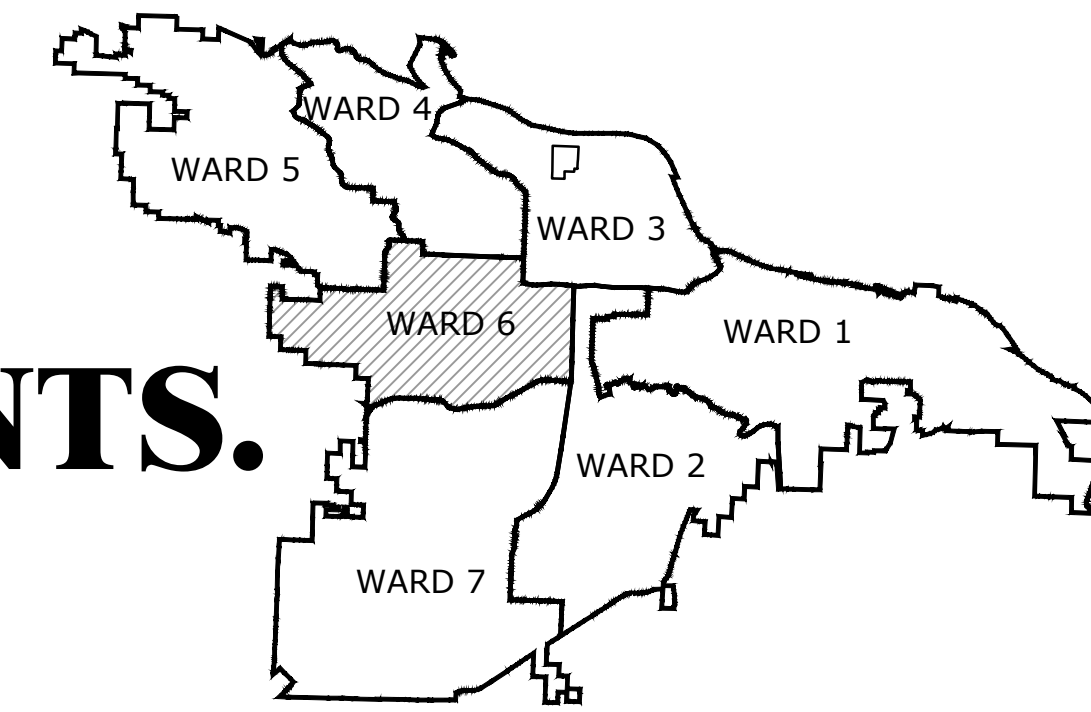


JOB #6-17-DR-228

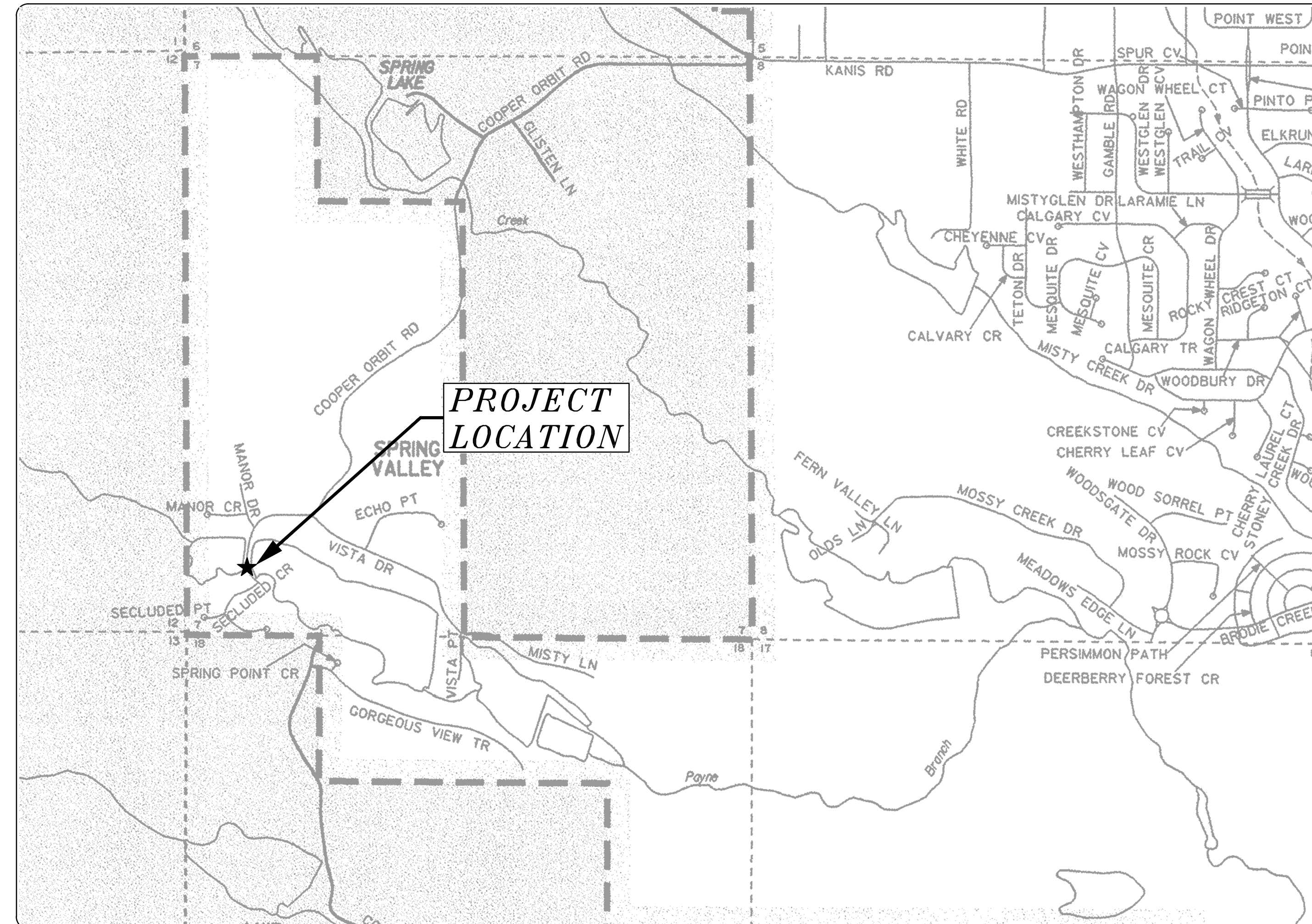
SPRING VALLEY DRAINAGE PHASE 2:

COOPER ORBIT RD. DRAINAGE IMPROVEMENTS.

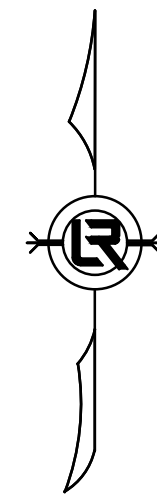
LITTLE ROCK, ARKANSAS



PROJECT LOCATION - WARD 6



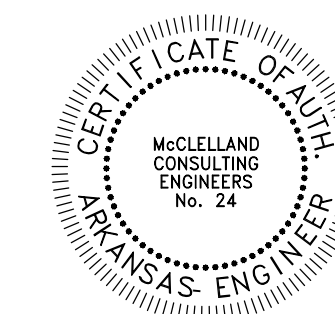
SHEET NO.	TITLE
C1	COVER SHEET
C2	LEGEND AND QUANTITIES
C3	TOPOGRAPHIC SURVEY
C4	DRAINAGE IMPROVEMENTS
C5	MAINTENANCE OF TRAFFIC OVERVIEW
C6	MAINTENANCE OF TRAFFIC STAGE 1
C7	MAINTENANCE OF TRAFFIC STAGE 2
	ARDOT STD. DWG W-X002-1
	ARDOT STD. DWG W-X003-1
	ARDOT STD. DWG PBC-1
	ARDOT STD. DWG GR-7
	ARDOT STD. DWG GR-8
	ARDOT STD. DWG GR-8A
	ARDOT STD. DWG TC-4
	ARDOT STD. DWG TC-5
	ARDOT STD. DWG R-100X-0



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 701 WEST MARKHAM STREET
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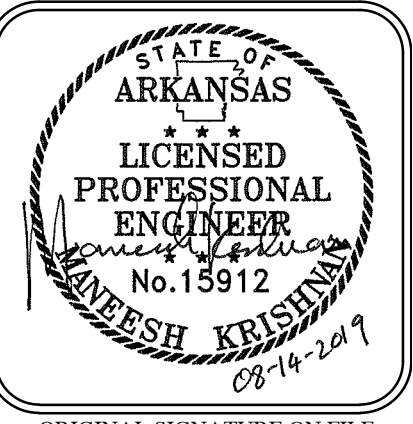
1810 N. College Fayetteville, AR 72702 PH# 479-443-2377
 7302 Kanis Rd. Little Rock, AR 72204 PH# 501-371-0272
 4606 S. Garnett Rd. Ste. 401 Tulsa, OK 74146 PH# 918-619-6803

<http://www.mce.us.com>

REVISIONS	DATE

CITY OF LITTLE ROCK, ARKANSAS
 COOPER ORBIT
 ROAD DRAINAGE IMPROVEMENTS
 COVER SHEET

DEPARTMENT OF PUBLIC WORKS
 CIVIL ENGINEERING
 701 W. MARKHAM
 LITTLE ROCK, ARKANSAS 72201



DRAWN BY JAM
DESIGNED JJW
CHECKED JSW
DATE 08/14/2019
SCALE NTS
PROJECT NO. 6-17-DR-228
SHEET NO. C1

REVISIONS	DATE

**CITY OF LITTLE ROCK, ARKANSAS
COOPER ORBIT
ROAD DRAINAGE IMPROVEMENTS
LEGEND AND QUANTITIES**

**DEPARTMENT OF PUBLIC WORKS
CIVIL ENGINEERING
701 W. MARKHAM
LITTLE ROCK, ARKANSAS 72201**



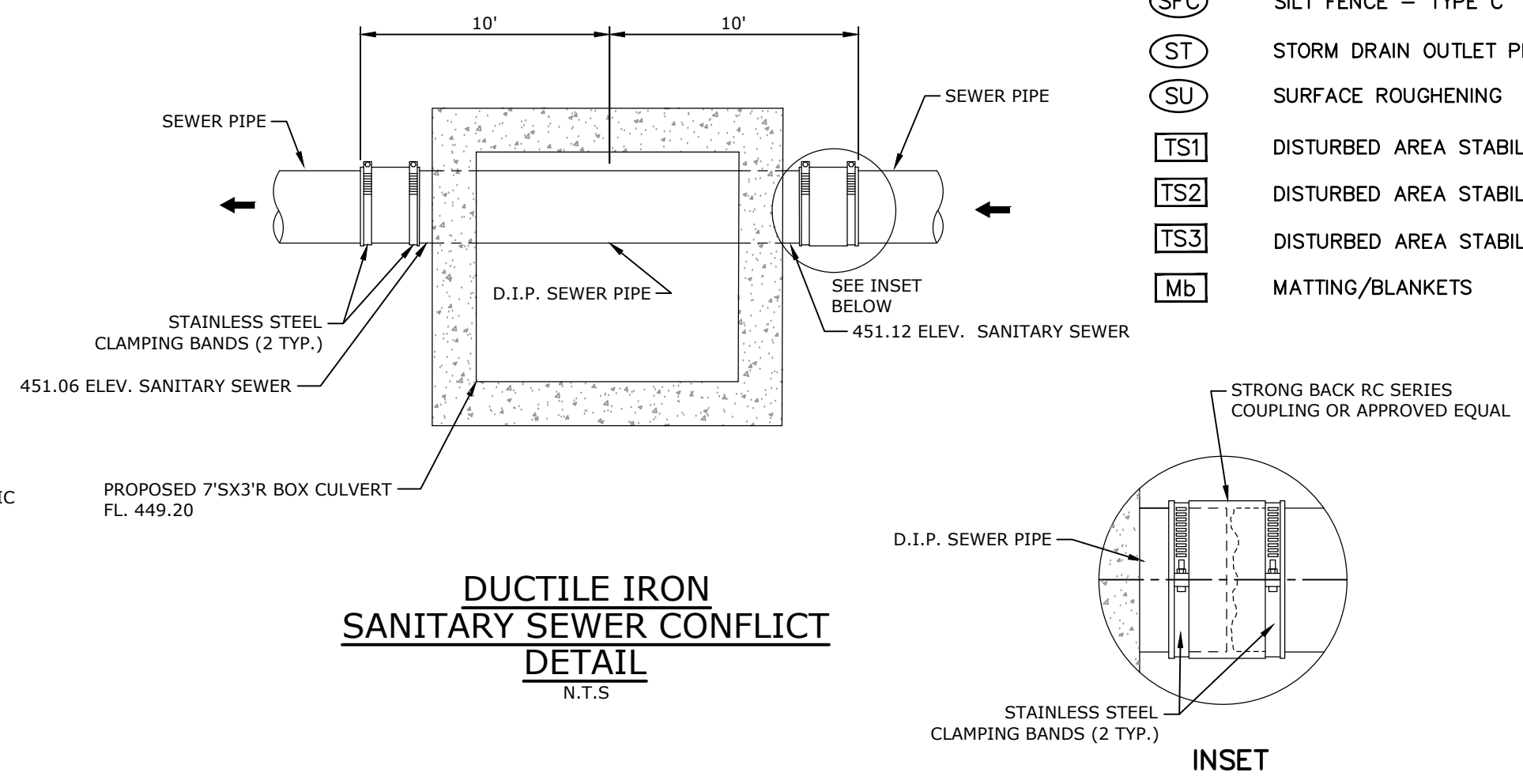
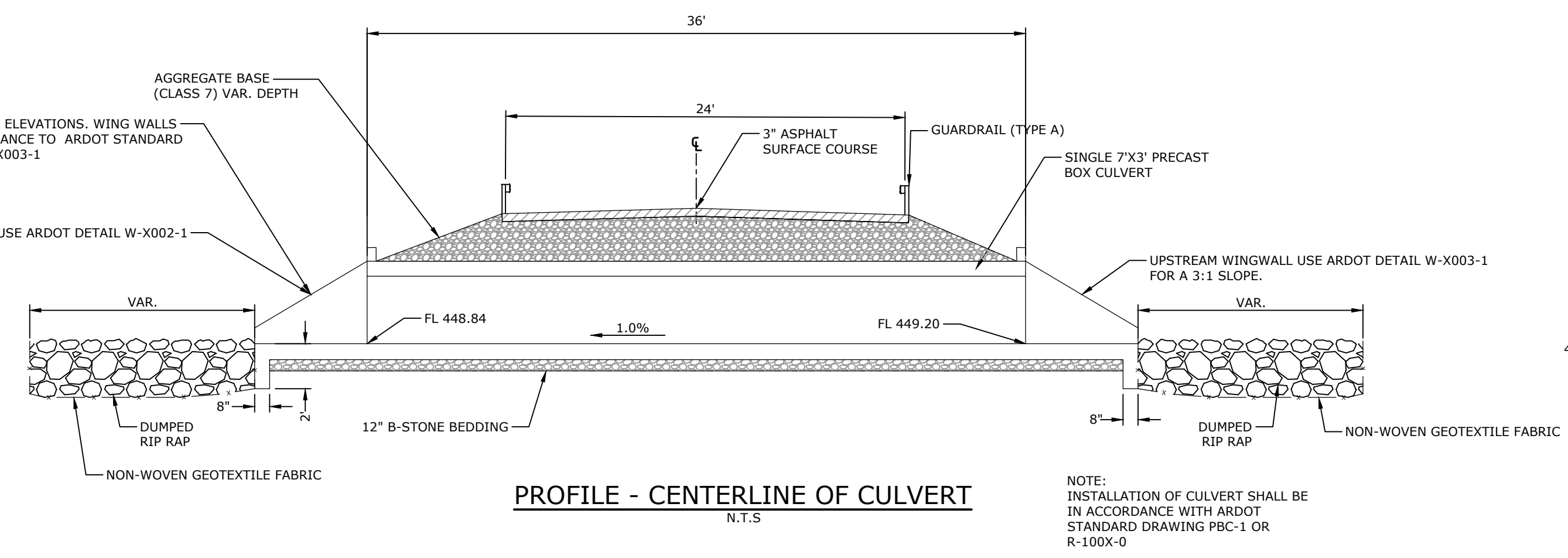
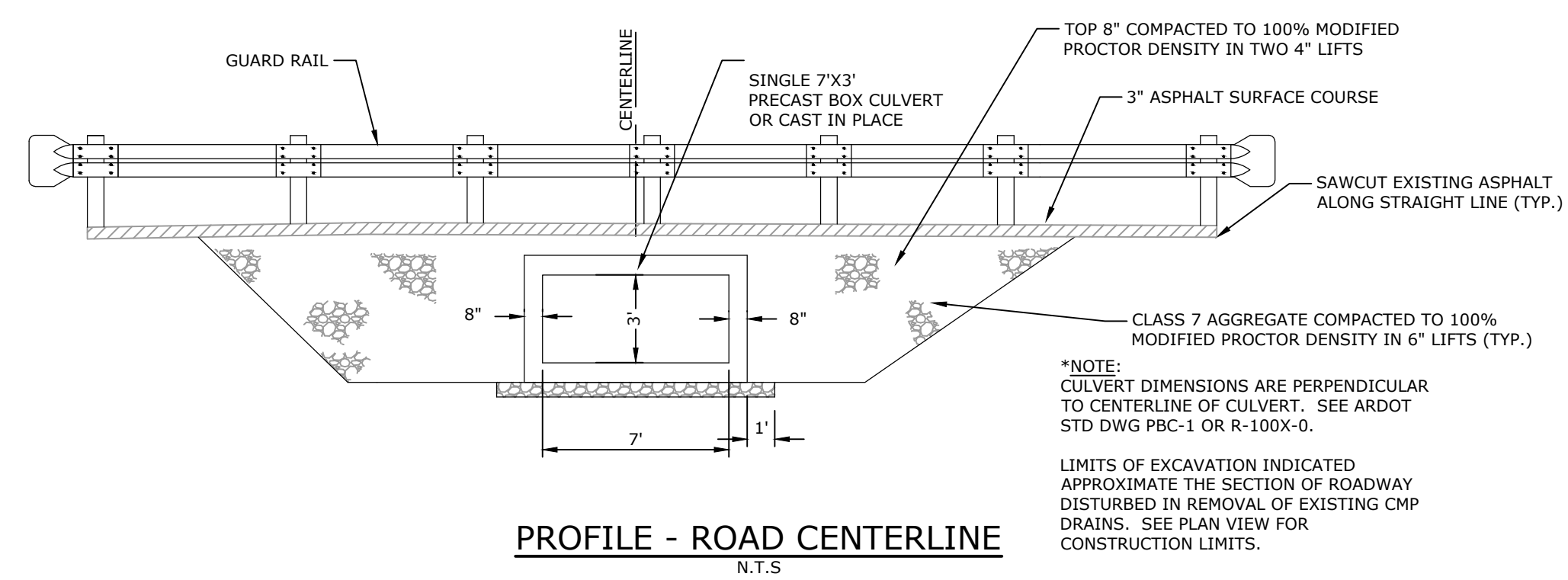
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JAM
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JJW
CHECKED
JSW
DATE
08/14/2019
SCALE
NTS
PROJECT NO.
6-17-DR-228
SHEET NO.
C2

QUANTITIES

CLR Item No.	Description	Unit	Estimated Quantity
2.01	Site Preparation	LUMP SUM	1
3.01	Unclassified Excavation	CU. YD.	130
4.01	Aggregate Base Course (Class 7)	TON	255
11.01	Reinforced Concrete Precast Box Culvert (7'X3') or Cast in Place	LIN. FT.	36
11.05	Reinforced Concrete Pour In-Place Headwall	CU. YD.	2
11.3	Reinforced Concrete Pour In- Place Wingwall	CU. YD.	10
14.01	Solid Sodding	SQ. YD.	20
16.01	Maintenance of Traffic	LUMP SUM	1
17.01	Pavement Repairs	SQ. YD.	40
18.45	Rip Rap	CU. YD.	58
23.01	B Stone	TON	25
24.11	Silt Fence - Type A (SFA)	LIN. FT.	1000
26.01	Trench or Excavation Safety Systems	LUMP SUM	1
28.01	Guardrail (Includes Post and Terminal Ends)	LIN. FT.	300
601	Mobilization	LUMP SUM	1
625.01	Geotextile Fabric (Type 1)	SQ. YD.	116
719.04 W	Thermoplastic Pavement Marking White (4")	LIN. FT.	50
719.04 Y	Thermoplastic Pavement Marking Yellow (4")	LIN. FT.	50
SP	6" Ductile Iron Sanitary Sewer Aerial Relay	LUMP SUM	1

LEGEND

EXISTING	PROPOSED
○ IR	PROPOSED CONTOUR
○ PK	PROPOSED SPOT ELEVATION
○ RR(Sp)	PROPOSED SPOT CURB ELEVATION
□ CM	STORM SEWER - PIPE
⊗ WV	STORM SEWER - MITERED END SECTION
□ WM	STORM SEWER - GRATE INLET
⊕ FH	STORM SEWER - JUNCTION BOX
⊕ GM	STORM SEWER - FLARED END SECTION
⊕ GV	STORM SEWER - HEADWALL
○ CO	STORM SEWER - SINGLE WING
• GP	STORM SEWER - DOUBLE WING
⊕	STORM SEWER - AREA INLET
⊕	GRADE BREAK LINE
⊕	HP HIGH POINT
⊕	LP LOW POINT
⊕	C CUT LINE
⊕	F FILL LINE
⊕	SS SANITARY SEWER PIPE
⊕	○ S SANITARY SEWER MANHOLE
⊕	PROPOSED CURB
⊕	PROPOSED CONCRETE
⊕	PROPOSED ASPHALT
⊕	PROPOSED RIP-RAP
⊕	○ CO CONSTRUCTION - ENTRANCE/EXIT
⊕	○ CD CHECK DAM
⊕	○ DI DIVERSION BERM
⊕	○ DN DOWNDRAIN STRUCTURE - TEMPORARY
⊕	○ RD ROCK DAM
⊕	○ SD1 SEDIMENT BARRIER - SILT FENCE
⊕	○ SD2 SEDIMENT BARRIER - GRAVEL RING
⊕	○ SD3 SEDIMENT BARRIER - BLOCK & GRAVEL
⊕	○ SD4 SEDIMENT BARRIER - BLOCK
⊕	○ SBT TEMPORARY SEDIMENT BASIN
⊕	○ SFA SILT FENCE - TYPE A
⊕	○ SFB SILT FENCE - TYPE B
⊕	○ SFC SILT FENCE - TYPE C
⊕	○ ST STORM DRAIN OUTLET PROTECTION
⊕	○ SU SURFACE ROUGHENING
⊕	TS1 DISTURBED AREA STABILIZATION -TEMPORARY STABILIZATION
⊕	TS2 DISTURBED AREA STABILIZATION -TEMPORARY GRASSING
⊕	TS3 DISTURBED AREA STABILIZATION -PERMANENT GRASSING
⊕	Mb MATTING/BLANKETS
⊕	○ IR IRON ROD
⊕	○ PK PK NAIL
⊕	○ RR(Sp) R.R. SPIKE
⊕	□ CM CONC. MONUMENT
⊕	⊗ WV WATER VALVE
⊕	□ WM WATER METER
⊕	⊕ FH FIRE HYDRANT
⊕	⊕ GM GAS METER
⊕	⊕ GV GAS VALVE
⊕	○ CO CLEAN-OUT
⊕	• GP GUARD POST (BOLLARD)
⊕	⊕ SIGN POST
⊕	⊕ BENCHMARK
⊕	⊕ STORM SEWER MANHOLE
⊕	○ S SANITARY SEWER MANHOLE
⊕	⊕ TELEPHONE MANHOLE
⊕	⊕ ELECTRIC MANHOLE
⊕	⊕ TELEPHONE BOX
⊕	⊕ ELECTRIC BOX
⊕	⊕ CABLE BOX
⊕	⊕ UTILITY POLE
⊕	⊕ GUY WIRE
⊕	⊕ LIGHT POLE
⊕	⊕ POST OR POLE (TYPE AS NOTED)
⊕	⊕ MAILBOX
⊕	⊕ DECIDUOUS TREE
⊕	⊕ EVERGREEN/CONIFEROUS TREE
⊕	⊕ BUSH
⊕	⊕ PROPERTY LINE
⊕	⊕ SETBACK LINE
⊕	⊕ EASEMENT LINE
⊕	⊕ CURB
⊕	⊕ FENCE
⊕	⊕ OVERHEAD ELECTRIC
⊕	⊕ OVERHEAD TELEPHONE
⊕	⊕ OVERHEAD CABLE
⊕	⊕ UNDERGROUND TELEPHONE
⊕	⊕ UNDERGROUND ELECTRIC
⊕	⊕ UNDERGROUND CABLE
⊕	⊕ WATER LINE
⊕	⊕ SEWER LINE
⊕	⊕ GAS LINE
⊕	⊕ STORM SEWER/CULVERT
⊕	⊕ EDGE OF WOODS
⊕	⊕ CONTOUR LINE

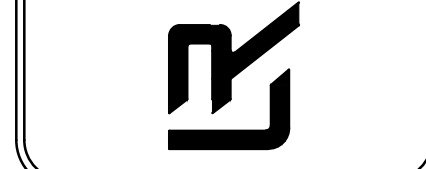


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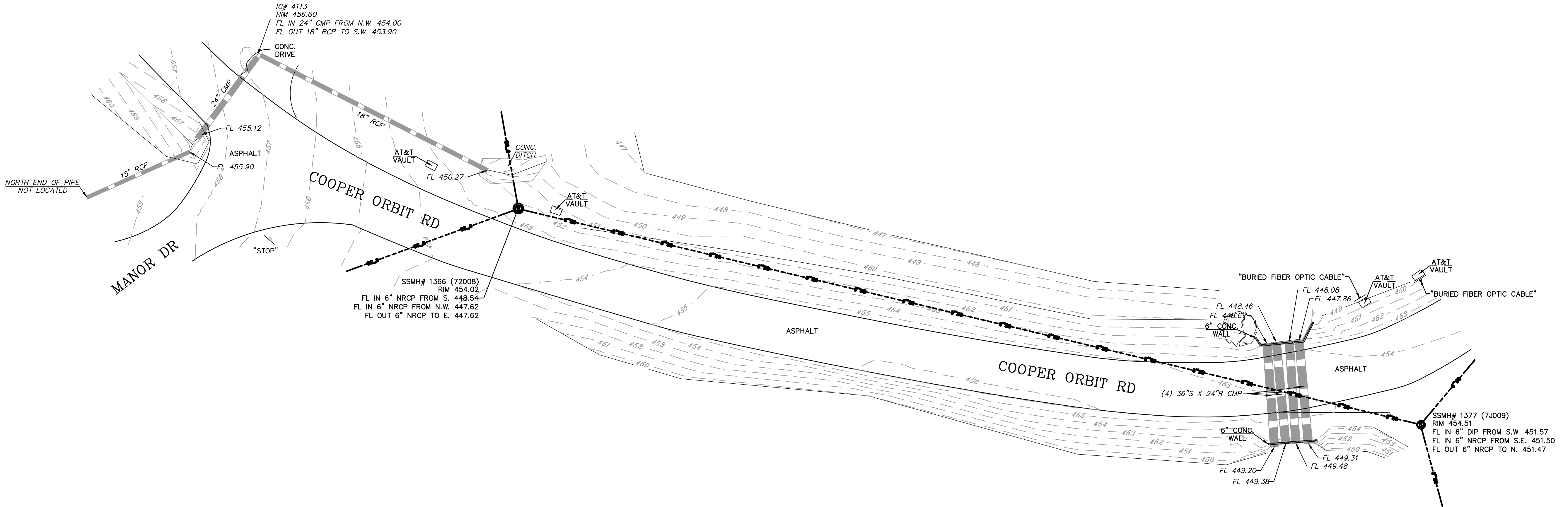
CITY OF LITTLE ROCK, ARKANSAS
 COOPER ORBIT
 ROAD DRAINAGE IMPROVEMENTS
 TOPOGRAPHIC SURVEY

DEPARTMENT OF PUBLIC WORKS
 CIVIL ENGINEERING
 701 W. MARKHAM
 LITTLE ROCK, ARKANSAS 72201



DRAWN BY
 JDM
 DESIGNED
 NA
 CHECKED
 KLS
 DATE
 02/01/2019
 SCALE
 1" = 20'
 PROJECT NO.
 6-17-DR-228
 SHEET NO.
 C3

SURVEYOR'S NOTES:
 HORIZONTAL COORDINATES FOR THIS PROJECT ARE ARKANSAS STATE PLANE NORTH ZONE AND ELEVATIONS ARE NAVD88 BASED ON THE P.A.G.I.S. REFERENCE STATION.
 CONTOUR INTERVAL = 1 FOOT.
 THIS IS A TOPOGRAPHIC SURVEY ONLY AND IN NO WAY SHOULD BE INTERPRETED AS A PROPERTY BOUNDARY SURVEY. ANY PROPERTY LINES SHOWN ARE FOR REFERENCE ONLY AND HAVE NOT BEEN VERIFIED.
 FIELD WORK FOR THIS SURVEY WAS COMPLETED JANUARY.
 NO STATEMENT IS MADE CONCERNING SUBSURFACE CONDITIONS.
 BURIED UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN BASED ON VISUAL INSPECTION OF MANHOLES AND OTHER SURFACE FEATURES. McLELLAND CONSULTING ENGINEERS HAS ACCURATELY DEPICTED THE UNDERGROUND AND SUBSURFACE FEATURES TO THE BEST OF THEIR KNOWLEDGE AND ABILITY. ANY CONSTRUCTION AT THIS SITE SHOULD ONLY BE DONE AFTER CONTACTING ARKANSAS ONE CALL AT 1-800-482-8998 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.
 MANHOLE AND DRAIN GRATE INFORMATION WERE GATHERED BY VISUAL INSPECTION AND ARE CONNECTED AND DESCRIBED ONLY AS COULD BE DETERMINED THROUGH SAID VISUAL INSPECTION.



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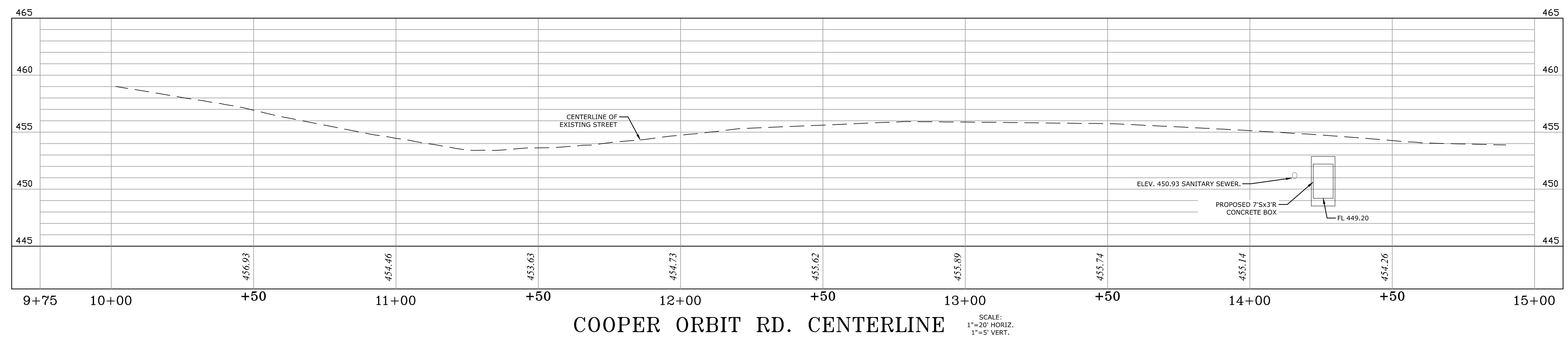
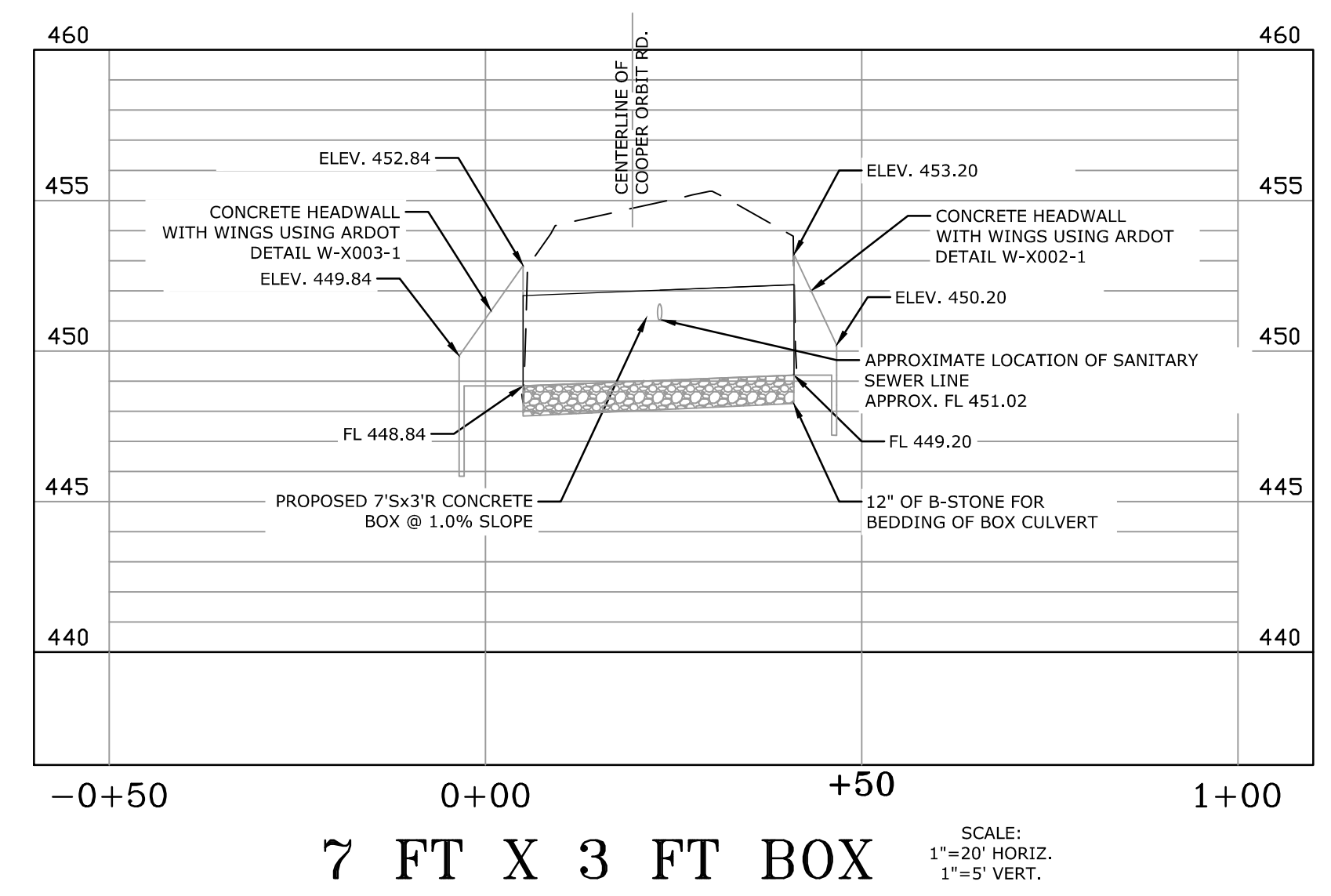
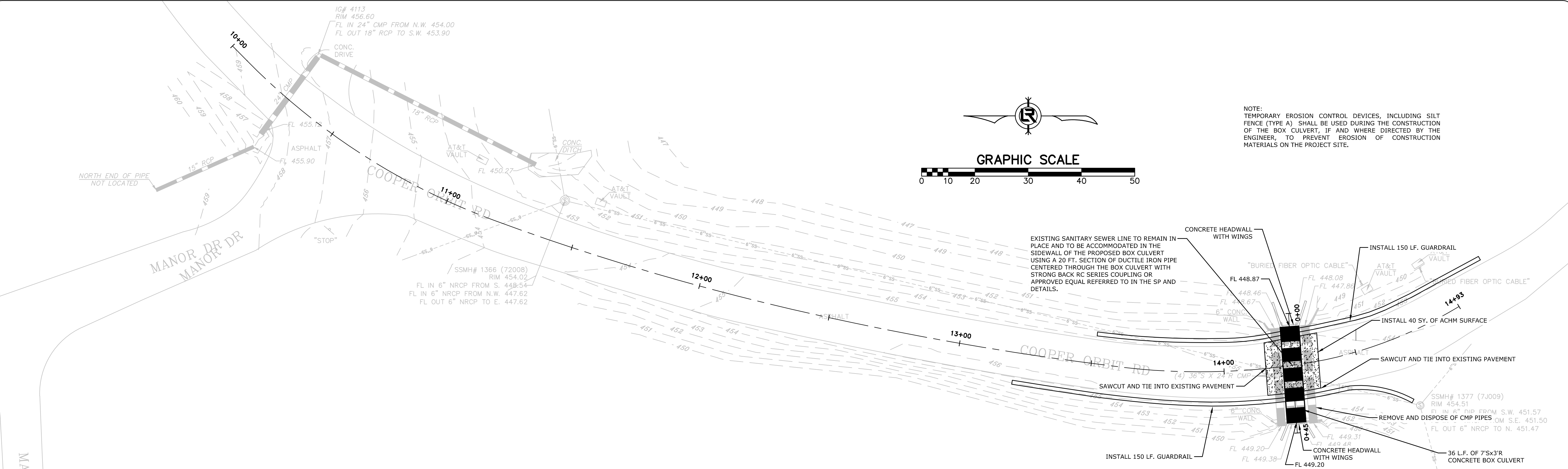
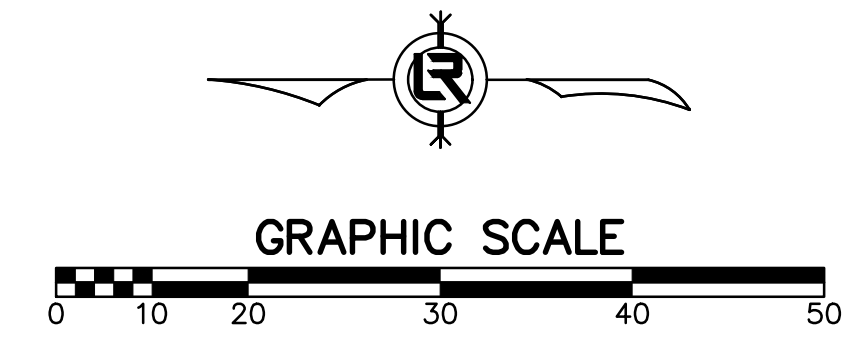
**CITY OF LITTLE ROCK, ARKANSAS
COOPER ORBIT
ROAD DRAINAGE IMPROVEMENTS
DRAINAGE IMPROVEMENTS**

DEPARTMENT OF PUBLIC WORKS
CIVIL ENGINEERING
701 W. MARKHAM
LITTLE ROCK, ARKANSAS 72201



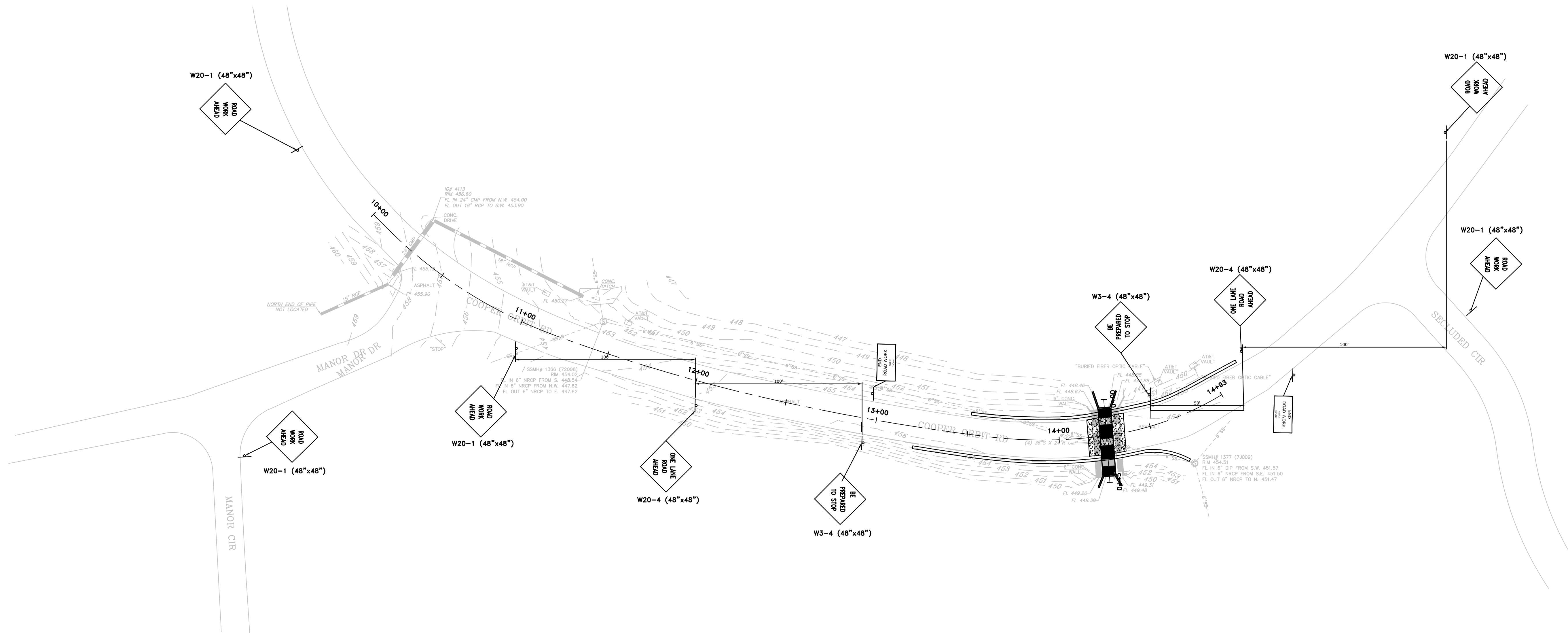
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DESIGNED
JJW
CHECKED
JSW
DATE
08/14/2019
SCALE
1" = 20'
PROJECT NO.
6-17-DR-228
SHEET NO.
C4

NOTE:
TEMPORARY EROSION CONTROL DEVICES, INCLUDING SILT FENCE (TYPE A) SHALL BE USED DURING THE CONSTRUCTION OF THE BOX CULVERT, IF AND WHERE DIRECTED BY THE ENGINEER, TO PREVENT EROSION OF CONSTRUCTION MATERIALS ON THE PROJECT SITE.



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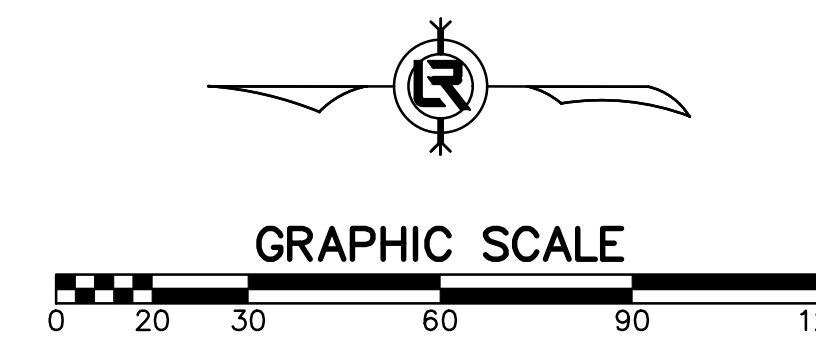
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SEQUENCE OF CONSTRUCTION

STAGE 1
 INSTALL SIGNS AND BARRIER ON WEST SIDE OF ROAD.
 INSTALL DUMPED RIP-RAP ON WEST SIDE OF ROAD AND GRAVEL FOR TEMPORARY ROAD. MAINTAIN TRAFFIC ON EAST SIDE OF ROAD. INSTALL EAST PORTION OF SINGLE BOX CULVERT, HEAD WALL, WING WALLS, DUMPED RIP-RAP, AND GRAVEL FOR TEMPORARY ROAD.

STAGE 2
 INSTALL TRAFFIC DRUMS AND RELOCATE BARRIER. MAINTAIN TRAFFIC ON THE TEMPORARY GRAVEL ROAD INSTALLED IN STAGE 1. INSTALL REMAINING PORTION OF SINGLE BOX CULVERT. CONSTRUCT 20' SECTION OF DUCTILE IRON PIPE PER THE SP. HEADWALL, WING WALLS, AND DUMPED RIP-RAP. INSTALL BASE COURSE AND PLACE ASPHALT SURFACE COURSE. DRESS SLOPES, REMOVE GRAVEL FOR TEMPORARY ACCESS ROAD, AND LAY SOD.



REVISIONS	DATE

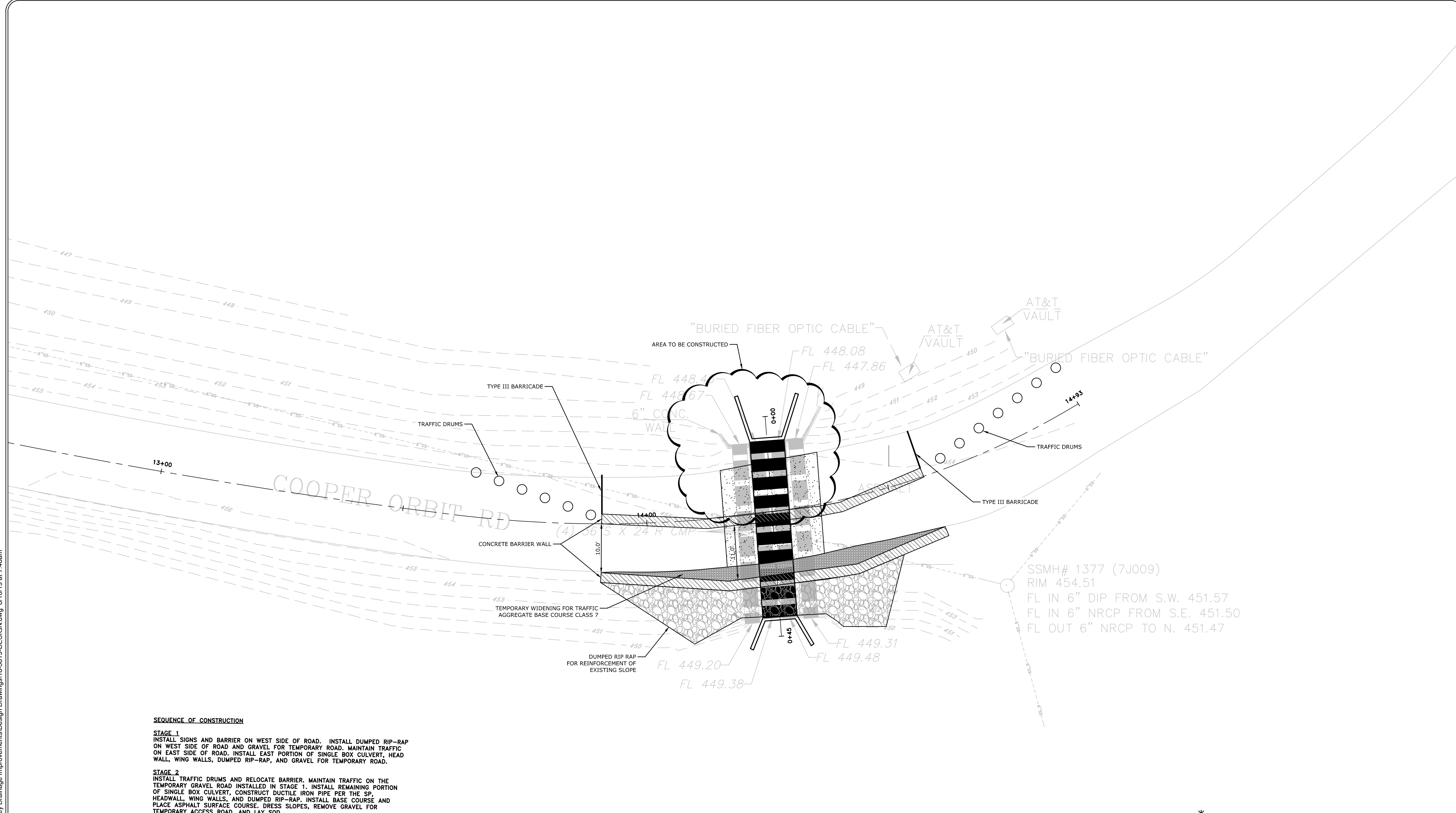
CITY OF LITTLE ROCK, ARKANSAS
COOPER ORBIT
ROAD DRAINAGE IMPROVEMENTS
 MAINTENANCE OF TRAFFIC OVERVIEW

DEPARTMENT OF PUBLIC WORKS
 CIVIL ENGINEERING
 701 W. MARKHAM
 LITTLE ROCK, ARKANSAS 72201



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CHECKED
 JSW
DATE
 08/14/2019
SCALE
 1" = 30'
PROJECT NO.
 6-17-DR-228
SHEET NO.
 C5

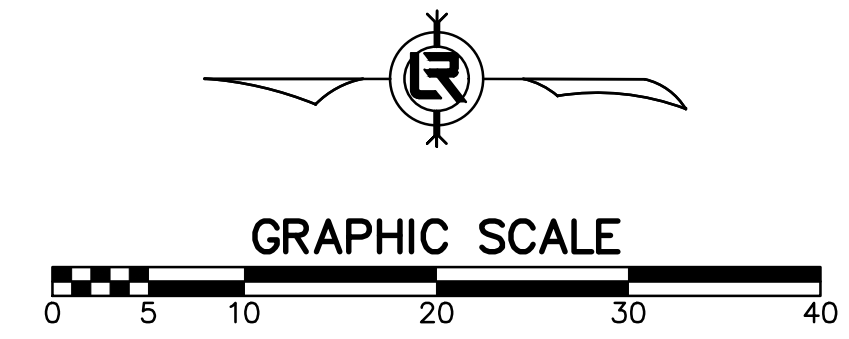
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SEQUENCE OF CONSTRUCTION

STAGE 1
 INSTALL SIGNS AND BARRIER ON WEST SIDE OF ROAD. INSTALL DUMPED RIP-RAP ON WEST SIDE OF ROAD AND GRAVEL FOR TEMPORARY ROAD. MAINTAIN TRAFFIC ON EAST SIDE OF ROAD. INSTALL EAST PORTION OF SINGLE BOX CULVERT, HEAD WALL, WING WALLS, DUMPED RIP-RAP, AND GRAVEL FOR TEMPORARY ROAD.

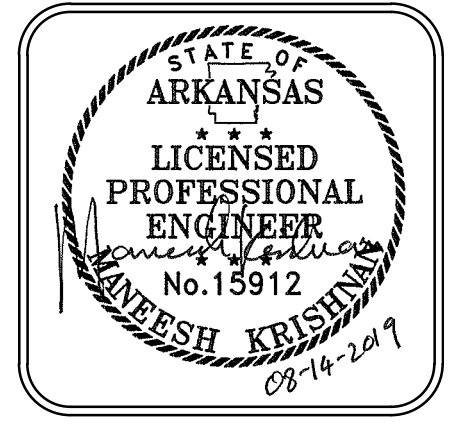
STAGE 2
 INSTALL TRAFFIC DRUMS AND RELOCATE BARRIER. MAINTAIN TRAFFIC ON THE TEMPORARY GRAVEL ROAD. INSTALLED IN STAGE 1. INSTALL REMAINING PORTION OF SINGLE BOX CULVERT, CONSTRUCT DUCTILE IRON PIPE PER THE SP. HEADWALL, WING WALLS, AND DUMPED RIP-RAP. INSTALL BASE COURSE AND PLACE ASPHALT SURFACE COURSE. DRESS SLOPES, REMOVE GRAVEL FOR TEMPORARY ACCESS ROAD, AND LAY SOD.



REVISIONS	DATE

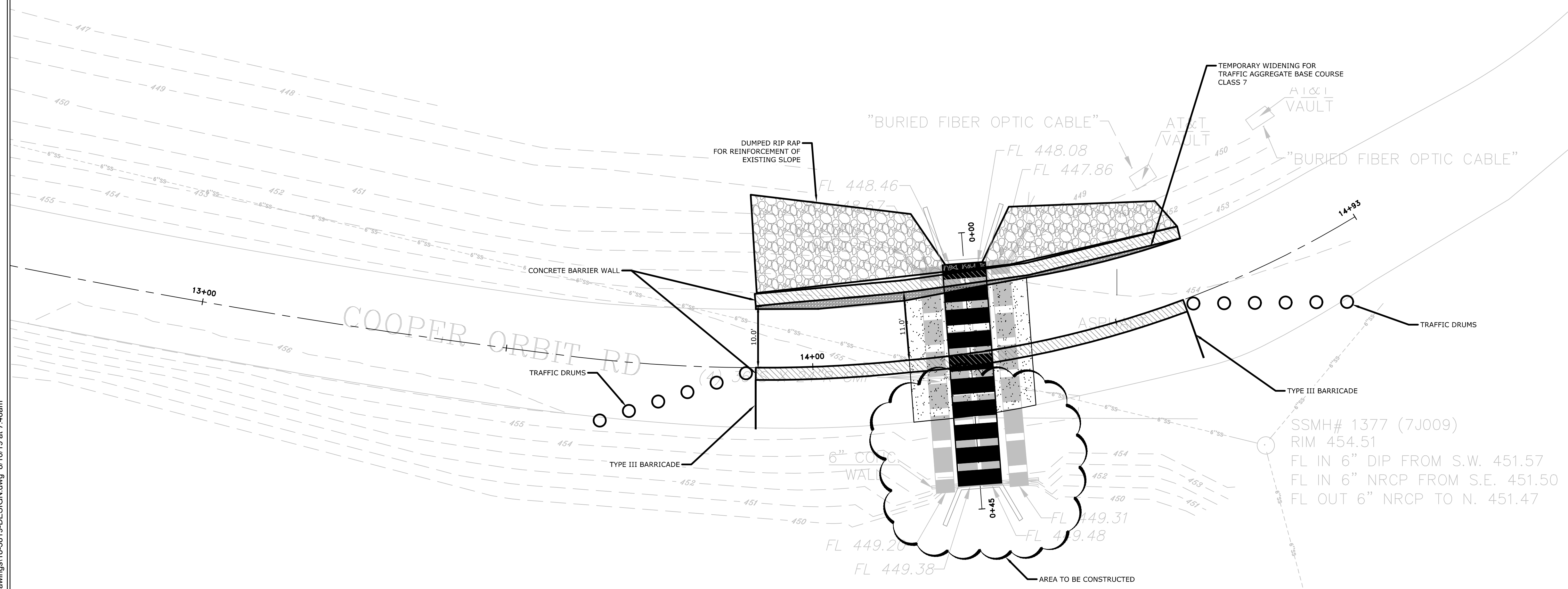
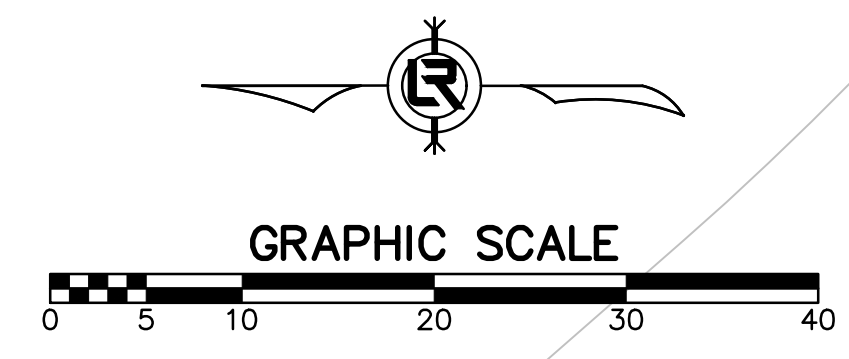
**CITY OF LITTLE ROCK, ARKANSAS
 COOPER ORBIT
 ROAD DRAINAGE IMPROVEMENTS
 MAINTENANCE OF TRAFFIC STAGE 1**

**DEPARTMENT OF PUBLIC WORKS
 CIVIL ENGINEERING
 701 W. MARKHAM
 LITTLE ROCK, ARKANSAS 72201**



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DESIGNED JJW
CHECKED JSW
DATE 08/14/2019
SCALE 1" = 10'
PROJECT NO. 6-17-DR-228
SHEET NO. C6

REVISIONS	DATE



SEQUENCE OF CONSTRUCTION

STAGE 1
 INSTALL SIGNS AND BARRIER ON WEST SIDE OF ROAD. INSTALL DUMPED RIP-RAP ON WEST SIDE OF ROAD AND GRAVEL FOR TEMPORARY ROAD. MAINTAIN TRAFFIC ON EAST SIDE OF ROAD. INSTALL EAST PORTION OF SINGLE BOX CULVERT, HEAD WALL, WING WALLS, DUMPED RIP-RAP, AND GRAVEL FOR TEMPORARY ROAD.

STAGE 2
 INSTALL TRAFFIC DRUMS AND RELOCATE BARRIER. MAINTAIN TRAFFIC ON THE TEMPORARY GRAVEL ROAD INSTALLED IN STAGE 1. INSTALL REMAINING PORTION OF SINGLE BOX CULVERT, CONSTRUCT DUCTILE IRON PIPE PER THE SP, HEADWALL, WING WALLS, AND DUMPED RIP-RAP. INSTALL BASE COURSE AND PLACE ASPHALT SURFACE COURSE, DRESS SLOPES, REMOVE GRAVEL FOR TEMPORARY ACCESS ROAD, AND LAY SOD.

**CITY OF LITTLE ROCK, ARKANSAS
 COOPER ORBIT
 ROAD DRAINAGE IMPROVEMENTS
 MAINTENANCE OF TRAFFIC STAGE 2**

**DEPARTMENT OF PUBLIC WORKS
 CIVIL ENGINEERING
 701 W. MARKHAM
 LITTLE ROCK, ARKANSAS 72201**



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 JSW
 DATE
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 SCALE
 1" = 10'
 PROJECT NO.
 6-17-DR-228
 SHEET NO.
 C7**

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WING DIMENSIONS

CLEAR HEIGHT OF BOX	THICKNESS OF WALL AT HEADWALL, E.C.	WING WALL HEIGHT AT HEADWALL	WIDTH OF WING FOOTINGS AT HEADWALL	WIDTH OF WING FOOTINGS AT END	PERPENDICULAR FEEDING DIMENSION FROM END OF WING TO END OF WING	LENGTH OF WING WALLS	INSIDE FOOTING DIMENSION	QUANTITY PER WING CLASS S CONCRETE	
								INLET END	OUTLET END
2'	12"	6'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	0.604	0.670
3'	12"	7'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	0.908	0.996
4'	12"	8'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1.267	1.376
5'	12"	9'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1.679	1.810
6'	12"	10'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	2.150	2.303
7'	12"	11'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	2.683	2.947
8'	12"	12'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	3.279	3.581
9'	12"	13'	2'-0"	2'-0"	1'-0"	1'-0"	1'-0"	3.930	4.284

APRON DIMENSION - W₂

$W_2 = (OW - 2F)$

CLEAR SPAN	CLEAR HEIGHT	CLASS S CONCRETE - 4 WINGS				
		SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
2'	2'	1.14	1.14	1.14	1.14	1.14
3'	3'	1.28	1.28	1.28	1.28	1.28
4'	4'	1.42	1.42	1.42	1.42	1.42
5'	5'	1.56	1.56	1.56	1.56	1.56
6'	6'	1.70	1.70	1.70	1.70	1.70
7'	7'	1.84	1.84	1.84	1.84	1.84
8'	8'	1.98	1.98	1.98	1.98	1.98
9'	9'	2.12	2.12	2.12	2.12	2.12
10'	10'	2.26	2.26	2.26	2.26	2.26
11'	11'	2.40	2.40	2.40	2.40	2.40
12'	12'	2.54	2.54	2.54	2.54	2.54

QUANTITIES

CLASS S CONCRETE - 4 WINGS

HEADWALLS, WING WALLS, FOOTINGS, SIDEWALLS AND APRONS

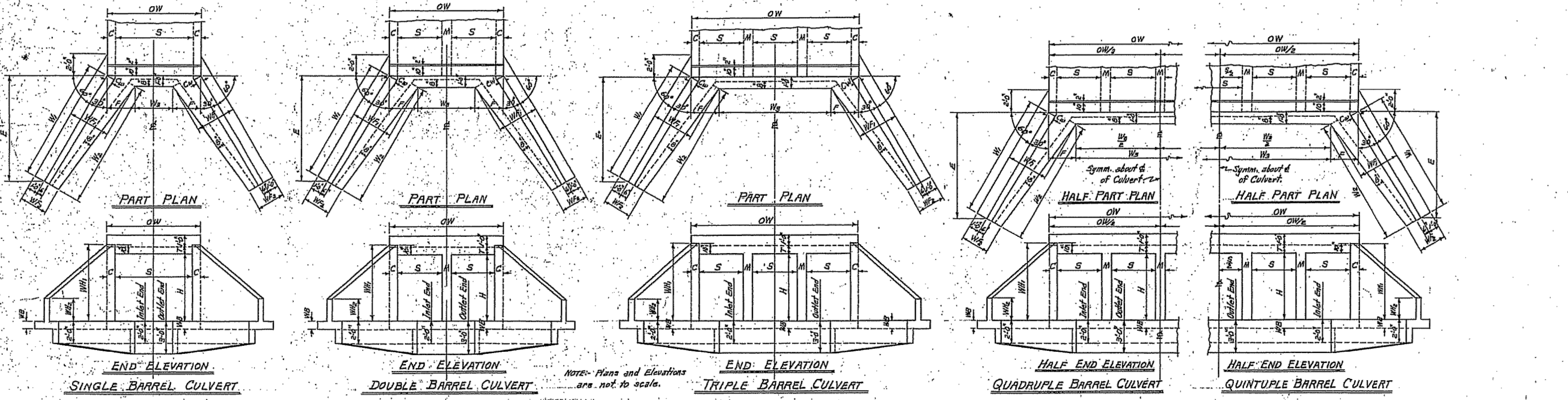
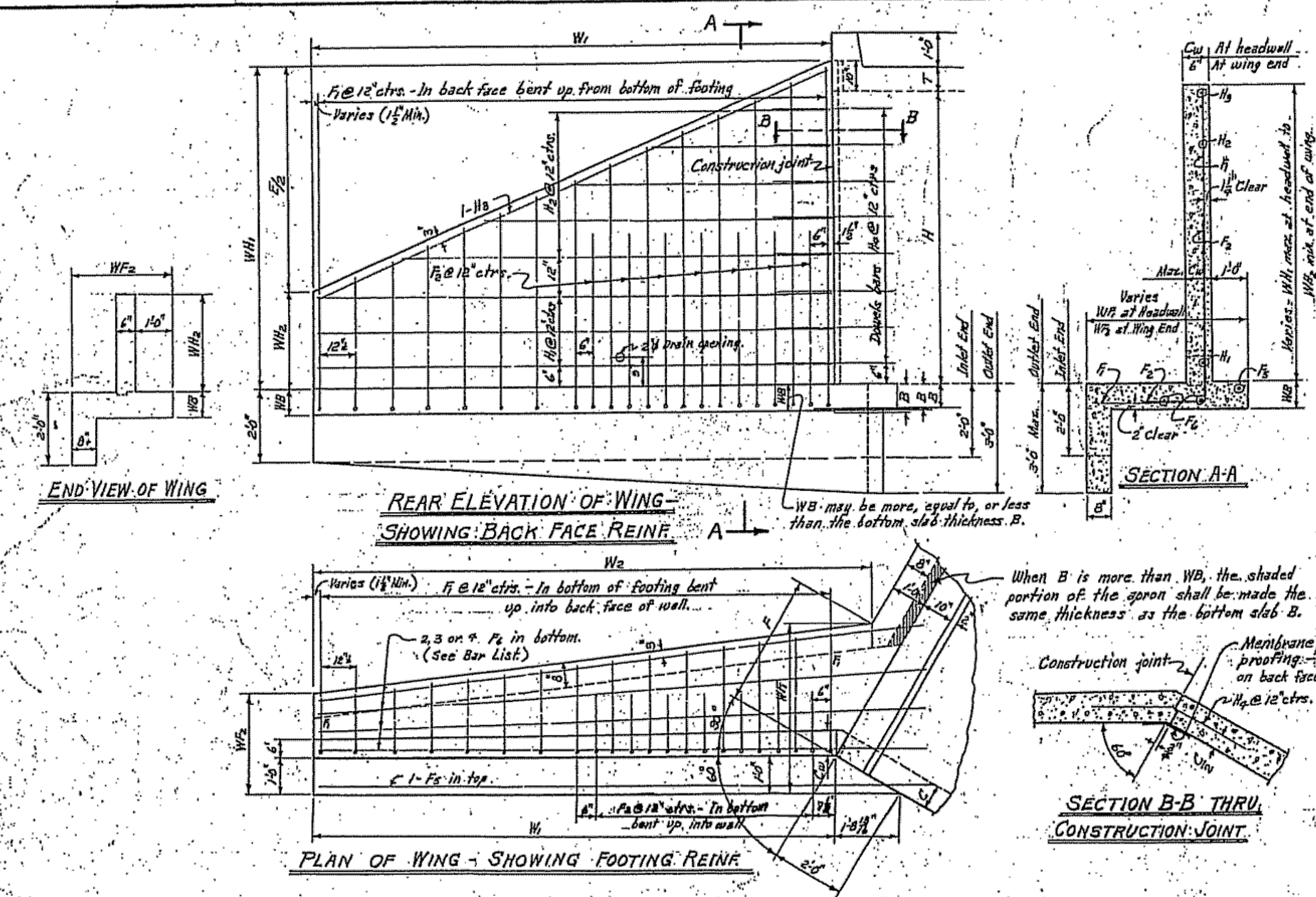
CLEAR SPAN	CLEAR HEIGHT	CLASS S CONCRETE - 4 WINGS				
		SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
2'	2'	8.10	4.25	5.21	6.17	7.13
3'	3'	119.8	6.65	5.41	6.37	7.33
4'	4'	183.3	5.83	6.78	7.74	8.70
5'	5'	252.2	7.41	8.37	9.33	10.29
6'	6'	329.7	9.97	10.95	11.91	12.87
7'	7'	415.9	12.53	13.50	14.46	15.42
8'	8'	501.1	15.09	16.07	17.03	18.00
9'	9'	587.3	17.65	18.64	19.60	20.56
10'	10'	673.5	20.21	21.17	22.13	23.10
11'	11'	759.7	22.77	23.73	24.69	25.65
12'	12'	845.9	25.33	26.29	27.25	28.21

* Quantity per wing does not include headwall or that portion of apron or firewall for the length W₂.

When B is more than W₂, the shaded portion of the apron shall be made the same thickness as the bottom slab B.

Membrane waterproofing 12" wide on back face of wing.

DETAIL AT TOP OF WING



BAR LIST FOR ONE WING - 4 REQUIRED

CLEAR HEIGHT	F ₁ BENT		F ₂ BENT		F ₃ STRAIGHT		F ₄ STRAIGHT		H ₁ STRAIGHT		H ₂ STRAIGHT		H ₃ BENT		H ₄ BENT		QUANTITY PER WING REINFORCING STEEL LB.
	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	SIZE	LENGTH	
2'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	20.2
3'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	23.9
4'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	45.8
5'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	68.3
6'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	103.8
7'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	139.4
8'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	#3	12'	201.2

MEMBRANE: A membrane waterproofing 12" wide, consisting of three mappings of waterproofing shall be applied to the back face of wing to cover the construction joints in wings.

REINFORCING STEEL: Reinforcing steel to be deformed bars of intermediate or hard grade.

CONSTRUCTION JOINTS: Construction joints between wingwall, footings and sidewalks shall be only where shown on plans.

SPECIFICATIONS: Arkansas State Highway Commission Standard Specifications for Highway Construction, and applicable Special Provisions.

UNIT STRESSES: Class S Concrete (n=10) 1200 psi; Reinforcing Steel 24000 psi.

REVISIONS: Membrane added 5-18-66 W.C.A.

GENERAL NOTES: CONCRETE: All concrete to be Class S, and shall be poured in the dry. All exposed corners to have 3/4" chamfers. REINFORCING STEEL: Reinforcing steel to be deformed bars of intermediate or hard grade. CONSTRUCTION JOINTS: Construction joints between wingwall, footings and sidewalks shall be only where shown on plans. SPECIFICATIONS: Arkansas State Highway Commission Standard Specifications for Highway Construction, and applicable Special Provisions. UNIT STRESSES: Class S Concrete (n=10) 1200 psi; Reinforcing Steel 24000 psi.

CLASS S CONCRETE

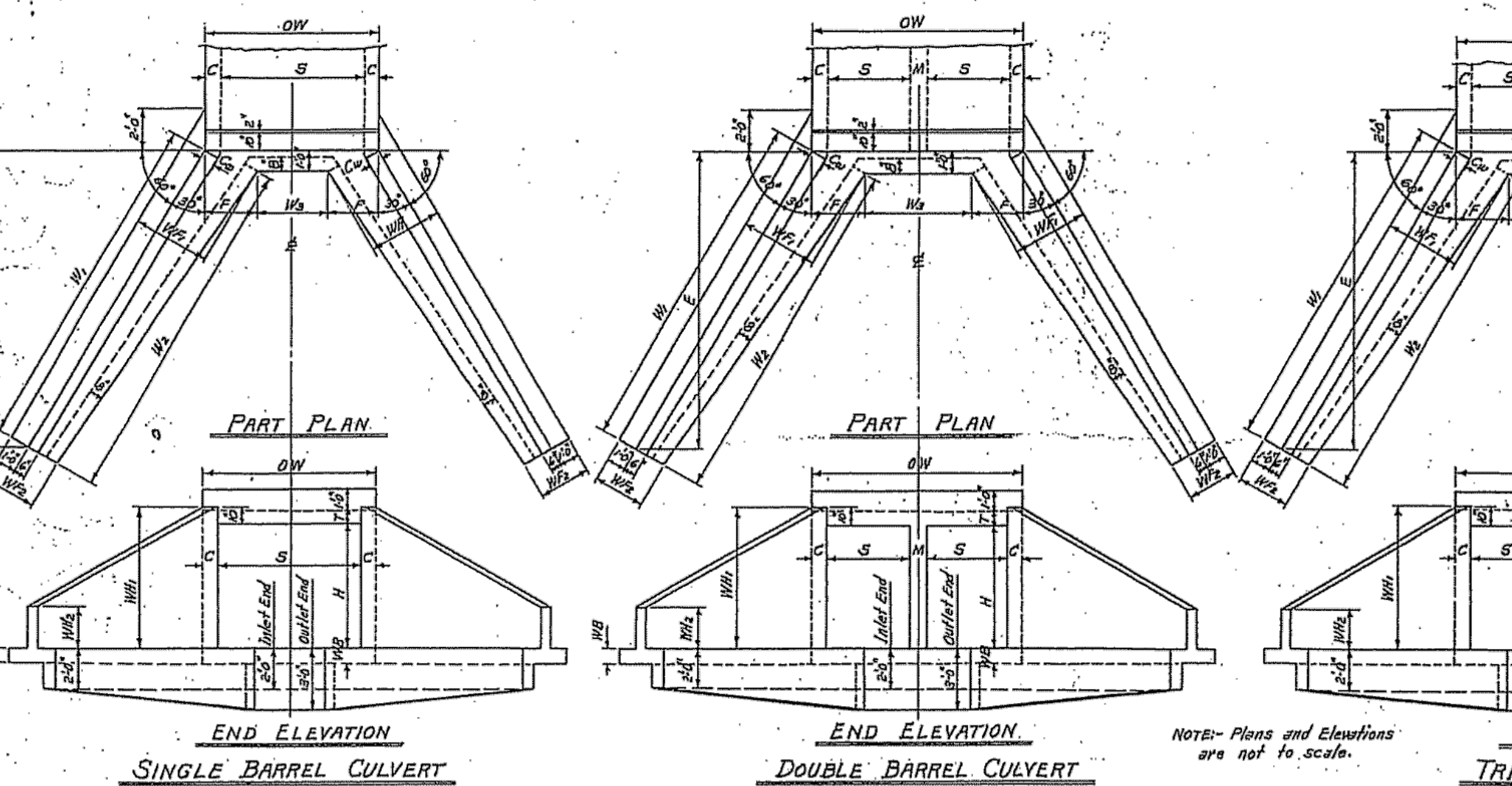
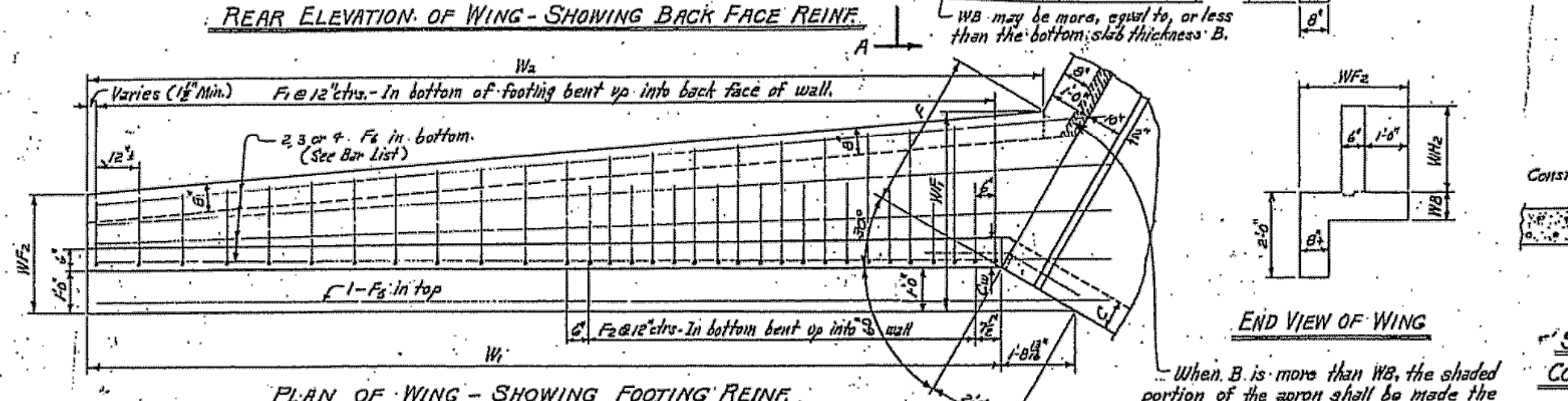
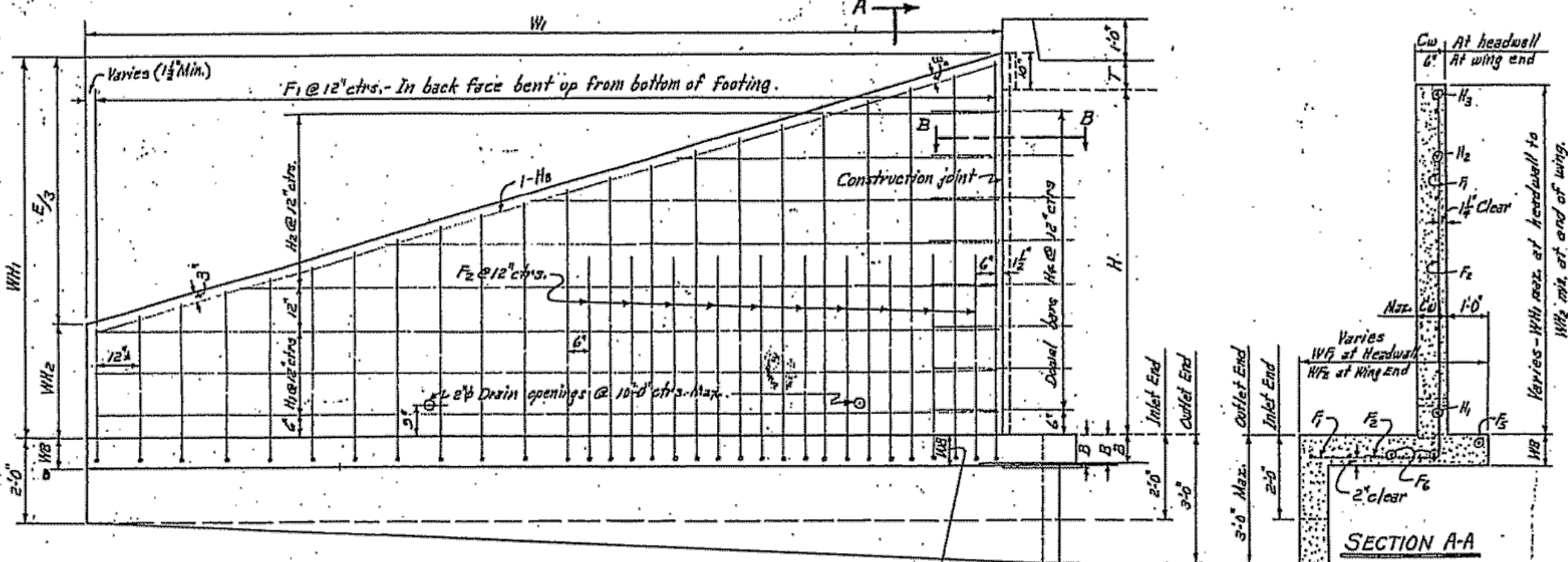
ARKANSAS STATE HIGHWAY COMMISSION
DETAILS OF STANDARD WINGS
FOR
REINFORCED CONCRETE BOX CULVERTS

4, 5, 6, 7, 8, 9, 10, 11 & 12 SPANS 2:1 SLOPES
SINGLES, DOUBLES, TRIPLES, ALL DEPTHS OF COVER
QUADRUPLES & QUINTUPLES. FOR H=8'-0" OR LESS

STANDARD DRAWING No. W-X002-1

Designed by: W.C.A. 7-2; Checked by: J.E.M. 5-7-63; Drawn by: W.C.A. 4-11-68; Checked by: J.E.M. 5-5-63; Quantifier by: W.C.A.

FED. ROAD NO.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
JOB No.					



WING DIMENSIONS

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	WING WALL HEIGHTS	WIDTHS OF WING FOOTINGS		PERPENDICULAR FOOTING DIMENSION	PARALLEL CULVERT DIST. FROM HEADWALL TO END OF WING	LENGTH OF WING WALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING	
			AT HEADWALL	AT END OF WING					CONCRETE	CLASS S
H	WB	CW	WH ₁	WH ₂	F	E	W ₁	W ₂	CULV. CU.YD.	CULV. CU.YD.
2'	7"	6"	2'-0"	2'-0"	0'-11"	6'-6"	7'-6"	7'-1 1/2"	0.889	0.986
3'	7"	6"	3'-0"	3'-0"	1'-0"	8'-6"	9'-6"	9'-2 1/2"	1.338	1.466
4'	7"	6"	4'-0"	4'-0"	2'-0"	10'-6"	12'-6"	12'-1 1/2"	1.888	2.027
5'	7"	6"	5'-0"	5'-0"	3'-0"	12'-6"	14'-6"	14'-2 1/2"	2.478	2.668
6'	7"	6"	6'-0"	6'-0"	4'-0"	14'-6"	16'-6"	17'-1 1/2"	3.111	3.332
7'	7"	6"	7'-0"	7'-0"	5'-0"	16'-6"	18'-6"	19'-1 1/2"	3.755	4.051
8'	7"	6"	8'-0"	8'-0"	6'-0"	18'-6"	20'-6"	21'-1 1/2"	4.409	4.751
9'	7"	6"	9'-0"	9'-0"	7'-0"	20'-6"	22'-6"	23'-1 1/2"	5.072	5.423
10'	7"	6"	10'-0"	10'-0"	8'-0"	22'-6"	24'-6"	25'-1 1/2"	5.744	6.094

APRON DIMENSION W₃

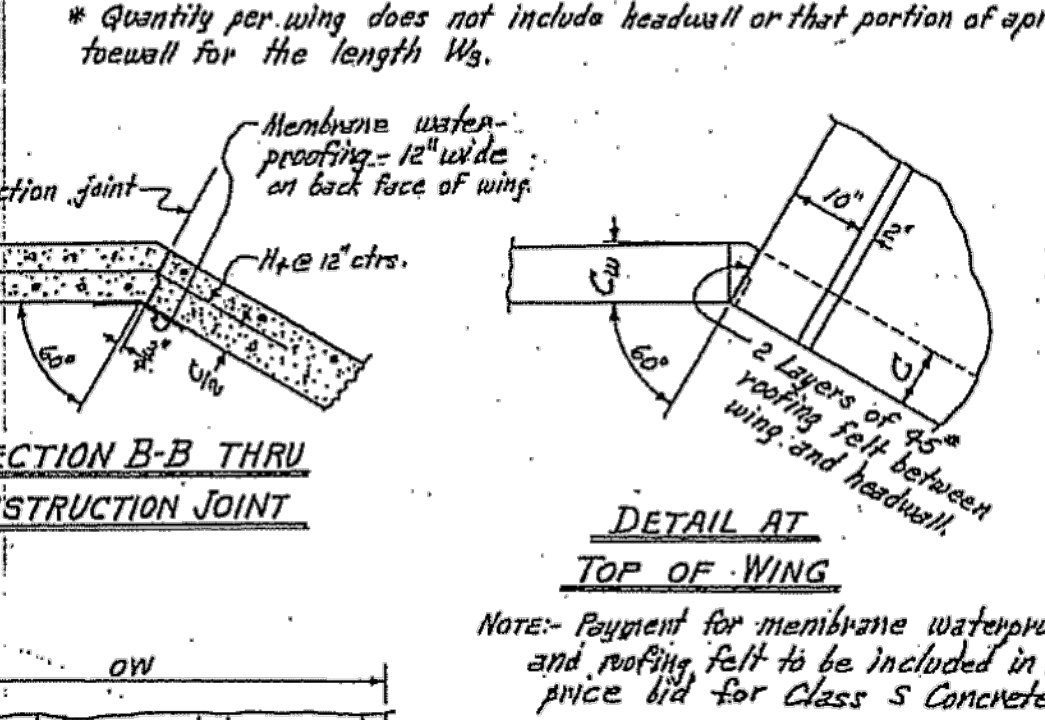
W₃ = (OW - 2F)

CLEAR SPAN	CLEAR HEIGHT	WING WALL					QUANTITY PER WING				
		SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT	CONCRETE	CLASS S	CONCRETE	CLASS S	
2'	7"	1'-1 1/2"	1'-3"	1'-6"	1'-9"	2'-0"	0.889	0.986	1.338	1.466	
3'	7"	1'-6"	1'-9"	2'-2"	2'-6"	3'-0"	1.338	1.466	1.888	2.027	
4'	7"	2'-0"	2'-3"	2'-10"	3'-4"	4'-0"	1.888	2.027	2.478	2.668	
5'	7"	2'-4"	2'-7"	3'-2"	3'-8"	5'-0"	2.478	2.668	3.111	3.332	
6'	7"	2'-8"	3'-1"	3'-8"	4'-4"	6'-0"	3.111	3.332	3.755	4.051	
7'	7"	3'-2"	3'-5"	4'-2"	4'-8"	7'-0"	3.755	4.051	4.409	4.751	
8'	7"	3'-6"	3'-9"	4'-6"	5'-2"	8'-0"	4.409	4.751	5.072	5.423	
9'	7"	4'-0"	4'-3"	5'-0"	5'-6"	9'-0"	5.072	5.423	5.744	6.094	
10'	7"	4'-4"	4'-7"	5'-4"	6'-0"	10'-0"	5.744	6.094	6.416	6.767	
11'	7"	4'-8"	5'-1"	5'-8"	6'-4"	11'-0"	6.416	6.767	7.088	7.439	
12'	7"	5'-2"	5'-5"	6'-2"	6'-8"	12'-0"	7.088	7.439	7.760	8.111	

QUANTITIES

CLASS S CONCRETE - 4 WINGS

CLEAR SPAN	CLEAR HEIGHT	QUANTITY PER WING									
		HEADWALLS	WING WALLS	FOOTINGS	TOWELLS	AND APRONS	SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
2'	7"	102.0	9.50	5.94	6.92	7.35	9.37	12.60	16.80	21.00	
3'	7"	169.0	6.26	7.21	8.17	9.13	10.09	13.32	17.52	21.72	
4'	7"	236.0	8.33	9.28	10.24	11.20	12.16	15.40	19.60	23.80	
5'	7"	303.0	10.72	11.68	12.64	13.60	14.56	17.80	22.00	26.20	
6'	7"	370.0	14.55	15.51	16.47	17.43	18.39	21.64	25.88	30.12	
7'	7"	437.0	18.38	19.34	20.30	21.26	22.22	25.47	29.71	33.95	
8'	7"	504.0	22.21	23.17	24.13	25.09	26.05	29.30	33.54	38.28	
9'	7"	571.0	26.04	27.00	27.96	28.92	29.88	33.13	37.77	42.11	
10'	7"	638.0	29.87	30.83	31.79	32.75	33.71	36.96	41.55	46.48	
11'	7"	705.0	33.70	34.66	35.62	36.58	37.54	40.79	45.93	50.86	
12'	7"	772.0	37.53	38.49	39.45	40.41	41.37	44.62	50.06	55.39	



Checked By: M.C.H. 8-21
 Made By: R.W.S. 1-9-63
 Design By: W.C.H. 12-4
 Drawn By: W.C.H. 12-11-64
 Rechecked By: R.W.S. 5-23-63

BAR LIST FOR ONE WING - 4 REQUIRED

CLEAR HEIGHT	H	BENT												QUANTITY PER WING	BAR BENDING DIAGRAMS						
		F ₁						F ₂								X					
		SIZE	SPACING	NO. REB.	LENGTH	SIZE	SPACING	NO. REB.	LENGTH	SIZE	SPACING	NO. REB.	LENGTH								
2'	7"	#3	12"	8	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	#3	12"	8	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	27.0	(Diagram)
3'	7"	#3	12"	10	2'-2"	3'-2"	0'-10"	1'-3"	1'-5"	3'-0"	#3	12"	10	2'-2"	3'-2"	0'-10"	1'-3"	1'-5"	3'-0"	41.1	(Diagram)
4'	7"	#3	12"	13	2'-4"	3'-6"	0'-11"	1'-5"	1'-6"	3'-0"	#3	12"	13	2'-4"	3'-6"	0'-11"	1'-5"	1'-6"	3'-0"	63.7	(Diagram)
5'	7"	#3	12"	15	2'-11"	3'-11"	1'-1"	1'-11"	1'-11"	3'-0"	#3	12"	15	2'-11"	3'-11"	1'-1"	1'-11"	1'-11"	3'-0"	89.5	(Diagram)
6'	7"	#4	12"	17	3'-6"	4'-6"	1'-2"	2'-3"	2'-5"	3'-11"	#4	12"	17	3'-6"	4'-6"	1'-2"	2'-3"	2'-5"	3'-11"	145.8	(Diagram)
7'	7"	#4	12"	20	3'-9"	5'-0"	1'-3"	2'-5"	2'-7"	4'-0"	#4	12"	20	3'-9"	5'-0"	1'-3"	2'-5"	2'-7"	4'-0"	283.7	(Diagram)
8'	7"	#4	12"	22	4'-4"	5'-4"	1'-5"	3'-0"	3'-10"	4'-2"	#4	12"	22	4'-4"	5'-4"	1'-5"	3'-0"	3'-10"	4'-2"	356.4	(Diagram)

MEMBRANE - A membrane waterproofing 12' wide, consisting of three coatings of waterproofing asphalt and two alternate layers of treated cotton fabric shall be applied to the back face of wing to cover the construction joints in wings.

REVISIONS - Membrane added 1-10-66 W.C.H.

GENERAL NOTES:
 CONCRETE - All concrete to be Class S, and shall be poured in the dry. All exposed corners to have 3/4" chamfers.
 REINFORCING STEEL - Reinforcing steel to be deformed bars of intermediate or hard grade.
 CONSTRUCTION JOINTS - Construction joints between wingwall, footings and sidewalls shall be only where shown on plans.
 SPECIFICATIONS - Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.
UNIT STRESSES:
 Class S Concrete (n=10) 12007₄
 Reinforcing Steel 200007₆

Note: This drawing to be used in conjunction with Standard Barrel Sections, Drawing Nos. as listed below.
 SINGLES DOUBLES TRIPLES QUADRUPLES QUINTUPLES
 R-100X-0 R-200X-0 R-300X-0 R-400X-0 R-500X-0
 R-100X-X1 R-200X-X1 R-300X-X1 R-400X-X1 R-500X-X1
 R-100X-X2 R-200X-X2 R-300X-X2 R-400X-X2

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

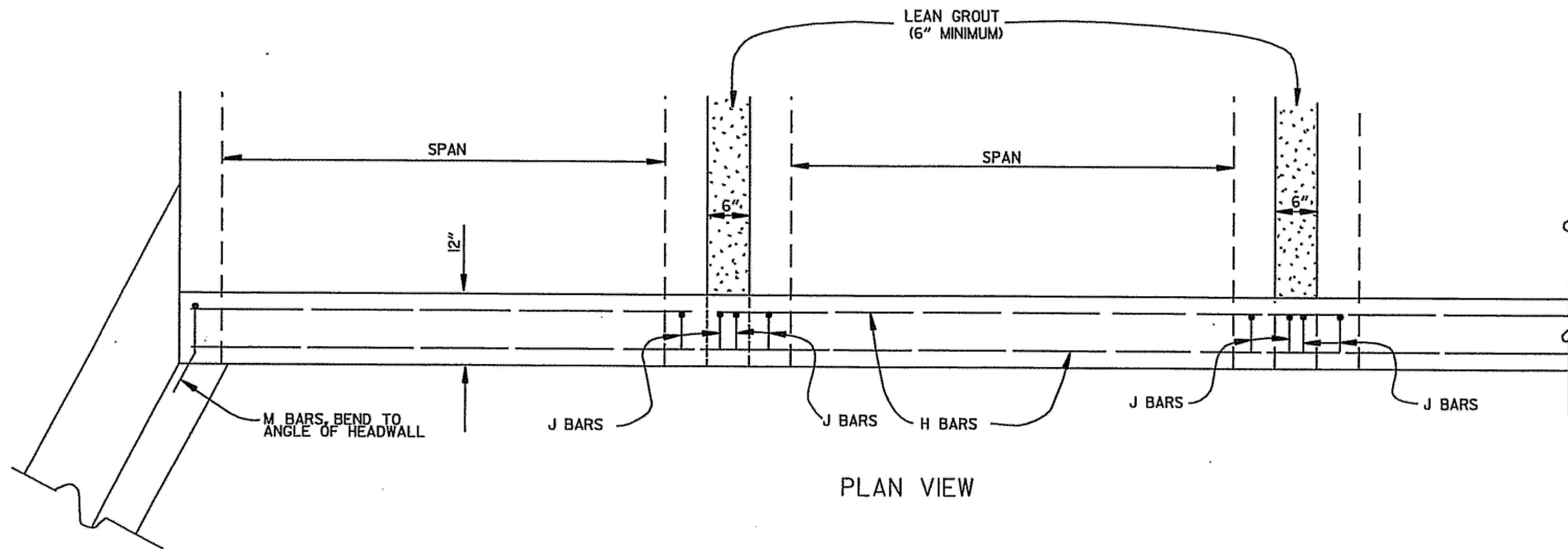
DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS

4, 5, 6, 7, 8, 9, 10, 11 & 12 SPANS 3:1 SLOPES

SINGLES, DOUBLES, TRIPLES, ALL DEPTHS OF COVER FOR H = 8'-0" OR LESS

QUADRUPLES & QUINTUPLES. FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X003-1



BAR LIST

BAR	NO.	SIZE	LENGTH	BAR BENDING DIAGRAM
H	2	#4	•	
I	•	#4	•	
J	•	#4	1'-5"	
L	•	#4	3'-2"	
M	•	#4	1'-8"	

• NOTE: LENGTH AND NUMBER OF BARS VARIES WITH SIZE OF CULVERT

GENERAL NOTES

WINGS, CURTAIN WALLS AND APRONS SHALL BE TIED TO THE PRECAST CULVERT SECTION BY CASTING BARS IN CULVERT END SECTIONS AS SHOWN OR BY DOWELING AND GROUTING. J BARS AND M BARS SHALL BE EMBEDDED A MINIMUM OF 10" IN PRECAST BOX.

WINGS, FOOTINGS, APRONS AND CURTAIN WALLS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPLICABLE STANDARD WING DRAWING, STEEL AND CONCRETE QUANTITIES WILL BE ADJUSTED TO FIT THE IN-PLACE WIDTH & HEIGHT OF THE PRECAST CONCRETE BOX CULVERTS.

ALL EXPOSED CORNERS TO HAVE 3/4" CHAMFERS.

WINGWALLS AND FOOTINGS MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

ALL CONCRETE, REINFORCING STEEL, LEAN GROUT, LABOR, MATERIALS AND EQUIPMENT REQUIRED FOR INSTALLING PRECAST BOX CULVERTS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED TO BE INCLUDED IN THE PRICE BID FOR THE ITEMS AS SPECIFIED IN SECTION 607 OF THE STANDARD SPECIFICATIONS.

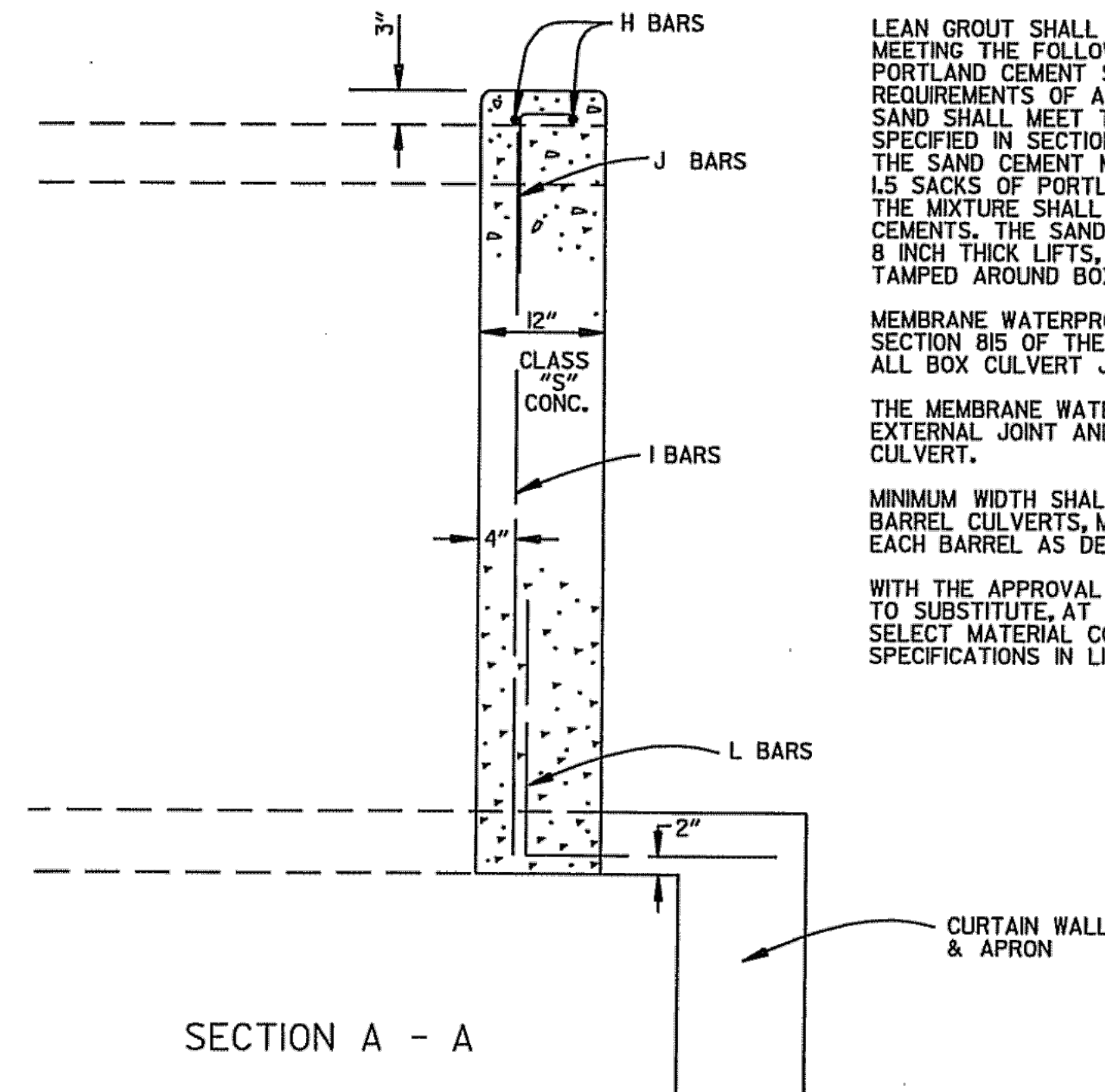
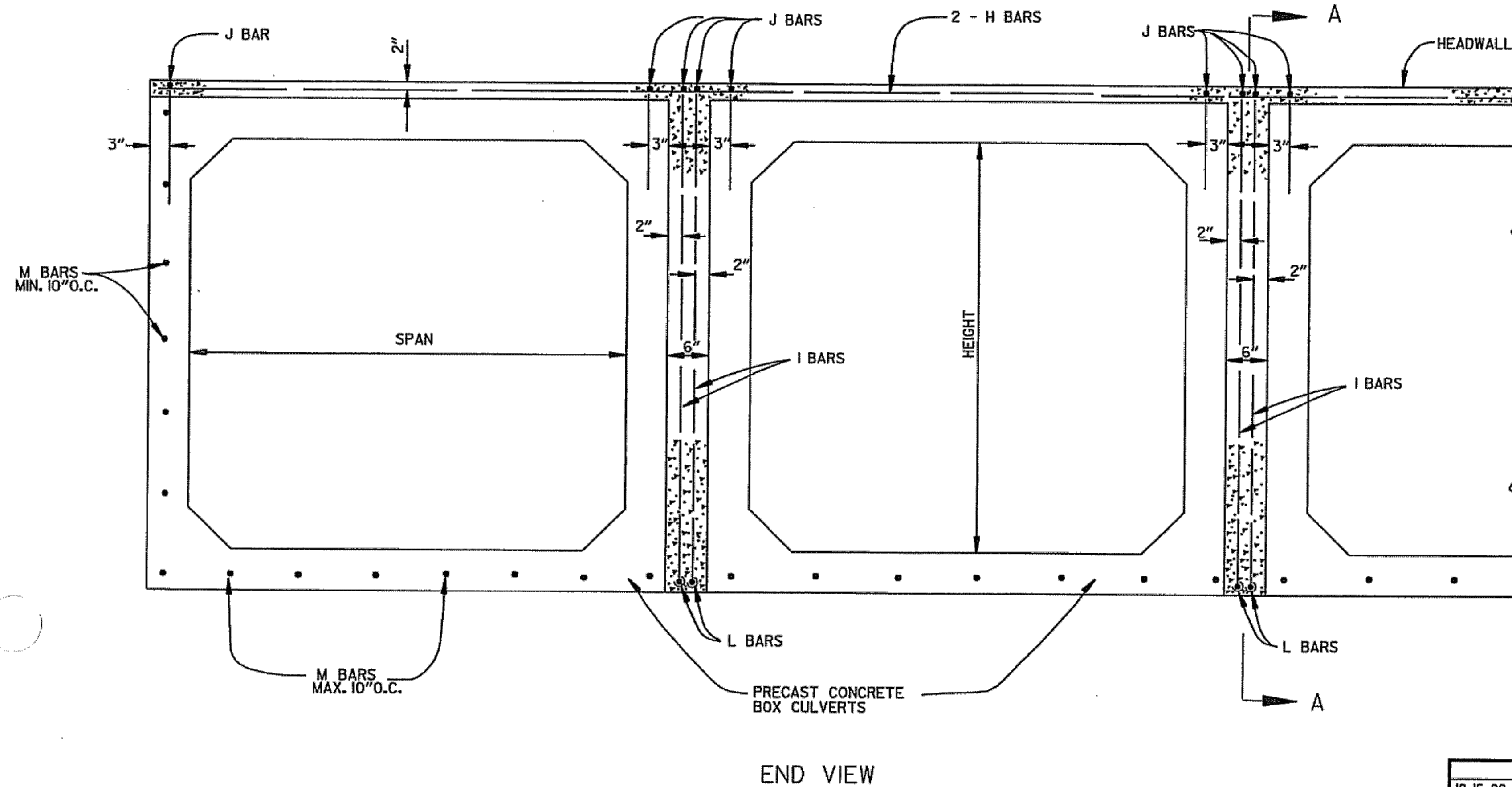
LEAN GROUT SHALL CONSIST OF A SAND CEMENT MIXTURE MEETING THE FOLLOWING REQUIREMENTS:
 PORTLAND CEMENT SHALL BE TYPE I AND SHALL MEET THE REQUIREMENTS OF AASHTO M 85.
 SAND SHALL MEET THE REQUIREMENTS OF FINE AGGREGATE AS SPECIFIED IN SECTION 802.02 OF THE STANDARD SPECIFICATIONS. THE SAND CEMENT MIXTURE SHALL CONSIST OF NOT LESS THAN 1.5 SACKS OF PORTLAND CEMENT PER TON OF MATERIAL MIXTURE. THE MIXTURE SHALL CONTAIN SUFFICIENT WATER TO HYDRATE THE CEMENTS. THE SAND CEMENT MIXTURE SHALL BE PLACED IN MAXIMUM 8 INCH THICK LIFTS, LOOSE MEASURE, AND THOROUGHLY RODDED AND TAMPED AROUND BOX TO THOROUGHLY FILL ALL VOIDS.

MEMBRANE WATERPROOFING CONFORMING TO THE REQUIREMENTS OF SECTION 815 OF THE STANDARD SPECIFICATIONS SHALL BE APPLIED TO ALL BOX CULVERT JOINTS.

THE MEMBRANE WATERPROOFING WILL BE REQUIRED ON THE TOP EXTERNAL JOINT AND SHALL EXTEND 1 FOOT DOWN THE SIDES OF THE CULVERT.

MINIMUM WIDTH SHALL BE 12" (6" ON EACH SIDE OF JOINT). ON MULTIPLE BARREL CULVERTS, MEMBRANE WATERPROOFING SHALL BE APPLIED TO EACH BARREL AS DESCRIBED ABOVE.

WITH THE APPROVAL OF THE ENGINEER, THE CONTRACTOR WILL BE ALLOWED TO SUBSTITUTE, AT NO ADDITIONAL COST TO THE DEPARTMENT, FLOWABLE SELECT MATERIAL CONFORMING TO SECTION 206 OF THE STANDARD SPECIFICATIONS IN LIEU OF LEAN GROUT.

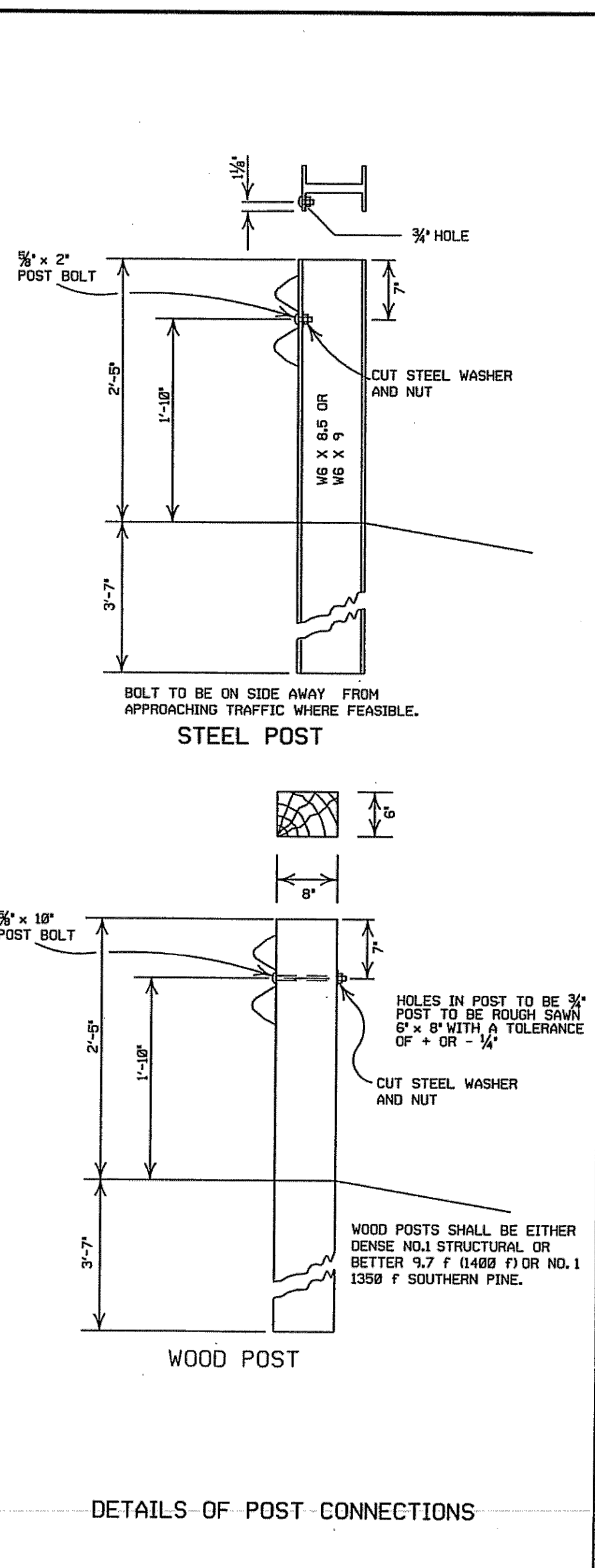
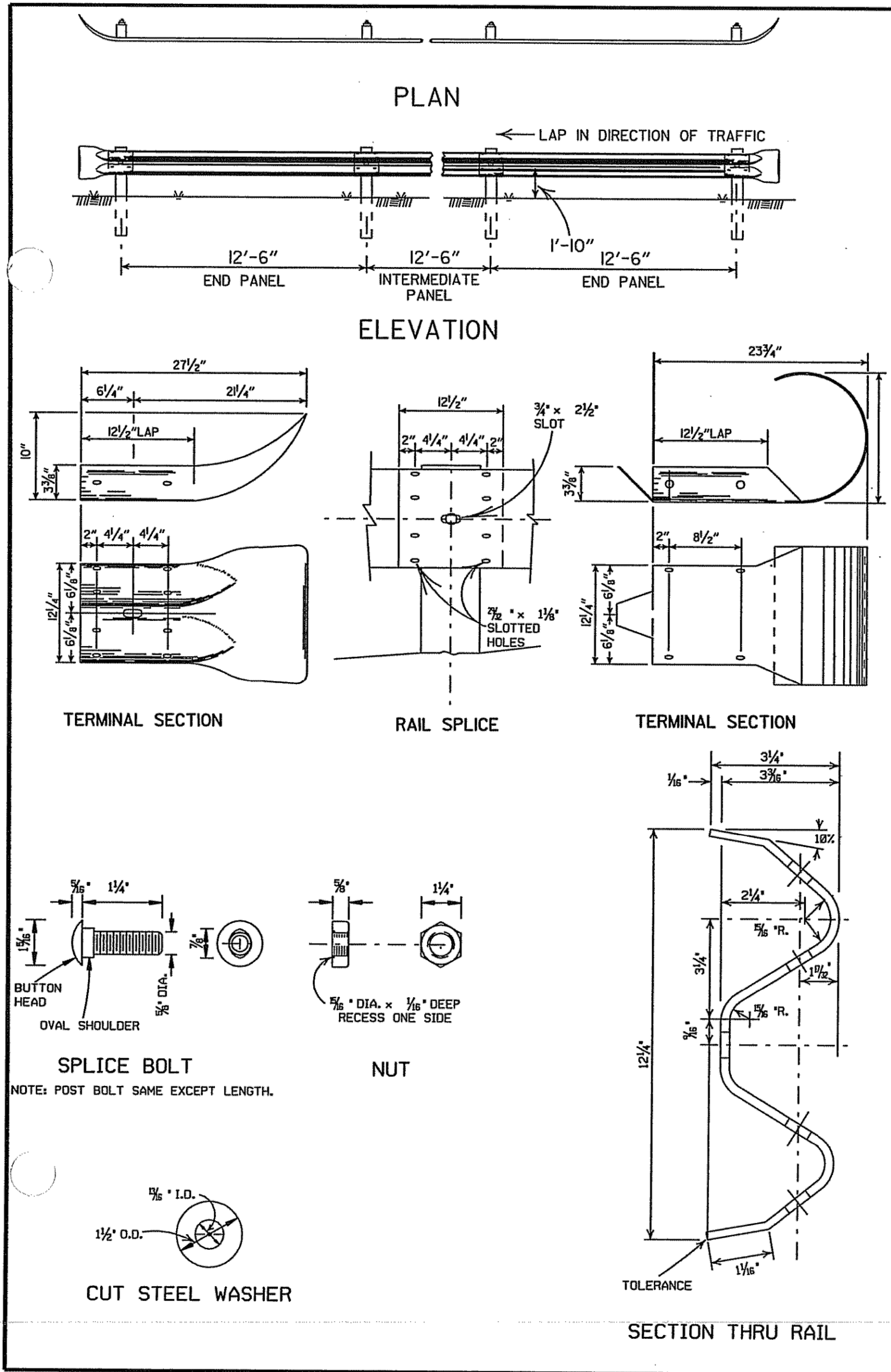


10-15-09	ADDED GENERAL NOTE		
11-10-05	REVISED SPACING OF "M" BARS		
4-10-03	REVISED GENERAL NOTES		
10-18-96	CORRECTED AASHTO REF.		
10-1-92	ADDED NOTE FOR MEMBRANE WATERPROOFING		
8-15-91	ADDED NOTE FOR LEAN GROUT		
11-8-90	REVISED FOR 1991 SPECS		
11-30-89	ISSUED; JABE		
DATE	REVISION		DATE FILMED

ARKANSAS STATE HIGHWAY COMMISSION

PRECAST CONCRETE BOX CULVERTS

STANDARD DRAWING PBC-1



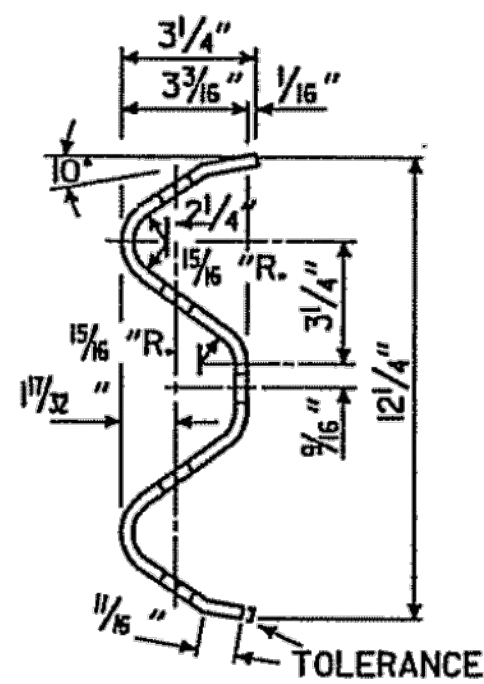
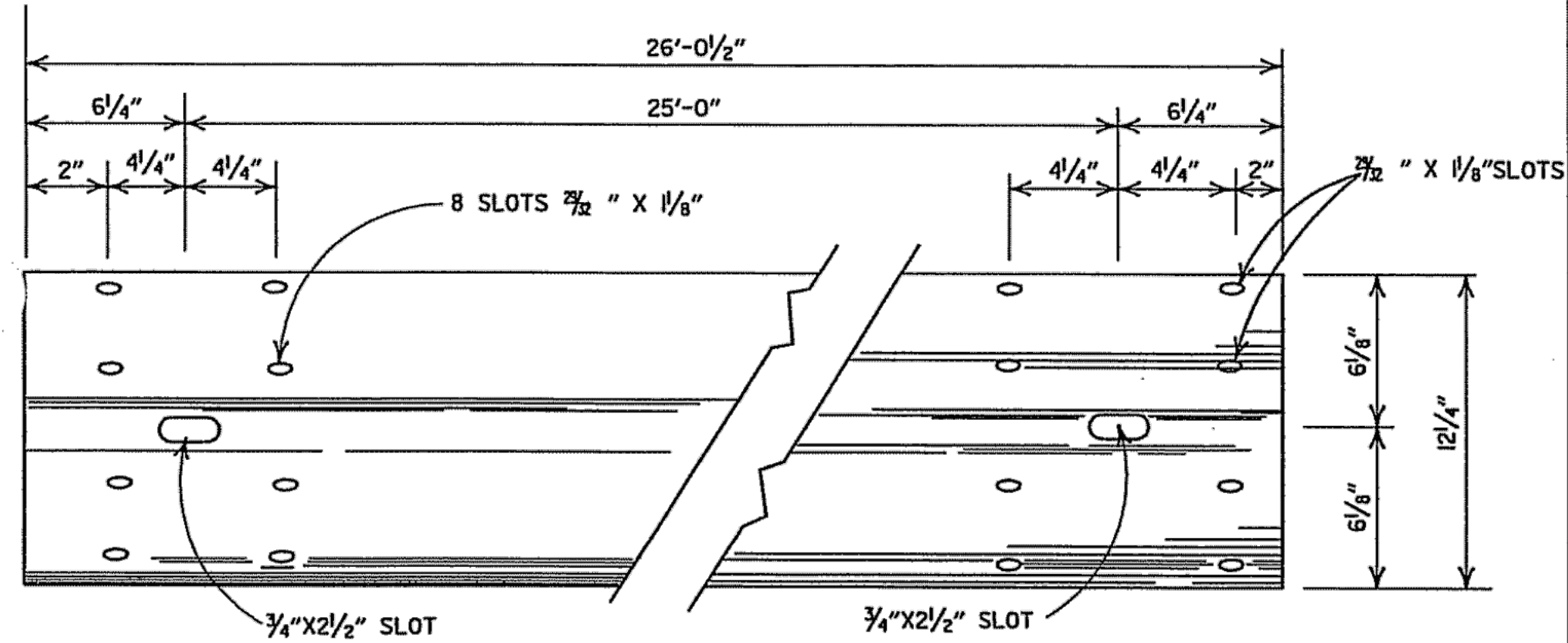
DATE	REVISION	DATE FILM
7-14-10	RAISED HEIGHT OF GUARD RAIL 1"	
8-22-02	REVISED DIMENSION ON STEEL POST	
11-16-01	REVISED STEEL AND WOOD POST	
8-12-98	REMOVED CONCRETE POST	
10-18-96	CHANGED WOOD POST NOTE	10-18-96
6-2-94	ADDED ALTERNATE STEEL POST SIZE	
8-5-93	REVISED STEEL POSTS SIZE	8-5-93
8-15-91	DELETE STEEL PLATE WASHER & ADDED TYPE C TO TITLE	8-15-91
10-30-87	REMOVED DET. PLCMNT. ON HWY.	555-11-20-87
1-4-83	GRADE FOR WOOD POSTS	679-1-4-83
10-1-77	HARDENED WASHER	922-10-1-72
10-2-72	REVISED & REDRAWN	521-10-2-72

ARKANSAS STATE HIGHWAY COMMISSION

GUARD RAIL DETAILS (TYPE C)

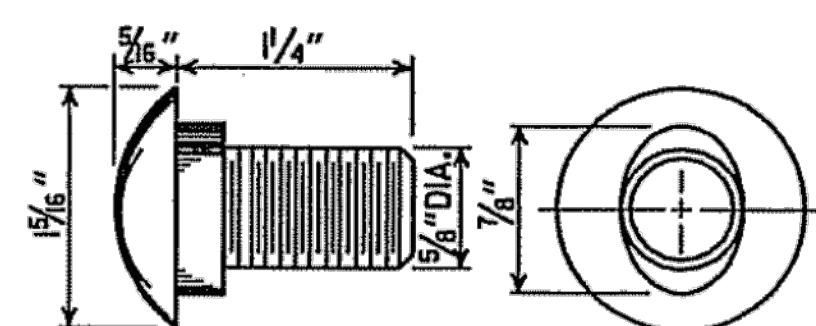
STREET / ROAD BARRICADE OR TEMPORARY INSTALLATION

STANDARD DRAWING GR-7

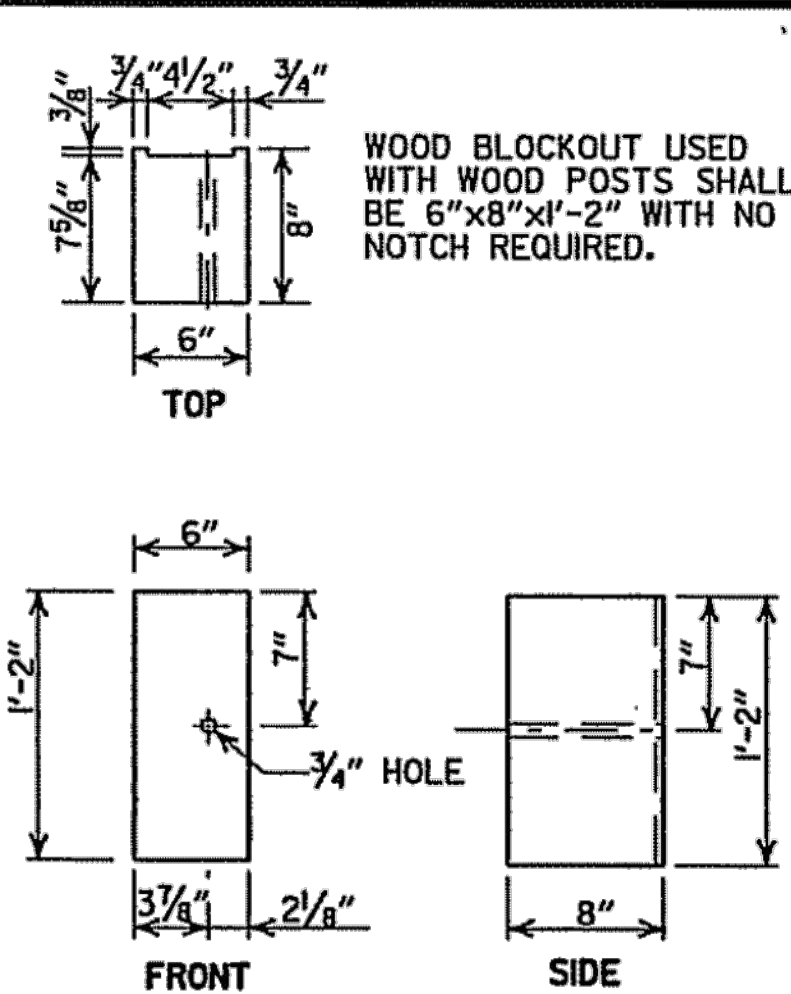
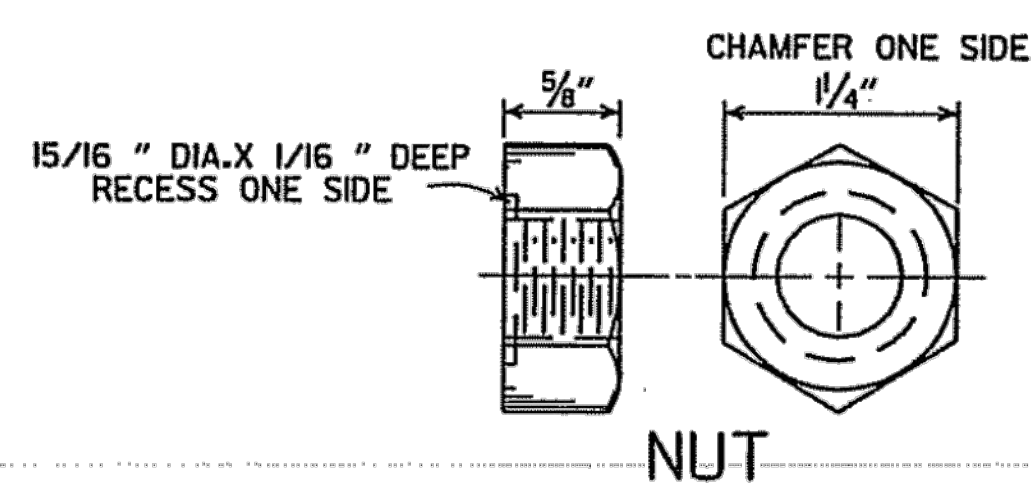
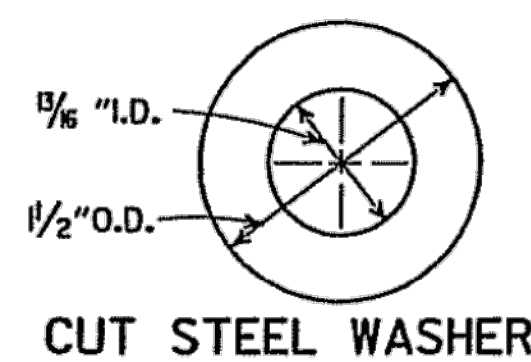


DETAILS OF W-BEAM GUARD RAIL

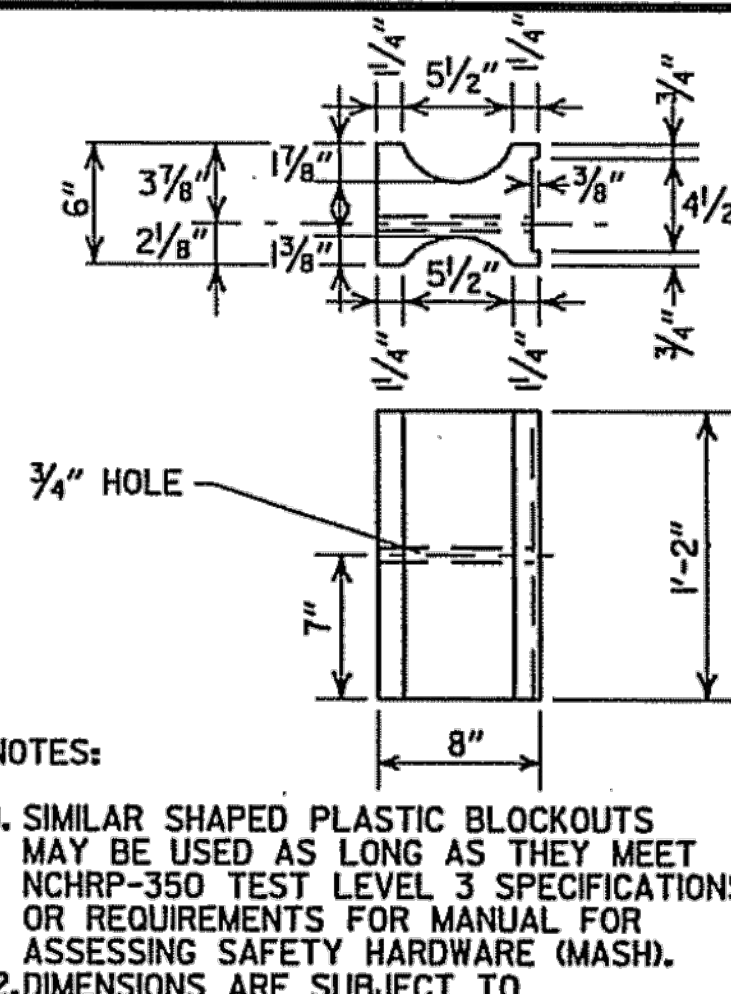
RAIL SECTION OF CLOSELY SIMILAR DIMENSIONS AND COMPARABLE STRENGTH MAY BE SUBSTITUTED IF APPROVED BY THE ENGINEER.



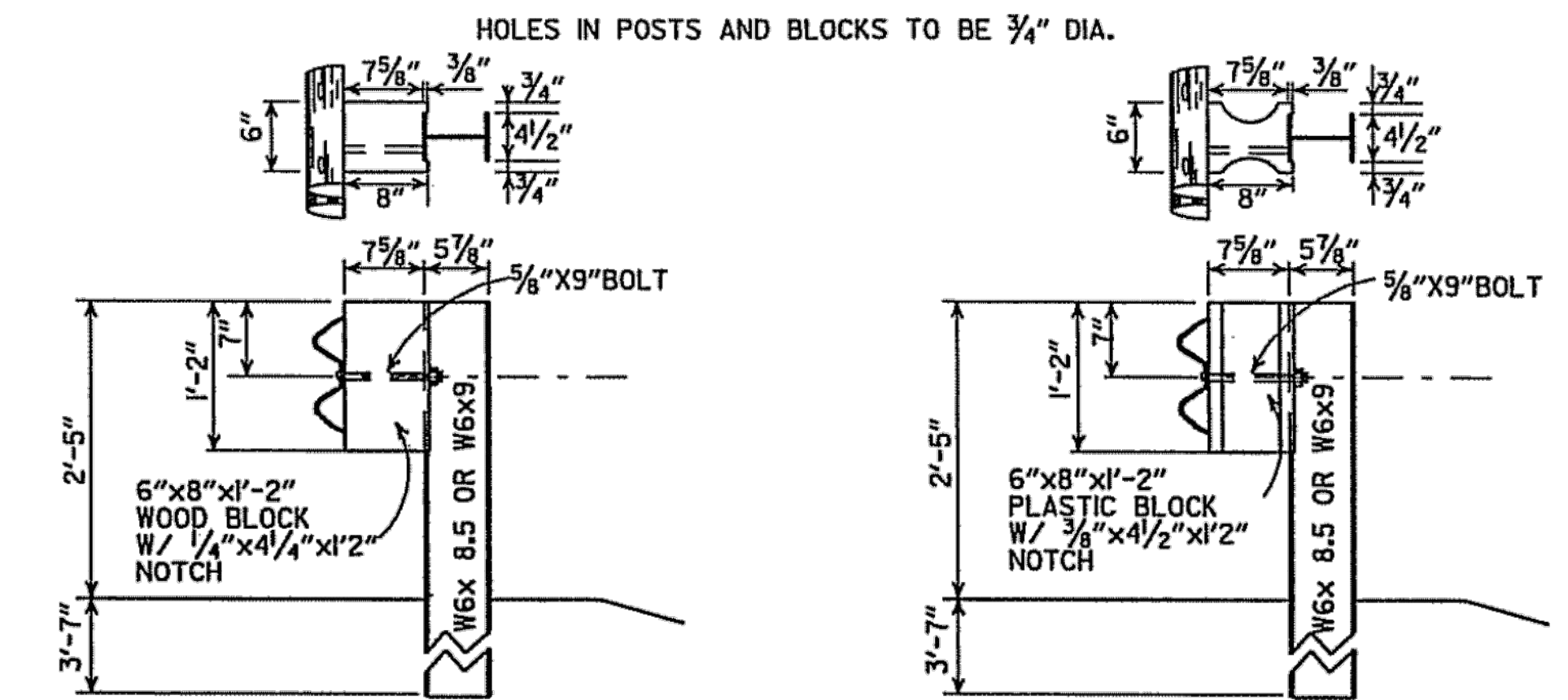
SPLICE BOLT POST BOLT - SAME EXCEPT LENGTH



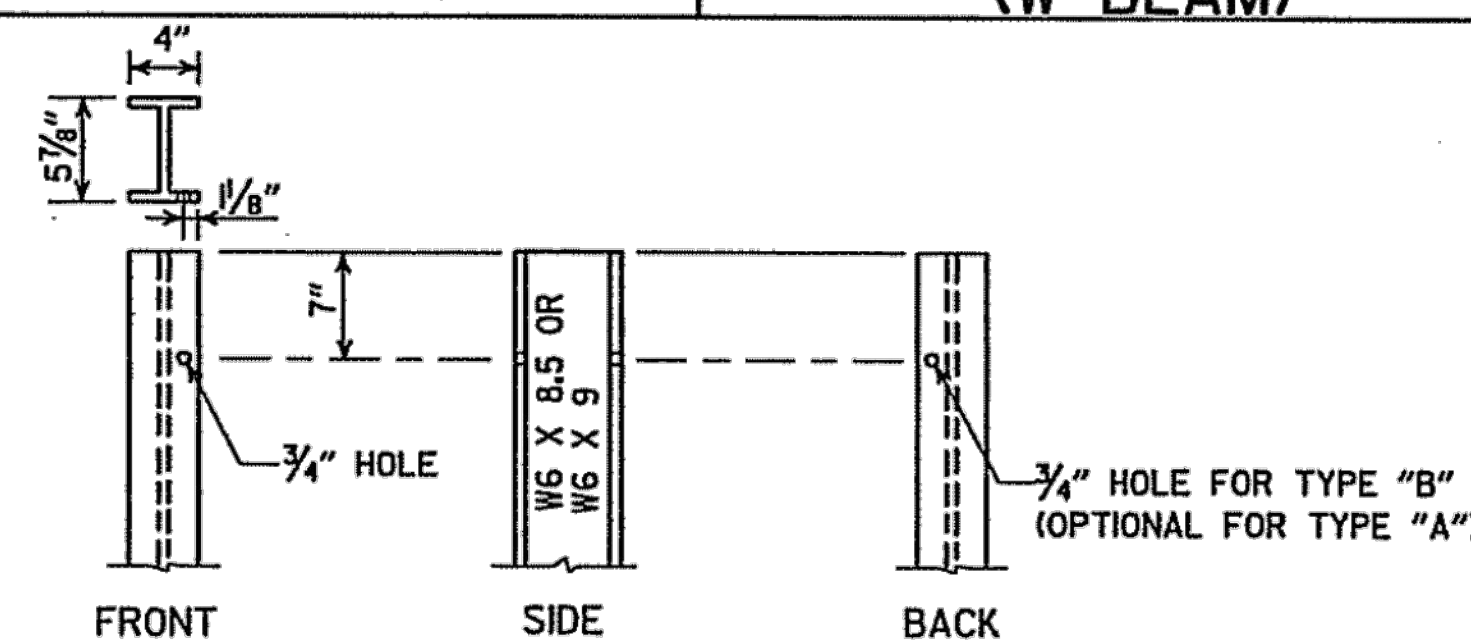
WOOD BLOCKOUT (W-BEAM)



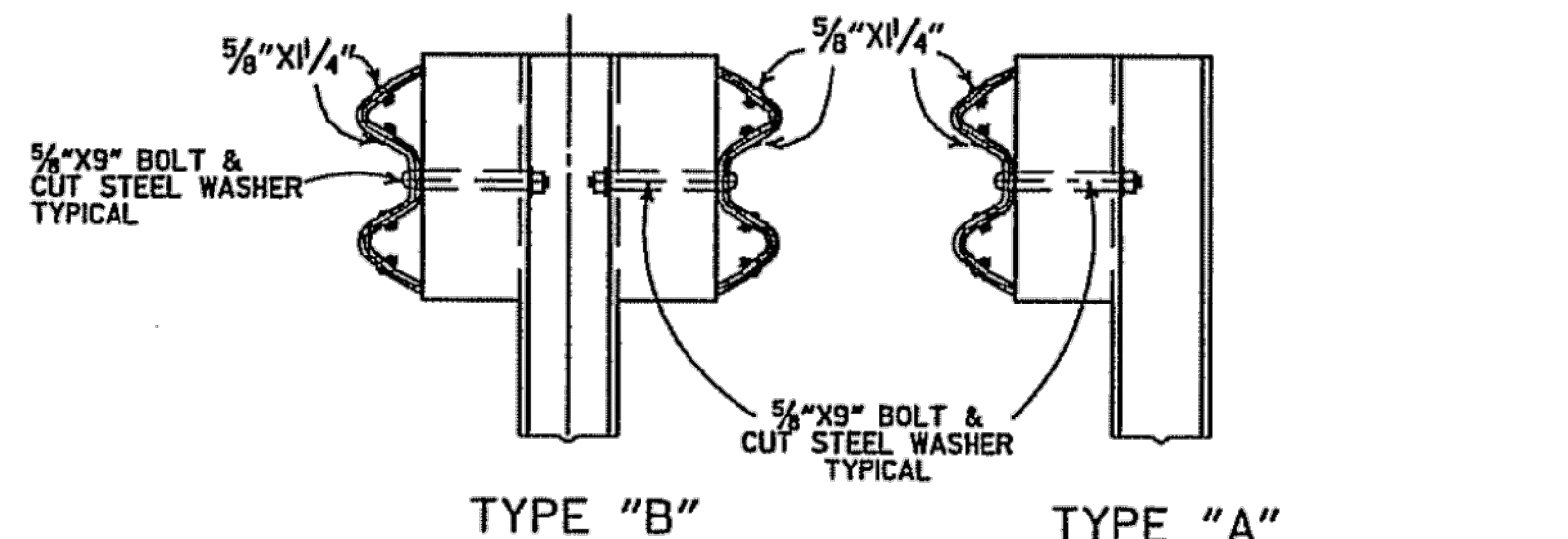
PLASTIC BLOCKOUT (W-BEAM)



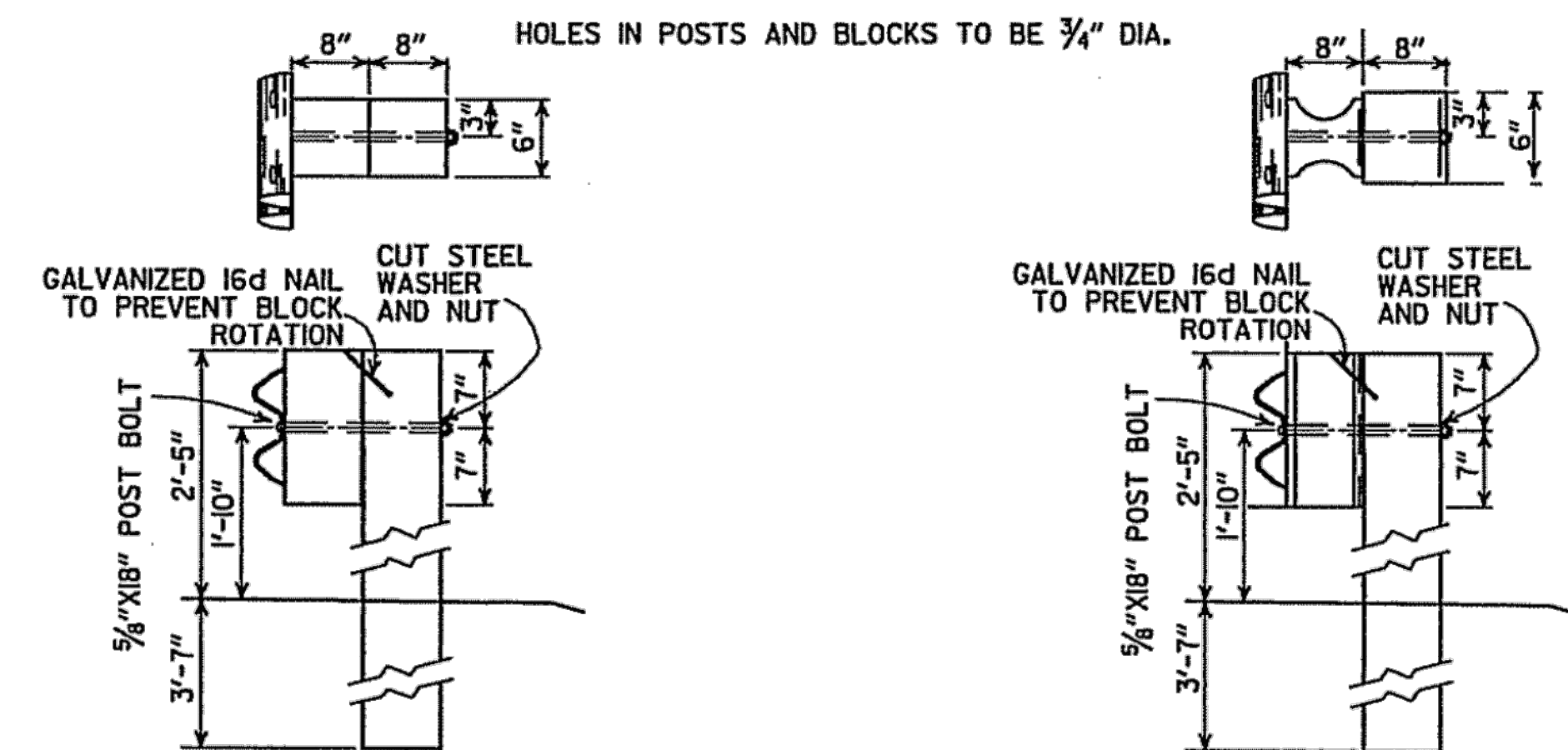
WOOD BLOCKOUT CONNECTIONS PLASTIC BLOCKOUT CONNECTIONS DETAILS OF STEEL LINE POST CONNECTIONS (W-BEAM)



STEEL POST



DETAILS OF STEEL LINE POST CONNECTIONS (W-BEAM)



WOOD BLOCKOUT CONNECTIONS PLASTIC BLOCKOUT CONNECTIONS DETAILS OF WOOD LINE POST CONNECTIONS (W-BEAM)

-GENERAL NOTES-

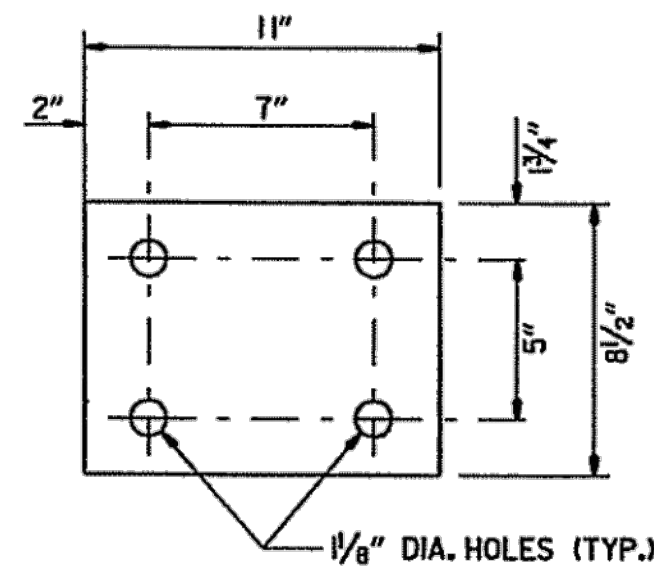
- ALL BOLTS SHALL BE SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND NO MORE THAN 3/4" BEYOND IT.
- WHERE W-BEAM GUARD RAIL CONTINUES, THE INTERMEDIATE SECTIONS SHALL HAVE A POST SPACING OF 6'-3" UNLESS OTHERWISE NOTED.
- W-BEAM GUARD RAIL REPRESENTING INTERMEDIATE SECTIONS WILL BE MEASURED ALONG THE ROADWAY FACE FROM CENTERLINE OF POST TO CENTERLINE OF POST.
- USE W-BEAM GUARD RAIL COMPONENTS OF SAME MATERIAL FOR ENTIRE JOB. FOR EXTENSIONS OR MODIFICATION OF EXISTING GUARD RAIL, W-BEAM GUARD RAIL COMPONENTS OF THE SAME TYPE AS THOSE EXISTING SHALL BE USED.
- ANY BACKFILLING UNDER OR AROUND POST SHALL BE DAMP SAND THOROUGHLY TAMPED IN PLACE.
- WOOD POSTS & WOOD BLOCKS SHALL BE EITHER DENSE NO. 1 STRUCTURAL OR BETTER 9.7f (1400 F) OR NO. 1 1350 + SOUTHERN PINE.
- CONTRACTOR SHALL HAVE THE OPTION OF USING WOOD BLOCKOUTS FOR W-BEAM GUARD RAIL OR PLASTIC BLOCKOUTS, AS LONG AS BLOCKOUT USED MEETS NCHRP-350 TEST LEVEL 3 SPECIFICATIONS OR REQUIREMENTS FOR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) FOR W-BEAM GUARD RAIL.

7-14-10	RAISED HEIGHT OF GUARD RAIL 1"	
10-15-09	ADDED REFERENCE TO MASH	
4-10-03	REVISED GENERAL NOTES	
8-22-02	REVISED DIMENSION ON WOOD & PLASTIC BLOCKOUT CONNECTIONS & ON STEEL POST	
11-16-01	REVISED WOOD BLOCKOUT & DETAILS OF WOOD LINE POST CONNECTIONS	
3-30-00	REMOVED GUARD RAIL AT BRIDGE ENDS	
11-2-00	ADDED PLASTIC BLOCKOUT	
8-12-98	REV. BLOCKOUTS TO WOOD, DELETED CONC. POST & REV. GENERAL NOTE DELETED DET. OF GUARD RAIL REPLACE, BEHIND CURB & DET. OF POST PLACE IN SOLID ROCK, & ADDED DETAILS OF STEEL LINE POST CONN. REMOVED BACK-UP PLATE, REVISED HOLES IN STEEL POLES	
4-3-97	REMOVED "LAP IN DIRECTION OF TRAFFIC" NOTE & PLACED ARROWS ON WASHERS	
10-18-96	REVISED WOOD POST NOTE	
6-2-94	ADDED ALT. STEEL POST SIZE	
8-5-93	REVISED STEEL POST SIZE	8-5-93
10-1-92	REDRAWN & REVISED	10-1-92
8-15-91	REVISED WASHER NOTE	8-15-91
8-2-90	REV. GEN. NOTE & DEPTH OF ANC. POST IN ROCK	8-2-90
7-15-88	REVISED SECTION 3 & GENERAL NOTES	
3-4-88	REV. ANCHOR POST, ELEV. NOTES & POST IN ROCK	780-3-4-88
10-30-87	REVISED WOOD LINE POST DETAIL	546-10-30-87
10-9-87	REDRAWN & REVISED	802-10-9-87
DATE	REVISION	DATE FILED

ARKANSAS STATE HIGHWAY COMMISSION

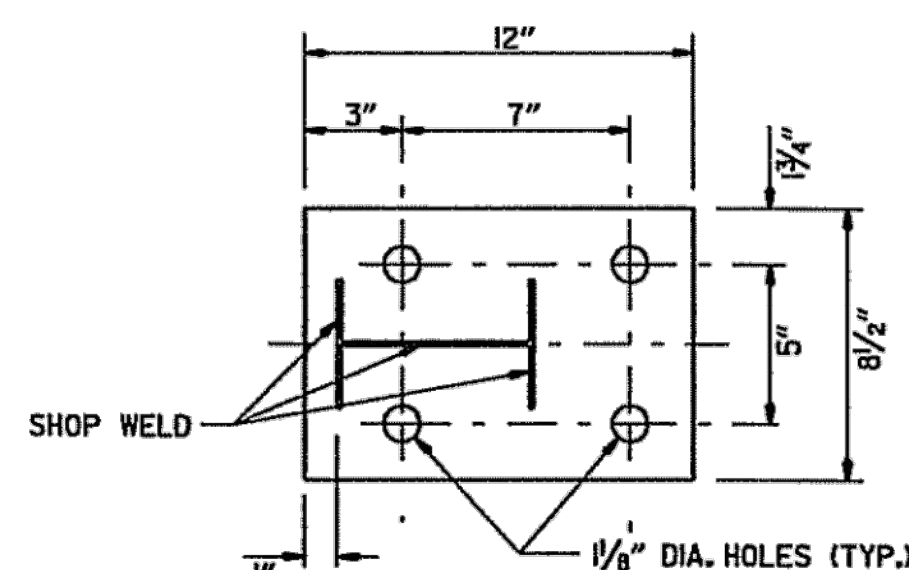
GUARD RAIL DETAILS

STANDARD DRAWING GR-8

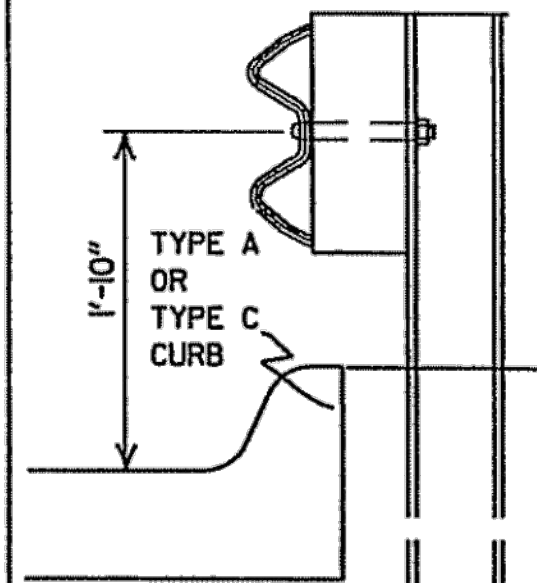


WASHER PLATE

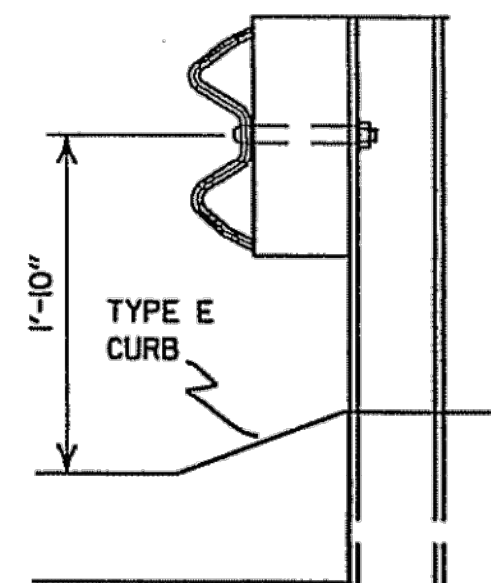
Note: Bolts, nuts, washers and plates shall be galvanized in accordance with Section 807 of the Standard Specifications.



BASE PLATE



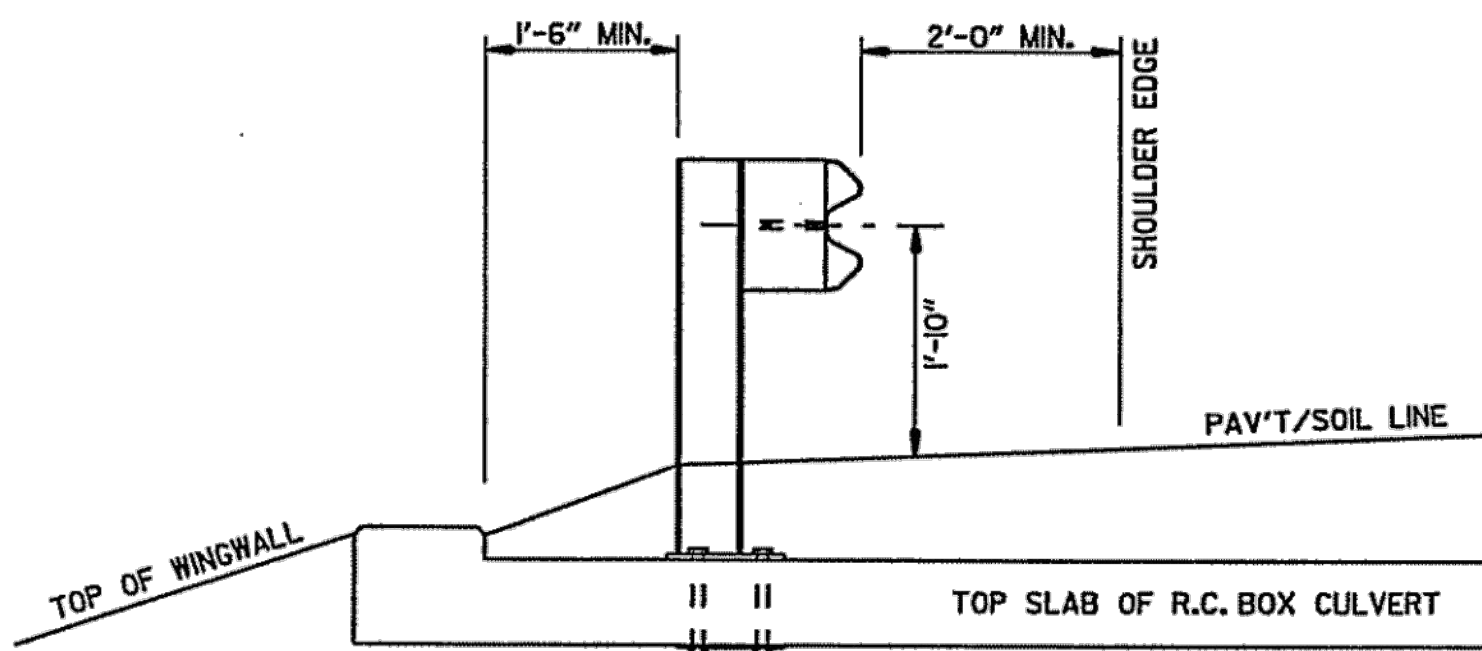
FOR DESIGN SPEEDS OF 50 MPH OR LESS
ALIGN FACE OF GUARD RAIL WITH FACE OF CURB.



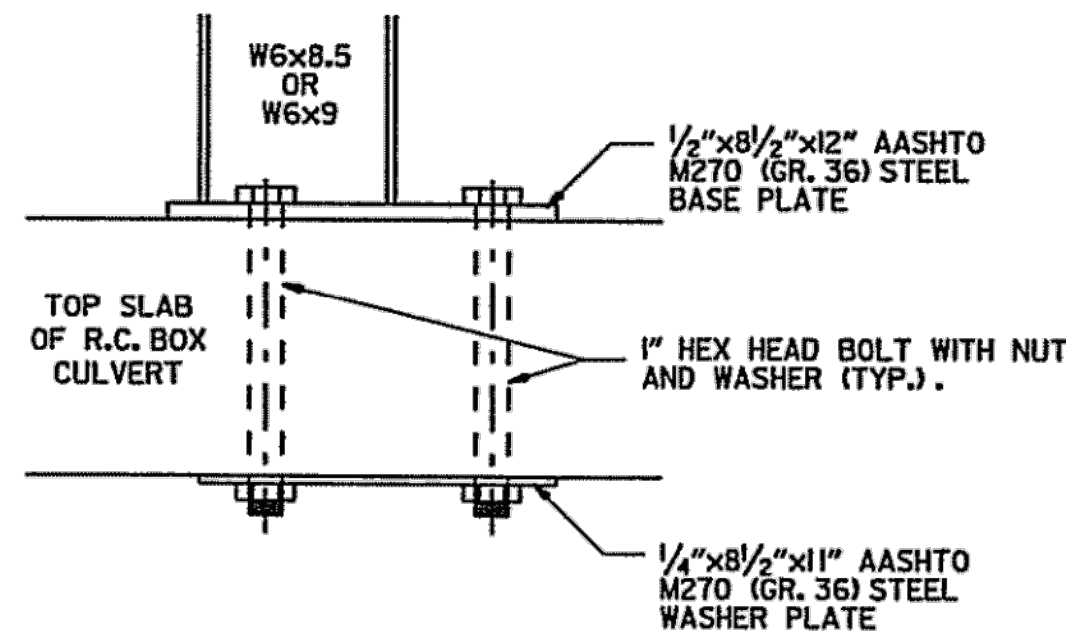
FOR DESIGN SPEEDS OF 55 MPH OR MORE
PLACE GUARD RAIL POSTS AGAINST BACK OF CURB.

DETAIL OF GUARD RAIL PLACEMENT BEHIND CURB (W-BEAM)

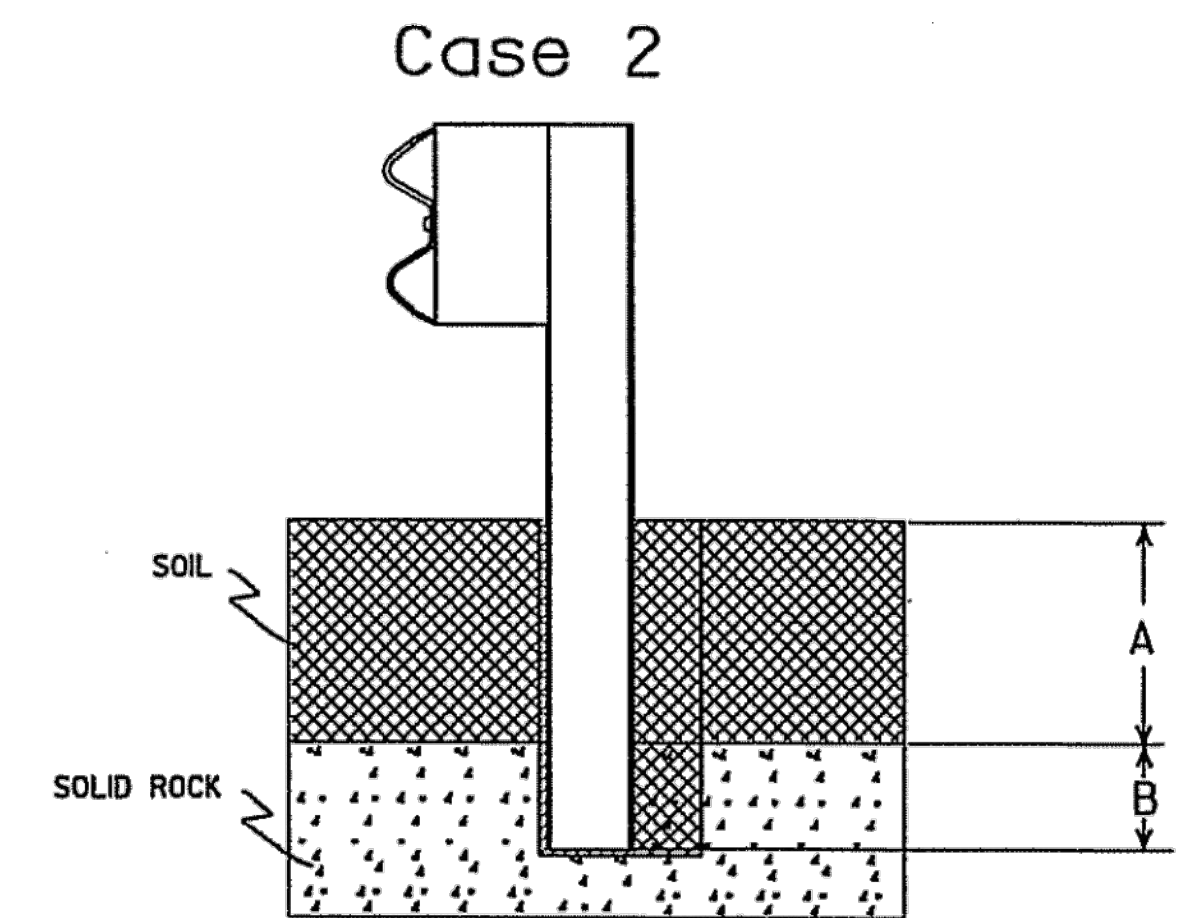
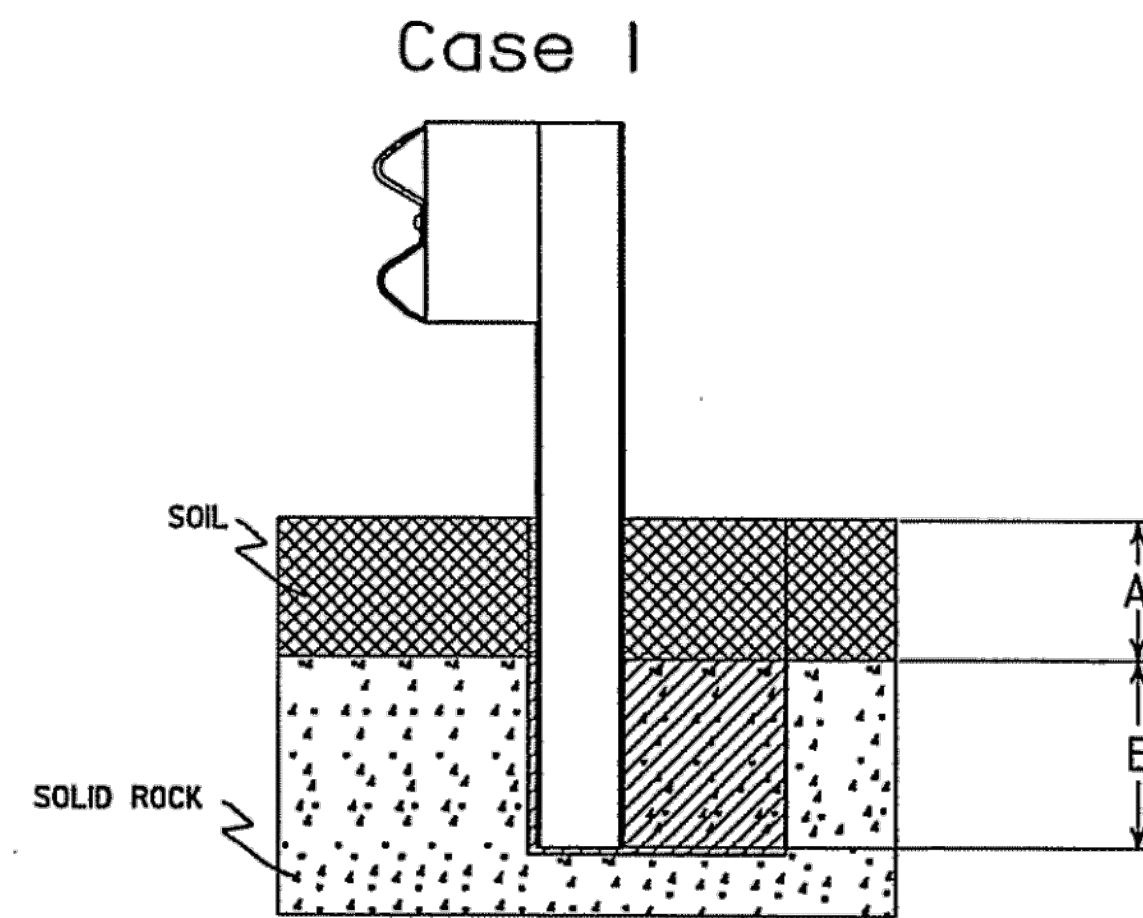
FOR DESIGN SPEEDS OF 50 MPH OR LESS ALL CURB FACES, AS SHOWN ON STD. DRWG. CG-1, MAY BE USED. FOR DESIGN SPEEDS OF 55 MPH OR MORE TYPE "E" CURB FACE SHALL BE USED.



SECTION A-A

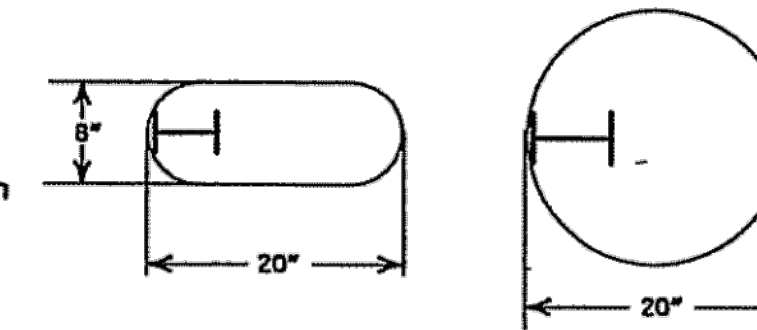


DETAIL OF CONNECTION



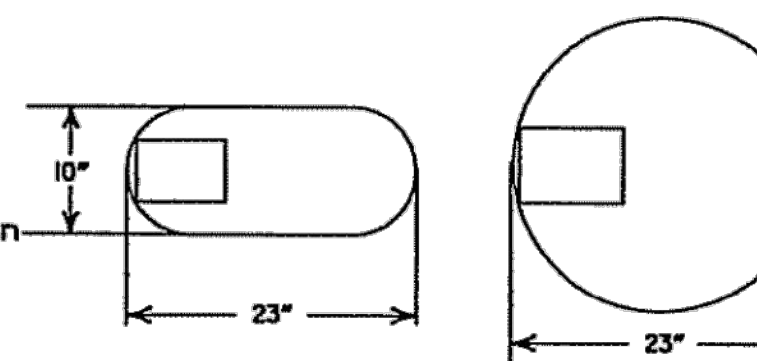
Plan View Steel Posts

Either hole configuration acceptable



Plan View Wood Posts

Either hole configuration acceptable



Notes: For overlying soil depths (A) ranging from 0 to 18", the depth of required drilling (B) is equal to 24".

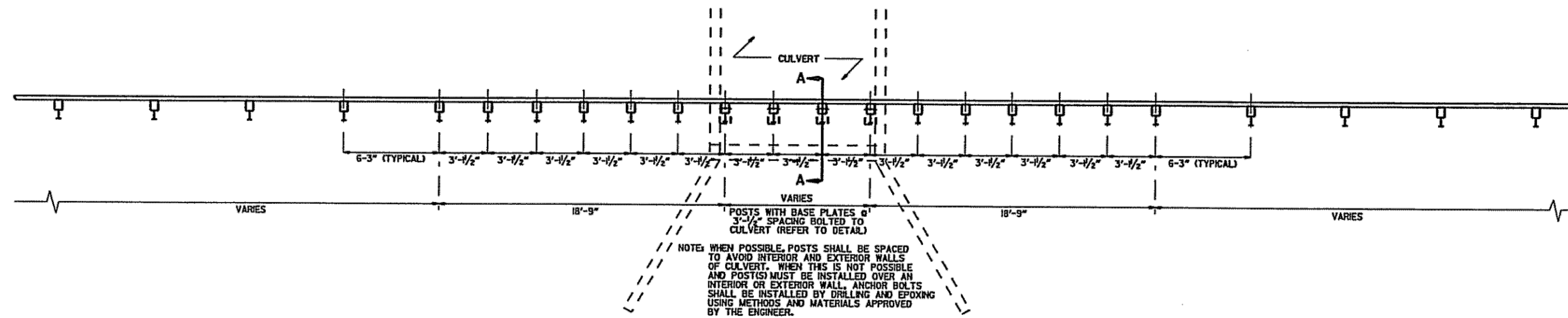
Zone A: Backfill according to Section 617.03(a).

Zone B: Backfill hole in 6" lifts with material meeting the requirements of Section 802.02(c) - Alternate gradation. Compact to 95% maximum dry density per ASTM D-698.

Notes: For overlying soil depths (A) ranging from 18" to 44", the depth of required drilling (B) is equal to either 12" or 44" minus the depth of soil whichever is less.

Zone A & B: Backfill according to Section 617.03(a).

DETAIL OF POST PLACEMENT IN SOLID ROCK (W-BEAM)



PLAN LAYOUT OF TYPE A GUARD RAIL AT LOW-FILL CULVERTS

NOTE: THIS DETAIL IS TO BE USED ONLY WHEN THE COVER OVER THE CULVERT DOES NOT PERMIT FULL EMBEDMENT OF GUARD RAIL POSTS AS SHOWN ON STD. DRWG. CR-8.

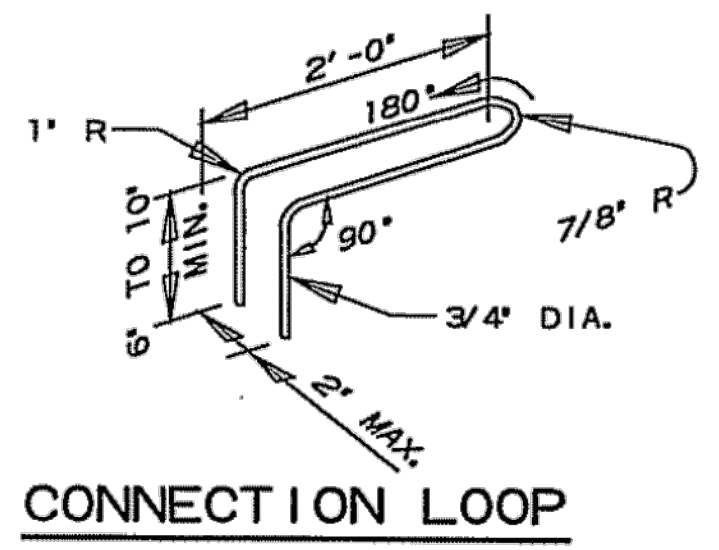
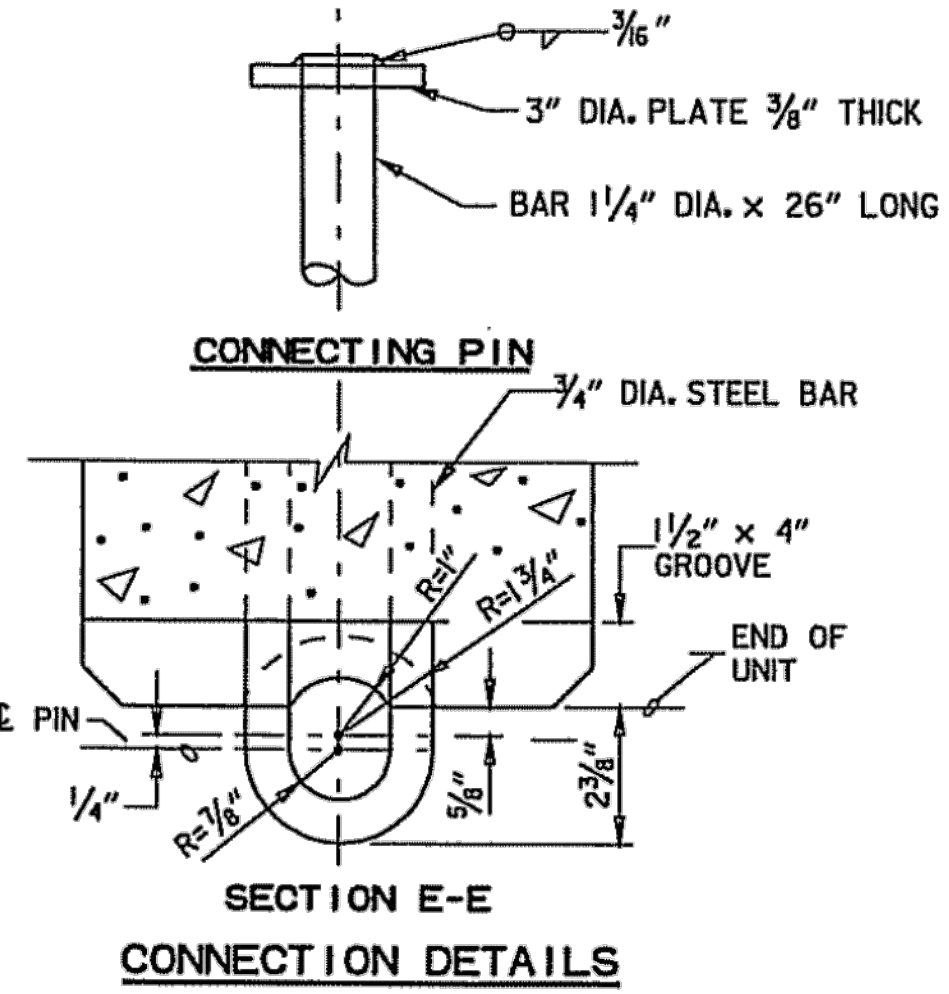
7-14-10	RAISED HEIGHT OF GUARD RAIL 1"	
4-12-07	REVISED DETAIL OF GUARD RAIL PLACEMENT BEHIND CURB	
11-10-05	ADDED GUARD RAIL PLACEMENT BEHIND CURB; REVISED DETAIL OF CONNECTION	
11-18-04	REVISED POST PLACEMENT IN ROCK & CULVERT CONNECTION DETAILS. ADDED DETAIL FOR GUARD RAIL PLACEMENT AT LOW-FILL CULVERTS	
3-30-00	REMOVED CONCRETE INSERT ANCHOR	
8-12-98	CHANGED STEEL SPACER BLOCK TO WOOD BLOCKOUT, ADD. DET. OF GUARD RAIL CONNECTION TO R.C. BOX CULVERT. DELETED DET. OF STEEL LINE POST CONNECTION. ADDED DET. OF GUARD RAIL PLACE BEHIND CURB & DET. OF POST PLACE IN SOLID ROCK	
4-3-96	PLACED ARROWS AT CUT STEEL WASHERS	4-3-96
10-18-96	REV. ASTM REF. TO AASHTO	
11-22-95	ADDED OPTIONAL HOLES	
6-2-94	REVISED ALTERNATE POST SIZE	
8-5-93	REVISED STEEL POST SIZE	
10-1-92	REDRAWN & REVISED	10-1-92
8-2-90	DEL. WASHER ON ANCHOR ASSEMBLY	8-2-90
7-15-88	CONFORMED TO 1988 SPECS	
3-4-88	REVISED ANCHOR NOTE	
10-30-87	REVISED ANCHOR ASSEMBLY	112-10-30-87
10-30-87	REVISED PLACEMENT BEHIND CURB	547-10-30-87
10-9-87	REDRAWN & REVISED	803-10-9-87
DATE	REVISION	DATE/FILM

ARKANSAS STATE HIGHWAY COMMISSION

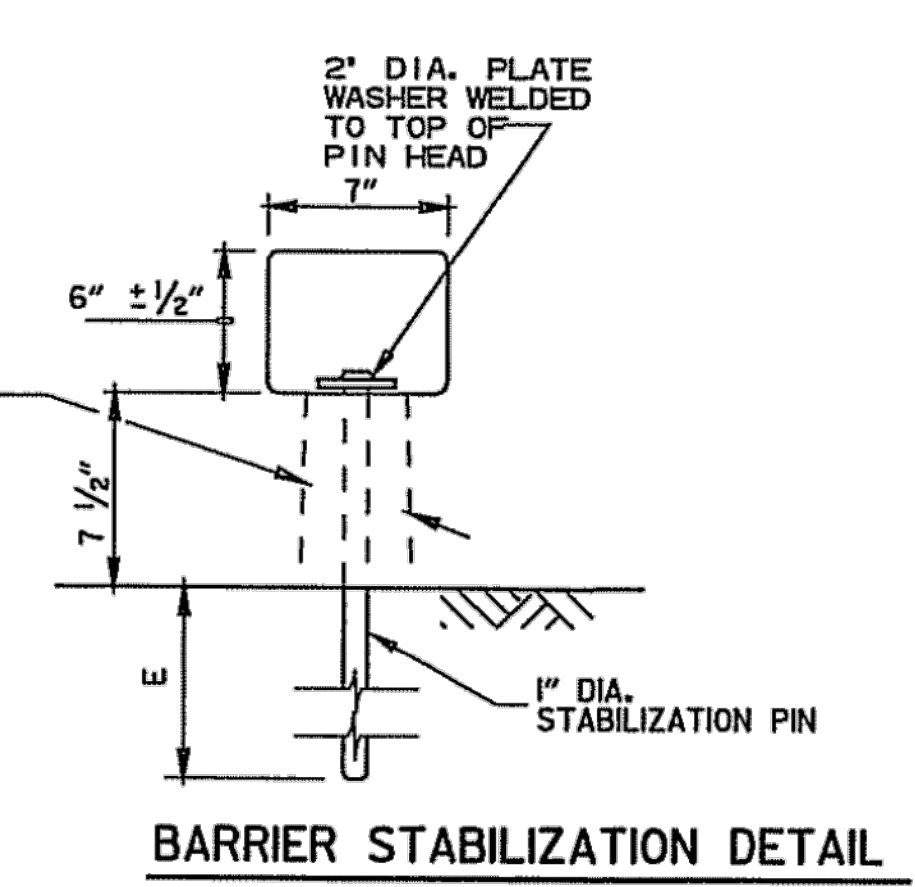
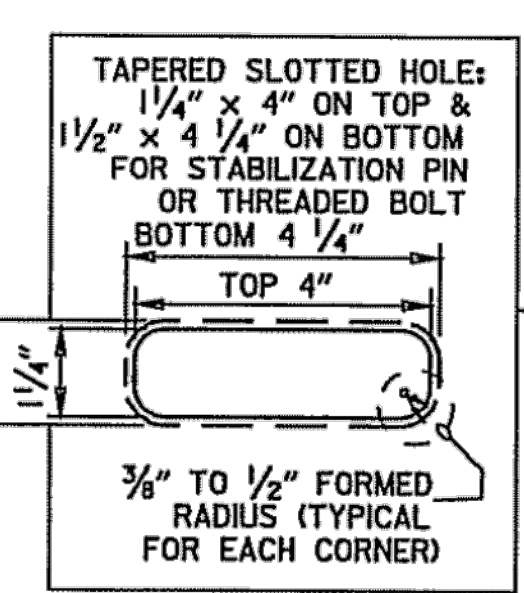
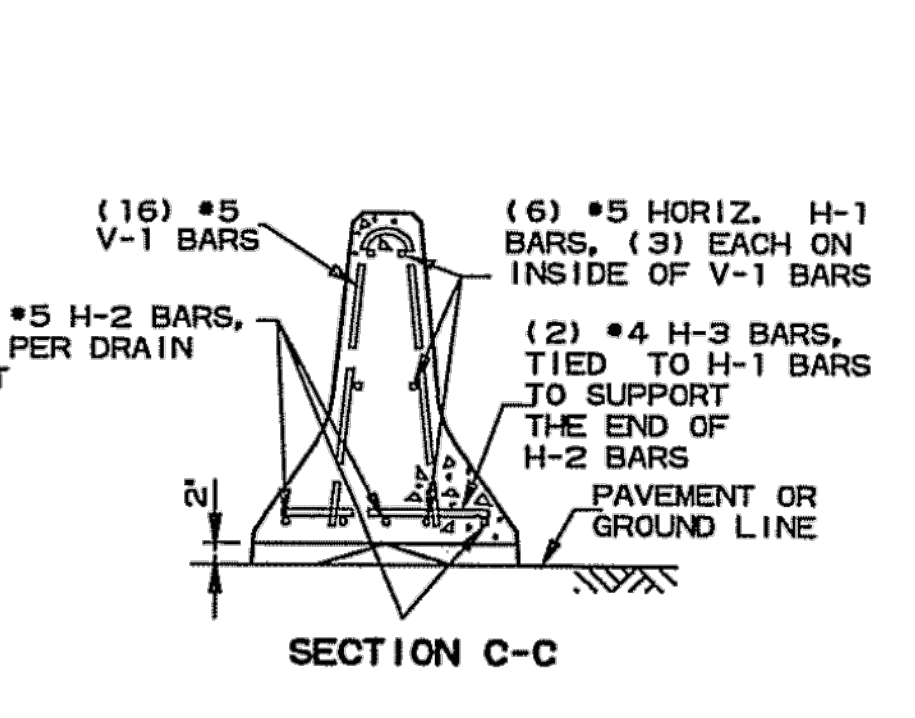
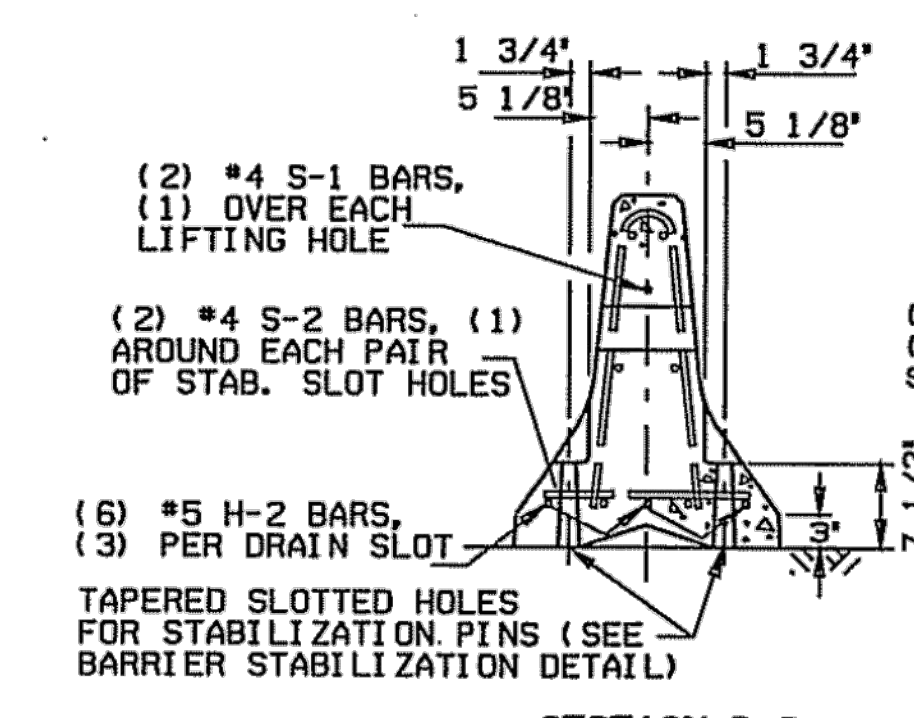
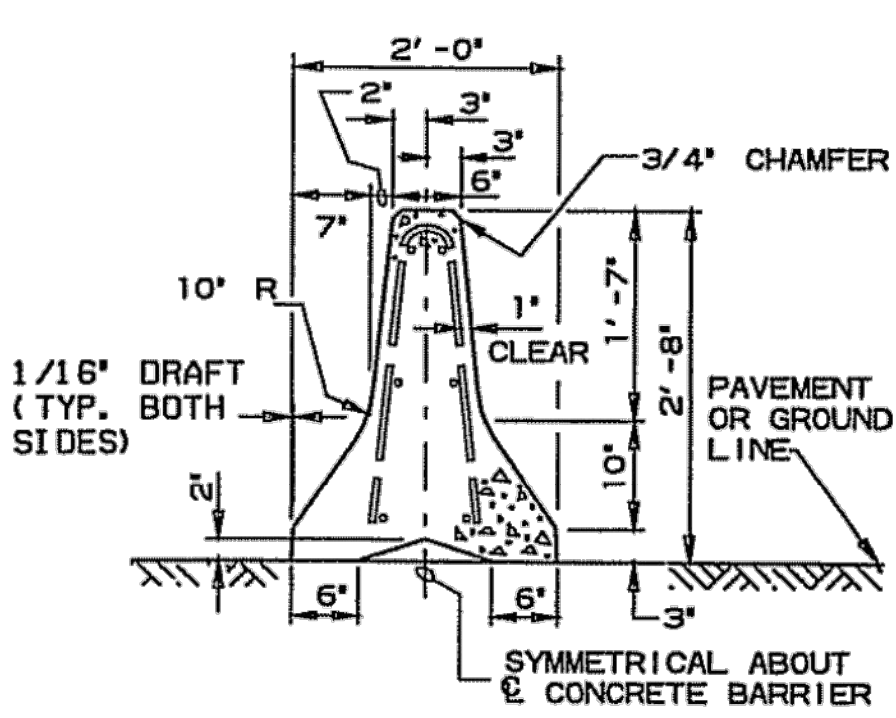
GUARD RAIL DETAILS

STANDARD DRAWING GR-8A

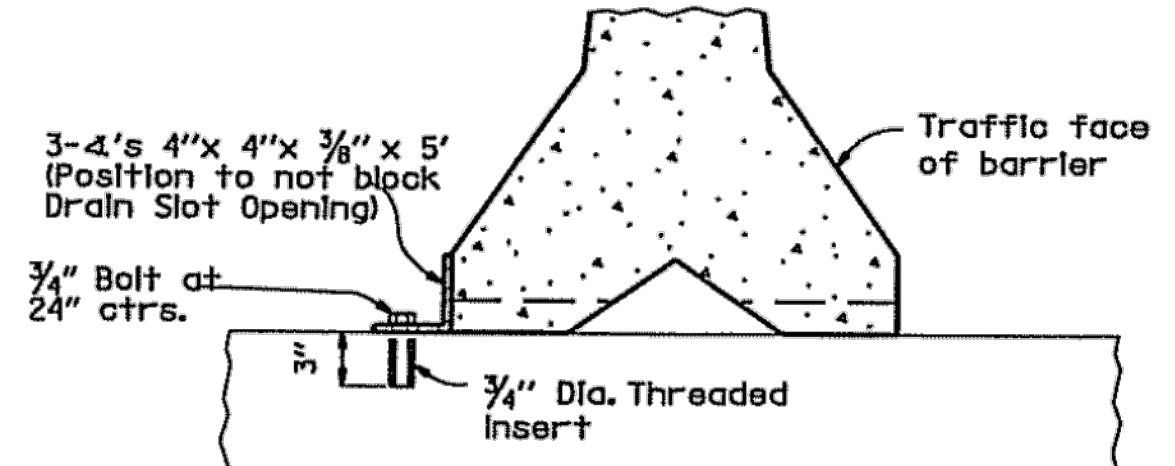
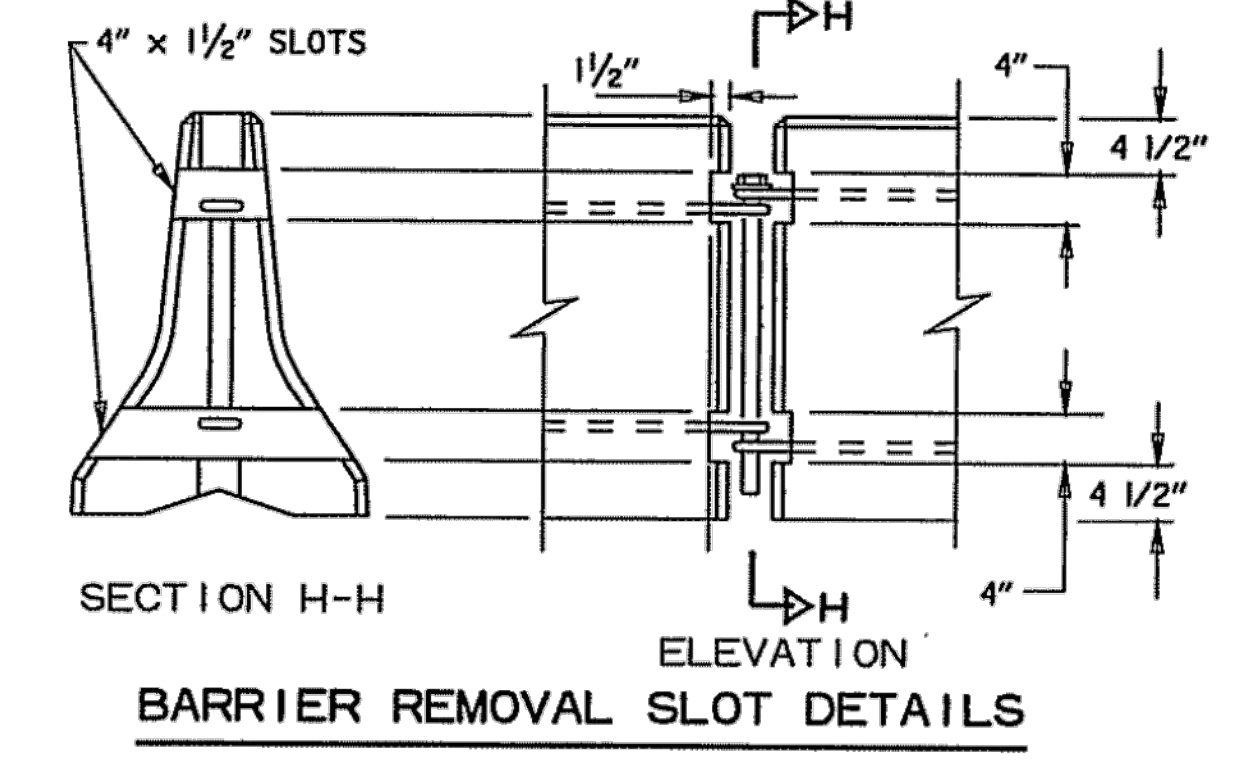
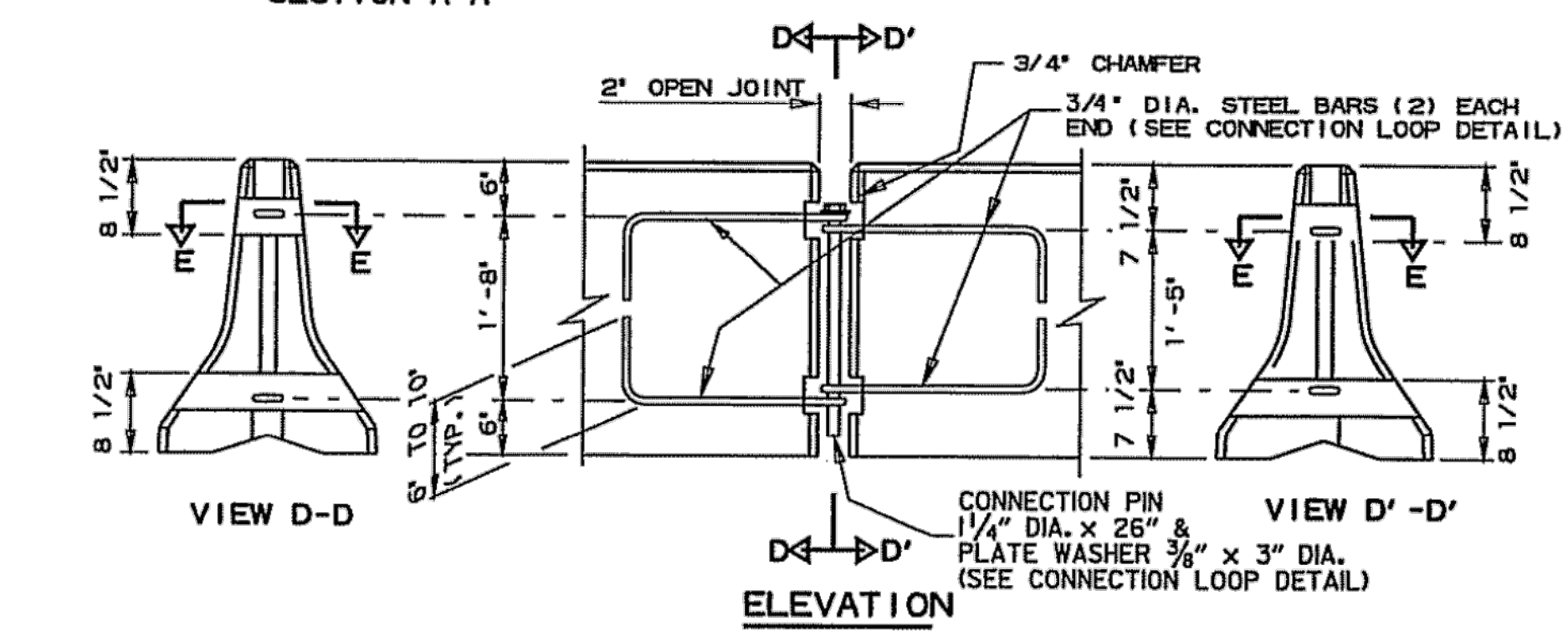
REINFORCING BAR TABLE PER BARRIER UNIT				
MARK	LOCATION	BAR SIZE	(NO. BARS)	SKETCH
H-1	HORIZONTAL IN BARRIER TIED INSIDE V-1 BARS	#5	(6)	19'-3"
H-2	CENTERED ABOVE DRAIN SLOTS LONG. & TRANSVERSELY	#5	(6)	6'-6"
H-3	TIED ABOVE H-1 BARS TO SUPPORT H-2, TIED TO V-1	#4	(2)	1'-6"
L	OVER LIFT HOLES	#4	(2)	2'-3" LIFTING HOLE 3 3/8" R
S-2	HORIZ. AROUND SLOTS BETWEEN V-1'S & DRAIN SLOTS	#4	(2)	1 1/2" R 5'-1" BAR W/ (4) 1 1/2" R BENDS & MIN. 1'-0" OVERLAP
V-1	VERTICAL IN BARRIER (3) EACH END & (2) AT EACH DRAIN SLOTS	#5	(16)	TOTAL LENGTH 4'-9" 2 3/16" R 12" 4 3/8" 2'-1 3/8"



SECTION E-E
CONNECTION DETAILS

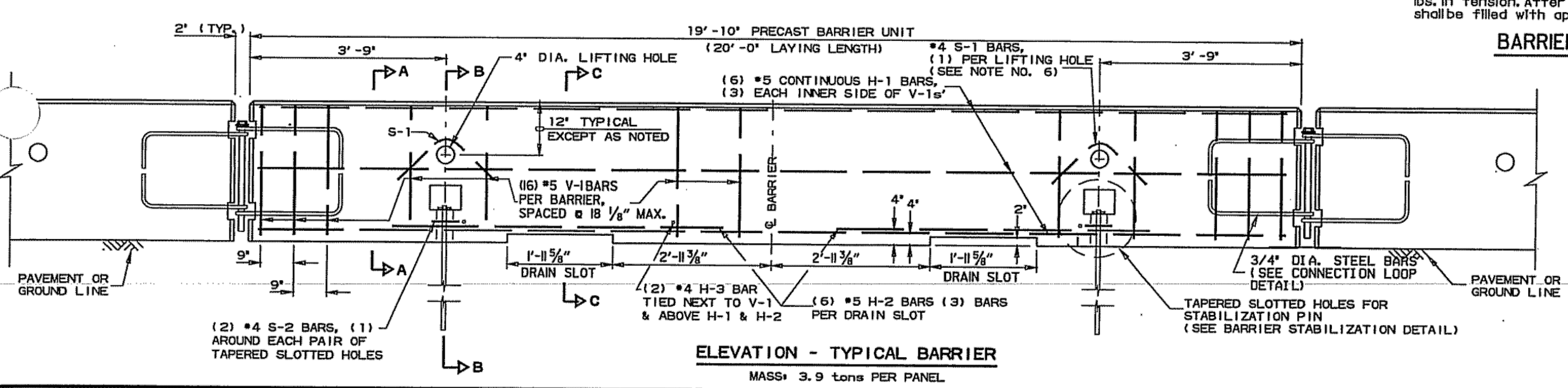


ROADWAY SECTION
4" - Concrete Pavement
8" - Asphalt Pavement
12" - Shoulder Areas



NOTE: 3/4" Threaded Inserts shall be cast in place for all new bridge decks and drilled and grouted for existing bridge decks to be retained. Inserts shall have a minimum ultimate load capacity of 8000 lbs. in tension. After removal of barrier, bolts, and angles, the inserts shall be filled with approved non-shrink epoxy.

BARRIER STABILIZATION DETAIL
BRIDGE DECKS



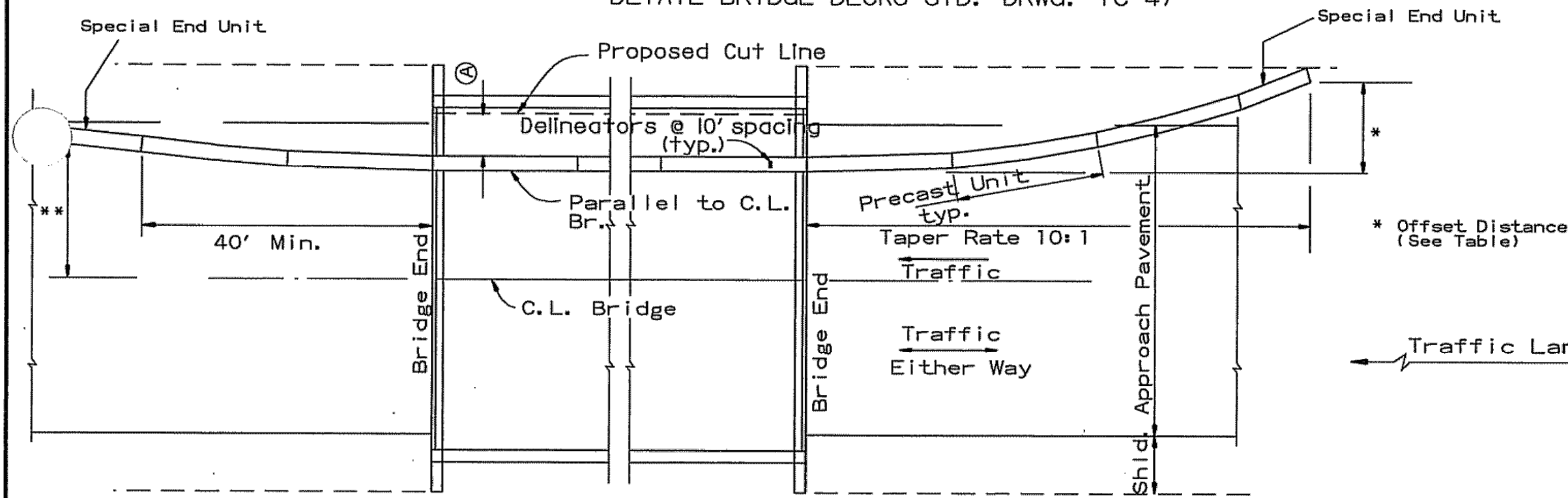
- General Notes**
- The contractor shall furnish the Precast Concrete Barrier Units and shall be responsible for the manufacture, shipment, storage, placement and removal. At the completion of the project, the precast units will remain the property of the contractor.
 - Materials shall meet the following minimum requirements:
Concrete: 2500 psi compressive strength at 28 days.
Reinforcing Steel: AASHTO M 31 or M 53, Grade 60
Structural Steel: AASHTO-M270 Grade 36 shall be used for the Connection Pin, Connection Loops, and Stabilization Pins. A One Piece Pin with a 3" rounded top may be used in place of the detailed Connection Pin. Delimiters: Delimiters shall be mounted at 10' spacing on top of precast barrier.

In applications where barrier walls within 6 feet of a traffic lane, additional delimiters shall be placed on the barrier at 10' spacing approximately one (1) foot from the top of the barrier. Delimiters shall be on the AHTD Qualified Products List for Construction Concrete Barrier Markers. Delimiter color shall be in accordance with the Manual Uniform Traffic Control Devices. Payment for delimiters shall be considered included in the price bid per Lin. Ft. for "Furnishing and Installing Precast Concrete Barrier". The contractor shall certify to the Engineer that the material and the design used in the precast barrier units meets the requirements as shown on this standard drawing.
 - Other Precast Concrete Barriers that have been crash tested and approved by the Federal Highway Administration to meet the requirements of NCHRP-350 test level 3 or Manual For Assessing Safety Hardware (MASH) will be accepted in lieu of the barrier shown. Drain slots shall be provided as needed or as directed by the Engineer. The Contractor shall furnish a certification of NCHRP Report 350 or Manual For Assessing Safety Hardware (MASH) compliance for any other types of precast barrier to be used. The certification shall state that the precast concrete barrier meets the requirements of NCHRP Report 350 or Manual For Assessing Safety Hardware (MASH) and include a copy of the Federal Highway Administration's (FHWA) approval letter with all attachments. Precast concrete barrier units shall be fabricated and installed in accordance with crash testing and documentation provided in the FHWA approval letter. Mixing of shapes will not be allowed in a continuous line of units.
 - Dowel holes in pavement or bridge slabs that are to remain in place shall be filled. Holes in concrete pavement and bridge slabs shall be filled with an approved non-shrink epoxy grout. Holes in asphalt pavement shall be filled with an approved asphalt joint filler. Payment for drilling and filling holes to be included in the price for various barrier items.
 - Attach Units To Roadway Surface with Stabilization Pins and to Deck Slabs using bolts when required.
 - A 4" White PVC Sleeve may be used to form the Lifting Hole and if used the Sleeve is to be left in place.

DATE	REVISION	FILMED
10-15-09	ADDED REFERENCE TO MASH	
8-5-09	REV. NOTE 3 CONCERNING DRAIN SLOTS	
11-29-07	REVISED NOTE 3	
5-25-06	DELETED GENERAL NOTE 7	
11-10-04	REVISED BARRIER STABILIZATION DETAIL BRIDGE DECKS	
4-10-03	REVISED GENERAL NOTE 2	
8-22-02	ISSUED NEW DRAWING	

ARKANSAS STATE HIGHWAY COMMISSION
STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION - TEMPORARY PRECAST BARRIER
STANDARD DRAWING TC-4

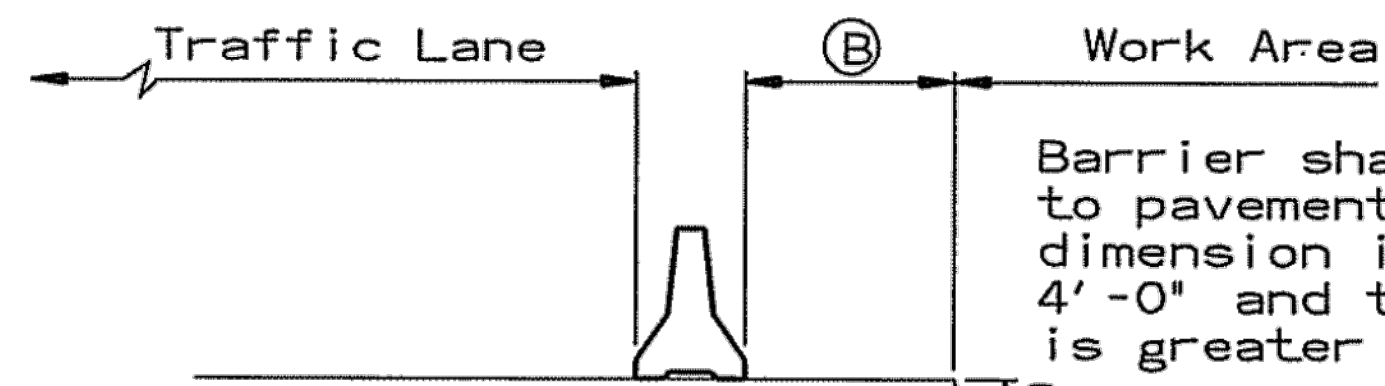
(A) 4 feet or greater preferred. If less than 4 feet, Precast Units shall be connected to slab (SEE BARRIER STABILIZATION DETAIL-BRIDGE DECKS STD. DRWG. TC-4)



BARRIER PLACEMENT ALONG BRIDGE WITH OFFSET

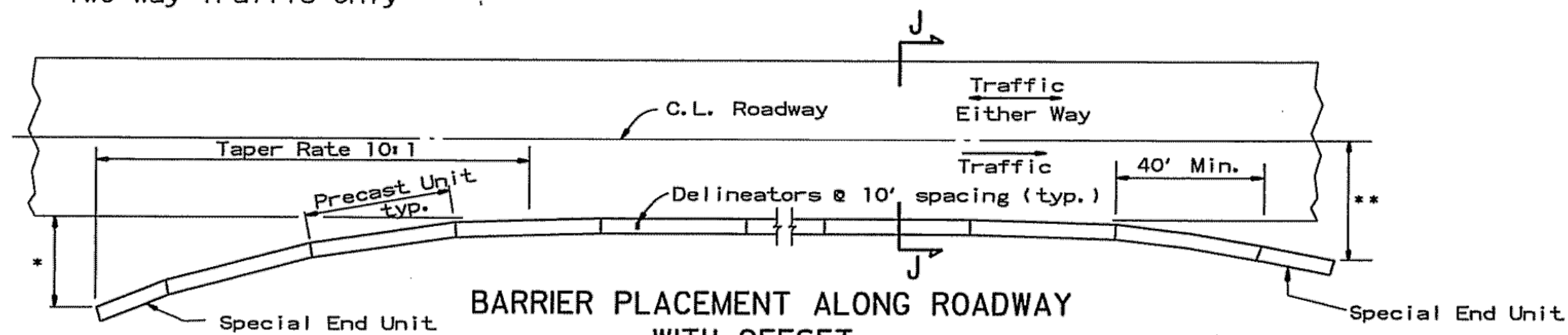
No Scale

** Offset Distance for Two Way Traffic Only



SECTION J-J

No Scale



BARRIER PLACEMENT ALONG ROADWAY WITH OFFSET

No Scale

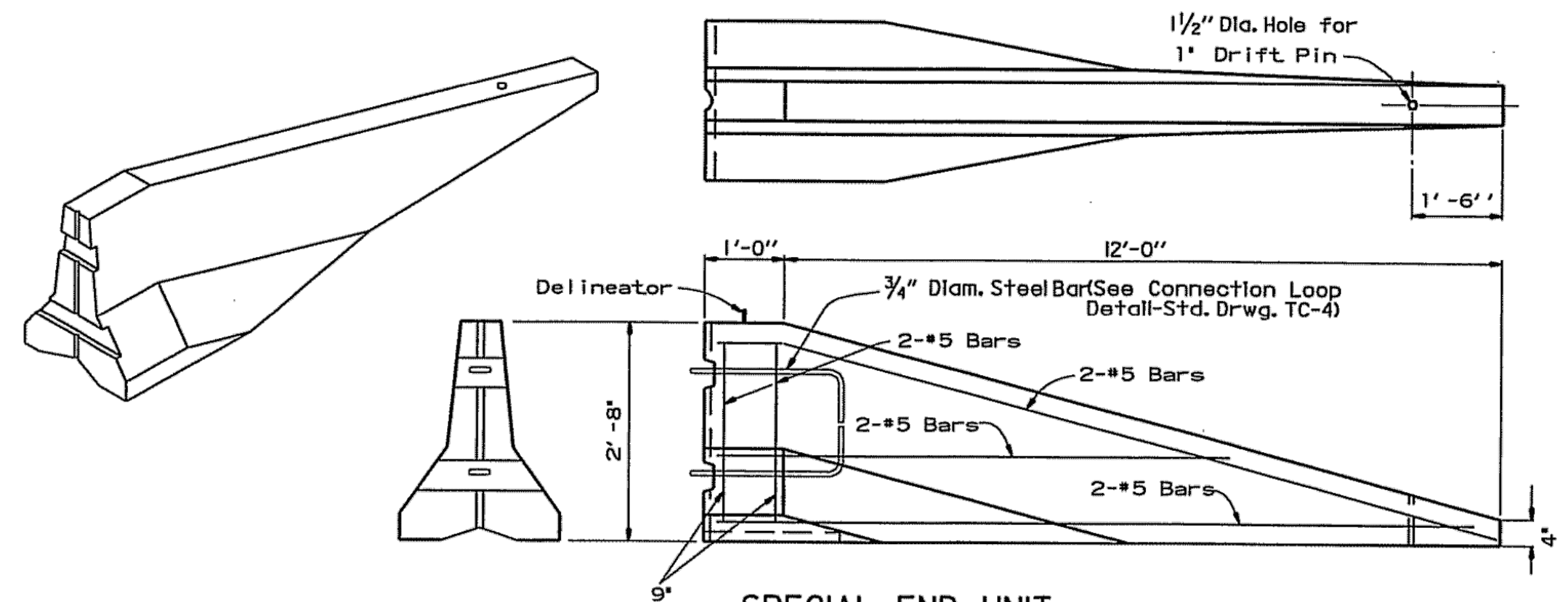
* Offset Distance (See Table)

** Offset Distance For Two Way Traffic Only

Offset Distance Table

Speed (MPH)	Offset Distance (FT.)
≤ 45	12
> 45	18

If offset distance is not attainable, then see 'Barrier Placement With Attenuator' Detail shown below.

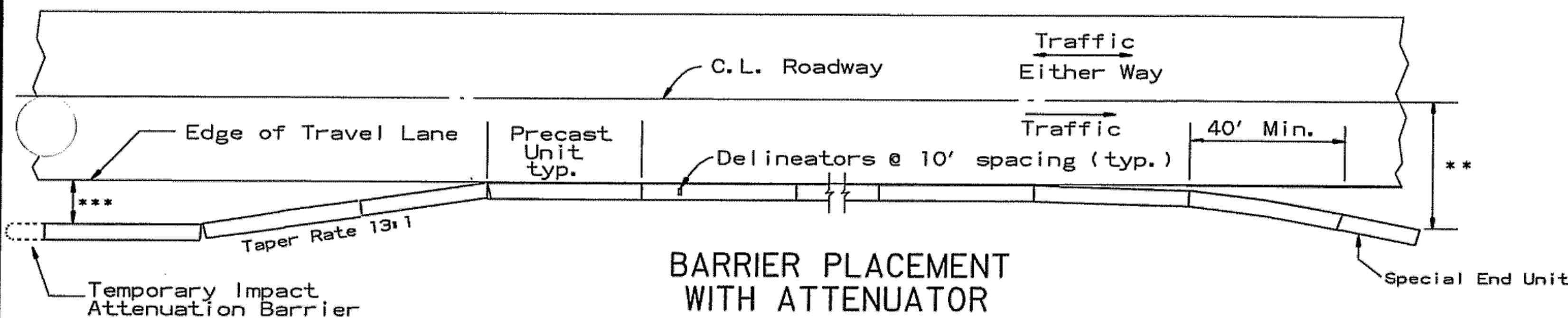


SPECIAL END UNIT

No Scale

General Notes

When shown on the Plans, the ends of the Temporary Precast Concrete Barrier shall be protected with an NCHRP-350 or Manual For Assessing Safety Hardware (MASH) approved Crash Cushion. Payment for Crash Cushions shall be made under the item of "Temporary Impact Attenuation Barrier."



BARRIER PLACEMENT WITH ATTENUATOR

No Scale

** Offset Distance For Two Way Traffic Only

*** Min. 3'-0" From Edge of Travel Lane to Nearest Edge of Attenuator

DATE	REVISION	FILMED
10-15-09	ADDED REFERENCE TO MASH	
5-25-06	REVISED BARRIER PLACEMENT	
8-22-02	ISSUED NEW DRAWING	

ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS
FOR HIGHWAY CONSTRUCTION -
TEMPORARY PRECAST BARRIER

STANDARD DRAWING TC-5

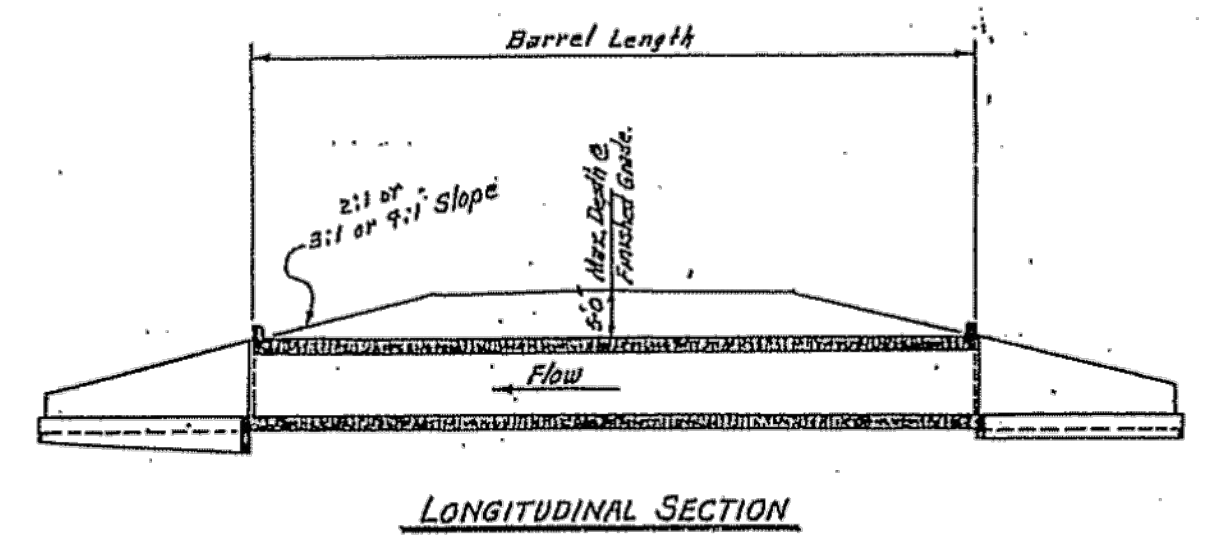
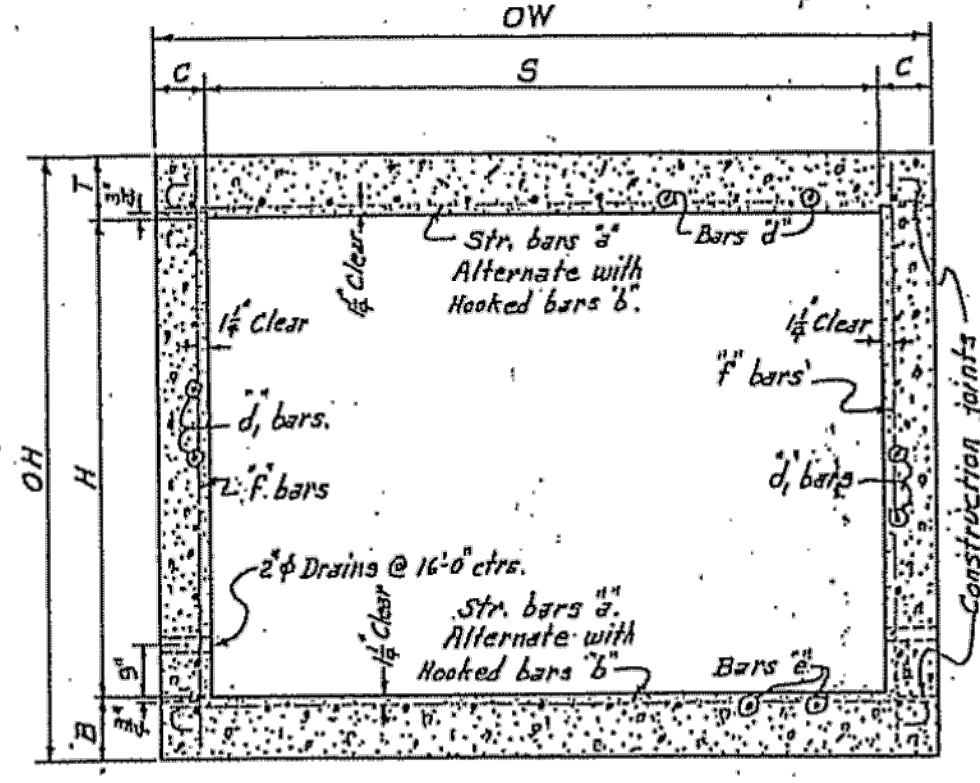
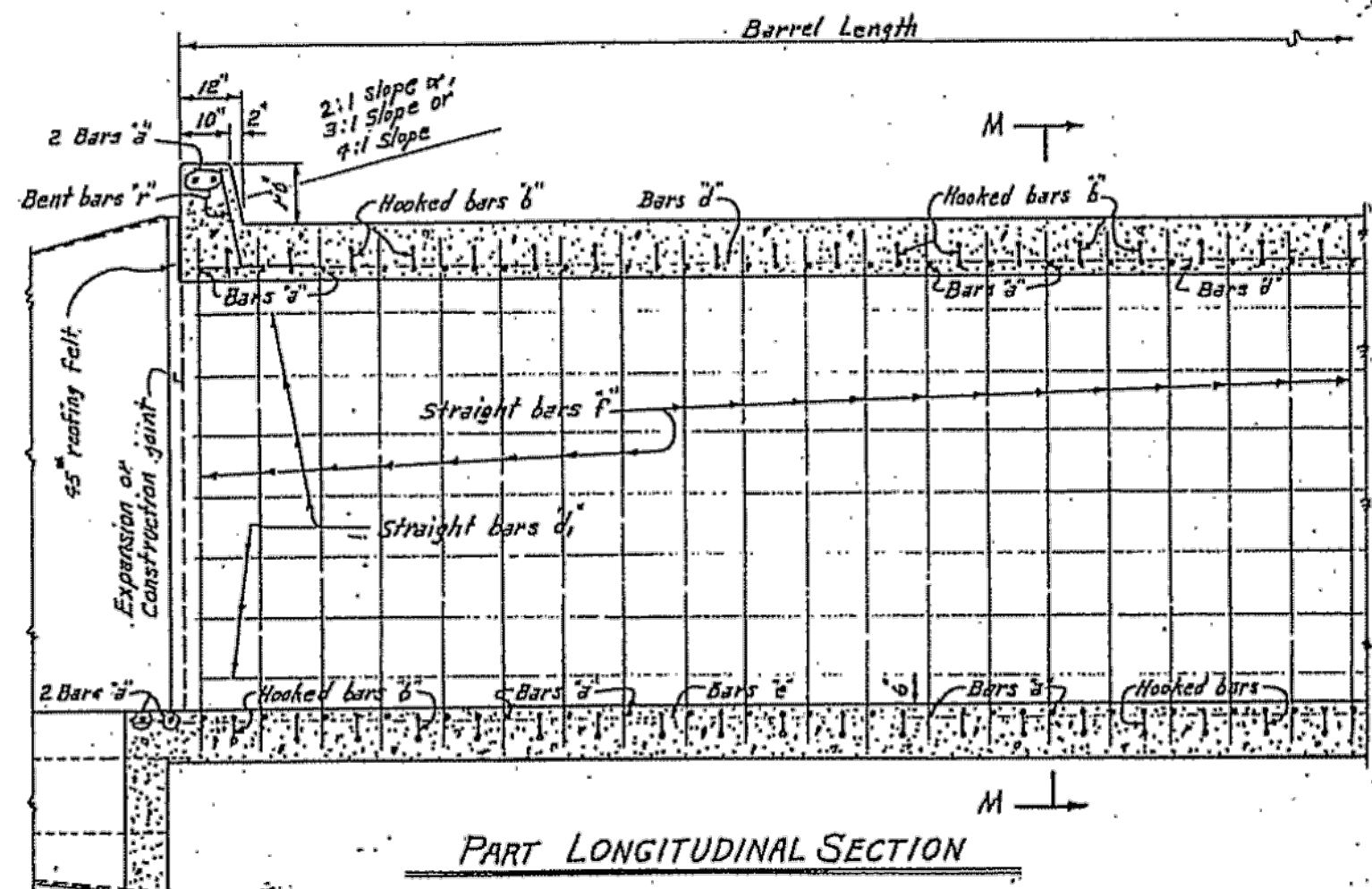
BAR LIST FOR BARREL SECTION 60'-0" IN LENGTH

DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	BAR LIST															
			a bars				b bars				c bars				d bars			
			STRAIGHT		BENT - See Diagram below.		STRAIGHT		STRAIGHT		STRAIGHT		STRAIGHT		STRAIGHT			
D	S	H	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D	Size	NUM. REQ'D

DIMENSIONS QUANTITIES

MAX. DESIGN DEPTH OF COVER	BARREL DIMENSIONS										UNIT QUANTITIES		
	D	S	H	A	O	W	T	C	B	OH	CUYD	REINFORCING STEEL	
												PER LAP	THRU HEADWALLS
D	S	H	A	O	W	T	C	B	OH	CUYD	LB.	LB.	LB.

Notes: For details of wings and bar lists, see Drawing Nos. W-X002-1 or W-X002-2 or W-X003-1 or W-X003-2.

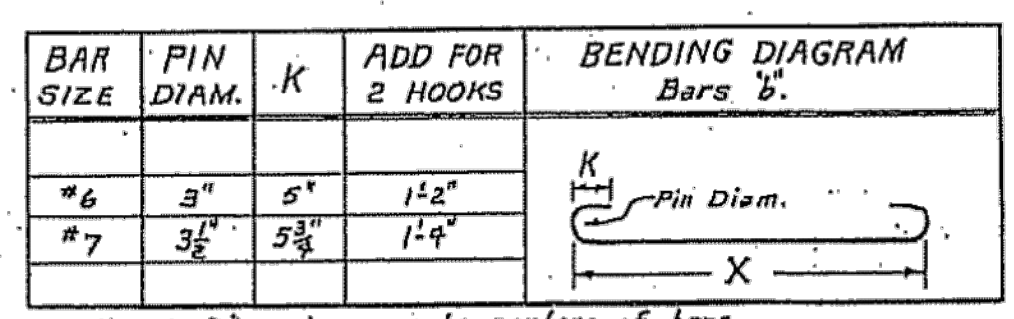


GENERAL NOTES:-
 CONCRETE:- All concrete to be Class S, and shall be poured in the dry.
 All exposed corners to have 3/4" chamfers.
 REINFORCING STEEL:- Reinforcing to be deformed bars of intermediate or hard grade.
 BAR LAP:- In computing the quantities of steel from the tables add one lap for each additional 33'-0" length of barrel over 33'-0". Lap longitudinal bars 30 diameters.
 CONSTRUCTION JOINTS:- Construction joints between wingwalls, side walls and slabs shall be only where shown on plans.
 SPECIFICATIONS:- Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.

DESIGN LIVE LOAD
 H20-S16 LOADING A.A.S.H.O. 1961
 AND
 SPECIAL MILITARY LOADING
 Two eq. 000 Lb. Axles @ 9'-0" c/c's.
 UNIT STRESSES:-
 Class S Concrete (n=10) 1200 psi
 Reinforcing Steel 24000 psi

Notes: This drawing to be used in conjunction with Standard Drawing Nos. W-X002-1 or W-X002-2 and W-X003-1 or W-X003-2. Also Drawing No. W-X002-1 or W-X002-2.

CLASS S CONCRETE
 ARKANSAS STATE HIGHWAY COMMISSION
 DETAILS OF STANDARD BARREL SECTIONS
 FOR
 REINFORCED CONCRETE BOX CULVERTS
 4', 5', 6', 7', 8', 9', 10', 11', 12' SPANS
 3:1 OR 4:1 SLOPES
 UNDER 5'-0" COVER.
 STANDARD DRAWING NO. R-100X-0



SPAN	SIZE	SPACING	WALL	LENGTH	X
4'	#4	11"	12	2'-6"	1'-3"
5'	#4	11"	14	2'-7"	1'-3 1/2"
6'	#4	11"	16	2'-8"	1'-4"
7'	#4	11"	18	2'-9"	1'-4 1/2"
8'	#4	11 1/2"	20	2'-11"	1'-5 1/2"
9'	#4	11 1/2"	22	3'-0"	1'-6"
10'	#4	11 1/2"	24	3'-1"	1'-6 1/2"
11'	#4	12"	26	3'-2"	1'-7"
12'	#4	12"	28	3'-3"	1'-7 1/2"

DOWEL BARS FOR TWO HEADWALLS

Bars "r"
 Dowel bars in Headwalls.

Designed by: M.C.H. 1-2-63
 Checked by: B.H.S. 5-8-63
 Drawn by: M.C.H. 2-8-63
 Checked by: B.H.S. 5-24-63
 Quantities by: M.C.H. 2-12-63
 Checked by: B.H.S. 5-24-63