DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	1	48
				(2) HWY. 128-BENTON (SAFETY IMPVTS.) (S)				

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
CONSTRUCTION PLANS FOR STATE HIGHWAY

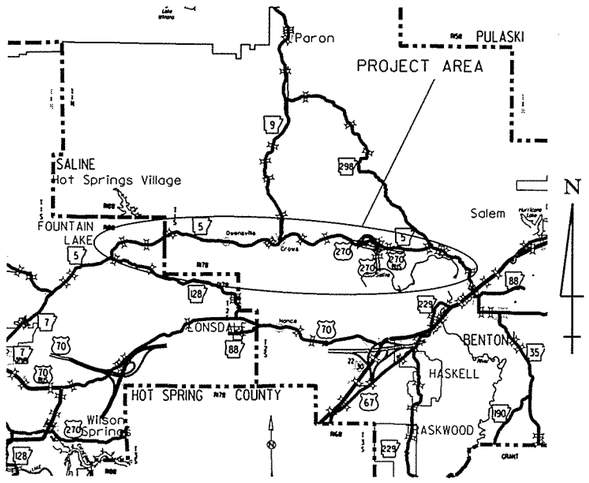
HWY. 128-BENTON
(SAFETY IMPVTS.) (S)

GARLAND & SALINE COUNTIES

ROUTE 5 SECTIONS 6 & 7

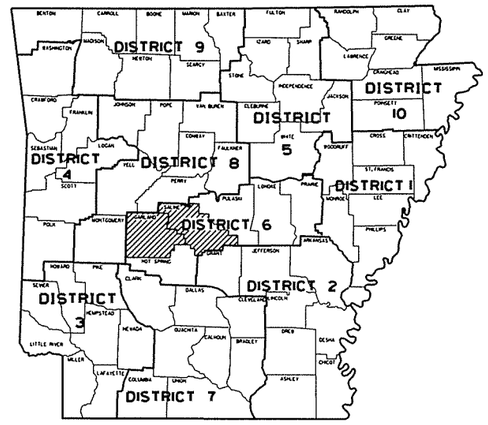
JOB 061441

FEDERAL AID PROJ. STPF-PEN-2662(5)



VICINITY MAP

NOT TO SCALE



EXCEPTIONS TO JOB 061441 BRIDGE INFORMATION

(1) L.M. 4.963 SECTION 6 BRIDGE END
BRIDGE NO. 06154
STRUCTURE LENGTH = 149'
L.M. 4.991 BRIDGE END - RETAIN

(2) L.M. 6.270 SECTION 6 BRIDGE END
BRIDGE NO. 06155
STRUCTURE LENGTH = 174'
L.M. 6.303 BRIDGE END - RETAIN

(3) L.M. 5.783 SECTION 7 BRIDGE END
BRIDGE NO. 06156
STRUCTURE LENGTH = 270'
L.M. 5.834 BRIDGE END - RETAIN

(4) L.M. 5.920 SECTION 7 BRIDGE END
BRIDGE NO. 06157
STRUCTURE LENGTH = 140'
L.M. 5.947 BRIDGE END - RETAIN

(5) L.M. 7.920 SECTION 7 BRIDGE END
BRIDGE NO. 06158
STRUCTURE LENGTH = 314'
L.M. 7.979 BRIDGE END - RETAIN

(6) L.M. 9.397 SECTION 7 BRIDGE END
BRIDGE NO. 05926
STRUCTURE LENGTH = 59'
L.M. 9.408 BRIDGE END - RETAIN

(7) L.M. 12.293 SECTION 7 BRIDGE END
BRIDGE NO. 06159
STRUCTURE LENGTH = 107'
L.M. 12.313 BRIDGE END - RETAIN

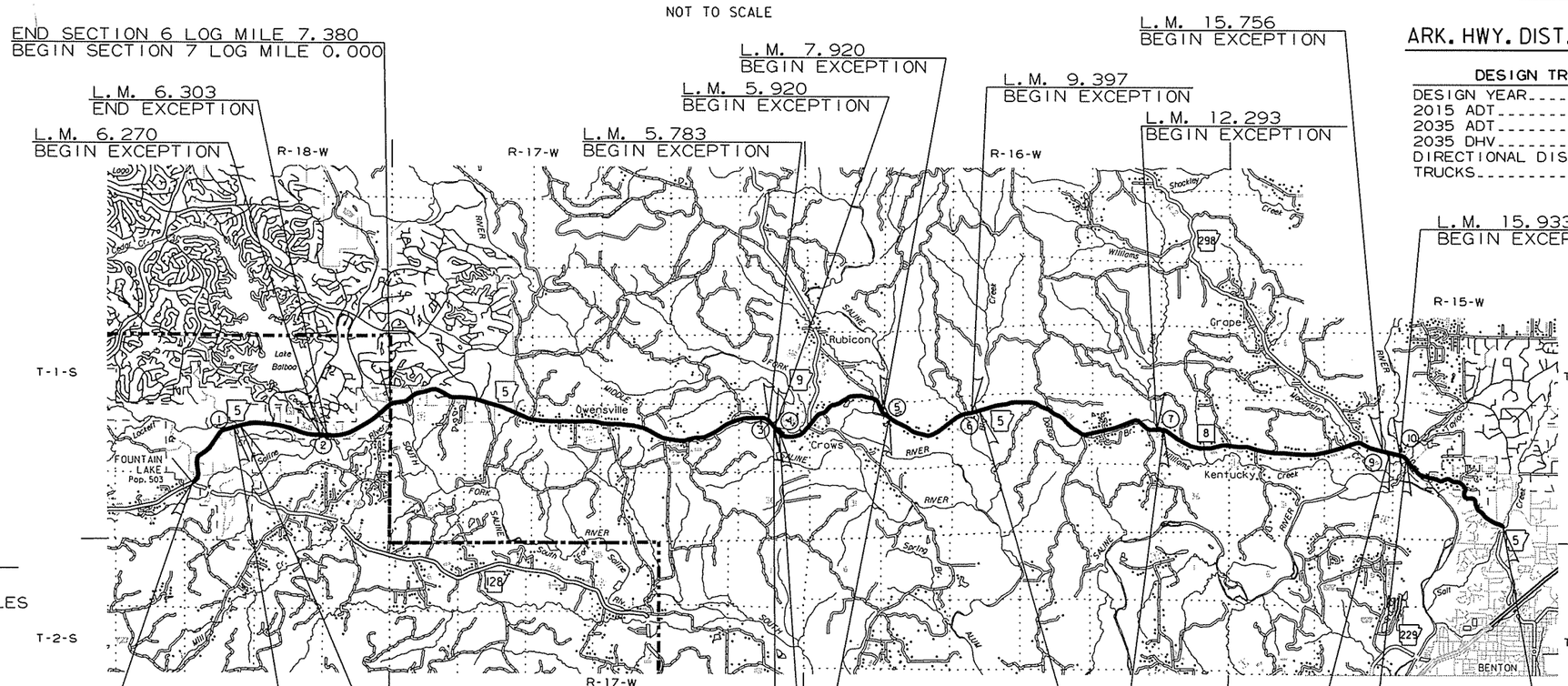
(9) L.M. 15.756 SECTION 7 BRIDGE END
BRIDGE NO. 06151
STRUCTURE LENGTH = 222'
L.M. 15.798 BRIDGE END - RETAIN

(10) L.M. 15.933 SECTION 7 BRIDGE END
BRIDGE NO. 06152
STRUCTURE LENGTH = 242'
L.M. 15.979 BRIDGE END - RETAIN

TOTAL LENGTH OF EXCEPTIONS
= 0.317 MILES

BRIDGE LENGTH FOR JOB 061441 STRUCTURES OVER 20'-0"

[8] L.M. 13.030 SECTION 7 IN PLACE
DBL. 10' X 7' X 35' R.C. BOX CULVERT
ON 31° SKEW
RETAIN AND EXTEND 4' LT. AND 6' RT.
TO A COMPLETED LENGTH OF 45'
ROADWAY LENGTH = 25.50'



ARK. HWY. DIST. NO. 6

DESIGN TRAFFIC DATA

DESIGN YEAR	2015
2015 ADT	4000
2035 ADT	5400
2035 DHV	594
DIRECTIONAL DISTRIBUTION	0.60
TRUCKS	3%

APPROVED

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 7836
M.E. BANKS

10-9-15

DEPUTY DIRECTOR
AND CHIEF ENGINEER

	BEGIN PROJECT	MID-POINT OF PROJECT	END PROJECT
LATITUDE	N 34°36'17"	N 34°37'14"	N 34°35'22"
LONGITUDE	W 92°55'36"	W 92°45'22"	W 92°35'35"

LENGTH OF PROJECT CALCULATED ALONG C.L.

GROSS LENGTH OF	PROJECT	112200.00	FEET	OR	21.250	MILES
NET	ROADWAY	110500.74			20.928	MILES
NET	BRIDGES	25.50			0.005	MILES
NET	PROJECT	110526.24			20.933	MILES

P.E. JOB 061428

10/8/2015

R061441.DGN

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
11-02-15				6	ARK.			
12-11-15				JOB NO.		061441	2	48
1-07-16								

(2) INDEX OF SHEETS, GOV. SPECS., & GEN. NOTES

INDEX OF SHEETS

SHEET NO.	TITLE	DRWG.NO.	DATE
1	TITLE SHEET		
2	INDEX OF SHEETS, GOVERNING SPECIFICATIONS, AND GENERAL NOTES		
3 - 4	TYPICAL SECTIONS OF IMPROVEMENT		
5 - 9	SPECIAL DETAILS		
10	MAINTENANCE OF TRAFFIC		
11	PERMANENT PAVEMENT MARKING DETAILS		
12 - 16	QUANTITIES		
17	SUMMARY OF QUANTITIES AND REVISIONS		
17A	CONCRETE DITCH PAVING	CDP-1	11-17-10
18	FLARED END SECTION	FES-1	10-18-96
19	FLARED END SECTION	FES-2	10-18-96
20	MAILBOX DETAILS	MB-1	11-18-04
21	PRECAST CONCRETE BOX CULVERTS	PBC-1	1-28-15
22	CONCRETE PIPE CULVERT FILL HEIGHTS & BEDDING	PCC-1	2-27-14
23	METAL PIPE CULVERT FILL HEIGHTS & BEDDING	PCM-1	2-27-14
24	PAVEMENT MARKING DETAILS	PM-1	9-12-13
25	REINFORCED CONCRETE BOX CULVERT DETAILS	RCB-1	7-26-12
26	EXCAVATION PAY LIMITS, BACKFILL, & SOLID SODDING FOR BOX CULVERTS	RCB-2	11-20-03
27	METHOD OF EXTENDING EXISTING R.C. BOX CULVERTS	RCB-3	10-12-95
28	STANDARD HIGHWAY SIGNS AND SUPPORT ASSEMBLIES	SHS-1	9-12-13
29	U-CHANNEL POST ASSEMBLIES	SHS-2	2-27-14
30	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	TC-1	9-02-15
31	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	TC-2	9-02-15
32	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	TC-3	9-02-15
33	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION-TEMPORARY PRECAST BARRIER	TC-4	2-27-14
34	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION-TEMPORARY PRECAST BARRIER	TC-5	10-15-09
35	TEMPORARY EROSION CONTROL DEVICES	TEC-1	12-15-11
36	TEMPORARY EROSION CONTROL DEVICES	TEC-2	6-02-94
37	TEMPORARY EROSION CONTROL DEVICES	TEC-3	11-03-94
38	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X002-1__	5-10-66
39	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X002-2__	4-19-63
40	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X003-1__	5-10-66
41	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X15____	6-13-63
42	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X152-2__	6-06-63
43	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X30____	7-15-63
44	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	W-X302-1__	5-10-66
45	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	R-100X-0__	2-08-63
46	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	R-115X-0__	8-14-63
47	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	R-130X-0__	2-24-64
48	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	R-230X-2__	1-30-64

GOVERNING SPECIFICATIONS

ARKANSAS STATE HIGHWAY COMMISSION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, EDITION OF 2014, AND THE FOLLOWING SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS:

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
1-8-16

NUMBER	TITLE
ERRATA____	ERRATA FOR THE BOOK OF STANDARD SPECIFICATIONS
FHWA-1273__	REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS
FHWA-1273__	SUPPLEMENT - EQUAL EMPLOYMENT OPPORTUNITY - NOTICE TO CONTRACTORS
FHWA-1273__	SUPPLEMENT - SPECIFIC EQUAL EMPLOYMENT OPPORTUNITY RESPONSIBILITIES (23 U.S.C. 140)
FHWA-1273__	SUPPLEMENT - EQUAL EMPLOYMENT OPPORTUNITY - GOALS AND TIMETABLES
FHWA-1273__	SUPPLEMENT - EQUAL EMPLOYMENT OPPORTUNITY - FEDERAL STANDARDS
FHWA-1273__	SUPPLEMENT - POSTERS AND NOTICES REQUIRED FOR FEDERAL-AID PROJECTS
FHWA-1273__	SUPPLEMENT - WAGE RATE DETERMINATION
100-3_____	CONTRACTOR'S LICENSE
108-1_____	LIQUIDATED DAMAGES
400-1_____	TACK COATS
410-1_____	CONSTRUCTION REQUIREMENTS AND ACCEPTANCE OF ASPHALT CONCRETE PLANT MIX COURSES
604-1_____	RETROREFLECTIVE SHEETING FOR TRAFFIC CONTROL DEVICES IN CONSTRUCTION ZONES
620-1_____	MULCH COVER
JOB 061441__	BIDDING REQUIREMENTS AND CONDITIONS
JOB 061441__	BROADBAND INTERNET SERVICE FOR ASPHALT CONCRETE PLANT
JOB 061441__	BROADBAND INTERNET SERVICE FOR FIELD OFFICE
JOB 061441__	CARGO PREFERENCE ACT REQUIREMENTS
JOB 061441__	CONSTRUCTION IN SPECIAL FLOOD HAZARD AREAS
JOB 061441__	CHANNEL POST SIGN SUPPORT
JOB 061441__	DELAY IN RIGHT OF WAY OCCUPANCY
JOB 061441__	DISADVANTAGED BUSINESS ENTERPRISE BIDDER'S RESPONSIBILITIES
JOB 061441__	EXTENSION FOR PIPE CULVERTS
JOB 061441__	GOALS FOR DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
JOB 061441__	HIGH PERFORMANCE PAVEMENT MARKING
JOB 061441__	MANDATORY ELECTRONIC CONTRACT
JOB 061441__	NESTING SITES OF MIGRATORY BIRDS
JOB 061441__	OFF-SITE RESTRAINING CONDITIONS FOR BATS
JOB 061441__	PARTNERING REQUIREMENTS
JOB 061441__	RUMBLE STRIPES
JOB 061441__	SHORING FOR CULVERTS
JOB 061441__	STORM WATER POLLUTION PREVENTION PLAN
JOB 061441__	SUBMISSION OF ASPHALT CONCRETE HOT MIX ACCEPTANCE TEST RESULTS
JOB 061441__	UTILITY ADJUSTMENTS
JOB 061441__	VALUE ENGINEERING
JOB 061441__	WARM MIX ASPHALT

GENERAL NOTES

1. ALL PIPE LINES, POWER, TELEPHONE, AND TELEGRAPH LINES TO BE MOVED OR LOWERED BY THE RESPECTIVE OWNERS AS PER AGREEMENT WITH SUCH OWNERS.
2. ANY EQUIPMENT OR APPURTENANCE THAT INTERFERES WITH THE PROPOSED CONSTRUCTION AND WHICH MAY BE THE PROPERTY OF UTILITY SERVICE ORGANIZATIONS SHALL BE MOVED BY THE OWNERS UNLESS OTHERWISE PROVIDED.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING U. S. MAILBOXES WITHIN THE PROJECT LIMITS IN SUCH A MANNER THAT THE PUBLIC MAY RECEIVE CONTINUED MAIL SERVICE. PAYMENT WILL BE CONSIDERED INCLUDED IN THE PRICE BID FOR THE VARIOUS BID ITEMS.
4. ALL LAND MONUMENTS LOCATED WITHIN THE CONSTRUCTION AREA SHALL BE PROTECTED IN ACCORDANCE WITH SECTION 107.12 OF THE STANDARD SPECIFICATIONS.
5. ALL TREES THAT DO NOT DIRECTLY INTERFERE WITH THE PROPOSED CONSTRUCTION SHALL BE SPARED AS DIRECTED BY THE ENGINEER. CARE AND DISCRETION SHALL BE USED TO INSURE THAT ALL TREES NOT TO BE REMOVED SHALL BE HARMED AS LITTLE AS POSSIBLE DURING THE CONSTRUCTION OPERATIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A FENCE TO CONTROL LIVESTOCK IN AREAS WHERE PASTURES ARE SEVERED. WIRE FENCE MAY BE CONSTRUCTED INITIALLY, OR IN LIEU THEREOF, THE CONTRACTOR AT HIS OWN EXPENSE, MAY ELECT TO PROVIDE TEMPORARY FENCING SUITABLE TO CONTAIN LIVESTOCK.
7. THIS PROJECT IS COVERED UNDER A SECTION 404 NATIONWIDE 23 PERMIT. REFER TO SECTION 110 OF THE STANDARD SPECIFICATIONS, EDITION OF 2014, FOR PERMIT REQUIREMENTS.
8. ALL FLEXIBLE BASE AND ASPHALTIC PAVEMENTS REMOVED SHALL BE PAID FOR UNDER THE ITEM NO. 210 - UNCLASSIFIED EXCAVATION.
9. THE EXISTING ASPHALT PAVEMENT TO BE REMOVED FROM THE REMAINING PAVEMENT SHALL BE SEPARATED BY SAWING ALONG A NEAT LINE. AFTER SAWING, THE PAVEMENT TO BE REMOVED SHALL BE CAREFULLY REMOVED IN A MANNER THAT WILL NOT DAMAGE THE PAVEMENT THAT IS TO REMAIN. ANY DAMAGE OF THE ASPHALT PAVEMENT THAT IS TO REMAIN IN PLACE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

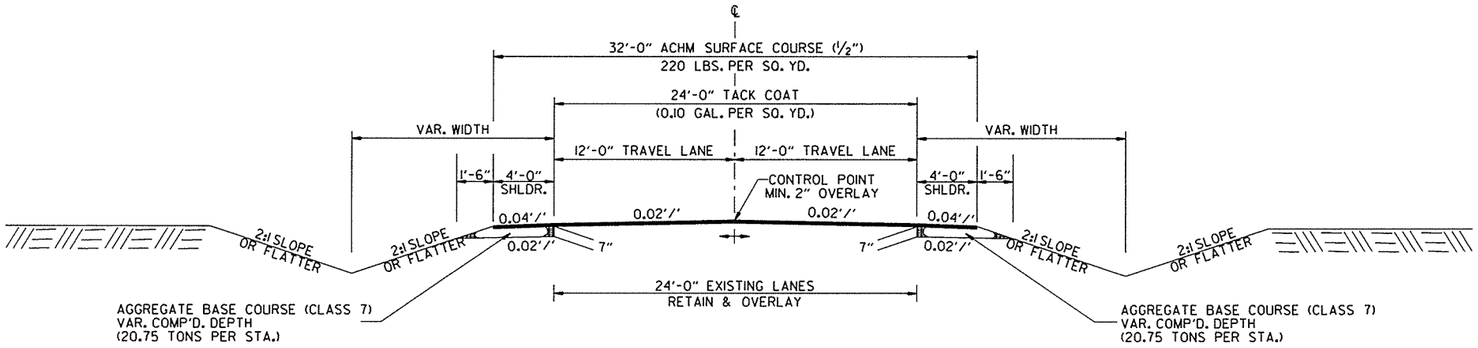
INDEX OF SHEETS, GOVERNING SPECIFICATIONS, & GENERAL NOTES

R061441.DGN 11/2/2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	3	48

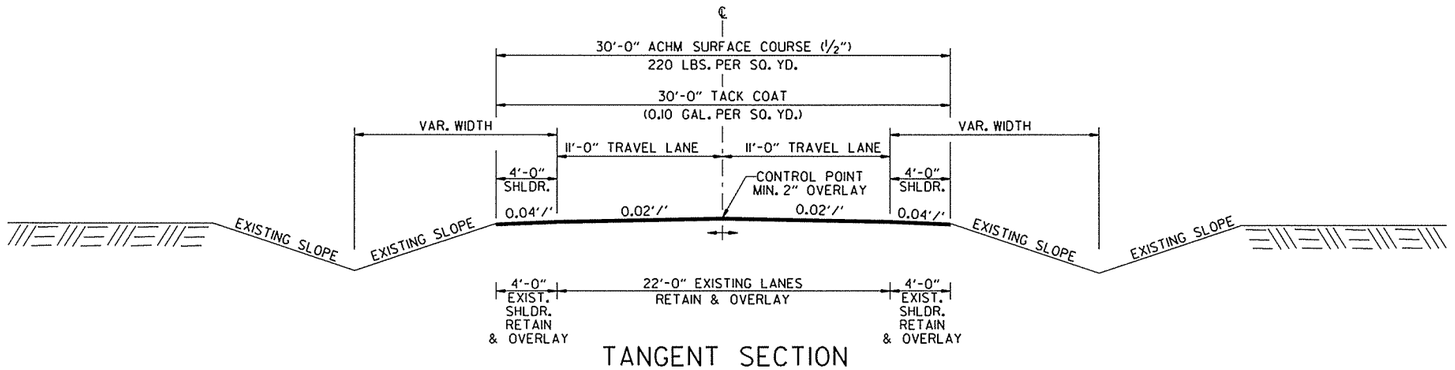
(2) TYPICAL SECTIONS OF IMPROVEMENT

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15



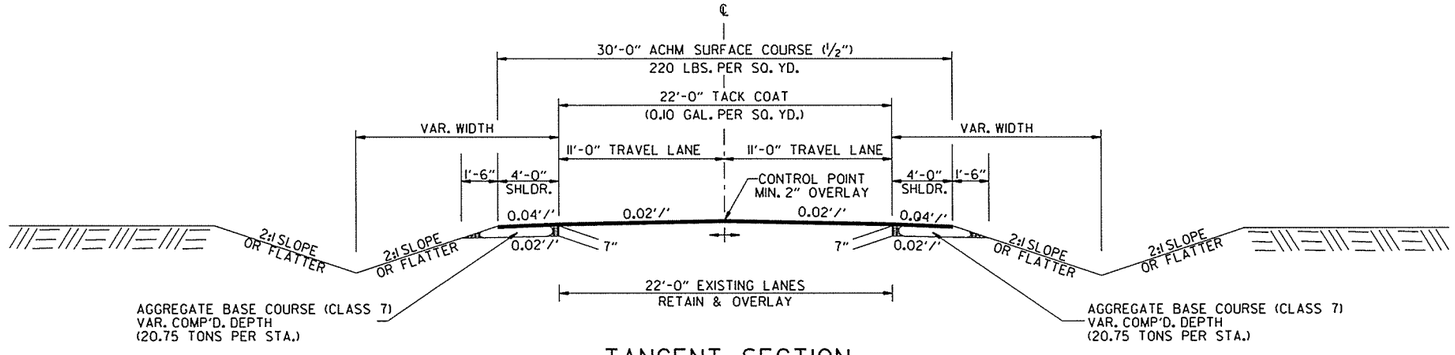
TANGENT SECTION
HWY. 5: NOTCH & WIDENING WITH 12' LANES

SEC. 7 LM 0.000 - 5.650
SEC. 7 LM 6.060 - 6.500



TANGENT SECTION
HWY. 5: OVERLAY WITH 11' LANES

SEC. 7 LM 5.650 - 5.783
SEC. 7 LM 5.834 - 5.920
SEC. 7 LM 5.947 - 6.060
SEC. 7 LM 6.500 - 7.070
SEC. 7 LM 7.750 - 7.920
SEC. 7 LM 7.979 - 8.260



TANGENT SECTION
HWY. 5: NOTCH & WIDENING WITH 11' LANES

SEC. 7 LM 7.070 - 7.750
SEC. 7 LM 15.250 - 15.610
SEC. 7 LM 16.320 - 18.010

NOTES:

THE EXISTING ASPHALT PAVEMENT TO BE REMOVED FROM THE REMAINING PAVEMENT SHALL BE SEPARATED BY SAWING ALONG A NEAT LINE. AFTER SAWING, THE PAVEMENT TO BE REMOVED SHALL BE CAREFULLY REMOVED IN A MANNER THAT WILL NOT DAMAGE THE PAVEMENT THAT IS TO REMAIN. ANY DAMAGE OF THE ASPHALT PAVEMENT THAT IS TO REMAIN IN PLACE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

SLOPES SHOWN ON TYPICAL SECTIONS ARE NORMAL. MATCH EXISTING CROSS SLOPE IN SUPERELEVATED SECTIONS.

ON ALL SUPERELEVATED CURVES AND THRU SUPERELEVATION TRANSITIONS THE ALGEBRAIC DIFFERENCE BETWEEN PAVEMENT SLOPE AND SHOULDER SLOPE SHALL NOT EXCEED 0.08'/'.

THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.

NO CHANGES SHALL BE MADE FROM THE PROPOSED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.

THE FINAL 2" OF SURFACE COURSE IS TO BE PLACED AFTER ALL OTHER COURSES HAVE BEEN LAID. LONGITUDINAL JOINTS SHALL BE AT LANE LINES.

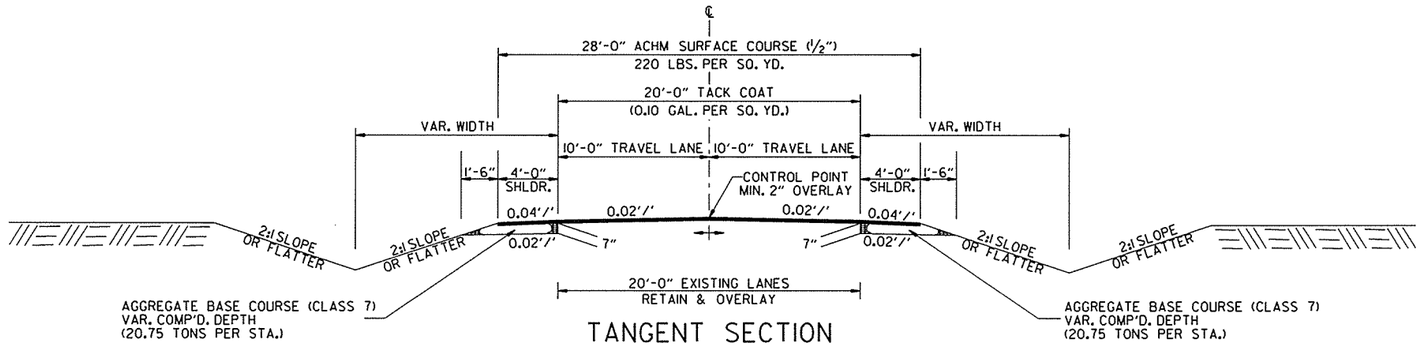
10/2/2015

R061441.DGN

TYPICAL SECTIONS OF IMPROVEMENT

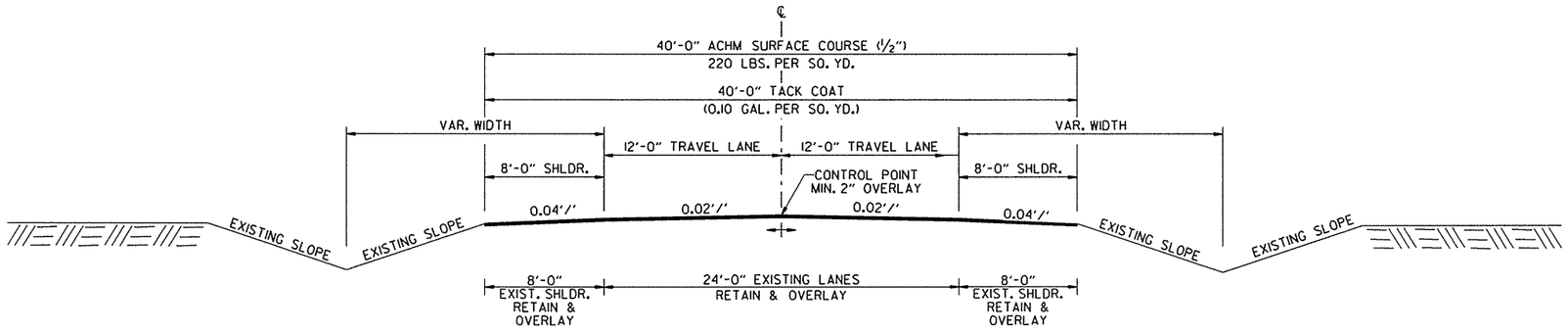
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	3A	48

(2) TYPICAL SECTIONS OF IMPROVEMENT



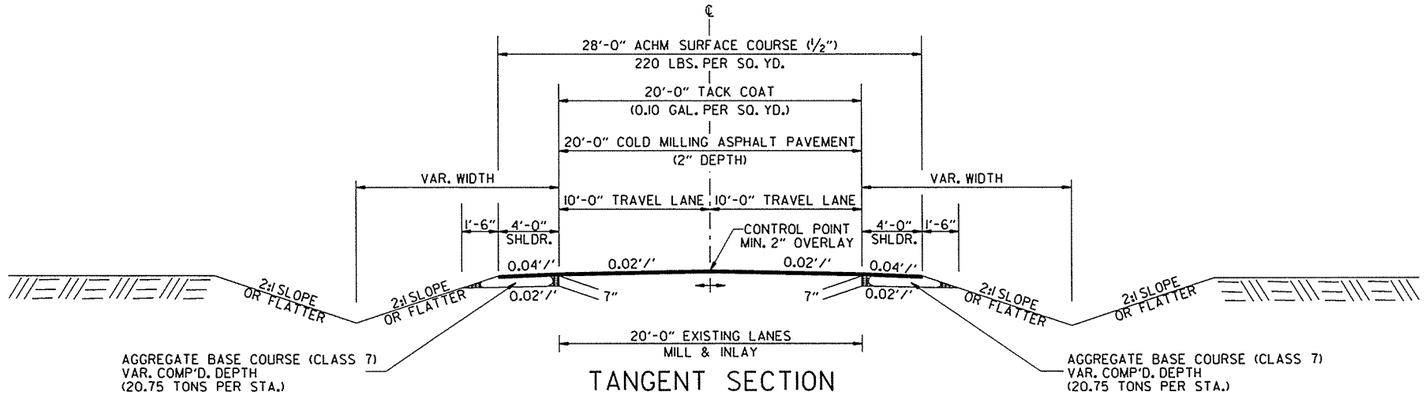
TANGENT SECTION
HWY. 5: NOTCH & WIDENING WITH 10' LANES

SEC. 7 LM 8.260 - 9.397
SEC. 7 LM 9.408 - 12.293
SEC. 7 LM 12.313 - 14.168
SEC. 7 LM 14.199 - 14.447
SEC. 7 LM 14.488 - 15.050



TANGENT SECTION
HWY. 5: OVERLAY WITH 12' LANES

SEC. 7 LM 15.050 - 15.250
SEC. 7 LM 15.798 - 15.933
SEC. 7 LM 15.979 - 16.320



TANGENT SECTION
HWY. 5: NOTCH & WIDENING WITH 10' LANES
MILL & INLAY

SEC. 7 LM 14.168 - 14.199
SEC. 7 LM 14.447 - 14.488

NOTES:

THE EXISTING ASPHALT PAVEMENT TO BE REMOVED FROM THE REMAINING PAVEMENT SHALL BE SEPARATED BY SAWING ALONG A NEAT LINE. AFTER SAWING, THE PAVEMENT TO BE REMOVED SHALL BE CAREFULLY REMOVED IN A MANNER THAT WILL NOT DAMAGE THE PAVEMENT THAT IS TO REMAIN. ANY DAMAGE OF THE ASPHALT PAVEMENT THAT IS TO REMAIN IN PLACE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

SLOPES SHOWN ON TYPICAL SECTIONS ARE NORMAL. MATCH EXISTING CROSS SLOPE IN SUPERELEVATED SECTIONS.

ON ALL SUPERELEVATED CURVES AND THRU SUPERELEVATION TRANSITIONS THE ALGEBRAIC DIFFERENCE BETWEEN PAVEMENT SLOPE AND SHOULDER SLOPE SHALL NOT EXCEED 0.08'/'.

THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.

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THE FINAL 2" OF SURFACE COURSE IS TO BE PLACED AFTER ALL OTHER COURSES HAVE BEEN LAID. LONGITUDINAL JOINTS SHALL BE AT LANE LINES.

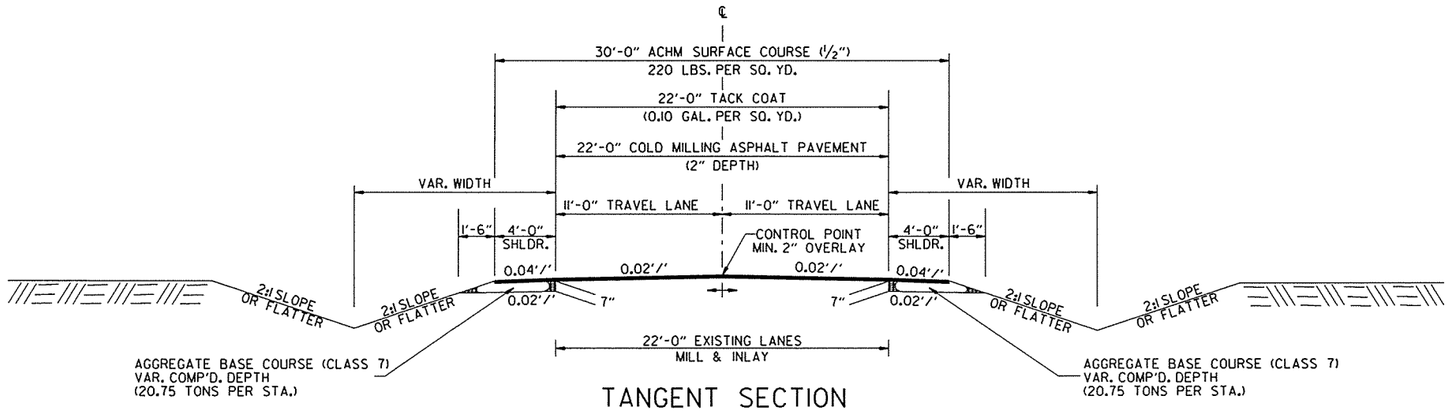
10/20/2015

R061441.DGN

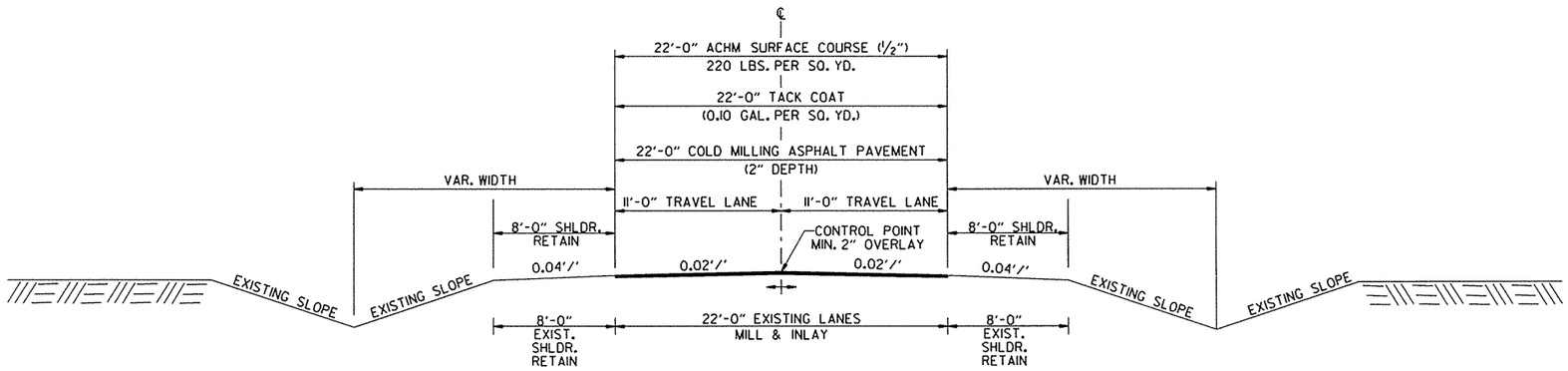
TYPICAL SECTIONS OF IMPROVEMENT

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	4	48

(2) TYPICAL SECTIONS OF IMPROVEMENT



TANGENT SECTION
HWY. 5: NOTCH & WIDENING WITH 11' LANES
MILL & INLAY
SEC. 7 LM 15.499 - 15.610



TANGENT SECTION
HWY. 5: OVERLAY WITH 11' LANES
MILL & INLAY
SEC. 7 LM 15.610 - 15.756

NOTES:

THE EXISTING ASPHALT PAVEMENT TO BE REMOVED FROM THE REMAINING PAVEMENT SHALL BE SEPARATED BY SAWING ALONG A NEAT LINE. AFTER SAWING, THE PAVEMENT TO BE REMOVED SHALL BE CAREFULLY REMOVED IN A MANNER THAT WILL NOT DAMAGE THE PAVEMENT THAT IS TO REMAIN. ANY DAMAGE OF THE ASPHALT PAVEMENT THAT IS TO REMAIN IN PLACE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-21-15

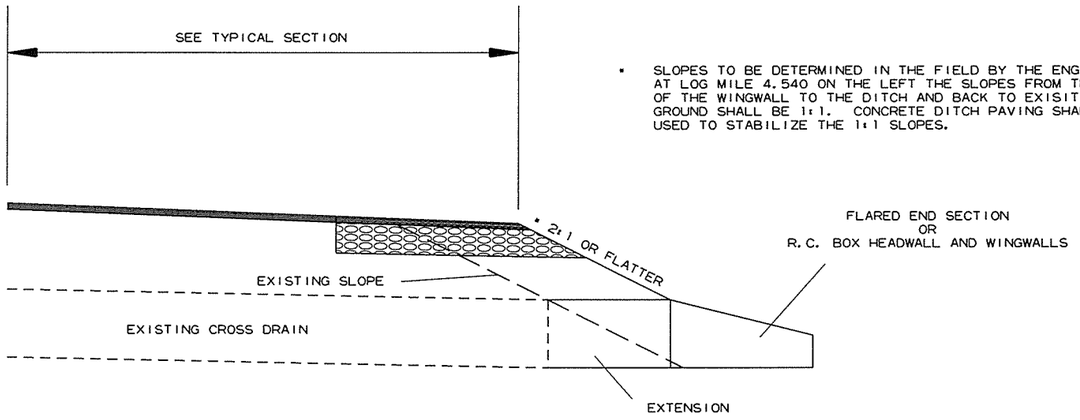
10/20/2015

R061441.DGN

TYPICAL SECTIONS OF IMPROVEMENT

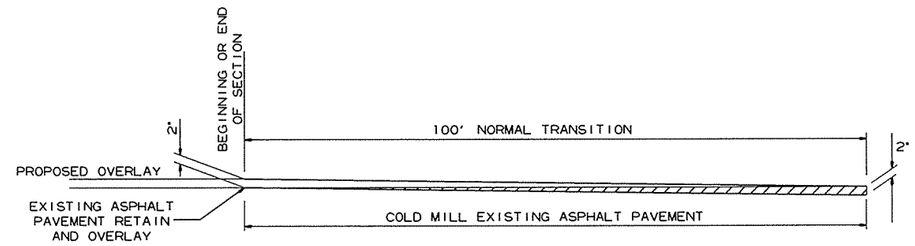
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
1-07-16				6	ARK.			
				JOB NO.		061441	5	48

(2) SPECIAL DETAILS

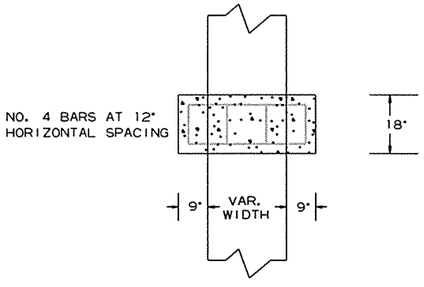


* SLOPES TO BE DETERMINED IN THE FIELD BY THE ENGINEER. AT LOG MILE 4.540 ON THE LEFT THE SLOPES FROM THE END OF THE WINGWALL TO THE DITCH AND BACK TO EXISITING GROUND SHALL BE 1:1. CONCRETE DITCH PAVING SHALL BE USED TO STABILIZE THE 1:1 SLOPES.

DETAIL OF CROSS DRAIN EXTENSION

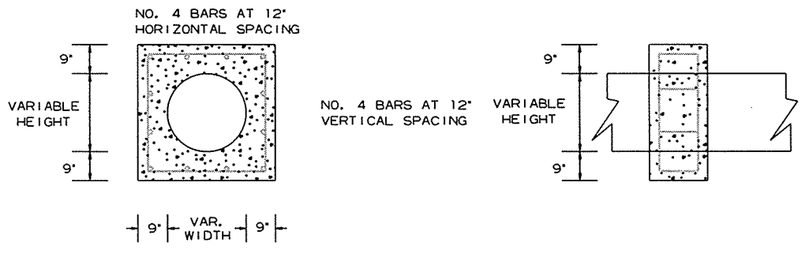


DETAIL FOR TRANSITIONS



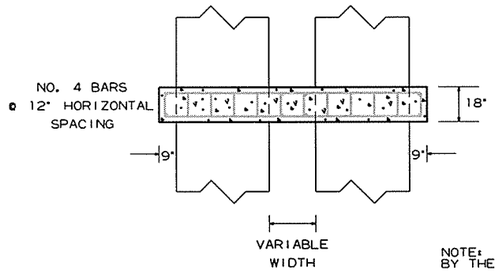
TOP VIEW

MIN 3" COVER



FRONT VIEW SIDE VIEW

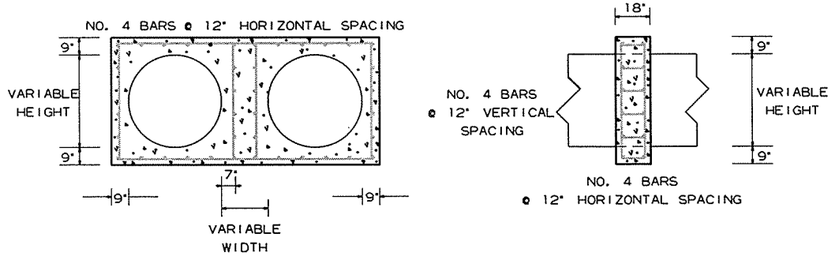
PIPE EXTENSION REINFORCED CONCRETE COLLAR DETAIL



TOP VIEW

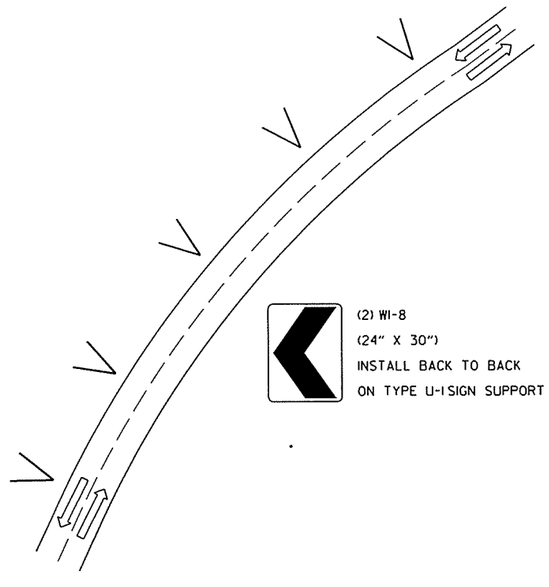
NOTE: PIPE COLLAR TO BE UTILIZED AS APPROVED BY THE ENGINEER.

MIN. 3" COVER



FRONT VIEW SIDE VIEW

PIPE EXTENSION REINFORCED CONCRETE COLLAR DETAIL



DETAIL FOR CHEVRON PLACEMENT

10/20/2015

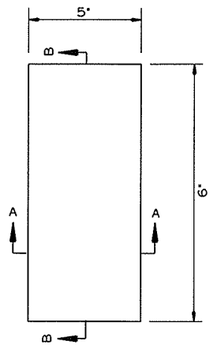
R061441.DGN

SPECIAL DETAILS

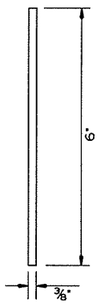
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	6	48

(2) SPECIAL DETAILS

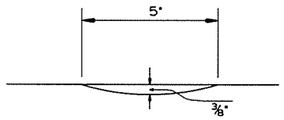
STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15



PLAN

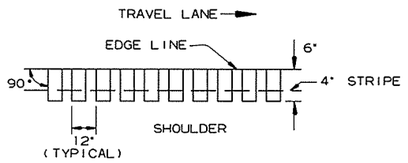


SECTION B-B

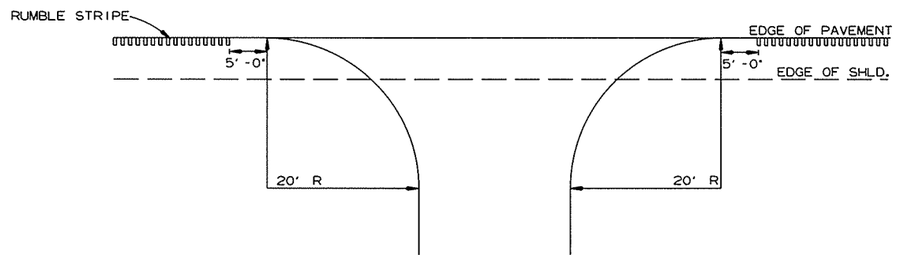


SECTION A-A

DETAILS OF RUMBLE STRIPE



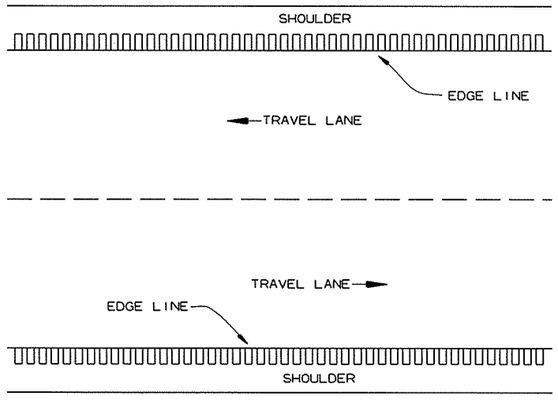
LOCATION PLAN OF RUMBLE STRIPE
LEFT OR RIGHT SHOULDER



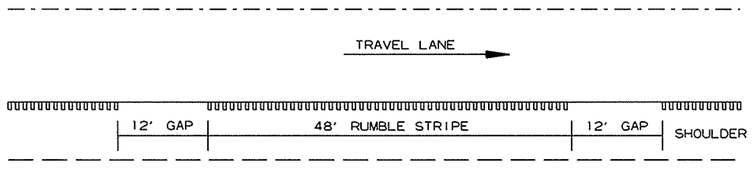
DETAIL FOR RUMBLE STRIPE GAP
AT DRIVEWAY TURNOUTS

GENERAL NOTES

1. RUMBLE STRIPES SHALL NOT BE INSTALLED ON BRIDGE DECKS, APPROACH SLABS, INTERSECTING STREETS OR ROADWAYS, RESIDENTIAL OR COMMERCIAL DRIVEWAYS OR ACROSS TRANSVERSE JOINTS OF CONCRETE SHOULDERS.
2. RUMBLE STRIPES SHALL NOT BE INSTALLED ON A PAVED SHOULDER THAT IS USED AS A DECELERATION LANE FOR THE LENGTH DEEMED APPROPRIATE BY THE ENGINEER.
3. RUMBLE STRIPES SHALL BE MEASURED BY THE LINEAR FOOT LONGITUDINALLY ALONG THE SHOULDER. PAYMENT SHALL ONLY INCLUDE THAT PORTION OF THE SHOULDER ON WHICH RUMBLE STRIPES HAVE BEEN CONSTRUCTED. NO MEASUREMENT OR PAYMENT WILL BE MADE FOR GAPS, DRIVEWAYS, TURNOUTS, OR OTHER PUBLIC ROAD INTERSECTIONS WHERE RUMBLE STRIPES HAVE NOT BEEN CONSTRUCTED.
4. THE 3/8" DEPTH SHALL GENERALLY APPLY FOR THE ENTIRE 6" LENGTH. SOME VARIATION TO SUIT SHOULDER SLOPE BREAKS MAY BE NECESSARY.



PLAN VIEW



NOTE: GAP PATTERN SHALL BE ADJUSTED BY THE ENGINEER IN THE FIELD ALLOWING FOR DRIVEWAYS TO SERVE AS THE GAP.

DETAIL FOR GAP PATTERN RUMBLE STRIPE

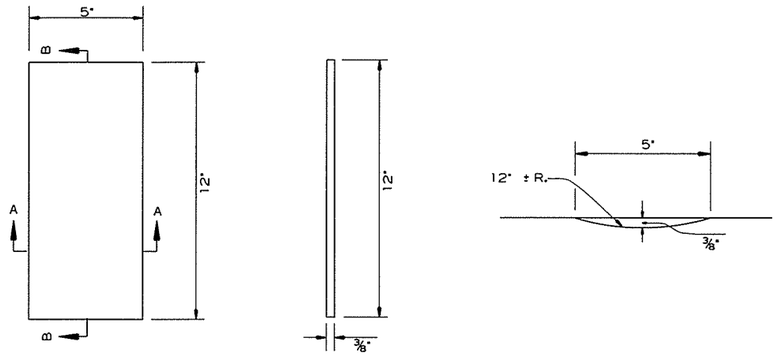
10/2/2015

R061441.DGN

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	7	48

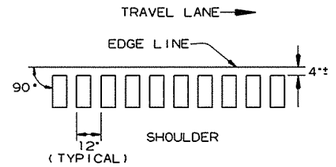
(2) SPECIAL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15

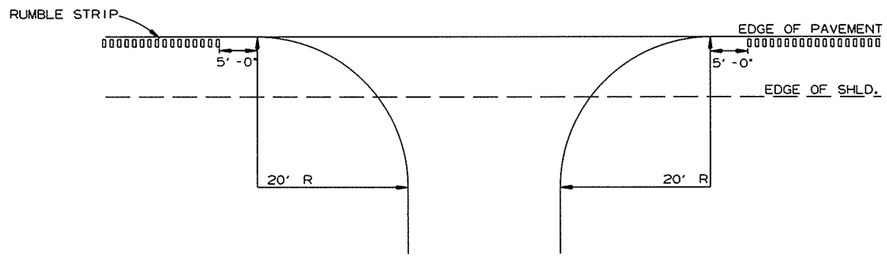


PLAN SECTION B-B SECTION A-A

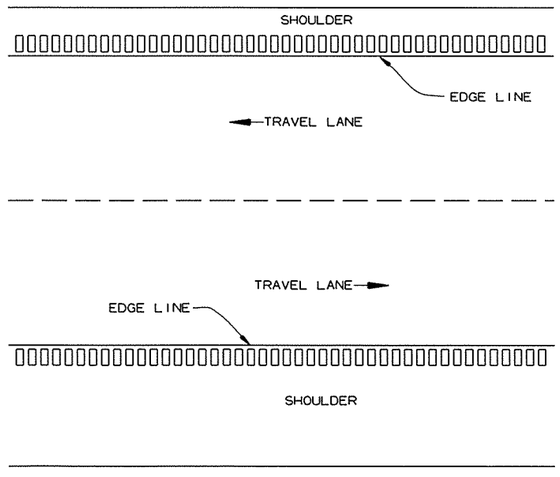
DETAILS OF RUMBLE STRIPS



LOCATION PLAN OF RUMBLE STRIPS
LEFT OR RIGHT SHOULDER



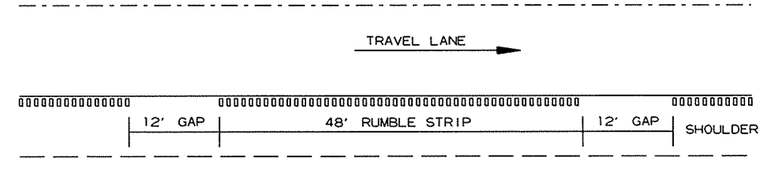
DETAIL FOR RUMBLE STRIP GAP
AT DRIVEWAY TURNOUTS



PLAN VIEW

GENERAL NOTES

1. RUMBLE STRIPS SHALL NOT BE INSTALLED ON CURB SECTIONS, BRIDGE DECKS, APPROACH SLABS, INTERSECTING STREETS OR ROADWAYS, RESIDENTIAL OR COMMERCIAL DRIVEWAYS OR ACROSS TRANSVERSE JOINTS OF CONCRETE SHOULDERS.
2. RUMBLE STRIPS SHALL NOT BE INSTALLED ON A PAVED SHOULDER THAT IS USED AS A DECELERATION LANE FOR THE LENGTH DEEMED APPROPRIATE BY THE ENGINEER.
3. THE 4" OFFSET FROM THE EDGE LINE MAY BE INCREASED TO AVOID LONGITUDINAL JOINTS. IN ALL CASES, THE LATERAL DEVIATION FROM THE PLANNED OFFSET SHOULD BE KEPT TO A MINIMUM.
4. RUMBLE STRIPS SHALL BE MEASURED BY THE LINEAR FOOT LONGITUDINALLY ALONG THE SHOULDER. PAYMENT SHALL ONLY INCLUDE THAT PORTION OF THE SHOULDER ON WHICH RUMBLE STRIPS HAVE BEEN CONSTRUCTED. NO MEASUREMENT OR PAYMENT WILL BE MADE FOR GAPS, DRIVEWAYS, TURNOUTS, OR OTHER PUBLIC ROAD INTERSECTIONS WHERE RUMBLE STRIPS HAVE NOT BEEN CONSTRUCTED.
5. THE 3/8" DEPTH SHALL GENERALLY APPLY FOR THE ENTIRE 12" LENGTH. SOME VARIATION TO SUIT SHOULDER SLOPE BREAKS MAY BE NECESSARY.



NOTE: GAP PATTERN SHALL BE ADJUSTED BY THE ENGINEER IN THE FIELD ALLOWING FOR DRIVEWAYS TO SERVE AS THE GAP.

DETAIL FOR GAP PATTERN RUMBLE STRIP

10/2/2015

R061441.DGN

SPECIAL DETAILS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	8	48

(2) SPECIAL DETAILS

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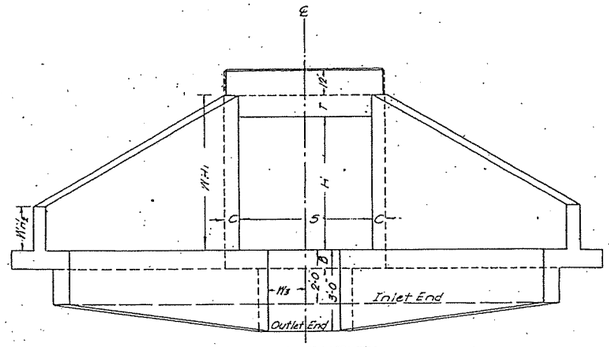
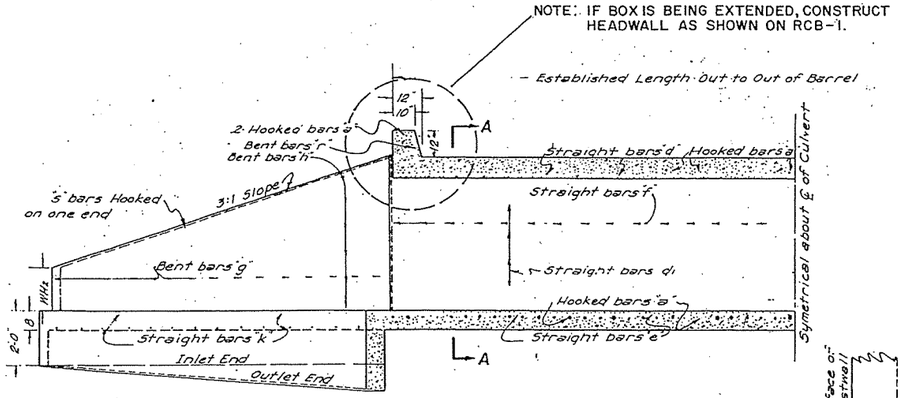
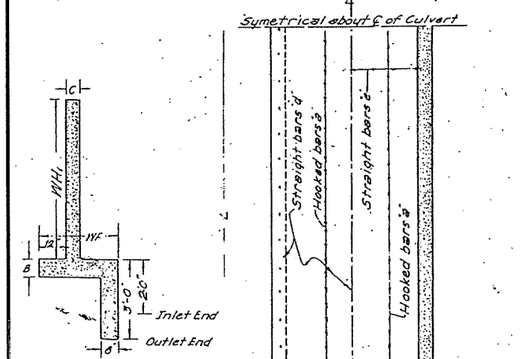


END ELEVATION



LONGITUDINAL SECTION



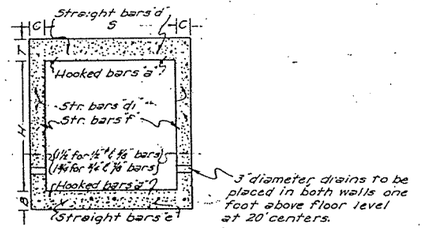
PLAN

HALF SECTION TOP SLAB

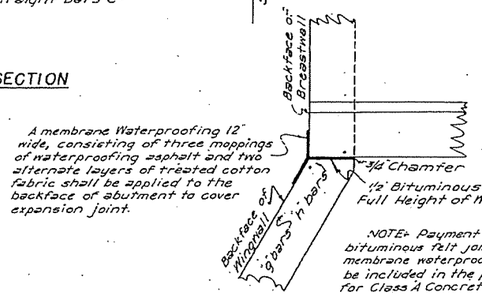
HALF SECTION BOTTOM SLAB & SIDEWALL

SECTION B-B

Note: Angle of wingwalls may be varied to conform to the natural or proposed Inlet or Outlet Channel.



SECTION A-A



A membrane Waterproofing 12" wide, consisting of three moppings of waterproofing asphalt and two alternate layers of treated cotton fabric shall be applied to the backface of abutment to cover expansion joint.

NOTE: Payment for the bituminous felt joint and membrane waterproofing shall be included in the price bid for Class A Concrete.

DETAIL OF EXPANSION JOINT FOR CULVERT WHEN HEIGHT "H" = 8' OR MORE

Scale ¾" = 1'-0"

SECTION A-A

DIMENSIONS AND QUANTITIES

SPAN	HEIGHT	AREA OF OPENING SQ. FT.	MAXIMUM DEPTH OF COVER	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF BOTTOM SLAB	WINGWALL HEIGHTS AT HEADWALL	WINGWALL HEIGHTS AT WING END	MAXIMUM WIDTH OF WING FOOTING	PERPENDICULAR DIST. FROM FACE OF HDWALL TO END OF WING	LENGTH OF WINGWALLS	INSIDE LENGTH OF WING FOOTING	FOOTING DIMENSION FROM ℄ OF BOX	CONCRETE CU. YDS. HEADWALLS WINGWALLS & FOOTINGS	CONCRETE CU. YDS. PER LINEAR FOOT OF BARREL	STEEL L.B. HEADWALLS WINGWALLS & FOOTINGS	STEEL L.B. PER LINEAR FOOT OF BARREL	100 L. STEEL FOR LAPS
S	H	A	D	T	C	B	WH1	WH2	WF	F	W1	W2	W3					
3	2	6	16'	6½"	6"	6½"	2'-9"	1'-0"	2'-6"	5'-3"	6'-0¼"	3'-9¼"	0'-10⅛"	3.65	0.235	233	22.56	11.1
	3	9					3'-9"	1'-0"	2'-6"	6'-3"	9'-6¼"	3'-2¼"	0'-10⅛"	5.86	0.272	350	25.27	13.4
	4	12					4'-9"	1'-4"	2'-6"	10'-3"	11'-10"	1'-5½"	0'-10⅛"	7.71	0.309	459	27.97	15.6
4	2	8	13'	7½"	6"	7½"	2'-9"	1'-0"	2'-6"	5'-3"	6'-0¼"	3'-9¼"	1'-4⅛"	4.02	0.306	245	31.05	15.6
	3	12	13'				3'-9"	1'-0"	2'-6"	6'-3"	9'-6¼"	3'-2¼"	1'-4⅛"	6.30	0.343	362	33.76	17.8
	4	16	13'				4'-9"	1'-4"	2'-6"	10'-3"	11'-10"	1'-5½"	1'-4⅛"	8.20	0.380	471	36.46	20.0
	6	24	11'				6'-9"	2'-0"	3'-4½"	14'-3"	16'-5½"	6'-8½"	0'-5"	13.57	0.498	776	42.41	24.5
5	2	10	11'	8"	6"	8"	2'-10"	1'-0"	2'-6"	5'-6"	6'-1¼"	6'-0⅝"	1'-10⅛"	4.56	0.370	288	38.31	17.8
	3	15	11'				3'-10"	1'-0"	2'-6"	8'-6"	9'-9⅜"	9'-6¼"	1'-10⅛"	6.82	0.407	407	41.06	22.0
	4	20	11'				4'-10"	1'-4"	2'-6"	10'-6"	12'-1½"	11'-10"	1'-10⅛"	8.78	0.444	512	43.77	22.3
	5	25	11'				5'-10"	1'-8"	2'-11"	12'-6"	14'-5⅝"	14'-4⅝"	1'-11½"	11.20	0.451	648	46.47	24.5
	7	35	9'			7½"	7'-10"	2'-8"	3'-1"	16'-6"	18'-9⅞"	18'-7⅞"	0'-4"	19.17	0.633	1231	58.60	28.9
6	3	18	9'	9"	6"	9"	3'-10"	1'-0"	2'-6"	8'-6"	9'-9⅛"	9'-6¼"	2'-4⅛"	7.28	0.500	402	50.41	22.3
	4	24	9'				4'-10"	1'-4"	2'-6"	10'-6"	12'-1⅞"	11'-10"	2'-4⅛"	9.28	0.537	525	53.11	24.5
	5	30	9'				5'-10"	1'-8"	2'-11"	12'-6"	14'-5⅝"	14'-4⅝"	2'-10½"	11.30	0.574	663	55.82	26.7
	6	36	9'				6'-10"	2'-0"	3'-5"	14'-6"	16'-9"	17'-0"	1'-4½"	15.76	0.657	824	58.55	28.9
	8	48	7'				8'-10"	2'-8"	4'-5"	18'-6"	21'-4½"	22'-3"	0'-3⅝"	24.93	0.802	1249	72.49	33.4
8	7	56	7'	11"	8"	7½"	8'-0"	2'-4"	4'-0"	17'-0"	19'-7½"	20'-3"	1'-1⅞"	22.58	0.952	1337	84.24	40.1
	9	64	7'			8"	9'-0"	2'-8"	4'-6"	19'-0"	21'-11⅝"	22'-10⅝"	1'-2½"	27.97	1.020	1592	88.05	42.3
	10	80	7'			10"	11'-0"	3'-4"	5'-6"	23'-0"	26'-6⅜"	28'-1½"	0'-2½"	43.93	1.274	2449	101.18	46.6
10	6	60	6'	13"	8"	8"	9'-0"	2'-8"	4'-6"	19'-0"	21'-11⅝"	22'-10⅝"	2'-2½"	30.05	1.305	1659	136.74	44.5
	10	100	6'			10"	11'-0"	3'-4"	5'-6"	23'-0"	26'-6⅜"	28'-1½"	1'-2½"	46.74	1.593	2524	151.04	49.0
	12	120	6'			12"	13'-0"	4'-0"	6'-6"	27'-0"	31'-2"	33'-4½"	0'-2½"	69.22	1.852	3847	169.90	53.4

LAP NOTE - In computing quantities of Steel from the above table, add one lap for culverts up to 50'-0 in length and one lap for each additional 25'-0 in length.

SPECIFICATIONS: Arkansas Standard Road and Bridge Specifications.

*REINFORCING STEEL - To be deformed bars of structural or intermediate grade.

CHAMFER - All exposed corners to have ¾" Chamfer

CONCRETE - All concrete to be Class 'A'.

*Reinforcing Steel to be deformed bars of intermediate or rail grade on all Interstate Highways.

STEEL SCHEDULE

For Culverts 30'-0 in Length-Out to Out of Barrel

SPAN	HEIGHT	'a' bars (3" for 11 #4 & #6 bars; 6" for 14 #4 & #5 bars; 2 in each headwall balance in Top and Bottom slab of barrel.) SIZE	'a' bars STIRRUPS SPACING	'a' bars NUMBER	'a' bars LENGTH	X	'd' bars STRAIGHT In Bottom of Top Slab SIZE	'd' bars STRAIGHT In Bottom of Top Slab SPACING	'd' bars STRAIGHT In Bottom of Top Slab NUMBER	'd' bars STRAIGHT In Bottom of Top Slab LENGTH	'd1' bars STRAIGHT In Sidewalls SIZE	'd1' bars STRAIGHT In Sidewalls SPACING	'd1' bars STRAIGHT In Sidewalls NUMBER	'd1' bars STRAIGHT In Sidewalls LENGTH	'e' bars In Top of Bottom Slab SIZE	'e' bars In Top of Bottom Slab SPACING	'e' bars In Top of Bottom Slab NUMBER	'e' bars In Top of Bottom Slab LENGTH	'f' bars STRAIGHT Vertical bars in Sidewalls SIZE	'f' bars STRAIGHT Vertical bars in Sidewalls SPACING	'f' bars STRAIGHT Vertical bars in Sidewalls NUMBER	'f' bars STRAIGHT Vertical bars in Sidewalls LENGTH	'g' bars Vertical bars in back face of Wingwall bent into Bottom of Footing SIZE	SPACING	NUMBER	LENGTH	X Min	X Max	Y Min	Y Max	'h' bars ½"ℓ bars @ 12" Ctrs Horizontal bars in Wingwalls NUMBER	LENGTH	Z Min	Z Max	'k' bars f'ℓ bars STRAIGHT In Wing Footing NUMBER	LENGTH	'r' bars ½"ℓ bars @ 24" Ctrs Dowels in Headwalls NUMBER	LENGTH	's' bars ½"ℓ bars In Top of each Wingwall NUMBER	LENGTH	Z
S	H	SIZE	SPACING	NUMBER	LENGTH	X	SIZE	SPACING	NUMBER	LENGTH	SIZE	SPACING	NUMBER	LENGTH	SIZE	SPACING	NUMBER	LENGTH	SIZE	SPACING	NUMBER	LENGTH	SIZE	SPACING	NUMBER	LENGTH																
3	2	#4	6"	124	4'-6"	3'-9"	#4	12"	4	2'-10"	#4	12"	2	2'-10"	#4	12"	4	2'-10"	#4	12"	62	2'-10"	#4	12"	28	3'-5"	1'-3"	1'-3"	1'-3½"	3'-0⅛"	12	6'-3¼"	2'-4"	5'-9⅝"	12	7'-8"	10	2'-11⅝"	4	7'-7⅛"	7'-1⅛"
	3			124	4'-6"	3'-9"			4	3'-10"			2	3'-10"			4	3'-10"			62	3'-10"	#5	12"	40	3'-11"	1'-3"	1'-3"	1'-4½"	3'-11½"	16	8'-4"	2'-5"	8'-3⅛"	12	11'-5½"	10	2'-11½"	4	11'-2⅜"	10'-8⅜"
	4			124	4'-6"	3'-9"			4	4'-10"			2	4'-10"			4	4'-10"			62	4'-10"			48	4'-7"	1'-3"	1'-3"	1'-5"	4'-11"	20	10'-5"	2'-5"	10'-3"	12	15'-3½"	10	2'-11½"	4	15'-7⅛"	13'-7⅛"
4	2	#5	5"	148	5'-6"	4'-3"	#4	12"	4	3'-0"	#4	12"	2	3'-0"	#4	12"	4	3'-0"	#4	12"	62	3'-0"	#4	12"	28	3'-6"	1'-3"	1'-3"	1'-4¼"	3'-1½"	12	6'-3¼"	2'-4"	5'-9⅝"	12	7'-8"	12	3'-0½"	4	7'-7⅛"	7'-1⅛"
	3			148	5'-6"	4'-3"			6	4'-0"			3	4'-0"			6	4'-0"			62	4'-0"	#5	12"	40	4'-0"	1'-3"	1'-3"	1'-5½"	4'-0½"	16	8'-4"	2'-5"	9'-3¼"	12	11'-5½"	12	3'-0½"	4	11'-2⅜"	10'-8⅜"
	4			148	5'-6"	4'-3"			6	5'-0"			3	5'-0"			6	5'-0"			62	5'-0"			48	4'-8"	1'-3"	1'-3"	1'-10"	5'-0"	20	9'-8½"	2'-5"	11'-7"	12	13'-5½"	12	3'-0½"	4	13'-7⅛"	13'-1⅛"
	6			148	5'-6"	4'-11"			6	7'-0"			3	7'-0"			6	7'-0"			62	7'-0"			63	6'-5½"	1'-4"	2'-1"	2'-3½"	7'-0½"	28	12'-11"	2'-5"	16'-2½"	12	18'-0½"	12	3'-0½"	4	18'-4⅜"	17'-10⅜"
5	2	#6	7"	108	6'-6"	5'-9"	#4	10"	7	3'-1"	#4	10"	4	3'-1"	#4	10"	7	3'-1"	#4	10"	62	3'-1"			28	3'-7"	1'-3"	1'-3"	1'-6"	3'-2"	12	6'-7¼"	2'-7½"	6'-1⅛"	12	7'-11⅝"	14	3'-1"	4	7'-10⅜"	7'-4⅜"
	3			108	6'-6"	5'-9"			7	4'-1"			4	4'-1"			7	4'-1"			62	4'-1"			40	4'-1"	1'-3"	1'-3"	1'-6½"	4'-1½"	16	8'-7⅛"	2'-7½"	9'-6⅝"	12	11'-5"	14	3'-1"	4	11'-6"	11'-0"
	4			108	6'-6"	5'-9"			7	5'-1"			6	5'-1"			7	5'-1"			62	5'-1"	#6	12"	52	4'-9"	1'-3"	1'-3"	1'-8"	5'-3"	20	10'-0⅜"	2'-7½"	11'-10⅝"	12	13'-5⅝"	14	3'-1"	4	13'-10⅜"	13'-4⅜"
	5			108	6'-6"	5'-9"			7	6'-1"			6	6'-1"			7	6'-1"			62	6'-1"			60	5'-7½"	1'-3"	1'-8"	2'-2"	6'-2"	24	11'-7⅛"	2'-7½"	14'-2⅜"	12	16'-0⅜"	14	3'-1"	4	16'-3⅝"	15'-9⅝"
	7			108	6'-5"	6'-0"			7	8'-1"			6	8'-1"			7	8'-1"			62	8'-1"	#7	12"	80	7'-6½"	1'-4½"	2'-8"	2'-9"	8'-3"	32	14'-8⅝"	2'-7½"	18'-9⅝"	12	20'-6"	14	3'-1"	4	21'-1⅜"	20'-7⅜"
6	3	#6	6"	124	7'-6"	6'-5"	#4	10"	6	4'-3"	#4	10"	4	4'-3"	#4	10"	6	4'-3"	#4	10"	62	4'-3"			40	4'-2"	1'-3"	1'-3"	1'-7½"	4'-2¾"	16	8'-7⅛"	2'-7½"	9'-6⅝"	12	11'-5"	16	3'-2"	4	11'-6"	11'-0"
	4			124	7'-6"	6'-5"			6	5'-3"			4	5'-3"			6	5'-3"			62	5'-3"			52	4'-10"	1'-3"	1'-3"	1'-10"	5'-4"	20	10'-0⅜"	2'-7½"	11'-10⅝"	12	13'-5⅝"	16	3'-2"	4	13'-10⅜"	13'-4⅜"
	5	#6	6"	124	7'-6"	6'-5"	#4	10"	6	6'-3"	#4	10"	4	6'-3"	#4	10"	6	6'-3"	#4	10"	62	6'-3"	#6	12"	60	5'-8½"	1'-3"	1'-8"	2'-3"	6'-3"	24	11'-7⅛"	2'-7½"	14'-2⅜"	12	16'-0⅜"	16	3'-2"	4	16'-3⅝"	15'-9⅝"
	6			124	7'-6"	6'-11"			6	7'-3"			4	7'-3"			6	7'-3"			62	7'-3"			68	6'-6"	1'-4"	2'-2"	2'-7½"	7'-2¾"	28	13'-2⅜"	2'-7½"	16'-6"	12	18'-4⅛"	16	3'-2"	4	18'-8⅛"	18'-2⅛"
	8			124	7'-10"	7'-1"			8	9'-3"			6	9'-3"			8	9'-3"			62	9'-3"	#7	12"	80	8'-6½"	1'-5"	3'-2"	3'-2¾"	9'-3⅝"	36	16'-2⅛"	2'-7½"	21'-1⅝"	12	22'-11⅝"	16	3'-2"	4	23'-6"	23'-0"
8	7	#7	6"	84	10'-5⅞"	8'-11⅛"	#4	10"	8	6'-7"	#4	10"	6	6'-7"	#4	10"	8	6'-7"	#4	10"	62	6'-7"			60	7'-10¾"	1'-4½"	2'-8"	3'-1"	8'-7"	32	15'-3¼"	3'-2¼"	19'-6⅜"	12	21'-2⅝"	20	3'-4"	4	21'-6⅜"	21'-2⅜"
	8	#8	5"	88	10'-6½"	9'-0⅛"	#5	12"	12	9'-7"	#5	12"	8	9'-7"	#5	12"	12	9'-7"	#5	12"	62	9'-7"	#6	12"	80	8'-10"	1'-5"	3'-3"	3'-5½"	9'-6⅜"	36	16'-9¾"	3'-2¼"	21'-8⅜"	12	23'-6⅛"	20	3'-4"	4	24'-1⅛"	23'-7⅛"
	10			84	10'-10⅛"	9'-4½"			12				8				12				74	11'-7"	#7	12"	124	10'-5"	1'-7"	4'-3"	4'-1"	11'-7"	44	19'-10⅝"	3'-2¼"	26'-3⅛"	12	28'-2"	20	3'-4"	4	28'-11"	28'-5"
10	6	#8	5"	108	12'-6½"	11'-0⅛"	#5	10"	13		#5	10"	8		#5	10"	13		#5	10"	62	9'-11"	#6	12"	88	8'-0"	1'-5"	3'-3"	3'-7¼"	9'-3⅝"	36	16'-9¾"	3'-2¼"	21'-8⅜"	12	23'-6⅛"	20	3'-4"	4	24'-1⅛"	23'-7⅛"
	10	#9	7"	108	12'-10⅝"	11'-4½"	#6	10"	13		#6	10"	8		#6	10"	13		#6	10"	74	11'-11"	#7	12"	124	10'-11"	1'-7"	4'-3"	4'-1½"	11'-11"	44	19'-10⅝"	3'-2¼"	26'-3⅛"	12	28'-2"	20	3'-5"	4	28'-11"	28'-5"
	12			108	13'-2½"	11'-8½"			13				8				13				92	13'-11"			188	12'-10"	1'-9"	5'-3"	5'-10⅞"	13'-9⅜"	52	23'-0"	3'-2¼"	30'-1⅞"	12	32'-9⅛"	26	3'-8"	4	33'-3⅛"	33'-2⅛"

NOTE: Lengths given above do not include lap.

REVISIONS	
Jan. 1957	Redrawn
Nov. 1957	Military Loading

A.A.S.H.O. DESIGN LIVE LOADING H-20 S-16

UNIT STRESSES

Concrete, (n-15) - 840 Lbs. Per Sq. In.
Reinf. Steel (Str. Gr.) - 18,000 Lbs. Per Sq. In.

SPECIAL MILITARY LOADING

Add'l Loading For Interstate Highways
2-24,000 Lb. Axles @ 4'-0" Ctrs.
Concrete (n-15) - 840 Lbs. per Sq. In.
Reinf. Steel (Int. or Rail) - 20000 Lbs. per Sq. In.

10/2/2015

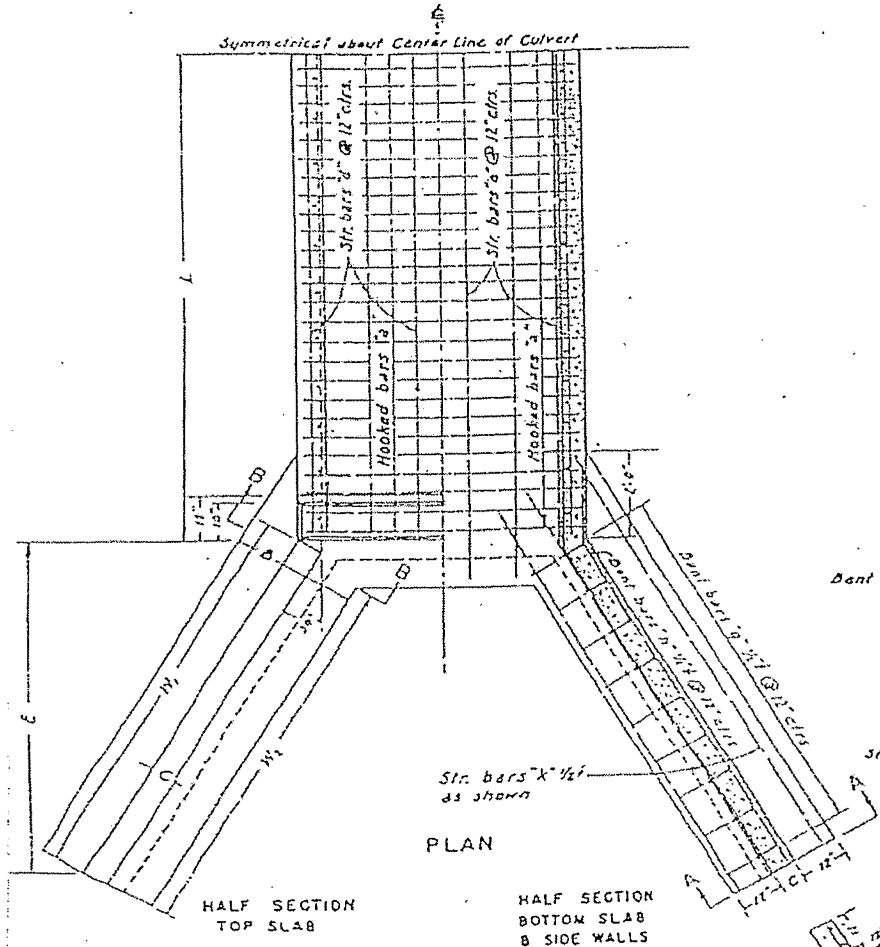
R061441.DGN

SPECIAL DETAILS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
					JOB NO.	061441	9	48

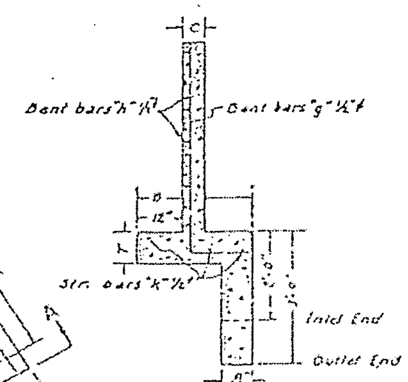
(2) SPECIAL DETAILS

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11425 TRINITY D. SMITH
10-9-15

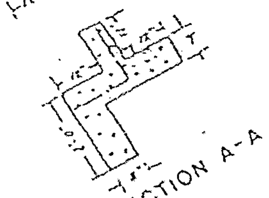


PLAN

NOTE:-
Angle of Wingwalls may be varied to conform to the natural or proposed inlet or outlet channel.



SECTION B-B



SECTION A-A

STEEL SCHEDULE

For Culvert 32' in Length Out to Out of Barrel

S (Length of Span)	H (Height)	"a" bars Size	"a" Spacing	"a" Number	"a" Length	"a" X	"b" bars Number	"b" Length	"c" bars Number	"c" Length	"f" bars Size	"f" Spacing	"f" Number	"f" Length	"g" bars Size	"g" Spacing	"g" Number	"g" Av. Length	"g" X Min.	"g" X Max.	"g" Y Min.	"g" Y Max.	"h" bars Number	"h" Av. Length	"h" Z Min.	"h" Z Max.	"k" bars Number	"k" Length	"r" bars Number	"r" Length	"s" bars Number	"s" Length
		3" for 2, 3, 4, 5, 6 & 8 Span; 6" for 10' Span; 2 in each headwall, balance in top and bottom slab of barrel					½"φ bars spaced at 12" Centers STRAIGHT; Top slab and Sidewalls		Top of Bottom Slab		STRAIGHT Vertical bars in Sidewalls				Vertical bars in Wingwalls								½"φ bars @ 12" Ctrs. Horizontal bars in Wingwalls				½"φ bars STRAIGHT Top of Wing Footings		½"φ BENT Dowel bar in Headwall		½"φ one in Top of Each Wingwall	
2	2	½"φ	6½"	122	3'-7"	2'-3"	2	31'-8" for 32'-0" Length	3	33'-9" for 32'-0" Length	½"	12"	64	2'-10"	½"φ	12"	16	3'-4"	1'-4"	2'-5"	1'-3"	1'-3"	12	4'-7"	1'-4"	3'-8"	12	5'-4"	6	3'-7"	4	5'-3"
3	2	⅝"φ	6"	132	4'-7"	3'-3"	3		4		½"φ	12"	64	2'-11"	½"φ	12"	16	3'-4½"	1'-4½"	2'-3½"	1'-3"	1'-3"	12	4'-7"	1'-4"	3'-6"	12	5'-4"	8	3'-7"	4	5'-3"
	3			132	4'-7"	3'-7"	3		4				64	3'-11"			24	3'-4½"	1'-6½"	3'-3½"	1'-3"	1'-3"	16	5'-11"	1'-4"	6'-8"	12	7'-8"	8	3'-7"	4	7'-3"
4	2	⅝"φ	5½"	144	5'-7"	4'-9"	7		5		½"φ	12"	64	3'-5"	½"φ	12"	16	3'-5"	1'-5"	2'-10"	1'-3"	1'-3"	12	4'-7"	1'-4"	3'-8"	12	5'-4"	10	3'-6"	4	5'-3"
	3			144	5'-7"	4'-5"	9		5				64	4'-0"			24	3'-11"	1'-7"	3'-10"	1'-3"	1'-3"	16	5'-11"	1'-4"	6'-0"	12	7'-8"	10	3'-6"	4	7'-3"
	4			144	5'-7"	4'-9"	11		5				64	5'-0"			36	4'-5"	1'-5"	4'-10"	1'-3"	1'-3"	20	7'-2"	1'-4"	8'-4"	12	10'-0"	10	3'-6"	4	10'-3"
5	2	½"φ	5"	158	6'-7"	5'-9"	8		6		⅝"φ	12"	64	3'-1"	½"φ	12"	16	3'-6"	1'-5"	2'-11"	1'-3"	1'-3"	12	4'-7"	1'-4"	3'-8"	12	5'-4"	14	3'-6"	4	5'-3"
	3			156	6'-7"	5'-9"	10		6				64	4'-1"			24	3'-11"	1'-5"	3'-11"	1'-3"	1'-3"	16	5'-11"	1'-4"	6'-0"	12	7'-8"	14	3'-6"	4	7'-3"
	4			158	6'-3"	5'-3"	12		6				64	5'-1"			36	4'-6"	1'-6"	4'-11"	1'-3"	1'-3"	20	7'-2"	1'-4"	8'-4"	12	10'-4"	14	3'-6"	4	10'-3"
	5			156	6'-3"	5'-1"	14		6				64	6'-1"			44	5'-2"	1'-7"	5'-11"	1'-4"	1'-4"	24	8'-3"	1'-4"	10'-4"	12	12'-4"	14	3'-6"	4	12'-3"
6	3	⅝"φ	5"	158	7'-7"	6'-9"	11		7		⅝"φ	12"	64	4'-1"	⅝"φ	12"	24	4'-1"	1'-5"	4'-3"	1'-3"	1'-3"	16	5'-11"	1'-4"	6'-0"	12	7'-8"	16	3'-6"	4	7'-3"
	4			158	7'-7"	6'-5"	13		7				64	5'-2"			36	4'-4"	1'-4"	5'-3"	1'-3"	1'-3"	20	7'-2"	1'-4"	8'-4"	12	10'-0"	16	3'-6"	4	10'-3"
	5			158	7'-7"	6'-5"	15		7				64	6'-2"			44	5'-4"	1'-7"	6'-3"	1'-4"	1'-4"	24	8'-5"	1'-4"	10'-8"	12	12'-4"	16	3'-6"	4	12'-3"
	6			158	7'-7"	6'-9"	17		7				64	7'-2"			52	5'-11"	1'-5"	7'-3"	1'-4"	1'-3"	28	9'-6"	1'-4"	13'-0"	12	14'-7"	16	3'-6"	4	15'-3"
8	3	⅝"φ	6"	132	9'-5"	8'-10"	13		9		⅝"φ	12"	64	4'-5"	½"φ	12"	28	4'-2"	1'-2"	4'-4"	1'-4"	1'-4"	16	4'-6"	1'-6"	4'-3"	12	7'-6"	20	3'-6"	4	7'-3"
	4			132	9'-6"	8'-10"	15		9				64	5'-5"			36	4'-11"	1'-7"	5'-4"	1'-4"	1'-4"	20	7'-6"	1'-6"	8'-3"	12	10'-4"	20	3'-6"	4	10'-3"
	5			132	9'-8"	8'-10"	17		9				64	6'-5"			44	5'-5"	1'-8"	6'-4"	1'-4"	1'-6"	24	8'-9"	1'-6"	11'-0"	12	12'-0"	20	3'-6"	4	12'-3"
	6			132	9'-8"	8'-10"	19		9				64	7'-5"			56	6'-2"	1'-7"	7'-4"	1'-4"	2'-5"	28	10'-0"	1'-6"	13'-4"	12	15'-0"	20	3'-6"	4	15'-3"
	7			132	9'-8"	8'-10"	21		9				64	8'-5"	⅝"φ	12"	64	6'-9"	1'-3"	8'-4"	1'-4"	2'-1"	32	11'-5"	1'-8"	15'-8"	12	17'-4"	20	3'-6"	4	18'-3"
	8			132	9'-10"	9'-0"	23		9				64	9'-3"			72	7'-5"	1'-7"	9'-4"	1'-5"	2'-6"	36	11'-5"	1'-8"	17'-11"	12	19'-8"	20	3'-6"	4	20'-3"
10	4	¾"φ	9½"	86	12'-5"	10'-10"	17		11		⅝"φ	12"	64	5'-5"	½"φ	12"	36	5'-4"	1'-10"	5'-1"	1'-4"	1'-4"	20	7'-7"	1'-8"	8'-4"	12	10'-4"	24	3'-6"	4	10'-3"
	5			86	12'-4"	10'-0"	19		11				64	6'-7"	½"φ	12"	44	5'-6"	1'-8"	6'-6"	1'-4"	1'-6"	24	8'-9"	1'-8"	11'-0"	12	12'-8"	24	3'-6"	4	13'-3"
	6			86	12'-4"	10'-10"	21		11				64	7'-7"			56	6'-1"	1'-8"	7'-6"	1'-4"	1'-8"	28	10'-0"	1'-8"	13'-4"	12	15'-0"	24	3'-6"	4	15'-3"
	7			86	11'-4"	10'-10"	23		11				64	8'-7"			64	7'-11"	1'-10"	8'-6"	1'-4"	2'-1"	32	11'-2"	1'-6"	15'-6"	12	17'-4"	24	3'-6"	4	18'-3"
	8			86	12'-6"	11'-0"	25		11				64	9'-7"	⅝"φ	12"	72	7'-7"	1'-8"	9'-6"	1'-5"	2'-6"	36	12'-5"	1'-8"	17'-11"	12	19'-4"	24	3'-6"	4	20'-3"
	9			86	12'-8"	11'-2"	27		11		¾"φ		64	10'-7"		9"	104	8'-7"	1'-6"	10'-6"	1'-6"	3'-0"	40	13'-7"	1'-8"	20'-2"	12	22'-0"	24	3'-6"	4	23'-3"
	10			86	12'-10"	11'-4"	29		11				64	11'-7"		8"	136	7'-3"	1'-10"	11'-6"	1'-7"	3'-6"	44	14'-5"	1'-8"	22'-6"	12	24'-6"	24	3'-6"	4	25'-3"

NOTE: Lengths given above do not include lap.

SPECIFICATIONS:- Arkansas Standard Road and Bridge Specifications.

REINFORCING STEEL:- To be deformed bars of structural or intermediate grade.

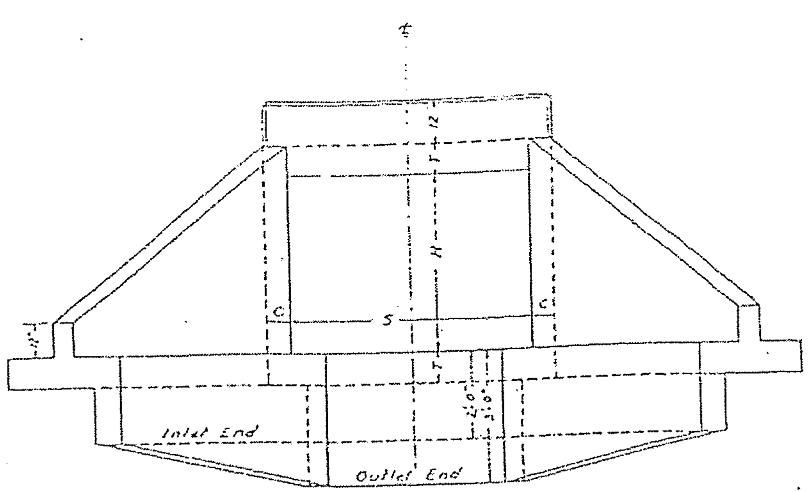
CHAMFER:- All exposed corners to have ¾" Chamfer

CONCRETE:- All Concrete to be Class "S"

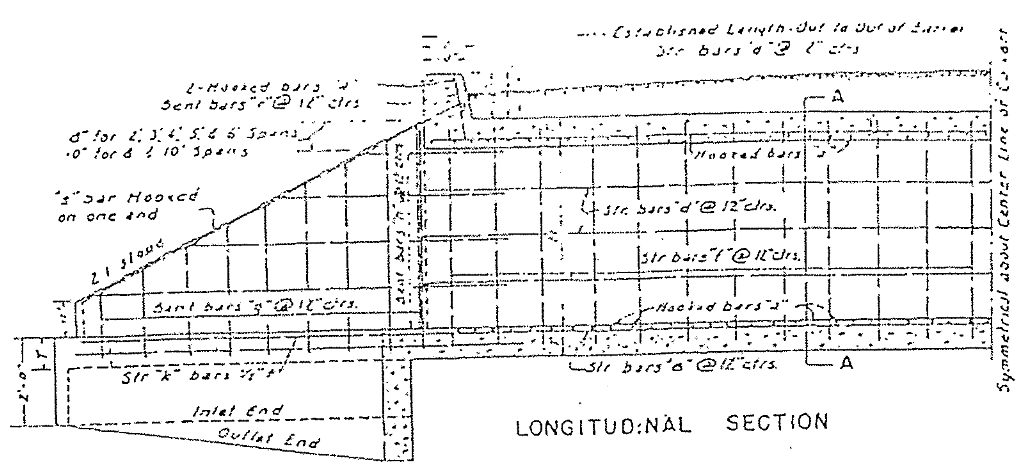
DIMENSIONS & QUANTITIES

Span	Height	Area of Opening Sq. Ft.	Maximum Depth of Cover	Thickness of Top & Bottom Slab	Thickness of Side & Wing Walls	Width of Footing	Length of Footing	Length of Wing Walls	Length of Wing from Back of Headwall	Concrete Cu. Yd. Headwalls, Wingwalls & Footing	Concrete Cu. Yd. Per Lin. Ft. of Barrel	Steel Lb. Headwalls, Wingwalls & Footing	Steel Lb. Per Lin. Ft. of Barrel	Steel Lb. Add Steel for Laps
S	H	A	D	T	C	B	W_2	W_1	E					
2	2	4	20'-0"	6½"	6"	2'-6"	3'-6½"	3'-10"	3'-4"	2.34	.194	155	11.91	8.9
3	2	6	10'-0"	7"	6"	2'-6"	3'-6½"	3'-10"	3'-4"	3.63	.247	164	22.77	11.1
	3	9			6"		5'-10½"	6'-2"	5'-4"	4.30	.284	243	23.43	13.2
4	2	8	10'-0"	7½"	6"	2'-6"	3'-6½"	3'-10"	3'-4"	2.90	.306	173	28.28	13.4
	3	12			6"		5'-10½"	6'-2"	5'-4"	4.36	.343	251	30.94	13.6
	4	16			6"		8'-2"	8'-5½"	7'-4"	5.94	.380	332	33.60	13.8
5	2	10	10'-0"	8"	6"	2'-6"	3'-6½"	3'-10"	3'-4"	3.15	.370	189	34.56	15.6
	3	15			6"		5'-10½"	6'-2"	5'-4"	4.60	.407	267	37.22	17.8
	4	20			6"		8'-2"	8'-5½"	7'-4"	6.28	.444	370	35.63	20.0
	5	25			7"	2'-9"	10'-8"	10'-9½"	9'-4"	8.74	.511	478	42.55	22.3
6	3	18	7'-6"	8½"	6"	2'-6"	5'-10½"	6'-2"	5'-4"	4.94	.478	278	41.68	20.0
	4	24			6"		8'-2"	8'-5½"	7'-4"	6.61	.515	383	44.54	22.3
	5	30			7"	2'-3"	10'-8"	10'-9½"	9'-4"	9.14	.582	493	47.20	24.5
	6	36			7"	3'-0"	13'-1"	13'-1"	11'-4"	11.58	.635	611	49.34	26.7
8	3	24	5'-0"	10½"	7"	2'-7"	6'-3½"	6'-6½"	5'-8"	6.28	.724	334	60.81	24.5
	4	32			7"	2'-7"	8'-7½"	8'-10½"	7'-8"	8.23	.767	427	63.47	26.7
	5	40			7"	2'-9"	11'-0½"	11'-2"	9'-8"	10.57	.810	536	66.13	28.9
	6	48			7"	3'-0"	13'-5½"	13'-5½"	11'-8"	13.08	.853	673	68.80	31.2
	7	56			7"	3'-4"	16'-0"	15'-8½"	13'-8"	16.03	.897	976	71.46	33.4
	8	64			8"	3'-10"	18'-8"	18'-1"	15'-8"	20.69	1.000	1163	74.81	35.6
10	4	40	4'-0"	11¼"	7"	2'-7"	8'-7½"	8'-10½"	7'-8"	8.31	.983	505	90.62	31.2
	5	50			7"	2'-9"	11'-0½"	11'-2"	9'-8"	11.33	1.026	611	93.18	33.4
	6	60			7"	3'-0"	13'-5½"	13'-5½"	11'-8"	13.55	1.069	749	95.94	35.6
	7	70			7"	3'-4"	16'-0"	15'-3½"	13'-8"	17.21	1.112	1060	98.60	37.9
	8	80			8"	3'-10"	18'-8"	18'-1"	15'-8"	21.85	1.217	1253	101.26	40.1
	9	90			9"	4'-3"	21'-6"	20'-2½"	17'-8"	27.55	1.334	1740	111.86	42.3
	10	100			10"	4'-5"	23'-3½"	22'-3½"	19'-6"	34.78	1.443	2161	115.27	44.5

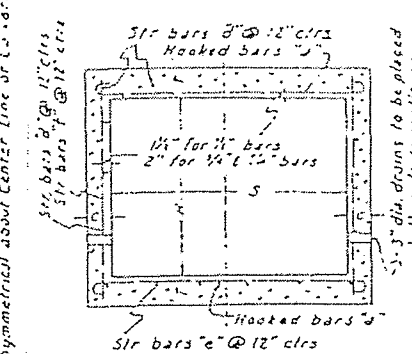
LAP NOTE:
In computing quantities of steel from the above table add one lap for culverts up to 50' in length and one lap for each additional 25' in length.



END ELEVATION



LONGITUDINAL SECTION



SECTION A-A

10/2/2015

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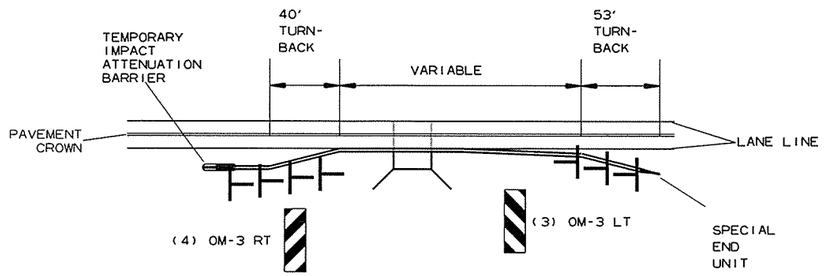
SPECIAL DETAILS

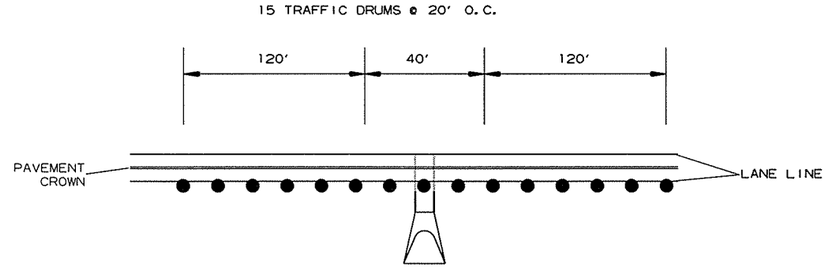
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	10	48

(2) MAINTENANCE OF TRAFFIC

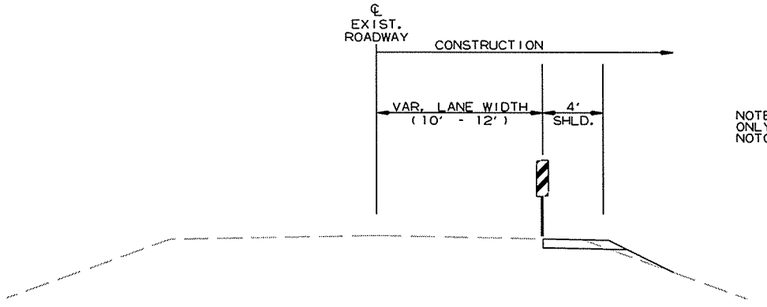
SEQUENCE OF CONSTRUCTION
1. EXTEND STRUCTURES
2. NOTCH & WIDEN SHOULDERS
3. OVERLAY



DETAIL OF PRECAST CONCRETE BARRIER WITH TEMPORARY IMPACT ATTENUATION BARRIER; REFER ALSO TO STANDARD DRAWINGS TC-4 & TC-5

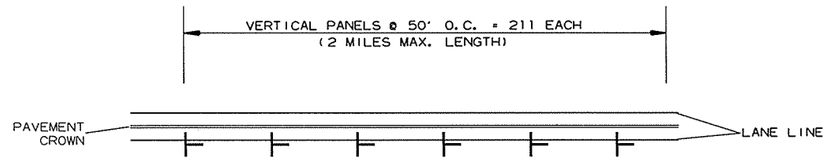


DETAIL OF TRAFFIC DRUM PLACEMENT AROUND PIPE EXTENSIONS



NOTE:
ONLY ONE SIDE OF THE ROADWAY SHALL BE NOTCHED AT A TIME.

DETAIL FOR SHOULDER WIDENING SHOWN IN THE DIRECTION OF TRAFFIC



DETAIL OF VERTICAL PANEL PLACEMENT

NOTE:
THE QUANTITY OF VERTICAL PANELS PROVIDED IN THE CONTRACT IS FOR ONE SIDE OF THE ROADWAY FOR 2 MILES. THIS IS THE MAXIMUM QUANTITY REQUIRED TO ALLOW THE CONTRACTOR TO NOTCH ONE MILE, BACKFILL TO A POINT WHERE THE VERTICAL DIFFERENTIAL IS 4" OR LESS, AND THEN NOTCH ANOTHER ONE-MILE SECTION. THIS IS THE MAXIMUM NUMBER OF VERTICAL PANELS THAT WILL BE PAID FOR. REFER TO SECTION 603.02 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15

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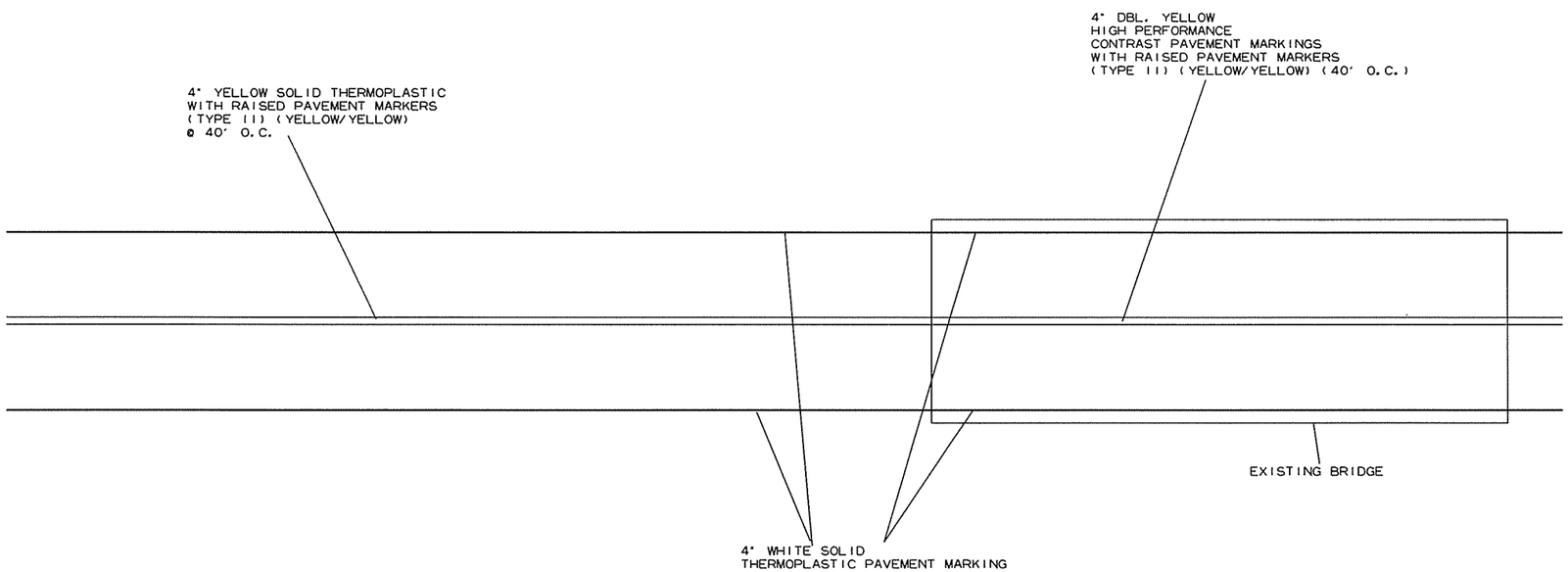
MAINTENANCE OF TRAFFIC

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	11	48

(2) PERMANENT PAVEMENT MARKING DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15



NOTE: THE THERMOPLASTIC PAVEMENT MARKING YELLOW (4") QUANTITY IS ESTIMATED AND IS BASED ON THE PLACEMENT OF A DOUBLE YELLOW CENTERLINE FOR THE ENTIRE PROJECT. THE CONTRACTOR SHALL NOT PLACE ANY PERMANENT PAVEMENT MARKINGS UNTIL THE PASSING/NO PASSING ZONES HAVE BEEN ESTABLISHED BY THE MAINTENANCE DIVISION.

SUMMARY OF QUANTITIES
CONSTRUCTION PAVEMENT MARKINGS = 414585 LIN. FT.
RAISED PAVEMENT MARKERS TYPE II (YEL/YEL) = 2377 EACH
THERMOPLASTIC PAVEMENT MARKING WHITE (4") = 224400 LIN. FT.
THERMOPLASTIC PAVEMENT MARKING YELLOW (4") = 187983 LIN. FT.
HIGH PERFORMANCE CONTRAST PAVEMENT MARKING YELLOW (4") = 2703 LIN. FT.

10/2/2015

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PERMANENT PAVEMENT MARKING DETAILS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	12	48

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15

ADVANCE WARNING SIGNS AND DEVICES

SIGN NUMBER	DESCRIPTION	SIGN SIZE	ENTIRE PROJECT	MAXIMUM NUMBER REQUIRED	TOTAL SIGNS REQUIRED		VERTICAL PANELS	TRAFFIC DRUMS	FURNISHING & INSTALLING PRECAST CONC. BARRIER	RELOCATING PRECAST CONCRETE BARRIER	TEMPORARY IMPACT ATTENUATION BARRIER	TEMP. IMPACT ATTEN.BARR. (REPAIR)	TEMP. IMPACT ATTEN. BARR. (RELOCATION)
			LIN. FT. - EACH		NO.	SQ. FT.	EACH		LIN. FT.			EACH	
W20-1	ROAD WORK 1500 FT.	48"x48"	4	4	4	64.0							
W20-1	ROAD WORK 1000 FT.	48"x48"	4	4	4	64.0							
W20-1	ROAD WORK 500 FT.	48"x48"	4	4	4	64.0							
W20-1	ROAD WORK AHEAD	48"x48"	13	13	13	208.0							
G20-2	END ROAD WORK	48"x24"	17	17	17	136.0							
G20-1	ROAD WORK NEXT xx MILES	60"x24"	2	2	2	20.0							
OM-3L	OBJECT MARKER	12"x36"	12	12	12	36.0							
OM-3R	OBJECT MARKER	12"x36"	16	16	16	48.0							
R4-1	DO NOT PASS	24"x30"	14	14	14	70.0							
RSP-1	SHOULDER CLOSED	48"x30"	4	4	4	40.0							
W8-11	UNEVEN LANES	48"x48"	8	8	8	128.0							
	VERTICAL PANELS		211	211			211						
	TRAFFIC DRUMS		60	60				60					
	FURNISHING AND INSTALLING PRECAST CONCRETE BARRIER		612	612					612				
	RELOCATING PRECAST CONCRETE BARRIER		3825	3825						3825			
	TEMPORARY IMPACT ATTENUATION BARRIER		4	4							4		
	TEMPORARY IMPACT ATTENUATION BARRIER (REPAIR)		29	29								29	
	TEMPORARY IMPACT ATTENUATION BARRIER (RELOCATION)		25	25									25
TOTALS:						878.0	211	60	612	3825	4	29	25

NOTES:
1. THIS IS A HIGH TRAFFIC VOLUME ROAD AS DEFINED IN SECTION 604.03, STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
2. QUANTITY OF PRECAST CONCRETE BARRIER WALL CALCULATED BASED ON 153' OF BARRIER AND 1 TEMPORARY IMPACT ATTENUATION BARRIER PER LOCATION WITH BARRIER FURNISHED AND INSTALLED AT 4 LOCATIONS AND RELOCATED TO OTHER LOCATIONS.
3. QUANTITY OF TRAFFIC DRUMS CALCULATED BASED 15 TRAFFIC DRUMS PER LOCATION WITH DRUMS FURNISHED AT 4 LOCATIONS AND RELOCATED TO OTHER LOCATIONS.
4. ADDITIONAL SIGNS, BARRICADES, AND TRAFFIC CONTROL DEVICES OF A PERMANENT NATURE DEEMED NECESSARY BY THE ENGINEER SHALL BE PAID FOR UNDER THE APPROPRIATE ITEM.
5. THE COST OF ANY ADDITIONAL SIGNS, BARRICADES, OR DEVICES OF A TEMPORARY NATURE THAT MAY BE NECESSITATED BY THE CONTRACTOR'S SEQUENCE OF OPERATIONS OR STANDARD DRAWINGS TC-1, TC-2, AND TC-3 SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS. ANY ADDITIONAL PERMANENT SIGNS, BARRICADES, OR DEVICES PLACE BY THE CONTRACTOR FOR HIS OWN CONVENIENCE SHALL NOT BE PAID FOR.
6. DETOUR SIGNS, BARRICADES, AND DEVICES MADE NECESSARY BY STAGE CONSTRUCTION, AS DETERMINED BY THE ENGINEER, SHALL BE PAID FOR UNDER THE APPROPRIATE ITEM.
7. SIGNS, BARRICADES, OR DEVICES PREVIOUSLY AUTHORIZED AND PAID FOR, WHICH BECAME DAMAGED BEYOND USE AT NO FAULT OF THE CONTRACTOR AND NEED TO BE REPLACED, SHALL BE REPLACED AND PAID FOR. REPLACEMENT FOR ANY STOLEN SIGNS, BARRICADES, OR DEVICES WILL NOT BE PAID FOR BUT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
8. THE QUANTITY OF VERTICAL PANELS PROVIDED IN THE CONTRACT IS FOR ONE SIDE OF THE ROADWAY FOR 2 MILES. THIS IS THE MAXIMUM QUANTITY REQUIRED TO ALLOW THE CONTRACTOR TO NOTCH ONE MILE, BACKFILL TO A POINT WHERE THE VERTICAL DIFFERENTIAL IS 4" OR LESS, AND THEN NOTCH ANOTHER ONE-MILE SECTION. THIS IS THE MAXIMUM NUMBER OF VERTICAL PANELS THAT WILL BE PAID FOR. REFER TO SECTION 603.02 OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS.

EROSION CONTROL MATTING

	LOCATION	LENGTH	CLASS 3
		LIN. FT.	SQ. YD.
*	TO BE USED IF AND WHERE	1000.00	888.89
	DIRECTED BY THE ENGINEER		
	TOTAL:		888.89

NOTE: AVERAGE WIDTH = 8'-0"
* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

CLEARING AND GRUBBING

	LOCATION	CLEARING	GRUBBING
		STATION	
*	ENTIRE PROJECT - TO BE USED IF AND WHERE	40	40
	DIRECTED BY THE ENGINEER.		
	TOTALS:	40	40

* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

EARTHWORK

	LOCATION / DESCRIPTION	UNCLASSIFIED EXCAVATION	COMPACTED EMBANKMENT
		CU. YD.	
*	HWY. 5 - TO BE USED IF AND WHERE	18148	29742
	DIRECTED BY THE ENGINEER.		
	TOTALS:	18148	29742

* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

REMOVAL AND DISPOSAL OF FENCE

STATION	LOCATION	FENCE
		LIN. FT.
1.598	RT. HWY. 5 SEC. 7	57
2.439	LT. HWY. 5 SEC. 7	21
2.885	LT. HWY. 5 SEC. 7	40
2.885	RT. HWY. 5 SEC. 7	29
6.159	RT. HWY. 5 SEC. 7	29
7.162	RT. HWY. 5 SEC. 7	44
13.033	LT. HWY. 5 SEC. 7	17
13.039	LT. HWY. 5 SEC. 7	27
TOTAL:		264

BENCH MARKS

LOCATION	BENCH MARKS
	EACH
R.C. BOX HEADWALLS	20
TOTAL:	20

NOTE: SHOWN FOR INFORMATION ONLY. BENCH MARKS SHALL BE FURNISHED AND PLACED BY STATE FORCES.

MAILBOXES

	LOCATION	MAILBOXES	MAILBOX SUPPORTS (SINGLE)
		EACH	
*	ENTIRE PROJECT - TO BE USED IF AND WHERE	30	30
	DIRECTED BY THE ENGINEER.		
	TOTALS:	30	30

* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

ACHM PATCHING OF EXISTING ROADWAY

DESCRIPTION	TON
ENTIRE PROJECT - TO BE USED IF AND WHERE	250
DIRECTED BY THE ENGINEER	
TOTAL:	250

NOTE: QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

10/8/2015

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QUANTITIES

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	13	48

(2) QUANTITIES

CONSTRUCTION PAVEMENT MARKINGS AND PERMANENT PAVEMENT MARKINGS (PEN)

DESCRIPTION	ENTIRE PROJECT	END OF JOB	CONSTRUCTION PAVEMENT MARKINGS	RAISED PAVEMENT MARKERS	THERMOPLASTIC PAVEMENT MARKING		HIGH PERFORMANCE CONTRAST PAVEMENT MARKING
				TYPE II	4"		4"
				(YEL/YEL)	WHITE	YELLOW	YELLOW
	LIN. FT. - EACH		LIN. FT.	EACH	LIN. FT.		LIN. FT.
CONSTRUCTION PAVEMENT MARKINGS	235488		235488				
RAISED PAVEMENT MARKERS TYPE II (YEL/YEL)		1258		1258			
THERMOPLASTIC PAVEMENT MARKING WHITE (4")		134851			134851		
THERMOPLASTIC PAVEMENT MARKING YELLOW (4")		98884				98884	
HIGH PERFORMANCE CONTRAST PAVEMENT MARKING YELLOW (4")		1753					1753
TOTALS:			235488	1258	134851	98884	1753

NOTE: THIS IS A HIGH TRAFFIC VOLUME ROAD AS DEFINED IN SECTION 604.03, STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.

NOTE: THE 4" YELLOW STRIPING QUANTITY HAS BEEN ESTIMATED BASED ON A DOUBLE YELLOW CENTERLINE STRIPE FOR THE ENTIRE PROJECT.
THE PROJECT MUST BE MARKED FOR PASSING/NO PASSING ZONES PRIOR TO THE PLACEMENT OF ANY FINAL STRIPING.
CONTACT THE MAINTENANCE DIVISION AFTER THE FINAL LIFT OF SURFACE COURSE HAS BEEN PLACED TO SCHEDULE THE ZONING OF THE PROJECT.

CONSTRUCTION PAVEMENT MARKINGS AND PERMANENT PAVEMENT MARKINGS (STPF)

DESCRIPTION	ENTIRE PROJECT	END OF JOB	CONSTRUCTION PAVEMENT MARKINGS	RAISED PAVEMENT MARKERS	THERMOPLASTIC PAVEMENT MARKING		HIGH PERFORMANCE CONTRAST PAVEMENT MARKING
				TYPE II	4"		4"
				(YEL/YEL)	WHITE	YELLOW	YELLOW
	LIN. FT. - EACH		LIN. FT.	EACH	LIN. FT.		LIN. FT.
CONSTRUCTION PAVEMENT MARKINGS	179097		179097				
RAISED PAVEMENT MARKERS TYPE II (YEL/YEL)		1119		1119			
THERMOPLASTIC PAVEMENT MARKING WHITE (4")		89549			89549		
THERMOPLASTIC PAVEMENT MARKING YELLOW (4")		88598				88598	
HIGH PERFORMANCE CONTRAST PAVEMENT MARKING YELLOW (4")		950					950
TOTALS:			179097	1119	89549	88598	950

NOTE: THIS IS A HIGH TRAFFIC VOLUME ROAD AS DEFINED IN SECTION 604.03, STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.

NOTE: THE 4" YELLOW STRIPING QUANTITY HAS BEEN ESTIMATED BASED ON A DOUBLE YELLOW CENTERLINE STRIPE FOR THE ENTIRE PROJECT.
THE PROJECT MUST BE MARKED FOR PASSING/NO PASSING ZONES PRIOR TO THE PLACEMENT OF ANY FINAL STRIPING.
CONTACT THE MAINTENANCE DIVISION AFTER THE FINAL LIFT OF SURFACE COURSE HAS BEEN PLACED TO SCHEDULE THE ZONING OF THE PROJECT.

COLD MILLING ASPHALT PAVEMENT (PEN)

LOG MILE	LOCATION	LENGTH	AVG. WIDTH	COLD MILLING ASPHALT PAVEMENT
SEC. 7		FEET		SQ. YD.
0.000	TRANSITION (START OF SECTION 7)	100.00	24.00	266.67
5.764	TRANSITION (BRIDGE END)	100.00	30.00	333.33
5.834	TRANSITION (BRIDGE END)	100.00	30.00	333.33
5.901	TRANSITION (BRIDGE END)	100.00	30.00	333.33
5.947	TRANSITION (BRIDGE END)	100.00	30.00	333.33
15.480	TRANSITION	100.00	40.00	444.44
15.499	MILL AND INLAY	1357.00	22.00	3317.11
15.790	TRANSITION (BRIDGE END)	100.00	40.00	444.44
15.914	TRANSITION (BRIDGE END)	100.00	40.00	444.44
15.979	TRANSITION (BRIDGE END)	100.00	40.00	444.44
18.010	TRANSITION (END OF JOB)	100.00	22.00	244.44
TOTAL:				6939.30

NOTES: AVERAGE MILLING DEPTH 1" FOR TRANSITION.
AVERAGE MILLING DEPTH 2" FOR MILL & INLAY.

COLD MILLING ASPHALT PAVEMENT (STPF)

LOG MILE	LOCATION	LENGTH	AVG. WIDTH	COLD MILLING ASPHALT PAVEMENT
SEC. 7		FEET		SQ. YD.
7.901	TRANSITION (BRIDGE END)	100.00	30.00	333.33
7.979	TRANSITION (BRIDGE END)	100.00	30.00	333.33
9.378	TRANSITION (BRIDGE END)	100.00	20.00	222.22
9.408	TRANSITION (BRIDGE END)	100.00	20.00	222.22
12.274	TRANSITION (BRIDGE END)	100.00	20.00	222.22
12.313	TRANSITION (BRIDGE END)	100.00	20.00	222.22
14.149	TRANSITION	100.00	20.00	222.22
14.168	MILL AND INLAY	164.00	20.00	364.44
14.199	TRANSITION	100.00	20.00	222.22
14.428	TRANSITION	100.00	20.00	222.22
14.447	MILL AND INLAY	216.00	20.00	480.00
14.488	TRANSITION	100.00	20.00	222.22
TOTAL:				3288.86

NOTES: AVERAGE MILLING DEPTH 1" FOR TRANSITION.
AVERAGE MILLING DEPTH 2" FOR MILL & INLAY.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-21-15

R.C. BOX CULVERTS

LOG MILE	DESCRIPTION	SPAN	HEIGHT	LENGTH	CLASS S CONCRETE-ROADWAY	REINF. STEEL-ROADWAY (GRADE 60)	UNCL.EXC. FOR STR.-ROADWAY	SOLID SODDING	WATER	STD. DWG. NOS.
SEC. 7		LIN. FT.			CU.YD.	POUND	CU.YD.	SQ.YD.	M.GAL.	
0.450	EXTEND R.C. BOX 8' LT. & 6' RT.	12	6	12	39.23	4554	26	20	0.25	W-X30, W-X302-1, R-130X-0
1.600	EXTEND R.C. BOX 4' LT. & 6' RT.	10	6	10	26.35	2686	19	16	0.20	W-X002-1, R-100X-0
1.940	EXTEND R.C. BOX 4' LT. & 5' RT.	10	6	9	25.32	2552	19	16	0.20	W-X002-1, R-100X-0
2.700	EXTEND R.C. BOX 4' LT. & 7' RT.	8	5	11	20.28	2056	15	13	0.16	W-X002-1, R-100X-0
3.480	EXTEND R.C. BOX 2' LT. & 5' RT.	3	4	7	11.20	806	8	12	0.15	SPECIAL DETAILS
3.780	EXTEND R.C. BOX 4' LT. & 5' RT.	4	3	9	8.76	822	8	9	0.11	W-X002-1, R-100X-0
4.540	EXTEND R.C. BOX 4' LT. & 4' RT.	3	4	8	11.53	854	8	12	0.15	SPECIAL DETAILS
4.640	EXTEND R.C. BOX 4' LT. & 4' RT.	3	3	8	7.41	567	8	6	0.08	SPECIAL DETAILS
4.750	EXTEND R.C. BOX 7' LT. & 6' RT.	3	2	13	6.75	557	9	5	0.06	SPECIAL DETAILS
7.170	EXTEND R.C. BOX 4' LT. & 4' RT.	4	3	8	16.13	976	9	9	0.11	W-X002-1, W-X003-1,R-100X-0
11.150	EXTEND R.C. BOX 2' LT. ON 30^ RT. FWD. SKEW	8	7	2	12.45	1413	9	10	0.13	W-X30, W-X302-1, R-130X-0
13.720	EXTEND R.C. BOX 3' RT.	10	5	3	9.54	974	7	8	0.10	W-X002-1, R-100X-0
14.740	EXTEND R.C. BOX 4' LT.	5	6	4	8.44	690	7	7	0.09	W-X002-1, R-100X-0
16.640	EXTEND R.C. BOX 6' LT. & 7' RT. ON 15^ LT. FWD. SKEW	12	10	13	58.07	6000	35	27	0.34	W-X15, W-X152-2, R-115X-0
17.190	EXTEND R.C. BOX 4' RT.	10	10	4	22.41	2088	15	11	0.14	W-X002-2, R-100X-0
TOTALS:					283.87	27595	202	181	2.27	
STRUCTURES OVER 20' - 0" SPAN										
13.030	EXTEND DBL. R.C. BOX 4' LT. & 6' RT. ON 30^ LT. FWD. SKEW	10	7	10	47.84	6484	30	26	0.33	W-X30, W-X302-1, R-230X-2
SUBTOTALS:					47.84	6484	30	26	0.33	
TOTALS:					331.71	34079	232	207	2.60	

BASIS OF ESTIMATE:
WATER.....12.6 GAL. / SQ. YD. OF SOLID SODDING

10/20/2015

R061441.DGN

QUANTITIES

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
1-07-16				6	ARK.			
				JOB NO.		061441	14	48

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
1-8-16

STANDARD SIGNS

LOG MILE	SIDE	SIGN NUMBER	DESCRIPTION	SIGN SIZE	TOTAL SIGNS REQUIRED		CHANNEL POST SIGN SUPPORT (TYPE U-1)
					NO.	SQ. FT.	EACH
PERMANENT INSTALLATION - HWY. 5 SEC. 7 (SEE SPECIAL DETAILS)							
4.740	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
4.767	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
4.780	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
6.050	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
6.073	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
6.096	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
6.120	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
8.605	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
8.627	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
8.665	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
8.685	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.290	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.306	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.323	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.340	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.360	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.385	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.410	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.490	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.510	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.530	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.750	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.763	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.777	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
10.790	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
11.109	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
11.133	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
11.147	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
11.167	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
12.130	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
12.147	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
12.164	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
12.177	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
12.191	RT.	W1-8	CHEVRON ON EXISTING SUPPORT	24"x30"	1	5.0	
17.062	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.076	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.087	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.107	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.128	LT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.175	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.190	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.210	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.230	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.252	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.272	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
17.295	RT.	W1-8	BACK TO BACK CHEVRONS ON SINGLE SUPPORT	24"x30"	2	10.0	1
TOTALS:						455.0	45

RUMBLE STRIPES

LOG MILE	LOG MILE	LOCATION	* RUMBLE STRIPES
			LIN.FT.
4.140	4.963	HWY. 5 SEC. 6	3476
4.991	6.270	HWY. 5 SEC. 6	5402
6.303	7.380	HWY. 5 SEC. 6	4549
0.000	5.783	HWY. 5 SEC. 7	24427
5.834	5.920	HWY. 5 SEC. 7	363
5.947	7.920	HWY. 5 SEC. 7	8334
7.979	9.397	HWY. 5 SEC. 7	5990
9.408	12.293	HWY. 5 SEC. 7	12186
12.313	15.050	HWY. 5 SEC. 7	10816
15.250	15.610	HWY. 5 SEC. 7	1758
TOTAL:			77301

* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.
TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER.

RUMBLE STRIPS IN ASPHALT SHOULDERS

LOG MILE	LOG MILE	LOCATION	* RUMBLE STRIPS IN ASPHALT SHOULDERS
			LIN.FT.
15.050	15.250	HWY. 5 SEC. 7	1056
15.610	15.756	HWY. 5 SEC. 7	771
15.798	15.933	HWY. 5 SEC. 7	713
15.979	16.320	HWY. 5 SEC. 7	1800
TOTAL:			4340

* QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.
TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER.

CONCRETE DITCH PAVING

LOG MILE	LOCATION	LENGTH	"W"	CONC. DITCH PAVING (TYPE B)	SOLID SODDING	WATER
		LIN. FT.	FEET	SQ. YD.	SQ. YD.	M. GAL.
4.540	HWY. 5	10.00	5.00	5.56	4.44	0.06
	TO BE USED IF AND WHERE			20.00	133.33	1.68
	DIRECTED BY THE ENGINEER					
TOTALS:				25.56	137.77	1.74

BASIS OF ESTIMATE:
WATER.....12.6 GAL. / SQ. YD. OF SOLID SODDING.

EROSION CONTROL

LOCATION	PERMANENT EROSION CONTROL					TEMPORARY EROSION CONTROL								
	SEEDING	LIME	MULCH COVER	WATER	SECOND SEEDING APPLICATION	TEMPORARY SEEDING	MULCH COVER	WATER	SAND BAG DITCH CHECKS (E-5)	ROCK DITCH CHECKS (E-6)	SILT FENCE (E-11)	SEDIMENT BASIN (E-14)	OBLITERATION OF SEDIMENT BASIN	*SEDIMENT REMOVAL & DISPOSAL
	ACRE	TON	ACRE	M.GAL.	ACRE	ACRE	ACRE	M.GAL.	BAG	CU.YD.	LIN. FT.	CU.YD.	CU.YD.	CU. YD.
*ENTIRE PROJECT TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER.	56.80	113.60	56.80	5793.6	56.80	28.00	28.00	571.2	2200	600	2000	300	300	674
TOTALS:	56.80	113.60	56.80	5793.6	56.80	28.00	28.00	571.2	2200	600	2000	300	300	674

BASIS OF ESTIMATE:
LIME .....2 TONS / ACRE OF SEEDING
WATER.....102.0 M.G. / ACRE OF SEEDING
WATER.....20.4 M.G. / ACRE OF TEMPORARY SEEDING
SAND BAG DITCH CHECKS.....22 BAGS / LOCATION
ROCK DITCH CHECKS.....3 CU.YD./LOCATION

NOTE: THE TEMPORARY EROSION CONTROL DEVICES SHOWN ABOVE AND ON THE PLANS SHALL BE INSTALLED IN SUCH A SEQUENCE AS TO DETER EROSION AND SEDIMENTATION ON U.S. WATERWAYS AS EXPLAINED BY THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT.

*QUANTITIES ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

10/20/2015

R061441.DGN

QUANTITIES

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	15	48

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-9-15

STRUCTURES

LOG MILE	DESCRIPTION	REINFORCED CONCRETE PIPE CULVERT (CLASS III)			CORRUGATED STEEL PIPE CULVERT	FLARED END SECTIONS FOR R.C. PIPE CULVERTS			FLARED END SECTIONS FOR CORRUGATED STEEL PIPE CULVERTS	SOLID SODDING	WATER	STD. DWG. NOS.
		18"	24"	30"	24"	18"	24"	30"	24"			
SEC. 7		LIN. FT.				EACH				SQ.YD.	M.GAL.	
0.020	EXTEND R.C. 30" PIPE CULVERT 2' LT. & 4' RT.			12				2		26	0.33	FES-1, FES-2, PCC-1
0.150	EXTEND R.C. 24" PIPE CULVERT 2' LT. & 2' RT.		8				2			16	0.20	FES-1, FES-2, PCC-1
0.680	EXTEND R.C. 24" PIPE CULVERT 6' RT.		8				1			8	0.10	FES-1, FES-2, PCC-1
0.830	EXTEND R.C. 18" PIPE CULVERT 6' LT. & 8' RT.	14				2				10	0.13	FES-1, FES-2, PCC-1
0.930	EXTEND R.C. 24" PIPE CULVERT 4' LT.		6				1			8	0.10	FES-1, FES-2, PCC-1
1.090	EXTEND R.C. 18" PIPE CULVERT 4' LT. & 8' RT. ON 15^ LT. FWD. SKEW	12				2				10	0.13	FES-1, FES-2, PCC-1
1.180	EXTEND R.C. 18" PIPE CULVERT 6' LT. & 4' RT.	12				2				10	0.13	FES-1, FES-2, PCC-1
1.410	EXTEND R.C. 18" PIPE CULVERT 2' LT. & 6' RT.	10				2				10	0.13	FES-1, FES-2, PCC-1
1.520	EXTEND R.C. 18" PIPE CULVERT 6' LT.	6				1				5	0.06	FES-1, FES-2, PCC-1
1.750	EXTEND R.C. 18" PIPE CULVERT 4' LT. & 2' RT.	8				2				10	0.13	FES-1, FES-2, PCC-1
2.000	EXTEND R.C. 18" PIPE CULVERT 4' LT. & 8' RT.	12				2				10	0.13	FES-1, FES-2, PCC-1
2.240	EXTEND R.C. 18" PIPE CULVERT 6' LT. & 12' RT. ON 15^ RT. FWD. SKEW	18				2				10	0.13	FES-1, FES-2, PCC-1
2.440	EXTEND R.C. 30" PIPE CULVERT 4' LT. & 4' RT.			12				2		26	0.33	FES-1, FES-2, PCC-1
2.880	EXTEND R.C. 18" PIPE CULVERT 4' LT. & 6' RT.	10				2				10	0.13	FES-1, FES-2, PCC-1
2.930	EXTEND R.C. 18" PIPE CULVERT 2' LT. & 6' RT.	12				2				10	0.13	FES-1, FES-2, PCC-1
3.120	EXTEND R.C. 18" PIPE CULVERT 4' RT.	4				1				5	0.06	FES-1, FES-2, PCC-1
3.350	EXTEND R.C. 24" PIPE CULVERT 2' LT. & 2' RT.		8				2			16	0.20	FES-1, FES-2, PCC-1
3.600	EXTEND R.C. 24" PIPE CULVERT 6' LT. & 4' RT.		14				2			16	0.20	FES-1, FES-2, PCC-1
3.700	EXTEND R.C. 24"PIPE CULVERT 2' LT. & 2' RT.		8				2			16	0.20	FES-1, FES-2, PCC-1
4.000	EXTEND R.C. 18" PIPE CULVERT 4' RT.	6				1				5	0.06	FES-1, FES-2, PCC-1
4.160	EXTEND R.C. 18" PIPE CULVERT 6' LT. & 6' RT.	12				2				10	0.13	FES-1, FES-2, PCC-1
4.280	EXTEND R.C. 30" PIPE CULVERT 2' RT. ON 15^ LT. FWD. SKEW			4				1		13	0.16	FES-1, FES-2, PCC-1
4.420	EXTEND R.C. 24" PIPE CULVERT 6' RT.		8				1			8	0.10	FES-1, FES-2, PCC-1
4.800	EXTEND R.C. 24" PIPE CULVERT 2' RT.		4				1			8	0.10	FES-1, FES-2, PCC-1
5.040	EXTEND R.C. 24" PIPE CULVERT 4' LT. & 2' RT.		10				2			16	0.20	FES-1, FES-2, PCC-1
5.110	EXTEND R.C. 24" PIPE CULVERT 4' RT.		6				1			8	0.10	FES-1, FES-2, PCC-1
5.380	EXTEND R.C. 24" PIPE CULVERT 4' LT.		6				1			8	0.10	FES-1, FES-2, PCC-1
6.160	EXTEND C.M. 24" PIPE CULVERT 4' RT.				4				1	8	0.10	FES-1, FES-2, PCM-1
11.300	EXTEND DBL. R.C. 30" PIPE CULVERT 4' LT.			12				2		14	0.18	FES-1, FES-2, PCC-1
11.750	EXTEND R.C. 30" PIPE CULVERT 4' LT.			6				1		13	0.16	FES-1, FES-2, PCC-1
12.570	EXTEND DBL.R.C. 30" PIPE CULVERT 2' RT.			8				2		14	0.18	FES-1, FES-2, PCC-1
12.920	EXTEND R.C. 18" PIPE CULVERT 2' RT.	4				1				5	0.06	FES-1, FES-2, PCC-1
13.970	EXTEND R.C. 18" PIPE CULVERT 2' RT.	4				1				5	0.06	FES-1, FES-2, PCC-1
14.060	EXTEND R.C. 18"PIPE CULVERT 4' LT. & 2' RT.	8				2				10	0.13	FES-1, FES-2, PCC-1
14.390	EXTEND R.C. 24" PIPE CULVERT 4' LT. & 2' RT.		8				2			16	0.20	FES-1, FES-2, PCC-1
14.460	EXTEND R.C. 30" PIPE 2' RT. ON 15^ RT. FWD. SKEW			4				1		13	0.16	FES-1, FES-2, PCC-1
16.620	EXTEND R.C. 30" PIPE CULVERT 2' LT. & 4' RT.			10				2		26	0.33	FES-1, FES-2, PCC-1
17.860	EXTEND C.M. 24" PIPE 4' LT. ON 15^ LT. FWD. SKEW				4				1	8	0.10	FES-1, FES-2, PCM-1
TOTALS:		152	94	68	8	27	18	13	2	440	5.56	

BASIS OF ESTIMATE:
WATER.....12.6 GAL. / SQ. YD. OF SOLID SODDING

NOTE: FOR R.C. PIPE CULVERT INSTALLATIONS USE TYPE 3 BEDDING UNLESS OTHERWISE SPECIFIED.

NOTE: FOR C.M. PIPE CULVERT INSTALLATIONS USE TYPE 2 BEDDING UNLESS OTHERWISE SPECIFIED.

SELECTED PIPE BEDDING

LOCATION	SELECTED PIPE BEDDING
	CU.YD.
ENTIRE PROJECT TO BE USED IF	
AND WHERE DIRECTED BY THE	30
ENGINEER	
TOTAL:	30

NOTE: QUANTITY ESTIMATED.
SEE SECTION 104.03 OF THE STD. SPECS.

FENCING

STATION	LOCATION	WIRE FENCE (TYPE D)
		LIN. FT.
1.598	RT. HWY. 5 SEC. 7	68
2.439	LT. HWY. 5 SEC. 7	21
2.885	LT. HWY. 5 SEC. 7	40
2.885	RT. HWY. 5 SEC. 7	29
6.159	RT. HWY. 5 SEC. 7	29
7.162	RT. HWY. 5 SEC. 7	44
13.039	LT. HWY. 5 SEC. 7	27
TOTAL:		258

10/7/2015

R061441.DGN

QUANTITIES

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		061441	16	48

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
10-21-15

BASE AND SURFACING (PEN)

LOG MILE	LOG MILE	LOCATION	LENGTH	AGGREGATE BASE COURSE (CLASS 7)		TACK COAT				ACHM SURFACE COURSE (1/2")			
				TON / STATION	TON	AVG. WID.	SQ.YD.	GALLONS / SQ.YD.	GALLON	AVG. WID.	SQ.YD.	POUND / SQ.YD.	PG 64-22
			FEET			FEET				FEET			TON
MAIN LANES SEC. 7													
0.000	5.650	OVERLAY AND ADD SHOULDERS	29832.00	41.50	12380.28	24.00	79552.00	0.10	7955.20	32.00	106069.33	220.00	11667.63
5.650	5.783	OVERLAY	702.24			30.00	2340.80	0.10	234.08	30.00	2340.80	220.00	257.49
5.834	5.920	OVERLAY	454.08			30.00	1513.60	0.10	151.36	30.00	1513.60	220.00	166.50
5.947	6.060	OVERLAY	596.64			30.00	1988.80	0.10	198.88	30.00	1988.80	220.00	218.77
6.060	6.500	OVERLAY AND ADD SHOULDERS	2323.20	41.50	964.13	24.00	6195.20	0.10	619.52	32.00	8260.27	220.00	908.63
6.500	6.570	OVERLAY	369.60			30.00	1232.00	0.10	123.20	30.00	1232.00	220.00	135.52
7.070	7.750	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	3590.40	41.50	1490.02					8.00	3191.47	220.00	351.06
8.260	9.397	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	6003.36	41.50	2491.39					8.00	5336.32	220.00	587.00
9.408	12.293	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	15232.80	41.50	6321.61					8.00	13540.27	220.00	1489.43
12.313	14.168	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	9794.40	41.50	4064.68					8.00	8706.13	220.00	957.67
14.168	14.199	MILL AND INLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	163.68	41.50	67.93					8.00	145.49	220.00	16.00
14.199	14.447	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	1309.44	41.50	543.42					8.00	1163.95	220.00	128.03
14.447	14.488	MILL AND INLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	216.48	41.50	89.84					8.00	192.43	220.00	21.17
14.488	15.050	OVERLAY AND ADD SHOULDERS (SHOULDER QUANTITIES)	2967.36	41.50	1231.45					8.00	2637.65	220.00	290.14
15.050	15.250	OVERLAY	1056.00			40.00	4693.33	0.10	469.33	40.00	4693.33	220.00	516.27
15.250	15.499	OVERLAY AND ADD SHOULDERS	1314.72	41.50	545.61	22.00	3213.76	0.10	321.38	30.00	4382.40	220.00	482.06
15.499	15.610	MILL AND INLAY AND ADD SHOULDERS	586.08	41.50	243.22	22.00	1432.64	1.10	1575.90	30.00	1953.60	220.00	214.90
15.610	15.756	MILL AND INLAY	770.88			22.00	1884.37	0.10	188.44	22.00	1884.37	220.00	207.28
15.798	15.933	OVERLAY	712.80			40.00	3168.00	0.10	316.80	40.00	3168.00	220.00	348.48
15.979	16.320	OVERLAY	1800.48			40.00	8002.13	0.10	800.21	40.00	8002.13	220.00	880.23
16.320	18.010	OVERLAY AND ADD SHOULDERS	8923.20	41.50	3703.13	22.00	21812.27	0.10	2181.23	30.00	29744.00	220.00	3271.84
TOTALS:					34136.71		137028.90		15135.53		210146.34		23116.10

BASIS OF ESTIMATE:
ACHM SURFACE COURSE (1/2").....95.1% MIN. AGGR.....4.9% ASPHALT BINDER
MAXIMUM NUMBER OF GYRATIONS = 115 FOR PG 64-22

BASE AND SURFACING (STPF)

LOG MILE	LOG MILE	LOCATION	LENGTH	TACK COAT				ACHM SURFACE COURSE (1/2")			
				AVG. WID.	SQ.YD.	GALLONS / SQ.YD.	GALLON	AVG. WID.	SQ.YD.	POUND / SQ.YD.	PG 64-22
			FEET	FEET				FEET			TON
MAIN LANES SEC. 7											
6.570	7.070	OVERLAY	2640.00	30.00	8800.00	0.10	880.00	30.00	8800.00	220.00	968.00
7.070	7.750	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	3590.40	22.00	8776.53	0.10	877.65	22.00	8776.53	220.00	965.42
7.750	7.920	OVERLAY	897.60	30.00	2992.00	0.10	299.20	30.00	2992.00	220.00	329.12
7.979	8.260	OVERLAY	1483.68	30.00	4945.60	0.10	494.56	30.00	4945.60	220.00	544.02
8.260	9.397	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	6003.36	20.00	13340.80	0.10	1334.08	20.00	13340.80	220.00	1467.49
9.408	12.293	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	15232.80	20.00	33850.67	0.10	3385.07	20.00	33850.67	220.00	3723.57
12.313	14.168	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	9794.40	20.00	21765.33	0.10	2176.53	20.00	21765.33	220.00	2394.19
14.168	14.199	MILL AND INLAY AND ADD SHOULDER (INLAY QUANTITIES)	163.68	20.00	363.73	0.10	36.37	20.00	363.73	220.00	40.01
14.199	14.447	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	1309.44	20.00	2909.87	0.10	290.99	20.00	2909.87	220.00	320.09
14.447	14.488	MILL AND INLAY AND ADD SHOULDER (INLAY QUANTITIES)	216.48	20.00	481.07	0.10	48.11	20.00	481.07	220.00	52.92
14.488	15.050	OVERLAY AND ADD SHOULDERS (OVERLAY QUANTITIES)	2967.36	20.00	6594.13	0.10	659.41	20.00	6594.13	220.00	725.35
TOTALS:					104819.73		10481.97		104819.73		11530.18

BASIS OF ESTIMATE:
ACHM SURFACE COURSE (1/2").....95.1% MIN. AGGR.....4.9% ASPHALT BINDER
MAXIMUM NUMBER OF GYRATIONS = 115 FOR PG 64-22

10/20/2015

R061441.DGN

QUANTITIES

SUMMARY OF QUANTITIES

ITEM NUMBER	ITEM		QUANTITY		TOTAL	UNIT
			PEN-2662(5)	STPF-2662(5)		
201	CLEARING		40		40	STATION
201	GRUBBING		40		40	STATION
202	REMOVAL AND DISPOSAL OF FENCE		264		264	LIN. FT.
210	UNCLASSIFIED EXCAVATION		18148		18148	CU. YD.
210	COMPACTED EMBANKMENT		29742		29742	CU. YD.
303	AGGREGATE BASE COURSE (CLASS 7)		34137		34137	TON
SS & 401	TACK COAT		15136	10482	25618	GAL.
SP, SS, & 407	MINERAL AGGREGATE IN ACHM SURFACE COURSE (1/2")		21983	10965	32948	TON
SP, SS, & 407	ASPHALT BINDER (PG 64-22) IN ACHM SURFACE COURSE (1/2")		1133	565	1698	TON
412	COLD MILLING ASPHALT PAVEMENT		6939	3289	10228	SQ. YD.
SP & 415	ACHM PATCHING OF EXISTING ROADWAY		250		250	TON
601	MOBILIZATION		1.00		1.00	LUMP SUM
SP & 602	FURNISHING FIELD OFFICE		1		1	EACH
603	MAINTENANCE OF TRAFFIC		1.00		1.00	LUMP SUM
SS & 604	SIGNS		878		878	SQ. FT.
SS & 604	TRAFFIC DRUMS		60		60	EACH
604	FURNISHING AND INSTALLING PRECAST CONCRETE BARRIER		612		612	LIN. FT.
604	RELOCATING PRECAST CONCRETE BARRIER		3825		3825	LIN. FT.
604	CONSTRUCTION PAVEMENT MARKINGS		235488	179097	414585	LIN. FT.
SS & 604	VERTICAL PANELS		211		211	EACH
605	CONCRETE DITCH PAVING (TYPE B)		26		26	SQ. YD.
606	18" REINFORCED CONCRETE PIPE CULVERTS (CLASS III)		152		152	LIN. FT.
606	24" REINFORCED CONCRETE PIPE CULVERTS (CLASS III)		94		94	LIN. FT.
606	30" REINFORCED CONCRETE PIPE CULVERTS (CLASS III)		68		68	LIN. FT.
* 606	24" ASPHALT COATED CORRUGATED STEEL PIPE CULVERTS (16 GAUGE)	(ALTERNATE NO. 1)	8		8	LIN. FT.
* 606	24" ALUMINUM COATED CORRUGATED STEEL PIPE CULVERTS (16 GAUGE)	(ALTERNATE NO. 2)	8		8	LIN. FT.
* 606	24" POLYMER PRECOATED METALLIC COATED CORRUGATED STEEL PIPE CULVERTS (16 GAUGE)	(ALTERNATE NO. 3)	8		8	LIN. FT.
606	18" FLARED END SECTIONS FOR REINFORCED CONCRETE PIPE CULVERTS		27		27	EACH
606	24" FLARED END SECTIONS FOR REINFORCED CONCRETE PIPE CULVERTS		18		18	EACH
606	24" FLARED END SECTIONS FOR CORRUGATED STEEL PIPE CULVERTS		2		2	EACH
606	30" FLARED END SECTIONS FOR REINFORCED CONCRETE PIPE CULVERTS		13		13	EACH
606	SELECTED PIPE BEDDING		30		30	CU. YD.
619	WIRE FENCE (TYPE D)		258		258	LIN. FT.
620	LIME		114		114	TON
620	SEEDING		56.80		56.80	ACRE
SS & 620	MULCH COVER		84.80		84.80	ACRE
620	WATER		6374.7		6374.7	M.GAL.
621	TEMPORARY SEEDING		28.00		28.00	ACRE
621	SILT FENCE		2000		2000	LIN. FT.
621	SAND BAG DITCH CHECKS		2200		2200	BAG
621	SEDIMENT BASIN		300		300	CU. YD.
621	OBLITERATION OF SEDIMENT BASIN		300		300	CU. YD.
621	SEDIMENT REMOVAL AND DISPOSAL		674		674	CU. YD.
621	ROCK DITCH CHECKS		600		600	CU. YD.
623	SECOND SEEDING APPLICATION		56.80		56.80	ACRE
624	SOLID SODDING		785		785	SQ. YD.
626	EROSION CONTROL MATTING (CLASS 3)		889		889	SQ. YD.
635	ROADWAY CONSTRUCTION CONTROL		1.00		1.00	LUMP SUM
637	MAILBOXES		30		30	EACH
637	MAILBOX SUPPORTS (SINGLE)		30		30	EACH
642	RUMBLE STRIPS IN ASPHALT SHOULDERS		4340		4340	LIN. FT.
SP	RUMBLE STRIPES		77301		77301	LIN. FT.
719	THERMOPLASTIC PAVEMENT MARKING WHITE (4")		134851	89549	224400	LIN. FT.
719	THERMOPLASTIC PAVEMENT MARKING YELLOW (4")		98884	88598	187482	LIN. FT.
* SP & 719	INVERTED PROFILE THERMOPLASTIC CONTRAST PAVEMENT MARKING YELLOW (4")	(ALTERNATE NO. 1)	1753	950	2703	LIN. FT.
* SP	HIGH PERFORMANCE CONTRAST MARKING TAPE YELLOW (4")	(ALTERNATE NO. 2)	1753	950	2703	LIN. FT.
721	RAISED PAVEMENT MARKERS (TYPE II)		1258	1119	2377	EACH
726	STANDARD SIGN		455		455	SQ. FT.
SP & 729	CHANNEL POST SIGN SUPPORT (TYPE U-1)		45		45	EACH
731	TEMPORARY IMPACT ATTENUATION BARRIER		4		4	EACH
731	TEMPORARY IMPACT ATTENUATION BARRIER (REPAIR)		29		29	EACH
731	TEMPORARY IMPACT ATTENUATION BARRIER (RELOCATION)		25		25	EACH
801	UNCLASSIFIED EXCAVATION FOR STRUCTURES-ROADWAY		202		202	CU. YD.
802	CLASS S CONCRETE-ROADWAY		283.87		283.87	CU. YD.
804	REINFORCING STEEL-ROADWAY (GRADE 60)		27595		27595	POUND
	STRUCTURES OVER 20' SPAN					
801	UNCLASSIFIED EXCAVATION FOR STRUCTURES-ROADWAY		30		30	CU. YD.
802	CLASS S CONCRETE-ROADWAY		47.84		47.84	CU. YD.
804	REINFORCING STEEL-ROADWAY (GRADE 60)		6484		6484	POUND

* DENOTES ALTERNATE BID ITEMS.

REVISIONS

DATE	REVISION	SHEET NUMBER
11/2/2015	ADDED DELAY IN RIGHT OF WAY OCCUPANCY SPECIAL PROVISION	2, 17
12/11/2015	ADDED CONTRACTOR'S LICENSE SUPPLEMENTAL SPECIFICATION	2, 17
1/7/2016	ADDED CARGO PREFERENCE ACT REQUIREMENTS SP, ADDED OFF-SITE RESTRAINING CONDITIONS FOR BATS SP, ADDED NOTE FOR SLOPES ON DETAIL OF CROSS DRAIN EXTENSION, ADDED CONCRETE DITCH PAVING, ADDED CONCRETE DITCH PAVING STANDARD DRAWING, REVISED DELAY IN ROW OCCUPANCY SP	2, 5, 14, 17, 17A
1/20/2016	REVISED OFF-SITE RESTRAINING CONDITIONS FOR BATS SP	17

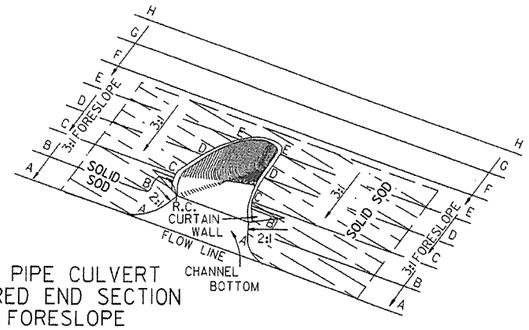
SUMMARY OF QUANTITIES AND REVISIONS

DATE REVISED	DATE PLANED	DATE REVISED	DATE PLANED	FED.ROAD DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
1-07-16				6	ARK.		17	48
12-11-15		1-20-16		JOB NO.		061441		
11-02-15								

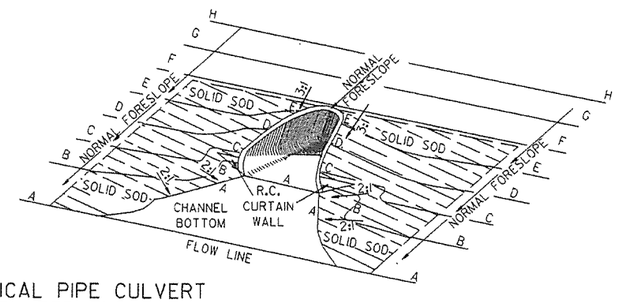
2 SUMMARY OF QUANTITIES AND REVISIONS

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11425 TERRY D. SMITH

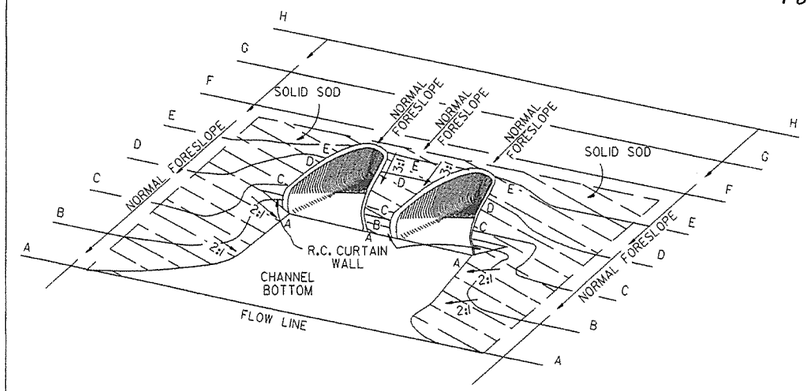
1-20-16



TYPICAL PIPE CULVERT
WITH FLARED END SECTION
& 3:1 FORESLOPE



TYPICAL PIPE CULVERT
WITH FLARED END SECTION
& FLATTENED ADJACENT SLOPES



TYPICAL MULTIPLE PIPE CULVERT
WITH FLARED END SECTIONS
& FLATTENED ADJACENT SLOPES

R.C. CURTAIN WALL
DIMENSIONS & QUANTITIES

PIPE DIA.	H_1	L_1	L	L (DBL.)/2	SINGLE R.C.P.C.		DOUBLE R.C.P.C.	
					CONC.	REINF. STEEL	CONC.	REINF. STEEL
					CU. YDS.	LBS.	CU. YDS.	LBS.
18"	11½"	3'-5"	8'-0"	6'-3"	0.31	27.7	0.45	39.5
24"	1'-0½"	4'-6"	9'-6"	7'-6"	0.37	33.4	0.53	48.0
30"	1'-3½"	5'-7"	11'-0"	9'-0"	0.45	39.0	0.67	59.0
36"	1'-7"	6'-8"	13'-0"	10'-6"	0.58	52.6	0.83	73.9
42"	2'-1½"	7'-3"	15'-6"	12'-0"	0.82	77.1	1.10	100.7
48"	2'-5"	7'-10"	17'-0"	13'-0"	0.98	94.9	1.27	120.4
54"	2'-9½"	8'-5"	18'-6"	14'-0"	1.16	115.8	1.47	143.7
60"	3'-4"	9'-0"	20'-6"	15'-6"	1.47	149.7	1.84	180.3
72"	4'-5"	10'-2"	25'-6"	18'-6"	2.31	232.6	2.73	271.0

NOTE: QUANTITIES SHOWN ARE FOR ONE (1) CURTAIN WALL.

REINFORCING STEEL SCHEDULE

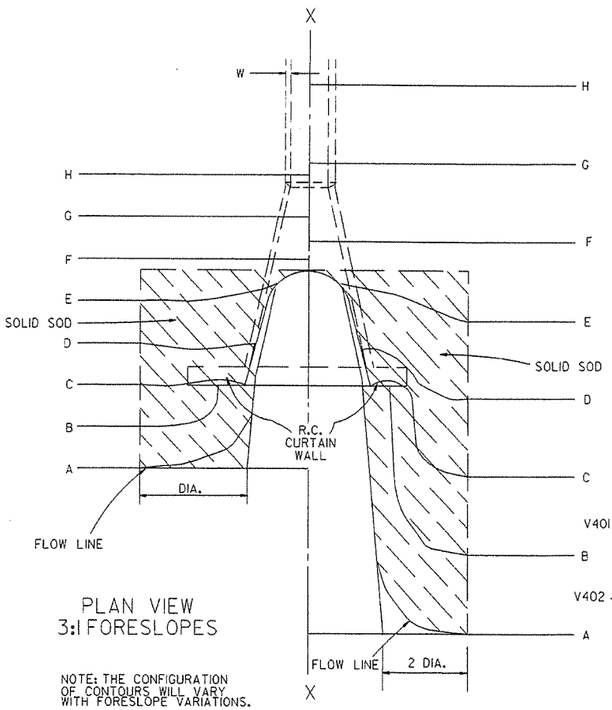
PIPE DIA.	SINGLE R.C. PIPE CULVERT								DOUBLE R.C. PIPE CULVERT											
	H401		H402		V401		V402		H401		H402		H403		V401		V402			
	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.	L	NO.
18"	7'-8"	2	1'-11½"	4	1'-7½"	8	8"	8	12'-2"	2	1'-11½"	4	8"	2	1'-7½"	10	8"	14		
24"	9'-2"	2	2'-2"	4	1'-8½"	10	8"	9	14'-8"	2	2'-2"	4	8"	2	1'-8½"	12	8"	18		
30"	10'-8"	2	2'-4½"	4	1'-11½"	10	8"	12	17'-8"	2	2'-4½"	4	8"	2	1'-11½"	14	8"	22		
36"	12'-8"	2	2'-10"	6	2'-3"	12	8"	14	20'-8"	2	2'-10"	6	8"	3	2'-3"	14	8"	28		
42"	15'-2"	2	3'-9½"	8	2'-9½"	16	8"	15	23'-8"	2	3'-9½"	8	8"	4	2'-9½"	18	8"	30		
48"	16'-8"	2	4'-3"	10	3'-1"	18	8"	16	25'-8"	2	4'-3"	10	8"	5	3'-1"	20	8"	32		
54"	18'-2"	2	4'-8½"	12	3'-5½"	20	8"	17	27'-8"	2	4'-9"	12	8"	6	3'-5½"	22	8"	34		
60"	20'-2"	2	5'-5"	14	4'-0"	24	8"	18	30'-8"	2	5'-5"	14	8"	7	4'-0"	26	8"	36		
72"	25'-2"	2	7'-4"	18	5'-1"	30	8"	20	36'-8"	2	7'-4"	18	8"	9	5'-1"	33	8"	40		

ALL REINFORCING STEEL #4 BARS @ 6" O.C.

SOLID SODDING

PIPE DIA.	SINGLE R.C.P.C.			DOUBLE R.C.P.C.		
	3:1	4:1	6:1	3:1	4:1	6:1
	SQ. YDS.			SQ. YDS.		
18"	5	7	12	6	8	13
24"	8	12	19	9	13	20
30"	13	18	29	14	19	30
36"	17	26	41	18	28	43
42"	23	35	55	25	37	57
48"	29	46	68	31	48	70
54"	35	57	85	37	59	87
60"	45	62	104	48	65	107
72"	64	92	156	67	95	159

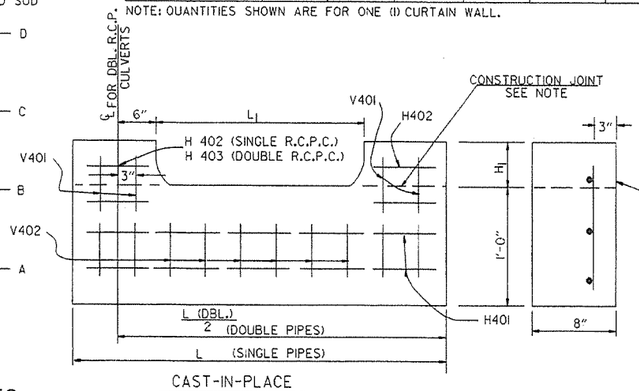
NOTE: QUANTITIES SHOWN ABOVE ARE FOR ONE (1) END OF F.E.S.



PLAN VIEW
3:1 FORESLOPES

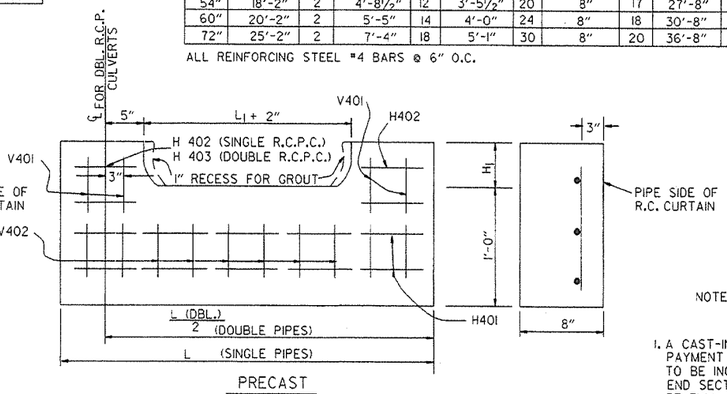
NOTE: THE CONFIGURATION OF CONTOURS WILL VARY WITH FORESLOPE VARIATIONS.

PLAN VIEW
FLATTENED FORESLOPES



CAST-IN-PLACE

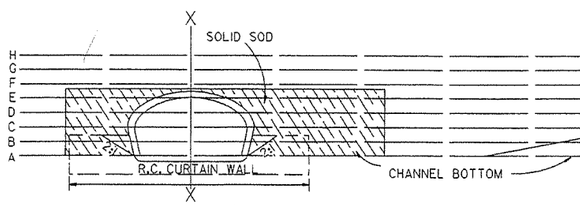
NOTE: THE PORTION OF THE R.C. CURTAIN WALL BENEATH THE FLARED END SECTION (LOWER 1'-0") SHALL BE PLACED MONOLITHICALLY. THE FLARED END SECTION SHALL THEN BE SET IN PLACE & THE REMAINING PORTIONS OF THE R.C. CURTAIN WALL PLACED.



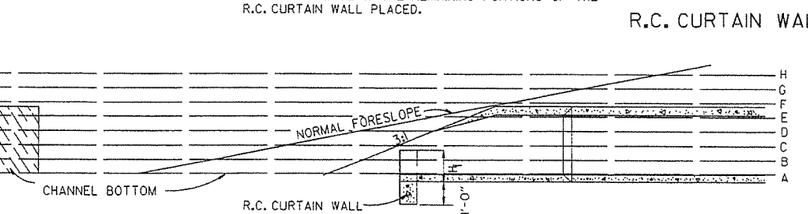
PRECAST

NOTE: THE PRECAST CURTAIN WALL WILL BE SET AND BACKFILLED WITH COMPACTED MATERIAL. THE FLARED END SECTION SHALL THEN BE SET IN PLACE AND THE 1" RECESS FILLED WITH GROUT. WHERE "L" EXCEEDS 11' THE CURTAIN WALL MAY BE CAST IN TWO (2) OR MORE SECTIONS. THE METHOD OF JOINING THE SECTIONS FOR INSTALLATION SHALL BE APPROVED BY THE ENGINEER.

R.C. CURTAIN WALL DETAILS



END VIEW



SECTIONAL VIEW "X-X"

GENERAL NOTES

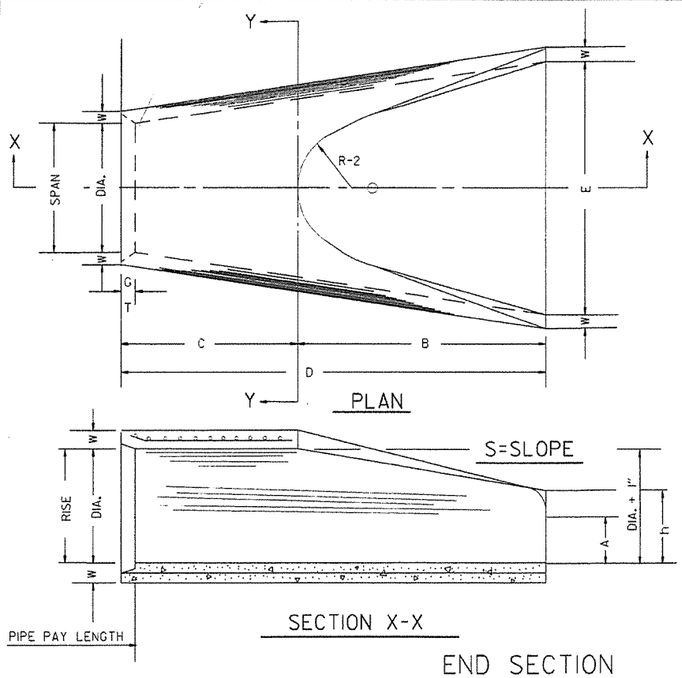
1. A CAST-IN-PLACE OR PRECAST CURTAIN WALL MAY BE USED. PAYMENT FOR THE CURTAIN WALL SHALL BE CONSIDERED TO BE INCLUDED IN THE UNIT PRICE BID EACH FOR FLARED END SECTIONS OF THE SEVERAL SIZES, WHICH PRICE SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS INCLUDING REINFORCING STEEL AND CONCRETE; FOR FORMS, MIXING AND PLACING; FOR EXCAVATION AND BACKFILL, AND FOR ALL LABOR, TOOLS, EQUIPMENT AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
2. ALL EXPOSED EDGES SHALL BE CHAMFERED ¾".
3. CONCRETE FOR CURTAIN WALL SHALL MEET THE REQUIREMENTS FOR CLASS A OR S CONCRETE AS PROVIDED IN SECTION 802 OF THE STANDARD SPECIFICATIONS OR FOR PAVING CONCRETE AS PROVIDED IN SECTION 501 OF THE STANDARD SPECIFICATIONS.
4. WELDED WIRE MESH 3 x 3 W10 x W10 MAY BE USED IN LIEU OF REINFORCING BARS.

DATE	REVISION	FILMED
10-18-96	ADDED NOTE TO SOLID SODDING	10-18-96
10-12-93	CORRECTED SPELLING	
11-3-94	ADDED GENERAL NOTE NO. 4	
8-15-91	REV. CURTAIN WALL QUANT. STEEL SCH. & SOLID SOD QUANT.	
3-2-81	ALLOW PRECAST IN 2 OR MORE PIECES CHAMFER EDGES	
5-15-80	ADDED PRECAST WALL & GENERAL NOTES	
10-2-72	REVISED AND REDRAWN	

ARKANSAS STATE HIGHWAY COMMISSION

FLARED END SECTION

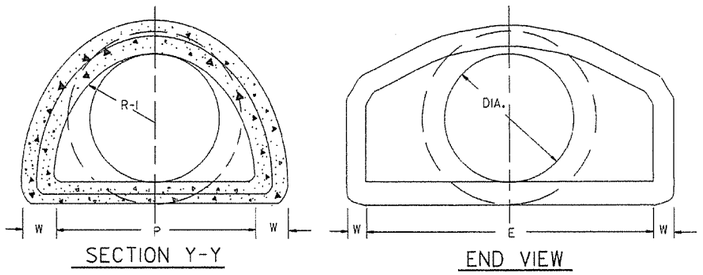
STANDARD DRAWING FES-1



END SECTION FOR REINFORCED CONCRETE PIPE CULVERTS

TABLE OF DIMENSIONS

DIA.	WALL	A	B	C	D	E	S	DIA. - 1"	P	R-1	R-2	G-T	WT.	h
18"	2½"	9"	2'-3"	3'-10"	6'-1"	3'-0"	3:1	19"	29"	15½"	12"	2"	1000	1'-0½"
24"	3"	9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3:1	25"	33⅜"	16Ⅼ"	14"	2½"	1600	1'-1½"
30"	3½"	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3:1	31"	37"	18½"	15"	3¼"	1940	1'-4⅝"
36"	4"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	6'-0"	3:1	37"	47Ⅼ"	24⅝"	20"	3½"	4100	1'-8"
42"	4½"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	3:1	43"	53⅞"	27½"	22"	3½"	5380	2'-2½"
48"	5"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	3:1	49"	56½"	28½"	22"	3½"	6550	2'-6"
54"	5½"	2'-4"	6'-6"	1'-10"	8'-4"	7'-6"	3:1	55"	65½"	33⅛"	24"	4"	8750	2'-10½"
60"	6"	2'-10"	6'-6"	1'-10"	8'-4"	8'-0"	3:1	61"	72½"	36Ⅼ"	24"	4"	9270	3'-5"
72"	7"	3'-10"	6'-6"	1'-10"	8'-4"	9'-0"	3:1	73"	77Ⅼ"	38⅝"	24"	5"	13250	4'-6"

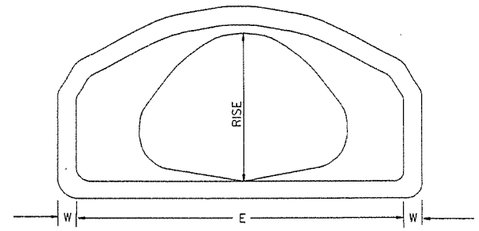


NOTE: TONGUE END ON UPSTREAM SECTION
GROOVE END ON DOWNSTREAM SECTION

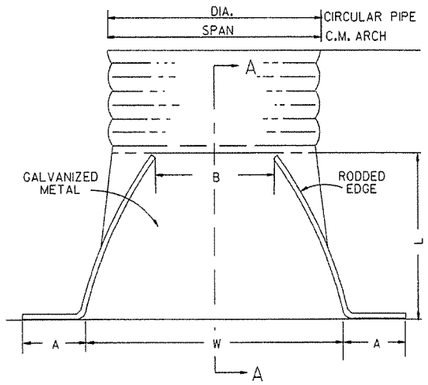
ARCH PIPE

EQUIV. DIA.	• SPAN AASHTO M 206	• SPAN AHD NOMINAL	• RISE AASHTO M 206	• RISE AHD NOMINAL	W	A	B	C	D	E	P	R2	G-T	S
	INCHES													
15	18	18	11	11	2"	4"	2'-0"	4'-0"	6'-0"	3'-0"	29"	12"	1½"	2½:1
18	22	22	13½	14	2½"	5"	2'-0"	4'-1"	6'-1"	3'-6"	32⅛"	13"	2½"	2½:1
21	26	26	15½	16	2¾"	7"	2'-3"	3'-10"	6'-1"	4'-0"	34⅛"	14"	2½"	2½:1
24	28½	29	18	18	3"	9"	2'-3"	3'-10"	6'-1"	5'-0"	36Ⅼ"	15"	2½"	2½:1
30	36¼	36	22½	23	3½"	10"	3'-1"	3'-0½"	6'-1½"	6'-0"	47Ⅼ"	20"	3"	2½:1
36	43¾	44	26⅝	27	4"	10½"	4'-0"	2'-1½"	6'-1½"	6'-6"	54⅝"	22"	3½"	2½:1
42	51⅛	51	31⅝	31	4½"	11½"	4'-7"	1-10¼"	6'-5¼"	7'-2"	59½"	23"	3¾"	2½:1
48	58½	59	36	36	5"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	7'-10"	70⅝"	24"	4¼"	2½:1
54	65	65	40	40	5½"	1'-7"	5'-3"	2'-11"	8'-2"	8'-6"	72Ⅼ"	24"	4¾"	2¼:1
60	73	73	45	45	6"	1'-10"	5'-6"	2'-8"	8'-2"	9'-0"	77Ⅼ"	24"	5"	2¼:1

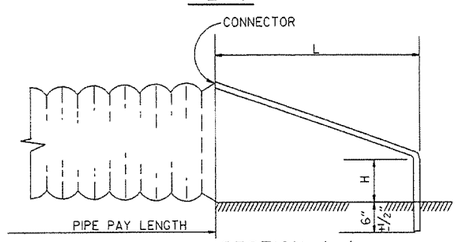
• THE MEASURED SPAN AND RISE SHALL NOT VARY MORE THAN ± 2 PER CENT FROM THE VALUES SPECIFIED BY AASHTO M 206.



END VIEW
CONCRETE ARCH PIPE

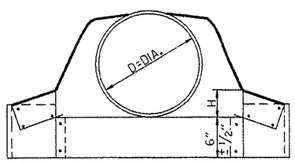


PLAN

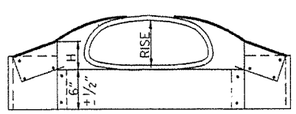


SECTION A-A

NOTE: ALTERNATE CONNECTIONS TO THE PIPE CULVERTS, IN ACCORDANCE WITH MANUFACTURER'S STANDARD PRACTICES, MAY BE MADE SUBJECT TO THE APPROVAL OF THE ENGINEER.



CIRCULAR PIPE



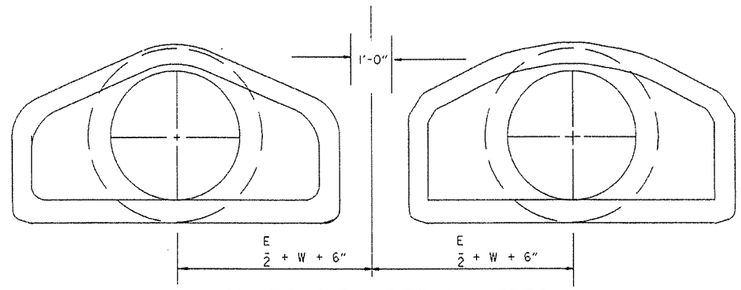
C.M. ARCH PIPE

CIRCULAR PIPE

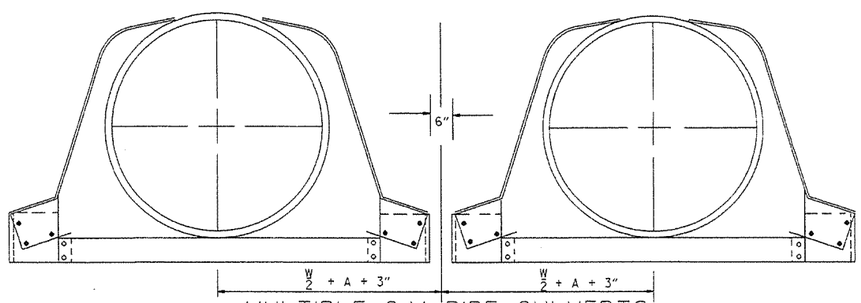
D. DIA.	GAUGE	A 1" ±	B MAX.	H 1" ±	L 1½" ±	W 2" ±	S
		INCHES					
12	16	6	6	6	21	24	2½:1
15	16	7	8	6	26	30	2½:1
18	16	8	10	6	31	36	2½:1
21	16	9	12	6	36	42	2½:1
24	16	10	13	6	41	48	2½:1
30	14	12	16	8	51	60	2½:1
36	14	14	19	9	60	72	2½:1
42	12	16	22	11	69	84	2½:1
48	12	18	27	12	78	90	2½:1
54	12	18	30	12	84	102	2:1
60	12	18	33	12	87	114	1¾:1
66	12	18	36	12	87	120	1½:1
72	12	18	39	12	87	126	1 1/3:1

C.M. ARCH PIPE

EQUIV. DIA.	SPAN	RISE	A 1" ±	B MAX.	H 1" ±	L 1½" ±	W 2" ±	S	GAUGE
	INCHES								
15"	17	13	7	9	6	19	30	2½:1	16
18"	21	15	7	10	6	23	36	2½:1	16
21"	24	18	8	12	6	28	42	2½:1	16
24"	28	20	9	14	6	32	48	2½:1	16
30"	35	24	10	16	6	39	60	2½:1	14
36"	42	29	12	18	8	46	75	2½:1	14
42"	49	33	13	21	9	53	85	2½:1	12
48"	57	38	18	26	12	63	90	2½:1	12
54"	64	43	18	30	12	70	102	2¼:1	12
60"	71	47	18	33	12	77	114	2¼:1	12



MULTIPLE R.C. PIPE CULVERTS



MULTIPLE C.M. PIPE CULVERTS

DATE	REVISION	BY	FILMED
10-18-96	REVISED ASTM REF. TO AASHTO		10-18-96
5-15-80	REVISED DISTANCE BETWEEN MULTIPLE R.C.P. F.E.S.		664-5-15-80
7-14-78	C.M. ARCH SIZES TO CONFORM WITH AASHTO SIZES		752-7-14-78
8-22-75	ADDED MULTIPLE PIPE CULVERTS		517-8-22-75
12-5-74	REMOVED NOTE RE REINF. FOR R.C. F.E.S.		500-12-5-74
5-24-73	CMP END SECTION, SHOW PIPE PAY LENGTH		627-5-24-73
10-2-72	REVISED AND REDRAWN		760-10-2-72

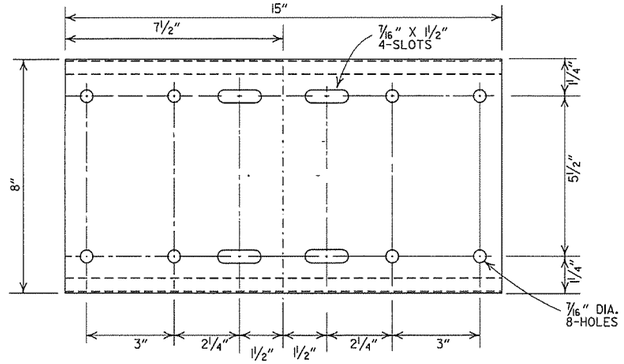
ARKANSAS STATE HIGHWAY COMMISION

FLARED END SECTION

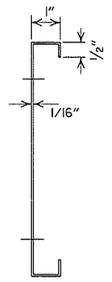
STANDARD DRAWING FES-2

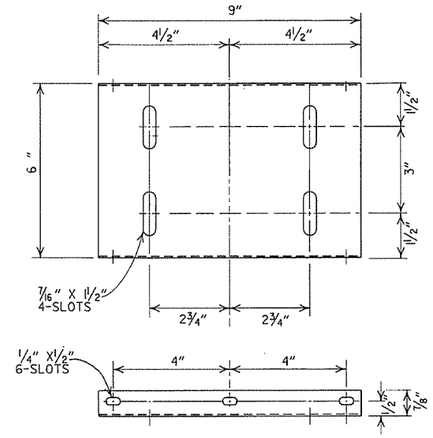
END SECTIONS FOR CORRUGATED METAL PIPE CULVERTS

stdfes2.dgn

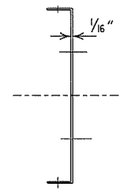


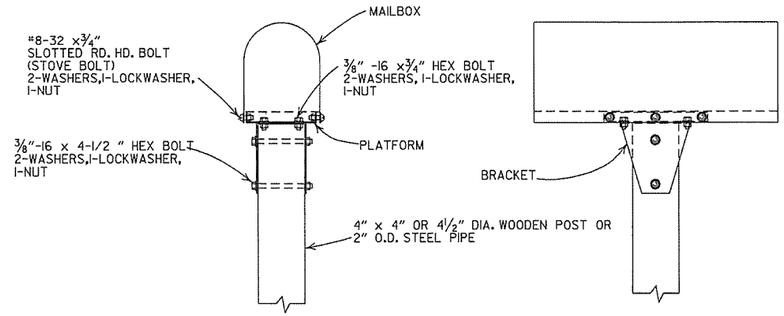
SHELF



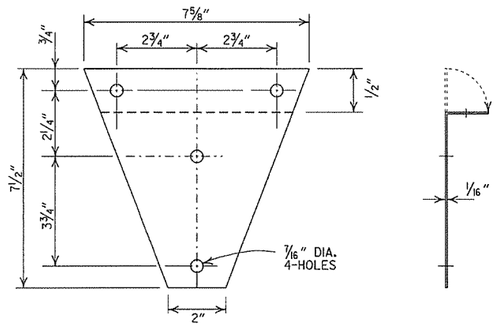


PLATFORM





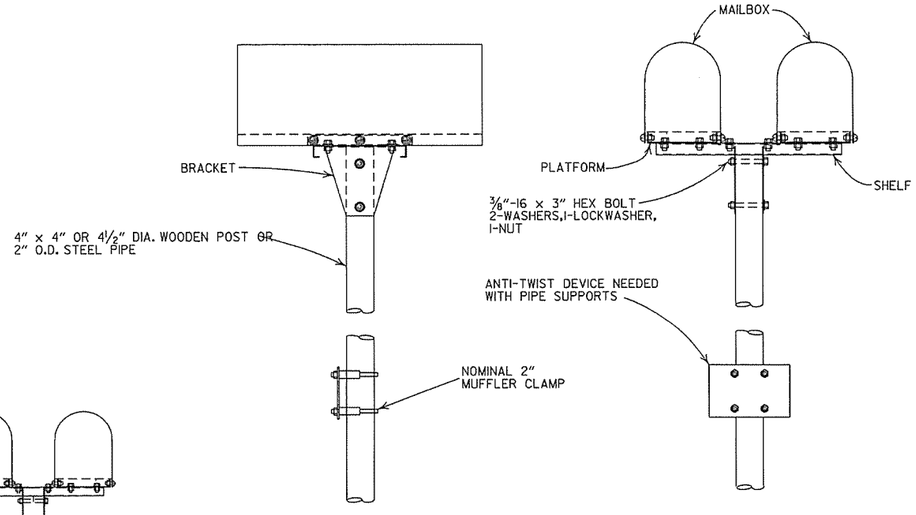
SINGLE INSTALLATION



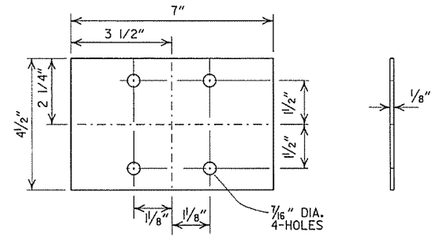
BRACKET

GENERAL NOTES

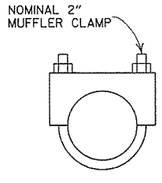
1. MAILBOX POSTS MAY BE WOOD OR METAL. WOOD POSTS SHALL BE PRESSURE TREATED FOR GROUND CONTACT IN ACCORDANCE WITH SECTION 637.02 OF THE STANDARD SPECIFICATIONS.
2. ANTI-TWIST PLATES SHALL BE USED ONLY ON METAL POSTS.
3. MAILBOX SHELF, BRACKET & PLATFORM SHALL BE GALVANIZED OR PAINTED STEEL, HOWEVER TREATED WOOD MAY BE USED WITH WOODEN POSTS. THE WOODEN SHELF, BRACKET & PLATFORM SHALL BE A MINIMUM OF ¾" THICK AND SHALL BE ASSEMBLED WITH BOLTS OF THE APPROPRIATE LENGTH WITH SIX 8 X¾" FLATHEAD WOOD SCREWS USED TO ATTACH THE MAILBOX TO THE PLATFORM.
4. THE MAILBOX SHELF AND PLATFORM THAT IS SHOWN IS FOR STANDARD SIZE MAILBOXES. THE SHELF AND PLATFORM SIZE SHALL BE MODIFIED TO FIT MAILBOXES OF A DIFFERENT SIZE.
5. METAL PIPE FOR MAILBOX SUPPORT SHALL BE 2" OUTSIDE DIAMETER STEEL WITH A WALL THICKNESS OF 0.145" AND A WEIGHT OF 2.72 LBS PER FT. OUTSIDE DIAMETER AND WEIGHT SHALL HAVE A TOLERANCE OF +/- 5% ACCORDING TO AASHTO M 181.
6. MAILBOX SUPPORT SYSTEM DIFFERING FROM THOSE SHOWN MAY BE USED, PROVIDED THEY ARE ON THE AHTD QUALIFIED PRODUCTS LIST FOR MAILBOX SUPPORTS.



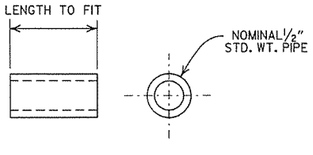
DOUBLE INSTALLATION



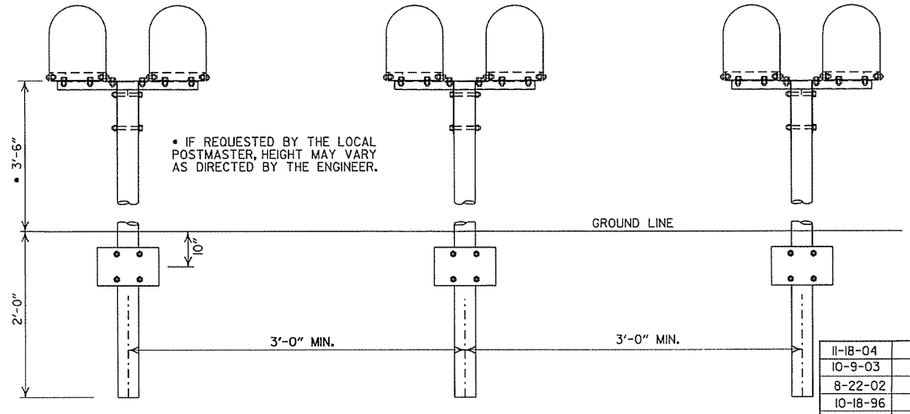
ANTI-TWIST PLATE



CLAMP



SPACER



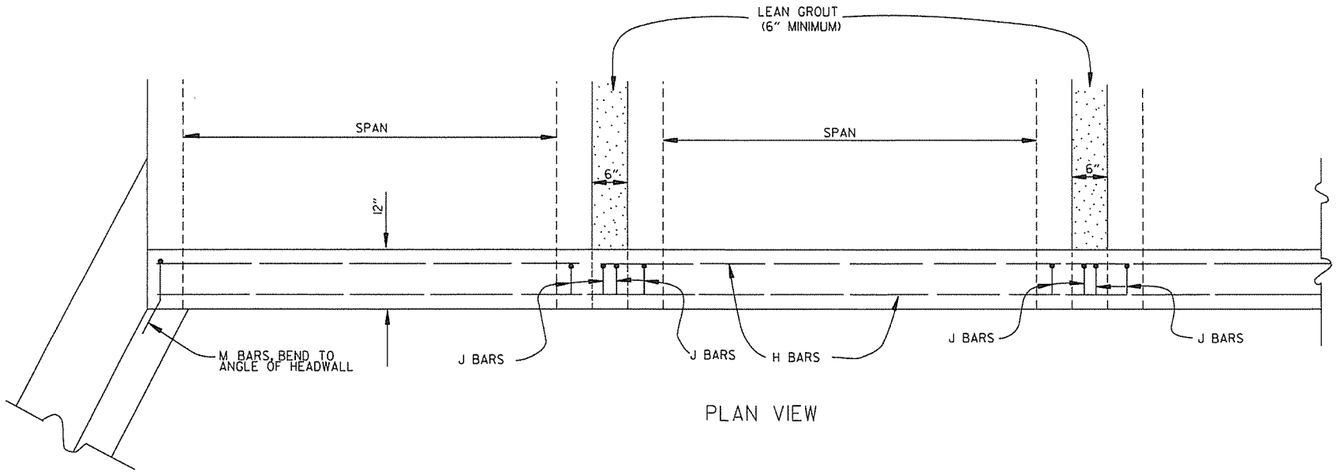
SPACING FOR MULTIPLE POST INSTALLATION

DATE	FILMED	REVISION
11-18-04		REVISED NOTES
10-9-03		REVISED NOTE 6
8-22-02		REVISED NOTE 6
10-18-96		CORRECTED AASHTO
10-1-92		CORRECTED SPELLING
9-26-91		NEW PHONE NUMBER
8-15-91		ADDED NOTE
11-30-89		ADJUSTED HEIGHT & ADDED NOTE
2-16-89		DELETED SLOTS FROM SHELF & PLTF
11-17-88	10-1-92	ADJUSTED DIMENSIONS OF STEEL POSTS
7-15-88	120-7-15-88	ISSUED

ARKANSAS STATE HIGHWAY COMMISSION

MAILBOX DETAILS

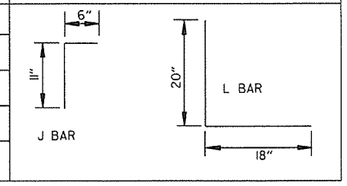
STANDARD DRAWING MB-1



PLAN VIEW

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 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 ¾" CHAMFERS.

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

ALL CONCRETE, REINFORCING STEEL, LEAN GROUT, MEMBRANE WATERPROOFING, DRAINAGE FILL MATERIAL, GEOTEXTILE FILTER FABRIC, 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.

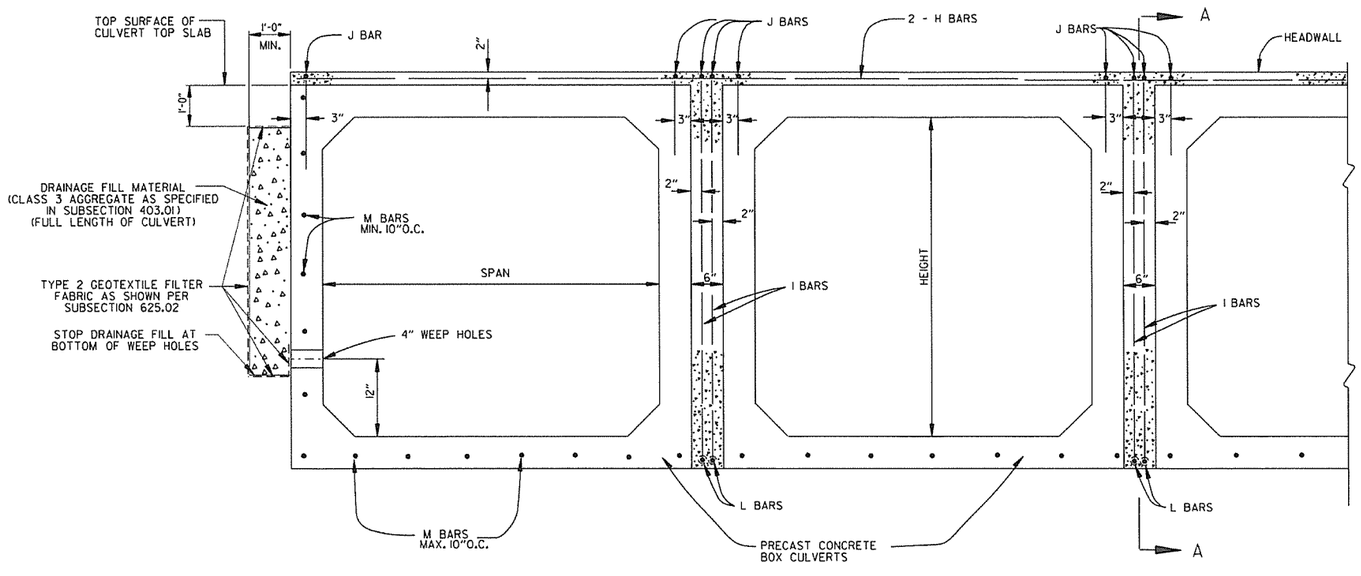
THE MEMBRANE WATERPROOFING WILL BE REQUIRED ON THE TOP EXTERNAL JOINT AND SHALL EXTEND 1 FOOT DOWN THE SIDES OF THE CULVERT.

IN OUTER BARRELS, ONE WEEP HOLE IS REQUIRED IN EXTERIOR WALLS OF EACH PRECAST CULVERT SECTION. WEEP HOLES SHALL HAVE A MAXIMUM HORIZONTAL SPACING OF 10'-0" IN THE ASSEMBLED CULVERT AND SHALL BE SPACED TO CLEAR ALL REINFORCING STEEL. THE DRAIN OPENING SHALL BE 4" DIAMETER AND SHALL BE PLACED 12" ABOVE THE TOP OF THE BOTTOM SLAB.

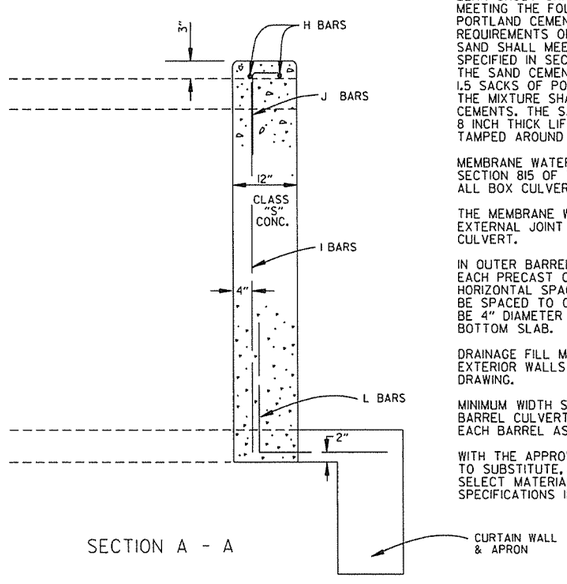
DRAINAGE FILL MATERIAL WITH GEOTEXTILE FABRIC IS REQUIRED AT THE EXTERIOR WALLS OF THE ASSEMBLED CULVERT, SEE DETAILS ON THIS DRAWING.

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.



END VIEW



SECTION A - A

DATE	REVISION	DATE FILMED
1-28-15	REVISED GEOTEXTILE FABRIC PLACEMENT	
12-15-11	ADDED NOTE & DTLS FOR WEEP HOLE AND DRAINAGE FILL	
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	

ARKANSAS STATE HIGHWAY COMMISSION

PRECAST CONCRETE BOX CULVERTS

STANDARD DRAWING PBC-1

REINFORCED CONCRETE ARCH PIPE DIMENSIONS

EQUIV. DIA.	SPAN		RISE	
	AASHTO M 206	AHTD NOMINAL	AASHTO M 206	AHTD NOMINAL
INCHES	INCHES			
15	18	18	11	11
18	22	22	13½	14
21	26	26	15½	16
24	28½	29	18	18
30	36¼	36	22½	23
36	43⅜	44	26⅝	27
42	51⅛	51	31⅝	31
48	58½	59	36	36
54	65	65	40	40
60	73	73	45	45
72	88	88	54	54
84	102	102	62	62
90	115	115	72	72
96	122	122	77½	77
108	138	138	87⅛	87
120	154	154	96⅞	97
132	168¾	169	106½	107

THE MEASURED SPAN AND RISE SHALL NOT VARY MORE THAN ± 2 PERCENT FROM THE VALUES SPECIFIED BY AASHTO M206.

REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE DIMENSIONS

EQUIV. DIA.	AASHTO M 207	
	SPAN	RISE
INCHES	INCHES	
18	23	14
24	30	19
27	34	22
30	38	24
33	42	27
36	45	29
39	49	32
42	53	34
48	60	38
54	68	43
60	76	48
66	83	53
72	91	58
78	98	63
84	106	68

THE MEASURED SPAN AND RISE SHALL NOT VARY MORE THAN ± 2 PERCENT FROM THE VALUES SPECIFIED BY AASHTO M207.

CONSTRUCTION SEQUENCE

1. PLACE STRUCTURAL BEDDING MATERIAL TO GRADE. DO NOT COMPACT.
2. INSTALL PIPE TO GRADE.
3. COMPACT STRUCTURAL BEDDING OUTSIDE THE MIDDLE THIRD OF THE PIPE.
4. PLACE AND COMPACT THE HAUNCH AREA UP TO THE MIDDLE OF THE PIPE.
5. COMPLETE BACKFILL ACCORDING TO SUBSECTION 606.03.(f)(1).

NOTE: HAUNCH AND STRUCTURAL BEDDING MATERIAL WILL NOT BE PAID FOR SEPARATELY, BUT COMPENSATION WILL BE CONSIDERED TO BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF CONCRETE PIPE.

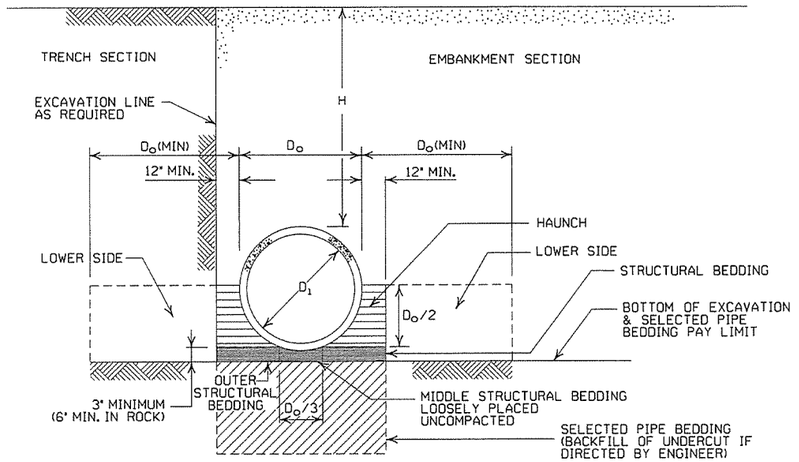
- LEGEND -

D_i = NORMAL INSIDE DIAMETER OF PIPE
D_o = OUTSIDE DIAMETER OF PIPE
H = FILL COVER HEIGHT OVER PIPE (FEET)
MIN. = MINIMUM
▨ = UNDISTURBED SOIL

INSTALLATION TYPE	MATERIAL REQUIREMENTS FOR HAUNCH AND STRUCTURAL BEDDING
TYPE 1	AGGREGATE BASE COURSE (CLASS 5 OR CLASS 7)
TYPE 2	SELECTED MATERIALS (CLASS SM-1, SM-2, OR SM-4) OR TYPE 1 INSTALLATION MATERIAL*
TYPE 3**	AASHTO CLASSIFICATION A-1 THRU A-6 SOIL OR TYPE 1 OR 2 INSTALLATION MATERIAL

*SM-3 WILL NOT BE ALLOWED.

**MATERIALS SHALL NOT INCLUDE ORGANIC MATERIALS OR STONES LARGER THAN 3 INCHES.



EMBANKMENT AND TRENCH INSTALLATIONS

1. MATERIAL IN THE HAUNCH AND OUTER STRUCTURAL BEDDING SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY ACCORDING TO THE TYPE OR CLASS OF MATERIAL USED.
2. FOR TRENCHES WITH WALLS OF NATURAL SOIL, THE DENSITY OF THE SOIL IN THE LOWER SIDE ZONE SHALL BE AS FIRM AS THE 95% DENSITY REQUIRED FOR THE HAUNCH. IF THE EXISTING SOIL DOES NOT MEET THIS CRITERIA, IT SHALL BE REMOVED AND RECOMPACTED TO 95% OF THE MAXIMUM DENSITY ACCORDING TO THE TYPE OF MATERIAL USED.
3. FOR EMBANKMENTS, THE MATERIAL IN THE LOWER SIDE ZONE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY ACCORDING TO THE TYPE OR CLASS OF MATERIAL USED.

GENERAL NOTES

1. CONCRETE PIPE CULVERT CONSTRUCTION SHALL CONFORM TO ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (CURRENT EDITION), WITH APPLICABLE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS. UNLESS OTHERWISE NOTED IN THE PLANS, SECTION AND SUBSECTION REFER TO THE STANDARD CONSTRUCTION SPECIFICATIONS.
2. CONCRETE PIPE CULVERT DESIGN SHALL CONFORM TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION (2010) WITH 2010 INTERIMS.
3. ALL PIPE SHALL CONFORM TO SECTION 606. CIRCULAR R.C. PIPE CULVERTS SHALL CONFORM TO AASHTO M170, R.C. ARCH PIPE CULVERTS SHALL CONFORM TO AASHTO M206 AND HORIZONTAL ELLIPTICAL PIPE CULVERTS SHALL CONFORM TO AASHTO M207.
4. ALL PIPE SHALL BE PROTECTED DURING CONSTRUCTION BY A COVER SUFFICIENT TO PREVENT DAMAGE FROM PASSAGE OF EQUIPMENT.
5. THE MINIMUM TRENCH WIDTH SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 24 INCHES. THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE THE MINIMUM WIDTH PRACTICABLE FOR WORKING CONDITIONS.
6. MULTIPLE PIPE CULVERTS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE OF 24 INCHES BETWEEN STRINGS OF PIPE. REFER TO STD. DWG. FES-2 FOR MINIMUM CLEARANCE WHERE FLARED END SECTIONS ARE USED.
7. IMPERVIOUS MATERIAL SHOULD BE PLACED AS DIRECTED BY THE ENGINEER AT THE ENDS OF THE CULVERT TO PREVENT LOSS OF STRUCTURAL BEDDING WHEN PERVIOUS MATERIAL IS USED FOR STRUCTURAL BEDDING AND/OR BACKFILL.
8. NOT MORE THAN ONE LIFTING HOLE MAY BE PROVIDED IN CONCRETE PIPE TO FACILITATE HANDLING. HOLE MAY BE CAST IN PLACE, CUT INTO THE FRESH CONCRETE AFTER FORMS ARE REMOVED, OR DRILLED. THE HOLE SHALL NOT BE MORE THAN TWO INCHES IN DIAMETER OR TWO INCHES SQUARE. CUTTING OR DISPLACEMENT OF REINFORCEMENT WILL NOT BE PERMITTED. SPALLED AREAS AROUND THE HOLE SHALL BE REPAIRED IN A WORKMANLIKE MANNER. LIFTING HOLE SHALL BE FILLED WITH MORTAR, CONCRETE, OR OTHER METHOD AS APPROVED BY THE ENGINEER.
9. WHEN DIRECTED BY THE ENGINEER, UNSUITABLE MATERIAL THAT IS ENCOUNTERED AT THE BOTTOM OF THE EXCAVATED TRENCH (BELOW THE AREA IDENTIFIED AS "STRUCTURAL BEDDING" ABOVE) WILL BE EXCAVATED AND REPLACED WITH SELECTED PIPE BEDDING. THE QUANTITY OF MATERIAL REQUIRED TO BACKFILL THE UNDERCUT AREA UP TO THE SELECTED PIPE BEDDING PAY LIMIT DESIGNATED ABOVE WILL BE MEASURED AND PAID FOR AS "SELECTED PIPE BEDDING."
10. WHEN THE EXISTING MATERIAL EXCAVATED FOR THE PIPE TRENCH IS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILLING THE PIPE (ABOVE THE AREA IDENTIFIED ABOVE AS THE HAUNCH), BORROW MATERIAL OR MATERIAL FROM THE ROADWAY EXCAVATION WILL BE USED TO BACKFILL THE PIPE. IF SUITABLE MATERIAL IS NOT AVAILABLE, THE ENGINEER MAY AUTHORIZE THE USE OF "SELECTED PIPE BACKFILL."

MINIMUM HEIGHT OF FILL "H" OVER CIRCULAR R.C. PIPE CULVERTS

	CLASS OF PIPE			
	CLASS III		CLASS IV	CLASS V
INSTALLATION TYPE	TYPE 1 OR 2	TYPE 3	ALL	ALL
PIPE ID (IN.)	FEET			
12-15	2	2.5	2	1
18-24	2.5	3	2	1
27-33	3	4	2	1
36-42	3.5	5	2	1
48	4.5	5.5	2	1
54-60	5	7	2	1
66-78	6	8	2	1
84-108	7.5	8	2	1

NOTE: FOR MINIMUM COVER VALUES, "H" SHALL INCLUDE A MINIMUM OF 12" OF PAVEMENT AND/OR BASE.

MAXIMUM HEIGHT OF FILL "H" OVER CIRCULAR R.C. PIPE CULVERTS

INSTALLATION TYPE	CLASS OF PIPE		
	CLASS III	CLASS IV	CLASS V
	FEET		
TYPE 1	21	32	50
TYPE 2	16	25	39
TYPE 3	12	20	30

NOTE: IF FILL HEIGHT EXCEEDS 50 FEET, A SPECIAL DESIGN CONCRETE PIPE WILL BE REQUIRED USING TYPE 1 INSTALLATION.

MINIMUM HEIGHT OF FILL "H" OVER R.C. ARCH & HORIZONTAL ELLIPTICAL PIPE CULVERTS

INSTALLATION TYPE	CLASS OF PIPE	
	CLASS III	CLASS IV
	FEET	
TYPE 2 OR TYPE 3	2.5	1.5

NOTE: TYPE 1 INSTALLATION WILL NOT BE ALLOWED FOR ARCH & HORIZONTAL ELLIPTICAL PIPE CULVERTS.

NOTE: FOR MINIMUM COVER VALUES, "H" SHALL INCLUDE A MINIMUM OF 12" OF PAVEMENT AND/OR BASE.

MAXIMUM HEIGHT OF FILL "H" OVER R.C. ARCH & HORIZONTAL ELLIPTICAL PIPE CULVERTS

INSTALLATION TYPE	CLASS OF PIPE	
	CLASS III	CLASS IV
	FEET	
TYPE 2	13	21
TYPE 3	10	16

NOTE: TYPE 1 INSTALLATION WILL NOT BE ALLOWED FOR ARCH & HORIZONTAL ELLIPTICAL PIPE CULVERTS.

DATE	REVISION	DATE FILMED
2-27-14	REVISED GENERAL NOTE 1.	
12-15-11	REVISED FOR LRFD DESIGN SPECIFICATIONS	
5-18-00	REVISED TYPE 3 BEDDING & ADDED NOTE	
3-30-00	REVISED INSTALLATIONS	
11-06-97	ISSUED	

ARKANSAS STATE HIGHWAY COMMISSION

CONCRETE PIPE CULVERT FILL HEIGHTS & BEDDING

STANDARD DRAWING PCC-1

CORRUGATED STEEL PIPE (ROUND)

PIPE DIAMETER (INCHES)	① MINUMUM COVER TOP OF PIPE TO TOP OF GROUND "H" (FEET)	MAX. FILL HEIGHT "H" ABOVE TOP OF PIPE (FEET)				
		METAL THICKNESS (INCHES)				
		0.064	0.079	0.109	0.138	0.168
2⅔ INCH BY ½ INCH CORRUGATION RIVETED, WELDED, OR HELICAL LOCK-SEAM						
12	1	84	91			
15	1	67	73			
18	1	56	61			
24	1	42	46	59		
30	2	34	36	47		
36	2		30	39	41	
42	2		43	67	70	73
48	2		37	58	61	64
② 3 INCH BY 1 INCH OR 5 INCH BY 1 INCH CORRUGATION RIVETED, WELDED, BOLTED, OR HELICAL LOCK-SEAM						
36	1	48	60	88	111	118
42	1	41	51	72	90	102
48	1	36	45	64	77	85
54	2	32	40	59	71	79
60	2	29	36	53	64	71
66	2	26	33	47	58	64
72	2	24	30	44	53	59
78	2		28	41	49	54
84	2		26	38	45	51
90	2		24	35	43	45
96	2		22	33	40	44
102	2			31	38	42
108	2			30	35	39
114	2			28	34	37
120	2			27	32	35

CORRUGATED ALUMINUM PIPE (ROUND)

PIPE DIAMETER (INCHES)	① MINUMUM COVER TOP OF PIPE TO TOP OF GROUND "H" (FEET)	MAX. FILL HEIGHT "H" ABOVE TOP OF PIPE (FEET)				
		METAL THICKNESS IN INCHES				
		0.060	0.075	0.105	0.135	0.164
		2 ⅔ INCH BY ½ INCH CORRUGATION RIVETED OR HELICAL LOCK-SEAM				
12	1	45	45			
18	2	30	30	52		
24	2	22	22	39	41	
30	2		18	31	32	34
36	2.5		15	26	27	28
42	2			43	43	44
48	2			40	41	43
54	2			35	37	38
60	2				33	34
66	2					31
72	2					29

CORRUGATED METAL PIPE ARCHES

EQUIV. DIA. (INCHES)	PIPE DIMENSION SPAN X RISE (INCHES)	MINUMUM CORNER RADIUS (INCHES)	STEEL			ALUMINUM		
			MIN. THICKNESS REQUIRED INCHES	① MIN. HEIGHT OF FILL, "H" (FT.) INSTALLATION TYPE 1	MAX. HEIGHT OF FILL, "H" (FT.) INSTALLATION TYPE 1	MIN. THICKNESS REQUIRED INCHES	① MIN. HEIGHT OF FILL, "H" (FT.) INSTALLATION TYPE 1	MAX. HEIGHT OF FILL, "H" (FT.) INSTALLATION TYPE 1
			2 ⅔ INCH BY ½ INCH CORRUGATION RIVETED, WELDED, OR HELICAL LOCK-SEAM			2 ⅔ INCH BY ½ INCH CORRUGATION RIVETED OR HELICAL LOCK-SEAM		
15	17x13	3	0.064	2	15	0.060	2	15
18	21x15	3	0.064	2	15	0.060	2	15
21	24x18	3	0.064	2.25	15	0.060	2.25	15
24	28x20	3	0.064	2.5	15	0.075	2.5	15
30	35x24	3	0.079	3	12	0.075	3	12
36	42x29	3½	0.079	3	12	0.105	3	12
42	49x33	4	0.079	3	12	0.105	3	12
48	57x38	5	0.109	3	13	0.135	3	13
54	64x43	6	0.109	3	14	0.135	3	14
60	71x47	7	0.138	3	15	0.164	3	15
66	77x52	8	0.168	3	15			
72	83x57	9	0.168	3	15			
			② 3 INCH BY 1 INCH OR 5 INCH BY 1 INCH CORRUGATION RIVETED, WELDED, OR HELICAL LOCK-SEAM					
				INSTALLATION TYPE 2	INSTALLATION TYPE 1	INSTALLATION TYPE 2	INSTALLATION TYPE 1	
36	40x31	5	0.079	3	2	12	15	
42	46x36	6	0.079	3	2	13	15	
48	53x41	7	0.079	3	2	13	15	
54	60x46	8	0.079	3	2	13	15	
60	66x51	9	0.079	3	2	13	15	
66	73x55	12	0.079	3	2	15	15	
72	81x59	14	0.079	3	2	15	15	
78	87x63	14	0.079	3	2	15	15	
84	95x67	16	0.109	3	2	15	15	
90	103x71	16	0.109	3	2	15	15	
96	112x75	18	0.109	3	2	15	15	
102	117x79	18	0.109	3	2	15	15	
108	128x83	18	0.138	3	2	15	15	

CONSTRUCTION SEQUENCE

1. PLACE STRUCTURAL BEDDING MATERIAL TO GRADE. DO NOT COMPACT.
2. INSTALL PIPE TO GRADE.
3. COMPACT STRUCTURAL BEDDING OUTSIDE THE MIDDLE THIRD OF THE PIPE.
4. COMPLETE STRUCTURAL BACKFILL OPERATION BY WORKING FROM SIDE TO SIDE OF THE PIPE. THE SIDE TO SIDE STRUCTURAL BACKFILL DIFFERENTIAL SHALL NOT EXCEED 24 INCHES OR 1/3 THE SIZE OF THE PIPE, WHICHEVER IS LESS.

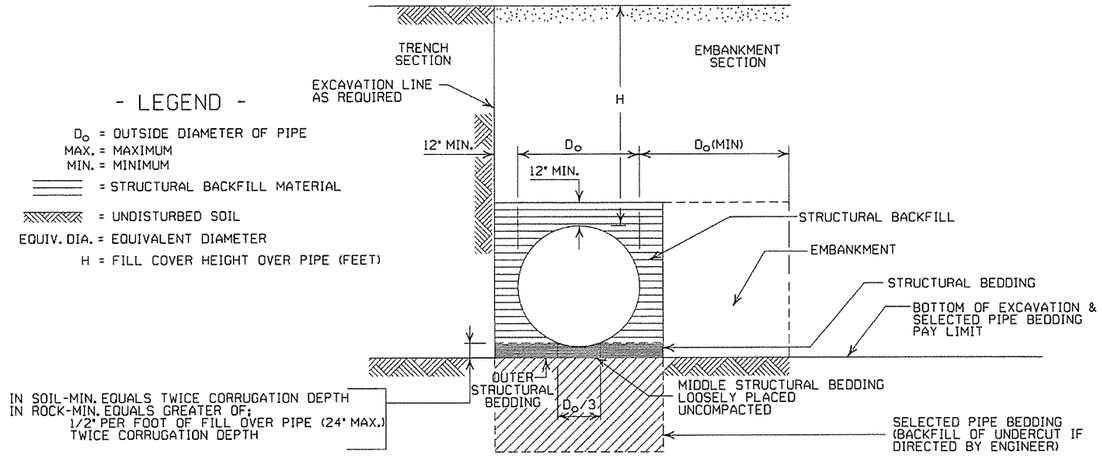
NOTE: STRUCTURAL BACKFILL AND STRUCTURAL BEDDING MATERIAL WILL NOT BE PAID FOR SEPARATELY, BUT COMPENSATION WILL BE CONSIDERED TO BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF METAL PIPE.

INSTALLATION TYPE	MATERIAL REQUIREMENTS FOR STRUCTURAL BACKFILL AND STRUCTURAL BEDDING
TYPE 1	AGGREGATE BASE COURSE (CLASS 4, 5, 6, OR 7)
TYPE 2	SELECTED MATERIALS (CLASS SM-1, SM-2, OR SM-4) OR TYPE 1 INSTALLATION MATERIAL ③

③ SM-3 WILL NOT BE ALLOWED.

EQUIVALENT METAL THICKNESSES AND GAUGES

METAL THICKNESS IN INCHES			GAUGE NUMBER
STEEL			
ZINC COATED	UNCOATED	ALUMINUM	
0.064	0.0598	0.060	16
0.079	0.0747	0.075	14
0.109	0.1046	0.105	12
0.138	0.1345	0.135	10
0.168	0.1644	0.164	8



EMBANKMENT AND TRENCH INSTALLATIONS

1. STRUCTURAL BACKFILL, EMBANKMENT, AND OUTER STRUCTURAL BEDDING MATERIAL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY ACCORDING TO THE TYPE OR CLASS OF MATERIAL USED.
2. INSTALLATION TYPE 1 OR 2 MAY BE USED FOR CORRUGATED STEEL OR ALUMINUM PIPE (ROUND).
3. INSTALALTION TYPE 1 SHALL BE USED FOR CORRUGATED STEEL OR ALUMINUM PIPE ARCHES WITH 2⅔" X ½" CORRUGATION.
4. INSTALLATION TYPE 1 OR 2 MAY BE USED FOR CORRUGATED STEEL OR ALUMINUM PIPE ARCHES WITH 3" X 1" OR 5" X 1" CORRUGATION.

GENERAL NOTES

1. METAL PIPE CULVERT CONSTRUCTION SHALL CONFORM TO ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (CURRENT EDITION), WITH APPLICABLE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS. UNLESS OTHERWISE NOTED IN THE PLANS, SECTION AND SUBSECTION REFER TO THE STANDARD CONSTRUCTION SPECIFICATIONS.
2. METAL PIPE CULVERT DESIGN SHALL CONFORM TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION (2010) WITH 2010 INTERIMS.
3. METAL PIPE CULVERT MATERIALS AND INSTALLATIONS SHALL CONFORM TO SECTION 606 AND JOB SPECIAL PROVISION "METAL PIPE".
4. ALL PIPE SHALL BE PROTECTED DURING CONSTRUCTION BY A COVER SUFFICIENT TO PREVENT DAMAGE FROM PASSAGE OF EQUIPMENT.
5. THE MINIMUM TRENCH WIDTH SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 24 INCHES. THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE THE MINIMUM WIDTH PRACTICABLE FOR WORKING CONDITIONS.
6. MULTIPLE PIPE CULVERTS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE OF 24 INCHES BETWEEN STRINGS OF PIPE. REFER TO STD. DWG. FES-2 FOR MINIMUM CLEARANCE WHERE FLARED END SECTIONS ARE USED.
7. IMPERVIOUS MATERIAL SHOULD BE PLACED AS DIRECTED BY THE ENGINEER AT THE ENDS OF THE CULVERT TO PREVENT LOSS OF STRUCTURAL BEDDING WHEN PERVIOUS MATERIAL IS USED FOR STRUCTURAL BEDDING AND/OR BACKFILL.
8. WHEN DIRECTED BY THE ENGINEER, UNSUITABLE MATERIAL THAT IS ENCOUNTERED AT THE BOTTOM OF THE EXCAVATED TRENCH (BELOW THE AREA IDENTIFIED AS "STRUCTURAL BEDDING" ABOVE) WILL BE EXCAVATED AND REPLACED WITH SELECTED PIPE BEDDING. THE QUANTITY OF MATERIAL REQUIRED TO BACKFILL THE UNDERCUT AREA UP TO THE SELECTED PIPE BEDDING PAY LIMIT DESIGNATED ABOVE WILL BE MEASURED AND PAID FOR AS "SELECTED PIPE BEDDING."
9. WHEN THE EXISTING MATERIAL EXCAVATED FOR THE PIPE TRENCH IS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILLING THE PIPE (ABOVE THE AREA IDENTIFIED AS STRUCTURAL BACKFILL), BORROW MATERIAL OR MATERIAL FROM THE ROADWAY EXCAVATION WILL BE USED TO BACKFILL THE PIPE. IF SUITABLE MATERIAL IS NOT AVAILABLE, THE ENGINEER MAY AUTHORIZE THE USE OF "SELECTED PIPE BACKFILL."

① FOR MINIMUM COVER VALUES, "H" SHALL INCLUDE A MINIMUM 12" OF PAVEMENT AND/OR BASE.

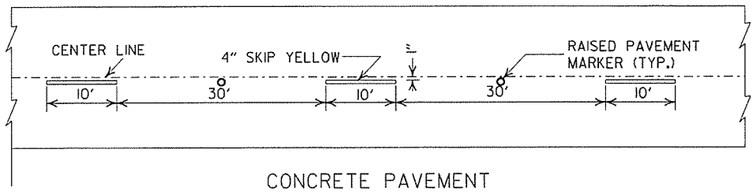
② WHERE THE STANDARD 2 2/3"x ½" CORRUGATION AND GAUGE IS SPECIFIED FOR A GIVEN DIAMETER, A PIPE OF THE SAME DIAMETER WITH A 3" x 1" OR 5" x 1" CORRUGATION MAY BE SUBSTITUTED, PROVIDING IT IS GAUGED FOR A FILL HEIGHT CONDITION EQUAL TO OR GREATER THAN THE MAXIMUM FILL HEIGHT CONDITION FOR THE SPECIFIED GAUGE AND CORRUGATION.

DATE	REVISION	DATE FILMED
2-27-14	REVISED GENERAL NOTE 1.	
12-15-11	REVISED FOR LRFD DESIGN SPECS	
3-30-00	REVISED INSTALLATIONS	
11-06-97	ISSUED	

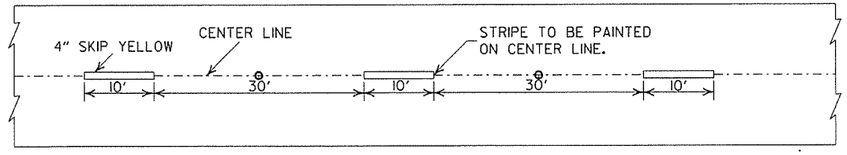
ARKANSAS STATE HIGHWAY COMMISSION

METAL PIPE CULVERT FILL HEIGHTS & BEDDING

STANDARD DRAWING PCM-1

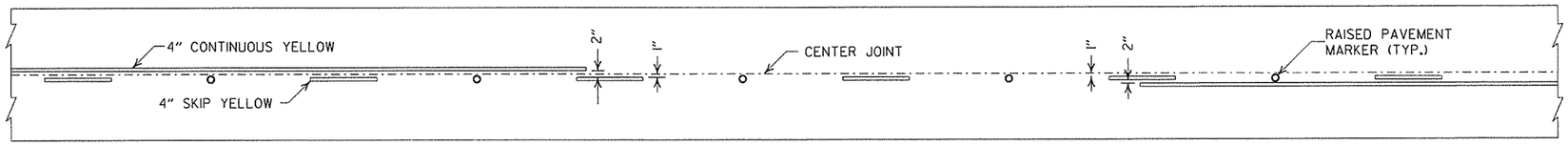


CONCRETE PAVEMENT

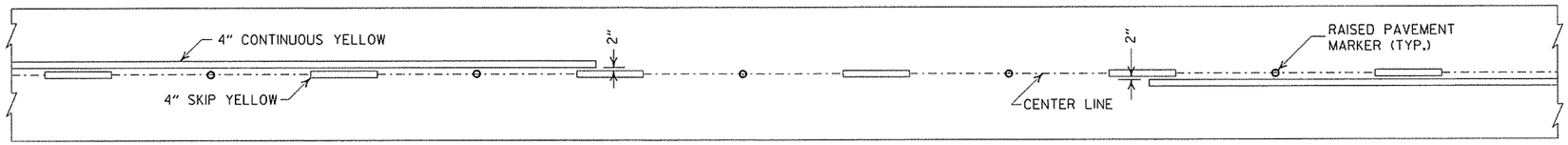


ASPHALT PAVEMENT

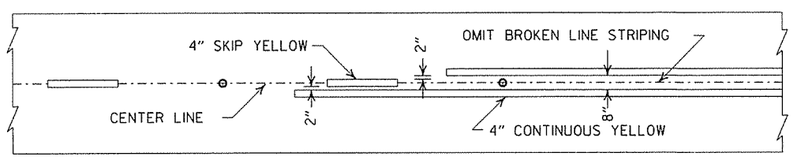
BROKEN LINE STRIPING



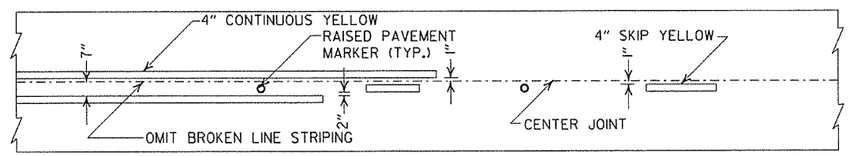
SOLID LINE STRIPING ON CONCRETE PAVEMENT



SOLID LINE STRIPING ON ASPHALT PAVEMENT



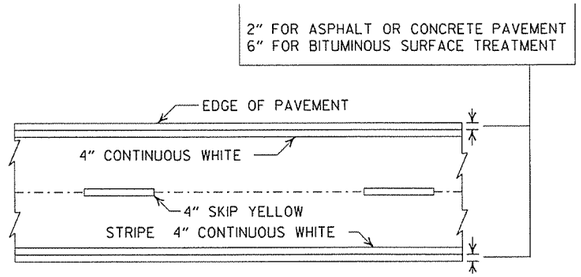
ASPHALT PAVEMENT



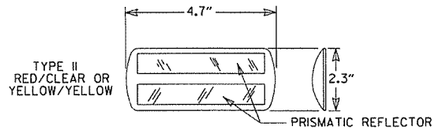
CONCRETE PAVEMENT

NOTES:

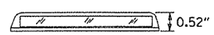
1. ALL LINES SHALL HAVE A WIDTH OF 4 INCHES.
2. THE THICKNESS AND RATE OF PAINT APPLICATION SHALL BE AS SPECIFIED IN SECTION 718 OF THE STANDARD SPECIFICATIONS.
3. THIS DRAWING SHALL BE USED IN CONJUNCTION WITH THE LATEST REVISED ADDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."
4. RAISED PAVEMENT MARKERS SHALL BE CENTERED BETWEEN SKIP LINES ON 40 FEET SPACING UNLESS OTHERWISE SHOWN ON THE PLANS.



PAVEMENT EDGE LINE MARKING



NOTE:
THE RED LENS OF THE TYPE II R.P.M. SHALL FACE THE INCORRECT TRAFFIC MOVEMENT.



DETAIL OF STANDARD RAISED PAVEMENT MARKERS

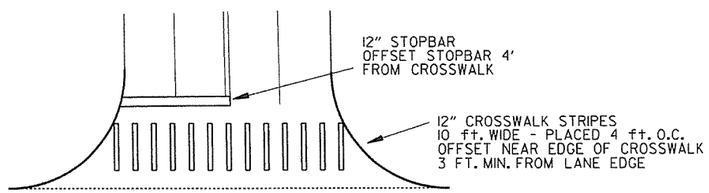
GENERAL NOTES:

THIS DRAWING SHOULD BE CONSIDERED AS TYPICAL ONLY AND THE FINAL LOCATION OF THE STRIPING AND RAISED PAVEMENT MARKERS SHALL BE DETERMINED BY THE ENGINEER.

THIS DRAWING SHOULD BE USED IN CONJUNCTION WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST REVISION.

NOTE:
DIMENSIONS SHOWN FOR RAISED PAVEMENT MARKERS ARE TYPICAL. THE CONTRACTOR MAY SUBSTITUTE SIMILAR MARKERS WITH THE APPROVAL OF THE ENGINEER. REQUESTING APPROVAL FOR SIMILAR MARKERS MAY BE MADE BY REFERRING TO THE AHTD QUALIFIED PRODUCTS LIST.

STRIPING AT ADJACENT NO PASSING LANES



CROSSWALK AND STOPBAR DETAILS

DATE	REVISION	FILMED
9-12-13	REVISED DETAIL OF STANDARD RAISED PAVEMENT MARKERS	
11-17-10	REVISED GENERAL NOTES & REMOVED PLOWABLE PVMT MRKRS	
11-18-04	REVISED NOTE 2 & GENERAL NOTES	
8-22-02	ADDED CROSSWALK & STOPBAR DTLS.	
7-02-98	ADDED DETAILS OF STD. RAISED PAV'T. MARKERS	
4-26-96	REV. NOTES 3&4; ADDED R.P.M.	
9-30-80	DRAWN	1-9-30-80

ARKANSAS STATE HIGHWAY COMMISSION

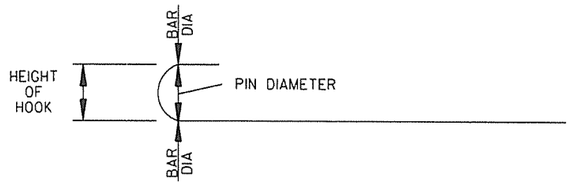
PAVEMENT MARKING DETAILS

STANDARD DRAWING PM-1

STEEL FABRICATION: REINFORCING STEEL FABRICATION SHALL CONFORM TO THE DIMENSIONS LISTED IN THE TABLE BELOW:

BAR SIZE	PIN DIAMETER	HOOK EXTENSION "K"
3	2¼"	4"
4	3 "	4½"
5	3¾"	5"
6	4½"	6"
7	5¼"	7"
8	6"	8"

IF THE OVERALL HEIGHT OF THE HOOK (SEE DIAGRAM BELOW) FOR A "b", "b1", "b2" or "b3" BENT BAR IS GREATER THAN THE CORRESPONDING TOP OR BOTTOM SLAB THICKNESS, LESS 2¾ INCHES, EACH BENT BAR SHALL BE REPLACED WITH ONE HOOKED BAR AND ONE STRAIGHT BAR, USING LENGTHS AS SHOWN IN THE TABLE BELOW. THE TWO BARS SHALL BE THE SAME DIAMETER AS, AND PLACED AT THE SAME SPACING AS, THE "b", "b1", "b2" OR "b3" BENT BARS THEY REPLACE.



NOTE: DIMENSIONS OF BARS ARE MEASURED OUT TO OUT OF BARS.

OVERALL HEIGHT OF HOOKED BAR DIAGRAM

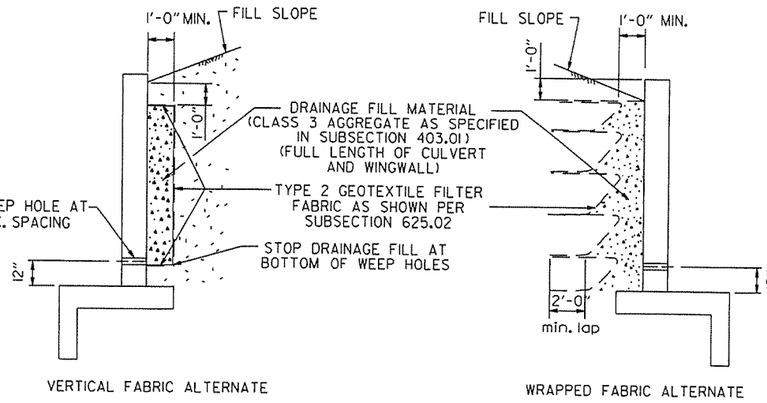
THE HOOKED BARS SHALL BE PLACED IN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOTTOM SLAB. THE STRAIGHT BARS SHALL BE PLACED IN THE TOP OF THE TOP SLAB AND THE BOTTOM OF THE BOTTOM SLAB. SEE TABLE BELOW FOR LENGTHS OF REPLACEMENT HOOKED AND STRAIGHT BARS.

FOR SKEWED CULVERTS, THE REPLACEMENT STRAIGHT BAR MAY HAVE TO BE CUT IN FIELD TO FIT.

REPLACEMENT BAR LENGTHS TABLE

BAR SIZE: "b", "b1", "b2" OR "b3"	LENGTH OF HOOKED BAR	LENGTH OF STRAIGHT BAR
#4	L + 1' - 0"	SEE "c" BAR LENGTH
#5	L + 1' - 2"	SEE "c" BAR LENGTH
#6	L + 1' - 4"	SEE "c" BAR LENGTH
#7	L + 1' - 8"	SEE "c" BAR LENGTH
#8	L + 1' - 10"	SEE "c" BAR LENGTH
#9	L + 2' - 6"	SEE "c" BAR LENGTH

L = "OW" - 3 INCHES



WINGWALL & CULVERT DRAINAGE DETAIL

REINFORCED CONCRETE BOX CULVERT GENERAL NOTES

CONCRETE SHALL BE CLASS S WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3500 PSI.

REINFORCING STEEL SHALL BE AASHTO M 31 OR M 53, GRADE 60.

CONSTRUCTION AND MATERIALS FOR WINGWALL & CULVERT DRAINAGE, INCLUDING WEEP HOLES AND GRANULAR MATERIAL, SHALL BE SUBSIDIARY TO THE BID ITEM, "CLASS S CONCRETE".

MEMBRANE WATERPROOFING SHALL CONFORM TO THE REQUIREMENTS OF SECTION 815 OF THE STANDARD SPECIFICATIONS.

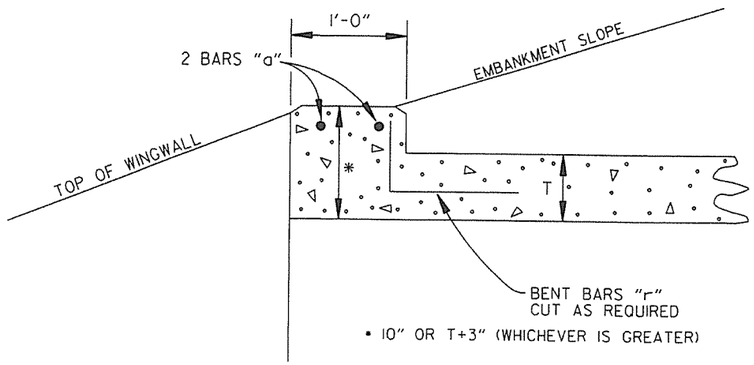
MEMBRANE WATERPROOFING SHALL BE APPLIED TO ALL CONSTRUCTION JOINTS IN THE TOP SLAB AND THE SIDEWALLS OF R.C. BOX CULVERTS AS DIRECTED BY THE ENGINEER. NO PAYMENT SHALL BE MADE FOR THIS ITEM, BUT PAYMENT WILL BE CONSIDERED TO BE INCLUDED IN THE VARIOUS ITEMS BID FOR THE R.C. BOX CULVERT.

REINFORCING STEEL TOLERANCES: THE TOLERANCES FOR REINFORCING STEEL SHALL MEET THOSE LISTED IN "MANUAL OF STANDARD PRACTICE" PUBLISHED BY CONCRETE REINFORCING STEEL INSTITUTE (CRSI) EXCEPT THAT THE TOLERANCE FOR TRUSS BARS SUCH AS FIGURE 3 ON PAGE 7-4 OF THE CRSI MANUAL SHALL BE MINUS ZERO TO PLUS ½ INCH.

WEEP HOLES IN BOX CULVERT WALLS SHALL HAVE A MAXIMUM HORIZONTAL SPACING OF 10'-0" AND SHALL BE SPACED TO CLEAR ALL REINFORCING STEEL. THE DRAIN OPENING SHALL BE 4" DIAMETER AND SHALL BE PLACED 12" ABOVE THE TOP OF THE BOTTOM SLAB.

WEEP HOLES IN WINGWALLS SHALL HAVE A MAXIMUM HORIZONTAL SPACING OF 10'-0" AND SHALL BE SPACED TO CLEAR ALL REINFORCING STEEL. THERE SHALL BE A MINIMUM OF TWO (2) WEEP HOLES IN EACH WINGWALL. THE DRAIN OPENING SHALL BE 4" DIAMETER AND SHALL BE PLACED 12" ABOVE THE TOP OF THE WINGWALL FOOTING.

THE REQUIREMENTS SHOWN ON THIS DRAWING SHALL SUPERCEDE THE CORRESPONDING REQUIREMENTS ON ALL REINFORCED CONCRETE BOX CULVERT STANDARD DRAWINGS.



NOTE: FOR ALL SKEWED R.C. BOX CULVERTS THE LENGTH "K" OF THE MODIFIED HEADWALL SHALL BE EQUAL TO THE ROADWAY LENGTH "RL". THE ENDS OF THE HEADWALL SHALL BE CONSTRUCTED PARALLEL TO THE SKEW ANGLE OF THE BOX CULVERT.

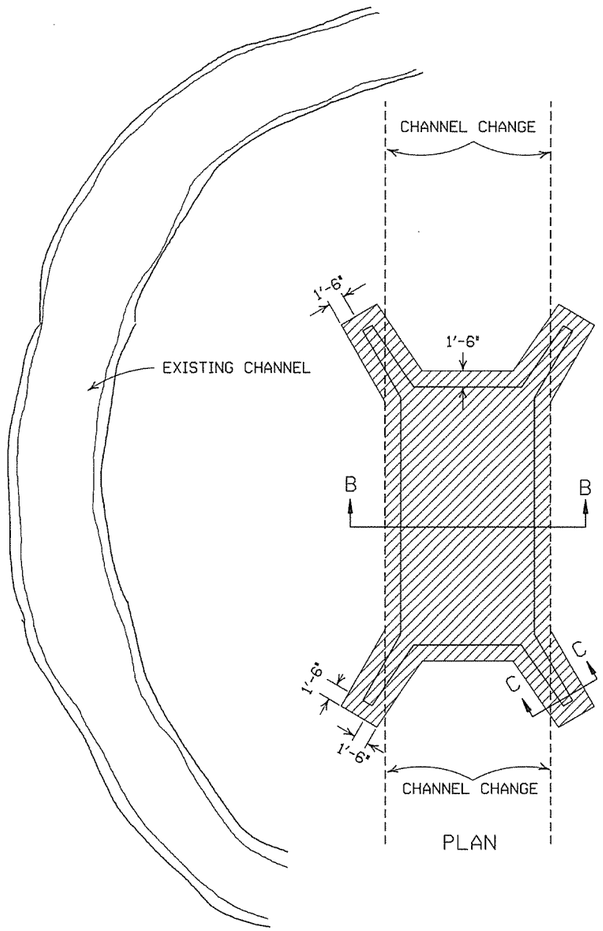
R.C. BOX CULVERT HEADWALL MODIFICATIONS

DATE	REVISION	DATE FILMED
7/26/12	REV. DRAINAGE FILL MATERIAL & DETAIL	
12/15/11	REQUIRE WEEP HOLES IN BOX CULVERT WALLS	
5-25-06	REV. GEN. NOTES AND DETAILS FOR WEEP HOLES; BAR DIAGRAM	
11-16-01	ADDED WINGWALL DRAINAGE DETAIL/EDITED GEN. NOTES	
10-18-96	REV. ASTM REF. TO AASHTO & ADDED BAR DIAGRAM	
10-12-95	MOVED SOLID SODDING DETAIL TO RCB-2	
6-2-94	ADDED SOLID SODDING PLAN DETAIL	
8-5-93	REVISED PIN DIAMETER TO SPECS.	
8-15-91	DRAWN AND ISSUED	

ARKANSAS STATE HIGHWAY COMMISSION

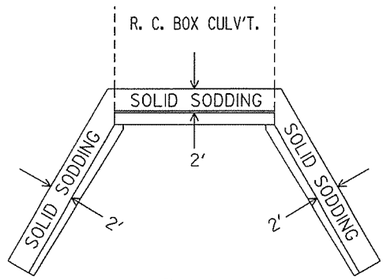
REINFORCED CONCRETE BOX CULVERT DETAILS

STANDARD DRAWING RCB-1



PLAN

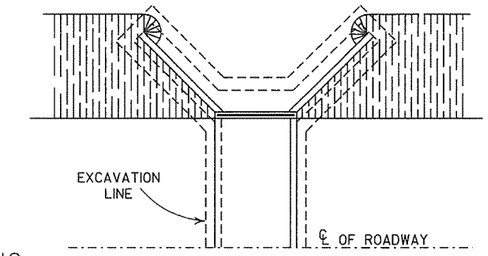
SOLID SODDING



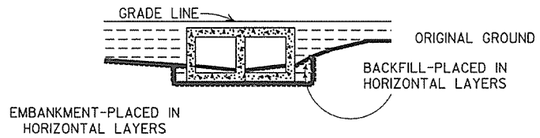
PLAN

PARTIAL SECTION SHOWING SOLID SODDING AT HEADWALLS AND WING WALLS

NOTE: LENGTH MEASURED ALONG THE CENTER OF 2' STRIP OF SOLID SODDING.

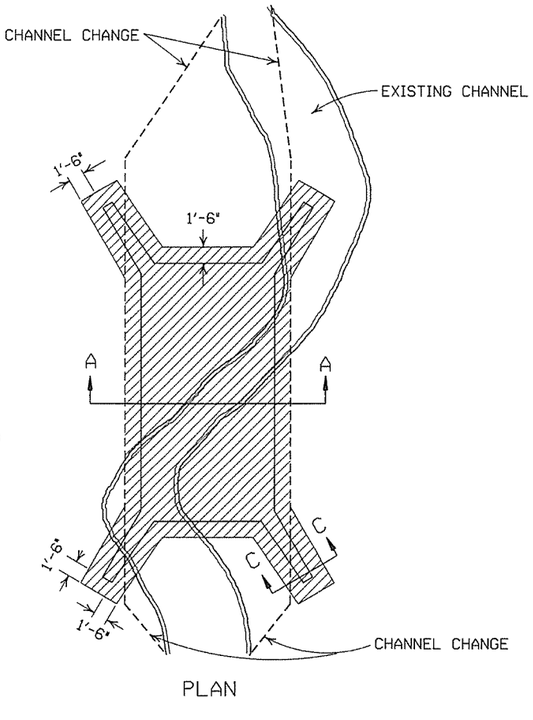


PLAN

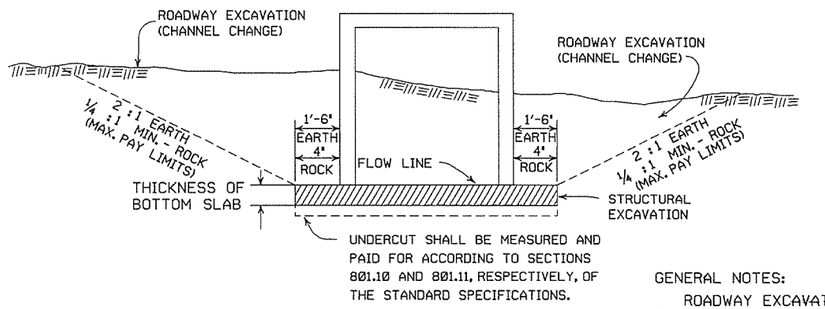


LONGITUDINAL SECTION

BACKFILL DETAILS FOR BOX CULVERT

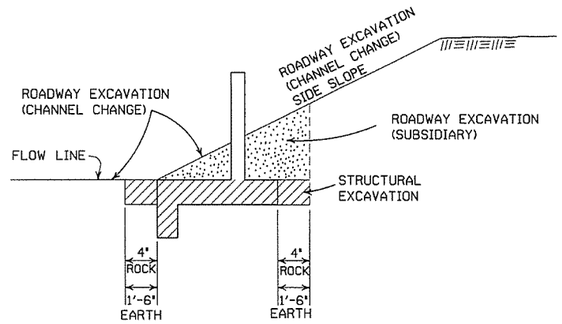


PLAN

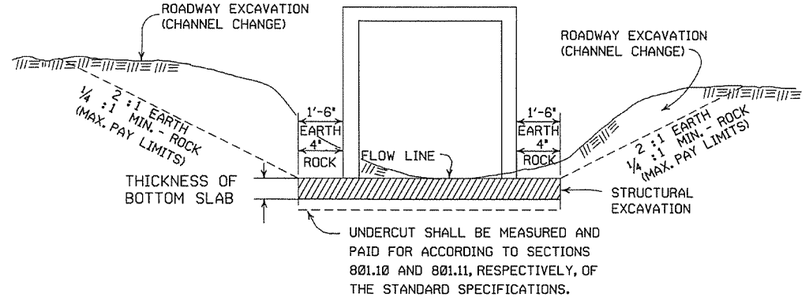


SECTION B-B

DETAILS FOR NEW CHANNELS



SECTION C-C



SECTION A-A

DETAILS THROUGH EXISTING CHANNELS

GENERAL NOTES:

ROADWAY EXCAVATION (CHANNEL CHANGE) WILL BE PAID FOR AT R.C. BOX CULVERT LOCATIONS. IT WILL BE PAID TO THE LIMITS ACTUALLY CUT AND WILL BE CONFINED TO THAT PORTION OF THE INDICATED AREA THAT IS ABOVE THE FLOW LINE. ROADWAY EXCAVATION (CHANNEL CHANGE) SHALL BE MEASURED BY CROSS SECTIONS AND VOLUMES COMPUTED BY AVERAGE END AREA METHOD. ALL CHANNEL CHANGES SHALL BE BROUGHT TO GRADE PRIOR TO MAKING ANY EXCAVATION FOR STRUCTURES.

EXCAVATION FOR STRUCTURES WILL BE PAID FOR AT ALL R.C. BOX CULVERT LOCATIONS. IT WILL BE PAID TO THE LIMITS SHOWN AND SHALL BE CONFINED TO THAT PORTION OF THE INDICATED AREA THAT IS BELOW THE CHANNEL FLOW LINE.

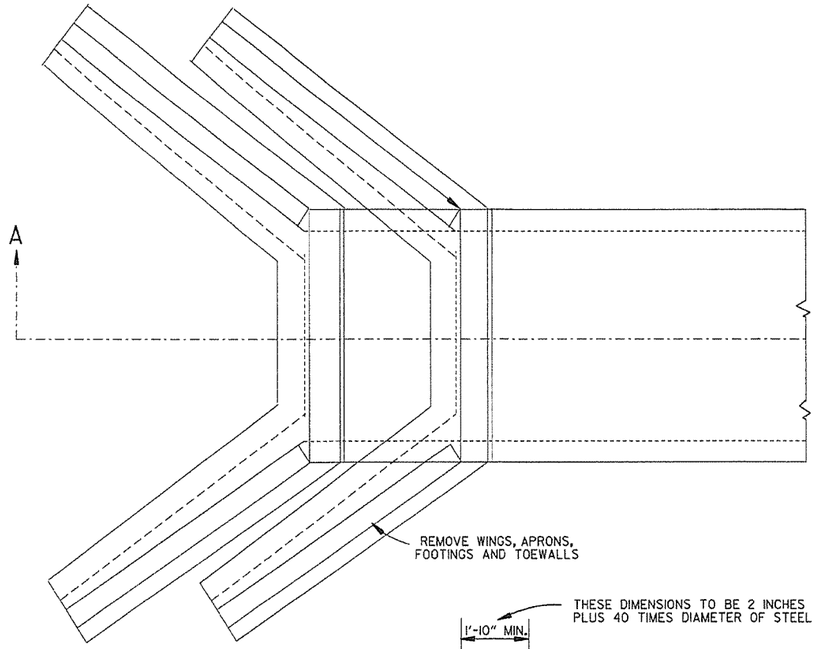
ROADWAY EXCAVATION SHOWN IN SECTION C-C ABOVE AS SUBSIDIARY WILL NOT BE MEASURED OR PAID FOR DIRECTLY, BUT PAYMENT WILL BE CONSIDERED TO BE INCLUDED IN THE VARIOUS ITEMS OF EXCAVATION.

DATE	REVISION	FILMED
11-20-03	REVISED SECTION A-A NOTE	
8-22-02	REVISED SECTION B-B NOTE	
10-12-95	COMBINED 1891B AND 1888A	
1-4-83	REVISED GENERAL NOTES	674-1-4-83
	AND ADDED MAXIMUM PAY	
	LIMIT NOTES.	
2-2-76	EXCAV. PAY LIMITS	917-2-2-76
10-2-72	REVISED AND REDRAWN	564-10-16-72

ARKANSAS STATE HIGHWAY COMMISSION

EXCAVATION PAY LIMITS, BACKFILL, & SOLID SODDING FOR BOX CULVERTS

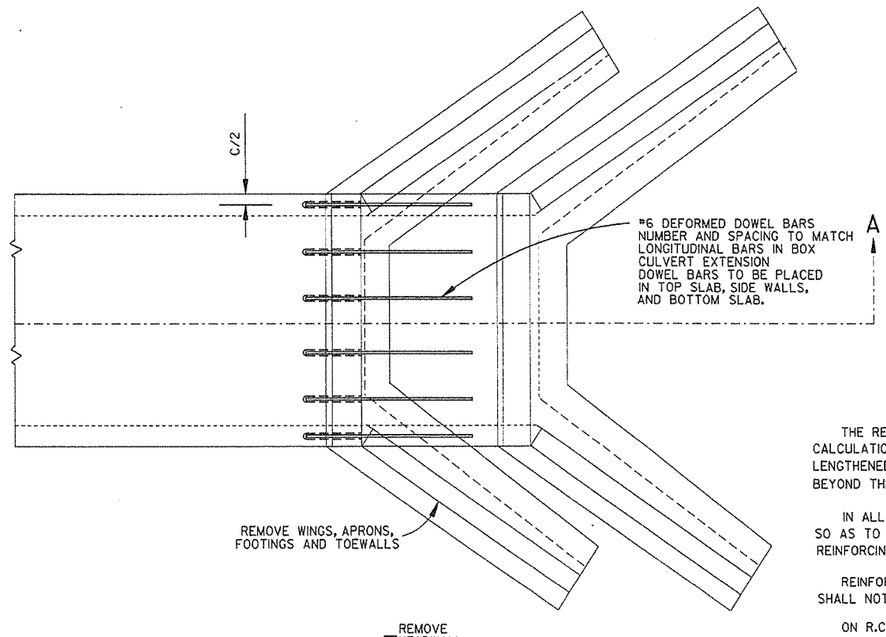
STANDARD DRAWING RCB-2



TOP VIEW
R.C. BOX CULVERT

SECTION A-A

METHOD 1



TOP VIEW
R.C. BOX CULVERT

SECTION A-A

METHOD 2

GENERAL NOTES

	USE FOR METHOD
THE RESIDENT ENGINEER WILL MAKE INDIVIDUAL CALCULATIONS OF QUANTITIES FOR EACH STRUCTURE LENGTHENED, MAKING NO ALLOWANCE FOR OVERBREAKAGE BEYOND THE LINES INDICATED.	1
IN ALL INSTANCES CONCRETE SHALL BE REMOVED SO AS TO PERMIT FULL 40 DIAMETER SPLICE OF REINFORCING STEEL.	1
REINFORCING STEEL REMOVED FROM EXISTING STRUCTURE SHALL NOT BE REUSED IN CONSTRUCTING EXTENSION.	1&2
ON R.C. BOX CULVERTS THAT HAVE AN EXISTING CONCRETE APRON; THE CONCRETE APRON SHALL BE REMOVED WITH THE WINGS. THE COST OF REMOVING ALL OLD CONCRETE WILL BE INCLUDED IN THE PRICE BID PER CUBIC YARD FOR NEW CONCRETE OF THE CLASS SPECIFIED AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.	1&2
MATERIALS FOR SECURING DOWEL BARS SHALL MEET THE REQUIREMENTS OF SECTION 507.02 OF THE STANDARD SPECIFICATIONS.	2
DOWEL BARS SHALL BE INSTALLED AS FOLLOWS: THE DRILLING PROCEDURE SHALL BE APPROVED BY THE ENGINEER, THE FILLING SYSTEM SHALL BE APPROVED BY THE ENGINEER. AND SHALL BE AN INJECTION-TYPE SYSTEM WHICH WILL INSURE THAT SUFFICIENT MATERIAL IS INJECTED SO IT COMPLETELY SURROUNDS THE BARS AND FILLS THE HOLES.	2
THE CONTRACTOR SHALL HAVE THE OPTION OF USING EITHER METHOD 1 OR METHOD 2. REGARDLESS OF WHICH METHOD IS USED, PAY QUANTITIES WILL BE CALCULATED BASED ON METHOD 1.	1&2

NOTE:
NO PART OF THIS STANDARD IS TO BE USED FOR ANY DETAILS RELATIVE TO NEW CONSTRUCTION.

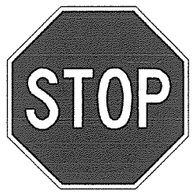
SEE STANDARD DRAWING LISTED IN TABULATION OF STRUCTURES FOR ALL NEW CONSTRUCTION DETAILS.

DATE	REVISION	DATE FILM
10-12-95	CHANGED DRAWING # FROM 144-A	
4-1-93	ADDED GENERAL NOTE	
10-1-92	ADDED ALT. METHOD OF EXTENSION	
11-30-89	REDRAWN	
1-4-83	ELIMINATED CONCRETE CLASS	
12-20-56	RETRACED	

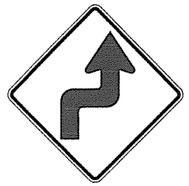
ARKANSAS STATE HIGHWAY COMMISSION

METHOD OF EXTENDING EXISTING R.C. BOX CULVERTS

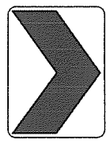
STANDARD DRAWING RCB-3



R1-1
30"X30"

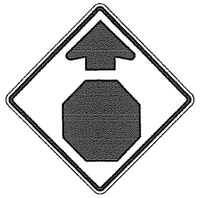


W1-3
30"X30"
(LT. OR RT.)



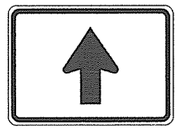
W1-8
18"X24"

W2-5
30"X30"



W3-1
36"X36"

W5-1
36"X36"



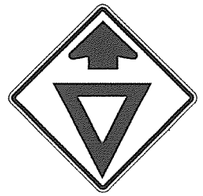
M6-3
21"X15"

R1-2
36"X36"X36"

W1-4
30"X30"
(LT. or RT.)

W2-1
30"X30"

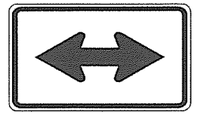
S1-1
36"X36"



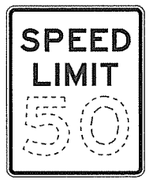
W3-2
36"X36"

County
Route Marker
M1-6
24"X24"

NOTE: REFLECTORIZED YELLOW LEGEND (COUNTY NAME, ROUTE LETTER & NUMBER) & BORDER ON A BLUE BACKGROUND.

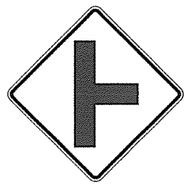


M6-4
21"X15"



R2-1
24"X30"

W1-5
30"X30"
(LT. or RT.)

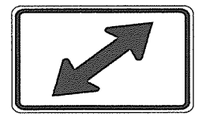


W2-2
30"X30"

W5-2
36"X36"

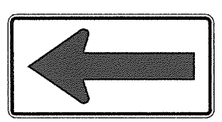
W8-3
36"X36"

R1-3P
18"X6"

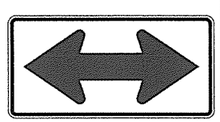


M6-5
21"X15"

W1-1
30"X30"
(LT. or RT.)



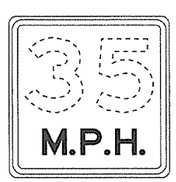
W1-6
48"X24"



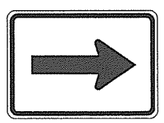
W1-7
48"X24"

W2-3
30"X30"
(LT. or RT.)

W5-3
36"X36"

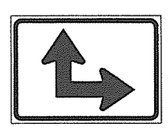


W13-1P
18"X18"

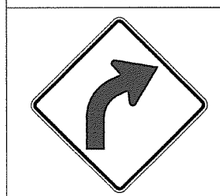


M6-1
21"X15"

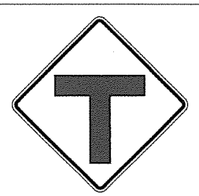
NOTE: ALL M6 SIGNS TO BE MADE WITH REFLECTORIZED YELLOW ARROW & BORDER WITH BLUE BACKGROUND.



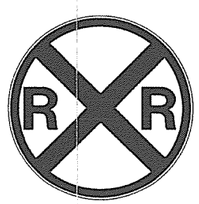
M6-6
21"X15"



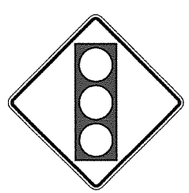
W1-2
30"X30"
(LT. or RT.)



W2-4
30"X30"

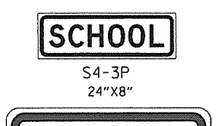


W10-1
36" DIAMETER

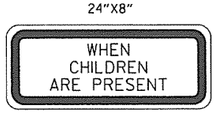


W3-3
36"X36"

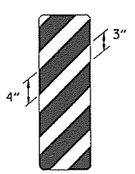
M6-2
21"X15"



S4-3P
24"X8"



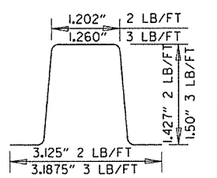
S4-2P
24"X10"



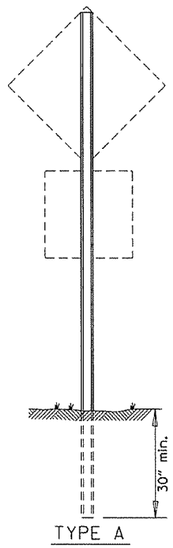
OM-3
12"X36"
(LT. or RT.)

MINIMUM DIMENSIONS SHOWN

SUPPORT SECTION

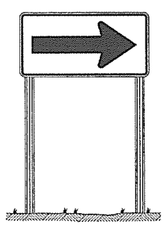


(U-CHANNEL)
STANDARD SUPPORT
ASSEMBLIES

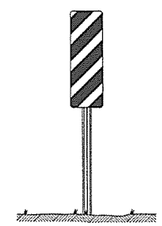


TYPE A

NOTE: LENGTH OF SIGN POSTS SHALL BE DETERMINED SO AS TO PROVIDE FOR MINIMUM VERTICAL CLEARANCES AS CALLED FOR IN THE SPECIFICATIONS PLUS A MINIMUM VERTICAL PENETRATION OF 30" IN THE SOIL.



TYPE B



TYPE C

MINIMUM WEIGHT

TYPE A & B = 3 LBS./FT.
TYPE C = 2 LBS./FT.

STANDARD HIGHWAY SIGNS

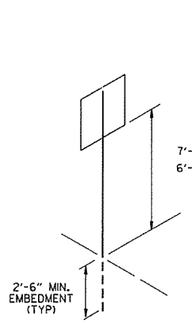
SUPPORT ASSEMBLIES

DATE	REVISION	DATE FILMED
9-12-13	DELETED JOB NO. BLOCK; REVISED RI-3 TO RI-3P	
4-17-08	REVISED SIGN DESIGNATION - W3-1& W3-2	
4-10-03	REVISED W5-2, W8-3, OM-3; ADDED W1-8	
1-5-81	REDRAWN	960-1-15-81
9-15-78	ADDED W14-3	877-9-15-78
9-2-76	POST WT.	623-9-3-76
5-3-76	STEEL POST WT. FROM 2#-3#; ADDED S4-2 & S4-3	504-5-3-76
8-12-74	REV. HT. TYPE "C" ASSEMBLY	500-8-21-74
12-21-72	ADDED M6-2,3,4,5,6	500-12-21-72
12-1-72	ISSUED	562-12-1-72

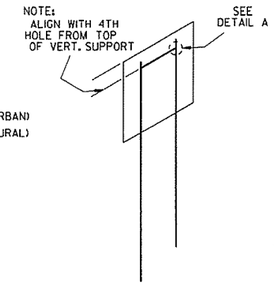
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD HIGHWAY SIGNS
AND SUPPORT ASSEMBLIES

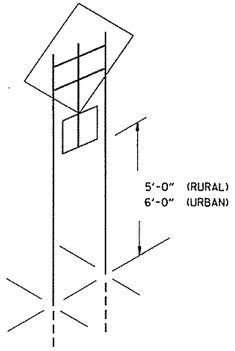
STANDARD DRAWING SHS-1



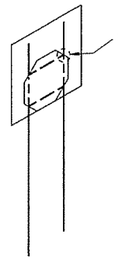
U-1



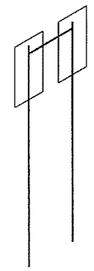
U-2



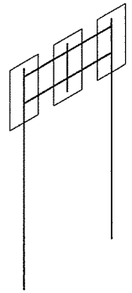
U-2 (A)



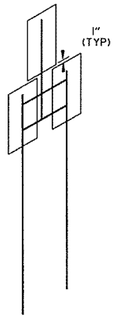
U-2 (B)



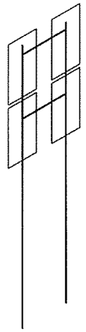
U-2 (1)



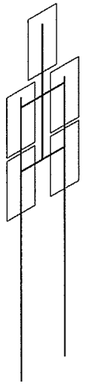
U-2 (2)



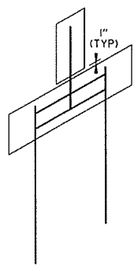
U-2 (3)



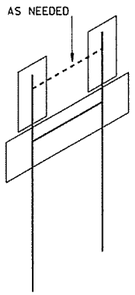
U-2 (4)



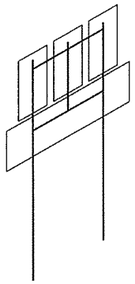
U-2 (5)



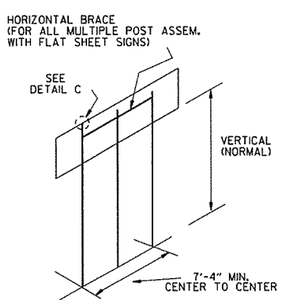
U-2 (6)



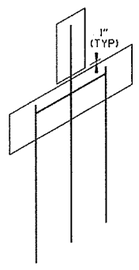
U-2 (7)



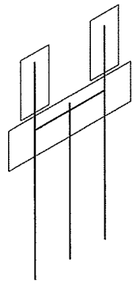
U-2 (8)



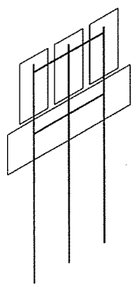
U-3



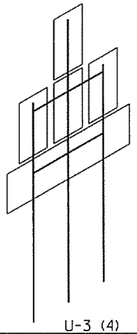
U-3 (1)



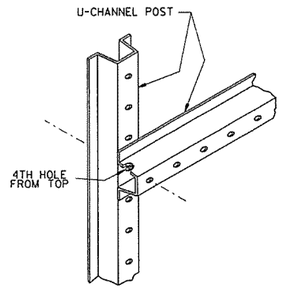
U-3 (2)



U-3 (3)

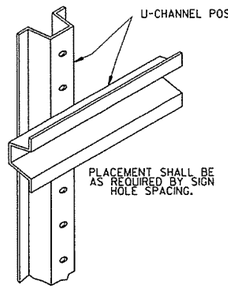


U-3 (4)



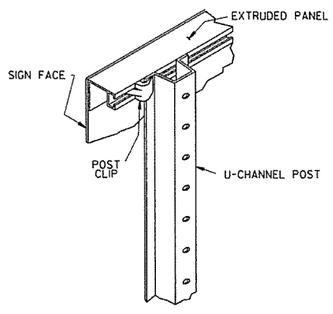
DETAIL A

SHOWING HORIZONTAL BRACE



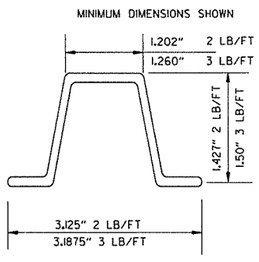
DETAIL B

SHOWING BACK-TO-BACK INSTALLATION



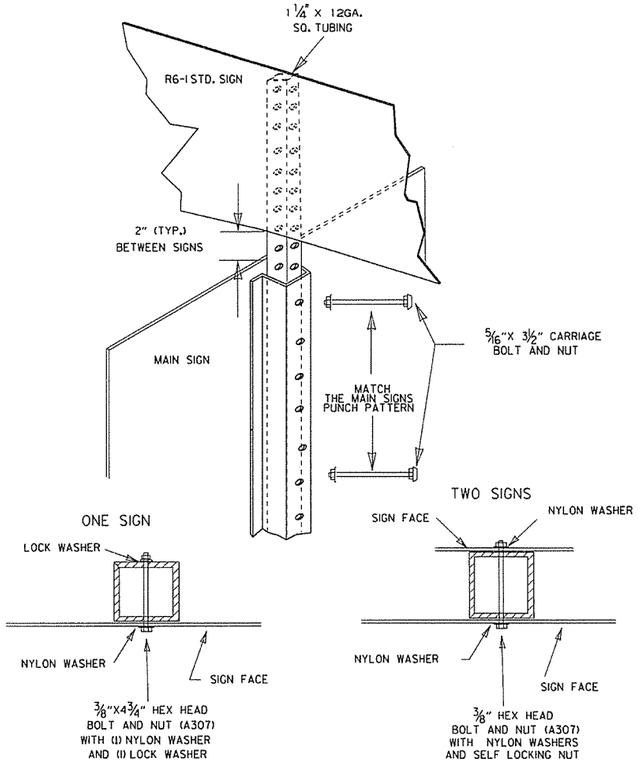
DETAIL C

SHOWING GUIDE SIGN MOUNTING WITH EXTRUDED PANELS



DETAIL C

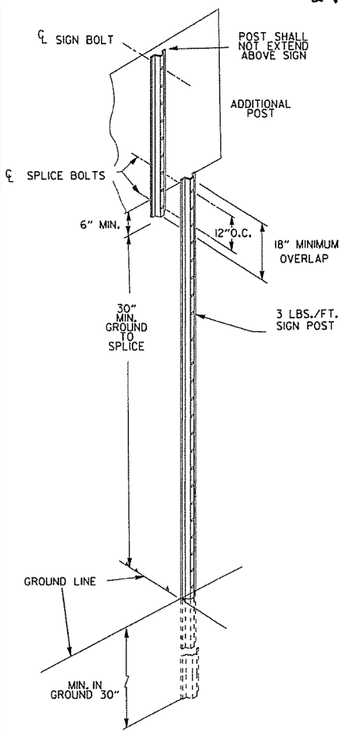
U-CHANNEL POST



DETAIL E

R6-1 EXTENSION

FOR U-CHANNEL POST



DETAIL F

DETAIL OF SPLICES

NOTES:

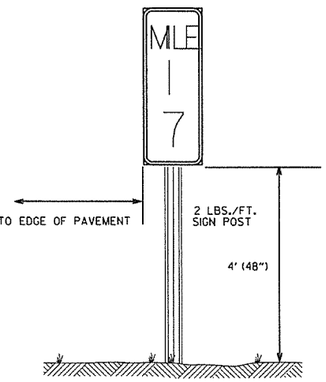
SIGNS AT LEAST 8' IN LENGTH MAY BE INSTALLED ON THREE 3 LB. POST. IN NO CASE SHALL THERE BE MORE THAN TWO 3 LB. POSTS WITHIN A 7' PATH.

SPLICES NECESSARY TO ATTAIN PROPER MOUNTING HEIGHT SHALL BE AS SHOWN IN DETAIL (F).

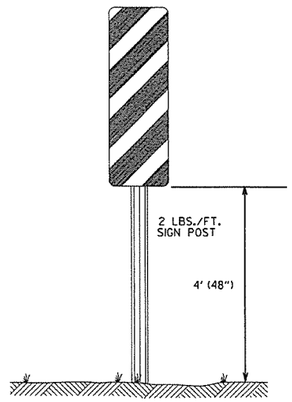
NORMAL INSTALLATIONS WILL REQUIRE $\frac{5}{16}$" DIA. CARRIAGE BOLTS TO MOUNT SIGNS TO POST AND TO ASSEMBLE THE VARIOUS POST SUPPORTS.

ALL SIGN POSTS SHALL BE PLUMB.

THE POST FOR "TYPE U" SUPPORTS SHALL BE HOT DIP GALVANIZED.



TYPICAL MILE MARKER INSTALLATION



TYPICAL OM-3 INSTALLATION AT EDGE OF OBSTRUCTION

DATE	REVISION	FILMED
9-12-13	REVISED U-2(3), U-2(6), U-3(1), DETAIL D; ADDED DETAILS E & F; ADDED TYPICAL MARKERS	
10-9-03	REMOVED ROUND POST & REVISED SPACING	
10-12-95	MOVED UPPER SPLICE	
6-8-95	REVISED SPLICE DETAIL	6-8-95
2-2-95	REDRAWN	2-2-95

ARKANSAS STATE HIGHWAY COMMISSION

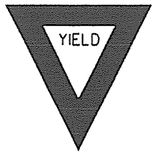
U-CHANNEL POST ASSEMBLIES

STANDARD DRAWING SHS-2

R1-1

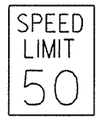
STANDARD 30"X30"
EXPRESSWAY 36"X36"
SPECIAL 48"X48"

R1-2



STD. 36"X36"X36"
EXPWY. 48"X48"X48"
FWY. 60"X60"X60"

R2-1



STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

W3-5

STD. 36"X36"
EXPWY. 48"X48"
FWY. 48"X48"

W3-5a

STD. 36"X36"
EXPWY. 48"X48"
FWY. 48"X48"

R4-1

STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

R4-2

STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

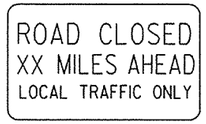
R5-1

STD. 30"X30"
EXPWY. 36"X36"
SPECIAL 48"X48"

R11-2

48"X30"

R11-3A



60"X30"

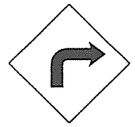
R11-4

60"X30"

RSP-1

48"X30"

W1-1



STD. 36"X36"
FWY. 48"X48"

W1-2

STD. 36"X36"
FWY. 48"X48"

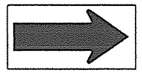
W1-3

STD. 48"X48"

W1-4

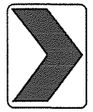
STD. 48"X48"

W1-6



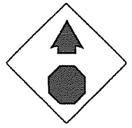
STD. 48"X24"
SPECIAL 60"X30"

W1-8



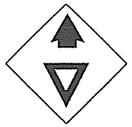
STD. 18"X24"
SPECIAL 24"X30"
EXPWY. 30"X36"
FWY. 36"X48"

W3-1



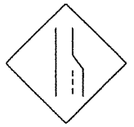
STD. 36"X36"
SPECIAL 48"X48"

W3-2



STD. 36"X36"
SPECIAL 48"X48"

W4-2



STD. 36"X36"
FWY. 48"X48"

W5-1

STD. 36"X36"
SPECIAL 48"X48"

W6-3

EXPWY. 36"X36"
SPECIAL 48"X48"

W8-7

EXPWY. 36"X36"
FWY. 48"X48"

W9-2

STD. 36"X36"
FWY. 48"X48"

W13-1

STD. 24"X24"

W20-1

STD. 48"X48"

W20-2

STD. 48"X48"

W20-3

STD. 48"X48"

W20-4

STD. 48"X48"

W20-5

STD. 48"X48"

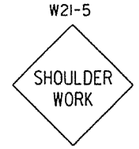
W20-7a

STD. 36"X36"
FWY. 48"X48"

W21-2

STD. 30"X30"
SPECIAL 36"X36"

W21-5



STD. 30"X30"
SPECIAL 36"X36"

W24-1

STD. 36"X36"

W1-4b

STD. 48"X48"

R56-1

STD. 18"X18"

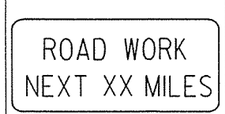
W8-11

STD. 36"X36"
FWY. 48"X48"

W8-9

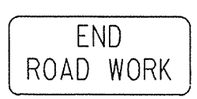
STD. 36"X36"
FWY. 48"X48"

G20-1



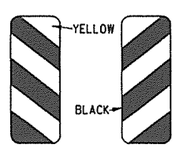
60"X24"

G20-2



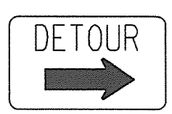
48"X24"

OM-3L OM-3R



12"X36"

M4-9

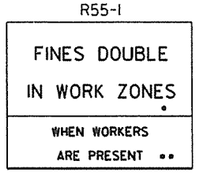


STD. 30"X24"
SPECIAL 48"X36"
SPECIAL 60"X48"

M4-10

48"X18"

R55-1



36"X60"

• USE 6" C LETTERS
•• USE 4" D LETTERS

ADVANCE DISTANCES
(XXXX)

500 FT	½ MILE
1000 FT	¾ MILE
1500 FT	1 MILE
	AHEAD

GENERAL NOTES:

1. ALL TRAFFIC CONTROL DEVICES USED ON ROAD CONSTRUCTION SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION, AND TO THE STANDARD HIGHWAY SIGNS, LATEST EDITION, OR AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.
2. TRAFFIC CONTROL DEVICES SHALL BE SET UP JUST BEFORE THE START OF CONSTRUCTION OPERATIONS AND SHALL BE PROPERLY MAINTAINED DURING THE TIME SUCH CONDITIONS EXIST. THEY SHALL REMAIN IN PLACE ONLY AS LONG AS NEEDED AND REMOVED THEREAFTER.
3. EXISTING SIGNS AND CONSTRUCTION SIGNS SHALL BE KEPT IN PROPER POSITION, AND BE CLEAN AND LEGIBLE AT ALL TIMES. SIGNS THAT DO NOT APPLY TO EXISTING CONDITIONS SHALL BE REMOVED. SIGNS THAT ARE DAMAGED, DEFACED, OR THAT ACCUMULATE DIRT DURING CONSTRUCTION SHALL BE CLEANED, REPAIRED, OR REPLACED.
- 4. SIGNS ARE USUALLY MOUNTED ON A SINGLE POST, ALTHOUGH THOSE WIDER THAN 36" OR LARGER THAN 10 SQ. FT. SHALL BE MOUNTED ON TWO POSTS OR ABOVE A TYPE III BARRICADE.
- 5. SIGN POSTS DIRECT BURIED IN SOIL SHALL BE 2 LB. MINIMUM CHANNEL POST OR 4"x4" WOOD POSTS. CHANNEL POSTS SHALL BE PAINTED GREEN. WOOD POSTS SHALL BE PAINTED WHITE. ALL POSTS SHALL BE NEATLY CONSTRUCTED, AND SHALL BE REPLUMBED, CLEANED, OR REPAIRED AS NEEDED FOR THE DURATION OF THE JOB. THERE SHALL NOT BE MORE THAN 2 POSTS IN A 7' PATH FOR WOOD OR CHANNEL POSTS. ANY CHANNEL POST SPLICE SHALL BE IN ACCORDANCE WITH STANDARD DRAWING TC-3.
6. POST MOUNTED SIGNS IN RURAL AREAS SHALL BE CONSTRUCTED WITH THE NEAR EDGE OF THE SIGN FROM 6 TO 12 FEET FROM THE PAVEMENT EDGE. SIGNS IN URBAN AREAS AND BARRICADE MOUNTED SIGNS SHALL BE MOUNTED A MINIMUM OF 2 FEET FROM THE PAVEMENT EDGE.
7. ALL POST AND BARRICADE MOUNTED SIGNS MOUNTED IN URBAN AREAS SHALL BE MOUNTED A MINIMUM DISTANCE OF 7' FROM THE BOTTOM OF THE SIGN TO THE ROADWAY SURFACE. ALL POST AND BARRICADE MOUNTED SIGNS MOUNTED IN RURAL AREAS SHALL BE MOUNTED A MINIMUM DISTANCE OF 7' FROM THE BOTTOM OF THE SIGN TO THE ROADWAY SURFACE, EXCEPT A MINIMUM OF 6' SHALL BE USED WHEN MOUNTING AN ADVISORY SIGN BELOW A WARNING SIGN. TEMPORARY SIGNS MAY BE MOUNTED ON PORTABLE SUPPORTS FOR INTERMEDIATE TERM STATIONARY WORK CONDITIONS. THE SIGNS MINIMUM MOUNTING HEIGHT SHALL BE 5'. RETROREFLECTIVE DEVICES SHALL BE USED. TEMPORARY SIGNS MAY BE MOUNTED ON PORTABLE SUPPORTS FOR SHORT-TERM, SHORT DURATION, AND MOBILE CONDITIONS. THEY SHALL BE NO LESS THAN ONE (1) FOOT ABOVE THE TRAVELED WAY. LONG-TERM STATIONARY SIGNS SHALL BE DIRECT BURIED IN SOIL, UNLESS CONDITIONS NECESSITATE THE USE OF PORTABLE SIGNS, OR AS APPROVED BY THE ENGINEER. CONCRETE PADS, CONCRETE OR ROCK BALLAST, OR OTHER SOLID MATERIALS SHALL NOT BE UTILIZED WITH PORTABLE SIGN SUPPORTS.
8. FLAGGERS SHALL USE REFLECTORIZED STOP-SLOW PADDLES. FLAGS MAY BE USED ONLY FOR EMERGENCY SITUATIONS.
9. MOST OF THE SIGNS SHOWN ARE ORIENTED TO THE RIGHT. HOWEVER, THIS DOES NOT PRECLUDE THE USE OF MIRROR IMAGES OF THESE SIGNS WHERE THE REVERSE ORIENTATION MIGHT BETTER CONVEY TO MOTORISTS THE PROPER DIRECTION OF MOVEMENT.
10. R55-1 SIGNS SHALL BE PLACED AT LEAST 1500' BUT NOT MORE THAN 1 MILE IN ADVANCE OF THE WORK ZONE. IF A SPEED LIMIT REDUCTION IS IN EFFECT, THE SIGN SHALL BE PLACED A MINIMUM OF 500' IN ADVANCE OF THE "REDUCED SPEED AHEAD" SIGN.

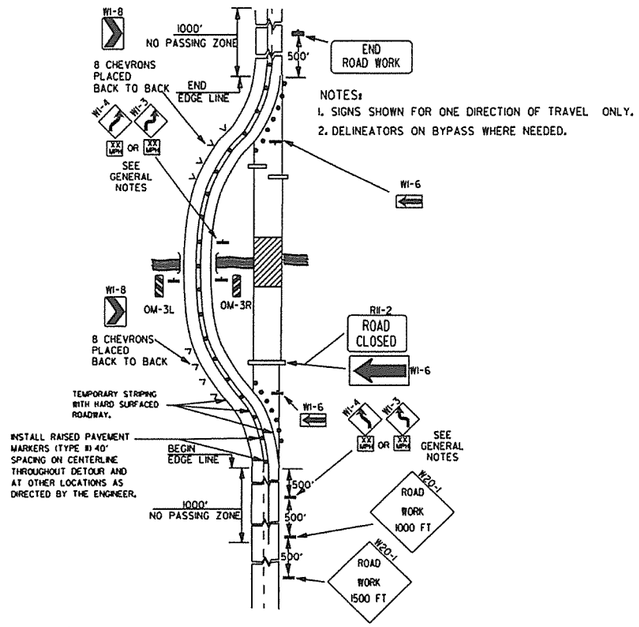
• NOTE: SUPPORTS FOR SIGNS, BARRICADES, AND VERTICAL PANELS THAT ARE DIFFERENT FROM THE REQUIREMENTS SHOWN IN NOTES 4 & 5, BUT MEET THE REQUIREMENTS OF NCHRP-350 OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH), WILL BE ACCEPTED. COMPLIANCE WITH THE REQUIREMENTS OF NCHRP-350 OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) IS REQUIRED FOR ALL PROJECTS.

DATE	REVISION	FILMED
9-2-15	REVISED REDUCED SPEED LIMIT AHEAD SIGNS REVISED ROAD WORK NEXT XX MILES	
12-15-11	REVISED W24-1	
1-17-10	DELETED W8-9a & ADDED W8-9	
10-15-09	ADDED REFERENCE TO MASH & ADDED SIGN W24-1	
4-17-08	REVISED SIGN DESIGNATIONS	
11-18-04	REVISED NOTES	
10-9-03	REVISED NOTE 1	
11-16-01	REVISED NOTE 7	
9-28-00	REVISED NOTE	
11-18-98	ADDED NOTE	
6-26-97	REVISED NOTE 5	
4-03-97	REVISED NOTE 5	
10-18-96	ADDED CONTROLLED ACCESS HWY. SIGN & TO NOTE 7	
10-12-95	ADDED R55-1	
6-8-95	REVISED TO CORRECT SIGN ILLUSTRATIONS	6-8-95
2-2-95	REVISED PER PART VI, MUTCD SEPT. 3, 1993	
8-15-91	DRAWN AND PLACED IN USE	

ARKANSAS STATE HIGHWAY COMMISSION

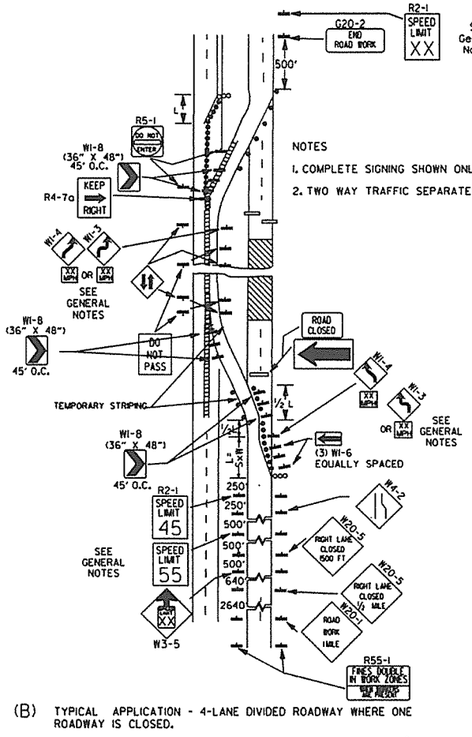
STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

STANDARD DRAWING TC-1



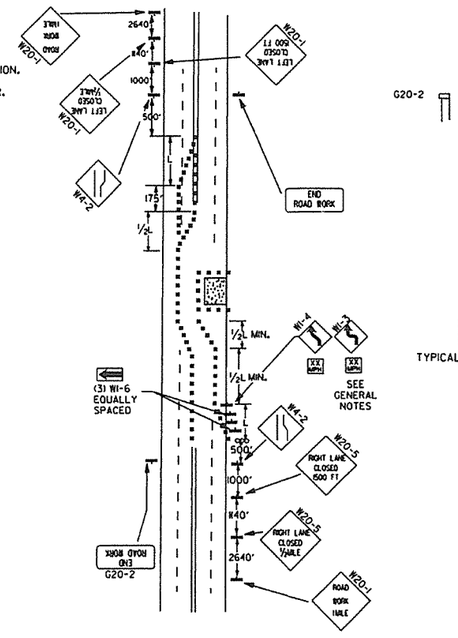
NOTES:
1. SIGNS SHOWN FOR ONE DIRECTION OF TRAVEL ONLY.
2. DELINEATORS ON BYPASS WHERE NEEDED.

(A) TYPICAL APPLICATION OF TRAFFIC CONTROL DEVICES ON A 2-LANE HIGHWAY WHERE THE ENTIRE ROADWAY IS CLOSED AND A BYPASS DETOUR IS PROVIDED.

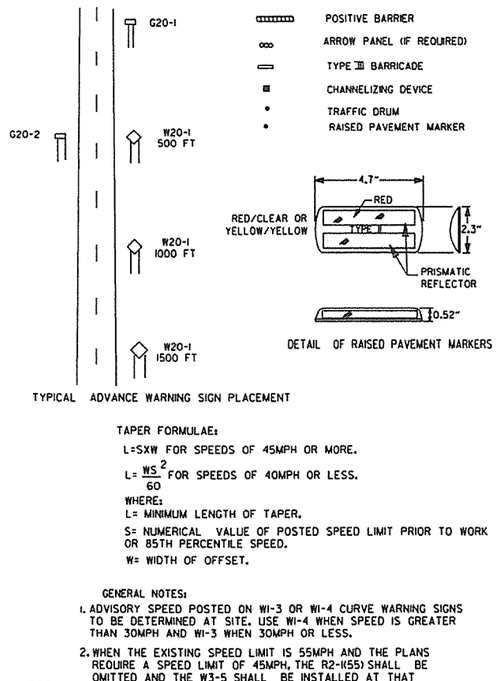


NOTES
1. COMPLETE SIGNING SHOWN ONLY IN CROSSOVER DIRECTION.
2. TWO WAY TRAFFIC SEPARATED WITH POSITIVE BARRIER.

(B) TYPICAL APPLICATION - 4-LANE DIVIDED ROADWAY WHERE ONE ROADWAY IS CLOSED.



(C) TYPICAL APPLICATION - 4-LANE UNDIVIDED ROADWAY WHERE HALF OF THE ROADWAY IS CLOSED.



DETAIL OF RAISED PAVEMENT MARKERS

TYPICAL ADVANCE WARNING SIGN PLACEMENT

TAPER FORMULAE:

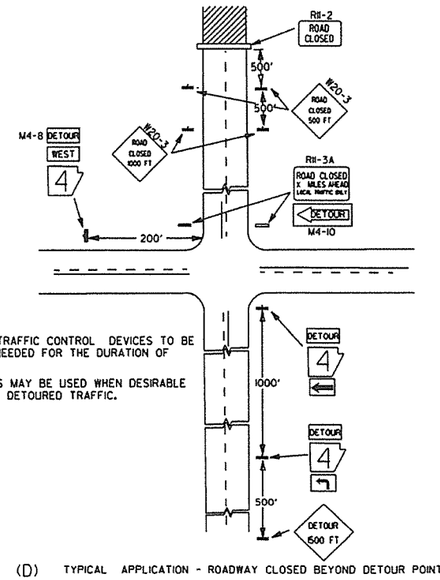
L=SXW FOR SPEEDS OF 45MPH OR MORE.

$L = \frac{WS^2}{60}$ FOR SPEEDS OF 40MPH OR LESS.

WHERE:
L= MINIMUM LENGTH OF TAPER.
S= NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK OR 85TH PERCENTILE SPEED.
W= WIDTH OF OFFSET.

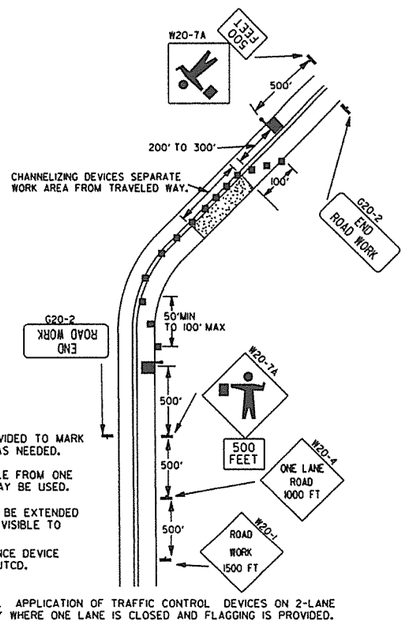
GENERAL NOTES:

1. ADVISORY SPEED POSTED ON W1-3 OR W1-4 CURVE WARNING SIGNS TO BE DETERMINED AT SITE. USE W1-4 WHEN SPEED IS GREATER THAN 30MPH AND W1-3 WHEN 30MPH OR LESS.
2. WHEN THE EXISTING SPEED LIMIT IS 55MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 45MPH, THE R2-1(55) SHALL BE OMITTED AND THE W3-5 SHALL BE INSTALLED AT THAT LOCATION. ADDITIONAL R2-1 45MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1 MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
3. WHEN THE EXISTING SPEED LIMIT IS 65MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 55MPH, THE R2-1(45) SHALL BE OMITTED. ADDITIONAL R2-1 55MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1 MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
4. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT. BEYOND THE TAPER, MAXIMUM SPACING SHALL BE TWO TIMES THE SPEED LIMIT, OR AS DIRECTED BY THE ENGINEER.
5. WARNING LIGHTS AND/OR FLAGS MAY BE MOUNTED TO SIGNS OR CHANNELIZING DEVICES AT NIGHT AS NEEDED.
6. PAVEMENT MARKINGS NO LONGER APPLICABLE WHICH MIGHT CREATE CONFUSION IN THE MINDS OF VEHICLE OPERATORS SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE.
7. TRAILER MOUNTED DEVICES SUCH AS ARROW PANELS AND PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE DELINEATED BY AFFIXING CONSPICUITY MATERIAL IN A CONTINUOUS LINE ON THE FACE OF THE TRAILER. WHEN PLACED ON OR ADJACENT TO THE SHOULDER AND NOT BEHIND A POSITIVE BARRIER, THESE DEVICES SHALL BE DELINEATED BY PLACING FIVE (5) TRAFFIC DRUMS, EQUALLY SPACED ALONG THE TRAFFIC SIDE OF THE DEVICE.
8. DIMENSIONS SHOWN FOR RAISED PAVEMENT MARKERS ARE TYPICAL. THE CONTRACTOR MAY SUBSTITUTE SIMILAR MARKERS WITH THE APPROVAL OF THE ENGINEER. REQUESTING APPROVAL FOR SIMILAR MARKERS MAY BE MADE BY REFERRING TO THE AHTD QUALIFIED PRODUCTS LIST.



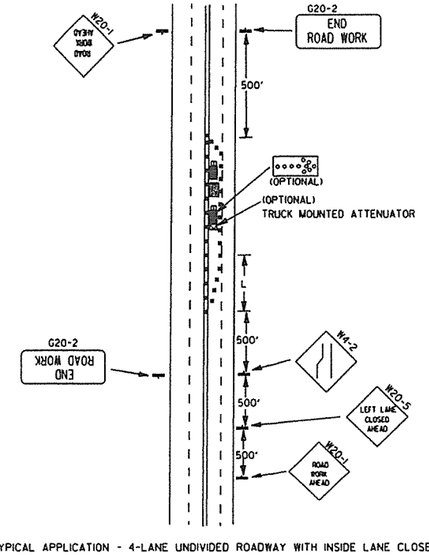
NOTES:
1. REGULATORY TRAFFIC CONTROL DEVICES TO BE MODIFIED AS NEEDED FOR THE DURATION OF THE DETOUR.
2. STREET NAMES MAY BE USED WHEN DESIRABLE FOR DIRECTING DETOURED TRAFFIC.

(D) TYPICAL APPLICATION - ROADWAY CLOSED BEYOND DETOUR POINT.



NOTES:
1. FLOOD LIGHTS SHOULD BE PROVIDED TO MARK FLAGGER STATIONS AT NIGHT AS NEEDED.
2. IF ENTIRE WORK AREA IS VISIBLE FROM ONE STATION, A SINGLE FLAGGER MAY BE USED.
3. CHANNELIZING DEVICES ARE TO BE EXTENDED TO A POINT WHERE THEY ARE VISIBLE TO APPROACHING TRAFFIC.
4. AUTOMATED FLAGGER ASSISTANCE DEVICE (AFAD) OPTIONAL. REFER TO MUTCD.

(E) TYPICAL APPLICATION OF TRAFFIC CONTROL DEVICES ON 2-LANE HIGHWAY WHERE ONE LANE IS CLOSED AND FLAGGING IS PROVIDED.



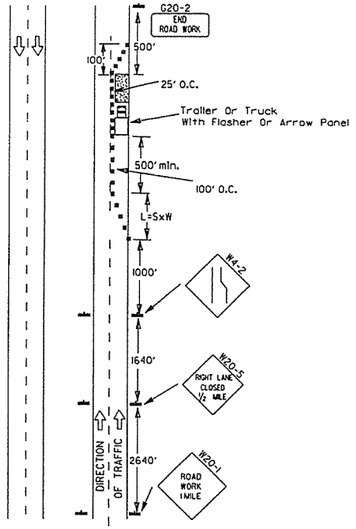
(F) TYPICAL APPLICATION - 4-LANE UNDIVIDED ROADWAY WITH INSIDE LANE CLOSED.

DATE	REVISION	FILMED
9-2-15	REVISED NOTE 2, ADDED NOTE 8, REVISED DRAWING (A) & REPLACED R2-5A WITH W3-5	
9-12-13	REVISED DETAIL OF RAISED PAVEMENT MARKERS	
3-8-10	ADDED (AFAD)	
8-20-08	REVISED SIGN DESIGNATIONS	
11-18-04	ADDED GENERAL NOTE	
10-18-96	ADDED R55-1	
4-26-96	CORRECTED (a) BEHIND G20-2	
6-8-95	CORRECTED SIGN IDENT. ON W1-4A	6-8-95
2-2-95	REVISED PER PART VI, MUTCD, SEPT. 3, 1993	
8-15-91	DRAWN AND PLACED IN USE	

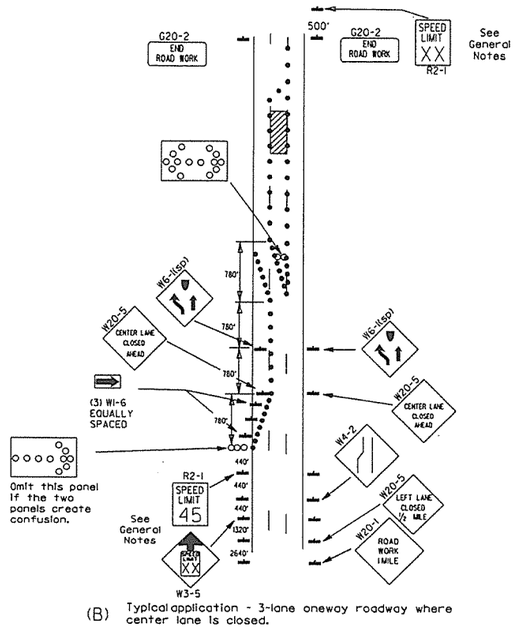
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

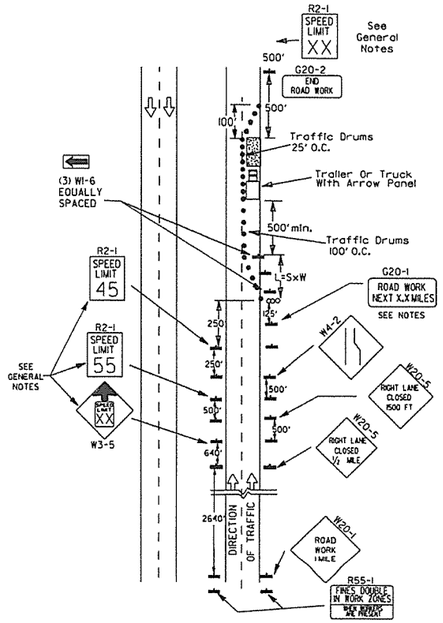
STANDARD DRAWING TC-2



(A) Typical application - daytime maintenance operations of short duration on a 4-lane divided roadway where half of the roadway is closed.



(B) Typical application - 3-lane oneway roadway where center lane is closed.



(C) Typical application - construction operatipns of intermediate to long term duration on a 4-lane divided roadway where half of the roadway is closed.

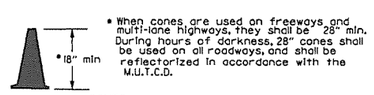
KEY:

- ○○○ Arrow Panel (If Required)
- ■ Channelizing Device
- ● Traffic drum

GENERAL NOTES:

1. A speed limit reduction may be implemented ONLY when designated in the plan or when recommended by the Roadway Design Division.
2. When the existing speed limit is 55mph and the plans require a speed limit of 45mph, the R2-1(55) shall be omitted and the W3-5 shall be installed at that location. Additional R2-1 45mph speed limit signs shall be installed at a maximum of 1 mile intervals. At the end of the work area a R2-1(XX) shall be installed to match original speed limit.
3. When the existing speed limit is 65mph and the plans require a speed limit of 55mph, the R2-1(45) shall be omitted. Additional R2-1 55mph speed limit signs shall be installed at a maximum of 1 mile intervals. At the end of the work area a R2-1(XX) shall be installed to match original speed limit.
4. The maximum spacing between channelizing devices in a taper should be approximately equal in feet to the speed limit. Beyond the taper, maximum spacing shall be two times the speed limit or as directed by the Engineer.
5. Warning lights and/or flags may be mounted to signs or channelizing devices at night as needed.
6. Pavement markings no longer applicable which might create confusion in the minds of vehicle operators shall be removed or obliterated as soon as practicable.
7. The G20-1 sign will be required on jobs of over two miles in length. When the lane closure is not at the beginning of the project, the G20-1 sign shall be erected 125' in advance of the job limit. Additional W20-1 (1 MILE) signs are not required in advance of lane closures that begin inside the project limits.
8. Flaggers shall use STOP/SLOW paddles for controlling traffic through work zones. Flags may be used only for emergency situations.
9. All plastic drums and cones shall meet the requirements of NCHRP-350 or Manual For Assessing Safety Hardware (MASH).
10. Trailer mounted devices such as arrow panels and portable changeable message signs shall be delineated by affixing conspicuity material in a continuous line on the face of the trailer. When placed on or adjacent to the shoulder and not behind a positive barrier, these devices shall be delineated by placing five (5) traffic drums, equally spaced along the traffic side of the device.

Channelizing devices

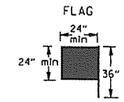


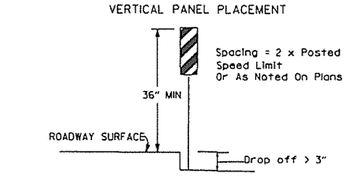
NOTE:
For all road closures, the Type III barricades shall be of sufficient length to extend across entire roadway.

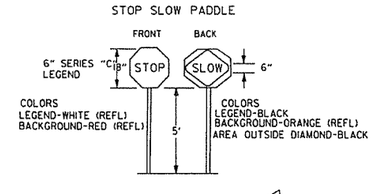
TRAFFIC CONTROL DEVICES
FOR
VERTICAL PAVEMENT DIFFERENTIALS

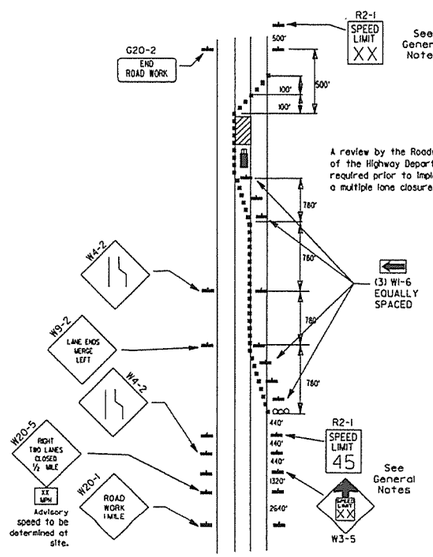
VERTICAL DIFFERENTIAL	LOCATIONS	TRAFFIC CONTROL
1" to 3"	Centerline, lane lines	W8-11
1" to 3"	Edge of shoulder	W8-9
Greater than 3"	Lane lines	Standard lane closure required
Greater than 3"	Edge of traveled lane	*RSP-1 and vertical panels, drums or concrete barrier
Greater than 3"	Edge of shoulder	*Vertical panels, drums or concrete barrier

* When shown on the plans concrete barrier will be used.
When the shoulder area is used as part of the traveled lane and there is insufficient width to place drums on the remaining shoulder width, then vertical panels shall be used.

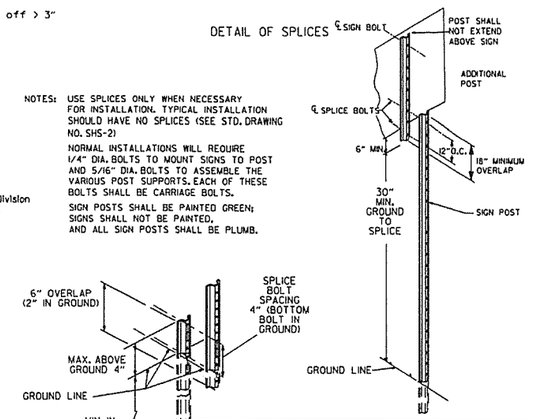








(D) Typical application - closing multiple lanes of a multilane highway.



NOTES: USE SPLICES ONLY WHEN NECESSARY FOR INSTALLATION. TYPICAL INSTALLATION SHOULD HAVE NO SPLICES (SEE STD. DRAWING NO. SHS-2)

NORMAL INSTALLATIONS WILL REQUIRE 1/4" DIA. BOLTS TO MOUNT SIGNS TO POST AND 5/16" DIA. BOLTS TO ASSEMBLE THE VARIOUS POST SUPPORTS. EACH OF THESE BOLTS SHALL BE CARRIAGE BOLTS.

SIGN POSTS SHALL BE PAINTED GREEN; SIGNS SHALL NOT BE PAINTED, AND ALL SIGN POSTS SHALL BE PLUMB.

DATE	REVISION	FILMED
9-2-15	REVISED NOTE 2 & REPLACED R2-5A WITH W3-5	
10-15-09	ADDED REFERENCE TO WASH	
11-20-08	REVISED SIGN DESIGNATIONS	
11-18-04	ADDED NOTE	
10-1-98	ADDED NOTE	
4-03-97	ADDED (SP) TO W6-1& REVISED TRAFFIC CONTROL DEVICES NOTE	
10-18-96	ADDED R55-1	
10-12-95	MOVED UPPER SPLICE	
6-8-95	REVISED SPLICE DETAIL, TEXT	6-8-95
2-2-95	REVISED PER PART VI, MUTCD, SEPT. 3, 1993	
8-15-91	DRAWN AND PLACED IN USE	

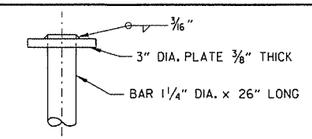
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

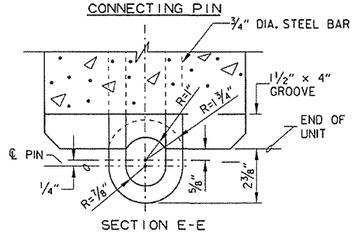
STANDARD DRAWING TC-3

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"
S-1	OVER LIFT HOLES	#4	(2)	2'-5", 90°, 3 3/8" R, LIFTING HOLE
S-2	HORIZ. AROUND SLOTS BETWEEN V-1'S @ DRAIN SLOTS	#4	(2)	1 1/2" R, SLOTS, 7", 1" MIN. CLEAR TO BAR, 5'-1" BAR W/(4) 1 1/2" R BENDS & MIN. 1'-0" OVERLAP, 1'-6"
V-1	VERTICAL IN BARRIER(3) EACH END & (2) AT EACH DRAIN SLOTS	#5	(16)	TOTAL LENGTH 4'-9", 2 3/16" R, 12°, 9 1/2", 2'-1 3/8", 4 3/8"

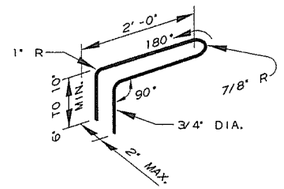


CONNECTING PIN

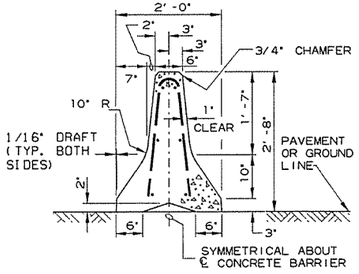


SECTION E-E

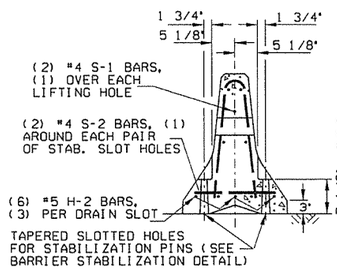
CONNECTION DETAILS



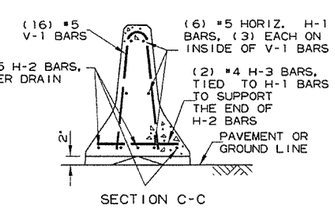
CONNECTION LOOP



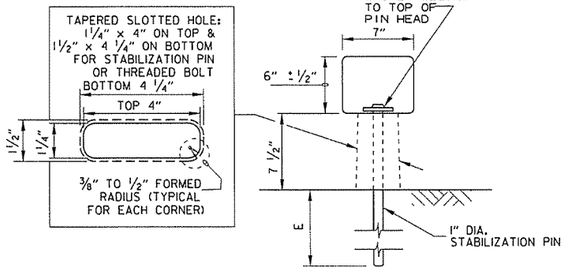
SECTION A-A



SECTION B-B



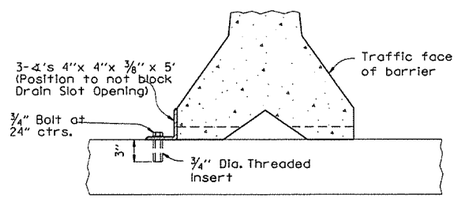
SECTION C-C



BARRIER STABILIZATION DETAIL

ROADWAY SECTION

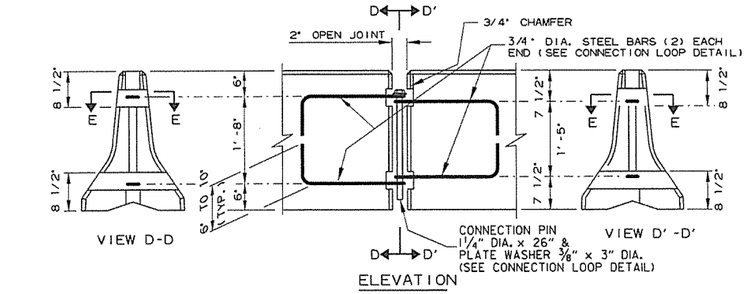
(E) 4" - Concrete Pavement
8" - Asphalt Pavement
12" - Shoulder Areas



NOTE: 3/4" Threaded Inserts shall be cast in place for all new bridge decks and drilled and grouted for existing bridge decks. 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

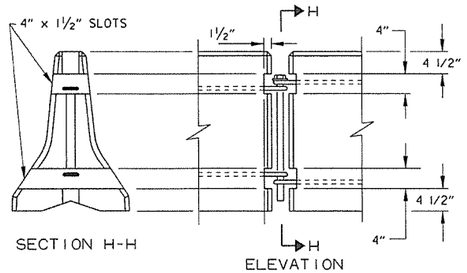
BRIDGE DECKS



VIEW D-D

VIEW D'-D'

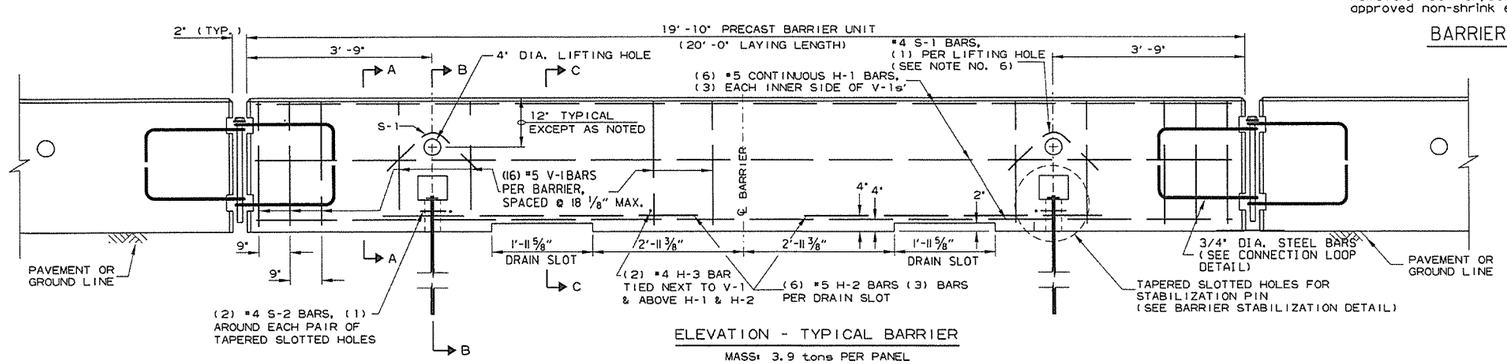
ELEVATION



SECTION H-H

ELEVATION

BARRIER REMOVAL SLOT DETAILS



ELEVATION - TYPICAL BARRIER

MASS: 3.9 tons PER PANEL

General Notes

1. 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.

2. 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.
   Delineators: Delineators shall be mounted at 10' spacing on top of precast barrier.

   In applications where barrier wall is within 6 feet of a traffic lane, additional delineators shall be placed on the barrier at 10' spacing approximately one (1) foot from the top of the barrier. Delineators shall be on the AHTD Qualified Products List for Construction Concrete Barrier Markers.
   Delineator color shall be in accordance with the Manual on Uniform Traffic Control Devices.
   Payment for delineators 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.

3. 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.

4. 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.

5. Attach Units To Roadway Surface with Stabilization Pins and to Deck Slabs using bolts when required.

6. A 4" White PVC Sleeve may be used to form the Lifting Hole and if used the Sleeve is to be left in place.

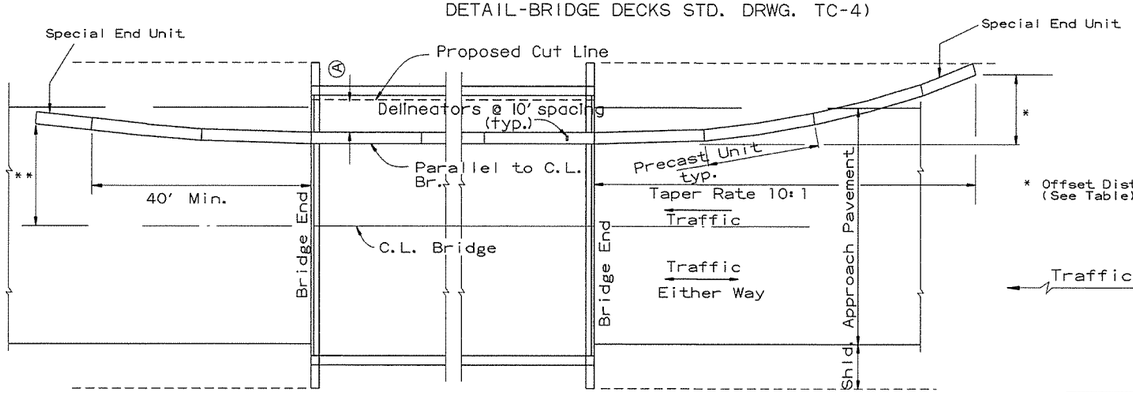
DATE	REVISION	FILMED
2-27-14	REVISED BARRIER STABILIZATION DETAIL	
10-15-09	ADDED REFERENCE TO MASH	
8-5-09	REV. NOTE 3 CONCERNING DRAIN SLOTS	
11-29-07	REVISED NOTE 3	
5-25-06	DELETED GENERAL NOTE 7	
11-18-04	REVISED BARRIER STABILIZATION DETAIL BRIDGE DECKS	
4-10-03	REVISED GENERAL NOTE 2	
8-22-02	ISSUED NEW DRAWING	

ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION - TEMPORARY PRECAST BARRIER

STANDARD DRAWING TC-4

Ⓐ 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)

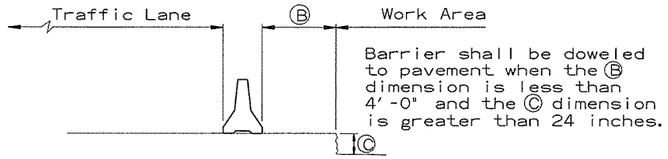


BARRIER PLACEMENT ALONG BRIDGE WITH OFFSET

No Scale

* Offset Distance (See Table)

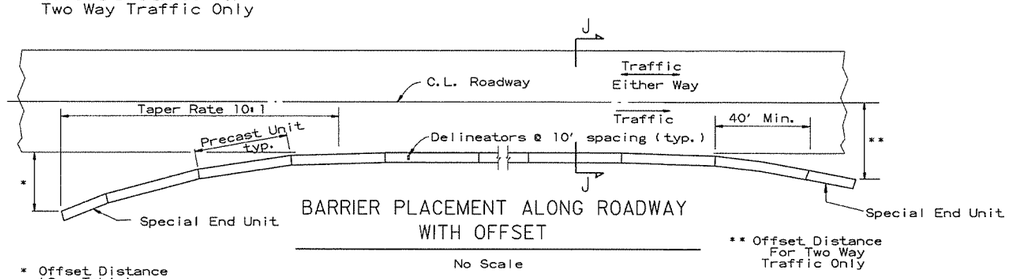
** Offset Distance for Two Way Traffic Only



Barrier shall be doweled to pavement when the Ⓑ dimension is less than 4'-0" and the Ⓒ dimension is greater than 24 inches.

SECTION J-J

No Scale



BARRIER PLACEMENT ALONG ROADWAY WITH OFFSET

No Scale

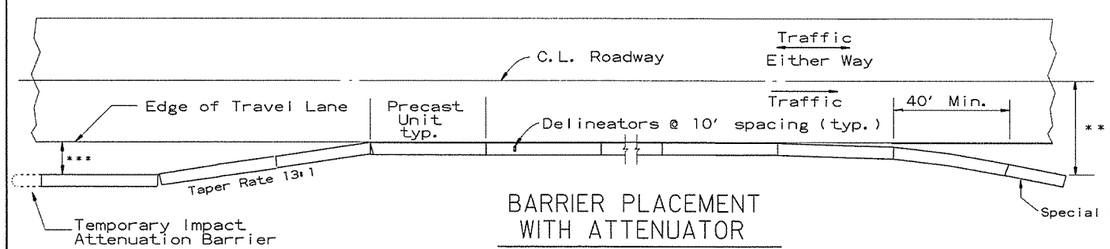
* Offset Distance (See Table)

** 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.

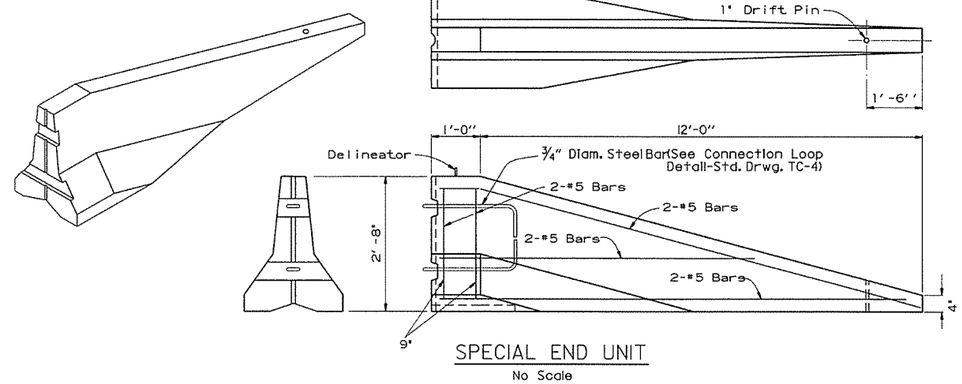


BARRIER PLACEMENT WITH ATTENUATOR

No Scale

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

** Offset Distance For Two Way Traffic Only



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."

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

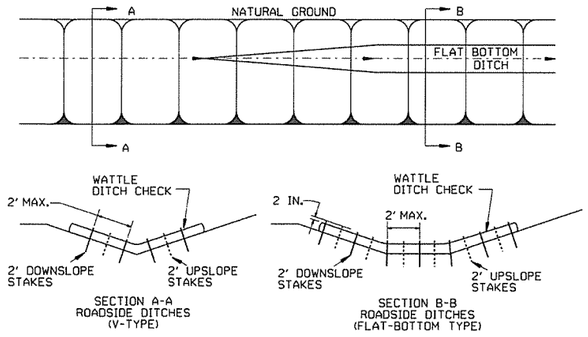
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION - TEMPORARY PRECAST BARRIER

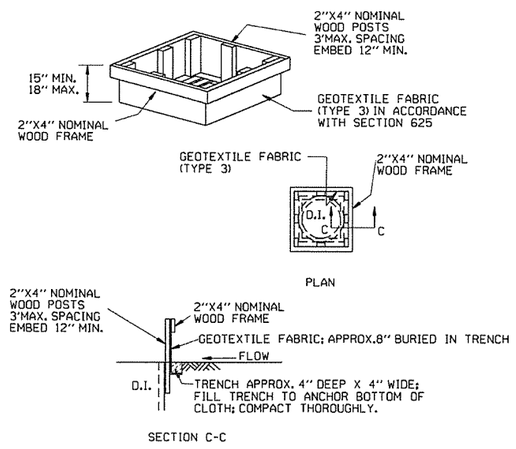
STANDARD DRAWING TC-5

GENERAL NOTES

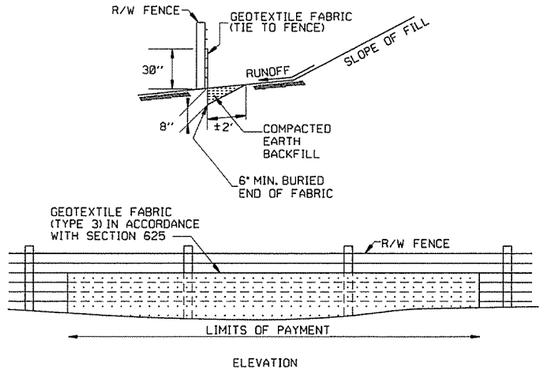
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.



WATTLE DITCH CHECK (E-1)



DROP INLET SILT FENCE (E-7)



SILT FENCE ON R/W FENCE (E-4)

GENERAL NOTES

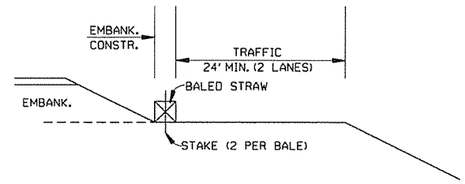
GEOTEXTILE FABRIC SHALL BE SPLICED TOGETHER WITH A SEWN SEAM ONLY AT A SUPPORT POST, OR TWO SECTIONS OF FENCE MAY BE OVERLAPPED INSTEAD. PAYMENT OF ADDITIONAL MATERIAL FOR OVERLAP WILL NOT BE MADE.

GENERAL NOTES

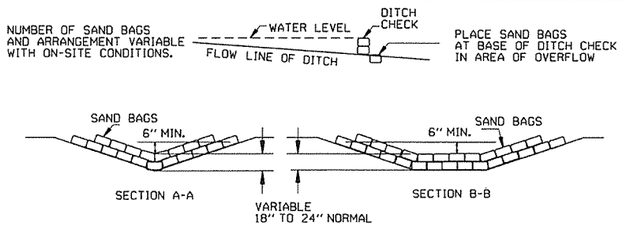
1. STRAW BALES SHALL BE INSTALLED SO THAT THE BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS OF THE BALES. THE BALES SHALL BE A MINIMUM OF 30 INCHES IN LENGTH.

2. NO GAPS SHALL BE LEFT BETWEEN BALES.

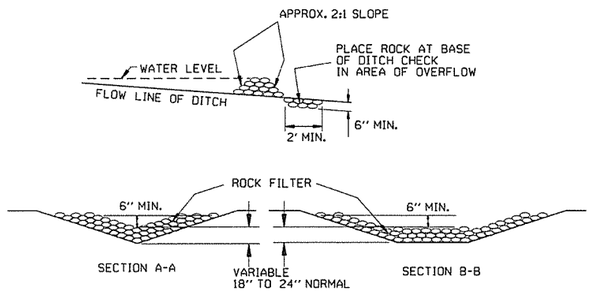
3. BALED STRAW FILTER BARRIERS COMPLETED AND ACCEPTED WILL BE MEASURED BY THE BALE IN PLACE AS AUTHORIZED BY THE ENGINEER AND WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID PER BALE FOR BALED STRAW DITCH CHECKS.



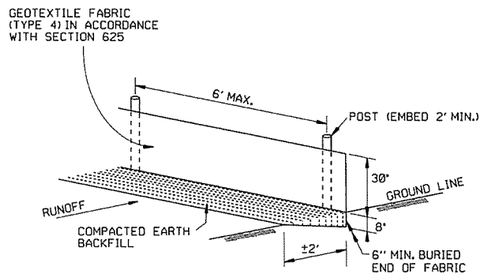
BALED STRAW FILTER BARRIER (E-2)



SAND BAG DITCH CHECK (E-5)



ROCK DITCH CHECK (E-6)



SILT FENCE (E-11)

GENERAL NOTES

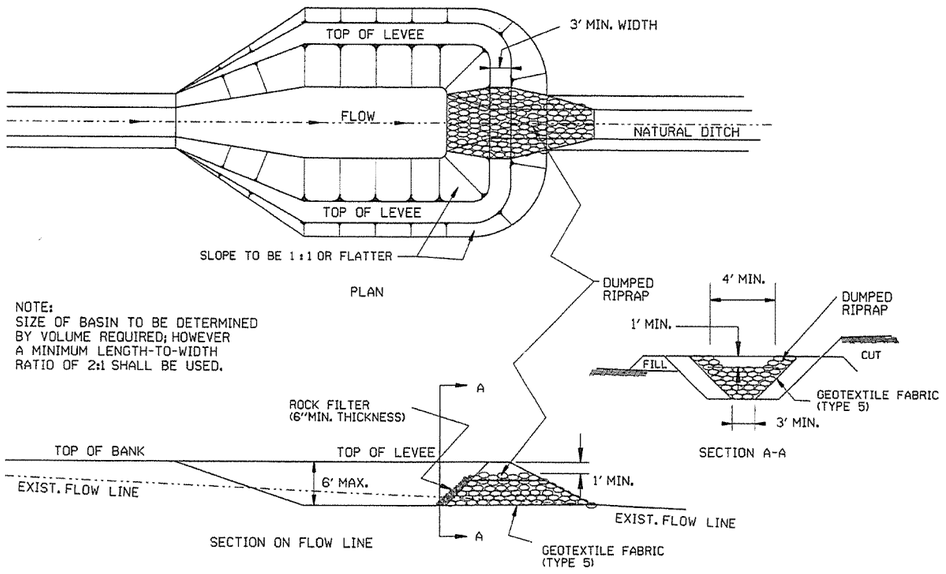
GEOTEXTILE FABRIC SHALL BE SPLICED TOGETHER WITH A SEWN SEAM ONLY AT A SUPPORT POST OR TWO SECTIONS OF FENCE MAY BE OVERLAPPED INSTEAD. PAYMENT OF ADDITIONAL MATERIAL FOR OVERLAP WILL NOT BE MADE.

DATE	REVISION	FILMED
12-15-11	DELETED BALED STRAW DITCH CHECK & ADDED WATTLE DITCH CHECK	
11-18-98	ADDED NOTES	
7-02-98	ADDED BALED STRAW FILTER BARRIER (E-2)	
7-20-95	REVISED SILT FENCE E-4 AND E-11	7-20-95
7-15-94	REV. E-4 & E-11 MIN. 13" BURIED END OF FABRIC	
6-2-94	REVISED E-1,4,7 & 11; DELETED E-2 & 3	6-2-94
4-1-93	REDRAWN	
10-1-92	REDRAWN	
8-2-76	ISSUED R.D.M.	298-7-28-76

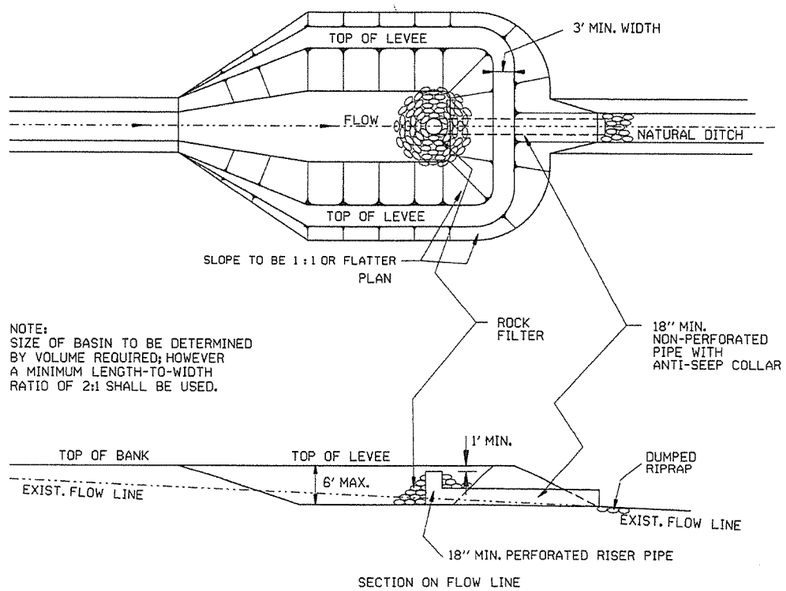
ARKANSAS STATE HIGHWAY COMMISSION

TEMPORARY EROSION CONTROL DEVICES

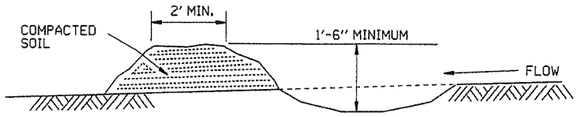
STANDARD DRAWING TEC-1



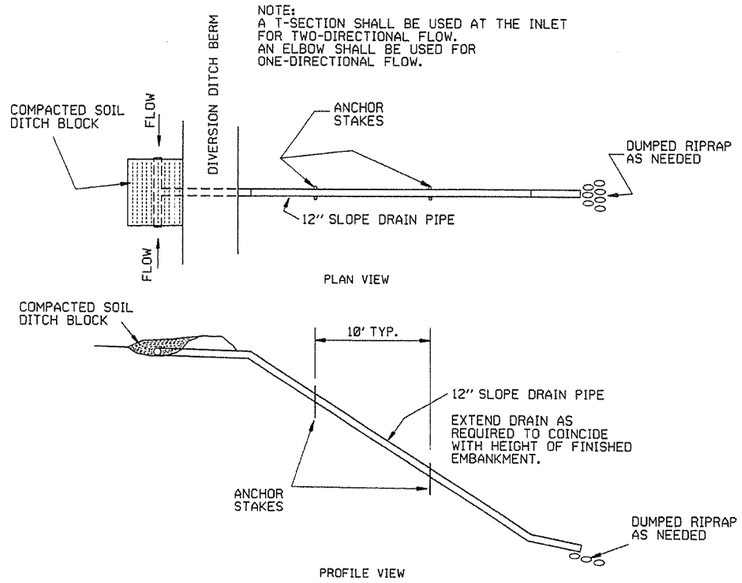
SEDIMENT BASIN WITH RIPRAP OUTLET (E-9)



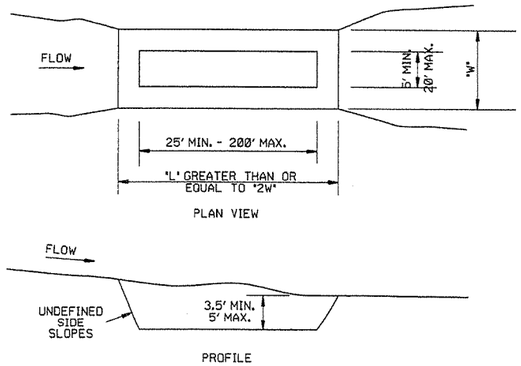
SEDIMENT BASIN WITH PIPE OUTLET (E-10)



DIVERSION DITCH (E-8)



SLOPE DRAIN (E-12)



SEDIMENT BASIN (E-14)

DATE	REVISION	FILMED
6-2-94	Revised E-8 & E-12; Added E-14 & Deleted E-13	
4-1-93	ISSUED	

ARKANSAS STATE HIGHWAY COMMISSION

TEMPORARY EROSION CONTROL DEVICES

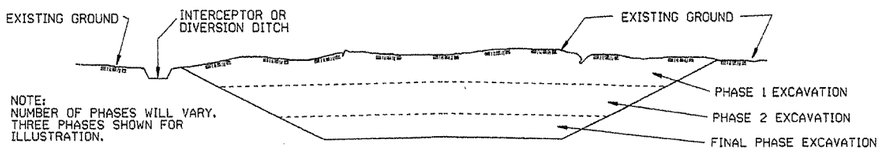
STANDARD DRAWING TEC-2

CLEARING AND GRUBBING

CONSTRUCTION SEQUENCE

1. PLACE PERIMETER CONTROLS (I.E. SILT FENCES , DIVERSION DITCHES, SEDIMENT BASINS, ETC.)
2. PERFORM CLEARING AND GRUBBING OPERATION.

EXCAVATION



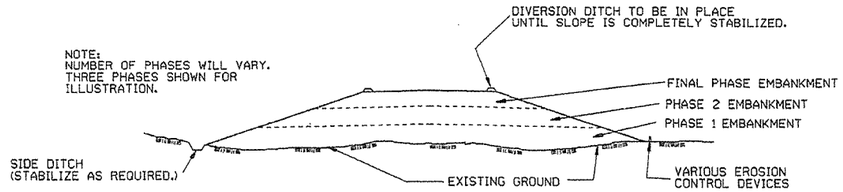
GENERAL NOTE

ALL CUT SLOPES SHALL BE DRESSED, PREPARED, SEEDED, AND MULCHED AS THE WORK PROGRESSES. SLOPES SHALL BE EXCAVATED AND STABILIZED IN EQUAL INCREMENTS NOT TO EXCEED 25 FEET, MEASURED VERTICALLY.

CONSTRUCTION SEQUENCE

1. EXCAVATE AND STABILIZE INTERCEPTOR AND/OR DIVERSION DITCHES.
2. PERFORM PHASE 1 EXCAVATION. PLACE PERMANENT OR TEMPORARY SEEDING.
3. PERFORM PHASE 2 EXCAVATION. PLACE PERMANENT OR TEMPORARY SEEDING.
4. PERFORM FINAL PHASE OF EXCAVATION. PLACE PERMANENT OR TEMPORARY SEEDING. STABILIZE DITCHES. CONSTRUCT DITCH CHECKS, DIVERSION DITCHES, SEDIMENT BASINS, OR OTHER EROSION CONTROL DEVICES AS REQUIRED.

EMBANKMENT



GENERAL NOTE

ALL EMBANKMENT SLOPES SHALL BE DRESSED, PREPARED, SEEDED, AND MULCHED AS THE WORK PROGRESSES. SLOPES SHALL BE CONSTRUCTED AND STABILIZED IN EQUAL INCREMENTS NOT TO EXCEED 25 FEET, MEASURED VERTICALLY.

CONSTRUCTION SEQUENCE

1. CONSTRUCT DIVERSION DITCHES, DITCH CHECKS, SEDIMENT BASINS, SILT FENCES, OR OTHER EROSION CONTROL DEVICES AS SPECIFIED.
2. PLACE PHASE 1 EMBANKMENT WITH PERMANENT OR TEMPORARY SEEDING. PROVIDE DIVERSION DITCHES AND SLOPE DRAINS IF EMBANKMENT CONSTRUCTION IS TO BE TEMPORARILY ABANDONED FOR A PERIOD OF GREATER THAN 21 DAYS.
3. PLACE PHASE 2 EMBANKMENT WITH PERMANENT OR TEMPORARY SEEDING. PROVIDE DIVERSION DITCHES AND SLOPE DRAINS IF EMBANKMENT CONSTRUCTION IS TO BE TEMPORARILY ABANDONED FOR A PERIOD OF GREATER THAN 21 DAYS.
4. PLACE FINAL PHASE OF EMBANKMENT WITH PERMANENT OR TEMPORARY SEEDING. PLACE DIVERSION DITCHES AND SLOPE DRAINS AND MAINTAIN UNTIL ENTIRE SLOPE IS STABILIZED.

DATE	REVISION	FILMED
11-03-94	CORRECTED SPELLING	
6-2-94	Drawn & Issued	6-2-94

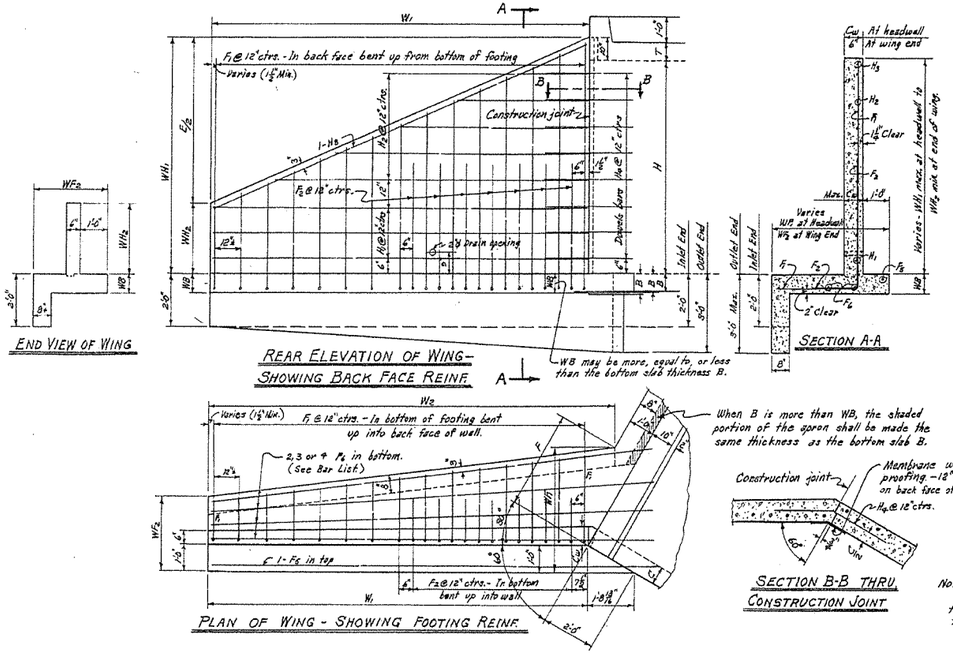
ARKANSAS STATE HIGHWAY COMMISSION

TEMPORARY EROSION CONTROL DEVICES

STANDARD DRAWING TEC-3

stdtec3.dgn

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			38	
JOB No.					



END VIEW OF WING

REAR ELEVATION OF WING - SHOWING BACK FACE REINF.

PLAN OF WING - SHOWING FOOTING REINF.

SECTION A-A

SECTION B-B THRU CONSTRUCTION JOINT

DETAIL AT TOP OF WING

WING DIMENSIONS

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HEADWALL	WINGWALL HEIGHTS		WIDTHS OF WING FOOTINGS		PERPENDICULAR DISTANCE FROM INSIDE FACE OF WING TO END OF WING	PERPENDICULAR DISTANCE FROM INSIDE FACE OF WING TO END OF WING	LENGTH OF WINGWALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING CLASS S CONCRETE	
			AT HEADWALL	AT END OF WING	AT HEADWALL	AT END OF WING					INLET END	OUTLET END
H	WB	Cw	WH1	WH2	WF1	WF2	F	E	N1	W2	CU.YD.	CU.YD.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	0'-11⅞"	4'-5"	5'-0"	4'-7½"	0.606	0.670
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-2½"	1'-0⅝"	5'-8"	6'-6⅝"	6'-0⅝"	0.908	0.996
4'	7"	6"	4'-10"	1'-0"	3'-0"	2'-8"	1'-9"	7'-0"	8'-1"	8'-1"	1.267	1.376
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-6½"	2'-1⅝"	8'-4"	9'-7½"	9'-9⅜"	1.679	1.810
		7"	5'-10"	1'-8"	3'-4"	2'-9½"	2'-1⅝"	8'-4"	9'-7½"	9'-9⅜"	1.750	1.881
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.330	2.483
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.379	2.531
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.427	2.580
7'	8½"	7½"	7'-10"	2'-0"	4'-2"	2'-7½"	3'-1⅛"	11'-0"	12'-10½"	13'-3½"	3.054	3.250
		8"	7'-10"	2'-0"	4'-2"	2'-7½"	3'-1⅛"	11'-0"	12'-10½"	13'-3½"	3.117	3.293
8'	9"	8"	8'-10"	2'-0"	4'-8"	2'-9"	3'-1⅝"	12'-1"	14'-3"	15'-2½"	3.905	4.104

* Quantity per wing does not include headwall or that portion of apron or toewall for the length W_3.

APRON DIMENSION W_2

$W_3 = (OW - 2F)$

CLEAR SPAN S	CLEAR HEIGHT H	2 × FOOTING DIMENSION 2F	SINGLE BARREL CULVERT OW	SINGLE BARREL CULVERT W_2	DOUBLE BARREL CULVERT OW	DOUBLE BARREL CULVERT W_2	TRIPLE BARREL CULVERT OW	TRIPLE BARREL CULVERT W_2	QUADRUPLE BARREL CULVERT OW	QUADRUPLE BARREL CULVERT W_2	QUINTUPLE BARREL CULVERT OW	QUINTUPLE BARREL CULVERT W_2
4'	2'	1'-11½"	5'-0"	3'-0⅝"	9'-8"	7'-9⅛"	14'-4"	12'-4⅝"	19'-0"	17'-0⅛"	23'-8"	21'-8⅛"
	3'	2'-8½"	5'-0"	2'-3⅜"	9'-8"	6'-11⅝"	14'-4"	11'-7¼"	19'-0"	16'-3¼"	23'-8"	20'-11⅛"
	4'	3'-6"	5'-0"	1'-6"	9'-8"	6'-2"	14'-9"	10'-10"	19'-0"	15'-6"	23'-8"	20'-2"
	5'	4'-3⅜"	5'-0"	0'-8⅝"	9'-8"	5'-4⅜"	14'-9"	10'-0⅝"	19'-0"	14'-8⅝"	23'-8"	19'-4⅝"
	6'	5'-0⅝"	5'-2"	0'-1¼"	9'-11"	4'-10⅝"	14'-8"	9'-7¼"	19'-5"	14'-4⅝"	24'-2"	19'-1¼"
5'	3'	2'-8½"	6'-0"	3'-3⅜"	11'-8"	8'-11⅝"	17'-4"	14'-7¼"	23'-0"	20'-3⅝"	28'-8"	25'-11⅛"
	4'	3'-6"	6'-0"	2'-6"	11'-8"	8'-2"	17'-8"	13'-10"	23'-0"	19'-6"	28'-8"	25'-2"
	5'	4'-3⅜"	6'-0"	1'-8⅝"	11'-8"	7'-4⅜"	17'-9"	13'-0⅝"	23'-0"	18'-8⅝"	28'-8"	24'-8⅝"
	6'	5'-0⅝"	6'-2"	1'-1¼"	11'-11"	6'-10⅝"	17'-8"	12'-7¼"	23'-5"	18'-4¼"	29'-2"	24'-1¼"
	7'	6'-2¼"	6'-3"	0'-0¾"	12'-1"	5'-10⅝"	17'-11"	11'-8⅝"	23'-10"	17'-6¾"	29'-7"	23'-6¾"
6'	3'	2'-8½"	7'-0"	4'-3⅜"	13'-8"	10'-11⅝"	20'-4"	17'-7¼"	27'-0"	24'-3⅝"	33'-8"	30'-11⅛"
	4'	3'-6"	7'-0"	3'-6"	13'-8"	10'-2"	20'-8"	16'-10"	27'-0"	23'-6"	33'-8"	30'-2"
	5'	4'-3⅜"	7'-0"	2'-8⅝"	13'-8"	9'-4⅜"	20'-9"	16'-0⅝"	27'-0"	22'-8⅝"	33'-8"	29'-8⅝"
	6'	5'-0⅝"	7'-2"	2'-1¼"	13'-11"	8'-10⅝"	20'-8"	15'-7¼"	27'-5"	22'-4⅝"	34'-2"	29'-1¼"
	7'	6'-2¼"	7'-3"	1'-0¾"	14'-1"	7'-10⅝"	20'-11"	14'-8⅝"	27'-9"	21'-6¾"	34'-7"	28'-6¾"
	8'	7'-1⅜"	7'-4"	0'-0"	14'-2"	6'-10"	21'-0"	13'-8"	27'-10"	20'-6"	34'-8"	27'-8"
7'	4'	3'-6"	8'-0"	4'-6"	15'-8"	12'-2"	23'-4"	19'-10"	31'-0"	27'-6"	38'-8"	35'-2"
	5'	4'-3⅜"	8'-0"	3'-8⅝"	15'-8"	11'-4⅜"	23'-4"	19'-0⅝"	31'-0"	26'-8⅝"	38'-8"	34'-8⅝"
	6'	5'-0⅝"	8'-2"	3'-1¼"	15'-11"	10'-10⅝"	23'-8"	18'-7¼"	31'-5"	26'-4⅝"	39'-2"	34'-1¼"
	7'	6'-2¼"	8'-3"	2'-0¾"	16'-1"	9'-10⅝"	23'-11"	17'-8⅝"	31'-9"	25'-6¾"	39'-7"	33'-6¾"
	8'	7'-1⅜"	8'-4"	1'-0"	16'-2"	8'-10"	24'-0"	16'-8"	31'-10"	24'-6"	39'-8"	32'-8"
8'	4'	3'-6"	9'-0"	5'-6"	17'-8"	14'-2"	26'-8"	22'-10"	35'-6"	31'-6"	43'-8"	40'-2"
	5'	4'-3⅜"	9'-0"	4'-10⅝"	17'-11"	13'-7⅜"	26'-8"	22'-2⅝"	35'-5"	31'-1⅝"	44'-1"	39'-10⅜"
	6'	5'-0⅝"	9'-2"	4'-3⅛"	17'-11"	12'-10⅝"	26'-8"	21'-7¼"	35'-5"	30'-4⅝"	44'-1"	39'-1¼"
	7'	6'-2¼"	9'-3"	3'-2¾"	18'-1"	11'-10⅝"	26'-11"	20'-8⅝"	35'-9"	29'-6¾"	44'-7"	38'-6¾"
	8'	7'-1⅜"	9'-4"	2'-2"	18'-2"	10'-10"	27'-0"	19'-8"	35'-10"	28'-6"	44'-8"	37'-8"
9'	5'	4'-3⅜"	10'-0"	5'-10⅛"	19'-11"	15'-5⅜"	29'-8"	25'-0⅛"	39'-5"	35'-1⅜"	49'-2"	44'-10⅜"
	6'	5'-0⅝"	10'-2"	5'-3¼"	20'-1"	14'-7⅛"	29'-11"	24'-1⅝"	39'-9"	34'-3⅛"	49'-7"	44'-1⅛"
	7'	6'-2¼"	10'-3"	4'-2¾"	20'-1"	13'-7⅛"	29'-11"	23'-2⅝"	39'-9"	33'-3⅛"	49'-7"	43'-1⅛"
	8'	7'-1⅜"	10'-4"	3'-2"	20'-2"	12'-7"	30'-0"	22'-3"	39'-10"	32'-3"	49'-8"	42'-1"
10'	5'	4'-3⅜"	11'-2"	6'-0⅜"	21'-10"	17'-3⅛"	32'-8"	28'-4⅛"	43'-5"	39'-1⅜"	54'-2"	49'-10⅜"
	6'	5'-0⅝"	11'-3"	6'-3⅛"	22'-1"	17'-0⅛"	32'-11"	27'-7⅛"	43'-9"	38'-3⅛"	54'-7"	49'-1⅛"
	7'	6'-2¼"	11'-3"	5'-2¾"	22'-1"	15'-11⅛"	32'-11"	26'-8⅝"	43'-9"	37'-3⅛"	54'-7"	48'-1⅛"
	8'	7'-1⅜"	11'-5"	4'-3"	22'-3"	14'-11"	33'-0"	25'-8"	43'-10"	36'-4"	54'-8"	47'-1"
11'	6'	5'-0⅝"	12'-4"	7'-3⅛"	24'-2"	19'-1⅛"	36'-0"	30'-11⅛"	47'-10"	42'-9⅛"		
	7'	6'-2¼"	12'-4"	6'-2⅛"	24'-2"	17'-11⅛"	36'-0"	29'-9⅝"	47'-10"	41'-7⅛"		
	8'	7'-1⅜"	12'-4"	5'-3"	24'-2"	16'-10"	36'-0"	28'-8"	47'-10"	40'-6"		
12'	6'	5'-0⅝"	13'-4"	8'-3⅛"	26'-2"	21'-1⅛"	39'-0"	33'-11⅛"	51'-10"	46'-9⅛"		
	7'	6'-2¼"	13'-4"	7'-1⅞"	26'-2"	19'-11⅛"	39'-0"	32'-9⅝"	51'-10"	45'-7⅛"		
	8'	7'-1⅜"	13'-4"	6'-3"	26'-2"	18'-10"	39'-0"	31'-8"	51'-10"	44'-6"		

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	REINFORCING STEEL - FOR 4 WINGS @	CLASS S CONCRETE - 4 WINGS					
					HEADWALLS, WINGWALLS, FOOTINGS, TOEWALLS AND APRONS					
					SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT	
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	
4'	2'	6"	7"	81.0	3.30	4.25	5.21	6.17	7.13	
	3'	6"	7"	113.8	4.45	5.41	6.37	7.33	8.29	
	4'	6"	7"	183.3	5.83	6.79	7.74	8.70	9.66	
	5'	6"	7"	258.2	7.41	8.37	9.33	10.29	11.25	
	6'	7"	8"	415.4	9.97	10.95	11.94	12.98	13.92	
5'	3'	6"	7"	113.8	4.67	5.63	6.99	8.16	9.33	
	4'	6"	7"	183.3	6.04	7.20	8.36	9.53	10.70	
	5'	6"	7"	258.2	7.63	8.78	9.95	11.12	12.28	
	6'	7"	8"	415.4	10.19	11.38	12.57	13.71	14.96	
	7'	7½	8½	797.6	12.98	14.19	15.41	16.63	17.85	
6'	3'	6"	7"	113.8	4.88	6.26	7.62	9.00	10.38	
	4'	6"	7"	183.3	6.25	7.63	8.99	10.37	11.75	
	5'	6"	7"	253.2	7.83	9.22	10.57	11.96	13.33	
	6'	7"	8"	415.4	10.40	11.81	13.20	14.61	16.01	
	7'	7½	8½	797.6	13.19	14.63	16.04	17.47	18.90	
	8'	8	9"	1006.9	16.50	17.93	19.34	20.79	22.23	
7'	4'	6"	7"	183.3	6.42	8.07	9.64	11.25	12.85	
	5'	6"	7"	258.2	8.05	9.64	11.23	12.84	14.44	
	6'	7"	8"	415.4	10.62	12.25	13.84	15.46	17.08	
	7'	7½	8½	797.6	13.42	15.06	16.68	18.32	19.96	
	8'	8	9"	1006.9	16.72	18.37	20.00	21.65	23.29	
8'	4'	6"	7"	183.3	6.69	8.52	10.32	12.15	13.95	
	5'	6"	7"	258.2	8.39	10.44	12.24	14.11	16.02	
	6'	7"	8"	415.4	10.88	12.89	14.91	16.36	18.17	
	7'	7½	8½	797.6	13.68	15.60	17.54	19.21	21.03	
	8'	8	9"	1006.9	16.98	18.81	20.65	22.51	24.24	
9'	5'	7"	7"	258.2	8.81	10.90	12.92	15.00	17.02	
	6'	7½	8"	415.4	11.27	13.38	15.42	17.52	19.55	
	7'	7½	8½	797.6	13.85	15.96	18.00	20.10	22.16	
	8'	8	9"	1006.9	17.16	19.26	21.31	23.41	25.45	
10'	5'	7"	7"	258.2	9.04	11.35	13.60	15.91	18.08	
	6'	7½	8"	415.4	11.50	13.83	16.10	18.33	20.61	
	7'	7½	8½	797.6	14.08	16.41	18.68	20.91	23.20	
	8'	8	9"	1006.9	17.38	19.71	21.98	24.22	26.50	
11'	6'	8"	8"	415.4	11.93	14.51	17.00	19.47		
	7'	8"	8½	797.6	14.56	17.15	19.64	22.11		
	8'	8"	9"	1006.9	17.59	20.18	22.67	25.14		
12'	6'	8"	8"	415.4	12.16	14.99	17.70	20.92		
	7'	8"	8½	797.6	14.79	17.62	20.33	23.06		
	8'	8"	9"	1006.9	17.82	20.65	23.36	26.09		

* For reinforcing steel in Headwalls and Aprons, see Details of Standard Barrel Sections for R.C. Box Culverts for the desired Span and Height.

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾ 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) 1200 #/□"
Reinforcing Steel 24000 #/□"

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	
	R-200X-X3	R-300X-X3		

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, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X002-1

NOTE:- Plans and Elevations are not to scale.

MEMBRANE:- A membrane waterproofing 12" wide, consisting of three mopings 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.

BAR LIST FOR ONE WING - 4 REQUIRED

CLEAR HEIGHT H	F_1 BENT — In bottom of footing, bent up into back face of wing. One bar of each length. SIZE	SPACING	NO. REQ'D	LENGTHS VARY X MIN.	X MAX.	Y MIN.	Y MAX.	F_2 BENT — In bottom of footing, bent up into back face of wing. Alt. with F_1 bars. SIZE	SPACING	NO. REQ'D	LENGTH	X	Y	F_5 STRAIGHT — Longitudinal in top of wing footing hook. SIZE	NO. REQ'D	LENGTH	F_6 STRAIGHT — Longitudinal in bottom of wing footing toe. SIZE	NO. REQ'D	LENGTH	H_1 STRAIGHT — Horizontal in back face of wing. SIZE	SPACING	NO. REQ'D	LENGTH	H_2 STRAIGHT — Horizontal in back face of wing, One bar of each length. SIZE	SPACING	NO. REQ'D	LENGTHS VARY MAX.	MIN.	H_3 STRAIGHT — In back face of wing at top-on slope. SIZE	NO. REQ'D	LENGTH	H_4 BENT — Dowels thru construction joint at headwall. SIZE	SPACING	NO. REQ'D	LENGTH	X	QUANTITY - REINFORCING STEEL PER WING LB.
2'	#3	12"	6	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	—	—	—	—	—	#3	1	7'-6"	#3	2	6'-3"	#3	12"	1	4'-5"	#3	12"	1	—	2'-8"	#3	1	5'-1"	#3	12"	2	2'-8"	1'-9"	20.2
3'	#3	12"	7	2'-2"	5'-3"	0'-10"	1'-4"	1'-5"	4'-0"	—	—	—	—	—	#3	1	9'-0"	#3	2	8'-0"	#3	12"	1	6'-3"	#3	12"	2	5'-0"	2'-8"	#3	1	6'-9"	#3	12"	3	2'-8"	1'-9"	29.9
4'	#3	12"	9	2'-10"	6'-7"	0'-11"	1'-8"	1'-8"	5'-0"	—	—	—	—	—	#3	1	10'-7"	#3	3	9'-9"	#3	12"	1	7'-10"	#3	12"	3	7'-4"	2'-8"	#3	1	8'-5"	#3	12"	4	2'-8"	1'-9"	45.8
5'	#3	12"	10	3'-0"	7'-10"	1'-1"	1'-11"	2'-0"	6'-0"	#3	12"	3	3'-6"	1'-1"	#3	1	12'-1"	#3	3	11'-6"	#3	12"	2	9'-8"	#3	12"	3	7'-6"	2'-8"	#3	1	10'-1"	#3	12"	5	2'-8"	1'-9"	68.3
6'	#4	12"	12	3'-5"	9'-3"	1'-2"	2'-3"	2'-4"	7'-1"	#3	12"	3	4'-6"	1'-9"	#3	1	13'-8"	#3	3	13'-3"	#3	12"	2	10'-11"	#3	12"	4	9'-8"	2'-8"	#3	1	11'-8"	#3	12"	6	2'-8"	1'-9"	103.8
7'	#4	12"	13	4'-1"	10'-9"	1'-6"	2'-8"	2'-10"	8'-1"	#4	12"	5	5'-6"	1'-7"	#4	1	15'-5"	#4	4	15'-0"	#4	12"	2	12'-5"	#4	12"	5	12'-0"	2'-8"	#4	1	13'-5"	#4	12"	7	3'-4"	1'-9"	139.4
8'	#4	12"	15	4'-5"	12'-3"	1'-5"	3'-2"	3'-1"	9'-2"	#4	12"	7	6'-6"	1'-10"	#4	1	16'-9"	#4	4	16'-9"	#4	12"	3	14'-0"	#4	12"	5	13'-0"	2'-8"	#4	1	15'-2"	#4	12"	8	3'-4"	1'-9"	261.2

BAR BENDING DIAGRAMS

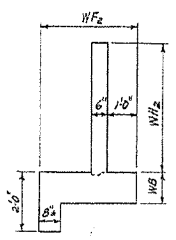
REVISIONS:- Membrane added. 5-10-66 W.G.H.

Quantities by - W.G.H. Checked by - J.S.M. - 5-5-63

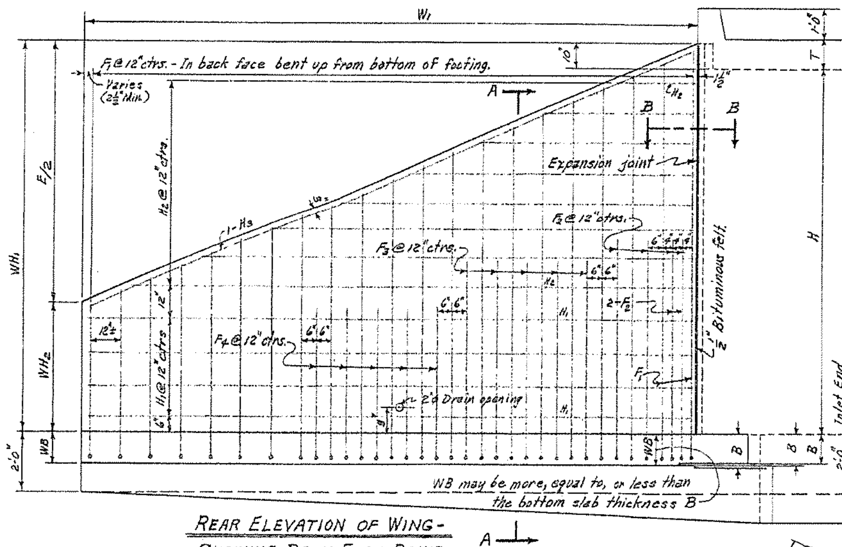
(1)

RESHOT 3-4-93 457 ~~458~~

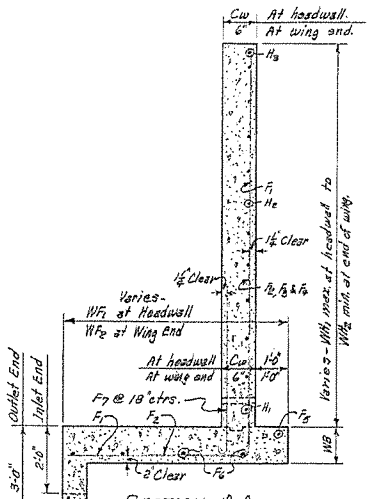
FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			39	
JOB No.					



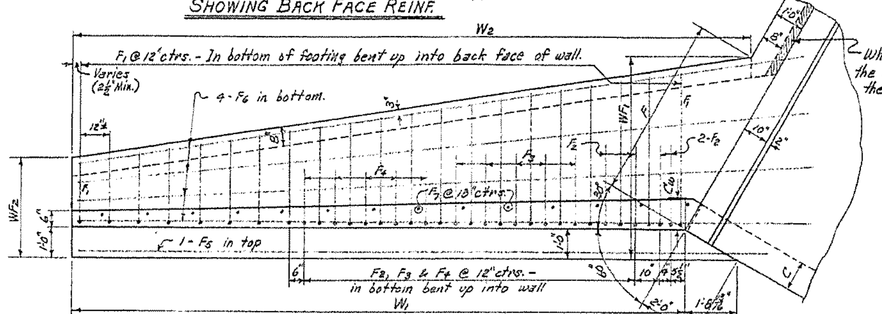
END VIEW OF WING



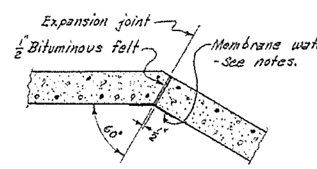
REAR ELEVATION OF WING - SHOWING BACK FACE REINF.



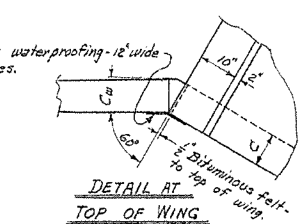
SECTION A-A



PLAN OF WING - SHOWING FOOTING REINF.



SECTION B-B THRU EXPANSION JOINT



DETAIL AT TOP OF WING

WING DIMENSIONS

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HEADWALL = C	WINGWALL HEIGHTS: AT HEADWALL	WINGWALL HEIGHTS: AT END OF WING	WIDTHS OF WING FOOTINGS: AT HEADWALL	WIDTHS OF WING FOOTINGS: AT END OF WING	PERPENDICULAR FOOTING DIMENSION	PERPENDICULAR DIST. FROM HDWL TO END OF WING	LENGTH OF WINGWALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING CLASS S CONCRETE: INLET END	OUTLET END
H	WB	Cw	WH1	WH2	WF1	WF2	F	E	W1	W2	CU.YD.	CU.YD.
9'	10"	9"	9'-10"	3'-0"	5'-2"	2'-10½"	4'-3"	13'-8"	15'-2⅝"	17'-0⅝"	5.072	5.293
10'	11"	10"	10'-10"	3'-4"	5'-8"	3'-0"	4'-10"	15'-0"	17'-3¾"	18'-10¼"	6.466	6.711
11'	12"	11"	11'-10"	3'-8"	6'-2"	3'-1½"	5'-5"	16'-4"	18'-10¼"	20'-8⅝"	8.104	8.372
12'	13"	12"	12'-10"	4'-0"	6'-8"	3'-3"	6'-0"	17'-8"	20'-4¾"	22'-6¼"	10.007	10.297

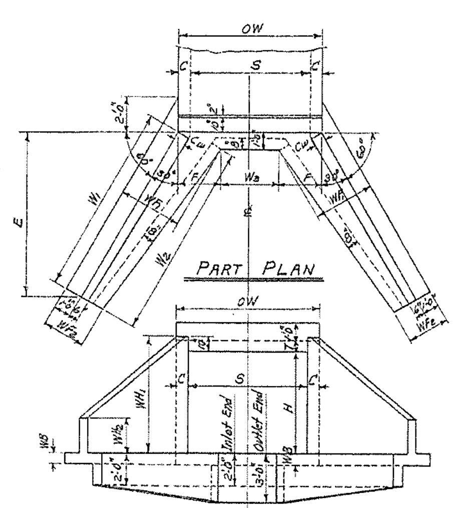
* Quantity per wing does not include headwall or that portion of apron or toewall for the length W_3.

CLEAR SPAN	CLEAR HEIGHT	2 x FOOTING DIMENSION	SINGLE BARREL CULVERT OW	SINGLE W_3	DOUBLE BARREL CULVERT OW	DOUBLE W_3	TRIPLE BARREL CULVERT OW	TRIPLE W_3	QUADRUPLE BARREL CULVERT OW	QUADRUPLE W_3	QUINTUPLE BARREL CULVERT OW	QUINTUPLE W_3
S	H	2F	W_3 = (OW - 2F)									
7'												
	9'	8'-6"	8'-6"	0'-0"	16'-5"	7'-11"	24'-4"	15'-10"	32'-3"	23'-9"	40'-2"	31'-8"
8'	9'	8'-6"	9'-6"	1'-0"	18'-5"	9'-11"	27'-4"	18'-10"	36'-3"	27'-9"	45'-2"	36'-8"
	10'	9'-8"	9'-8"	0'-0"	18'-8"	9'-0"	27'-8"	18'-0"	36'-8"	27'-0"	45'-8"	36'-0"
9'	9'	8'-6"	10'-6"	2'-0"	20'-5"	11'-11"	30'-4"	21'-10"	40'-3"	31'-9"	50'-2"	41'-8"
	10'	9'-8"	10'-8"	1'-0"	20'-8"	11'-0"	30'-8"	21'-0"	40'-8"	31'-0"	50'-8"	41'-0"
	11'	10'-10"	10'-10"	0'-0"	20'-10"	10'-0"	30'-10"	20'-0"	40'-10"	30'-0"	50'-10"	40'-0"
10'	9'	8'-6"	11'-6"	3'-0"	22'-5"	13'-11"	33'-4"	24'-10"	44'-3"	35'-9"	55'-2"	46'-8"
	10'	9'-8"	11'-8"	2'-0"	22'-8"	13'-0"	33'-8"	24'-0"	44'-8"	35'-0"	55'-8"	46'-0"
	11'	10'-10"	11'-10"	1'-0"	22'-10"	12'-0"	33'-10"	23'-0"	44'-10"	34'-0"	55'-10"	45'-0"
	12'	12'-0"	12'-0"	0'-0"	23'-0"	11'-0"	34'-0"	22'-0"	45'-0"	33'-0"	56'-0"	44'-0"
11'	9'	8'-6"	12'-6"	4'-0"	24'-5"	15'-11"	36'-4"	27'-10"	48'-3"	39'-9"		
	10'	9'-8"	12'-8"	3'-0"	24'-8"	15'-0"	36'-8"	27'-0"	48'-8"	39'-0"		
	11'	10'-10"	12'-10"	2'-0"	24'-10"	14'-0"	36'-10"	26'-0"	48'-10"	38'-0"		
	12'	12'-0"	13'-0"	1'-0"	25'-0"	13'-0"	37'-0"	25'-0"	49'-0"	37'-0"		
12'	9'	8'-6"	13'-6"	5'-0"	26'-5"	17'-11"	39'-4"	30'-10"	52'-3"	43'-9"		
	10'	9'-8"	13'-8"	4'-0"	26'-8"	17'-0"	39'-8"	30'-0"	52'-8"	43'-0"		
	11'	10'-10"	13'-10"	3'-0"	26'-10"	16'-0"	39'-10"	29'-0"	52'-10"	42'-0"		
	12'	12'-0"	14'-0"	2'-0"	27'-0"	15'-0"	40'-0"	28'-0"	53'-0"	41'-0"		

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	⊛ REINFORCING STEEL - FOR 4 WINGS	CLASS S CONCRETE - 4 WINGS (HEADWALLS, WINGWALLS, FOOTINGS, TOE WALLS AND APRONS): SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.
7'									
	9'	9"	10"	1487.2	21.29	22.97	24.64	26.32	27.99
8'	9'	9"	10"	1487.2	21.51	23.41	25.28	27.18	29.06
	10'	10"	11"	1842.6	26.99	28.92	30.83	32.76	34.68
9'	9'	9"	10"	1487.2	21.73	23.85	25.93	28.04	30.13
	10'	10"	11"	1842.6	27.22	29.36	31.49	33.63	35.76
	11'	11"	12"	2196.1	33.67	35.83	37.98	40.14	42.29
10'	9'	9"	10"	1487.2	21.95	24.30	26.61	28.92	31.24
	10'	10"	11"	1842.6	27.44	29.81	32.14	34.48	36.84
	11'	11"	12"	2196.1	33.90	36.27	38.64	41.01	43.39
	12'	12"	13"	2766.4	41.40	43.80	46.19	48.58	50.98
11'	9'	9"	10"	1487.2	22.17	24.77	27.28	29.81	
	10'	10"	11"	1842.6	27.66	30.27	32.80	35.37	
	11'	11"	12"	2196.1	34.11	36.73	39.30	41.88	
	12'	12"	13"	2766.4	41.62	44.25	46.85	49.46	
12'	9'	9"	10"	1487.2	22.39	25.24	27.97	30.76	
	10'	10"	11"	1842.6	27.88	30.74	33.49	36.30	
	11'	11"	12"	2196.1	34.34	37.20	39.95	42.78	
	12'	12"	13"	2766.4	41.85	44.71	47.52	50.35	

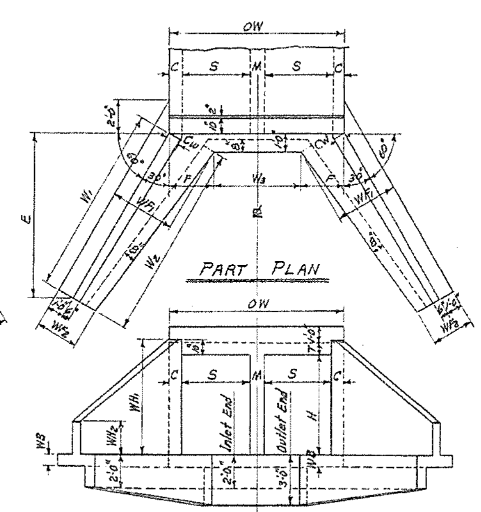
⊛ For reinforcing steel in Headwalls and Aprons, See Details of Standard Barrel Sections for R.C. Box Culverts for the desired Span and Height.



PART PLAN

END ELEVATION

SINGLE BARREL CULVERT

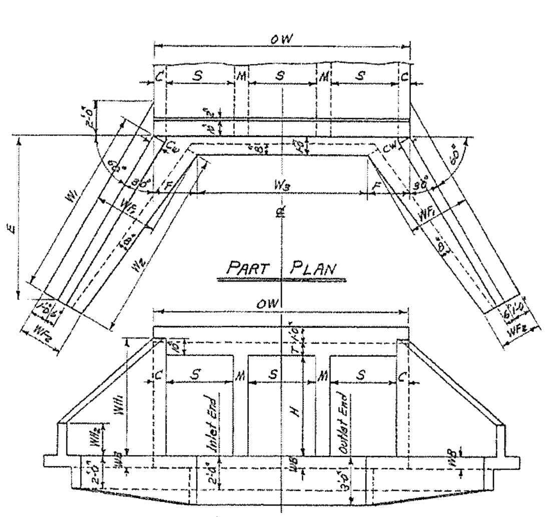


PART PLAN

END ELEVATION

DOUBLE BARREL CULVERT

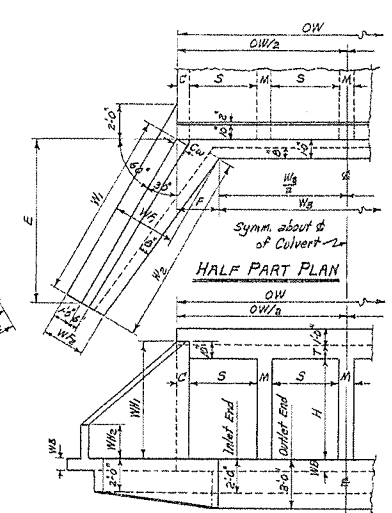
NOTE:- Plans and Elevations are not to scale.



PART PLAN

END ELEVATION

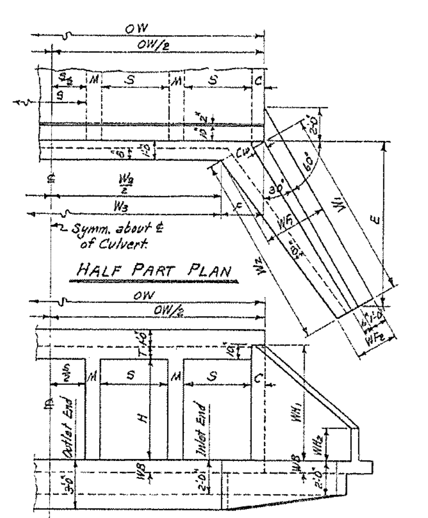
TRIPLE BARREL CULVERT



HALF PART PLAN

HALF END ELEVATION

QUADRUPLE BARREL CULVERT



HALF PART PLAN

HALF END ELEVATION

QUINTUPLE BARREL CULVERT

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" chamfers.

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

CONSTRUCTION JOINTS:- Construction joints between wingwalls, footings and sidewalls shall be only where shown on plans.

MEMBRANE:- A membrane waterproofing 12" wide, consisting of three moppings of waterproofing asphalt and two alternate layers of treated cotton fabric shall be applied to the back face of wing to cover the expansion joints.

Payment for the membrane waterproofing and bituminous felt shall be included in unit price bid for Class S Concrete.

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

UNIT STRESSES:-
Class S Concrete (n=10) 1200#/□"
Reinforcing Steel 20,000#/□"

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-X2	R-200X-X2	R-300X-X2	R-400X-X2	
	R-200X-X3	R-300X-X3		

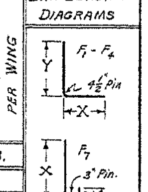
BAR LIST FOR ONE WING — 4 REQUIRED

F1 — BENT — In bottom of footing, bent up into back face of wing. One bar of each length.
F2 — BENT — In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
F3 — BENT — In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
F4 — BENT — In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
F5 — STRAIGHT — Longitudinal in top of wing footing heel.
F6 — STRAIGHT — Longitudinal in bottom of wing footing toe.
F7 — BENT — Footing dowels extending up into front face of wing.
H1 — STRAIGHT — Horizontal in back face of wing.
H2 — STRAIGHT — Horizontal in back face of wing. One bar of each length.
H3 — STRAIGHT — In back face of wing at top - on slope.

CLEAR HEIGHT H	F1 SIZE	F1 SPACING	F1 NO. REQ'D	F1 LENGTHS VARY MIN.	F1 LENGTHS VARY MAX.	F1 X MIN.	F1 X MAX.	F1 Y MIN.	F1 Y MAX.	F2 SIZE	F2 SPACING ⊙	F2 NO. REQ'D	F2 LENGTH	F2 X	F2 Y	F3 SIZE	F3 SPACING	F3 NO. REQ'D	F3 LENGTH	F3 X	F3 Y	F4 SIZE	F4 SPACING	F4 NO. REQ'D	F4 LENGTH	F4 X	F4 Y	F5 SIZE	F5 NO. REQ'D	F5 LENGTH	F6 SIZE	F6 NO. REQ'D	F6 LENGTH	F7 SIZE	F7 SPACING	F7 NO. REQ'D	F7 LENGTH	F7 X	H1 SIZE	H1 SPACING	H1 NO. REQ'D	H1 LENGTH	H2 SIZE	H2 SPACING	H2 NO. REQ'D	H2 LENGTHS VARY MAX.	H2 LENGTHS VARY MIN.	H3 SIZE	H3 NO. REQ'D	H3 LENGTH	QUANTITY - REINFORCING STEEL PER WING LB.
9'	#5	12"	16	5'-3"	13'-10"	1'-7"	3'-8"	3'-9"	10'-3"	#5	12"	3	7'-6"	2'-1"	5'-6"	#4	12"	5	6'-6"	1'-10"	4'-9"	—	—	—	—	—	—	#4	1	18'-3"	#4	4	18'-6"	#4	18"	11	4'-0"	3'-6"	#4	12"	3	15'-6"	#4	12"	6	14'-4"	2'-8"	#4	1	16'-10"	371.8
10'	#5	12"	18	5'-6"	15'-4"	1'-8"	4'-1"	3'-11"	11'-4"	#6	12"	2	8'-6"	2'-4"	6'-3"	#5	12"	3	7'-6"	2'-1"	5'-6"	#4	12"	5	6'-6"	1'-10"	4'-9"	#4	1	19'-10"	#4	4	20'-6"	#4	18"	12	4'-4"	3'-10"	#4	12"	3	17'-0"	#4	12"	7	16'-8"	2'-8"	#4	1	18'-6"	460.7
11'	#5	12"	19	6'-4"	16'-10"	1'-10"	4'-6"	4'-7"	12'-5"	#6	12"	4	8'-6"	2'-4"	6'-3"	#5	12"	3	7'-6"	2'-1"	5'-6"	#4	12"	5	6'-6"	1'-10"	4'-9"	#4	1	21'-4"	#4	4	22'-6"	#4	18"	13	4'-8"	4'-2"	#4	12"	4	18'-7"	#4	12"	7	16'-8"	2'-8"	#4	1	20'-2"	549.0
12'	#5	12"	21	6'-8"	18'-5"	1'-11"	5'-0"	4'-10"	13'-6"	#7	12"	4	9'-6"	2'-7"	7'-0"	#6	12"	5	8'-6"	2'-4"	6'-3"	#4	12"	5	6'-6"	1'-10"	4'-9"	#4	1	22'-11"	#4	4	24'-6"	#4	18"	14	5'-0"	4'-6"	#4	12"	4	20'-1"	#4	12"	8	19'-0"	2'-8"	#4	1	21'-10"	691.6

⊙ Except as shown at headwall.

BAR BENDING DIAGRAMS



NOTE:- Dimensions are to bar centers.

Designed By:- W.C.H. 7-25-62. Checked By:-
Drawn By:- W.C.H. 4-19-63. Checked By:- J&M - 5-16-63
Quantities By:- W.C.H. Checked By:- J&M - 5-10-63

CLASS S CONCRETE

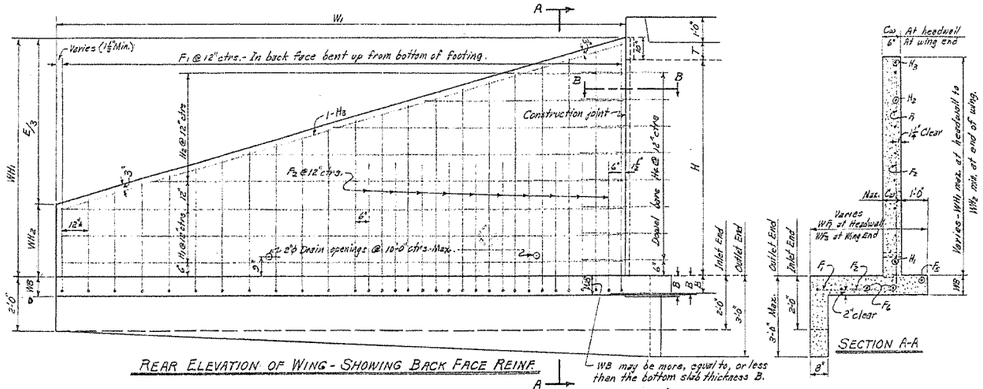
ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS

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

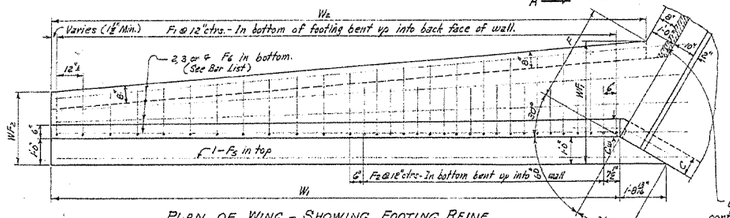
STANDARD DRAWING NO. W-X002-2

FED. ROAD DIV.	STATE	FED. AID PROJECT	SHEET NO.	TOTAL SHEETS
6	ARK.		40	
JOB NO.				



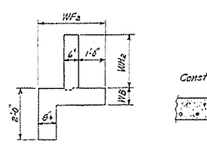
REAR ELEVATION OF WING - SHOWING BACK FACE REINF.

SECTION A-A

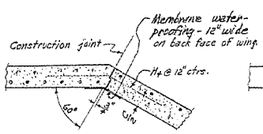


PLAN OF WING - SHOWING FOOTING REINF.

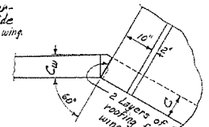
W8 may be more, equal to, or less then the bottom slab thickness B.



END VIEW OF WING



SECTION B-B THRU CONSTRUCTION JOINT



DETAIL AT TOP OF WING

When B is more than W8, the shaded portion of the apron shall be made the same thickness as the barrel base B.

NOTE:- Payment for membrane waterproofing and roofing felt to be included in the price bid for Class S Concrete.

WING DIMENSIONS

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HEADWALL = C	WINGWALL HEIGHTS		WIDTHS OF WING FOOTINGS		PERPENDICULAR FOOTING DIMENSION	PERPENDICULAR DIST. FROM HDWL. TO END OF WING	LENGTH OF WINGWALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING CLASS S CONCRETE	
			AT HEADWALL	AT END OF WING	AT HEADWALL	AT END OF WING					INLET END	OUTLET END
H	WB	Cw	WH1	WH2	WF1	WF2	F	E	W1	W2	CU.YD.	CU.YD.
2'	7"	6"	2'-10"	0'-8"	2'-9"	2'-0"	0'-11⅞"	6'-6"	7'-6"	7'-1½"	0.889	0.986
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-3⅜"	8'-6"	9'-10⅝"	9'-5½"	1.338	1.466
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	1'-8"	10'-6"	12'-1⅝"	12'-1½"	1.868	2.027
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	12'-6"	14'-5⅛"	14'-2½"	2.478	2.668
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	12'-6"	14'-5⅛"	14'-2½"	2.582	2.772
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6½"	14'-6"	16'-9"	17'-1⅝"	3.440	3.661
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6½"	14'-6"	16'-9"	17'-1⅝"	3.511	3.732
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6½"	14'-6"	16'-9"	17'-1⅝"	3.582	3.803
7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1⅛"	16'-6"	19'-0½"	19'-8½"	4.505	4.758
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1⅛"	16'-6"	19'-0½"	19'-8½"	4.597	4.851
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-2"	18'-6"	21'-4½"	22'-2"	5.761	6.097

* Quantity per wing does not include headwall or that portion of apron or toewall for the length W3.

APRON DIMENSION W3

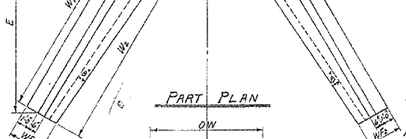
W3 = (OW - 2F)

CLEAR SPAN S	CLEAR HEIGHT H	2 x FOOTING DIMENSION 2F	SINGLE BARREL CULVERT OW	SINGLE BARREL CULVERT W3	DOUBLE BARREL CULVERT OW	DOUBLE BARREL CULVERT W3	TRIPLE BARREL CULVERT OW	TRIPLE BARREL CULVERT W3	QUADRUPLE BARREL CULVERT OW	QUADRUPLE BARREL CULVERT W3	QUINTUPLE BARREL CULVERT OW	QUINTUPLE BARREL CULVERT W3
4'	2'	1'-11⅞"	5'-0"	3'-0⅛"	9'-8"	7'-8½"	14'-4"	12'-4½"	19'-0"	17'-0½"	23'-8"	21'-8½"
	3'	2'-8⅜"	5'-0"	2'-3⅝"	9'-8"	6'-11⅛"	14'-4"	11'-7¼"	19'-0"	16'-3½"	23'-8"	20'-11⅝"
	4'	3'-6"	5'-0"	1'-6"	9'-8"	6'-2"	14'-4"	10'-10"	19'-0"	15'-6"	23'-8"	20'-2"
	5'	4'-3⅜"	5'-0"	0'-8⅝"	9'-8"	5'-4⅛"	14'-4"	10'-0⅝"	19'-0"	14'-8⅛"	23'-8"	19'-8⅝"
	6'	5'-0⅝"	5'-2"	0'-1½"	9'-11"	4'-10⅝"	14'-8"	9'-7½"	19'-5"	14'-0⅝"	24'-2"	19'-1⅝"
5'	3'	2'-8⅜"	6'-0"	3'-3⅜"	11'-8"	8'-11½"	17'-4"	14'-7½"	23'-0"	20'-3½"	28'-8"	25'-11⅝"
	4'	3'-6"	6'-0"	2'-6"	11'-8"	8'-2"	17'-4"	13'-10"	23'-0"	19'-6"	28'-8"	25'-2"
	5'	4'-3⅜"	6'-0"	1'-8⅜"	11'-8"	7'-4½"	17'-4"	13'-0⅛"	23'-0"	18'-8½"	28'-8"	24'-4⅝"
	6'	5'-0⅝"	6'-2"	1'-1½"	11'-11"	6'-10⅛"	17'-8"	12'-7½"	23'-5"	18'-0⅝"	29'-2"	24'-1⅛"
	7'	6'-2⅝"	6'-5"	0'-0½"	12'-1"	5'-10⅛"	17'-11"	11'-8⅝"	23'-9"	17'-8½"	29'-7"	23'-6⅝"
6'	3'	2'-8⅜"	7'-0"	4'-3⅜"	13'-8"	10'-11½"	20'-4"	17'-7½"	27'-0"	24'-3½"	33'-8"	30'-11⅝"
	4'	3'-6"	7'-0"	3'-6"	13'-8"	10'-2"	20'-4"	16'-10"	27'-0"	23'-6"	33'-8"	30'-2"
	5'	4'-3⅜"	7'-0"	2'-8⅜"	13'-8"	9'-5⅛"	20'-4"	16'-0⅛"	27'-0"	22'-8⅝"	33'-8"	29'-4⅝"
	6'	5'-0⅝"	7'-2"	2'-1⅞"	13'-11"	8'-10⅛"	20'-8"	15'-7½"	27'-5"	22'-1⅝"	34'-2"	28'-11⅝"
	7'	6'-2⅝"	7'-5"	1'-0⅝"	14'-1"	7'-10⅛"	20'-11"	14'-8⅝"	27'-9"	21'-6⅝"	34'-7"	28'-4⅝"
	8'	7'-2⅝"	7'-8"	0'-0"	14'-4"	6'-10"	21'-0"	13'-8"	27'-10"	20'-8"	34'-8"	27'-8"
7'	4'	3'-6"	8'-0"	4'-0"	15'-8"	12'-2"	23'-4"	19'-10"	31'-0"	27'-6"	38'-8"	35'-2"
	5'	4'-3⅜"	8'-0"	3'-5⅜"	15'-8"	11'-4⅝"	23'-4"	19'-0⅛"	31'-0"	26'-8⅝"	38'-8"	34'-6⅝"
	6'	5'-0⅝"	8'-2"	2'-7⅛"	15'-11"	10'-10⅝"	23'-8"	18'-7½"	31'-5"	26'-0⅝"	39'-2"	34'-1⅛"
	7'	6'-2⅝"	8'-5"	2'-0⅝"	16'-1"	9'-10⅝"	23'-11"	17'-8⅝"	31'-9"	25'-6⅝"	39'-7"	33'-6⅝"
	8'	7'-2⅝"	8'-8"	1'-0"	16'-2"	8'-10"	24'-0"	16'-8"	31'-10"	24'-6"	39'-8"	32'-8"
8'	4'	3'-6"	9'-0"	5'-6"	17'-8"	14'-2"	26'-4"	22'-10"	35'-6"	31'-2"	49'-8"	40'-2"
	5'	4'-3⅜"	9'-2"	4'-9⅜"	17'-11"	13'-3⅝"	26'-8"	22'-0⅛"	35'-5"	31'-1⅛"	44'-2"	39'-10⅝"
	6'	5'-0⅝"	9'-2"	4'-1⅞"	17'-11"	12'-10⅝"	26'-8"	21'-2⅞"	35'-5"	30'-4⅝"	44'-2"	39'-1⅛"
	7'	6'-2⅝"	9'-5"	3'-0⅝"	18'-1"	11'-10⅝"	26'-11"	20'-3⅝"	35'-9"	29'-6⅝"	44'-7"	38'-6⅝"
	8'	7'-2⅝"	9'-8"	2'-0"	18'-2"	10'-10"	27'-0"	19'-8"	35'-10"	28'-6"	44'-8"	37'-8"
9'	5'	4'-3⅜"	10'-2"	5'-0⅜"	19'-11"	15'-7⅛"	29'-8"	25'-0⅛"	39'-5"	35'-1⅛"	49'-2"	44'-10⅝"
	6'	5'-0⅝"	10'-3"	5'-2⅝"	20'-1"	15'-0⅝"	29'-11"	24'-1⅛"	39'-9"	34'-2⅝"	49'-7"	44'-1⅛"
	7'	6'-2⅝"	10'-5"	4'-0⅝"	20'-1"	13'-10⅝"	29'-11"	23'-1⅛"	39'-9"	33'-1⅝"	49'-7"	43'-0⅛"
	8'	7'-2⅝"	10'-8"	3'-0"	20'-2"	12'-10"	30'-0"	22'-2"	39'-10"	32'-2"	49'-8"	42'-2"
10'	5'	4'-3⅜"	11'-2"	6'-0⅜"	21'-11"	17'-7⅛"	32'-8"	28'-1⅛"	43'-5"	39'-1⅛"	54'-2"	49'-10⅝"
	6'	5'-0⅝"	11'-3"	6'-2⅝"	22'-1"	17'-0⅝"	32'-11"	27'-10⅛"	43'-9"	38'-0⅝"	54'-7"	49'-1⅛"
	7'	6'-2⅝"	11'-5"	5'-0⅝"	22'-1"	15'-10⅝"	32'-11"	26'-10⅛"	43'-9"	37'-1⅝"	54'-7"	48'-0⅛"
	8'	7'-2⅝"	11'-8"	4'-0"	22'-2"	14'-10"	33'-0"	25'-8"	43'-10"	36'-2"	54'-8"	47'-2"
11'	6'	5'-0⅝"	12'-4"	7'-3⅛"	24'-2"	19'-1⅛"	36'-0"	30'-1⅛"	47'-10"	42'-9⅛"		
	7'	6'-2⅝"	12'-5"	6'-1⅛"	24'-2"	17'-11⅛"	36'-0"	29'-1⅛"	47'-10"	41'-7⅛"		
	8'	7'-2⅝"	12'-8"	5'-0"	24'-3"	16'-10"	36'-0"	28'-0"	47'-10"	40'-6"		
12'	6'	5'-0⅝"	13'-6"	8'-3⅝"	26'-2"	21'-1⅛"	39'-0"	33'-1⅛"	51'-10"	46'-9⅛"		
	7'	6'-2⅝"	13'-8"	7'-1⅛"	26'-2"	19'-11⅛"	39'-0"	32'-0⅛"	51'-10"	45'-7⅛"		
	8'	7'-2⅝"	13'-11"	6'-0"	26'-2"	18'-10"	39'-0"	31'-0"	51'-10"	44'-6"		

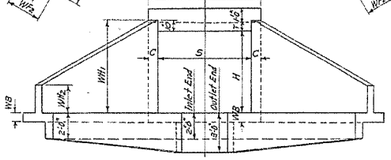
QUANTITIES

CLEAR SPAN S	CLEAR HEIGHT H	THICKNESS OF WING AT HEADWALL Cw	THICKNESS OF WING FOOTING WB	REINFORCING STEEL @ FOR 4 WINGS LB.	CLASS S CONCRETE - 4 WINGS HEADWALLS, WINGWALLS, FOOTINGS, TOEWALLS AND APRONS SINGLE BARREL CULVERT CU.YD.	DOUBLE BARREL CULVERT CU.YD.	TRIPLE BARREL CULVERT CU.YD.	QUADRUPLE BARREL CULVERT CU.YD.	QUINTUPLE BARREL CULVERT CU.YD.
4'	2'	6"	7"	102.0	4.50	5.96	6.92	7.38	8.34
	3'	6"	7"	164.8	6.26	7.21	8.17	9.13	10.09
	4'	6"	7"	254.6	8.33	9.28	10.24	11.20	12.16
	5'	6"	7"	357.8	10.72	11.68	12.64	13.60	14.56
	6'	7"	8"	583.1	14.55	15.53	16.52	17.51	18.49
5'	3'	6"	7"	164.9	6.47	7.43	8.79	9.96	11.12
	4'	6"	7"	254.6	8.54	9.70	10.87	10.03	13.20
	5'	6"	7"	357.8	10.96	12.10	13.26	14.98	15.59
	6'	7"	8"	583.1	14.77	15.96	17.15	18.34	19.54
	7'	7½"	8½"	1139.6	18.94	20.15	21.37	22.59	23.80
6'	3'	6"	7"	164.8	6.68	8.06	9.42	10.80	12.18
	4'	6"	7"	254.6	8.75	10.16	11.89	12.87	14.25
	5'	6"	7"	357.8	11.15	12.53	13.89	15.27	16.65
	6'	7"	8"	583.1	14.90	16.39	17.78	19.18	20.59
	7'	7½"	8½"	1139.6	19.15	20.58	22.00	23.43	24.86
	8'	8"	9"	1922.6	24.09	25.53	26.96	28.39	29.83
7'	4'	6"	7"	254.6	8.97	10.58	12.15	13.76	15.35
	5'	6"	7"	357.8	11.36	12.97	14.58	16.15	17.75
	6'	7"	8"	583.1	15.20	16.82	18.42	20.04	21.64
	7'	7½"	8½"	1139.6	19.38	21.02	22.68	24.28	25.92
	8'	8"	9"	1925.6	24.32	25.97	27.60	29.25	30.89
8'	4'	6"	7"	259.6	9.19	11.03	12.82	14.65	16.45
	5'	7"	7"	357.8	12.03	13.89	15.70	17.55	19.34
	6'	7"	8"	583.1	16.93	17.27	19.09	20.93	22.75
	7'	7½"	8½"	1139.6	19.59	21.94	23.30	25.16	26.93
	8'	8"	9"	1925.6	24.54	26.91	28.24	30.11	31.96
9'	5'	7"	7"	357.8	12.26	14.39	16.37	18.45	20.47
	6'	7½"	8"	583.1	15.94	18.04	20.09	22.15	24.23
	7'	7½"	8½"	1139.6	19.81	21.91	23.96	26.06	28.10
	8'	8"	9"	1925.6	24.76	26.86	28.91	31.00	33.05
10'	5'	7"	7"	357.8	12.49	14.80	17.05	19.26	21.52
	6'	7½"	8"	583.1	16.17	18.50	20.77	22.99	25.28
	7'	7½"	8½"	1139.6	20.04	22.37	24.64	26.87	29.15
	8'	8"	9"	1925.6	24.98	27.31	29.58	31.81	34.10
11'	6'	8"	8"	583.1	16.69	19.27	21.76	24.23	
	7'	8"	8½"	1139.6	20.64	23.22	25.71	28.18	
	8'	8"	9"	1925.6	25.19	27.77	30.27	32.74	
12'	6'	8"	8"	583.1	16.92	19.75	22.45	25.18	
	7'	8"	8½"	1139.6	20.87	23.69	26.50	29.13	
	8'	8"	9"	1925.6	25.42	28.25	30.96	33.69	

@ For reinforcing steel in Headwalls and Aprons, See Details of Standard Barrel Sections for R.C. Box Culverts for the desired Span and Height.

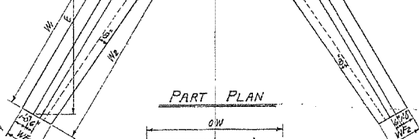


PART PLAN

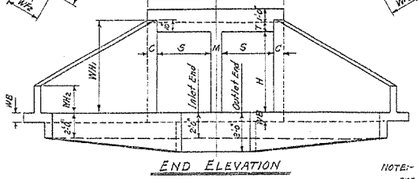


END ELEVATION

SINGLE BARREL CULVERT



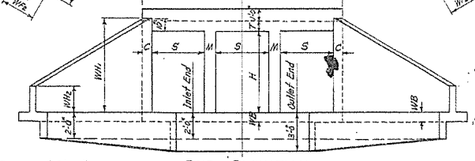
PART PLAN



END ELEVATION

DOUBLE BARREL CULVERT

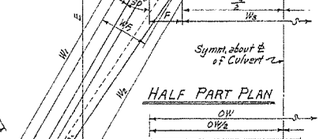
PART PLAN



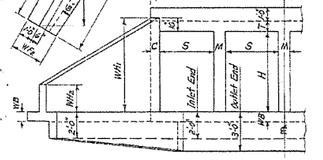
END ELEVATION

TRIPLE BARREL CULVERT

NOTE:- Plans and Elevations are not to scale.

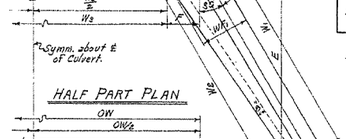


HALF PART PLAN

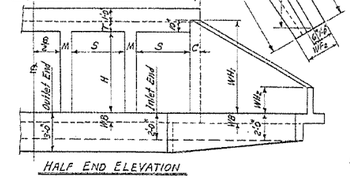


HALF END ELEVATION

QUADRUPLE BARREL CULVERT



HALF PART PLAN



HALF END ELEVATION

QUINTUPLE BARREL CULVERT

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾ 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) 1200#/□"
Reinforcing Steel 20,000#/□"

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	
	R-200X-X3	R-300X-X3		

CLASS S CONCRETE

MEMBRANE:- A membrane waterproofing 12" wide, consisting of three moppings 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.

BAR LIST FOR ONE WING - 4 REQUIRED

CLEAR HEIGHT H	F1 Bent: In bottom of footing, bent up into back face of wing. One bar of each length. SIZE	SPACING	NO. REQD	LENGTHS VARY MIN.	LENGTHS VARY MAX.	X MIN.	X MAX.	Y MIN.	Y MAX.	F2 Bent: In bottom of footing, bent up into back face of wing. Alt. with F1 bars. SIZE	SPACING	NO. REQD	LENGTH	X	Y	F3 Straight: Longitudinal in top of wing footing heel. SIZE	NO. REQD	LENGTH	F4 Straight: Longitudinal in bottom of wing footing toe. NO. REQD	LENGTH	H1 Bent: Horizontal in back face of wing. SIZE	SPACING	NO. REQD	LENGTH	H2 Straight: Horizontal in back face of wing. One bar of each length. SIZE	SPACING	NO. REQD	LENGTHS VARY MAX.	LENGTHS VARY MIN.	H3 Straight: In back face of wing at top - on slope. SIZE	NO. REQD	LENGTH	H4 Bent: Dowels thru construction joint at headwall. SIZE	SPACING	NO. REQD	LENGTH	X	QUANTITY REINFORCING STEEL PER WING LB.
2'	#3	12"	8	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	—	—	—	—	—	—	#3	1	9'-8"	#3	2	8'-6"	#3	12"	1	7'-2"	#3	12"	1	9'-6"	#3	16"	2	7'-6"	9'-8"	#8	1	9'-8"	#3	2	2'-8"	1'-9"	27.0
3'	#3	12"	10	2'-2"	5'-2"	0'-10"	1'-3"	1'-5"	4'-0"	—	—	—	—	—	—	#3	1	12'-0"	#3	2	11'-0"	#3	12"	1	9'-6"	#3	12"	1	11'-10"	#3	12"	3	10'-11"	9'-8"	#8	1	9'-9"	#3	2	2'-8"	1'-9"	41.1
4'	#3	12"	13	2'-9"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—	#3	1	16'-9"	#3	3	13'-6"	#3	12"	1	11'-10"	#3	12"	3	10'-11"	9'-8"	#3	1	12'-2"	#3	12"	4	2'-8"	1'-9"	63.7
5'	#3	12"	15	2'-11"	7'-10"	1'-1"	1'-11"	1'-11"	6'-0"	#3	12"	4	3'-6"	1'-1"	2'-6"	#3	1	16'-8"	#3	3	16'-0"	#5	12"	2	14'-2"	#3	12"	3	10'-11"	9'-8"	#3	1	14'-7"	#3	12"	5	2'-8"	1'-9"	89.5
6'	#4	12"	17	3'-6"	9'-3"	1'-2"	2'-3"	2'-5"	7'-1"	#3	12"	4	4'-4"	1'-6"	3'-3"	#3	1	19'-0"	#3	3	18'-6"	#3	12"	2	16'-6"	#3	12"	4	16'-4"	9'-8"	#3	1	17'-0"	#3	12"	6	2'-8"	1'-9"	145.8
7'	#4	12"	20	3'-9"	10'-9"	1'-3"	2'-9"	2'-7"	8'-1"	#4	12"	7	5'-6"	1'-7"	4'-0"	#4	1	21'-6"	#4	4	21'-0"	#4	12"	2	18'-9"	#3	12"	5	17'-9"	9'-8"	#4	1	19'-5"	#4	12"	7	3'-6"	1'-9"	283.7
8'	#4	12"	22	4'-4"	12'-3"	1'-5"	3'-2"	3'-0"	9'-2"	#4	12"	10	6'-6"	1'-10"	4'-9"	#4	1	23'-8"	#4	4	23'-9"	#4	12"	3	21'-1"	#4	12"	5	17'-9"	9'-8"	#4	1	21'-10"	#4	12"	8	3'-6"	1'-9"	356.4

BAR BENDING DIAGRAMS

NOTE:- Dimensions are to bar centers.

REVISIONS:- Membrane added. 5-10-66 W.C.H.

Designed By:- W.C.H. 6-20-62 Checked By:-
Drawn By:- W.C.H. 12-4-62 Checked By:- RMS - 1-9-63
Quantities By:- W.C.H. 12-14-62 Checked By:- RMS - 1-31-63
Re-checked By:- RMS - 3-22-63

ARKANSAS STATE HIGHWAY COMMISSION

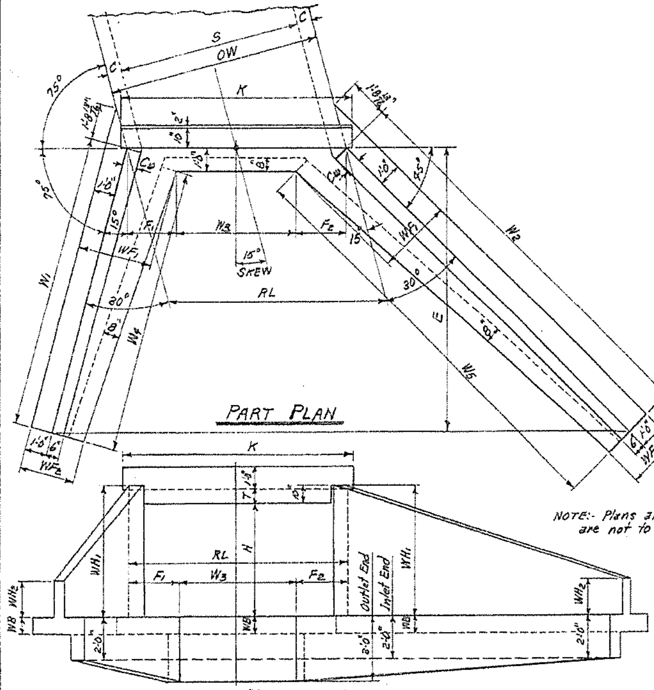
DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS

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

SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X003-1

W.C.H. 3



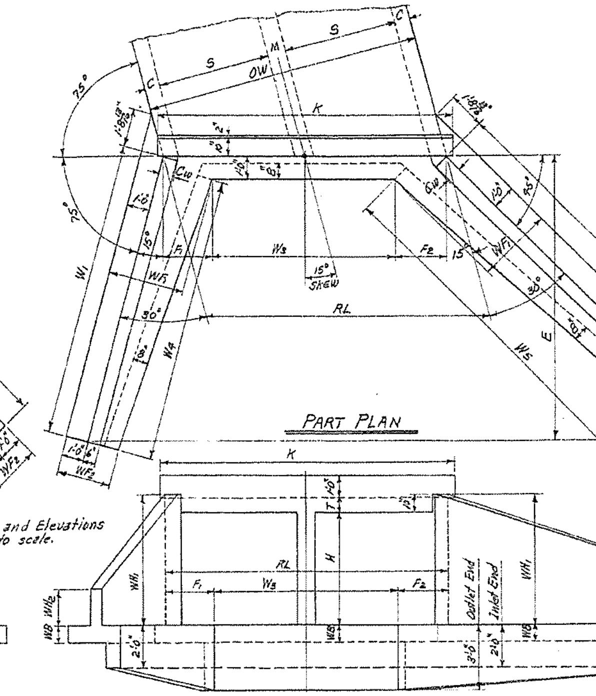
PART PLAN

NOTE:- Plans and Elevations are not to scale.

END ELEVATION

SINGLE BARREL CULVERT - 15° SKEW RIGHT FORWARD

Details of Culvert with 15° Skew Left Forward is reversed, see Layout below.

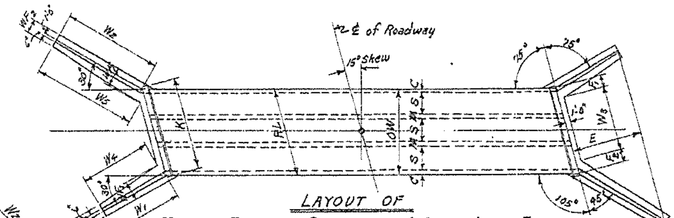


PART PLAN

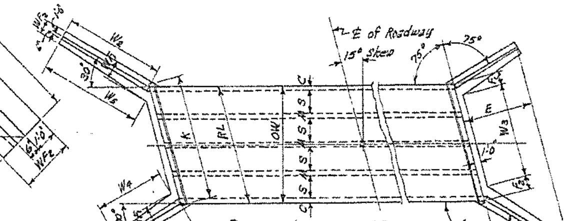
END ELEVATION

DOUBLE BARREL CULVERT - 15° SKEW RIGHT FORWARD

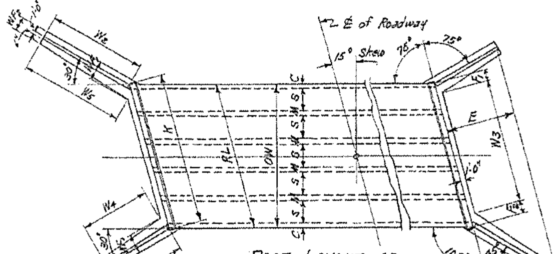
Details of Culvert with 15° Skew Left Forward is reversed, see Layout below.



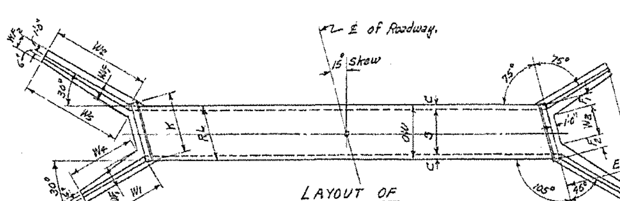
LAYOUT OF TRIPLE BARREL CULVERT - 15° SKEW LEFT FORWARD



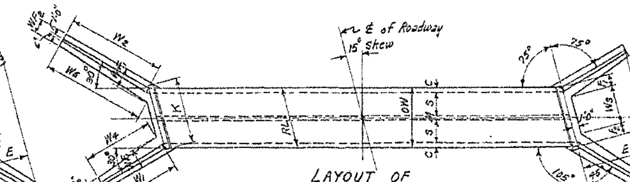
PART LAYOUT OF QUADRUPLE BARREL CULVERT - 15° SKEW LEFT FORWARD



PART LAYOUT OF QUINTUPLE BARREL CULVERT - 15° SKEW LEFT FORWARD



LAYOUT OF SINGLE BARREL CULVERT - 15° SKEW LEFT FORWARD



LAYOUT OF DOUBLE BARREL CULVERT - 15° SKEW LEFT FORWARD

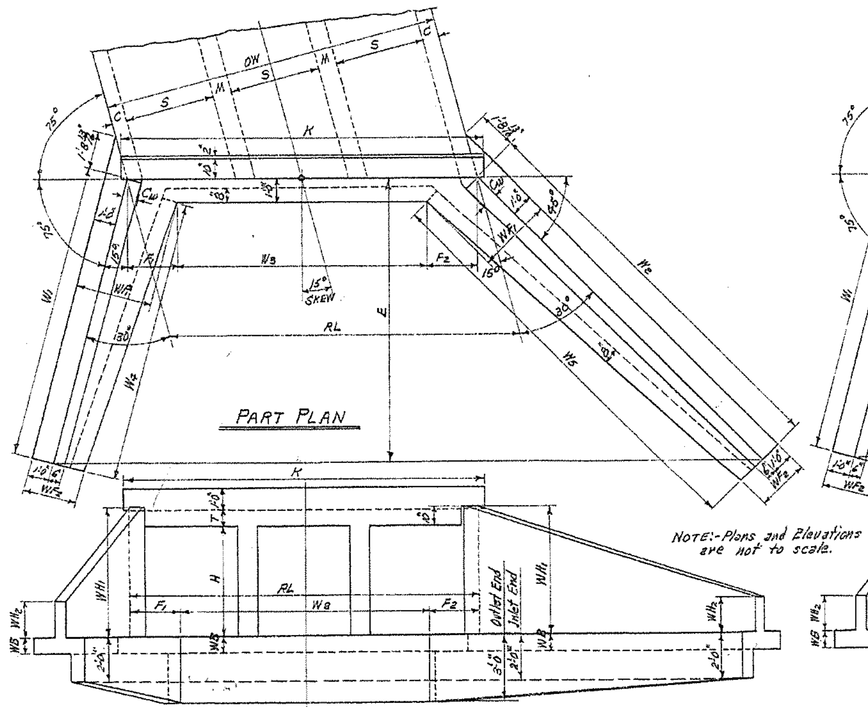
NOTE:- The length of the wings for the Plans, Elevations, and Layouts, as drawn, are proportioned for 3:1 slopes. For 2:1 slopes the wings are proportionally shorter, while for 4:1 slopes they are longer.

ROADWAY LENGTH RL — HEADWALL LENGTH K — APRON DIMENSION W_3

RL = OW x 1.035276 — K = RL + (6 1/2") — $W_3 = RL - (F_1 + F_2)$

Use With Drawing No.	Clear Span S	Clear Height H	Sum of Footing Dimensions F_1 & F_2	Single Barrel Culvert OW	Single RL	Single K	Single W_3	Double Barrel Culvert OW	Double RL	Double K	Double W_3	Triple Barrel Culvert OW	Triple RL	Triple K	Triple W_3	Quadruple Barrel Culvert OW	Quadruple RL	Quadruple K	Quadruple W_3	Quintuple Barrel Culvert OW	Quintuple RL	Quintuple K	Quintuple W_3
W-X152-1, W-X153-1 or W-X154-1. (For H = 8'-0" or Less)	4'	2'	2'-0"	5'-0"	5'-2 1/8"	5'-8 5/8"	3'-2 1/8"	9'-8"	10'-0"	10'-6 1/2"	8'-0"	14'-4"	14'-10"	15'-4 1/2"	12'-10"	19'-0"	19'-8"	20'-2 1/2"	17'-8"	23'-8"	24'-6"	25'-0 1/2"	22'-6"
		3'	2'-9 3/4"	5'-0"	"	"	2'-4 3/8"	9'-8"	"	"	7'-2 1/4"	14'-4"	"	"	12'-0 1/4"	19'-0"	"	"	16'-10 1/4"	23'-8"	"	"	21'-8 1/4"
		4'	3'-7 5/8"	5'-0"	"	"	1'-6 1/2"	9'-8"	"	"	6'-4 1/2"	14'-4"	"	"	11'-2 1/2"	19'-0"	"	"	16'-0 1/2"	23'-8"	"	"	20'-10 1/2"
		5'	4'-5 3/8"	5'-0"	"	"	0'-8 3/4"	9'-8"	"	"	5'-6 3/4"	14'-4"	"	"	10'-4 3/4"	19'-0"	"	"	15'-2 3/4"	23'-8"	"	"	20'-0 3/4"
		6'	5'-3 1/8"	5'-2"	5'-4 1/8"	5'-10 5/8"	0'-1"	9'-11"	10'-3 1/8"	10'-9 5/8"	5'-0"	14'-8"	15'-2 1/4"	15'-8 3/4"	9'-11"	19'-5"	20'-1 1/4"	20'-7 3/4"	14'-10"	24'-2"	25'-0 1/4"	25'-6 3/4"	19'-9"
	5'	3'	2'-9 3/4"	6'-0"	6'-2 1/2"	6'-9"	3'-4 3/4"	11'-8"	12'-1"	12'-7 1/2"	9'-3 1/8"	17'-4"	17'-11 3/8"	18'-5 3/8"	15'-1 1/2"	23'-0"	23'-9 3/4"	24'-4 1/4"	21'-0"	28'-8"	29'-8 1/8"	30'-2 1/2"	26'-10 1/4"
		4'	3'-7 5/8"	6'-0"	"	"	2'-7"	11'-8"	"	"	8'-5 3/8"	17'-4"	"	"	14'-3 3/4"	23'-0"	"	"	20'-2 1/4"	28'-8"	"	"	26'-0 1/4"
		5'	4'-5 3/8"	6'-0"	"	"	1'-9 1/8"	11'-8"	"	"	7'-7 5/8"	17'-4"	"	"	13'-6"	23'-0"	"	"	19'-4 1/2"	28'-8"	"	"	25'-2 3/4"
		6'	5'-3 1/8"	6'-2"	6'-4 5/8"	6'-11 1/8"	1'-1 1/2"	11'-11"	12'-4"	12'-10 1/2"	7'-0 7/8"	17'-8"	18'-3 1/2"	18'-10"	13'-0 1/4"	23'-5"	24'-2 7/8"	24'-9 1/4"	18'-11 3/4"	29'-2"	30'-2 3/8"	30'-8 3/4"	24'-11 1/4"
		7'	6'-5 7/8"	6'-3"	6'-5 5/8"	7'-0 1/8"	Ⓐ 0"	12'-1"	12'-6 1/8"	13'-0 1/2"	6'-0 1/4"	17'-11"	18'-6 5/8"	19'-1"	12'-0 3/4"	23'-9"	24'-7"	25'-1 1/2"	18'-1 1/4"	29'-7"	30'-7 1/4"	31'-2"	24'-1 3/4"
	6'	3'	2'-9 3/4"	7'-0"	7'-3"	7'-9 1/2"	4'-3 1/4"	13'-8"	14'-1 3/4"	14'-8 1/4"	11'-4"	20'-4"	21'-0 5/8"	21'-7"	18'-2 3/4"	27'-0"	27'-11 3/8"	28'-5 3/4"	25'-1 3/4"	33'-8"	34'-10 1/4"	35'-4 3/4"	32'-0 1/2"
		4'	3'-7 5/8"	7'-0"	"	"	3'-7 3/8"	13'-8"	"	"	10'-6 1/2"	20'-4"	"	"	17'-5"	27'-0"	"	"	24'-3 3/4"	33'-8"	"	"	31'-2 3/4"
		5'	4'-5 3/8"	7'-0"	"	"	2'-9 5/8"	13'-8"	"	"	9'-8 3/8"	20'-4"	"	"	16'-7 1/4"	27'-0"	"	"	23'-6"	33'-8"	"	"	30'-4 5/8"
		6'	5'-3 1/8"	7'-2"	7'-5"	7'-11 1/2"	2'-1 7/8"	13'-11"	14'-5"	14'-11 1/2"	9'-1 3/8"	20'-8"	21'-4 3/8"	21'-11 1/4"	16'-1 1/2"	27'-5"	28'-4 5/8"	28'-11"	23'-1 1/2"	34'-2"	35'-4 1/2"	35'-11"	30'-1 1/4"
		7'	6'-5 7/8"	7'-3"	7'-6"	8'-0 1/2"	1'-0 1/4"	14'-1"	14'-7"	15'-1 1/2"	8'-1 1/8"	20'-11"	21'-7 3/8"	22'-2 1/4"	15'-2"	27'-9"	28'-8 3/4"	29'-3 1/4"	22'-3"	34'-7"	35'-9 5/8"	36'-4"	29'-3 3/4"
		8'	7'-8 5/8"	7'-4"	7'-7 1/8"	8'-1 5/8"	Ⓐ 0"	14'-2"	14'-8"	15'-2 1/2"	6'-11 3/4"	21'-0"	21'-8 7/8"	22'-3 1/4"	14'-0 1/4"	27'-10"	28'-9 3/4"	29'-4 1/4"	21'-1 1/4"	34'-8"	35'-10 5/8"	36'-5"	28'-2"
	7'	4'	3'-7 5/8"	8'-0"	8'-3 3/8"	8'-9 7/8"	4'-7 3/4"	15'-8"	16'-2 5/8"	16'-9"	12'-7"	23'-4"	24'-1 7/8"	24'-6 1/4"	20'-6 1/4"	31'-0"	32'-1 1/8"	32'-7 1/2"	28'-5 1/2"	38'-8"	40'-0 3/8"	40'-6 3/4"	36'-4 3/4"
		5'	4'-5 3/8"	8'-0"	"	"	3'-10"	15'-8"	"	"	11'-9 1/4"	23'-4"	"	"	19'-8 1/2"	31'-0"	"	"	27'-7 3/4"	38'-8"	"	"	35'-7"
		6'	5'-3 1/8"	8'-2"	8'-5 1/2"	9'-0"	3'-2 1/4"	15'-11"	16'-5 3/4"	17'-0 1/4"	11'-2 1/2"	23'-8"	24'-6"	25'-0 1/2"	19'-2 3/4"	31'-5"	32'-6 1/4"	33'-0 3/4"	27'-3"	39'-2"	40'-6 5/8"	41'-1"	35'-3 1/2"
		7'	6'-5 7/8"	8'-3"	8'-6 1/2"	9'-1"	2'-0 3/8"	16'-1"	16'-7 3/4"	17'-2 1/4"	10'-2"	23'-11"	24'-9 3/4"	25'-3 1/2"	18'-3 1/4"	31'-9"	32'-10 1/2"	33'-5"	26'-4 1/2"	39'-7"	40'-11 3/4"	41'-6 1/4"	34'-6"
		8'	7'-8 5/8"	8'-4"	8'-7 1/2"	9'-2"	0'-11"	16'-2"	16'-8 7/8"	17'-3 1/4"	9'-0 1/4"	24'-0"	24'-10 1/8"	25'-4 1/2"	17'-1 1/2"	31'-10"	32'-11 1/2"	33'-6"	25'-3"	39'-8"	41'-0 3/4"	41'-7 1/2"	33'-4 1/2"
	8'	4'	3'-7 5/8"	9'-0"	9'-3 3/4"	9'-10 1/4"	5'-8 1/8"	17'-8"	18'-3 1/4"	18'-10"	14'-3"	26'-4"	27'-3 1/4"	27'-9 1/4"	23'-7 1/2"	35'-0"	36'-2 7/8"	36'-9 1/4"	32'-7 1/4"	43'-8"	45'-2 1/2"	45'-9"	41'-7"
		5'	4'-5 3/8"	9'-2"	9'-5 7/8"	10'-0 1/4"	5'-0 1/2"	17'-11"	18'-6 5/8"	19'-1"	14'-1 1/4"	26'-8"	27'-7 1/4"	28'-1 3/4"	23'-2"	35'-5"	36'-8"	37'-2 1/2"	32'-2 3/4"	44'-2"	45'-8 3/4"	46'-3 1/4"	41'-3 1/4"
		6'	5'-3 1/8"	9'-2"	"	"	4'-2 3/4"	17'-11"	"	"	13'-3 1/2"	26'-8"	"	"	22'-4"	35'-5"	"	"	31'-4 3/4"	44'-2"	"	"	40'-5 1/2"
		7'	6'-5 7/8"	9'-3"	9'-6 7/8"	10'-1 1/4"	3'-1"	18'-1"	18'-8 3/4"	19'-3"	12'-2 3/4"	26'-11"	27'-10 3/8"	28'-4 3/4"	21'-4 1/4"	35'-9"	37'-0 1/8"	37'-6 1/2"	30'-6 1/2"	44'-7"	46'-1 3/4"	46'-8 1/2"	39'-8"
		8'	7'-8 5/8"	9'-4"	9'-8"	10'-2 1/2"	1'-11 1/2"	18'-2"	18'-9 3/4"	19'-4 1/4"	11'-1 1/4"	27'-0"	27'-11 3/8"	28'-5 3/4"	20'-2 1/4"	35'-10"	37'-1 1/8"	37'-7 1/2"	29'-4 1/4"	44'-8"	46'-2 3/8"	46'-9 1/2"	38'-6 1/4"
	9'	5'	4'-5 3/8"	10'-2"	10'-6 1/4"	11'-0 3/4"	6'-1"	19'-11"	20'-7 1/2"	21'-2"	16'-2"	29'-8"	30'-8 1/2"	31'-3"	26'-3 1/2"	39'-5"	40'-9 3/4"	41'-4 1/4"	36'-4 1/2"	49'-2"	50'-10 3/4"	51'-5 1/4"	46'-5 1/2"
		6'	5'-3 1/8"	10'-3"	10'-7 3/8"	11'-1 3/4"	5'-4 1/8"	20'-1"	20'-9 1/2"	21'-4"	15'-6 1/2"	29'-11"	30'-11 5/8"	31'-6"	25'-8 1/2"	39'-9"	41'-1 3/8"	41'-8 1/4"	35'-10 3/4"	49'-7"	51'-4"	51'-10 1/2"	46'-0 3/4"
		7'	6'-5 7/8"	10'-3"	"	"	4'-1 1/2"	20'-1"	"	"	14'-3 3/4"	29'-11"	"	"	24'-5 3/4"	39'-9"	"	"	34'-8"	49'-7"	"	"	44'-10"
		8'	7'-8 5/8"	10'-4"	10'-8 3/4"	11'-2 3/4"	2'-11 3/4"	20'-2"	20'-10 1/2"	21'-5"	13'-2"	30'-0"	31'-0 3/4"	31'-7 1/4"	23'-4 1/2"	39'-10"	41'-2 7/8"	41'-9 1/4"	33'-6 1/2"	49'-8"	51'-5"	51'-11 1/2"	43'-8 1/2"
	10'	5'	4'-5 3/8"	11'-2"	11'-6 3/4"	12'-1 1/4"	7'-1 3/8"	21'-11"	22'-8 1/4"	23'-2 3/4"	18'-3"	32'-8"	33'-9 3/4"	34'-4 1/4"	29'-4 1/2"	43'-5"	44'-11 1/4"	45'-6"	40'-6"	54'-2"	56'-1"	56'-7 1/2"	51'-7 1/2"
		6'	5'-3 1/8"	11'-3"	11'-7 3/8"	12'-2 1/4"	6'-4 5/8"	22'-1"	22'-10 3/4"	23'-4 3/4"	17'-7 1/4"	32'-11"	34'-1"	34'-7 1/2"	28'-9 3/4"	43'-9"	45'-3 1/2"	45'-10"	40'-0 1/4"	54'-7"	56'-6"	57'-0 1/2"	51'-3"
		7'	6'-5 7/8"	11'-3"	"	"	5'-1 7/8"	22'-1"	"	"	16'-4 1/2"	32'-11"	"	"	27'-7"	43'-9"	"	"	38'-9 3/4"	54'-7"	"	"	50'-0 1/4"
		8'	7'-8 5/8"	11'-4"	11'-8 3/4"	12'-3 1/4"	4'-0 1/4"	22'-2"	22'-11 3/4"	23'-5 3/4"	15'-2 3/4"	33'-0"	34'-2"	34'-8 1/2"	26'-5 1/2"	43'-10"	45'-4 1/2"	45'-11"	37'-8"	54'-8"	56'-7 3/8"	57'-1 1/2"	48'-10 1/2"
	11'	6'	5'-3 1/8"	12'-4"	12'-9 1/4"	13'-3 3/4"	7'-6"	24'-2"	25'-0 1/4"	25'-6 3/4"	19'-9"	36'-0"	37'-3 1/4"	37'-9 3/4"	32'-0"	47'-10"	49'-6 1/4"	50'-0 3/4"	44'-3"	—	—	—	—
		7'	6'-5 7/8"	12'-4"	"	"	6'-3 3/4"	24'-2"	"	"	18'-6 1/4"	36'-0"	"	"	30'-9 1/4"	47'-10"	"	"	43'-0 1/2"	—	—	—	—
		8'	7'-8 5/8"	12'-4"	"	"	5'-0 5/8"	24'-2"	"	"	17'-3 1/4"	36'-0"	"	"	29'-6 1/4"	47'-10"	"	"	41'-9 3/4"	—	—	—	—
	12'	6'	5'-3 1/8"	13'-4"	13'-9 3/4"	14'-4"	8'-6 1/2"	26'-2"	27'-1"	27'-7 1/2"	21'-10"	39'-0"	40'-4 1/2"	40'-11"	35'-1 1/4"	51'-10"	53'-8"	54'-2 1/2"	48'-4 3/4"	—	—	—	—
		7'	6'-5 7/8"	13'-4"	"	"	7'-3 3/4"	26'-2"	"	"	20'-7 1/2"	39'-0"	"	"	33'-10 3/4"	51'-10"	"	"	47'-2"	—	—	—	—
		8'	7'-8 5/8"	13'-4"	"	"	6'-1"	26'-2"	"	"	19'-4 1/2"	39'-0"	"	"	32'-8"	51'-10"	"	"	45'-11 1/4"	—	—	—	—
W-X152-2, W-X153-2 or W-X154-2. (For H = 9'-0" & Over)	7'	9'	8'-11 1/8"	8'-6"	8'-9 5/8"	9'-4"	Ⓐ 0"	16'-5"	17'-0"	17'-6 1/2"	8'-0 3/4"	24'-4"	25'-2 1/4"	25'-8 3/4"	16'-3"	32'-3"	33'-4 5/8"	33'-11"	24'-5 1/2"	40'-2"	41'-7"	42'-1 1/2"	32'-7 3/4"
	8'	9'	8'-11 1/8"	9'-6"	9'-10"	10'-4 1/2"	0'-10 3/4"	18'-5"	19'-0 3/4"	19'-7 1/4"	10'-1 1/2"	27'-4"	28'-3 5/8"	28'-10"	19'-4 1/2"	36'-3"	37'-6 3/8"	38'-0 3/4"	28'-7"	45'-2"	46'-9 1/8"	47'-3 1/2"	37'-9 3/4"
		10'	10'-2"	9'-8"	10'-0 1/8"	10'-6 1/2"	Ⓐ 0"	18'-8"	19'-3 3/4"	19'-10 1/2"	9'-2"	27'-8"	28'-7 3/4"	29'-2 1/4"	18'-5 3/4"	36'-8"	37'-11 1/2"	38'-6"	27'-9 1/2"	45'-8"	47'-3 3/8"	47'-9 3/4"	37'-1 1/2"
	9'	9'	8'-11 1/8"	10'-6"	10'-10 1/2"	11'-5"	1'-11 1/4"	20'-5"	21'-1 3/8"	21'-8 1/4"	12'-2 1/2"	30'-4"	31'-4 5/8"	31'-11 1/4"	22'-5 1/2"	40'-3"	41'-8"	42'-2 1/2"	32'-8 3/4"	50'-2"	51'-11 1/4"	52'-5 3/4"	43'-0"
		10'	10'-2"	10'-8"	11'-0 1/2"	11'-7"	0'-10 1/2"	20'-8"	21'-4 3/4"	21'-11 1/4"	11'-2 3/4"	30'-8"	31'-9"	32'-3 1/2"	21'-7"	40'-8"	42'-1 1/2"	42'-7 3/4"	31'-11 1/4"	50'-8"	52'-5 1/2"	53'-0"	42'-3 1/2"
		11'	11'-4 5/8"	10'-10"	11'-2 3/8"	11'-9"	Ⓐ 0"	20'-10"	21'-6 3/4"	22'-1 1/4"	10'-2 1/4"	30'-10"	31'-11"	32'-5 1/2"	20'-6 1/4"	40'-10"	42'-3 1/4"	42'-9 3/4"	30'-10 3/4"	50'-10"	52'-7 1/2"	53'-2"	41'-2 3/4"
	10'	9'	8'-11 1/8"	11'-6"	11'-10 7/8"	12'-5 1/4"	2'-11 3/8"	22'-5"	23'-2 1/4"	23'-9"	14'-3 1/4"	33'-4"	34'-6 1/8"	35'-0 1/2"	25'-6 3/4"	44'-3"	45'-9 3/8"	46'-4 1/2"	36'-10 1/4"	55'-2"	57'-1 3/8"	57'-7 3/4"	48'-2"
		10'	10'-2"	11'-8"	12'-1"	12'-7 1/2"	1'-11"	22'-8"	23'-5 5/8"	24'-0"	13'-3 3/4"	33'-8"	34'-10 1/8"	35'-4 3/4"	24'-8 1/2"	44'-8"	46'-2 3/8"	46'-9 1/2"	36'-1"	55'-8"	57'-7 3/8"	58'-2"	47'-5 1/2"
		11'	11'-4 5/8"	11'-10"	12'-3"	12'-9 1/2"	0'-10 3/4"	22'-10"	23'-7 3/4"	24'-2"	12'-3"	33'-10"	35'-0 5/8"	35'-6 3/4"	23'-7 3/4"	44'-10"	46'-5"	46'-11 1/2"	35'-0 1/4"	55'-10"	57'-9 3/4"	58'-4"	46'-5"
		12'	12'-7 3/8"	12'-0"	12'-5 1/4"	12'-11 1/2"	Ⓐ 0"	23'-0"	23'-9 3/4"	24'-4 1/4"	11'-2 1/2"	34'-0"	35'-2 3/4"	35'-8 3/4"	22'-7"	45'-0"	46'-7"	47'-1 1/2"	33'-11 3/4"	56'-0"	57'-11 3/4"	58'-6"	45'-4 1/4"
	11'	9'	8'-11 1/8"	12'-6"	12'-11 1/4"	13'-5 3/4"	4'-0"	24'-5"	25'-3 3/4"	25'-9 3/4"	16'-4"	36'-4"	37'-7 3/8"	38'-1 3/4"	28'-8"	48'-3"	49'-11 3/4"	50'-5 3/4"	41'-0 1/4"	—	—	—	—
		10'	10'-2"	12'-8"	13'-1 3/8"	13'-7 3/4"	2'-11 3/8"	24'-8"	25'-6 1/2"	26'-1"	15'-4 1/2"	36'-8"	37'-11 3/8"	38'-6"	27'-9 1/2"	48'-8"	50'-4 3/8"	50'-11"	40'-2 3/8"	—	—	—	—
		11'	11'-4 5/8"	12'-10"	13'-3 3/8"	13'-10"	1'-10 3/4"	24'-10"	25'-8 1/2"	26'-3"	14'-3 3/4"	36'-10"	38'-1 3/8"	38'-8"	26'-9"	48'-10"	50'-6 3/4"	51'-1"	39'-2"	—	—	—	—
		12'	12'-7 3/8"	13'-0"	13'-5 1/2"	14'-0"	0'-10 1/2"	25'-0"	25'-10 5/8"	26'-5"	13'-3 1/4"	37'-0"	38'-3 5/8"	38'-10"	25'-8 1/4"	49'-0"	50'-8 3/4"	51'-3 3/4"	38'-1 1/2"	—	—	—	—
	12'	9'	8'-11 1/8"	13'-6"	13'-11 3/4"	14'-6 1/2"	5'-0 1/2"	26'-5"	27'-4 1/8"	27'-10 3/4"	18'-5"	39'-4"	40'-8 3/4"	41'-3"	31'-9 1/2"	52'-3"	54'-1 1/2"	54'-7 1/2"	45'-1 1/2"	—	—	—	—
		10'	10'-2"	13'-8"	14'-1 3/4"	14'-8 1/4"	3'-11 3/4"	26'-8"	27'-7 1/4"	28'-1 3/4"	17'-5 1/2"	39'-8"	41'-0 3/4"	41'-7 1/4"	30'-10 3/4"	52'-8"	54'-6 1/4"	55'-0 3/4"	44'-4 1/2"	—	—	—	—
		11'	11'-4 5/8"	13'-10"	14'-3 3/4"	14'-10 1/4"	2'-11 1/2"	26'-10"	27'-9 3/4"	28'-3 3/4"	16'-4 3/4"	39'-10"	41'-2 3/4"	41'-9 1/4"	29'-10 1/4"	52'-10"	54'-8 3/4"	55'-2 3/4"	43'-3 3/4"	—	—	—	—
		12'	12'-7 3/8"	14'-0"	14'-5 3/4"	15'-0 1/2"	1'-10 1/2"	27'-0"	27'-11 3/8"	28'-6"	15'-4"	40'-0"	41'-4 3/4"	41'-11 1/4"	28'-9 1/2"	53'-0"	54'-10 3/4"	55'-4 3/4"	42'-3"	—	—	—	—

Ⓐ Special case for these boxes, See Detail "A" and Table "A" for revised values of F_1, F_2, W_4 and W_5, when apron width is more than 1'-0" and $W_3 = 0$". For Detail "A" and Tables "A" for each slope, see Drawing Nos. W-X152-1, W-X152-2, or W-X153-1, W-X153-2, or W-X154-1, W-X154-2.



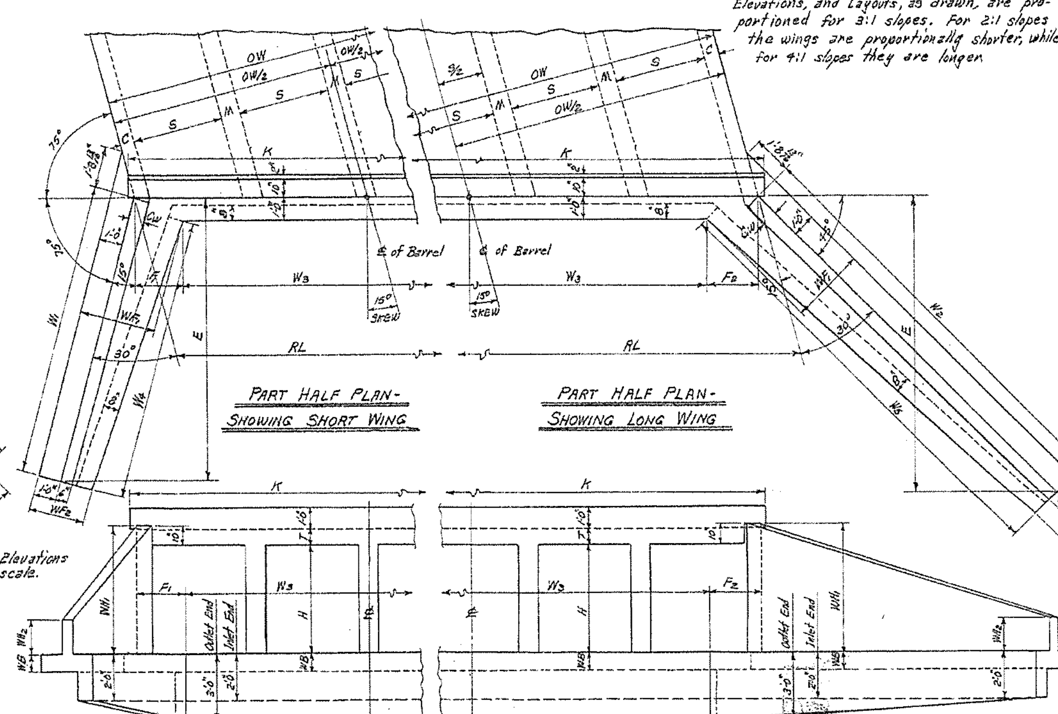
PART PLAN

NOTE:- Plans and Elevations are not to scale.

END ELEVATION

TRIPLE BARREL CULVERT - 15° SKEW RIGHT FORWARD

Details of Culvert with 15° Skew Left Forward is reversed, see Layout at top center of sheet.



PART HALF PLAN - SHOWING SHORT WING

PART HALF PLAN - SHOWING LONG WING

PART END ELEVATION

QUADRUPLE BARREL CULVERT - 15° SKEW RT. FWD.

Details of Culvert with 15° Skew Left Forward is reversed, see Layout at above center.

PART END ELEVATION

QUINTUPLE BARREL CULVERT - 15° SKEW RT. FWD.

Details of Culvert with 15° Skew Left Forward is reversed, see Layout above.

NOTE:- This drawing to be used in conjunction with Standard Wing Drawings for 15° Skews for each slope as listed below.

2:1 Slopes	3:1 Slopes	4:1 Slopes
W-X152-1 or W-X152-2	W-X153-1 or W-X153-2	W-X154-1 or W-X154-2.

This drawing to be used in conjunction with Std. Barrel Sections, Drawing Nos.

SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-115X-0	R-215X-0	R-315X-0	R-415X-0	R-515X-0
R-115X-1	R-215X-1	R-315X-1	R-415X-1	R-515X-1
	R-215X-2	R-315X-2		

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 15° SKEW

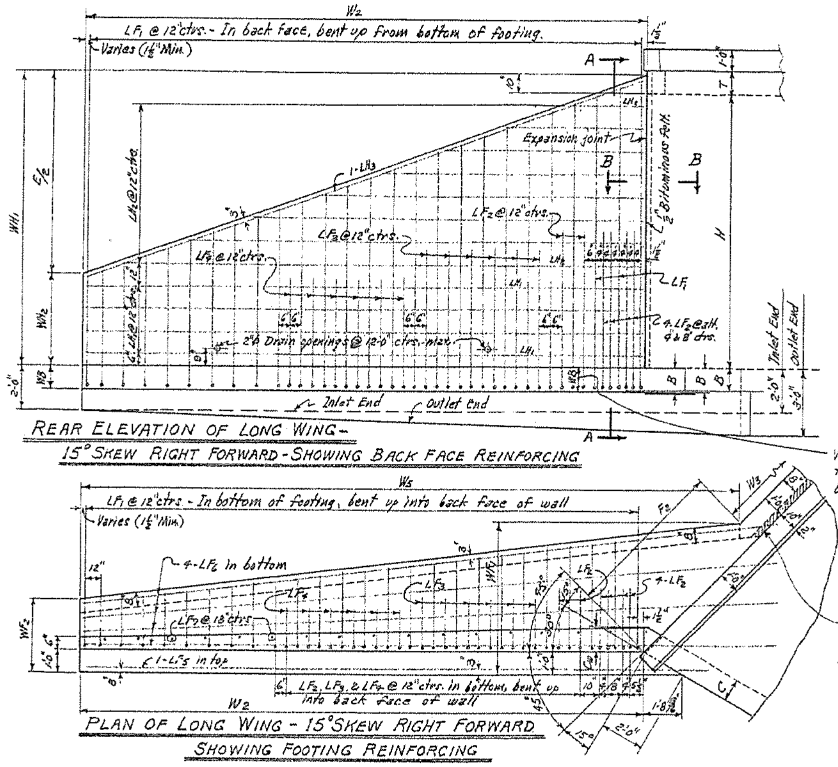
4, 5, 6, 7, 8, 9, 10, 11 & 12 SPANS — 2:1, 3:1 & 4:1 SLOPES

SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER. H = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 & 12.

STANDARD DRAWING NO. W-X15

Designed by:- W.C.H. 5-22-63. Checked by:-
Traced by:- W.C.H. 6-13-63 Checked by:- J.E.M. 6-20-63
Quantities by:- Checked by:-

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			42	
JOB No.					

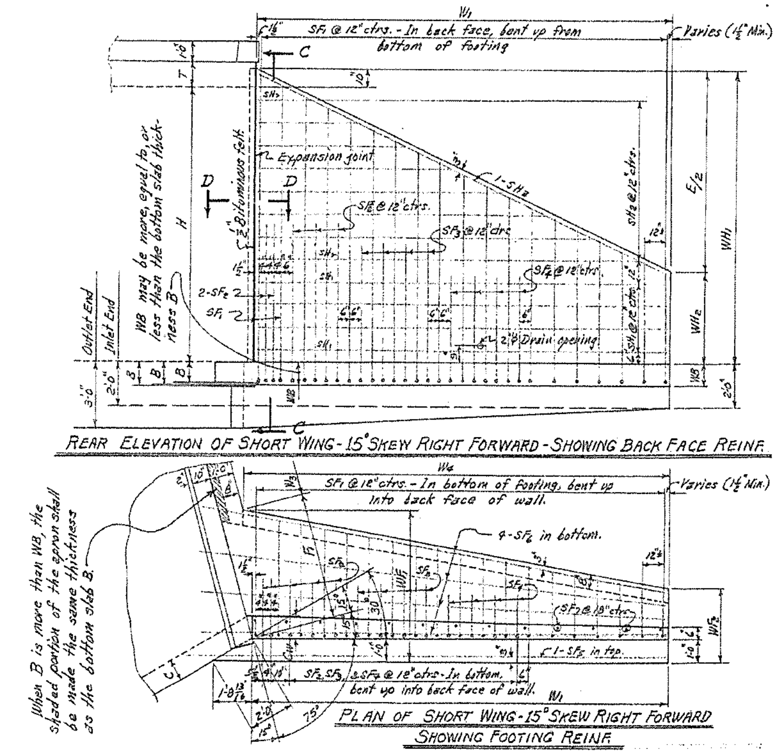


REAR ELEVATION OF LONG WING - 15° SKEW RIGHT FORWARD - SHOWING BACK FACE REINFORCING

WB may be more, equal to, or less than the bottom slab thickness B.

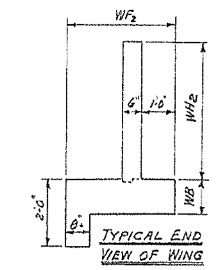
PLAN OF LONG WING - 15° SKEW RIGHT FORWARD SHOWING FOOTING REINFORCING

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

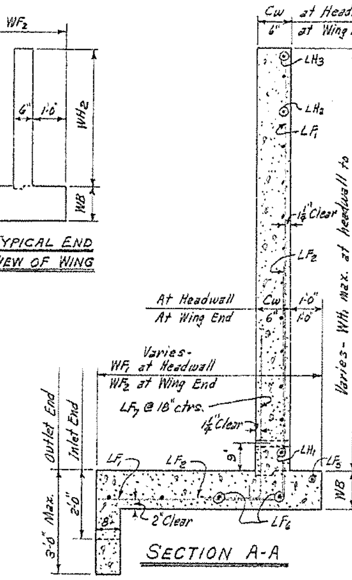


REAR ELEVATION OF SHORT WING - 15° SKEW RIGHT FORWARD - SHOWING BACK FACE REINF.

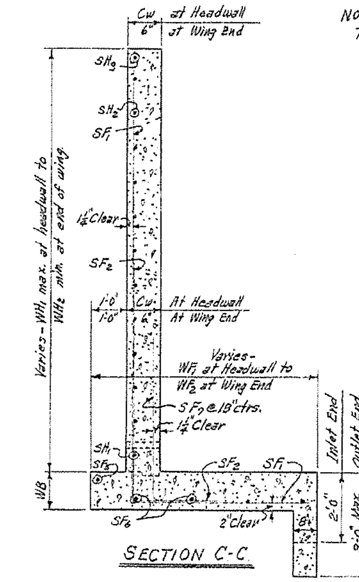
PLAN OF SHORT WING - 15° SKEW RIGHT FORWARD SHOWING FOOTING REINF.



TYPICAL END VIEW OF WING



SECTION A-A



SECTION C-C

NOTE:- This drawing to be used in conjunction with Std. Barrel Sections, Drawing Nos.

SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-115X-0	R-215X-0	R-315X-0	R-415X-0	R-515X-0
R-115X-1	R-216X-1	R-315X-1	R-415X-1	R-515X-1
	R-215X-2	R-315X-2		

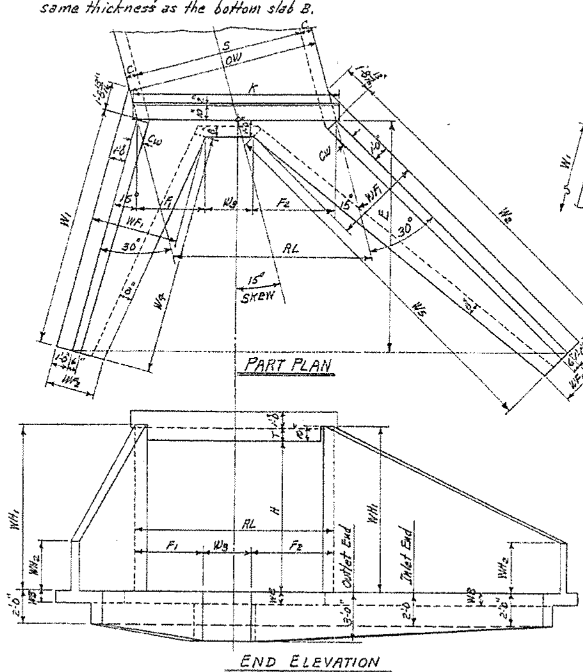
REGULAR WING DIMENSIONS - 2:1 SLOPES

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HDWL.=C.	WINGWALL HEIGHTS AT HEADWALL	WINGWALL HEIGHTS AT END OF WING	WIDTHS OF WING FOOTINGS AT HEADWALL	WIDTHS OF WING FOOTINGS AT END OF WING	FOOTING DIMENSION PARALLEL WITH HEADWALL SHORT WING	FOOTING DIMENSION PARALLEL WITH HEADWALL LONG WING	PERPENDICULAR DIST. FROM HDWL TO END OF WING	LENGTHS OF WINGWALLS SHORT WING	LENGTHS OF WINGWALLS LONG WING	INSIDE FOOTING DIMENSIONS SHORT WING	INSIDE FOOTING DIMENSIONS LONG WING	* QUANTITY PER WING CLASS S CONCRETE INLET END SHORT WING	INLET END LONG WING	OUTLET END SHORT WING	OUTLET END LONG WING
H	WB	Cw	WH1	WH2	WF1	WF2	F1	F2	E	W1	W2	W4	W5	CU.YD.	CU.YD.	CU.YD.	CU.YD.
9' ☓	10"	9"	9'-10"	3'-0"	5'-2"	2'-10½"	4'-0½"	4'-10¾"	13'-8"	14'-1¾"	19'-4"	14'-2¾"	22'-1"	4.480	6.284	4.670	6.565
10' ☓	11"	10"	10'-10"	3'-4"	5'-8"	3'-0"	4'-6¾"	5'-7¼"	15'-0"	15'-6¼"	21'-2½"	15'-9"	24'-5½"	5.710	8.005	5.920	8.315
11' ☓	12"	11"	11'-10"	3'-8"	6'-2"	3'-1½"	5'-1"	6'-3⅝"	16'-4"	16'-11"	23'-1¼"	17'-3"	26'-10¾"	7.161	10.034	7.390	10.374
12' ☓	13"	12"	12'-10"	4'-0"	6'-8"	3'-3"	5'-7⅞"	7'-0½"	17'-8"	18'-3½"	24'-11¾"	18'-9¾"	29'-2¾"	8.840	12.380	9.088	12.750

* Quantity per wing does not include headwall or that portion of apron or toewall for the length W3.
☓ See Table "A" for special values of F1 & F2 and W4 & W5 for Single 7'x9', 8'x10', 9'x11' and 10'x12' Box Culverts.

TABLE "A" - DIMENSIONS FOR DETAIL "A"

S	H	F1	F2	W3	Y	W4	W5
7'	9'	4'-0⅛"	4'-9½"	0"	1'-1"	14'-1¾"	21'-11½"
8'	10'	4'-6¼"	5'-5⅞"	0"	1'-1⅛"	15'-7¾"	24'-3¾"
9'	11'	5'-0⅜"	6'-2¼"	0"	1'-1¼"	17'-1¾"	26'-8¼"
10'	12'	5'-6⅝"	6'-10½"	0"	1'-1¼"	18'-7¾"	29'-0¾"



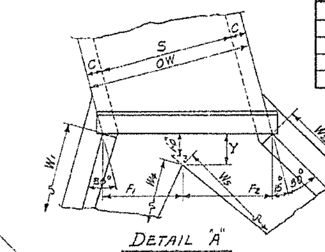
PART PLAN

END ELEVATION

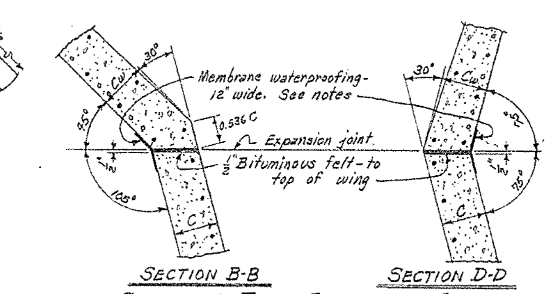
SINGLE BARREL CULVERT - 15° SKEW RIGHT FORWARD

Details of Culvert with 15° Skew Left Forward is reversed, see Drawing No. W-X15.

TYPICAL WING DETAILS

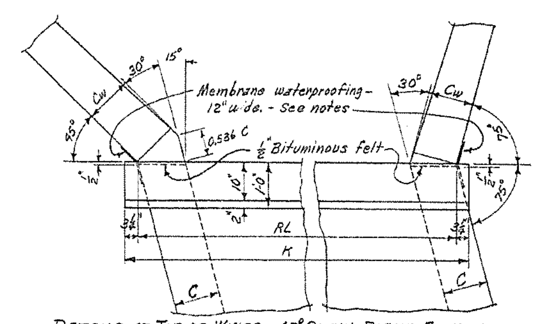


DETAIL "A"



SECTION B-B   SECTION D-D

SECTIONS THRU EXPANSION JOINTS



DETAILS AT TOP OF WINGS - 15° SKEW RIGHT FORWARD

NOTE:- For remainder of General Plans and Elevations of Single, Double, Triple, Quadruple and Quintuple Span Culverts, see Std. Drawing No. W-X15. For values of RL, K and W3 for each box, see above Std. also.

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	® REINFORCING STEEL - FOR 4 WINGS	CLASS S CONCRETE - 4 WINGS (HEADWALLS, WINGWALLS, FOOTINGS, TOEWALLS AND APRONS) SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.
7'	9'	9"	10"	1584	22.59	24.39	26.06	27.80	29.53
8'	9'	9"	10"	1584	22.83	24.79	26.73	28.69	30.64
	10'	10"	11"	1980	28.62	30.62	32.60	34.60	36.58
9'	9'	9"	10"	1584	23.06	25.25	27.40	29.58	31.74
	10'	10"	11"	1980	28.86	31.08	33.28	35.50	37.70
	11'	11"	12"	2401	35.71	37.95	40.17	42.41	44.64
10'	9'	9"	10"	1584	23.28	25.71	28.09	30.45	32.85
	10'	10"	11"	1980	29.09	31.54	33.96	36.38	38.82
	11'	11"	12"	2401	35.95	38.41	40.86	43.30	45.76
	12'	12"	13"	3011	43.88	46.37	48.84	51.31	53.80
11'	9'	9"	10"	1584	23.51	26.20	28.80	31.38	—
	10'	10"	11"	1980	29.31	32.02	34.64	37.28	—
	11'	11"	12"	2401	36.17	38.88	41.54	44.21	—
	12'	12"	13"	3011	44.12	46.84	49.53	52.23	—
12'	9'	9"	10"	1584	23.74	26.68	29.51	32.35	—
	10'	10"	11"	1980	29.54	32.50	35.35	38.22	—
	11'	11"	12"	2401	36.90	39.36	42.22	45.12	—
	12'	12"	13"	3011	44.35	47.31	50.22	53.15	—

® For reinforcing steel in Headwalls and Aprons, see Drawings listed at top of sheet.

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" chamfers.

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

CONSTRUCTION JOINTS:- Construction joints between wingwalls, footings and sidewalls shall be only where shown on plans.

MEMBRANE:- A membrane waterproofing 12" wide, consisting of three moppings of waterproofing asphalt and two alternate layers of treated cotton fabric shall be applied to the back face of wing to cover the expansion joints.
Payment for the membrane waterproofing and bituminous felt shall be included in unit price bid for Class S Concrete.

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

UNIT STRESSES:-
Class S Concrete (n=10) 1200#/□"
Reinforcing Steel 20,000#/□"

BAR LIST FOR ONE SHORT AND ONE LONG WING - 2 EACH REQUIRED

SF1 & LF1 — BENT: In bottom of footing, bent up into back face of wing. One bar of each length.
SF2 & LF2 — BENT: In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
SF3 & LF3 — BENT: In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
SF4 & LF4 — BENT: In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
SF5 & LF5 — STRAIGHT: Longitudinal in top of wing footing heel.
SF6 & LF6 — STRAIGHT: Longitudinal in bottom of wing footing toe.
SF7 & LF7 — BENT: Footing dowels extending up into front face of wing.
SH1 & LH1 — STRAIGHT: Horizontal in back face of wing.
SH2 & LH2 — STRAIGHT: Horizontal in back face of wing. One bar of each length.
SH3 & LH3 — STRAIGHT: In back face of wing at top-on slope.

H	WING LOCATION	SF1&LF1 SIZE	SPACING	NO. REQ'D	LENGTHS VARY MIN.	MAX.	X MIN.	X MAX.	Y MIN.	Y MAX.	SF2&LF2 SIZE	® SPACING	NO. REQ'D	LENGTH	X	Y	SF3&LF3 SIZE	SPACING	NO. REQ'D	LENGTH	X	Y
9'	Short	#5	12"	15	4'-11"	13'-11"	1'-6"	3'-10"	3'-6"	10'-2"	#5	12"	3	7'-6"	2'-1"	5'-6"	#4	12"	4	6'-6"	1'-10"	4'-9"
	Long	#5	12"	20	4'-11"	13'-8"	1'-6"	3'-6"	3'-6"	10'-3"	#5	12"	4	7'-6"	2'-1"	5'-6"	#4	12"	6	6'-6"	1'-10"	4'-9"
10'	Short	#5	12"	16	5'-7"	15'-6"	1'-8"	4'-4"	4'-0"	11'-3"	#6	12"	3	8'-6"	2'-4"	6'-3"	#5	12"	2	7'-6"	2'-1"	5'-6"
	Long	#5	12"	22	5'-6"	15'-3"	1'-8"	4'-0"	3'-11"	11'-4"	#6	12"	4	8'-6"	2'-4"	6'-3"	#5	12"	2	7'-6"	2'-1"	5'-6"
11'	Short	#5	12"	18	5'-10"	17'-0"	1'-9"	4'-9"	4'-2"	12'-4"	#6	12"	5	8'-6"	2'-4"	6'-3"	#5	12"	3	7'-6"	2'-1"	5'-6"
	Long	#5	12"	24	5'-11"	16'-9"	1'-9"	4'-5"	4'-3"	12'-5"	#6	12"	6	8'-6"	2'-4"	6'-3"	#5	12"	3	7'-6"	2'-1"	5'-6"
12'	Short	#5	12"	19	6'-8"	18'-7"	1'-11"	5'-3"	4'-10"	13'-5"	#7	12"	5	9'-6"	2'-7"	7'-0"	#6	12"	4	8'-6"	2'-4"	6'-3"
	Long	#5	12"	26	6'-6"	18'-3"	1'-11"	4'-10"	4'-8"	13'-6"	#7	12"	6	9'-6"	2'-7"	7'-0"	#6	12"	6	8'-6"	2'-4"	6'-3"

H	WING LOCATION	SF4&LF4 SIZE	SPACING	NO. REQ'D	LENGTH	X	Y	SF5&LF5 SIZE	NO. REQ'D	LENGTH	SF6&LF6 SIZE	NO. REQ'D	LENGTH	SF7&LF7 SIZE	SPACING	NO. REQ'D	LENGTH	X
9'	Short	—	—	—	—	—	—	#4	1	16'-7"	#4	4	16'-3"	#4	18"	10	4'-0"	3'-6"
	Long	—	—	—	—	—	—	#4	1	21'-10"	#4	4	23'-6"	#4	18"	13	4'-0"	3'-6"
10'	Short	#4	12"	4	6'-6"	1'-10"	4'-9"	#4	1	19'-0"	#4	4	17'-10"	#4	18"	11	4'-4"	3'-10"
	Long	#4	12"	6	6'-6"	1'-10"	4'-9"	#4	1	23'-8"	#4	4	25'-11"	#4	18"	15	4'-4"	3'-10"
11'	Short	#4	12"	4	6'-6"	1'-10"	4'-9"	#4	1	19'-5"	#4	4	19'-5"	#4	18"	12	4'-8"	4'-2"
	Long	#4	12"	6	6'-6"	1'-10"	4'-9"	#4	1	25'-7"	#4	4	28'-4"	#4	18"	16	4'-8"	4'-2"
12'	Short	#4	12"	4	6'-6"	1'-10"	4'-9"	#4	1	20'-9"	#4	4	21'-0"	#4	18"	13	5'-0"	4'-6"
	Long	#4	12"	6	6'-6"	1'-10"	4'-9"	#4	1	27'-6"	#4	4	30'-9"	#4	18"	17	5'-0"	4'-6"

H	WING LOCATION	SH1&LH1 SIZE	SPACING	NO. REQ'D	LENGTH	SH2&LH2 SIZE	SPACING	NO. REQ'D	LENGTHS VARY MAX.	MIN.	SH3&LH3 SIZE	NO. REQ'D	LENGTH	QUANTITY REINFORCING STEEL PER WING - LBS. SHORT WING	LONG WING
9'	Short	#4	12"	3	13'-10"	#4	12"	6	12'-7"	2'-2"	#4	1	15'-5"	337.0	455.2
	Long	#4	12"	3	19'-0"	#4	12"	6	17'-2"	3'-0"	#4	1	20'-2"		
10'	Short	#4	12"	3	15'-3"	#4	12"	7	14'-8"	2'-2"	#4	1	16'-11"	420.0	569.8
	Long	#4	12"	3	20'-11"	#4	12"	7	20'-0"	3'-0"	#4	1	22'-2"		
11'	Short	#4	12"	4	16'-7"	#4	12"	7	14'-8"	2'-2"	#4	1	18'-6"	517.3	683.4
	Long	#4	12"	4	22'-10"	#4	12"	7	20'-0"	3'-0"	#4	1	24'-2"		
12'	Short	#4	12"	4	18'-0"	#4	12"	8	16'-9"	2'-2"	#4	1	20'-0"	641.1	864.5
	Long	#4	12"	4	24'-8"	#4	12"	8	22'-10"	3'-0"	#4	1	26'-2"		

BAR BENDING DIAGRAMS: SF1 - SF4, LF1 - LF4 (Y, X, 4½" Pin); SF7 & LF7 (X, 3" Pin).
NOTE:- Dimensions are to bar centers.

NOTE:- Bars for short wing to be marked with prefix letter "S", while those for long wing shall be marked with letter "L".
® Except as shown at headwall.

Designed by:- W.C.H. 5-13-63 Checked by:-
Drawn by:- W.C.H. 6-6-63 Checked by:- R.H.S. 7-31-63
Quantities by:- W.C.H. 9-17-63 Checked by:-

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 15° SKEW

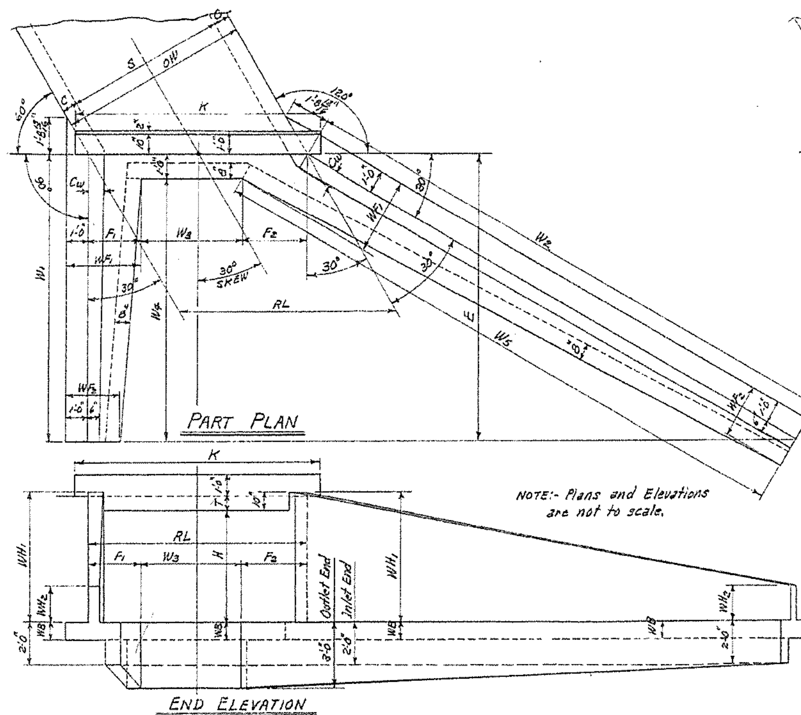
7', 8', 9', 10', 11' & 12' SPANS   2:1 SLOPES
SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES   ALL DEPTHS OF COVER FOR H = 9'-0" & OVER

STANDARD DRAWING NO. W-X152-2

Reshot 3-8-93

191

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			43	
JOB No.					



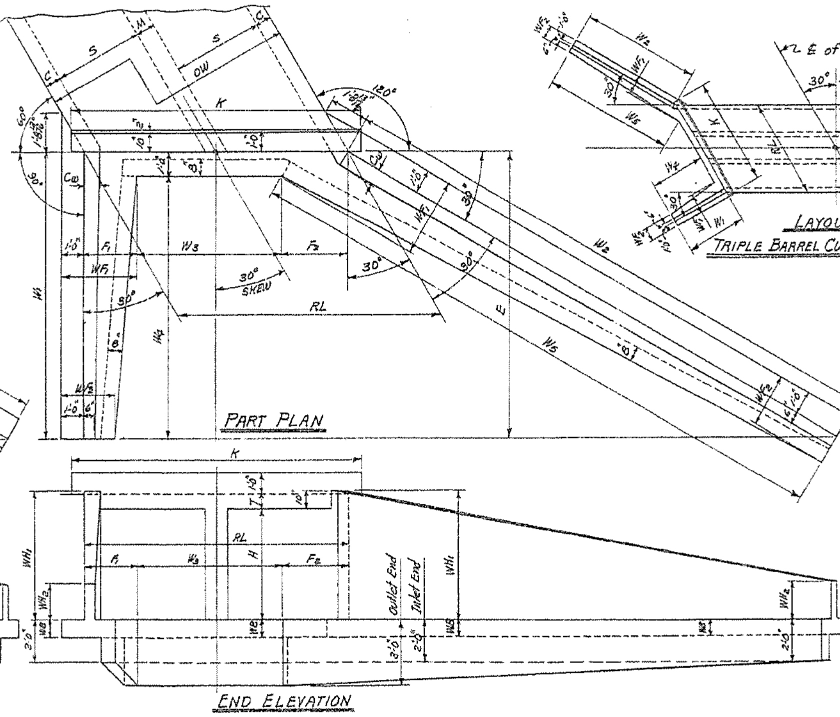
PART PLAN

END ELEVATION

NOTE:- Plans and Elevations are not to scale.

SINGLE BARREL CULVERT-30° SKEW RIGHT FORWARD

Details of Culvert with 30° Skew Left Forward is reversed, see Layout below.



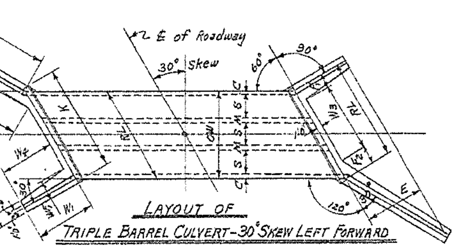
PART PLAN

END ELEVATION

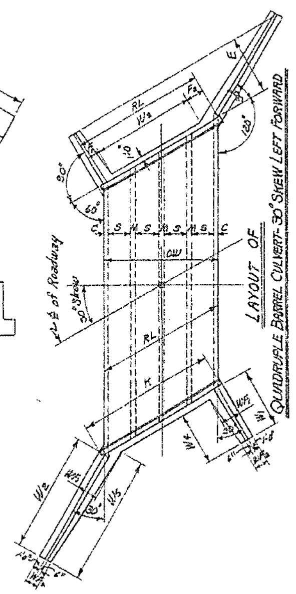
DOUBLE BARREL CULVERT-30° SKEW RIGHT FORWARD

Details of Culvert with 30° Skew Left Forward is reversed, see Layout below.

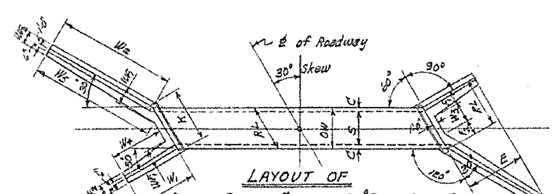
NOTE:- The length of the wings for the Plans, Elevations, and Layouts, as drawn, are proportioned for 3:1 slopes. For 2:1 slopes the wings are proportionally shorter, while for 4:1 slopes they are longer.



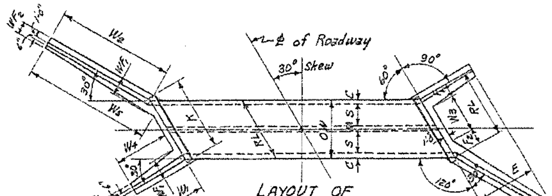
LAYOUT OF TRIPLE BARREL CULVERT-30° SKEW LEFT FORWARD



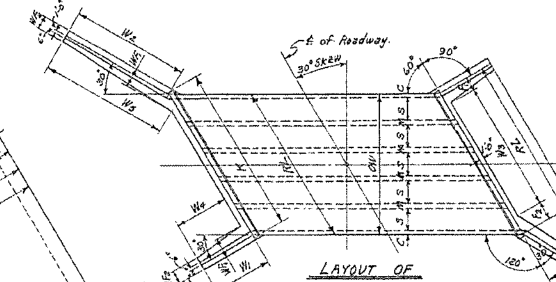
LAYOUT OF QUADRUPLE BARREL CULVERT-30° SKEW LEFT FORWARD



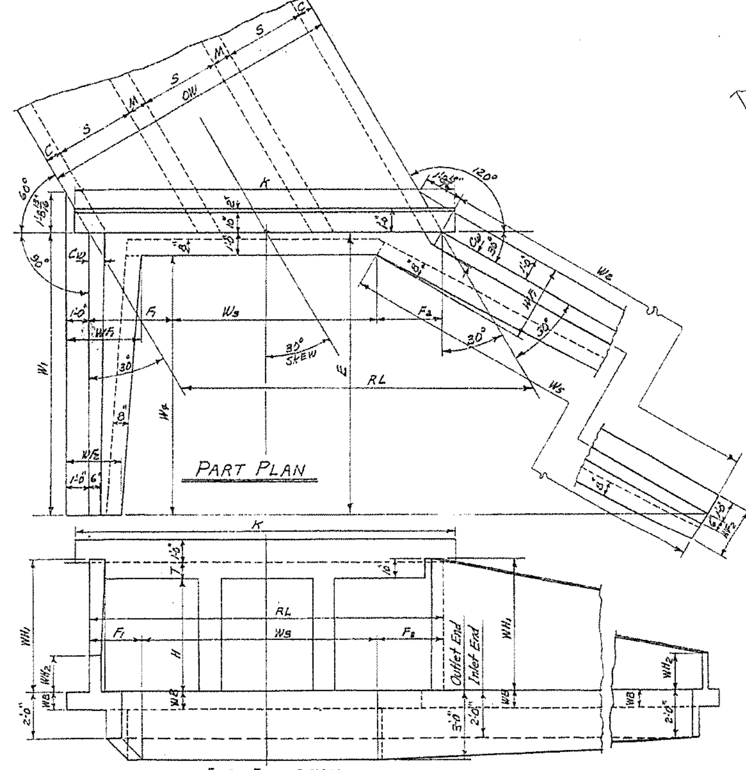
LAYOUT OF SINGLE BARREL CULVERT-30° SKEW LEFT FORWARD



LAYOUT OF DOUBLE BARREL CULVERT-30° SKEW LEFT FORWARD



LAYOUT OF QUINTUPLE BARREL CULVERT-30° SKEW LEFT FORWARD

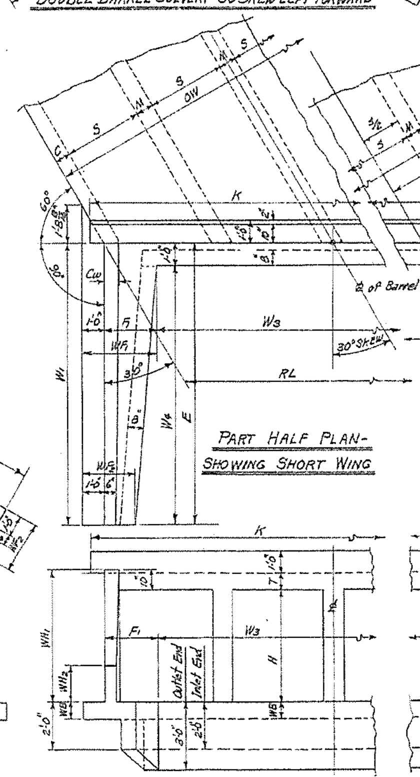


PART PLAN

END ELEVATION

TRIPLE BARREL CULVERT- 30° SKEW RIGHT FORWARD

Details of Culvert with 30° Skew Left Forward is reversed, see Layout at top center of sheet.

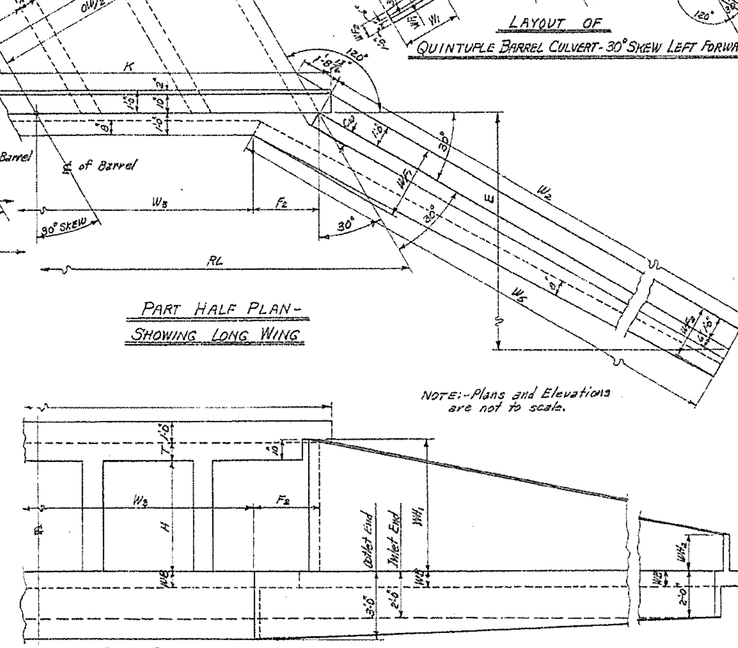


PART HALF PLAN- SHOWING SHORT WING

PART END ELEVATION

QUADRUPLE BARREL CULVERT-30° SKEW RT. FWD.

Details of Culvert with 30° Skew Left Forward is reversed, see Layout at above center.



PART HALF PLAN- SHOWING LONG WING

PART END ELEVATION

NOTE:-Plans and Elevations are not to scale.

QUINTUPLE BARREL CULVERT-30° SKEW RT. FWD.

Details of Culvert with 30° Skew Left Forward is reversed, see Layout above.

ROADWAY LENGTH RL HEADWALL LENGTH K APRON DIMENSION W_3

$RL = OW \times 1.1547$ $K = RL + (1'-1\frac{7}{8}")$ $W_3 = RL - (F_1 + F_2)$

USE WITH DRAWING No.	CLEAR SPAN S	CLEAR HEIGHT H	SUM OF FOOTING DIMENSIONS F_1 & F_2	SINGLE BARREL CULVERT OW	RL	K	W_3	DOUBLE BARREL CULVERT OW	RL	K	W_3	TRIPLE BARREL CULVERT OW	RL	K	W_3	QUADRUPLE BARREL CULVERT OW	RL	K	W_3	QUINTUPLE BARREL CULVERT OW	RL	K	W_3
W-X302-1, W-X303-1 or W-X304-1. (FOR H=8'0" OR LESS)	4'	2'	2'-3¼"	5'-0"	5'-9¼"	6'-11⅛"	3'-6"	9'-8"	11'-2"	12'-3¾"	8'-10¾"	14'-4"	16'-6⅝"	17'-8½"	14'-3⅜"	19'-0"	21'-11⅛"	23'-1"	19'-8"	23'-8"	27'-4"	28'-5¾"	25'-0¾"
		3'	3'-3¼"	5'-0"	"	"	2'-6"	9'-8"	"	"	7'-10¾"	14'-4"	"	"	13'-3⅜"	19'-0"	"	"	18'-8"	23'-8"	"	"	24'-0¾"
		4'	4'-3¼"	5'-0"	"	"	1'-6"	9'-8"	"	"	6'-10¾"	14'-4"	"	"	12'-3⅜"	19'-0"	"	"	17'-8"	23'-8"	"	"	23'-0¾"
		5'	5'-3¼"	5'-0"	5'-9¼"	6'-11⅛"	0'-6"	9'-8"	11'-2"	12'-3¾"	5'-10¾"	14'-4"	16'-6⅝"	17'-8½"	11'-3⅜"	19'-0"	21'-11⅛"	23'-1"	16'-8"	23'-8"	27'-4"	28'-5¾"	22'-0¾"
		6'	6'-3¼"	5'-2"	5'-11⅝"	7'-1½"	Ⓐ 0"	9'-11"	11'-5½"	12'-7¼"	5'-2¼"	14'-8"	16'-11⅛"	18'-1"	10'-8"	19'-5"	22'-5"	23'-7"	16'-1⅜"	24'-2"	27'-10⅝"	29'-0¾"	21'-7¾"
	5'	3'	3'-3¼"	6'-0"	6'-11⅛"	8'-1"	3'-7⅞"	11'-8"	13'-5¾"	14'-7½"	10'-2½"	17'-4"	20'-0¼"	21'-2"	16'-9"	23'-0"	26'-6⅜"	27'-8⅛"	23'-3½"	28'-8"	33'-1¼"	34'-3"	29'-10"
		4'	4'-3¼"	6'-0"	"	"	2'-7⅞"	11'-8"	"	"	9'-2½"	17'-4"	"	"	15'-9"	23'-0"	"	"	22'-3½"	28'-8"	"	"	28'-10"
		5'	5'-3¼"	6'-0"	6'-11⅛"	8'-1"	1'-7⅞"	11'-8"	13'-5¾"	14'-7½"	8'-2½"	17'-4"	20'-0¼"	21'-2"	14'-9"	23'-0"	26'-6⅜"	27'-8⅛"	21'-3½"	28'-8"	33'-1¼"	34'-3"	27'-10"
		6'	6'-3¼"	6'-2"	7'-1½"	8'-3¼"	0'-10⅛"	11'-11"	13'-9⅛"	14'-11"	7'-5⅝"	17'-8"	20'-4¾"	21'-6½"	14'-1½"	23'-5"	27'-0⅛"	28'-2¼"	20'-9⅛"	29'-2"	33'-8½"	34'-10"	27'-5"
		7'	7'-9¼"	6'-3"	7'-2⅝"	8'-4⅜"	Ⓐ 0"	12'-1"	13'-11⅝"	15'-1⅛"	6'-2⅛"	17'-11"	20'-8¼"	21'-10"	12'-11"	23'-9"	27'-5¼"	28'-7"	19'-8"	29'-7"	34'-2"	35'-3¾"	26'-4¾"
	6'	3'	3'-3¼"	7'-0"	8'-1"	9'-2⅞"	4'-9¾"	13'-8"	15'-9⅜"	16'-11⅛"	12'-6⅛"	20'-4"	23'-5¾"	24'-7½"	20'-2½"	27'-0"	31'-2⅛"	32'-4"	27'-11"	33'-8"	38'-10½"	40'-0¼"	35'-7½"
		4'	4'-3¼"	7'-0"	"	"	3'-9¾"	13'-8"	"	"	11'-6⅛"	20'-4"	"	"	19'-2½"	27'-0"	"	"	26'-11"	33'-8"	"	"	34'-7½"
		5'	5'-3¼"	7'-0"	8'-1"	9'-2⅞"	2'-9¾"	13'-8"	15'-9⅜"	16'-11⅛"	10'-6⅛"	20'-4"	23'-5¾"	24'-7½"	18'-2½"	27'-0"	31'-2⅛"	32'-4"	25'-11"	33'-8"	38'-10½"	40'-0¼"	33'-7½"
		6'	6'-3¼"	7'-2"	8'-3½"	9'-5⅛"	2'-0"	13'-11"	16'-0⅞"	17'-2¾"	9'-9⅝"	20'-8"	23'-10⅜"	25'-0¼"	17'-7¼"	27'-5"	31'-7⅞"	32'-9¾"	25'-4¾"	34'-2"	39'-5½"	40'-7¼"	33'-2¼"
		7'	7'-9¼"	7'-3"	8'-4½"	9'-6⅜"	0'-7¼"	14'-1"	16'-3¼"	17'-5"	8'-6"	20'-11"	24'-1⅞"	25'-3¾"	16'-4¼"	27'-9"	32'-0½"	33'-2¼"	24'-3½"	34'-7"	39'-11⅛"	41'-1"	32'-2"
		8'	9'-3¼"	7'-4"	8'-5⅝"	9'-7½"	Ⓐ 0"	14'-2"	16'-4⅝"	17'-6¼"	7'-1"	21'-0"	24'-3"	25'-4¾"	14'-11¾"	27'-10"	32'-1¾"	33'-3½"	22'-10½"	34'-8"	40'-0⅜"	41'-2¼"	30'-9⅛"
	7'	4'	4'-3¼"	8'-0"	9'-2⅞"	10'-4¾"	4'-11⅝"	15'-8"	18'-1⅛"	19'-3"	13'-9¾"	23'-4"	26'-11⅜"	28'-1¼"	22'-8"	31'-0"	35'-9½"	36'-11¼"	31'-6¼"	38'-8"	44'-7⅜"	45'-9⅜"	40'-4½"
		5'	5'-3¼"	8'-0"	9'-2⅞"	10'-4¾"	3'-11⅝"	15'-8"	18'-1⅛"	19'-3"	12'-9¾"	23'-4"	26'-11⅜"	28'-1¼"	21'-8"	31'-0"	35'-9½"	36'-11¼"	30'-6¼"	38'-8"	44'-7⅜"	45'-9⅜"	39'-4½"
		6'	6'-3¼"	8'-2"	9'-5⅛"	10'-7"	3'-2"	15'-11"	18'-4½"	19'-6¼"	12'-1¼"	23'-8"	27'-4"	28'-5¾"	21'-0⅝"	31'-5"	36'-3⅜"	37'-5¼"	30'-0"	39'-2"	45'-2⅜"	46'-4⅛"	38'-11⅛"
		7'	7'-9¼"	8'-3"	9'-6¼"	10'-8⅛"	1'-9"	16'-1"	18'-6⅞"	19'-8¾"	10'-9¾"	23'-11"	27'-7⅜"	28'-9¼"	19'-10¼"	31'-9"	36'-8"	37'-9¾"	28'-10⅝"	39'-7"	45'-8½"	46'-10⅛"	37'-11⅛"
		8'	9'-3¼"	8'-4"	9'-7½"	10'-9⅜"	0'-4¼"	16'-2"	18'-8"	19'-9¾"	9'-4⅜"	24'-0"	27'-8½"	28'-10¼"	18'-5¼"	31'-10"	36'-9⅜"	37'-11"	27'-6"	39'-8"	45'-9⅝"	46'-11½"	36'-6½"
	8'	4'	4'-3¼"	9'-0"	10'-4⅞"	11'-6½"	6'-1½"	17'-8"	20'-4⅜"	21'-6¾"	16'-1½"	26'-4"	30'-4⅞"	31'-6⅜"	26'-1⅜"	35'-0"	40'-5"	41'-6¾"	36'-1⅜"	43'-8"	50'-5⅛"	51'-7"	46'-1¾"
		5'	5'-3¼"	9'-2"	10'-7"	11'-8⅞"	5'-3¾"	17'-11"	20'-8¼"	21'-10"	15'-5"	26'-8"	30'-9½"	31'-11¼"	25'-6¼"	35'-5"	40'-10¾"	42'-0½"	35'-7½"	44'-2"	51'-0"	52'-1¾"	45'-8¾"
		6'	6'-3¼"	9'-2"	10'-7"	11'-8⅞"	4'-3¾"	17'-11"	20'-8¼"	21'-10"	14'-5"	26'-8"	30'-9½"	31'-11¼"	24'-6¼"	35'-5"	40'-10¾"	42'-0½"	34'-7½"	44'-2"	51'-0"	52'-1¾"	44'-8¾"
		7'	7'-9¼"	9'-3"	10'-8¼"	11'-10"	2'-11"	18'-1"	20'-10⅝"	22'-0½"	13'-1¼"	26'-11"	31'-1"	32'-2¾"	23'-3¾"	35'-9"	41'-3⅜"	42'-5¼"	33'-6¼"	44'-7"	51'-5¾"	52'-7½"	43'-8½"
		8'	9'-3¼"	9'-4"	10'-9⅜"	11'-11¼"	1'-6⅛"	18'-2"	20'-11⅜"	22'-1½"	11'-8½"	27'-0"	31'-2⅛"	32'-4"	21'-11"	35'-10"	41'-4½"	42'-6¼"	32'-1⅛"	44'-8"	51'-7"	52'-8¾"	42'-3¾"
	9'	5'	5'-3¼"	10'-2"	11'-8⅞"	12'-10¾"	6'-5⅝"	19'-11"	23'-0"	24'-1¾"	17'-8¾"	29'-8"	34'-3⅛"	35'-5"	28'-11⅛"	39'-5"	45'-6⅛"	46'-8"	40'-3"	49'-2"	56'-9¼"	57'-11⅛"	51'-6"
		6'	6'-3¼"	10'-3"	11'-10"	13'-0"	5'-6⅜"	20'-1"	23'-2¼"	24'-4⅛"	16'-11"	29'-11"	34'-6⅛"	35'-8½"	28'-3⅛"	39'-9"	45'-10⅜"	47'-0⅜"	39'-7½"	49'-7"	57'-3"	58'-5"	50'-11⅜"
		7'	7'-9¼"	10'-3"	11'-10"	13'-0"	4'-0¾"	20'-1"	23'-2¼"	24'-4⅛"	15'-5"	29'-11"	34'-6⅛"	35'-8½"	26'-9¼"	39'-9"	45'-10⅜"	47'-0⅜"	38'-1½"	49'-7"	57'-3"	58'-5"	49'-5⅜"
		8'	9'-3¼"	10'-4"	11'-11⅛"	13'-1"	2'-8"	20'-2"	23'-3½"	24'-5¼"	14'-0½"	30'-0"	34'-7¾"	35'-9½"	25'-4½"	39'-10"	46'-0"	47'-1¾"	36'-8¾"	49'-8"	57'-4½"	58'-6"	48'-1"
	10'	5'	5'-3¼"	11'-2"	12'-10¾"	14'-0½"	7'-7½"	21'-11"	25'-3⅜"	26'-5½"	20'-0½"	32'-8"	37'-8⅝"	38'-10½"	32'-5½"	43'-5"	50'-1⅝"	51'-3½"	44'-10½"	54'-2"	62'-6½"	63'-8½"	57'-3¼"
		6'	6'-3¼"	11'-3"	12'-11⅞"	14'-1¾"	6'-8⅝"	22'-1"	25'-6"	26'-7¾"	19'-2¾"	32'-11"	38'-0⅛"	39'-2"	31'-9"	43'-9"	50'-6⅛"	51'-8"	44'-3"	54'-7"	63'-0⅜"	64'-2¼"	56'-9"
		7'	7'-9¼"	11'-3"	12'-11⅞"	14'-1¾"	5'-2⅝"	22'-1"	25'-6"	26'-7¾"	17'-8¾"	32'-11"	38'-0⅛"	39'-2"	30'-3"	43'-9"	50'-6⅛"	51'-8"	42'-9"	54'-7"	63'-0⅜"	64'-2¼"	55'-3"
		8'	9'-3¼"	11'-4"	12'-1"	14'-3"	3'-9¾"	22'-2"	25'-7⅛"	26'-9"	16'-4"	33'-0"	38'-1¼"	39'-3"	28'-10"	43'-10"	50'-7⅜"	51'-9⅛"	41'-4¼"	54'-8"	63'-1½"	64'-3¼"	53'-10¼"
	11'	6'	6'-3¼"	12'-4"	14'-2⅝"	15'-4⅜"	7'-11⅜"	24'-2"	27'-10⅝"	29'-0¾"	21'-7¾"	36'-0"	41'-6⅞"	42'-8¾"	35'-3½"	47'-10"	55'-2⅜"	56'-4¾"	48'-11½"	—	—	—	—
		7'	7'-9¼"	12'-4"	"	"	6'-5⅝"	24'-2"	"	"	20'-1⅜"	36'-0"	"	"	33'-9½"	47'-10"	"	"	47'-5½"	—	—	—	—
		8'	9'-3¼"	12'-4"	"	"	4'-11⅝"	24'-2"	"	"	18'-7⅜"	36'-0"	"	"	32'-3½"	47'-10"	"	"	45'-11½"	—	—	—	—
	12'	6'	6'-3¼"	13'-4"	15'-4¾"	16'-6½"	9'-1½"	26'-2"	30'-2⅝"	31'-4½"	23'-11⅝"	39'-0"	45'-0⅜"	46'-2¼"	38'-9¼"	51'-10"	59'-10¼"	61'-0"	53'-7"	—	—	—	—
		7'	7'-9¼"	13'-4"	"	"	7'-7½"	26'-2"	"	"	22'-5⅝"	39'-0"	"	"	37'-3¼"	51'-10"	"	"	52'-1"	—	—	—	—
		8'	9'-3¼"	13'-4"	"	"	6'-1½"	26'-2"	"	"	20'-11⅝"	39'-0"	"	"	35'-9¼"	51'-10"	"	"	50'-7"	—	—	—	—
W-X302-2, W-X303-2 or W-X304-2. (FOR H=9'0" & OVER)	7'	9'	10'-9¼"	8'-6"	9'-9⅜"	10'-11⅜"	Ⓐ 0"	16'-5"	18'-11½"	20'-1¼"	8'-2¼"	24'-4"	28'-1⅛"	29'-3"	17'-4"	32'-3"	37'-2⅜"	38'-4⅜"	26'-5¾"	40'-2"	46'-4⅜"	47'-6½"	35'-7¼"
	8'	9'	10'-9¼"	9'-6"	10'-11⅝"	12'-1½"	0'-2⅜"	18'-5"	21'-3⅛"	22'-5"	10'-6"	27'-4"	31'-6⅜"	32'-8½"	20'-9½"	36'-3"	41'-10½"	43'-0¼"	31'-1"	45'-2"	52'-1⅞"	53'-3¾"	41'-4⅜"
		10'	12'-3¼"	9'-8"	11'-2"	12'-3¾"	Ⓐ 0"	18'-8"	21'-6⅜"	22'-8¼"	9'-3½"	27'-8"	31'-11⅜"	33'-1¼"	19'-8¼"	36'-8"	42'-4⅛"	43'-6"	30'-0¾"	45'-8"	52'-8⅞"	53'-10⅝"	40'-5½"
	9'	9'	10'-9¼"	10'-6"	12'-1½"	13'-3¼"	1'-4½"	20'-5"	23'-6⅞"	24'-8¾"	12'-9¾"	30'-4"	35'-0⅛"	36'-2¼"	24'-3"	40'-3"	46'-5⅜"	47'-7¼"	35'-8½"	50'-2"	57'-11⅛"	59'-1"	47'-2"
		10'	12'-3¼"	10'-8"	12'-3⅞"	13'-5¾"	0'-0⅝"	20'-8"	23'-10⅜"	25'-0¼"	11'-7¼"	30'-8"	35'-4⅞"	36'-6¾"	23'-1⅞"	40'-8"	46'-11¼"	48'-1⅛"	34'-8¼"	50'-8"	58'-6"	59'-8"	46'-2¾"
		11'	13'-9¼"	10'-10"	12'-6⅛"	13'-8"	Ⓐ 0"	20'-10"	24'-0⅝"	25'-2½"	10'-3½"	30'-10"	35'-7¼"	36'-9"	21'-10"	40'-10"	47'-1⅜"	48'-3⅛"	33'-4¼"	50'-10"	58'-8⅜"	59'-10⅛"	44'-11¼"
	10'	9'	10'-9¼"	11'-6"	13'-3⅜"	14'-5⅛"	2'-6⅛"	22'-5"	25'-10⅜"	27'-0½"	15'-3½"	33'-4"	38'-5⅜"	39'-7¾"	27'-8¾"	44'-3"	51'-1⅛"	52'-3"	40'-4"	55'-2"	63'-8⅜"	64'-10⅛"	52'-11¼"
		10'	12'-3¼"	11'-8"	13'-5⅝"	14'-7½"	1'-2⅛"	22'-8"	26'-2¼"	27'-4"	13'-10⅜"	33'-8"	38'-10¼"	40'-0⅛"	26'-7¼"	44'-8"	51'-7"	52'-8¾"	39'-3⅜"	55'-8"	64'-3⅜"	65'-5¼"	52'-0"
		11'	13'-9¼"	11'-10"	13'-8"	14'-9¾"	Ⓐ 0"	22'-10"	26'-4⅜"	27'-6½"	12'-7¼"	33'-10"	39'-0⅝"	40'-2½"	25'-3½"	44'-10"	51'-9½"	52'-11"	38'-0"	55'-10"	64'-5⅝"	65'-7½"	50'-8½"
		12'	15'-3¼"	12'-0"	13'-10⅛"	15'-0¼"	Ⓐ 0"	23'-0"	26'-6¾"	27'-8½"	11'-3¼"	34'-0"	39'-3⅛"	40'-5"	24'-0"	45'-0"	51'-11½"	53'-1¼"	36'-8¼"	56'-0"	64'-8"	65'-9¾"	49'-4¾"
	11'	9'	10'-9¼"	12'-6"	14'-5⅛"	15'-7"	3'-8"	24'-5"	28'-2⅜"	29'-4¼"	17'-5"	36'-4"	41'-11½"	43'-1¼"	31'-2¼"	48'-3"	55'-8⅜"	56'-10¼"	44'-11¼"	—	—	—	—
		10'	12'-3¼"	12'-8"	14'-7½"	15'-9¼"	2'-4¼"	24'-8"	28'-5⅞"	29'-7¾"	16'-2½"	36'-8"	42'-4⅛"	43'-6"	30'-0¾"	48'-8"	56'-2⅜"	57'-4¼"	43'-11¼"	—	—	—	—
		11'	13'-9¼"	12'-10"	14'-9⅞"	15'-11¾"	1'-0⅝"	24'-10"	28'-8⅛"	29'-10"	14'-11"	36'-10"	42'-6⅜"	43'-8¼"	28'-9¼"	48'-10"	56'-4⅝"	57'-6½"	42'-7¼"	—	—	—	—
		12'	15'-3¼"	13'-0"	15'-0⅛"	16'-2"	Ⓐ 0"	25'-0"	28'-10⅜"	30'-0¼"	13'-7¼"	37'-0"	42'-8¾"	43'-10½"	27'-5¼"	49'-0"	56'-7"	57'-8¾"	41'-3¾"	—	—	—	—
	12'	9'	10'-9¼"	13'-6"	15'-7⅛"	16'-9"	4'-9⅜"	26'-5"	30'-6"	31'-8"	19'-8¾"	39'-4"	45'-5"	46'-7"	34'-7¾"	52'-3"	60'-4"	61'-5¾"	49'-6¾"	—	—	—	—
		10'	12'-3¼"	13'-8"	15'-9⅜"	16'-11¼"	3'-6⅛"	26'-8"	30'-9¼"	31'-11⅛"	18'-6¼"	39'-8"	45'-9⅜"	46'-11¼"	33'-6½"	52'-8"	60'-9⅜"	61'-11¾"	48'-6⅜"	—	—	—	—
		11'	13'-9¼"	13'-10"	15'-11⅝"	17'-1½"	2'-2½"	26'-10"	30'-11⅞"	32'-1⅜"	17'-2½"	39'-10"	46'-0"	47'-1¾"	32'-2¾"	52'-10"	61'-0⅛"	62'-2"	47'-2¾"	—	—	—	—
		12'	15'-3¼"	14'-0"	16'-2"	17'-3¾"	0'-10¾"	27'-0"	31'-2⅛"	32'-4"	15'-11"	40'-0"	46'-2¼"	47'-4"	30'-11"	53'-0"	61'-2⅞"	62'-4⅝"	45'-11¼"	—	—	—	—

Ⓐ Special case for these boxes. See Detail "A" and Table "A" for revised values of F_1, F_2, W_4 and W_5, when apron width is more than 1'-0" and W_3=0". For Details "A" and Tables "A" for each slope, see Drawing Nos. W-X302-1, W-X302-2, or W-X303-1, W-X303-2, or W-X304-1, W-X304-2.

NOTE:- This drawing to be used in conjunction with Standard Wing Drawings for 30° Skews for each slope as listed below.

2:1 Slopes	3:1 Slopes	4:1 Slopes
W-X302-1 or W-X302-2	W-X303-1 or W-X303-2	W-X304-1 or W-X304-2.

NOTE:- This drawing to be used in conjunction with Standard Barrel Sections, Drawing Nos.-

SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-130X-0	R-230X-01	R-330X-01	R-430X-01	R-530X-01
	R-230X-02	R-330X-02	R-430X-02	R-530X-02
R-130X-1	R-230X-1	R-330X-1	R-430X-1	R-530X-1
	R-230X-2	R-330X-2		

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 30° SKEW

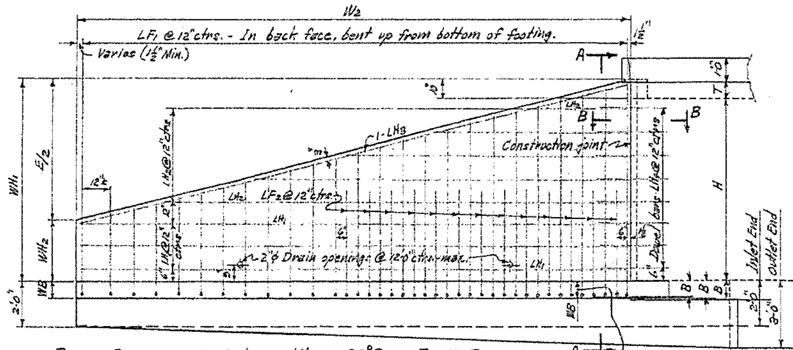
4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS — 2:1, 3:1 & 4:1 SLOPES

SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER H=2,3,4,5,6,7,8,9,10,11 & 12.

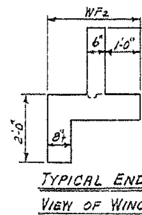
STANDARD DRAWING NO. W-X30

Designed by:- W.C.H. 5-16-63
Drawn by:- W.C.H. 7-15-63
Quantities by:-
Checked by:-
Checked by:- TAHS 8-21-63
Checked by:-

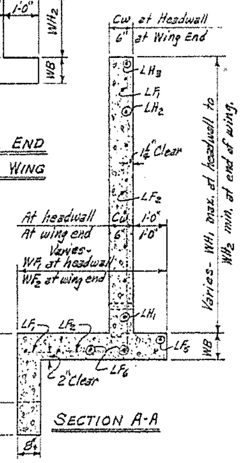
FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			44	
JOB No.					



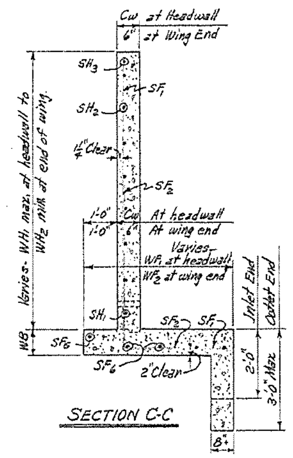
REAR ELEVATION OF LONG WING - 30° SKEW RIGHT FORWARD - SHOWING BACK FACE REINFORCING



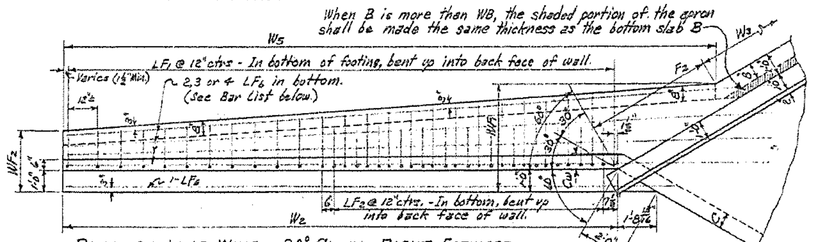
TYPICAL END VIEW OF WING



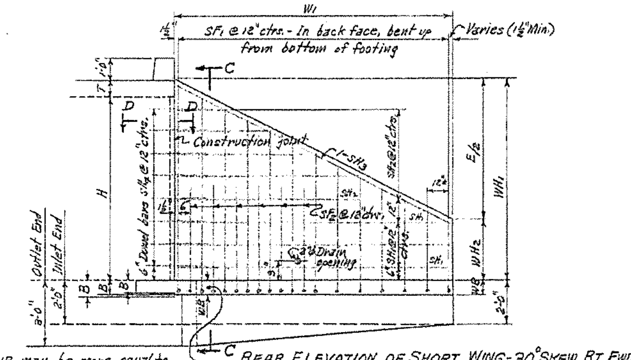
SECTION A-A



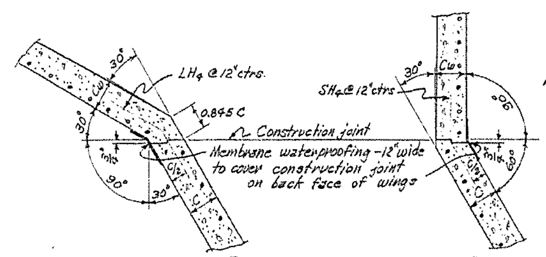
SECTION C-C



PLAN OF LONG WING - 30° SKEW RIGHT FORWARD - SHOWING FOOTING REINFORCING



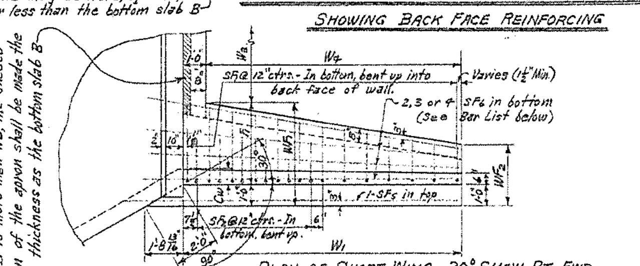
REAR ELEVATION OF SHORT WING - 30° SKEW RT. FWD. SHOWING BACK FACE REINFORCING



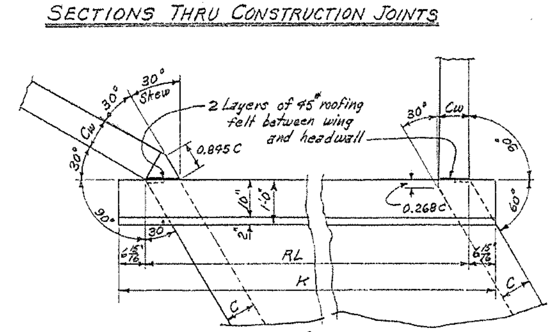
SECTION B-B SECTION D-D

SECTIONS THRU CONSTRUCTION JOINTS

NOTE:- Payment for the membrane waterproofing and roofing felt shall be included in unit price bid for Class S Concrete.



PLAN OF SHORT WING - 30° SKEW RT. FWD. SHOWING FOOTING REINFORCING



DETAILS AT TOP OF WINGS - 30° SKEW RIGHT FORWARD

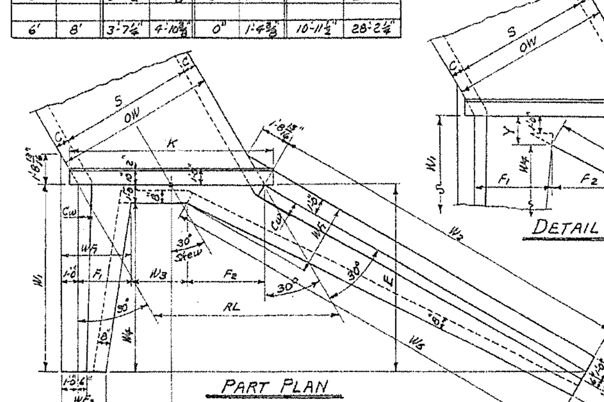
REGULAR WING DIMENSIONS - 2:1 SLOPES

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HDWL=C	WINGWALL HEIGHTS AT HEADWALL	WINGWALL HEIGHTS AT END OF WING	WIDTHS OF WING FOOTINGS AT HEADWALL	WIDTHS OF WING FOOTINGS AT END OF WING	FOOTING DIMENSION PARALLEL WITH HEADWALL SHORT WING	FOOTING DIMENSION LONG WING	PERPENDICULAR DIST. FROM HDWL TO END OF WING	LENGTHS OF WINGWALLS SHORT WING	LENGTHS OF WINGWALLS LONG WING	INSIDE FOOTING DIMENSIONS SHORT WING	INSIDE FOOTING DIMENSIONS LONG WING	* QUANTITY PER WING CLASS S CONCRETE INLET END SHORT WING	INLET END LONG WING	OUTLET END SHORT WING	OUTLET END LONG WING
H	WB	Cw	WH1	WH2	WF1	WF2	F1	F2	E	W1	W2	W4	W5	CU.YD.	CU.YD.	CU.YD.	CU.YD.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	1'-4"	0'-11½"	4'-4"	4'-4"	8'-8"	3'-4"	8'-11¾"	0.505	1.054	0.562	1.169
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-8"	1'-7¼"	5'-8"	5'-8"	11'-4"	4'-8"	12'-2¾"	0.757	1.595	0.831	1.750
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	2'-0"	2'-3¼"	7'-0"	7'-0"	14'-0"	6'-0"	15'-5½"	1.056	2.229	1.147	2.424
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11½"	8'-4"	8'-4"	16'-8"	7'-4"	18'-8½"	1.402	2.957	1.509	3.193
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11½"	8'-4"	8'-4"	16'-8"	7'-4"	18'-8½"	1.458	3.083	1.565	3.318
⊕ 6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	9'-8"	9'-8"	19'-4"	8'-8"	21'-11½"	1.948	4.101	2.071	4.377
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	9'-8"	9'-8"	19'-4"	8'-8"	21'-11½"	1.986	4.186	2.110	4.462
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	9'-8"	9'-8"	19'-4"	8'-8"	21'-11½"	2.025	4.272	2.149	4.547
⊕ 7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	11'-0"	11'-0"	22'-0"	10'-0"	25'-5¾"	2.552	5.377	2.693	5.696
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	11'-0"	11'-0"	22'-0"	10'-0"	25'-5¾"	2.603	5.487	2.743	5.807
⊕ 8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	5'-7¼"	12'-4"	12'-4"	24'-8"	11'-4"	29'-0¼"	3.267	6.875	3.422	7.239

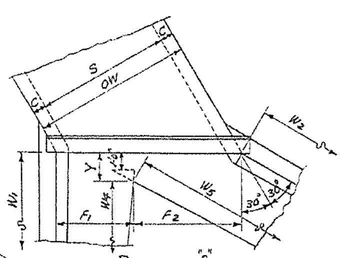
* Quantity per wing does not include headwall or that portion of apron or toewall for the length W3.
⊕ See Table "A" for special values of F1 & F2 and W4 & W5 for Single 4'x6', 5'x7' and 6'x8' Box Culverts.

TABLE "A" - DIMENSIONS FOR DETAIL "A"

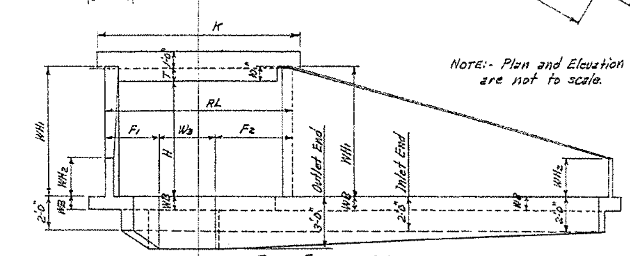
S	H	F1	F2	W3	Y	W4	W5
4'	6'	2'-7¾"	3'-3⅞"	0"	1'-1¾"	8'-6¼"	21'-7½"
5'	7'	3'-1½"	9'-1⅛"	0"	1'-3"	9'-9"	24'-11"
6'	8'	3'-7¼"	4'-10⅜"	0"	1'-4⅜"	10'-11½"	28'-2¼"



PART PLAN



DETAIL "A"



NOTE:- Plan and Elevation are not to scale.

END ELEVATION

SINGLE BARREL CULVERT - 30° SKEW RIGHT FORWARD

Details of Culvert with 30° Skew Left Forward is reversed, see Drawing No. W-X30.

TYPICAL WING DETAILS

NOTE:-
For remainder of General Plans and Elevations of Single, Double, Triple, Quadruple and Quintuple Span Culverts, see Std. Drawing No. W-X30.
For values of RL, K and W3 for each box, see above Std. also.

MEMBRANE:- A membrane waterproofing 12" wide, consisting of three moppings 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.

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	REINFORCING STEEL ⊕ - FOR 4 WINGS	CLASS S CONCRETE - 4 WINGS (HEADWALLS, WINGWALLS, FOOTINGS, TOEWALLS AND APRONS) SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.
4'	2'	6"	7"	100	4.23	5.34	6.44	7.55	8.66
	3'	6"	7"	151	5.74	6.84	7.95	9.06	10.17
	4'	6"	7"	232	7.53	8.63	9.73	10.84	11.95
	5'	6"	7"	321	9.59	10.69	11.80	12.91	14.02
	6'	7"	8"	522	12.91	14.05	15.19	16.33	17.47
5'	3'	6"	7"	151	5.99	7.33	8.67	10.02	11.36
	4'	6"	7"	232	7.77	9.11	10.46	11.80	13.15
	5'	6"	7"	321	9.84	11.18	12.52	13.87	15.22
	6'	7"	8"	522	13.16	14.53	15.91	17.29	18.67
	7'	7½"	8½"	1023	16.76	18.18	19.59	21.00	22.40
6'	3'	6"	7"	151	6.23	7.83	9.39	10.99	12.58
	4'	6"	7"	232	8.01	9.61	11.18	12.77	14.36
	5'	6"	7"	321	10.08	11.68	13.24	14.84	16.43
	6'	7"	8"	522	13.41	15.03	16.64	18.26	19.88
	7'	7½"	8½"	1023	17.03	18.69	20.32	21.97	23.62
	8'	8"	9"	1285	21.26	22.98	24.62	26.28	27.94
7'	4'	6"	7"	232	8.26	10.12	11.94	13.79	15.60
	5'	6"	7"	321	10.33	12.18	14.00	15.86	17.66
	6'	7"	8"	522	13.66	15.54	17.38	19.25	21.09
	7'	7½"	8½"	1023	17.29	19.18	21.06	22.95	24.83
	8'	8"	9"	1285	21.57	23.48	25.36	27.27	29.16
8'	4'	6"	7"	232	8.52	10.64	12.71	14.83	16.86
	5'	7"	7"	321	10.98	13.12	15.22	17.36	19.41
	6'	7"	8"	522	13.91	16.05	18.15	20.29	22.34
	7'	7½"	8½"	1023	17.54	19.70	21.82	23.98	26.05
	8'	8"	9"	1285	21.83	23.98	26.11	28.26	30.38
9'	5'	7"	7"	321	11.24	13.65	15.99	18.39	20.67
	6'	7½"	8"	522	14.44	16.86	19.23	21.65	23.95
	7'	7½"	8½"	1023	17.79	20.22	22.59	25.01	27.31
	8'	8"	9"	1285	22.08	24.50	26.87	29.29	31.60
10'	5'	7"	7"	321	11.50	14.17	16.77	19.32	21.94
	6'	7½"	8"	522	14.70	17.39	20.01	22.58	25.22
	7'	7½"	8½"	1023	18.05	20.74	23.37	25.94	28.58
	8'	8"	9"	1285	22.33	25.02	27.65	30.23	32.87
11'	6'	8"	8"	522	15.21	18.20	21.07	23.93	——
	7'	8"	8½"	1023	18.64	21.62	24.50	27.36	——
	8'	8"	9"	1285	22.58	24.56	28.44	31.30	——
12'	6'	8"	8"	522	15.48	18.75	21.88	25.02	——
	7'	8"	8½"	1023	18.90	22.17	25.30	28.45	——
	8'	8"	9"	1285	22.84	26.10	29.24	32.39	——

⊕ For reinforcing steel in Headwalls and Aprons, see Drawing Nos. of Barrel Sections listed below.

GENERAL NOTES:-
CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" 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) 1200#/"
Reinforcing Steel 20,000#/"

NOTE:-
This drawing to be used in conjunction with Standard Barrel Sections, Drawing Nos.-

SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-130X-0	R-230X-01	R-330X-01	R-430X-01	R-530X-01
	R-230X-02	R-330X-02	R-430X-02	R-530X-02
R-130X-1	R-230X-1	R-330X-1	R-430X-1	R-530X-1
	R-230X-2	R-330X-2		

BAR LIST FOR ONE SHORT AND ONE LONG WING - 2 EACH REQUIRED

CLEAR HEIGHT	WING LOCATION	SF1 & LF1 BENT - In bottom of footing, bent up into back face of wing. One bar of each length. SIZE	SPACING	NO. REQ'D	LENGTHS VARY MIN.	LENGTHS VARY MAX.	X MIN.	X MAX.	Y MIN.	Y MAX.	SF2 & LF2 BENT - In bottom of footing, bent up into back face of wing. Alt. with F1 bars. SIZE	SPACING	NO. REQ'D	LENGTH	X	Y
H	SHORT OR LONG															
2'	Short	#3	12"	5	1'-6"	3'-11"	0'-8"	1'-1"	0'-11"	2'-11"	—	—	—	—	—	—
	Long	#3	12"	9	1'-7"	3'-11"	0'-8"	1'-0"	1'-0"	3'-0"	—	—	—	—	—	—
3'	Short	#3	12"	6	2'-2"	5'-3"	0'-10"	1'-5"	1'-5"	3'-11"	—	—	—	—	—	—
	Long	#3	12"	12	2'-0"	5'-3"	0'-10"	1'-4"	1'-3"	4'-0"	—	—	—	—	—	—
4'	Short	#3	12"	8	2'-3"	6'-7"	0'-11"	1'-9"	1'-5"	4'-11"	—	—	—	—	—	—
	Long	#3	12"	15	2'-4"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—
5'	Short	#3	12"	9	2'-10"	7'-11"	1'-0"	2'-1"	1'-11"	5'-11"	#3	12"	2	3'-6"	1'-1"	2'-6"
	Long	#3	12"	17	2'-11"	7'-10"	1'-0"	1'-11"	2'-0"	6'-0"	#3	12"	5	3'-6"	1'-1"	2'-6"
6'	Short	#4	12"	10	3'-7"	9'-4"	1'-2"	2'-5"	2'-6"	7'-0"	#3	12"	2	4'-6"	1'-4"	3'-3"
	Long	#4	12"	20	3'-5"	9'-3"	1'-2"	2'-3"	2'-4"	7'-1"	#3	12"	5	4'-6"	1'-4"	3'-3"
7'	Short	#4	12"	12	3'-8"	10'-10"	1'-3"	2'-11"	2'-6"	8'-0"	#4	12"	4	5'-6"	1'-7"	4'-0"
	Long	#4	12"	23	3'-9"	10'-8"	1'-3"	2'-8"	2'-7"	8'-1"	#4	12"	9	5'-6"	1'-7"	4'-0"
8'	Short	#4	12"	13	4'-5"	12'-5"	1'-5"	3'-5"	3'-1"	9'-1"	#4	12"	6	6'-6"	1'-10"	4'-9"
	Long	#4	12"	25	4'-6"	12'-2"	1'-5"	3'-1"	3'-2"	9'-2"	#4	12"	13	6'-6"	1'-10"	4'-9"

CLEAR HEIGHT	WING LOCATION	SF5 & LF5 STRAIGHT - Longitudinal in top of wing footing heel. SIZE	NO. REQ'D	LENGTH	SF6 & LF6 STRAIGHT - Longitudinal in bottom of wing footing toe. SIZE	NO. REQ'D	LENGTH	SH1 & LH1 STRAIGHT - Horizontal in back face of wing. SIZE	SPACING	NO. REQ'D	LENGTH
2'	Short	#3	1	6'-10"	#3	2	6'-0"	#3	12"	1	4'-1"
	Long	#3	1	11'-2"	#3	2	11'-2"	#3	12"	1	8'-4"
3'	Short	#3	1	8'-2"	#3	2	7'-4"	#3	12"	1	5'-5"
	Long	#3	1	13'-10"	#3	2	14'-6"	#3	12"	1	11'-0"
4'	Short	#3	1	9'-6"	#3	3	8'-8"	#3	12"	1	6'-9"
	Long	#3	1	16'-6"	#3	3	17'-10"	#3	12"	1	13'-8"
5'	Short	#3	1	10'-10"	#3	3	10'-0"	#3	12"	2	8'-1"
	Long	#3	1	19'-2"	#3	3	21'-2"	#3	12"	2	16'-4"
6'	Short	#3	1	12'-2"	#3	3	11'-4"	#3	12"	2	9'-5"
	Long	#3	1	21'-10"	#3	3	24'-6"	#3	12"	2	19'-0"
7'	Short	#4	1	13'-6"	#4	4	12'-8"	#4	12"	2	10'-9"
	Long	#4	1	24'-6"	#4	4	28'-0"	#4	12"	2	21'-8"
8'	Short	#4	1	14'-10"	#4	4	14'-0"	#4	12"	3	12'-1"
	Long	#4	1	27'-2"	#4	4	31'-6"	#4	12"	3	24'-4"

CLEAR HEIGHT	WING LOCATION	SH2 & LH2 STRAIGHT - Horizontal in back face of wing. One bar of each length. SIZE	SPACING	NO. REQ'D	LENGTHS VARY MAX.	LENGTHS VARY MIN.	SH3 & LH3 STRAIGHT - In back face of wing at top - on slope SIZE	NO. REQ'D	LENGTH	SH4 & LH4 BENT - Dowels thru construction joint at headwall. SIZE	SPACING	NO. REQ'D	LENGTH	X	QUANTITY REINFORCING STEEL PER WING - LBS. SHORT WING	LONG WING
2'	Short	#3	12"	1	—	2'-2"	#3	1	4'-6"	#3	12"	2	2'-8"	1'-4"	18.2	31.9
	Long	#3	12"	1	—	4'-4"	#3	1	8'-8"	#3	12"	2	"	"		
3'	Short	#3	12"	2	4'-2"	2'-2"	#3	1	6'-0"	#3	12"	3	"	"	26.6	48.7
	Long	#3	12"	2	8'-4"	4'-4"	#3	1	11'-5"	#3	12"	3	"	"		
4'	Short	#3	12"	3	6'-2"	2'-2"	#3	1	7'-6"	#3	12"	4	"	"	40.7	75.1
	Long	#3	12"	3	12'-4"	4'-4"	#3	1	14'-3"	#3	12"	4	"	"		
5'	Short	#3	12"	3	6'-2"	2'-2"	#3	1	9'-0"	#3	12"	5	"	"	55.4	105.1
	Long	#3	12"	3	12'-4"	4'-4"	#3	1	16'-11"	#3	12"	5	"	"		
6'	Short	#3	12"	4	8'-2"	2'-2"	#3	1	10'-6"	#3	12"	6	"	"	88.7	172.2
	Long	#3	12"	4	16'-4"	4'-4"	#3	1	19'-8"	#3	12"	6	2'-8"	1'-4"		
7'	Short	#4	12"	5	10'-2"	2'-2"	#4	1	12'-0"	#4	12"	7	3'-6"	1'-9"	175.0	336.5
	Long	#4	12"	5	20'-4"	4'-4"	#4	1	22'-5"	#4	12"	7	"	"		
8'	Short	#4	12"	5	10'-2"	2'-2"	#4	1	13'-6"	#4	12"	8	"	"	219.0	423.4
	Long	#4	12"	5	20'-4"	4'-4"	#4	1	25'-2"	#4	12"	8	3'-6"	1'-9"		

BAR BENDING DIAGRAM: SF1 & SF2, LF1 & LF2 (3" Pin); SH4 & LH4 (slope 7:12).
NOTE:- Dimensions are to bar centers.

NOTE:- Bars for short wing shall be marked with prefix letter "S", while those for long wing shall be marked with letter "L".

REVISIONS:- Membrane Added. 5-10-66 W.C.H.

Designed By:- W.C.H. 5-13-63 Checked By:- RHS 8-21-63
Drawn By:- W.C.H. 7-30-63 Checked By:- DMT 7-15-64
Quantities By:- W.C.H. 1-7-64 Checked By:-

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 30° SKEW

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

STANDARD DRAWING NO. W-X302-1

RESHOT 3-4-93

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			45	
JOB No.					

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

DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	'a' bars STRAIGHT — In Top and Bottom Slabs of Barrel. 2 Add'l in Apron and Headwall- Each. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	'b' bars BENT - See Diagram below. In Top and Bottom Slabs of Barrel. Alternate with 'a' bars. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	'd' bars STRAIGHT — Longitudinal in Top Slab of Barrel. SIZE	SPACING	NO REQ'D	LENGTH	'd' bars STRAIGHT — Longitudinal in Sidewalls. SIZE	SPACING	NO REQ'D	LENGTH	'e' bars. STRAIGHT — Longitudinal in Bottom Slab of Barrel SIZE	SPACING	NO REQ'D	LENGTH	'f' bars STRAIGHT — Verticals in Sidewalls SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
0'-0" TO 5'-0" MAXIMUM	4'@1'	2'			120	120	4'-9"			110	110	5'-10"	4'-8"															120	120	2'-11"
		3'			120	120	4'-9"			110	110	5'-10"	4'-8"															120	120	3'-11"
		4'	#5	13"	120	120	4'-9"	#6	13"	110	110	5'-10"	4'-8"	#5	10½"	6		#4	12"	4		#4	12"	5		#4	12"	120	120	4'-11"
		5'			120	120	4'-9"			110	110	5'-10"	4'-8"			6				6				5				120	120	5'-11"
		6'			120	120	4'-11"			110	110	6'-0"	4'-10"			6				12				5				120	120	6'-11"
	5'@1'	3'			120	120	5'-9"			110	110	6'-10"	5'-8"			6				6				6				120	120	4'-0"
		4'			120	120	5'-9"			110	110	6'-10"	5'-8"			7				8				6				120	120	5'-0"
		5'	#6	13"	120	120	5'-9"	#6	13"	110	110	6'-10"	5'-8"	#5	10½"	7		#4	12"	10		#4	12"	6		#4	12"	120	120	6'-0"
		6'			120	120	5'-11"			110	110	7'-0"	5'-10"			7				12				6				120	120	7'-0"
		7'			120	120	6'-0"			110	110	7'-1"	5'-11"			7				14				6				120	120	8'-0"
	6'@1'	3'			128	128	6'-9"			118	118	7'-10"	6'-8"			8				6				7				120	120	4'-1"
		4'			128	128	6'-9"			118	118	7'-10"	6'-8"			8				8				8				120	120	5'-1"
		5'	#6	12"	128	128	6'-9"	#6	12"	118	118	7'-10"	6'-8"	#5	10½"	8		#4	12"	10		#4	12"	7		#4	12"	120	120	6'-1"
		6'			128	128	6'-11"			118	118	8'-0"	6'-10"			8				12				7				120	120	7'-1"
		7'			128	128	7'-0"			118	118	8'-1"	6'-11"			8				14				7				120	120	8'-1"
		8'			128	128	7'-1"			118	118	8'-2"	7'-0"			8				16				7		#5	12"	120	120	9'-1"
	7'@1'	4'			140	140	7'-9"			130	130	8'-10"	7'-8"			9				8				8				120	120	5'-2"
		5'			140	140	7'-9"			130	130	8'-10"	7'-8"			9				10				8		#4	12"	120	120	6'-2"
		6'	#6	11"	140	140	7'-11"	#6	11"	130	130	9'-0"	7'-10"	#5	10½"	9		#4	12"	12		#4	12"	8				120	120	7'-2"
		7'			140	140	8'-0"			130	130	9'-1"	7'-11"			9				14				8				120	120	8'-2"
		8'			140	140	8'-1"			130	130	9'-2"	8'-0"			9				16				8				10"	144	144	9'-2"
		9'			140	140	8'-3"			130	130	9'-4"	8'-2"			9				18				8				#5	12"	120	120	10'-2"
	8'@1'	4'			128	128	8'-9"			118	118	9'-10"	8'-8"			9				8				9				12"	120	120	5'-8"
		5'			128	128	8'-11"			118	118	10'-0"	8'-10"			9				10				9				120	120	6'-8"
		6'			128	128	8'-11"			118	118	10'-0"	8'-10"			9				12				9				120	120	7'-8"
		7'	#7	12"	128	128	9'-0"	#6	12"	118	118	10'-1"	8'-11"	#5	10"	11		#4	12"	14		#4	12"	9		#4	12"	120	120	8'-8"
		8'			128	128	9'-1"			118	118	10'-2"	9'-0"			11				16				9				10"	144	144	9'-10"
		9'			128	128	9'-3"			118	118	10'-4"	9'-2"			11				18				9				#5	12"	120	120	10'-8"
		10'			128	128	9'-5"			118	118	10'-6"	9'-4"			11				20				9				11"	132	132	11'-9"
	9'@1'	5'			140	140	9'-11"			130	130	11'-0"	9'-10"			12				10				10				12"	120	120	6'-5"
		6'			140	140	10'-0"			130	130	11'-1"	9'-11"			12				12				10				120	120	7'-5"
		7'			140	140	10'-0"			130	130	11'-1"	9'-11"			12				14				10				120	120	8'-5"
		8'	#7	11"	140	140	10'-1"	#6	11"	130	130	11'-2"	10'-0"	#5	10"	12		#4	12"	16		#4	12"	10		#4	12"	144	144	9'-5"
		9'			140	140	10'-3"			130	130	11'-4"	10'-2"			12				18				10				12"	120	120	10'-5"
		10'			140	140	10'-5"			130	130	11'-6"	10'-4"			12				20				10		#5	11"	132	132	11'-5"
		11'			140	140	10'-7"			130	130	11'-8"	10'-6"			12				22				10				144	144	12'-5"
	10'@1'	5'			128	128	10'-11"			118	118	12'-2"	10'-10"			13				10				11				12"	120	120	6'-6"
		6'			128	128	11'-0"			118	118	12'-3"	10'-11"			13				12				11				120	120	7'-6"
		7'			128	128	11'-0"			118	118	12'-3"	10'-11"			13				14				11				120	120	8'-6"
		8'	#7	12"	128	128	11'-1"	#7	12"	118	118	12'-4"	11'-0"	#5	10"	13		#4	12"	16		#4	12"	11		#4	12"	144	144	9'-6"
		9'			128	128	11'-3"			118	118	12'-6"	11'-2"			13				18				11				12"	120	120	10'-6"
		10'			128	128	11'-5"			118	118	12'-8"	11'-4"			13				20				11		#5	11"	132	132	11'-6"
		11'			128	128	11'-7"			118	118	12'-10"	11'-6"			13				22				11				144	144	12'-6"
		12'			128	128	11'-9"			118	118	13'-0"	11'-8"			13				24				11		#6	13"	120	120	13'-6"
	6'@1'	6'			140	140	12'-1"			130	130	13'-2"	12'-0"			15				12				12				120	120	7'-7"
		7'			140	140	12'-1"			130	130	13'-2"	12'-0"			15				14				12		#4	13"	120	120	8'-7"
		8'			140	140	12'-1"			130	130	13'-3"	12'-0"			15				16				12				10"	144	144	9'-7"
		9'	#7	11"	140	140	12'-3"	#7	11"	130	130	13'-4"	12'-2"	#5	9½"	15		#4	12"	18		#4	12"	12		#4	13"	12"	120	120	10'-7"
		10'			140	140	12'-5"			130	130	13'-6"	12'-4"			15				20				12		#5	11"	132	132	11'-7"
		11'			140	140	12'-7"			130	130	13'-10"	12'-6"			15				22				12				10"	144	144	12'-7"
		12'			140	140	12'-9"			130	130	14'-0"	12'-8"			15				24				12		#6	13"	12"	120	120	13'-7"
	7'@1'	6'			128	128	13'-1"			118	118	14'-4"	13'-0"			16				12				13				12"	120	120	7'-9"
		7'			128	128	13'-1"			118	118	14'-4"	13'-0"			16				14				13		#4	13"	12"	120	120	8'-9"
		8'			128	128	13'-1"			118	118	14'-4"	13'-0"			16				16				13				10"	144	144	9'-9"
		9'	#8	12"	128	128	13'-3"	#7	12"	118	118	14'-6"	13'-2"	#5	9½"	16		#4	12"	18		#4	12"	13		#4	13"	12"	120	120	10'-9"
		10'			128	128	13'-5"			118	118	14'-8"	13'-4"			16				20				13		#5	11"	132	132	11'-9"
		11'			128	128	13'-7"			118	118	14'-10"	13'-6"			16				22				13				144	144	12'-9"
		12'			128	128	13'-9"			118	118	15'-0"	13'-8"			16				24				13		#6	13"	12"	120	120	13'-9"

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM Bars 'b'.
#6	3"	5"	1'-2"	K, Pin Diam., X
#7	3½"	5⅝"	1'-4"	

NOTE:- Dimensions are to centers of bars.

DOWEL BARS FOR TWO HEADWALLS

SPAN	SIZE	SPACING	NO. REQ'D	LENGTH	X
4'	#4	11½"	12	2'-6"	1'-3"
5'	#4	11½"	14	2'-7"	1'-3½"
6'	#4	11½"	16	2'-8"	1'-4"
7'	#4	11½"	18	2'-9"	1'-4⅝"
8'	#4	11⅝"	20	2'-11"	1'-5⅛"
9'	#4	11⅝"	22	3'-0"	1'-6"
10'	#4	11⅝"	24	3'-1"	1'-6⅝"
11'	#4	12"	26	3'-2"	1'-7"
12'	#4	12"	28	3'-3"	1'-7⅝"

Bars 'r' Dowel bars in Headwalls.

DIMENSIONS — BARREL DIMENSIONS

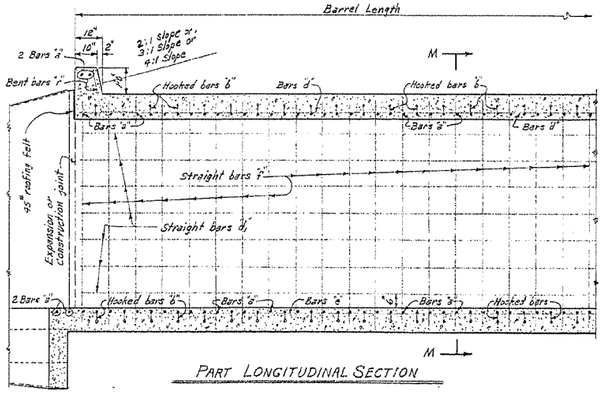
MAX. DESIGN DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	SQ. FT. OPENING A	OVERALL WIDTH OW	THICKNESS OF TOP SLAB T	THICKNESS OF SIDEWALLS C	THICKNESS OF BOTTOM SLAB B	OVERALL HEIGHT OH
5'-0"	4'@1'	2'	8	5'-0"	7"	6"	6"	3'-1½"
		3'	12	5'-0"		6"	6"	4'-1½"
		4'	16	5'-0"		6"	6"	5'-1½"
		5'	20	5'-0"		6"	6"	6'-1½"
		6'	24	5'-2"		7"	7"	7'-1½"
	5'@1'	3'	15	6'-0"	7⅞"	6"	6½"	4'-2½"
		4'	20	6'-0"		6"		5'-2½"
		5'	25	6'-0"		6"		6'-2½"
		6'	30	6'-2"		7"		7'-2½"
		7'	35	6'-3"		7½"		8'-2½"
	6'@1'	3'	18	7'-0"	8"	6"	7"	4'-3½"
		4'	24	7'-0"		6"		5'-3½"
		5'	30	7'-0"		6"		6'-3½"
		6'	36	7'-2"		7"		7'-3½"
		7'	42	7'-3"		7½"		8'-3½"
		8'	48	7'-4"		8"		9'-3½"
	7'@1'	4'	28	8'-0"	8⅝"	6"	7½"	5'-5"
		5'	35	8'-0"		6"		6'-5"
		6'	42	8'-2"		7"		7'-5"
		7'	49	8'-3"		7½"		8'-5"
		8'	56	8'-4"		8"		9'-5"
		9'	63	8'-6"		9"		10'-5"
	8'@1'	4'	32	9'-0"	9⅜"	6"	8"	5'-7"
		5'	40	9'-2"		7"		6'-7"
		6'	48	9'-3"		7"		7'-7"
		7'	56	9'-3"		7½"		8'-7"
		8'	64	9'-4"		8"		9'-7"
		9'	72	9'-6"		9"		10'-7"
		10'	80	9'-8"		10"		11'-7"
	9'@1'	5'	45	10'-2"	10"	7"	9"	6'-8"
		6'	54	10'-3"		7½"		7'-8"
		7'	63	10'-3"		7½"		8'-8"
		8'	72	10'-4"		8"		9'-8"
		9'	81	10'-6"		9"		10'-8"
		10'	90	10'-8"		10"		11'-8"
		11'	99	10'-10"		11"		12'-8"
	10'@1'	5'	50	11'-2"	10⅝"	7"	11"	6'-9½"
		6'	60	11'-3"		7½"		7'-9½"
		7'	70	11'-3"		7½"		8'-9½"
		8'	80	11'-4"		8"		9'-9½"
		9'	90	11'-6"		9"		10'-9½"
		10'	100	11'-8"		10"		11'-9½"
		11'	110	11'-10"		11"		12'-9½"
		12'	120	12'-0"		12"		13'-9½"
	11'@1'	6'	66	12'-9"	11⅜"	8"	11⅝"	7'-10⅛"
		7'	77	12'-9"		8"		8'-10⅛"
		8'	88	12'-9"		8"		9'-10⅛"
		9'	99	12'-9"		9"		10'-10⅛"
		10'	110	12'-9"		10"		11'-10⅛"
		11'	121	12'-9"		11"		12'-10⅛"
		12'	132	13'-0"		12"		13'-10⅛"
	12'@1'	6'	72	13'-9"	11⅞"	8"	12½"	8'-0"
		7'	84	13'-9"		8"		9'-0"
		8'	96	13'-9"		8"		10'-0"
		9'	108	13'-9"		9"		11'-0"
		10'	120	13'-9"		10"		12'-0"
		11'	132	13'-10"		11"		13'-0"
		12'	144	14'-0"		12"		14'-0"

QUANTITIES — UNIT QUANTITIES

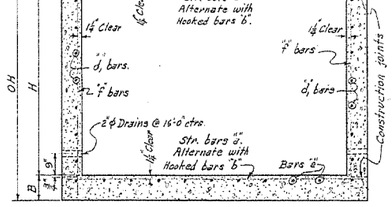
CLASS S CONC PER LIN. FT. OF BARREL CU.YD.	REINFORCING STEEL PER LIN. FT. OF BARREL LB.	REINFORCING STEEL ADDITIONAL PER LAP LB.	REINFORCING STEEL ADDITIONAL TWO HEADWALLS & APRONS LB.
0.282	41.49	17.95	66.35
0.319	46.16	19.62	66.35
0.356	46.83	21.29	66.35
0.394	49.50	22.96	66.35
0.474	52.96	24.63	67.75
0.380	55.55	22.19	101.27
0.417	58.23	23.86	101.27
0.454	60.90	25.53	101.27
0.535	64.99	27.20	103.27
0.606	67.63	28.87	104.27
0.496	66.29	24.76	118.96
0.483	68.96	26.93	118.96
0.520	71.64	28.10	118.96
0.602	75.31	29.77	120.96
0.671	78.98	31.94	121.97
0.796	88.47	33.11	122.37
0.568	81.32	29.01	136.88
0.605	84.00	30.68	136.88
0.688	87.76	32.35	138.88
0.757	90.38	34.02	139.88
0.832	96.65	35.69	140.88
0.996	105.59	37.36	142.89
0.676	95.26	33.32	159.67
0.754	99.12	34.99	196.80
0.797	101.79	36.66	196.80
0.867	105.05	38.33	198.16
0.992	110.81	40.00	199.52
1.057	119.92	41.67	202.25
1.189	126.67	43.34	204.97
0.844	119.72	37.56	219.61
0.910	118.04	39.23	220.97
0.957	120.71	40.90	220.97
1.033	126.54	42.57	222.33
1.148	135.80	44.24	224.06
1.276	142.69	45.91	224.78
1.416	150.90	47.58	230.51
0.957	130.69	40.13	242.64
1.024	133.99	41.80	244.00
1.071	136.66	43.47	244.00
1.147	142.55	45.14	245.36
1.263	151.92	46.81	248.09
1.391	158.89	48.98	250.81
1.532	166.71	50.15	253.54
1.685	178.67	51.82	256.26
1.153	156.16	46.12	268.62
1.202	157.83	47.79	268.62
1.252	162.06	49.46	268.62
1.368	172.60	51.13	271.34
1.497	173.70	52.80	274.07
1.638	187.67	54.47	276.79
1.792	193.73	56.14	279.52
1.284	172.20	48.69	352.62
1.333	174.87	50.36	352.62
1.383	190.15	52.03	352.62
1.500	183.85	58.70	361.18
1.630	197.07	55.37	364.74
1.772	205.16	57.04	368.30
1.926	217.95	58.71	371.86

W-X002-1, W-X003-2, W-X004-2.

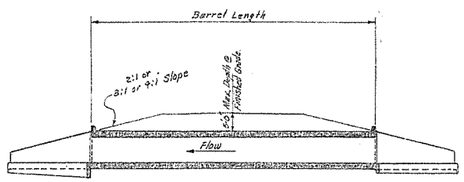
W-X002-1 or W-X003-1 or W-X004-1 and W-X002-2 or W-X003-2 or W-X004-2.



PART LONGITUDINAL SECTION



TYPICAL SECTION M-M



LONGITUDINAL SECTION

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" 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 32'-0". Lap longitudinal bars 30 diameters.

CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls 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 24,000 Lb. Axles @ 9'-0" ctrs.

UNIT STRESSES:-

Class S Concrete (n=10) 1200 #/□"

Reinforcing Steel 20,000 #/□"

NOTE:- This drawing to be used in conjunction with Standard Drawing Nos. W-X003-1 or W-X003-2 and W-X004-1 or W-X004-2. Also Drawing Nos. 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

SINGLES — UNDER 5'-0" COVER

STANDARD DRAWING NO. R-100X-0

Designed By:- W.C.H. 1-20-63. Checked By:- RBHS - 5-31-63

Drawn By:- W.C.H. 2-8-63. Checked By:- RBHS - 5-31-63

Quantities By:- W.C.H. 2-12-63. Checked By:- RBHS - 5-31-63

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			46	
JOB No.					

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

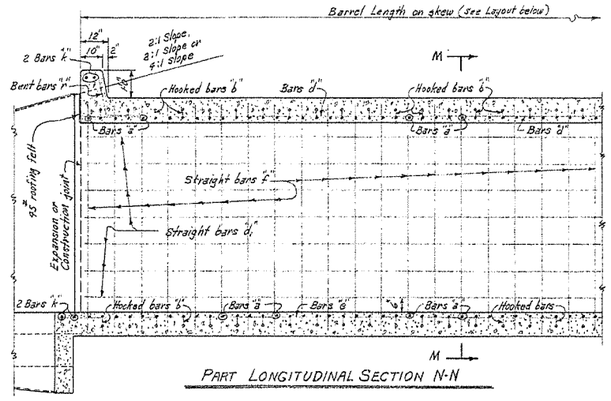
DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	"a" bars STRAIGHT In Top and Bottom Slabs of Barrel.				"b" bars BENT- See Diagram. In Top and Bottom Slabs of Barrel. Alternate with "a" bars					"d" bars STRAIGHT Longitudinal in Top Slab of Barrel.				"d1" bars STRAIGHT Longitudinal in Sidewalls				"e" bars STRAIGHT Longitudinal in Bottom Slab of Barrel				"f" bars STRAIGHT Verticals in Sidewalls				"h" bars STRAIGHT 2 in Top of Headwalls and Aprons-Each.		
D	S	H	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	X	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	No. REQ'D	LENGTH
0'-0" TO 5'-0" MAXIMUM	4'@	2'	#6	13"	112	4'-11"	#6	13"	110	6'-0"	4'-2"	#5	10½"	6		#4	12"	4		#4	12"	5		#6	12"	120	2'-11"	#5	8	5'-5"
		3'			112	4'-11"			110	6'-0"	4'-2"			6				6				5				120	3'-11"		8	5'-5"
		4'			112	4'-11"			110	6'-0"	4'-2"			6				8				5				120	4'-11"		8	5'-5"
		5'			112	4'-11"			110	6'-0"	4'-2"			6				10				5				120	5'-11"		8	5'-5"
		6'			112	5'-1"			110	6'-2"	5'-0"			6				12				5				120	6'-11"		8	5'-7"
	5'@	3'			112	5'-11"			110	7'-1"	5'-11"			6				6				6				120	4'-5"		8	6'-6"
		4'			112	5'-11"			110	7'-1"	5'-11"			7				8				6				120	5'-5"		8	6'-6"
		5'	#6	13"	112	5'-11"	#6	13"	110	7'-1"	5'-11"	#5	10½"	7		#4	12"	10		#4	12"	6		#6	12"	120	6'-0"	#6	8	6'-6"
		6'			112	6'-1"			110	7'-3"	6'-1"			7				12				6				120	7'-0"		8	6'-8"
		7'			112	6'-2"			110	7'-4"	6'-2"			7				14				6				120	8'-0"		8	6'-9"
	6'@	3'			120	7'-0"			118	8'-1"	6'-11"			8				6				7				120	4'-11"		8	7'-6"
		4'			120	7'-0"			118	8'-1"	6'-11"			8				8				7				120	5'-11"		8	7'-6"
		5'	#6	12"	120	7'-0"	#6	12"	118	8'-1"	6'-11"	#5	10½"	8		#4	12"	10		#4	12"	7		#6	12"	120	6'-11"	#6	8	7'-6"
		6'			120	7'-2"			118	8'-3"	7'-1"			8				12				7				120	7'-11"		8	7'-8"
		7'			120	7'-3"			118	8'-4"	7'-2"			8				14				7				120	8'-11"		8	7'-9"
		8'			120	7'-5"			118	8'-5"	7'-3"			8				16				7				120	9'-11"		8	7'-10"
	7'@	4'			132	8'-0"			130	9'-1"	7'-11"			9				8				8				120	5'-11"		8	8'-7"
		5'			132	8'-0"			130	9'-1"	7'-11"			9				10				8				120	6'-11"		8	8'-7"
		6'	#6	11"	132	8'-2"	#6	11"	130	9'-3"	8'-1"	#5	10½"	9		#4	12"	12		#4	12"	8		#6	12"	120	7'-11"	#6	8	8'-9"
		7'			132	8'-3"			130	9'-4"	8'-2"			9				14				8				120	8'-11"		8	8'-10"
		8'			132	8'-4"			130	9'-5"	8'-3"			9				16				8				120	9'-11"		8	8'-11"
		9'			132	8'-6"			130	9'-7"	8'-5"			9				18				8				120	10'-5"		8	9'-1"
	8'@	4'			120	9'-1"			118	10'-2"	9'-0"			11				8				9				120	5'-9"		8	9'-7"
		5'			120	9'-3"			118	10'-4"	9'-2"			11				10				9				120	6'-9"		8	9'-9"
		6'			120	9'-3"			118	10'-4"	9'-2"			11				12				9				120	7'-9"		8	9'-9"
		7'	#7	12"	120	9'-4"	#6	12"	118	10'-5"	9'-3"	#5	10"	11		#4	12"	14		#4	12"	9		#7	12"	120	8'-9"	#6	8	9'-10"
		8'			120	9'-5"			118	10'-6"	9'-4"			11				16				9				120	9'-11"		8	9'-11"
		9'			120	9'-7"			118	10'-8"	9'-6"			11				18				9				120	10'-11"		8	10'-1"
		10'			120	9'-9"			118	10'-10"	9'-8"			11				20				9				120	11'-7"		8	10'-3"
	9'@	5'			132	10'-3"			130	11'-4"	10'-2"			12				10				10				120	6'-5"		8	10'-9"
		6'			132	10'-4"			130	11'-5"	10'-3"			12				12				10				120	7'-5"		8	10'-11"
		7'			132	10'-4"			130	11'-5"	10'-3"			12				14				10				120	8'-5"		8	10'-11"
		8'	#7	11"	132	10'-5"	#6	11"	130	11'-6"	10'-4"	#5	10"	12		#4	12"	16		#4	12"	10		#7	12"	120	9'-5"	#6	8	10'-11"
		9'			132	10'-7"			130	11'-8"	10'-6"			12				18				10				120	10'-5"		8	11'-2"
		10'			132	10'-9"			130	11'-10"	10'-8"			12				20				10				120	11'-5"		8	11'-4"
		11'			132	10'-11"			130	12'-0"	10'-10"			12				22				10				120	12'-5"		8	11'-6"
	10'@	5'			120	11'-3"			118	12'-7"	11'-3"			13				10				11				120	6'-6"		8	11'-10"
		6'			120	11'-4"			118	12'-8"	11'-4"			13				12				11				120	7'-6"		8	11'-11"
		7'			120	11'-4"			118	12'-8"	11'-4"			13				14				11				120	8'-6"		8	11'-11"
		8'	#7	12"	120	11'-5"	#7	12"	118	12'-9"	11'-5"	#5	10"	13		#4	12"	16		#4	12"	11		#7	12"	120	9'-6"	#6	8	12'-0"
		9'			120	11'-8"			118	12'-11"	11'-7"			13				18				11				120	10'-6"		8	12'-2"
		10'			120	11'-10"			118	13'-1"	11'-9"			13				20				11				120	11'-6"		8	12'-4"
		11'			120	12'-0"			118	13'-3"	11'-11"			13				22				11				120	12'-6"		8	12'-6"
		12'			120	12'-2"			118	13'-5"	12'-1"			13				24				11				120	13'-6"		8	12'-8"
	12'@	6'			132	12'-6"			130	13'-9"	12'-5"			15				12				12				120	7'-7"		8	13'-0"
		7'			132	12'-6"			130	13'-9"	12'-5"			15				14				12				120	8'-7"		8	13'-0"
		8'			132	12'-6"			130	13'-9"	12'-5"			15				16				12				120	9'-7"		8	13'-0"
		9'	#7	11"	132	12'-8"	#7	11"	130	13'-11"	12'-7"	#5	9½"	15		#4	12"	18		#4	12"	12		#7	12"	120	10'-7"	#6	8	13'-2"
		10'			132	12'-10"			130	14'-1"	12'-9"			15				20				12				120	11'-7"		8	13'-4"
		11'			132	13'-0"			130	14'-3"	12'-11"			15				22				12				120	12'-7"		8	13'-7"
		12'			132	13'-2"			130	14'-5"	13'-1"			15				24				12				120	13'-7"		8	13'-9"
	14'@	6'			120	13'-6"			118	14'-10"	13'-6"			16				12				13				120	7'-8"		8	14'-1"
		7'			120	13'-6"			118	14'-10"	13'-6"			16				14				13				120	8'-8"		8	14'-1"
		8'			120	13'-6"			118	14'-10"	13'-6"			16				16				13				120	9'-8"		8	14'-1"
		9'	#8	12"	120	13'-8"	#7	12"	118	15'-0"	13'-8"	#5	9½"	16		#4	12"	18		#4	12"	13		#8	12"	120	10'-8"	#6	8	14'-3"
		10'			120	13'-10"			118	15'-2"	13'-10"			16				20				13				120	11'-8"		8	14'-5"
		11'			120	14'-0"			118	15'-4"	14'-0"			16				22				13				120	12'-8"		8	14'-7"
		12'			120	14'-2"			118	15'-6"	14'-2"			16				24				13				120	13'-8"		8	14'-9"

NOTE:- The "a" and "b" bars are to be placed parallel with the headwalls, spacing to be parallel with barrel.

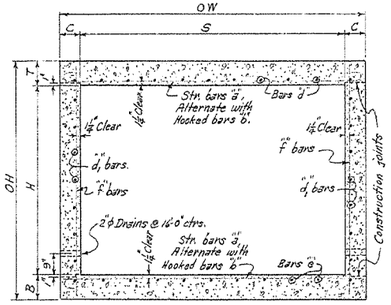
DIMENSIONS — QUANTITIES

MAX. DESIGN DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	BARREL DIMENSIONS: SQ. FT. OF OPENING	OVERALL WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF BOTTOM SLAB	OVERALL HEIGHT	ROADWAY LENGTH	LENGTH OF HEADWALL	UNIT QUANTITIES: CLASS 'S' CONC. PER LIN. FT. OF BARREL	REINFORCING STEEL PER LIN. FT. OF BARREL	REINFORCING STEEL ADDITIONAL PER LAP	REINFORCING STEEL ADDITIONAL TWO HEADWALLS & APRONS
D	S	H	A	OW	T	C	B	OH	RL	K	CU.YD.	LB.	LB.	LB.
5'-0"	4'@	2'	8	5'-0"	7"	6"	6½"	3'-1½"	5'-2⅛"	5'-8⅝"	0.382	92.27	17.95	71.92
		3'	12	5'-6"		6"		4'-1½"	"	"	0.319	94.96	19.62	71.92
		4'	16	5'-6"		6"		5'-1½"	"	"	0.356	97.62	21.29	71.92
		5'	20	5'-6"		6"		6'-1½"	"	"	0.396	100.29	22.96	71.92
		6'	24	5'-6"		7"		7'-1⅞"	5'-4⅝"	5'-10⅜"	0.474	53.74	24.63	73.31
	5'@	3'	15	6'-0"		6"		4'-2⅜"	6'-2⅝"	6'-9"	0.380	56.71	22.19	110.28
		4'	20	6'-0"		6"		5'-2⅜"	"	"	0.417	59.38	23.86	110.28
		5'	25	6'-0"	7½"	6"	7"	6'-2⅜"	"	"	0.454	62.05	25.53	110.28
		6'	30	6'-2"		7"		7'-2⅝"	6'-6⅝"	6'-11⅛"	0.535	65.65	27.20	112.26
		7'	35	6'-3"		7½"		8'-2⅝"	6'-5⅝"	7'-0⅛"	0.604	68.78	28.87	113.28
	6'@	3'	18	7'-0"		6"		4'-3⅜"	7'-3"	7'-9½"	0.446	67.79	26.76	127.97
		4'	24	7'-0"		6"		5'-3⅜"	"	"	0.483	70.47	26.93	127.97
		5'	30	7'-0"	8"	6"	7½"	6'-3⅜"	"	"	0.520	73.14	28.10	127.97
		6'	36	7'-2"		7"		7'-3⅝"	7'-5"	7'-11½"	0.602	76.81	29.77	129.96
		7'	42	7'-3"		7½"		8'-3½"	7'-6"	8'-0⅛"	0.671	79.99	31.98	130.98
		8'	48	7'-4"		8"		9'-3½"	7'-7⅝"	8'-1⅝"	0.746	83.97	33.11	131.98
	7'@	4'	28	8'-0"		6"		5'-5"	8'-3⅛"	8'-9⅜"	0.568	82.96	29.01	196.89
		5'	35	8'-0"		6"		6'-5"	"	"	0.605	85.63	30.68	196.89
		6'	42	8'-2"		7"		7'-5"	8'-5⅛"	9'-0"	0.688	88.40	32.35	198.89
		7'	49	8'-3"	8½"	7½"	8½"	8'-5"	8'-6⅝"	9'-1"	0.757	92.62	34.02	199.90
		8'	56	8'-4"		8"		9'-5"	8'-7½"	9'-2"	0.832	96.28	35.69	150.90
		9'	63	8'-6"		9"		10'-5"	8'-8⅝"	9'-3"	0.946	107.22	37.36	152.90
	8'@	4'	32	9'-0"		6"		5'-7"	9'-3⅝"	9'-10⅛"	0.676	97.69	33.32	202.70
		5'	40	9'-2"		7"		6'-7"	9'-5⅞"	10'-0⅛"	0.754	101.98	34.99	210.92
		6'	48	9'-2"		7"		7'-7"	"	"	0.797	104.15	36.66	210.92
		7'	56	9'-3"	9½"	7½"	9½"	8'-7"	9'-6⅝"	10'-1⅛"	0.867	107.92	38.33	211.79
		8'	64	9'-6"		8"		9'-7"	9'-8"	10'-2⅝"	0.962	113.17	40.00	213.15
		9'	72	9'-6"		9"		10'-7"	9'-10"	10'-5⅜"	1.057	122.28	41.67	215.67
		10'	80	9'-8"		10"		11'-7"	10'-0⅝"	10'-6⅝"	1.184	129.04	43.34	218.60
	9'@	5'	45	10'-2"		7"		6'-8"	10'-6⅝"	11'-0⅜"	0.864	117.30	37.56	233.23
		6'	54	10'-3"		7½"		7'-8"	10'-7⅝"	11'-1⅝"	0.910	120.62	39.23	234.60
		7'	63	10'-3"		7½"		8'-8"	"	"	0.957	123.29	40.90	234.60
		8'	72	10'-4"	10"	8"	10"	9'-8"	10'-8⅝"	11'-2⅝"	1.033	129.18	42.57	235.96
		9'	81	10'-4"		9"		10'-8"	10'-10⅝"	11'-5"	1.148	139.38	44.24	240.05
		10'	90	10'-8"		10"		11'-8"	11'-0⅝"	11'-7"	1.276	145.26	45.91	242.77
		11'	99	10'-10"		11"		12'-8"	11'-2⅝"	11'-9"	1.416	152.98	47.58	246.50
	10'@	5'	50	11'-2"		7"		6'-8½"	11'-6⅝"	12'-1⅛"	0.957	133.70	40.13	257.63
		6'	60	11'-3"		7½"		7'-8½"	11'-7⅝"	12'-2⅝"	1.024	137.06	41.80	258.99
		7'	70	11'-3"		7½"		8'-8½"	"	"	1.071	139.73	43.47	258.99
		8'	80	11'-4"	10½"	8"	11"	9'-8½"	11'-8⅝"	12'-3⅜"	1.147	145.62	45.14	260.35
		9'	90	11'-4"		9"		10'-8½"	11'-10⅝"	12'-5⅜"	1.263	155.33	46.81	263.08
		10'	100	11'-8"		10"		11'-3½"	12'-1"	12'-7½"	1.391	162.30	48.48	265.80
		11'	110	11'-10"		11"		12'-3½"	12'-3"	12'-9½"	1.532	170.12	50.15	268.53
		12'	120	12'-0"		12"		13'-3½"	12'-5⅛"	12'-11⅝"	1.685	182.08	51.82	271.25
	12'@	6'	66	12'-4"	8"	8"	11½"	7'-10½"	12'-7⅝"	13'-3⅜"	1.153	158.87	46.12	283.61
		7'	77	12'-4"		8"		8'-10½"	"	"	1.202	161.55	47.79	283.61
		8'	88	12'-4"		8"		9'-10½"	"	"	1.252	166.78	49.46	283.61
		9'	99	12'-6"	11"	9"		11'-10½"	12'-11⅛"	13'-5⅝"	1.348	176.31	51.13	286.33
		10'	110	12'-8"		10"		11'-10½"	13'-1⅜"	13'-7¾"	1.497	183.92	52.80	289.04
		11'	121	12'-10"		11"		12'-10½"	13'-3⅝"	13'-10"	1.638	191.38	54.47	293.18
		12'	132	13'-0"		12"		13'-10½"	13'-5⅞"	14'-0"	1.732	205.51	56.14	295.87
	14'@	6'	72	13'-4"		8"		8'-0"	13'-9⅝"	14'-4"	1.284	176.97	48.69	378.98
		7'	84	13'-4"		8"		9'-0"	"	"	1.333	179.14	50.36	378.98
		8'	96	13'-4"		8"		10'-0"	"	"	1.383	184.42	52.03	378.98
		9'	108	13'-6"	11½"	9"	12½"	11'-0"	13'-11⅝"	14'-6⅛"	1.500	194.12	53.70	382.54
		10'	120	13'-8"		10"		12'-0"	14'-1⅝"	14'-8⅛"	1.630	201.34	55.37	386.10
		11'	132	13'-10"		11"		13'-0"	14'-3⅝"	14'-10⅛"	1.772	209.48	57.04	389.66
		12'	144	14'-0"		12"		14'-0"	14'-5⅝"	15'-0⅛"	1.926	221.72	58.71	393.22

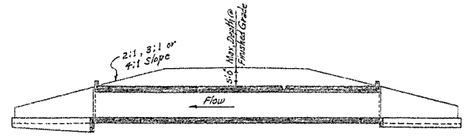
NOTE:- For details of wings and bar lists, see Drawing Nos. W-X152-1 or W-X152-2 and W-X15 / W-X153-1 or W-X153-2 " " / W-X154-1 or W-X154-2 " "



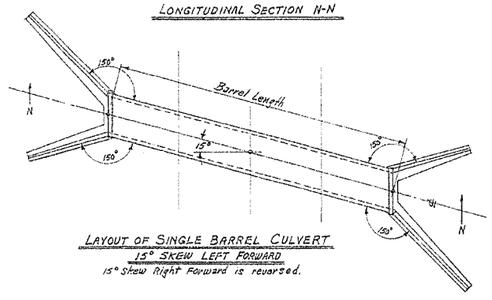
PART LONGITUDINAL SECTION N-N



TYPICAL SECTION M-M



LONGITUDINAL SECTION N-N



LAYOUT OF SINGLE BARREL CULVERT
15° SKEW LEFT FORWARD
15° Skew Right Forward is reversed.

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾ 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 32'-0". Lap longitudinal bars 30 diameters.

CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls 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 24,000 Lb. Axles @ 4'-0" ctrs.

UNIT STRESSES:-

Class S Concrete (n=10) 1200 #/□"

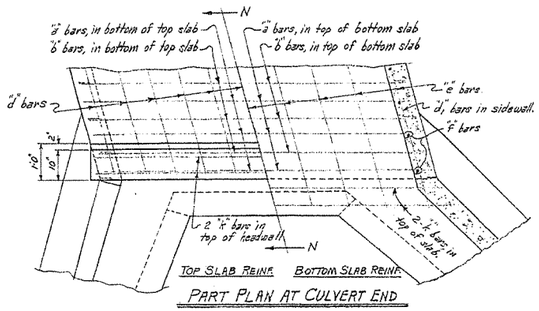
Reinforcing Steel 20,000 #/□"

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM Bars "b"
#6	3"	5"	1'-2"	Pin diam.
#7	3⅝"	5⅜"	1'-4"	X

NOTE:-Dimensions are to centers of bars

DOWEL BARS FOR TWO HEADWALLS

SPAN @	SIZE	SPACING	No. REQ'D	LENGTH	X	Bars "r" Dowel bars in headwalls
4'	#4	11"	12	2'-6"	1'-3"	
5'	#4	11"	14	2'-7"	1'-3½"	
6'	#4	11"	16	2'-8"	1'-4"	
7'	#4	11½"	18	2'-9"	1'-4½"	
8'	#4	11½"	20	2'-11"	1'-5½"	
9'	#4	11½"	22	3'-0"	1'-6"	
10'	#4	12"	24	3'-1"	1'-6½"	
11'	#4	12"	26	3'-2"	1'-7"	
12'	#4	12"	28	3'-3"	1'-7½"	



PART PLAN AT CULVERT END

NOTE:- This drawing to be used in conjunction with Standard Drawing Nos. W-X152-1 or W-X152-2 ; W-X153-1 or W-X153-2 and W-X154-1 or W-X154-2. Also W-X15.

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS 15° SKEW

4',5',6',7',8',9',10',11' & 12' SPANS SINGLES — 2:1, 3:1 OR 4:1 SLOPES UNDER 5'-0" COVER

STANDARD DRAWING NO. R-115X-0

Designed By:- W.C.H. 1-23-63 Checked By:- R.R.S. 5-8-63
Drawn By:- W.C.H. 8-14-63 Checked By:- P.P.S. 10-7-63
Quantities By:- W.C.H. 8-21-63 Checked By:- R. G. 12-10-63.

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			47	
JOB No.					

BAR LIST FOR BARREL SECTION 60'-0" IN LENGTH - TWO 30° SKEWED ENDS.

"a" bars: Straight, in top and bottom slabs of barrel. "a₁" bars: Straight, in top and bottom slab of barrel (four of each length). "b" bars: Bent (see diagrams below), in top and bottom slabs of barrel, hooked, alternate with "a" bars. "b₁" bars: Bent, in top and bottom slabs of barrel, one end hooked (four of each length), alternate with "a₁" bars. "d" bars: Straight, longitudinal in top slab of barrel, 2 @ 30'-8" for 60'-0" Length Barrel (1'-8" Lap). "d₁" bars: Straight, longitudinal in sidewalls, 2 @ 30'-6" for 60'-0" Length Barrel (1'-3" Lap). "e" bars: Straight, longitudinal in bottom slab of barrel, 2 @ 31'-8" for 60'-0" Length Barrel (1'-5" Lap). "f" bars: Straight, verticals in sidewalls. "k₁" bars: Straight, in bottom of headwall. "k₂" bars: Straight, in top of headwall and apron (2 each).

Depth of Cover D	Clear Span S	Clear Height H	a Size	a Spacing	a No. Req'd	a Length	a₁ Size	a₁ Spacing	a₁ No. Req'd	a₁ Length Max.	a₁ Length Min.	b Size	b Spacing	b No. Req'd	b Length	b X	b₁ Size	b₁ Spacing	b₁ No. Req'd	b₁ Length Max.	b₁ Length Min.	b₁ X Max.	b₁ X Min.	d Size	d Spacing	d No. Req'd	d Length	d₁ Size	d₁ Spacing	d₁ No. Req'd	d₁ Length	e Size	e Spacing	e No. Req'd	e Length	f Size	f Spacing	f No. Req'd	f Length	k₁ Size	k₁ No. Req'd	k₁ Length	k₂ Size	k₂ No. Req'd	k₂ Length
0'-0" to 5'-0" Maximum	1 @ 4'	2'	#5	13"	108	4'-9"	#5	13"	4	2'-11"	—	#6	13"	108	5'-10"	4'-8"	#6	13"	4	4'-5"	—	3'-10"	—	#5	10½"	6	2 @ 30'-8" for 60'-0" Length Barrel. (1'-8" Lap)	#4	12"	4	2 @ 30'-6" for 60'-0" Length Barrel. (1'-3" Lap)	#4	12"	5	2 @ 31'-8" for 60'-0" Length Barrel. (1'-5" Lap)	#4	12"	120	2'-11"	#5	6	5'-6"	#5	8	6'-8"
		3'			108	4'-9"			4	"	—			108	5'-10"	"			4	"	—	"	—			6				6				5				120	3'-11"		6	"		8	"
		4'			108	4'-9"			4	"	—			108	5'-10"	"			4	"	—	"	—			6				8				5				120	4'-11"		6	"		8	"
		5'			108	4'-9"			4	"	—			108	5'-10"	"			4	"	—	"	—			6				10				5				120	5'-11"		6	"		8	"
		6'			108	4'-11"			4	3'-1"	—			108	6'-0"	4'-10"			8	4'-8"	2'-8"	4'-0"	2'-1"			6				12				5				120	6'-11"		6	5'-8"		8	6'-10"
	1 @ 5'	3'	#6	13"	108	5'-9"	#6	13"	4	3'-11"	—	#6	13"	106	6'-10"	5'-8"	#6	13"	8	5'-5"	3'-6"	4'-10"	2'-11"	#5	10½"	7		#4	12"	6		#4	12"	6		#4	12"	120	4'-0"	#6	6	6'-8"	#6	8	7'-10"
		4'			108	5'-9"			4	"	—			106	6'-10"	"			8	"	"	"	"			7				8				6				120	5'-0"		6	"		8	"
		5'			108	5'-9"			4	"	—			106	6'-10"	"			8	"	"	"	"			7				10				6				120	6'-0"		6	"		8	"
		6'			108	5'-11"			4	4'-1"	—			106	7'-0"	5'-10"			8	5'-7"	3'-8"	5'-0"	3'-1"			7				12				6				120	7'-0"		6	6'-10"		8	8'-0"
		7'			108	6'-0"			4	4'-2"	—			106	7'-1"	5'-11"			8	5'-8"	3'-9"	5'-1"	3'-2"			7				14				6				120	8'-0"		6	6'-11"		8	8'-1"
	1 @ 6'	3'	#6	12"	114	6'-9"	#6	12"	8	5'-0"	3'-3"	#6	12"	114	7'-10"	6'-8"	#6	12"	12	6'-5"	2'-11"	5'-10"	2'-9"	#5	10½"	8		#4	12"	6		#4	12"	7		#4	12"	120	4'-1"	#6	6	7'-10"	#6	8	9'-0"
		4'			114	6'-9"			8	"	"			114	7'-10"	"			12	"	"	"	"			8				8				7				120	5'-1"		6	"		8	"
		5'			114	6'-9"			8	"	"			114	7'-10"	"			12	"		"	"			8				10				7				120	6'-1"		6	"		8	"
		6'			114	6'-11"			8	5'-2"	3'-5"			114	8'-0"	6'-10"			12	6'-7"	3'-1"	6'-0"	2'-6"			8				12				7				120	7'-1"		6	8'-0"		8	9'-2"
		7'			114	7'-0"			8	5'-3"	3'-6"			114	8'-1"	6'-11"			12	6'-8"	8'-2"	6'-1"	2'-7"			8				14				7				120	8'-1"		6	8'-1"		8	9'-3"
		8'			114	7'-1"			8	5'-4"	3'-7"			114	8'-2"	7'-0"			12	6'-9"	3'-3"	6'-2"	2'-8"			8				16				7		#5	12"	120	9'-1"		6	8'-2"		8	9'-4"
	1 @ 7'	4'	#6	11"	124	7'-9"	#6	11"	12	6'-2"	3'-0"	#6	11"	122	8'-10"	7'-8"	#6	11"	12	7'-6"	4'-4"	6'-11"	3'-9"	#5	10½"	9		#4	12"	8		#4	12"	8		#4	12"	120	5'-2"	#6	6	9'-0"	#6	8	10'-2"
		5'			124	7'-9"			12	"	"			122	8'-10"	"			12	"	"	"	"			9				10				8				120	6'-2"		6	"		8	"
		6'			124	7'-11"			12	6'-4"	3'-2"			122	9'-0"	7'-10"			16	7'-8"	2'-11"	7'-1"	2'-4"			9				12				8				120	7'-2"		6	9'-2"		8	10'-4"
		7'			124	8'-0"			12	6'-5"	3'-3"			122	9'-1"	7'-11"			16	7'-9"	3'-0"	7'-2"	2'-5"			9				14				8				120	8'-2"		6	9'-3"		8	10'-5"
		8'			124	8'-1"			12	6'-6"	3'-4"			122	9'-2"	8'-0"			16	7'-10"	3'-1"	7'-3"	2'-6"			9				16				8			10"	144	9'-2"		6	9'-4"		8	10'-6"
		9'			124	8'-3"			12	6'-8"	3'-6"			122	9'-4"	8'-2"			16	8'-0"	3'-3"	7'-5"	2'-8"			9				18				8		#5	12"	120	10'-2"		6	9'-6"		8	10'-8"
	1 @ 8'	4'	#7	12"	112	8'-9"	#7	12"	12	7'-0"	3'-6"	#6	12"	112	9'-10"	8'-8"	#6	12"	16	8'-5"	3'-2"	7'-10"	2'-7"	#5	10"	11		#4	12"	8		#4	12"	9		#4	12"	120	5'-4"	#7	6	10'-1"	#7	8	11'-3"
		5'			112	8'-11"			12	7'-2"	3'-8"			112	10'-0"	8'-10"			16	8'-7"	3'-4"	8'-0"	2'-9"			11				10				9				120	6'-4"		6	10'-4"		8	11'-6"
		6'			112	8'-11"			12	"	"			112	10'-0"	"			16	"	"	"	"			11				12				9				120	7'-4"		6	"		8	"
		7'			112	9'-0"			12	7'-3"	3'-9"			112	10'-1"	8'-11"			16	8'-8"	3'-5"	8'-1"	2'-10"			11				14				9				120	8'-4"		6	10'-5"		8	11'-7"
		8'			112	9'-1"			12	7'-4"	3'-10"			112	10'-2"	9'-0"			16	8'-9"	3'-6"	8'-2"	2'-11"			11				16				9			10"	144	9'-4"		6	10'-6"		8	11'-8"
		9'			112	9'-3"			12	7'-6"	4'-0"			112	10'-4"	9'-2"			16	8'-11"	3'-8"	8'-4"	3'-1"			11				18				9		#5	12"	120	10'-4"		6	10'-8"		8	11'-10"
		10'			112	9'-5"			16	7'-8"	2'-5"			110	10'-6"	9'-4"			16	9'-1"	3'-10"	8'-6"	3'-3"			11				20				9			11"	132	11'-4"		6	10'-11"		8	12'-0"
	1 @ 9'	5'	#7	11"	122	9'-11"	#7	11"	16	8'-4"	3'-7"	#6	11"	120	11'-0"	9'-10"	#6	11"	20	9'-8"	3'-4"	9'-1"	2'-9"	#5	10"	12		#4	12"	10		#4	12"	10		#4	12"	120	6'-5"	#7	6	11'-5"	#7	8	12'-7"
		6'			122	10'-0"			16	8'-5"	3'-8"			120	11'-1"	9'-11"			20	9'-9"	3'-5"	9'-2"	2'-10"			12				12				10				120	7'-5"		6	11'-7"		8	12'-9"
		7'			122	10'-0"			16	"	"			120	11'-1"	9'-11"			20	"	"	"	"			12				14				10				120	8'-5"		6	"		8	"
		8'			122	10'-1"			16	8'-6"	3'-9"			120	11'-2"	10'-0"			20	9'-10"	3'-6"	9'-3"	2'-11"			12				16				10			10"	144	9'-5"		6	11'-8"		8	12'-10"
		9'			120	10'-3"			20	8'-8"	2'-4"			120	11'-4"	10'-2"			20	10'-0"	3'-8"	9'-5"	3'-1"			12				18				10		#5	12"	120	10'-5"		6	11'-10"		8	13'-0"
		10'			120	10'-5"			20	8'-10"	2'-6"			120	11'-6"	10'-4"			20	10'-2"	3'-10"	9'-7"	3'-3"			12				20				10			11"	132	11'-5"		6	12'-1"		8	13'-2"
		11'			120	10'-7"			20	9'-0"	2'-8"			120	11'-8"	10'-6"			20	10'-4"	4'-0"	9'-9"	3'-5"			12				22				10			10"	144	12'-5"		6	12'-3"		8	13'-5"
	1 @ 10'	5'	#7	12"	110	10'-11"	#7	12"	16	9'-2"	3'-11"	#7	12"	110	12'-2"	10'-10"	#7	12"	20	10'-8"	3'-8"	10'-0"	3'-0"	#5	10"	13		#4	12"	10		#4	12"	11		#4	12"	120	6'-6"	#7	6	12'-7"	#7	8	13'-9"
		6'			110	11'-0"			16	9'-3"	4'-0"			110	12'-3"	10'-11"			20	10'-9"	3'-9"	10'-1"	3'-1"			13				12				11				120	7'-6"		6	12'-8"		8	13'-10"
		7'			110	11'-0"			16	"	"			110	12'-3"	"			20	"	"	"	"			13				14				11				120	8'-6"		6	"		8	"
		8'			110	11'-1"			20	9'-4"	2'-4"			110	12'-4"	11'-0"			20	10'-10"	3'-10"	10'-2"	3'-2"			13				16				11			10"	144	9'-6"		6	12'-10"		8	14'-0"
		9'			110	11'-3"			20	9'-6"	2'-6"			108	12'-6"	11'-2"			20	11'-0"	4'-0"	10'-4"	3'-4"			13				18				11		#5	12"	120	10'-6"		6	13'-0"		8	14'-2"
		10'			110	11'-5"			20	9'-8"	2'-8"			108	12'-8"	11'-4"			20	11'-2"	4'-2"	10'-6"	3'-6"			13				20				11			11"	132	11'-6"		6	13'-2"		8	14'-4"
		11'			110	11'-7"			20	9'-10"	2'-10"			108	12'-10"	11'-6"			20	11'-4"	4'-4"	10'-8"	3'-8"			13				22				11			10"	144	12'-6"		6	13'-5"		8	14'-6"
		12'			110	11'-9"			20	10'-0"	3'-0"			108	13'-0"	11'-8"			20	11'-6"	4'-6"	10'-10"	3'-10"			13				24				11	#6	12"	120	13'-6"		6	13'-7"		8	14'-9"
	1 @ 11'	6'	#7	11"	118	12'-1"	#7	11"	24	10'-6"	2'-7"	#7	11"	118	13'-4"	12'-0"	#7	11"	24	11'-11"	4'-0"	11'-3"	3'-4"	#5	9½"	15		#4	12"	12		#4	12"	12		#4	12"	120	7'-7"	#7	6	14'-0"	#7	8	15'-1"
		7'			118	12'-1"			24	"	"			118	13'-4"	"			24	"	"	"	"			15				14				12				120	8'-7"		6	"		8	"
		8'			118	12'-1"			24	"	"			118	13'-4"	"			24	"	"	"	"			15				16				12			10"	144	9'-7"		6	"		8	"
		9'			118	12'-3"			24	10'-8"	2'-9"			118	13'-6"	12'-2"			24	12'-1"	4'-2"	11'-5"	3'-6"			15				18				12			12"	120	10'-7"		6	14'-2"		8	15'-4"
		10'			118	12'-5"			24	10'-10"	2'-11"			116	13'-8"	12'-4"			24	12'-3"	4'-4"	11'-7"	3'-8"			15				20				12	#5	11"	132	11'-7"		6	14'-4"		8	15'-6"
		11'			118	12'-7"			24	11'-0"	3'-1"			116	13'-10"	12'-6"			24	12'-5"	4'-6"	11'-9"	3'-10"			15				22				12		10"	144	12'-7"		6	14'-7"		8	15'-8"
		12'			118	12'-9"			24	11'-2"	3'-3"			116	14'-0"	12'-8"			24	12'-7"	4'-8"	11'-11"	4'-0"			15				24				12	#6	12"	120	13'-7"		6	14'-9"		8	15'-11"
	1 @ 12'	6'	#8	12"	108	13'-1"	#8	12"	24	11'-4"	2'-7"	#7	12"	106	14'-4"	13'-0"	#7	12"	24	12'-10"	4'-1"	12'-2"	3'-5"	#5	9½"	16		#4	12"	12		#4	12"	13		#4	12"	120	7'-9"	#8	6	15'-1"	#8	8	16'-3"
		7'			108	13'-1"			24	"	"			106	14'-4"	"			24	"	"	"	"			16				14				13				120	8'-9"		6	"		8	"
		8'			108	13'-1"			24	"	"			106	14'-4"	"			24	"	"	"	"			16				16				13			10"	144	9'-9"		6	"		8	"
		9'			108	13'-3"			24	11'-6"	2'-9"			106	14'-6"	13'-2"			24	13'-0"	4'-3"	12'-4"	3'-7"			16				18				13			12"	120	10'-9"		6	15'-4"		8	16'-6"
		10'			108	13'-5"			24	11'-8"	2'-11"			106	14'-8"	13'-4"			24	13'-2"	4'-5"	12'-6"	3'-9"			16				20				13	#5	11"	132	11'-9"		6	15'-6"		8	16'-8"
		11'			108	13'-7"			24	11'-10"	3'-1"			106	14'-10"	13'-6"			24	13'-4"	4'-7"	12'-8"	3'-11"			16				22				13		10"	144	12'-9"		6	15'-8"		8	16'-10"
		12'			106	13'-9"			24	12'-0"	3'-3"			106	15'-0"	13'-8"			24	13'-6"	4'-9"	12'-10"	4'-1"			16				24				13	#6	12"	120	13'-9"		6	15'-11"		8	17'-0"

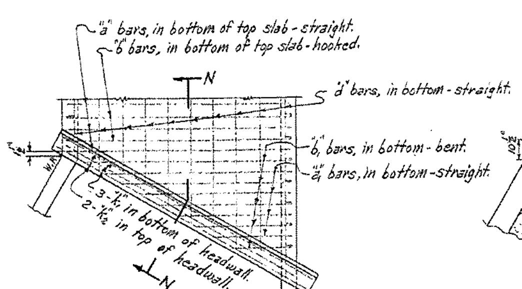
▼ These bars are in the skewed portion of barrel only. The length of "a₁" bars and overall length X of "b₁" bars vary by 1'-11" for 13" spacing, 1'-9" for 12" spacing and 1'-7" for 11" spacing.

Bar Size	Pin Diam.	K	Add for Hooks	Bending Diagrams for Bars "b" & "b₁"
#6	3"	5"	1'-2"	2 Hooks – "b" bars (K, Pin diam, X)
#7	3½"	5¾"	1'-4"	
#6	3"	5"	0'-7"	1 Hook – "b₁" bars (K, Pin diam., X)
#7	3½"	5¾"	0'-8"	

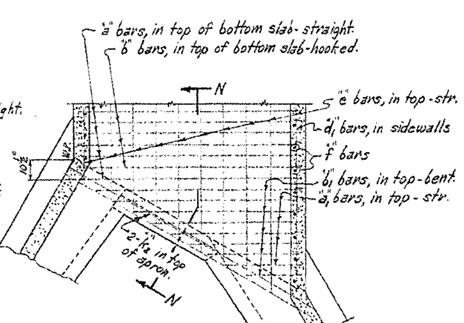
NOTE:- Dimensions are to centers of bars. ("b" and "b₁")

DOWEL BARS FOR TWO HEADWALLS

Span	Size	Spacing	No. Req'd	Length	X	Dowel bars "r" in Two Headwalls.
4'	#4	12"±	12	2'-6"	1'-3"	(diagram: X, 2, 12, X)
5'	#4	12"±	16	2'-7"	1'-3½"	
6'	#4	12"±	18	2'-8"	1'-4"	
7'	#4	12"±	20	2'-9"	1'-4½"	
8'	#4	12"±	22	2'-11"	1'-5½"	
9'	#4	12"±	26	3'-0"	1'-6"	
10'	#4	12"±	28	3'-1"	1'-6½"	
11'	#4	12"±	30	3'-2"	1'-7"	
12'	#4	12"±	32	3'-3"	1'-7½"	

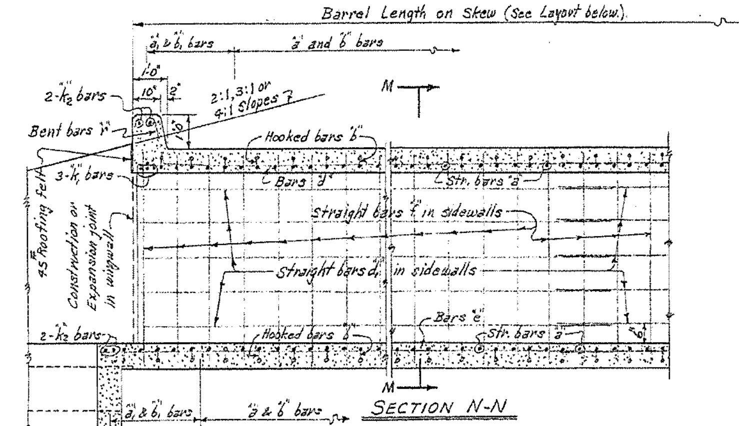


TOP SLAB REINFORCING
PART PLAN AT END OF CULVERT

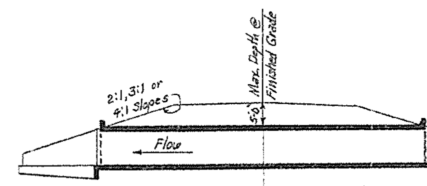


BOTTOM SLAB REINFORCING
PART PLAN AT END OF CULVERT

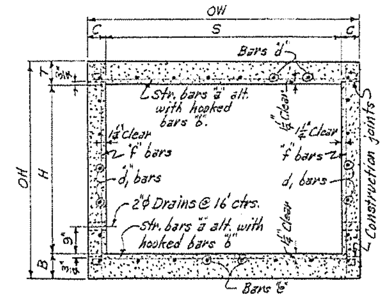
NOTE:- For Details of Standard Wings and bar lists, see Drawing No. W-X302-1 or W-X302-2; W-X303-1 or W-X303-2, and W-X304-1 or W-X304-2. Also W-X30.



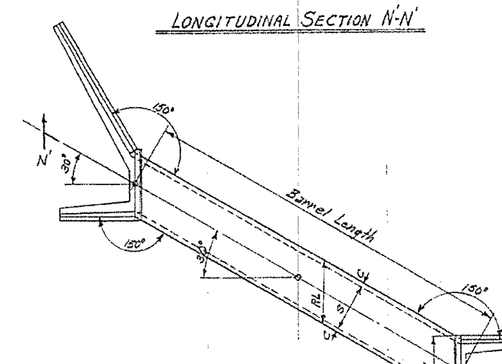
SECTION N-N



LONGITUDINAL SECTION N-N'



TYPICAL SECTION M-M



LAYOUT OF SINGLE BARREL CULVERT
30° SKEW LEFT FORWARD
30° Skew Right Forward is reversed.

DESIGN LIVE LOAD

H20-S16 LOADING A.A.S.H.O. 1961
AND
SPECIAL MILITARY LOADING
Two 24,000 Lb. Axles @ 4'-0" ctrs

UNIT STRESSES:-
Class S Concrete (n=10) 1200 #/□"
Reinforcing Steel 20,000 #/□"

NOTE:- This drawing to be used in conjunction with Standard Wing Drawing Nos. W-X302-1 or W-X302-2, W-X303-1 or W-X303-2, and W-X304-1 or W-X304-2. Also W-X30.

GENERAL NOTES

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" 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 32'-0". Lap longitudinal bars 30 diameters min.
CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls and slabs shall be only where shown on plans.
SPECIFICATIONS:- Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.

Max. Design Depth of Cover D	Clear Spans S	Clear Height H	Sq. Ft. Opening A	Overall Width OW	Thickness of Top Slab T	Thickness of Sidewalls C	Thickness of Bottom Slab B	Overall Height OH	Roadway Length RL	Length of Headwalls K	* Class S Conc. per Lin. Ft. of Barrel Cu. Yd.	Reinforcing Steel: Total for 60'-0" Length of Barrel Lb.	Per Lin. Ft. of Barrel Lb.	Additional per Lap Lb.
5'-0"	1 @ 4'	2'	8	5'-0"	7"	6"	6½"	3'-1½"	5'-9¼"	6'-11⅛"	0.282	2622	41.99	17.95
		3'	12	5'-0"		6"		4'-1½"	"	"	0.319	2784	44.16	19.62
		4'	16	5'-0"		6"		5'-1½"	"	"	0.356	2946	46.83	21.29
		5'	20	5'-0"		6"		6'-1½"	"	"	0.394	3107	49.50	22.96
		6'	24	5'-2"		7"		7'-1½"	5'-11⅝"	7'-1½"	0.474	3335	52.96	24.63
	1 @ 5'	3'	15	6'-0"	7½"	6"	7"	4'-2½"	6'-11⅝"	8'-1"	0.380	3541	55.55	22.19
		4'	20	6'-0"		6"		5'-2½"	"	"	0.417	3703	58.23	23.86
		5'	25	6'-0"		6"		6'-2½"	"	"	0.454	3865	60.90	25.53
		6'	30	6'-2"		7"		7'-2½"	7'-1½"	8'-3¼"	0.535	4091	64.49	27.20
		7'	35	6'-3"		7½"		8'-2½"	7'-2⅝"	8'-4½"	0.604	4283	67.63	28.87
	1 @ 6'	3'	18	7'-0"	8"	6"	7½"	4'-3⅝"	8'-1"	9'-2⅞"	0.446	4221	66.29	24.76
		4'	24	7'-0"		6"		5'-3⅝"	"	"	0.483	4383	68.96	26.43
		5'	30	7'-0"		6"		6'-3⅝"	"	"	0.520	4595	71.64	28.10
		6'	36	7'-2"		7"		7'-3⅝"	8'-3¼"	9'-5⅛"	0.602	4772	75.31	29.77
		7'	42	7'-3"		7½"		8'-3⅝"	8'-4¼"	9'-6⅜"	0.671	4966	78.48	31.44
		8'	48	7'-4"		8"		9'-3⅝"	8'-5⅝"	9'-7⅝"	0.746	5570	88.47	33.11
	1 @ 7'	4'	28	8'-0"	8½"	6"	8½"	5'-5"	9'-2⅞"	10'-4⅜"	0.568	5196	81.32	29.01
		5'	35	8'-0"		6"		6'-5"	"	"	0.605	5307	84.00	30.68
		6'	42	8'-2"		7"		7'-5"	9'-5¼"	10'-7"	0.689	5558	87.76	32.35
		7'	49	8'-3"		7½"		8'-5"	9'-6¼"	10'-8⅛"	0.767	5755	90.98	34.02
		8'	56	8'-4"		8"		9'-5"	9'-7¼"	10'-9⅜"	0.832	6100	96.65	35.69
		9'	63	8'-6"		9"		10'-5"	9'-9¾"	10'-11⅜"	0.946	6649	105.59	37.36
	1 @ 8'	4'	32	9'-0"	9½"	6"	9½"	5'-7"	10'-4¾"	11'-6¼"	0.676	6114	95.26	33.32
		5'	40	9'-2"		7"		6'-7"	10'-7"	11'-8⅞"	0.754	6357	99.12	34.99
		6'	48	9'-2"		7"		7'-7"	"	"	0.797	6518	101.79	36.66
		7'	56	9'-3"		7½"		8'-7"	10'-8¼"	11'-10"	0.867	6720	105.05	38.33
		8'	64	9'-4"		8"		9'-7"	10'-9⅜"	11'-11½"	0.942	7070	110.81	40.00
		9'	72	9'-6"		9"		10'-7"	10'-11⅝"	12'-1½"	1.057	7627	119.92	41.67
		10'	80	9'-8"		10"		11'-7"	11'-2"	12'-3⅜"	1.184	8043	126.67	43.34
	1 @ 9'	5'	45	10'-2"	10"	7"	10"	6'-8"	11'-8⅞"	12'-10¾"	0.844	7356	114.72	37.56
		6'	54	10'-3"		7½"		7'-8"	11'-10"	13'-0"	0.910	7567	118.04	39.23
		7'	63	10'-3"		7½"		8'-8"	"	"	0.957	7725	120.71	40.90
		8'	72	10'-4"		8"		9'-8"	11'-11¼"	13'-1"	1.033	8081	126.54	42.57
		9'	81	10'-6"		9"		10'-8"	12'-1½"	13'-3¼"	1.198	8625	135.80	44.24
		10'	90	10'-8"		10"		11'-8"	12'-3⅞"	13'-5¾"	1.276	9063	142.68	45.91
		11'	99	10'-10"		11"		12'-8"	12'-6⅛"	13'-8"	1.416	9526	150.40	47.58
	1 @ 10'	5'	50	11'-2"	10½"	7"	11"	6'-9½"	12'-10¾"	14'-0½"	0.957	8359	130.64	40.13
		6'	60	11'-3"		7½"		7'-9½"	12'-11⅞"	14'-1¾"	1.024	8567	133.99	41.80
		7'	70	11'-3"		7½"		8'-9½"	"	"	1.071	8729	136.66	43.47
		8'	80	11'-4"		8"		9'-9½"	13'-1"	14'-3"	1.147	9110	142.55	45.14
		9'	90	11'-6"		9"		10'-9½"	13'-3⅜"	14'-5⅛"	1.263	9634	151.92	46.81
		10'	100	11'-8"		10"		11'-9½"	13'-5¾"	14'-7½"	1.391	10,019	158.89	48.48
		11'	110	11'-10"		11"		12'-9½"	13'-8"	14'-9¾"	1.532	10,597	166.71	50.15
		12'	120	12'-0"		12"		13'-9½"	13'-10⅜"	15'-0½"	1.685	11,278	178.67	51.82
	1 @ 11	6'	66	12'-4"	11"	8"	11½"	7'-10½"	14'-2⅞"	15'-4¾"	1.153	9888	155.16	46.12
		7'	77	12'-4"		8"		8'-10½"	"	"	1.202	10,099	157.83	47.79
		8'	88	12'-4"		8"		9'-10½"	"	"	1.252	10,364	163.06	49.46
		9'	99	12'-6"		9"		10'-10½"	14'-5½"	15'-7"	1.368	10,952	172.60	51.13
		10'	110	12'-8"		10"		11'-10½"	14'-7½"	15'-9¼"	1.497	11,399	179.70	52.80
		11'	121	12'-10"		11"		12'-10½"	14'-9⅞"	15'-11⅝"	1.639	11,927	187.67	54.47
		12'	132	13'-0"		12"		13'-10½"	15'-0⅛"	16'-2"	1.792	12,569	199.79	56.14
	1 @ 12	6'	72	13'-4"	11¾"	8"	12¼"	8'-0"	15'-4⅞"	16'-6½"	1.284	11,081	172.20	48.69
		7'	84	13'-4"		8"		9'-0"	"	"	1.333	11,293	174.87	50.36
		8'	96	13'-4"		8"		10'-0"	"	"	1.383	11,561	180.15	52.03
		9'	108	13'-6"		9"		11'-0"	15'-7⅛"	16'-9"	1.500	12,162	189.85	53.70
		10'	120	13'-8"		10"		12'-0"	15'-9⅜"	16'-11¼"	1.630	12,625	197.07	55.37
		11'	132	13'-10"		11"		13'-0"	15'-11⅝"	17'-1½"	1.772	13,113	205.16	57.04
		12'	144	14'-0"		12"		14'-0"	16'-2"	17'-3¾"	1.926	13,795	217.45	58.71

* For remainder of quantities see Std. Wing Drawings listed at left.
Total steel quantities listed above include one lap of longitudinal bars.

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS 30° SKEW

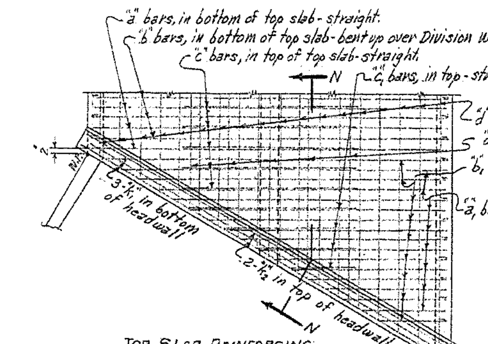
4, 5, 6, 7, 8, 9, 10, 11 & 12' SPANS — SINGLES
2:1, 3:1 OR 4:1 SLOPES — UNDER 5'-0" COVER

STANDARD DRAWING NO. R-130X-0

Designed by:- W.C.H. 1-23-63
Drawn by:- W.C.H. 2-24-64
Quantities by:- W.C.H. 4-2-64
Checked by:- R.H.S. 5-8-63
Checked by:-
Checked by:-

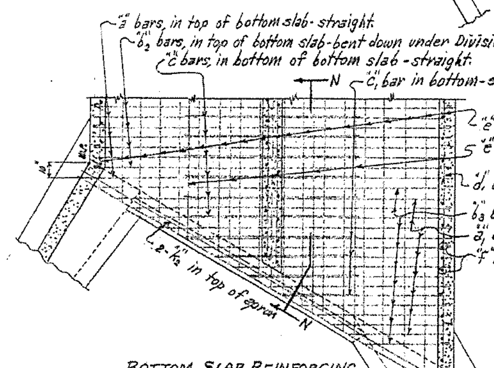
FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.			48	
JOB No.					

NOTE:- For Details of Standard Wings and bar lists, see Drawing No. W-X302-1 or W-X302-2; W-X303-1 or W-X303-2, and W-X304-1 or W-X304-2. Also W-X30.



TOP SLAB REINFORCING

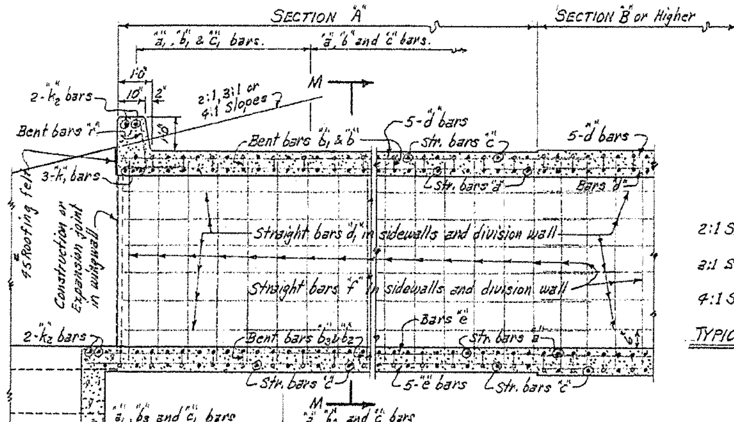
PART PLAN AT END OF CULVERT



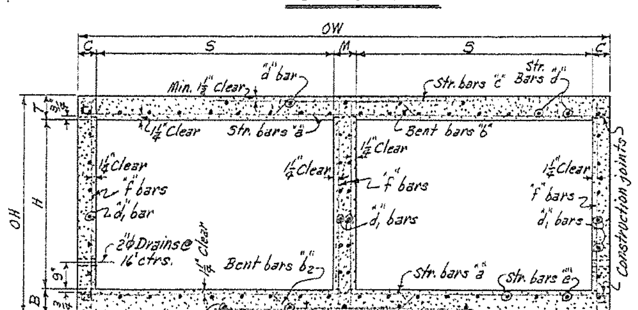
BOTTOM SLAB REINFORCING

PART PLAN AT END OF CULVERT

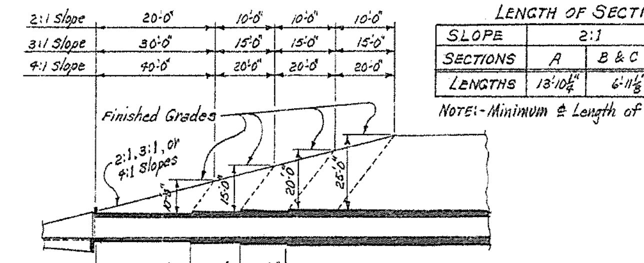
NOTE:- The "d", "d1" and "e" bars vary in length. They should extend 1'-9" min. into SECTION B.



SECTION N-N



TYPICAL SECTION M-M

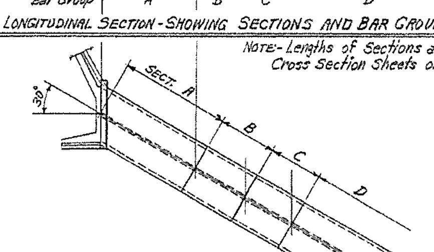


2:1 Slope =	SECTIONS	A = 12'-0"	B = 6'-0"	C = 6'-0"	MID-SECTION D - Varies
	Bar Group	A	B	C	D
3:1 Slope =	SECTIONS	A = 22'-0"	B = 11'-0"	C = 11'-0"	MID-SECTION D - Varies
	Bar Group	A	B	C	D
4:1 Slope =	SECTIONS	A = 32'-0"	B = 16'-0"	C = 16'-0"	MID-SECTION D - Varies
	Bar Group	A	B	C	D

These lengths are perpendicular to ℄ of roadway. See Table of Skew Lengths above.

TYPICAL LONGITUDINAL SECTION - SHOWING SECTIONS AND BAR GROUPS FOR VARIOUS DEPTHS OF COVER

NOTE:- Lengths of Sections and Bar Groups are to be shown on Cross Section Sheets or on Special Culvert Layout Sheet.



PART PLAN

NOTE:- For Details and Bar Lists for SECTIONS B, C & D, see Barrel Drawing Nos. R-200X-X2 and R-200X-X3.

LENGTH OF SECTIONS ON 30° SKEW

SLOPE	2:1		3:1		4:1	
SECTIONS	A	B & C	A	B & C	A	B & C
LENGTHS	13'-10¼"	6'-11⅛"	25'-4¾"	12'-8⅜"	36'-11¼"	18'-5⅝"

NOTE:- Minimum ℄ Length of SECTION "A" on 30° Skew = (0.288675 OW + 2").

SECTIONS AND BAR GROUPS TO BE USED FOR VARIOUS DEPTHS OF COVER

DEPTHS OF COVER	SECTIONS & BAR GROUPS FOR END SECTIONS A	B	C		MID-SECTION AND BAR GROUP
5.0' to 9.5'	A				A
10.0' to 14.5'	A				B
15.0' to 19.5'	A	B			C
20.0' to 25.0'	A	B	C		D

OR ALT.

DEPTHS OF COVER	SECTIONS & BAR GROUPS FOR END SECTIONS A	B	C		MID-SECTION AND BAR GROUP
5.0' to 9.5'	A				A
10.0' to 14.5'	A				B
15.0' to 19.5'	A	B			C
20.0' to 25.0'	A	2@ C			D

BARREL DIMENSIONS / * QUANTITIES - ONE SECTION "A"

MAX. DESIGN DEPTH OF COVER (D)	CLEAR SPANS (S)	CLEAR HEIGHT (H)	SQ. FT. OPENING (A)	OVERALL WIDTH (OW)	THICKNESS OF TOP SLAB (T)	THICKNESS OF SIDEWALLS (C)	THICKNESS OF DIVISION WALL (M)	THICKNESS OF BOTTOM SLAB (B)	OVERALL HEIGHT (OH)	ROADWAY LENGTH (RL)	LENGTH OF HEADWALL (K)	CLASS S CONCRETE, BARREL ONLY 2:1 Cu.Yd.	3:1 Cu.Yd.	4:1 Cu.Yd.	REINFORCING STEEL, BARREL, APRON AND HEADWALL 2:1 Lb.	3:1 Lb.	4:1 Lb.
SECTION "A" = 10'-0"	2 @ 9'	5'	90	19'-11"	10"	7"	9"	10¾"	6'-8¾"	23'-0"	24'-1⅝"	22.58	41.90	60.21	3488	5962	8640
		6'	108	20'-1"		7½"	10"		7'-8¾"	23'-2½"	24'-4⅝"	24.23	44.42	64.60	3591	6141	8899
		7'	126	20'-1"		7½"	10"		8'-8¾"	"	"	25.30	46.37	67.45	3738	6405	9262
		8'	144	20'-2"		8"	10"		9'-8¾"	23'-3½"	24'-5⅝"	26.79	49.12	71.44	3963	6803	9859
		9'	162	20'-5"		9"	11"		10'-8¾"	23'-6⅞"	24'-8⅝"	29.27	53.66	78.05	4229	7276	10522
		10'	180	20'-8"		10"	12"		11'-8¾"	23'-10⅜"	25'-0⅜"	32.02	58.69	85.36	4462	7776	11,249
		11'	198	20'-10"		11"	12"		12'-8¾"	24'-0⅝"	25'-2⅝"	34.48	63.21	91.94	4720	8249	11,941
	2 @ 10'	5'	100	21'-11"	10¾"	7"	9"	11½"	6'-10¼"	25'-3¾"	26'-5⅜"	25.77	47.24	68.70	3796	6486	9321
		6'	120	22'-1"		7½"	10"		7'-10¼"	25'-6"	26'-7⅞"	27.42	50.26	73.10	3851	6668	9583
		7'	140	22'-1"		7½"	10"		8'-10¼"	"	"	28.50	52.24	75.98	3999	6934	9960
		8'	160	22'-2"		8"	10"		9'-10¼"	25'-7⅛"	26'-9"	29.98	54.96	79.93	4221	7331	10,546
		9'	180	22'-5"		9"	11"		10'-10¼"	25'-10⅝"	27'-0⅝"	32.19	59.55	86.62	4489	7808	11,214
		10'	200	22'-8"		10"	12"		11'-10¼"	26'-2⅛"	27'-4"	35.25	64.61	93.97	4790	8342	12,006
		11'	220	22'-10"		11"	12"		12'-10¼"	26'-4⅜"	27'-6⅛"	37.71	69.13	100.54	5079	8786	12,639
		12'	240	23'-0"		12"	12"		13'-10¼"	26'-6⅝"	27'-8⅜"	40.36	73.98	107.60	5334	9310	13,363
	2 @ 11'	6'	132	24'-2"	11¾"	8"	10"	12½"	8'-0¼"	27'-10⅝"	29'-0⅝"	31.73	58.16	84.59	4670	8056	11,502
		7'	154	24'-2"		8"	10"		9'-0¼"	"	"	32.83	60.19	87.57	4784	8255	11,790
		8'	176	24'-2"		8"	10"		10'-0¼"	"	"	33.96	62.25	90.53	5033	8710	12,454
		9'	198	24'-5"		9"	11"		11'-0¼"	28'-2⅜"	29'-4⅜"	36.48	66.87	97.26	5311	9202	13,141
		10'	220	24'-8"		10"	12"		12'-0¼"	28'-5⅞"	29'-7⅞"	39.26	71.97	104.68	5635	9764	13,967
		11'	242	24'-10"		11"	12"		13'-0¼"	28'-8⅛"	29'-10"	41.74	76.52	111.29	5902	10,219	14,614
		12'	264	25'-0"		12"	12"		14'-0¼"	28'-10⅜"	30'-0⅜"	44.39	81.37	118.35	6351	10,993	15,715
	2 @ 12'	6'	144	26'-2"	12½"	8"	10"	13½"	8'-2"	30'-2⅜"	31'-4½"	35.76	65.55	95.34	5334	9196	13,120
		7'	168	26'-2"		8"	10"		9'-2"	"	"	36.88	67.60	98.33	5413	9336	13,326
		8'	192	26'-2"		8"	10"		10'-2"	"	"	37.99	69.64	101.28	5700	9856	14,081
		9'	216	26'-5"		9"	11"		11'-2"	30'-6"	31'-8"	40.52	74.28	108.04	5986	10,360	14,783
		10'	240	26'-8"		10"	12"		12'-2"	30'-9½"	31'-11½"	43.34	79.44	115.54	6309	10,924	15,616
		11'	264	26'-10"		11"	12"		13'-2"	30'-11¾"	32'-1¾"	45.93	84.01	122.19	6579	11,385	16,270
		12'	288	27'-0"		12"	12"		14'-2"	31'-2¼"	32'-4"	48.49	88.89	129.28	7035	12,168	17,385

* For remainder of quantities see Std. Wing and Barrel Drawings listed below. Total steel quantities listed above include one lap of longitudinal bars, plus an add'l lap for 4:1 slopes.

GENERAL NOTES

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾ chamfers.

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

CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls, division wall and slabs shall be only where shown on plans.

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

BAR LIST FOR SECTION "A" ON 30° SKEW - ONE END ONLY.

SECTION "A" & BAR GROUP "A". LENGTH OF SECTION: 2:1 = 13'-10¼"; 3:1 = 25'-4¾"; 4:1 = 36'-11¼". DEPTH OF COVER (D): 0'-0" TO 10'-0" MAXIMUM.

"a" bars — STRAIGHT — In Top and Bottom Slab of Barrel. "a1" bars — STRAIGHT — In Top and Bottom Slab of Barrel - (Two of each Length).

S	H	a Size	a Spacing	a No. Req'd 2:1	3:1	4:1	a Length	a1 Size	a1 Spacing	a1 No. Req'd	a1 Length Max.	a1 Length Min.
2 @ 9'	5'	#5	11"	19	43	69	19'-8"	#5	11"	20	18'-1"	3'-10"
	6'			19	43	69	19'-10"			20	18'-3"	4'-0"
	7'			19	43	69	19'-10"			20	18'-3"	"
	8'			19	43	69	19'-11"			22	18'-4"	2'-6"
	9'			19	43	69	20'-2"			22	18'-7"	2'-9"
	10'			19	43	69	20'-5"			22	18'-10"	3'-0"
	11'			19	43	69	20'-7"			22	19'-0"	3'-2"
2 @ 10'	5'	#5	12"	17	39	63	21'-8"	#5	12"	22	19'-11"	2'-5"
	6'			17	39	63	21'-10"			22	20'-1"	2'-7"
	7'			17	39	63	21'-10"			22	20'-1"	"
	8'			17	39	63	21'-11"			22	20'-2"	2'-8"
	9'			17	39	63	22'-2"			22	20'-5"	2'-11"
	10'			17	39	63	22'-5"			22	20'-8"	3'-2"
	11'			17	39	63	22'-7"			22	20'-10"	3'-4"
	12'			17	39	63	22'-9"			22	21'-0"	3'-6"
2 @ 11'	6'	#5	12"	15	39	61	23'-11"	#5	12"	24	22'-2"	2'-11"
	7'			15	39	61	23'-11"			24	22'-2"	"
	8'			15	39	61	23'-11"			24	22'-2"	"
	9'			15	39	61	24'-2"			24	22'-5"	3'-2"
	10'			15	39	61	24'-5"			24	22'-8"	3'-5"
	11'			15	39	61	24'-7"			24	22'-10"	3'-7"
	12'			15	39	61	24'-9"			24	23'-0"	3'-9"
2 @ 12'	6'	#5	11"	15	41	65	25'-11"	#5	11"	28	24'-4"	3'-9"
	7'			15	41	65	25'-11"			28	24'-4"	"
	8'			15	41	65	25'-11"			28	24'-4"	"
	9'			15	41	65	26'-2"			28	24'-7"	4'-0"
	10'			15	41	65	26'-5"			30	24'-10"	2'-8"
	11'			15	41	65	26'-7"			30	25'-0"	2'-10"
	12'			15	41	65	26'-9"			30	25'-2"	3'-0"

"b" bars — BENT - See Diagrams below — In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars. "b1" bars — In Bottom of Top Slab - some bent up over Division Wall - one end hooked. Alt. with "a1" and "c1" or "c" bars.

S	H	b Size	b Spacing	b No. Req'd 2:1	3:1	4:1	b Length	X	Y	Z	b1 Size	b1 Spacing	b1 No. Req'd	b1 Length Max.	b1 Length Min.	L Max.	L Min.
2 @ 9'	5'	#6	11"	9	21	34	21'-2"	0'-6½"	4'-2"	7'-2"	#6	11"	11	19'-10"	3'-7"	18'-10"	3'-0"
	6'			9	21	34	21'-4"	"	4'-3"	7'-2½"			11	20'-0"	3'-9"	19'-0"	3'-2"
	7'			9	21	34	21'-4"	"	"	7'-2½"			11	20'-0"	"	"	"
	8'			9	21	34	21'-5"	"	"	7'-3"			11	20'-1"	3'-10"	19'-1"	3'-3"
	9'			9	21	34	21'-8"	"	4'-4"	7'-4"			11	20'-4"	4'-1"	19'-4"	3'-6"
	10'			8	21	34	21'-11"	"	4'-5"	7'-5"			11	20'-7"	4'-4"	19'-7"	3'-9"
	11'			8	21	34	22'-1"	0'-6½"	4'-5"	7'-6"			11	20'-9"	4'-6"	19'-9"	3'-11"
2 @ 10'	5'	#6	12"	7	19	30	23'-2"	0'-7¾"	4'-6½"	7'-11"	#6	12"	11	21'-10"	3'-10"	20'-9"	3'-3"
	6'			7	19	30	23'-4"	"	4'-7½"	7'-11½"			11	22'-0"	4'-0"	20'-11"	3'-5"
	7'			7	19	30	23'-4"	"	"	"			11	22'-0"	"	"	"
	8'			7	19	30	23'-5"	"	"	8'-0"			11	22'-1"	4'-1"	21'-0"	3'-6"
	9'			7	19	30	23'-8"	"	4'-8½"	8'-1"			11	22'-4"	4'-4"	21'-3"	3'-9"
	10'			7	19	30	23'-11"	"	4'-9½"	8'-2"			11	22'-7"	4'-7"	21'-6"	4'-0"
	11'			7	19	30	24'-1"	"	4'-9½"	8'-3"			11	22'-9"	4'-9"	21'-8"	4'-2"
	12'			7	19	30	24'-3"	0'-7¾"	4'-9½"	8'-4"			12	22'-11"	3'-1"	21'-10"	2'-7"
2 @ 11'	6'	#7	12"	7	18	30	25'-8"	0'-8"	5'-0"	8'-9"	#7	12"	12	24'-2"	4'-5"	23'-0"	3'-9"
	7'			7	18	30	25'-8"	"	"	"			12	24'-2"	"	"	"
	8'			7	18	30	25'-8"	"	"	"			12	24'-2"	"	"	"
	9'			7	18	30	25'-11"	"	5'-1"	8'-10"			12	24'-5"	4'-8"	23'-3"	4'-0"
	10'			7	18	30	26'-2"	"	5'-2"	8'-11"			13	24'-8"	3'-2"	23'-6"	2'-6"
	11'			7	18	30	26'-4"	"	5'-2"	9'-0"			13	24'-10"	3'-4"	23'-8"	2'-8"
	12'			7	18	30	26'-6"	0'-8"	5'-2"	9'-1"			13	25'-0"	3'-6"	23'-10"	2'-10"
2 @ 12'	6'	#7	11"	7	19	32	27'-8"	0'-8¾"	5'-4½"	9'-6"	#7	11"	15	26'-4"	3'-7"	25'-1"	2'-11"
	7'			7	19	32	27'-8"	"	"	"			15	26'-4"	"	"	"
	8'			7	19	32	27'-8"	"	"	"			15	26'-4"	"	"	"
	9'			7	19	32	27'-11"	"	5'-5½"	9'-7"			15	26'-7"	3'-10"	25'-4"	3'-2"
	10'			7	19	32	28'-2"	"	5'-6½"	9'-8"			15	26'-10"	4'-1"	25'-7"	3'-5"
	11'			7	19	32	28'-4"	"	5'-6½"	9'-9"			15	27'-0"	4'-3"	25'-9"	3'-7"
	12'			7	19	32	28'-6"	0'-8¾"	5'-6½"	9'-10"			15	27'-2"	4'-5"	25'-11"	3'-9"

"b2" bars — BENT - See Diagrams below — In Top of Bottom Slab bent down under Division Wall - hooked. Alternate with "a" and "c" bars. "b3" bars — In Top of Bottom Slab - some bent down under Division Wall - one end hooked. Alt. with "a1" and "c" or "c1" bars.

S	H	b2 Size	b2 Spacing	b2 No. Req'd 2:1	3:1	4:1	b2 Length	X	Y	Z	b3 Size	b3 Spacing	b3 No. Req'd	b3 Length Max.	b3 Length Min.	L Max.	L Min.
2 @ 9'	5'	#6	11"	10	22	35	21'-3"	0'-7¼"	4'-0½"	7'-2"	#6	11"	11	19'-11"	3'-7"	18'-10"	3'-0"
	6'			10	22	35	21'-5"	"	4'-1½"	7'-2½"			11	20'-1"	3'-9"	19'-0"	3'-2"
	7'			10	22	35	21'-5"	"	"	7'-2½"			11	"	"	"	"
	8'			10	22	35	21'-6"	"	"	7'-3"			11	20'-2"	3'-10"	19'-1"	3'-3"
	9'			10	22	35	21'-9"	"	4'-2½"	7'-4"			11	20'-5"	4'-1"	19'-4"	3'-6"
	10'			9	22	35	22'-0"	"	4'-3½"	7'-5"			11	20'-8"	4'-4"	19'-7"	3'-9"
	11'			9	22	35	22'-2"	0'-7¼"	4'-3½"	7'-6"			11	20'-10"	4'-6"	19'-9"	3'-11"
2 @ 10'	5'	#6	12"	8	20	31	23'-3"	0'-8"	4'-5"	7'-11"	#6	12"	11	21'-10"	3'-10"	20'-9"	3'-3"
	6'			8	20	31	23'-5"	"	4'-6"	7'-11½"			11	22'-0"	4'-0"	20'-11"	3'-5"
	7'			8	20	31	"	"	"	"			11	"	"	"	"
	8'			8	20	31	23'-6"	"	"	8'-0"			11	22'-1"	4'-1"	21'-0"	3'-6"
	9'			8	20	31	23'-9"	"	4'-7"	8'-1"			11	22'-4"	4'-4"	21'-3"	3'-9"
	10'			8	20	31	24'-0"	"	4'-8"	8'-2"			11	22'-7"	4'-7"	21'-6"	4'-0"
	11'			8	20	31	24'-2"	"	4'-8"	8'-3"			11	22'-9"	4'-9"	21'-8"	4'-2"
	12'			8	20	31	24'-4"	0'-8"	4'-8"	8'-4"			12	22'-11"	3'-1"	21'-10"	2'-7"
2 @ 11'	6'	#7	12"	8	19	31	25'-9"	0'-8¾"	4'-10½"	8'-9"	#7	12"	12	24'-3"	4'-5"	23'-0"	3'-9"
	7'			8	19	31	"	"	"	"			12	"	"	"	"
	8'			8	19	31	"	"	"	"			12	"	"	"	"
	9'			8	19	31	26'-0"	"	4'-11½"	8'-10"			12	24'-6"	4'-8"	23'-3"	4'-0"
	10'			8	19	31	26'-3"	"	5'-0½"	8'-11"			13	24'-9"	3'-2"	23'-6"	2'-6"
	11'			8	19	31	26'-5"	"	5'-0½"	9'-0"			13	24'-11"	3'-4"	23'-8"	2'-9"
	12'			8	19	31	26'-7"	0'-8¾"	5'-0½"	9'-1"			13	25'-1"	3'-6"	23'-10"	2'-10"
2 @ 12'	6'	#7	11"	8	20	33	27'-9"	0'-9¾"	5'-2½"	9'-6"	#7	11"	15	26'-5"	3'-7"	25'-1"	2'-11"
	7'			8	20	33	"	"	"	"			15	"	"	"	"
	8'			8	20	33	"	"	"	"			15	"	"	"	"
	9'			8	20	33	28'-0"	"	5'-3½"	9'-7"			15	26'-8"	3'-10"	25'-4"	3'-2"
	10'			8	20	33	28'-3"	"	5'-4½"	9'-8"			15	26'-11"	4'-1"	25'-7"	3'-5"
	11'			8	20	33	28'-5"	"	5'-4½"	9'-9"			15	27'-1"	4'-3"	25'-9"	3'-7"
	12'			8	20	33	28'-7"	0'-9¾"	5'-4½"	9'-10"			15	27'-3"	4'-5"	25'-11"	3'-9"

"c" bars — STRAIGHT — In Top and Bottom Slab of Barrel. Alternate with "b" and "b2" bars. "c1" bars — In Top and Bottom Slab of Barrel. Alt. with "b1" & "b3" bars. (Two of each Length). "d" bars — STRAIGHT — Longitudinal in Top Slab of Barrel. "d1" bars — Longitudinal in Sidewalls and Division Wall. "e" bars — Longitudinal in Bottom Slab of Barrel.

S	H	c Size	c Spacing	c No. Req'd 2:1	3:1	4:1	c Length	c1 Size	c1 Spacing	c1 No. Req'd	c1 Length Max.	c1 Length Min.	d Size	d Spacing	d No. Req'd	d1 Size	d1 Spacing	d1 No. Req'd	e Size	e Spacing	e No. Req'd
2 @ 9'	5'	#7	11"	25	49	75	9'-9"	#7	11"	8	8'-5"	3'-8"	#4	12"	25	#4	12"	20	#4	12"	25
	6'			25	49	75	9'-10"			8	8'-6"	3'-9"			25			24			25
	7'			25	49	75	"			8	"	"			25			28			25
	8'			25	49	75	"			8	8'-7"	3'-10"			25			32			25
	9'			25	49	75	9'-11"			8	8'-9"	4'-0"			25			36			25
	10'			25	49	75	10'-0"			8	8'-11"	4'-2"			25			40			25
	11'			25	49	75	"			8	9'-0"	4'-3"			25			44			25
2 @ 10'	5'	#8	12"	23	45	69	10'-9"	#8	12"	8	9'-2"	3'-11"	#4	12"	27	#4	12"	20	#4	12"	27
	6'			23	45	69	10'-10"			8	9'-4"	4'-1"			27			24			27
	7'			23	45	69	"			8	"	"			27			28			27
	8'			23	45	69	"			8	9'-5"	4'-2"			27			32			27
	9'			23	45	69	10'-11"			8	9'-7"	4'-4"			27			36			27
	10'			23	45	69	11'-0"			8	9'-9"	4'-6"			27			40			27
	11'			23	45	69	"			8	9'-10"	4'-7"			27			44			27
	12'			23	45	69	"			8	3'-11"	4'-8"			27			48			27
2 @ 11'	6'	#8	12"	21	45	67	11'-10"	#8	12"	10	10'-11"	3'-11"	#4	12"	29	#4	12"	24	#4	12"	29
	7'			21	45	67	"			10	"	"			29			28			29
	8'			21	45	67	"			10	"	"			29			32			29
	9'			21	45	67	11'-11"			10	11'-1"	4'-1"			29			36			29
	10'			21	45	67	12'-0"			10	11'-3"	4'-3"			29			40			29
	11'			21	45	67	"			10	11'-4"	4'-4"			29			44			29
	12'			21	45	67	"			10	11'-5"	4'-5"			29			48			29
2 @ 12'	6'	#8	11"	23	49	73	12'-10"	#8	11"	12	11'-6"	3'-7"	#4	12"	31	#4	12"	24	#4	12"	31
	7'			23	49	73	"			12	"	"			31			28			31
	8'			23	49	73	"			12	"	"			31			32			31
	9'			23	49	73	12'-11"			12	11'-8"	3'-9"			31			36			31
	10'			23	49	73	13'-0"			12	11'-10"	3'-11"			31			40			31
	11'			23	49	73	"			12	11'-11"	4'-0"			31			44			31
	12'			23	49	73	"			12	12'-0"	4'-1"			31			48			31

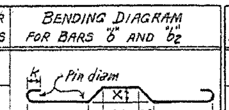
"d" bars Length: Lengths Vary - Ave. Lengths: 2:1 = 15'-6", 3:1 = 27'-1", ⊙4:1 = 38'-8".
"d1" bars Length: Lengths Vary - Ave. Lengths: 2:1 = 15'-6", 3:1 = 27'-1", ⊙4:1 = 38'-8".
"e" bars Length: Lengths Vary - Ave. Length; 2:1 = 16'-8", 3:1 = 28'-3", ⊙4:1 = 39'-10".

"f" bars — STRAIGHT — Verticals in Sidewalls and Division Wall. "k1" bars — STRAIGHT — In Bottom of Headwall. "k2" bars — In Top of Headwall and Apron. (2 Each)

S	H	f Size	f Spacing	f No. Req'd 2:1	3:1	4:1	f Length	k1 Size	k1 No. Req'd	k1 Length	k2 Size	k2 No. Req'd	k2 Length
2 @ 9'	5'	#4	12"	56	102	148	6'-5"	#6	3	22'-9"	#6	4	23'-10"
	6'			56	102	148	7'-5"		3	22'-11"		4	24'-1"
	7'		10"	68	124	176	8'-5"		3	"		4	"
	8'	#5	12"	56	102	148	9'-5"		3	23'-0"		4	24'-2"
	9'		10"	68	124	178	10'-5"		3	23'-3"		4	24'-5"
	10'	#6	12"	56	102	148	11'-5"		3	23'-7"		4	24'-9"
	11'		11"	62	112	162	12'-5"		3	23'-9"		4	24'-11"
2 @ 10'	5'	#4	12"	56	102	148	6'-7"	#6	3	25'-0"	#6	4	26'-2"
	6'			56	102	148	7'-7"		3	25'-3"		4	26'-4"
	7'		10"	68	124	178	8'-7"		3	"		4	"
	8'	#5	12"	56	102	148	9'-7"		3	25'-4"		4	26'-6"
	9'		10"	68	124	178	10'-7"		3	25'-7"		4	26'-9"
	10'	#6	12"	56	102	148	11'-7"		3	25'-11"		4	27'-1"
	11'		11"	62	112	162	12'-7"		3	26'-1"		4	27'-3"
	12'		10"	68	124	178	13'-7"		3	26'-3"		4	27'-5"
2 @ 11'	6'	#4	12"	56	102	148	7'-9"	#7	3	27'-7"	#7	4	28'-9"
	7'		11"	62	112	162	8'-9"		3	"		4	"
	8'	#5	12"	56	102	148	9'-9"		3	"		4	"
	9'		10"	68	124	178	10'-9"		3	27'-11"		4	29'-1"
	10'	#6	12"	56	102	148	11'-9"		3	28'-2"		4	29'-4"
	11'		11"	62	112	162	12'-9"		3	28'-5"		4	29'-7"
	12'		9"	76	136	196	13'-9"		3	28'-7"		4	29'-9"
2 @ 12'	6'	#4	12"	56	102	148	7'-11"	#7	3	29'-11"	#7	4	31'-1"
	7'			56	102	148	8'-11"		3	"		4	"
	8'	#5	12"	56	102	148	9'-11"		3	"		4	"
	9'		10"	68	124	178	10'-11"		3	30'-3"		4	31'-5"
	10'	#6	12"	56	102	148	11'-11"		3	30'-6"		4	31'-8"
	11'		11"	62	112	162	12'-11"		3	30'-8"		4	31'-10"
	12'		9"	76	136	196	13'-11"		3	30'-11"		4	32'-1"

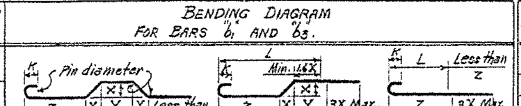
BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS
#5	2½"	4¼"	0'-11½"
#6	3"	5"	1'-2"
#7	3½"	5¾"	1'-4"

BENDING DIAGRAM FOR BARS "b" AND "b2"



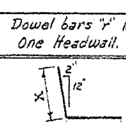
BAR SIZE	PIN DIAM.	K	ADD FOR 1 HOOK
#5	2½"	4¼"	0'-5¾"
#6	3"	5"	0'-7"
#7	3½"	5¾"	0'-8"

BENDING DIAGRAM FOR BARS "b1" AND "b3".



SPAN	SIZE	SPACING	No. REQ'D	LENGTH	X
9'	#4	12"±	24	3'-1"	1'-6½"
10'	#4	12"±	26	3'-2"	1'-7"
11'	#4	12"±	29	3'-4"	1'-8"
12'	#4	12"±	31	3'-6"	1'-9"

Dowel bars "r" in One Headwall.



NOTE:- Dimensions are to centers of bars (b, b1, b2 & b3). The X, Y & Z values for "b1" bars are same as for "b" bars and for "b3" bars same as for "b2" bars.

▼ These bars are in the skewed portion of barrel only. The length of "a1" and "c1" bars and overall length L of "b1" and "b3" bars vary by 1'-9" for 12" spacing and 1'-7" for 11" spacing.

⊙ To Longitudinal bars of 4:1 Slopes add one splice for each "d", "d1" and "e" bar. (1'-3" Lap.)

DESIGN LIVE LOAD

H20-S16 LOADING A.A.S.H.O. 1961 AND SPECIAL MILITARY LOADING

Two 24,000 Lb. Axles @ 4'-0" ctrs.

UNIT STRESSES:-

Class S Concrete (n=10) 1200#/□"

Reinforcing Steel 20,000#/□"

NOTE:- This drawing to be used in conjunction with Standard Wing Drawing Nos. W-X302-1 or W-X302-2, W-X303-1 or W-X303-2, and W-X304-1 or W-X304-2. Also W-X30.
For Barrels of 10' and 12' Spans, See Drawing No. R-200X-X2.
For " " 9' and 11' Spans, " " No. R-200X-X3.

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS

30° SKEW ~ SECTIONS "A" ONLY

9', 10', 11' AND 12' SPANS DOUBLES

2:1, 3:1 OR 4:1 SLOPES OVER 5'-0" COVER

STANDARD DRAWING NO. R-230X-2

Designed by:- W.C.H. 1-29-63 Checked by:- R.H.S. 5-29-63
Drawn by:- W.C.H. 6-29-62 Checked by:- 7-20-62
Quantities by:- W.C.H. 1-30-64, 4-28-64 Checked by:-