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.		070265	1	37
				(2)	HWY. 51 - I-30 (S)			

ARKANSAS DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLANS FOR STATE HIGHWAY

HWY. 51 - I-30 (S)

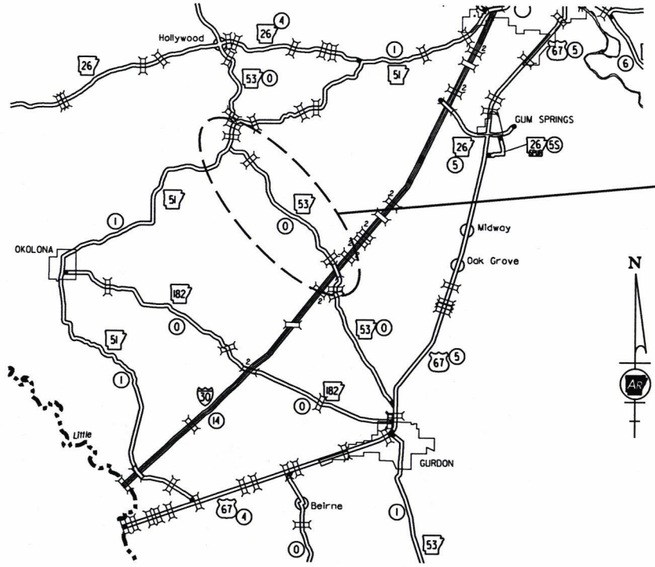
CLARK COUNTY

ROUTE 53 SECTION 0

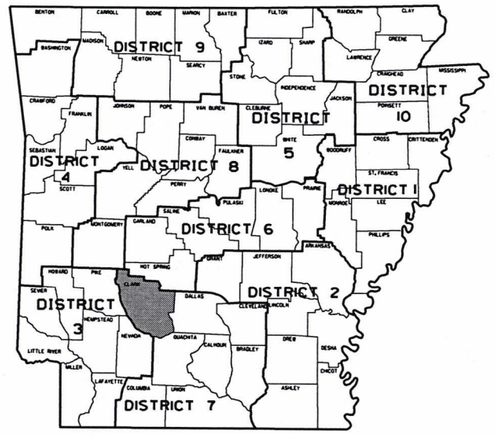
FED. AID PROJECT STPF-0010(34)

JOB 070265

NOT TO SCALE



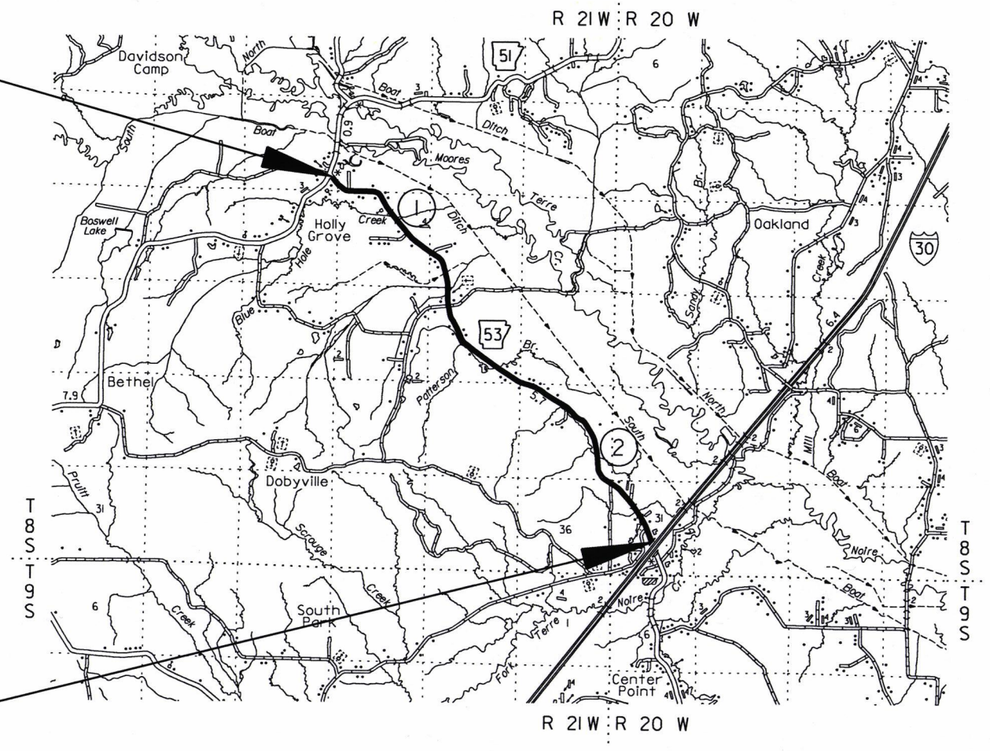
VICINITY MAP



ARK. HWY. DIST. NO. 7

LOG MILE 10.76
BEGIN JOB 070265

LOG MILE 16.30
END JOB 070265



STRUCTURES OVER 20'-0" SPAN

(1) LOG MILE 11.59 IN PLACE
DBL. 10' x 8' x 72' R.C. BOX
WITH 3:1 WINGS LT. AND RT.
ON 45° LT. FWD. SKEW
RETAIN AND EXTEND
9' LT. AND 9' RT.
TO A COMPLETED LENGTH OF 90'
SPAN = 31'-4"

(2) LOG MILE 15.17 IN PLACE
DBL. 10' x 7' x 63' R.C. BOX
WITH 3:1 WINGS LT. AND RT.
ON 45° LT. FWD. SKEW
RETAIN AND EXTEND
8' LT. AND 8' RT.
TO A COMPLETED LENGTH OF 79'
SPAN = 31'-3"

DESIGN TRAFFIC DATA

DESIGN YEAR	2038
2018 ADT	550
2038 ADT	700
2038 DHV	77
DIRECTIONAL DISTRIBUTION	0.60
TRUCKS	13%
AVERAGE RUNNING SPEED	50 MPH

BEGIN PROJECT		MID-POINT OF PROJECT		END PROJECT	
LATITUDE	34° 03' 19" N	LATITUDE	34° 01' 35" N	LATITUDE	33° 59' 50" N
LONGITUDE	93° 14' 37" W	LONGITUDE	93° 12' 54" W	LONGITUDE	93° 11' 03" W

GROSS LENGTH OF PROJECT	29251.20	FEET OR	5.540	MILES		
NET " " ROADWAY	29188.62	" "	5.528	"		
NET " " BRIDGES	62.58	" "	0.012	"		
NET " " PROJECT	29251.20	" "	5.540	"		

APPROVED

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

4-26-18

DEPUTY DIRECTOR
AND CHIEF ENGINEER

4/25/2018

R070265.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.		070265	2	37

(2) INDEX OF SHEETS AND STANDARD DRAWINGS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

INDEX OF SHEETS

ROADWAY STANDARD DRAWINGS

DRWG.NO.	TITLE	DATE
CDP-1	CONCRETE DITCH PAVING	12-08-16
FES-1	FLARED END SECTION	10-18-96
FES-2	FLARED END SECTION	10-18-96
MB-1	MAILBOX DETAILS	11-18-04
PBC-1	PRECAST CONCRETE BOX CULVERTS	01-28-15
PCC-1	CONCRETE PIPE CULVERT FILL HEIGHTS & BEDDING	02-27-14
PCM-1	METAL PIPE CULVERT FILL HEIGHTS & BEDDING	02-27-14
PCP-1	PLASTIC PIPE CULVERT (HIGH DENSITY POLYETHYLENE)	02-27-14
PCP-2	PLASTIC PIPE CULVERT (PVC F949)	02-27-14
PM-1	PAVEMENT MARKING DETAILS	06-01-17
PU-1	DETAILS OF PIPE UNDERDRAIN	12-08-16
RCB-1	REINFORCED CONCRETE BOX CULVERT DETAILS	07-26-12
RCB-2	EXCAVATION PAY LIMITS, BACKFILL, & SOLID SODDING FOR BOX CULVERTS	11-20-03
RCB-3	METHOD OF EXTENDING EXISTING R.C. BOX CULVERTS	10-12-95
SE-2	TABLES AND METHOD OF SUPERELEVATION FOR TWO-WAY TRAFFIC	10-18-96
SI-1	DETAILS OF SPECIAL ITEMS	09-12-13
TC-1	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	04-13-17
TC-2	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	09-02-15
TC-3	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	09-02-15
TC-4	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION-TEMPORARY PRECAST BARRIER	02-27-14
TC-5	STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION-TEMPORARY PRECAST BARRIER	10-15-09
TEC-1	TEMPORARY EROSION CONTROL DEVICES	11-16-17
TEC-2	TEMPORARY EROSION CONTROL DEVICES	06-02-94
TEC-3	TEMPORARY EROSION CONTROL DEVICES	11-03-94
W-X003-1	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	05-10-66
W-X153-1	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	05-10-66
W-X30	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	07-15-63
W-X303-1	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	05-10-66
W-X45	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	06-15-64
W-X453-1	DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS	05-10-66
R-100X-0	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	02-08-63
R-200X-0	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	02-15-63
R-200X-X2	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	01-14-63
R-215X-0	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	08-23-63
R-230X-01	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	02-26-64
R-145X-0	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	07-10-64
R-245X-02	DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS	07-15-64

4/25/2018

R070265.DGN

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
06-05-18				6	ARK.			
				JOB NO.		070265	3	37

(2) GOVERNING SPECIFICATIONS AND GEN. NOTES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
6-6-18

GOVERNING SPECIFICATIONS

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

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
100-4_____	DEPARTMENT NAME CHANGE
102-2_____	ISSUANCE OF PROPOSALS
108-1_____	LIQUIDATED DAMAGES
108-2_____	WORK ALLOWED PRIOR TO ISSUANCE OF WORK ORDER
303-1_____	AGGREGATE BASE COURSE
400-1_____	TACK COATS
400-4_____	DESIGN AND QUALITY CONTROL OF ASPHALT MIXTURES
410-1_____	CONSTRUCTION REQUIREMENTS AND ACCEPTANCE OF ASPHALT CONCRETE PLANT MIX COURSES
604-1_____	RETROREFLECTIVE SHEETING FOR TRAFFIC CONTROL DEVICES IN CONSTRUCTION ZONES
605-1_____	CONCRETE DITCH PAVING
606-1_____	PIPE CULVERTS FOR SIDE DRAINS
620-1_____	MULCH COVER
JOB 070265__	BIDDING REQUIREMENTS AND CONDITIONS
JOB 070265__	BROADBAND INTERNET SERVICE FOR ASPHALT CONCRETE PLANT
JOB 070265__	BROADBAND INTERNET SERVICE FOR FIELD OFFICE
JOB 070265__	CARGO PREFERENCE ACT REQUIREMENTS
JOB 070265__	CONSTRUCTION IN SPECIAL FLOOD HAZARD AREAS
JOB 070265__	CULVERT CLEAN OUT
JOB 070265__	DISADVANTAGED BUSINESS ENTERPRISE BIDDER'S RESPONSIBILITIES
JOB 070265__	GOALS FOR DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
JOB 070265__	MANDATORY ELECTRONIC CONTRACT
JOB 070265__	MANDATORY ELECTRONIC DOCUMENT SUBMITTAL
JOB 070265__	NESTING SITES OF MIGRATORY BIRDS
JOB 070265__	PARTNERING REQUIREMENTS
JOB 070265__	PERCENT WITHIN LIMITS/PAVEMENT SMOOTHNESS
JOB 070265__	PLASTIC PIPE
JOB 070265__	PROTECTION OF WATER QUALITY AND WETLANDS
JOB 070265__	RUMBLE STRIPS
JOB 070265__	SHORING FOR CULVERTS
JOB 070265__	SOIL STABILIZATION
JOB 070265__	STORM WATER POLLUTION PREVENTION PLAN
JOB 070265__	SUBMISSION OF ASPHALT CONCRETE HOT MIX ACCEPTANCE TEST RESULTS
JOB 070265__	UTILITY ADJUSTMENTS
JOB 070265__	VALUE ENGINEERING
JOB 070265__	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 14 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.

6/5/2018

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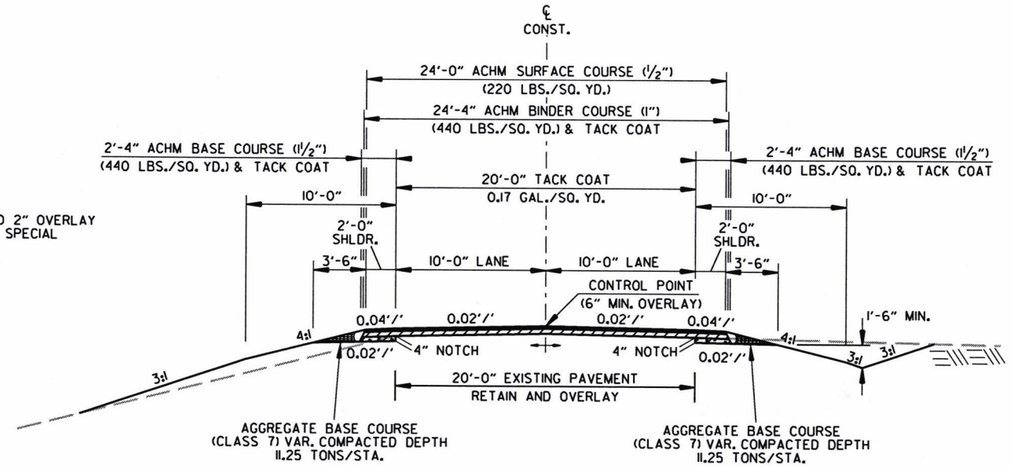
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	4	37

(2) TYPICAL SECTIONS OF IMPROVEMENT

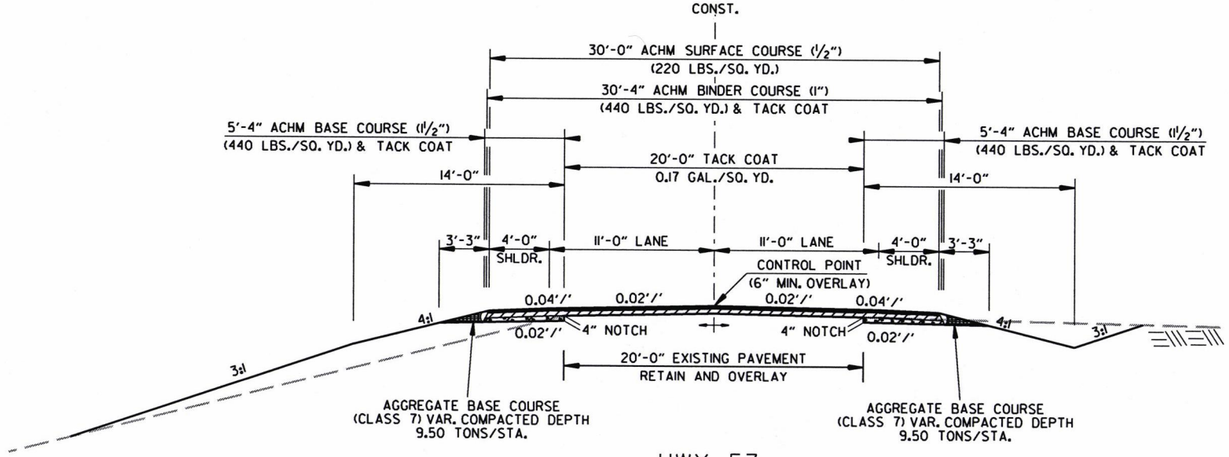
STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

•TRANSITION FROM 6" OVERLAY TO 2" OVERLAY FROM L.M. 16.54 TO L.M. 16.19 (SEE SPECIAL DETAIL "DETAIL FOR TRANSITION").



HWY. 53
TYPICAL SECTION OF IMPROVEMENT

LOG MILE 10.76 TO LOG MILE 11.58
LOG MILE 11.60 TO LOG MILE 11.68
LOG MILE 11.69 TO LOG MILE 12.42
LOG MILE 12.44 TO LOG MILE 12.59
LOG MILE 12.60 TO LOG MILE 12.64
LOG MILE 12.66 TO LOG MILE 13.65
LOG MILE 13.66 TO LOG MILE 15.16
LOG MILE 15.18 TO LOG MILE 15.92
LOG MILE 15.94 TO LOG MILE 15.99
LOG MILE 16.01 TO LOG MILE 16.19•



HWY. 53
TYPICAL SECTION OF IMPROVEMENT - R.C. BOX CULVERTS

LOG MILE 11.58 TO LOG MILE 11.60
LOG MILE 11.68 TO LOG MILE 11.69
LOG MILE 12.42 TO LOG MILE 12.44
LOG MILE 12.59 TO LOG MILE 12.60
LOG MILE 12.64 TO LOG MILE 12.66
LOG MILE 13.65 TO LOG MILE 13.66
LOG MILE 15.16 TO LOG MILE 15.18
LOG MILE 15.92 TO LOG MILE 15.94
LOG MILE 15.99 TO LOG MILE 16.01

NOTES:

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.

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

ALL DITCHES SHALL BE GRADED TO DRAIN.

2/15/2018

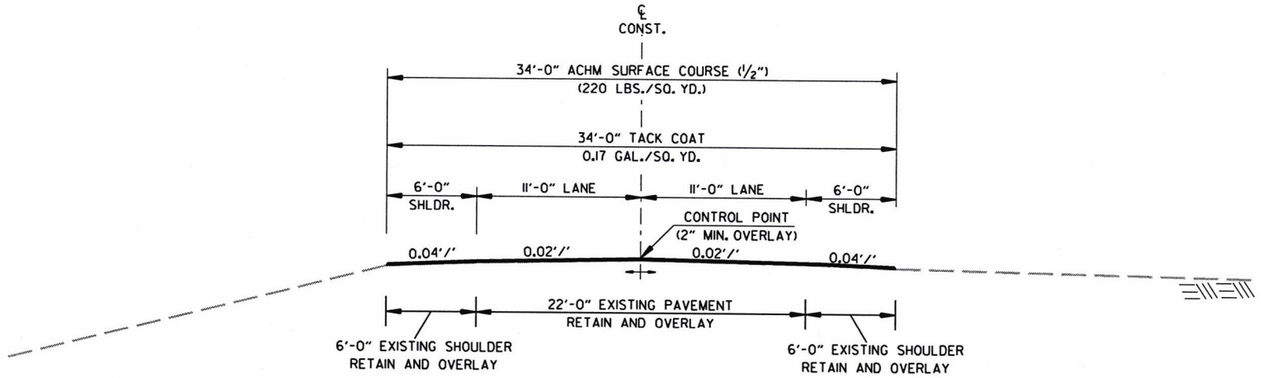
R070265.DGN

TYPICAL SECTIONS OF IMPROVEMENT

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	5	37

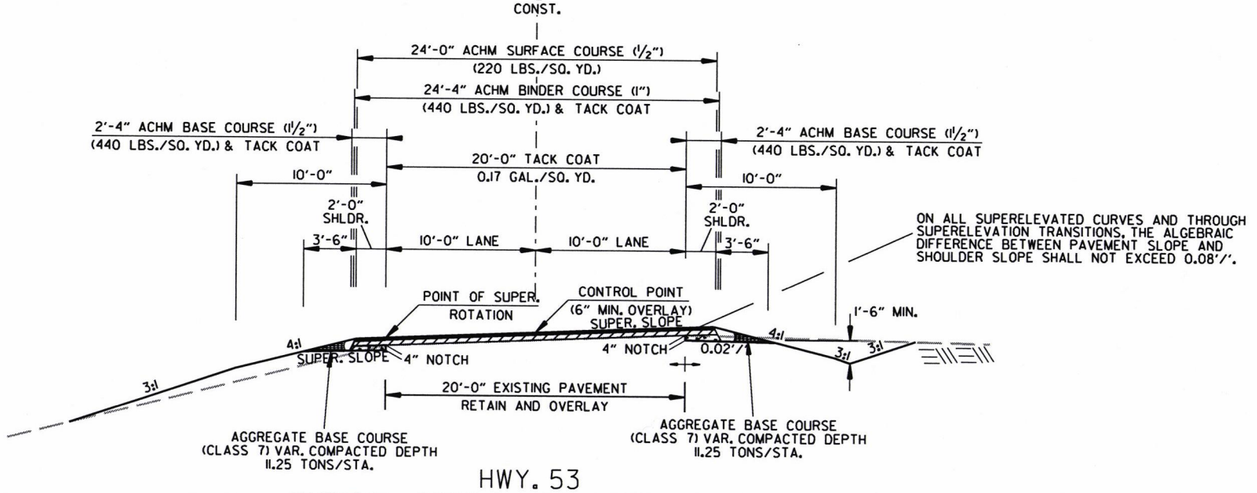
(2) TYPICAL SECTIONS OF IMPROVEMENT

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



HWY. 53
TYPICAL SECTION OF IMPROVEMENT

LOG MILE 16.19 TO LOG MILE 16.30



HWY. 53
TYPICAL SECTION OF IMPROVEMENT
SUPERELEVATION

NOTES:

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.

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

ALL DITCHES SHALL BE GRADED TO DRAIN.

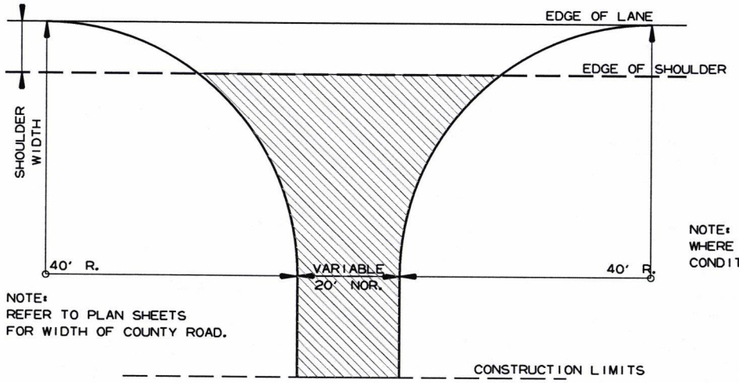
R070265.DGN 2/15/2018

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.		070265	6	37

(2) SPECIAL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

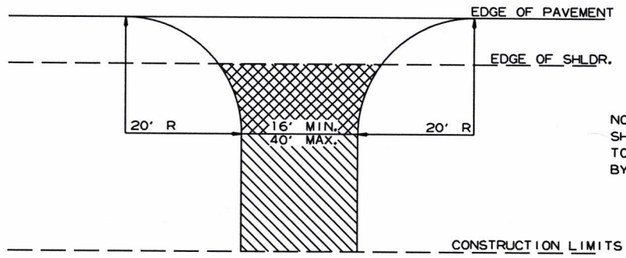


NOTE:
REFER TO PLAN SHEETS FOR WIDTH OF COUNTY ROAD.

NOTE: TURNOUTS SHALL BE MODIFIED WHERE NECESSARY TO MEET LOCAL CONDITIONS AS DIRECTED BY THE ENGINEER.

ACHM SURFACE COURSE (1/2") (220 LBS. PER SQ. YD.) AND AGGREGATE BASE COURSE (CLASS 7) 7" COMP. DEPTH

DETAIL FOR COUNTY ROAD TURNOUTS OPEN SHOULDER SECTION

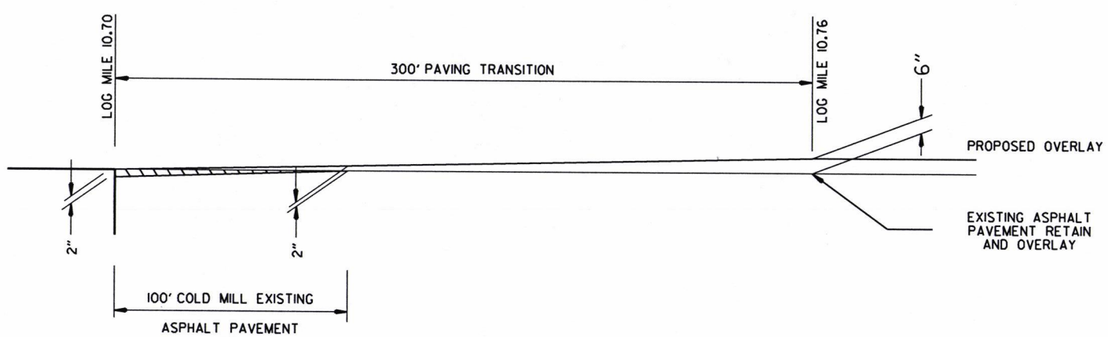


NOTE: TURNOUTS AND PRIVATE DRIVES SHALL BE MODIFIED WHERE NECESSARY TO MEET LOCAL CONDITIONS AS DIRECTED BY THE ENGINEER.

ASPHALT CONCRETE HOT MIX SURFACE COURSE (220 LBS. PER SQ. YD.) AGGREGATE BASE COURSE (CLASS 7) 7" COMP. DEPTH IF ASPHALT DRIVE EXIST OR 6" CONCRETE IF CONCRETE DRIVE EXIST.

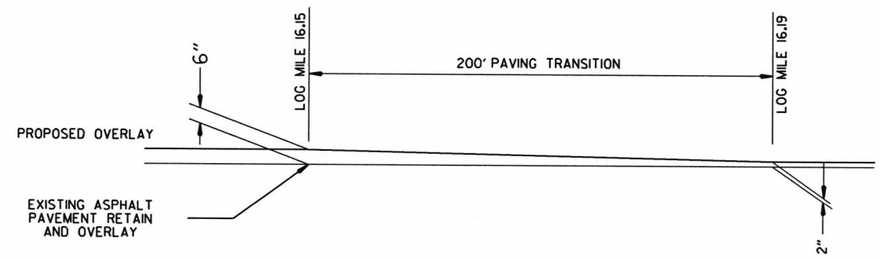
AGGREGATE BASE COURSE (CLASS 7) 9" COMP. DEPTH OR CONFORM TO EXISTING DRIVEWAY

DETAIL FOR DRIVEWAY TURNOUTS (COLLECTORS)



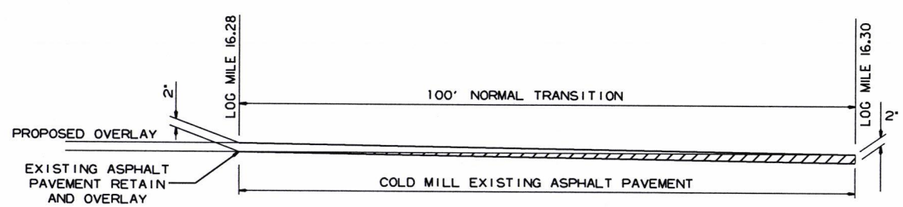
DETAIL FOR TRANSITION

LOG MILE 10.700 TO LOG MILE 10.72



DETAIL FOR TRANSITION

LOG MILE 16.15 TO LOG MILE 16.19



DETAIL FOR TRANSITION

LOG MILE 16.28 TO LOG MILE 16.30

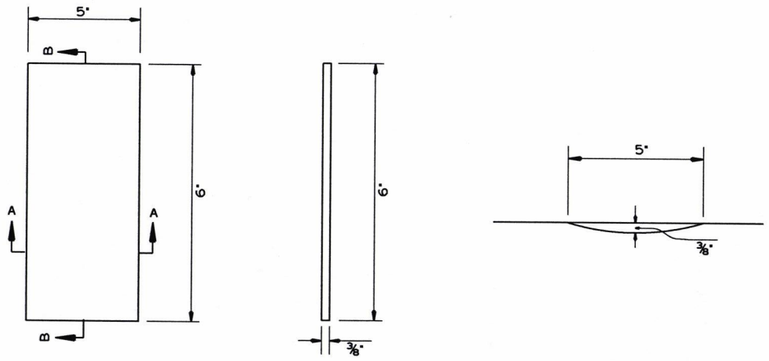
4/25/2018

R070265.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.		070265	7	37

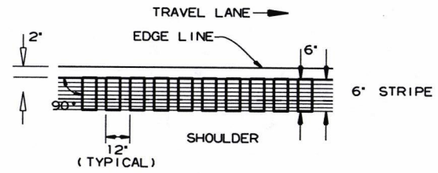
(2) SPECIAL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

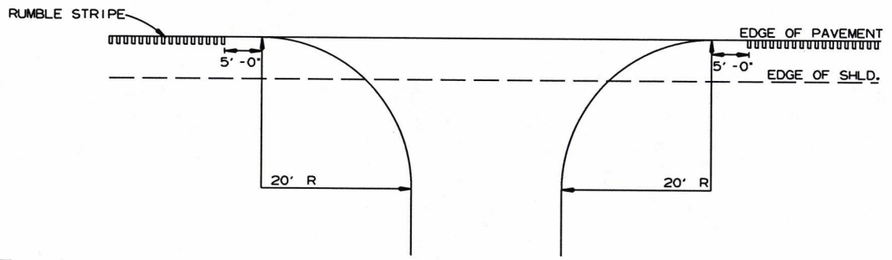


PLAN SECTION B-B SECTION A-A

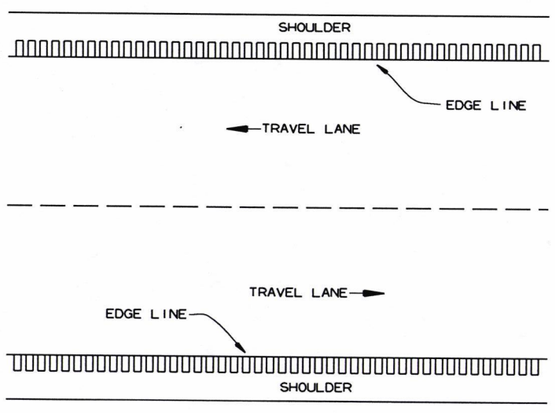
DETAILS OF RUMBLE STRIPE



LOCATION PLAN OF RUMBLE STRIPE
LEFT OR RIGHT SHOULDER



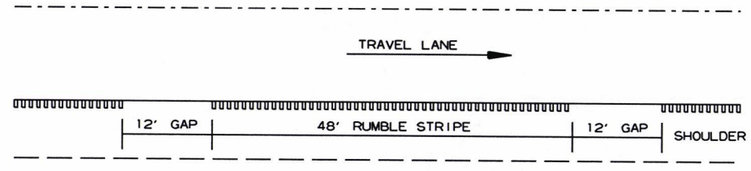
DETAIL FOR RUMBLE STRIPE GAP
AT DRIVEWAY TURNOUTS



PLAN VIEW

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.



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

4/25/2018

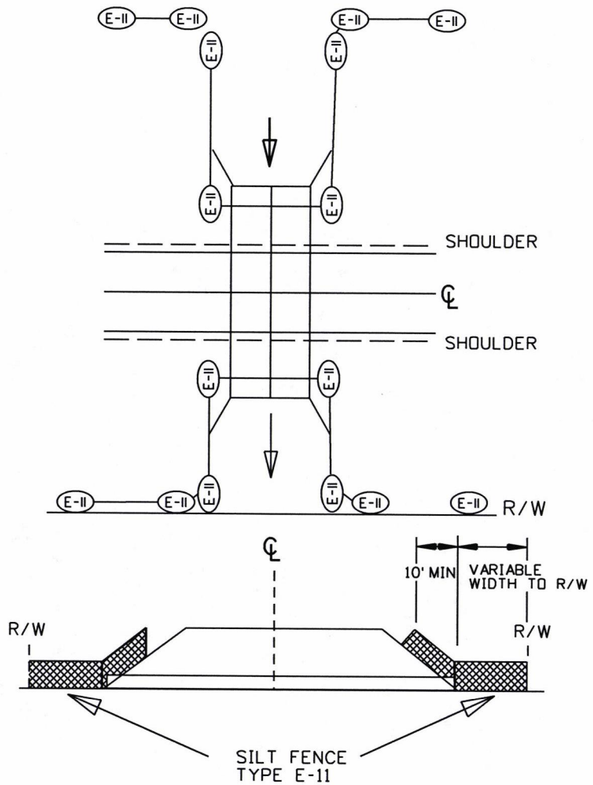
R070265.DGN

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.		070265	8	37

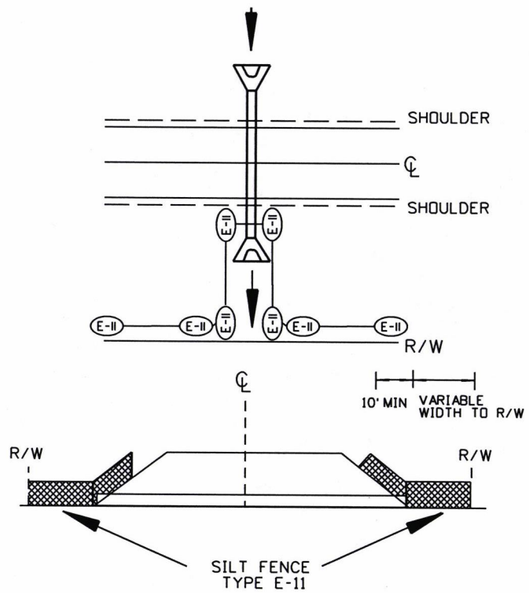
(2) SPECIAL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



DETAIL OF SILT FENCE

AT R.C. BOX



DETAIL OF SILT FENCE

AT CROSS DRAINS

4/25/2018

R070265.DGN

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

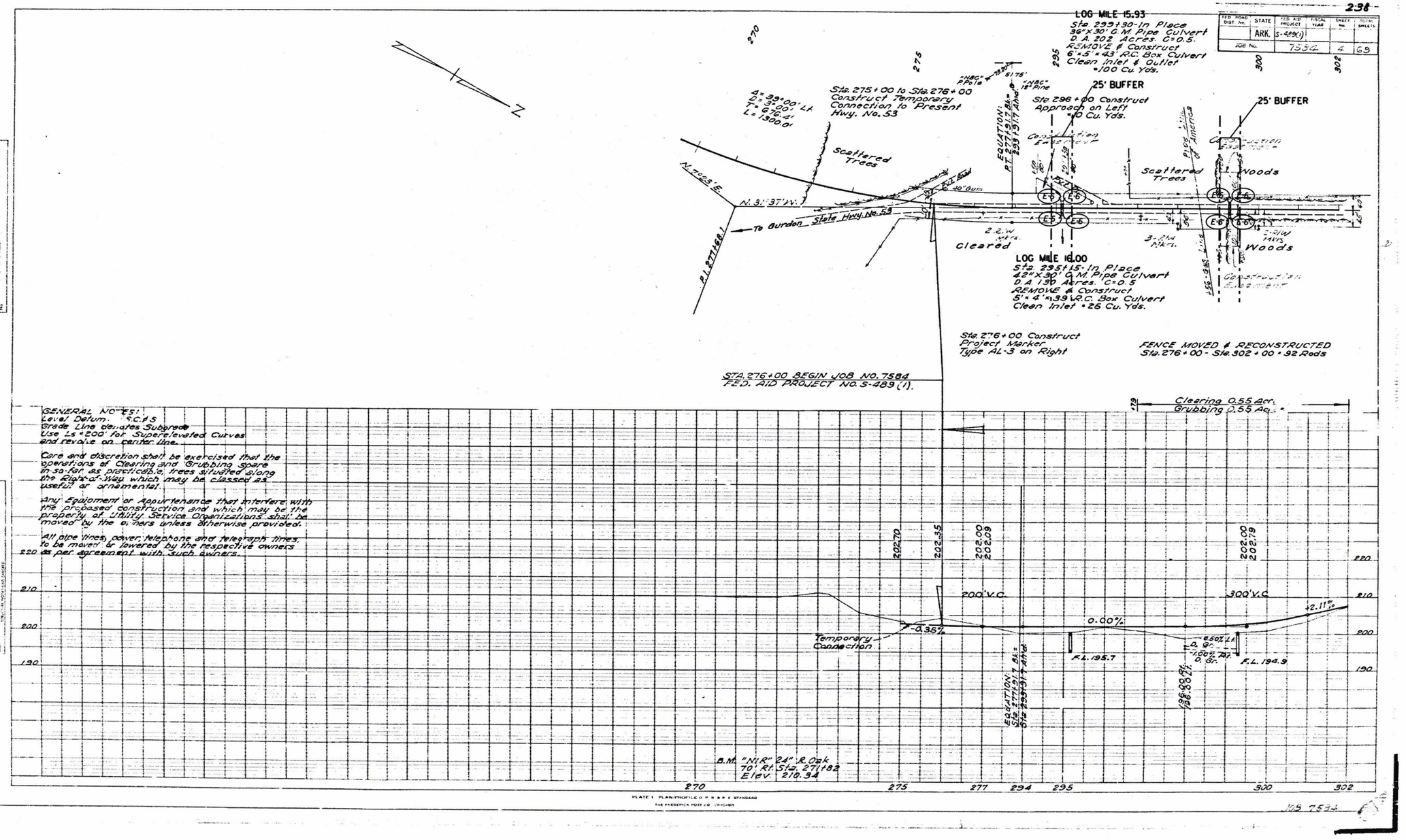
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	9	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

298

FED. ROAD DIST. NO.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	ARK.	S-489(1)			
JOB NO.		7554		4	69



GENERAL NOTES:
Level Datum. S.C.H.S
Grade Line designates Subgrade
Use Ls = 200 for Superelevated Curves and revolve on center line.

Care and discretion shall be exercised that the operations of Clearing and Grubbing spare in so far as practicable, trees situated along the Right-of-Way which may be classed as useful or ornamental.

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.

All pipe lines, power, telephone and telegraph lines, to be moved or lowered by the respective owners as per agreement with such owners.

PLATE 1 PLAN-PROFILE O.P.R.B.B.E. STANDARD
THE FREDERICK POST CO. CHICAGO

JOB 7554

4/25/2018

R070265.DGN

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

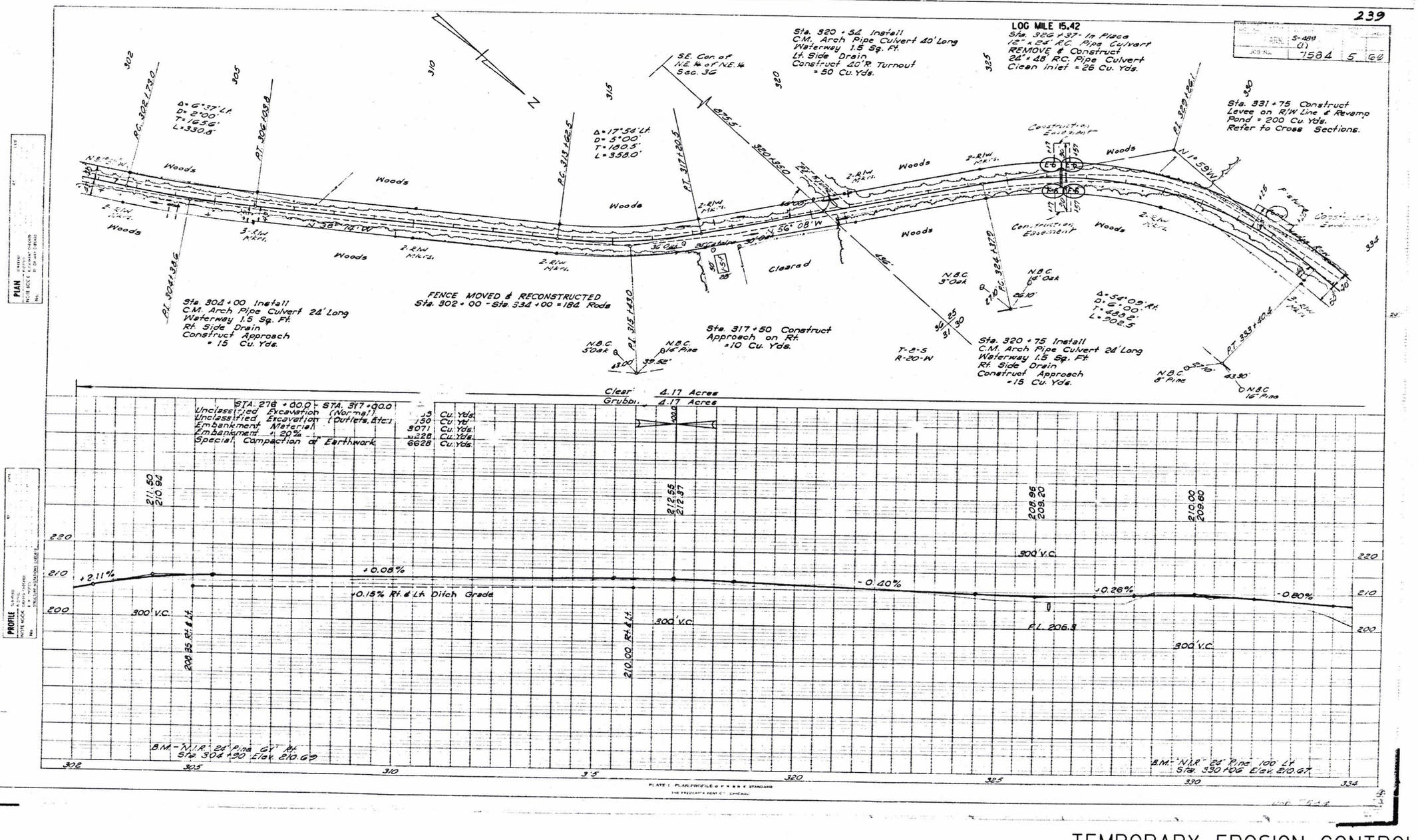
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	10	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

239

S-469 (1) JOB No. 7584 5 69



4/25/2018

R070265.DGN

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

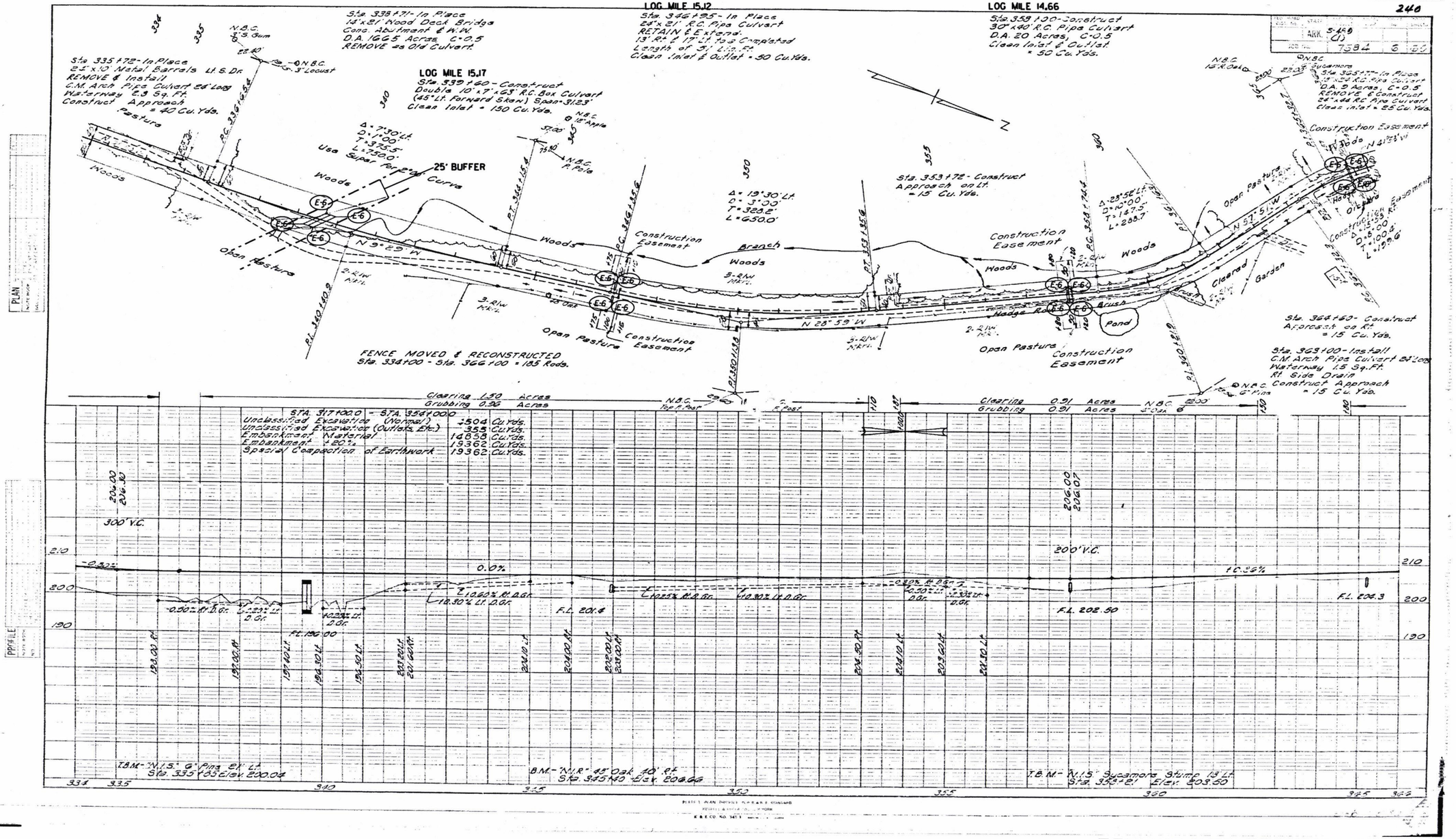
(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

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.		070265	11	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



R070265.DGN 4/25/2018

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

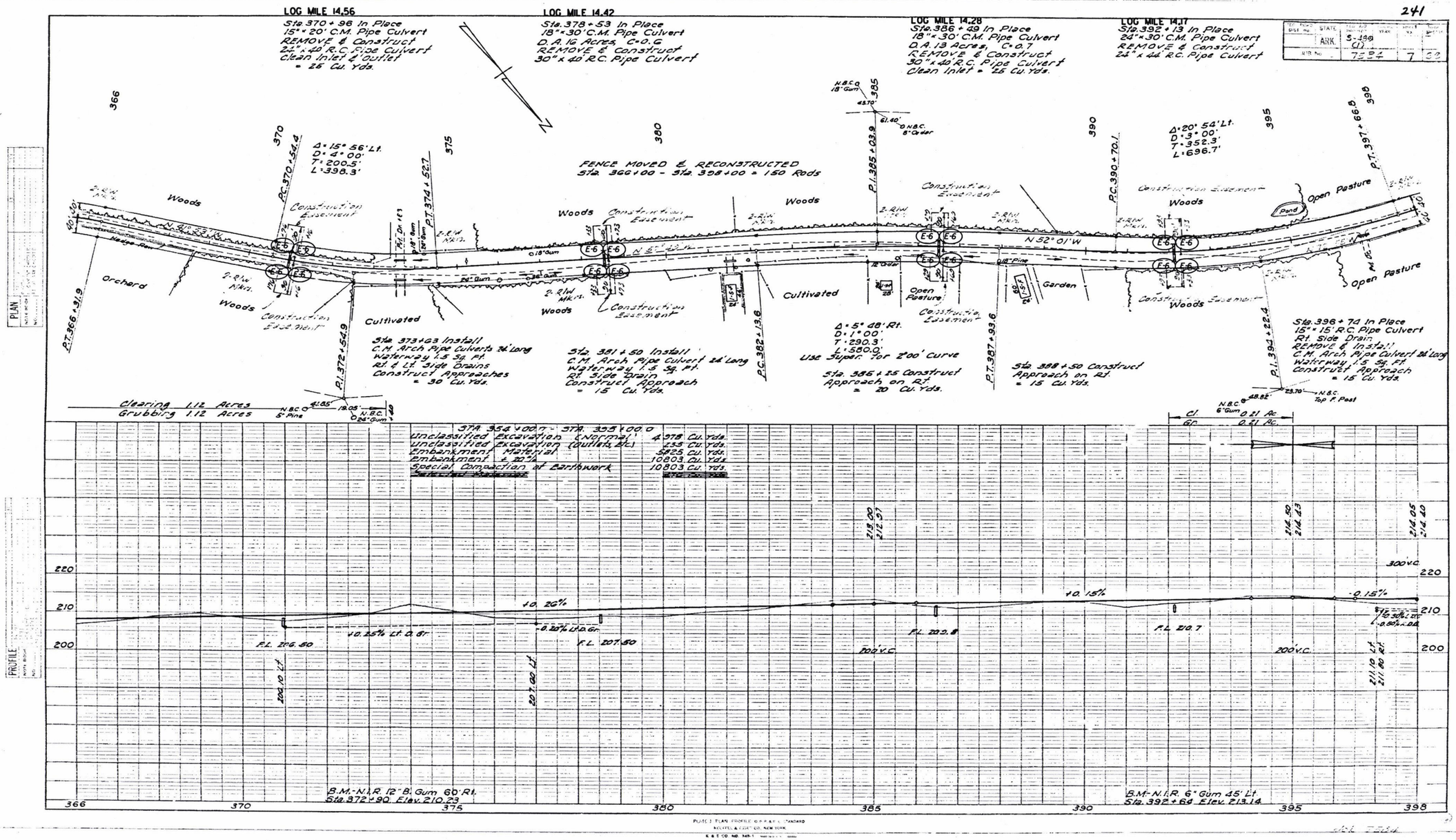
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	12	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

241

FED. ROAD DIST. No.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
	ARK	S-149 (2)		
JOB No.		7294	7	37



4/25/2018

R070265.DGN

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

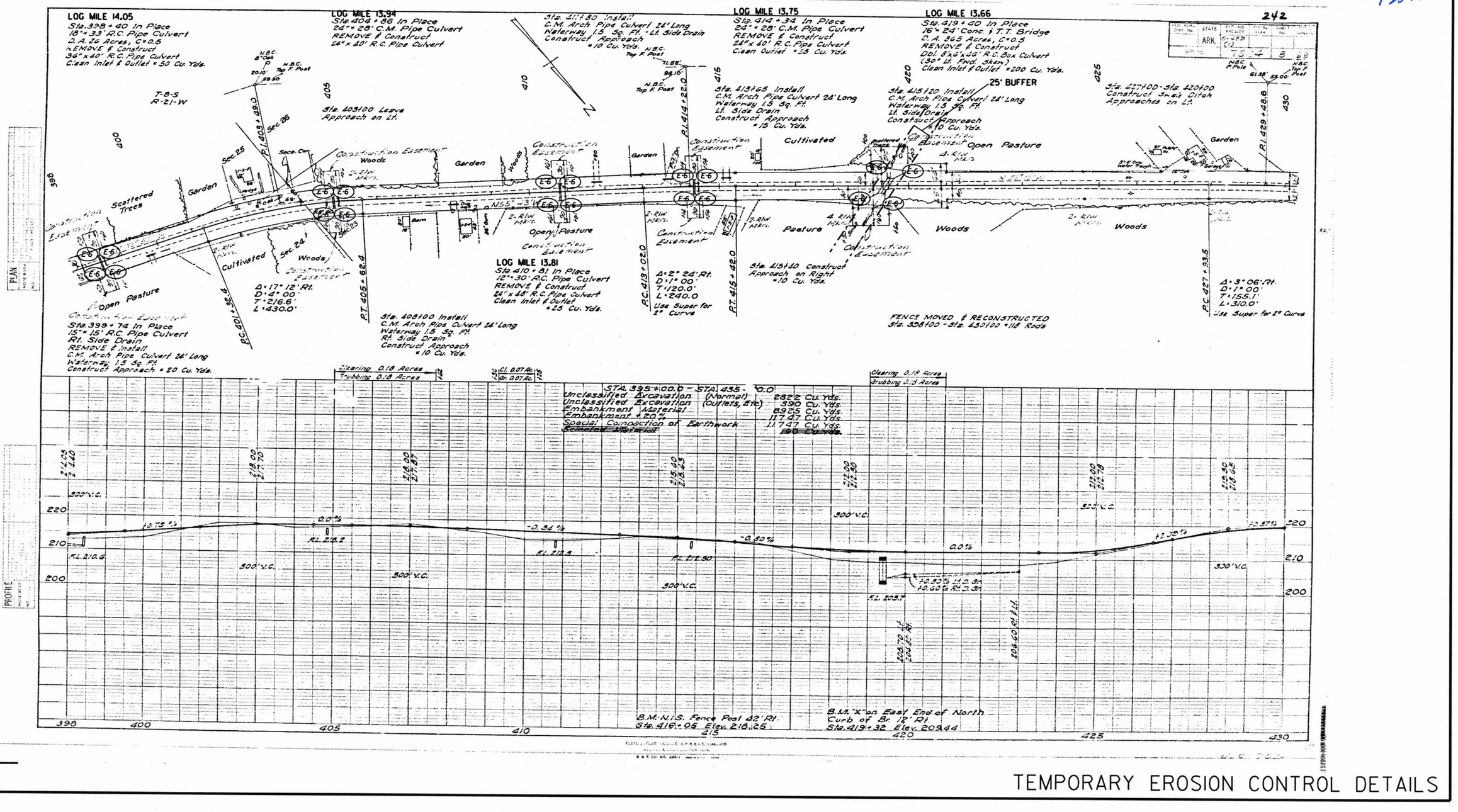
(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

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.		070265	13	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



4/25/2018

R070265.DGN

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

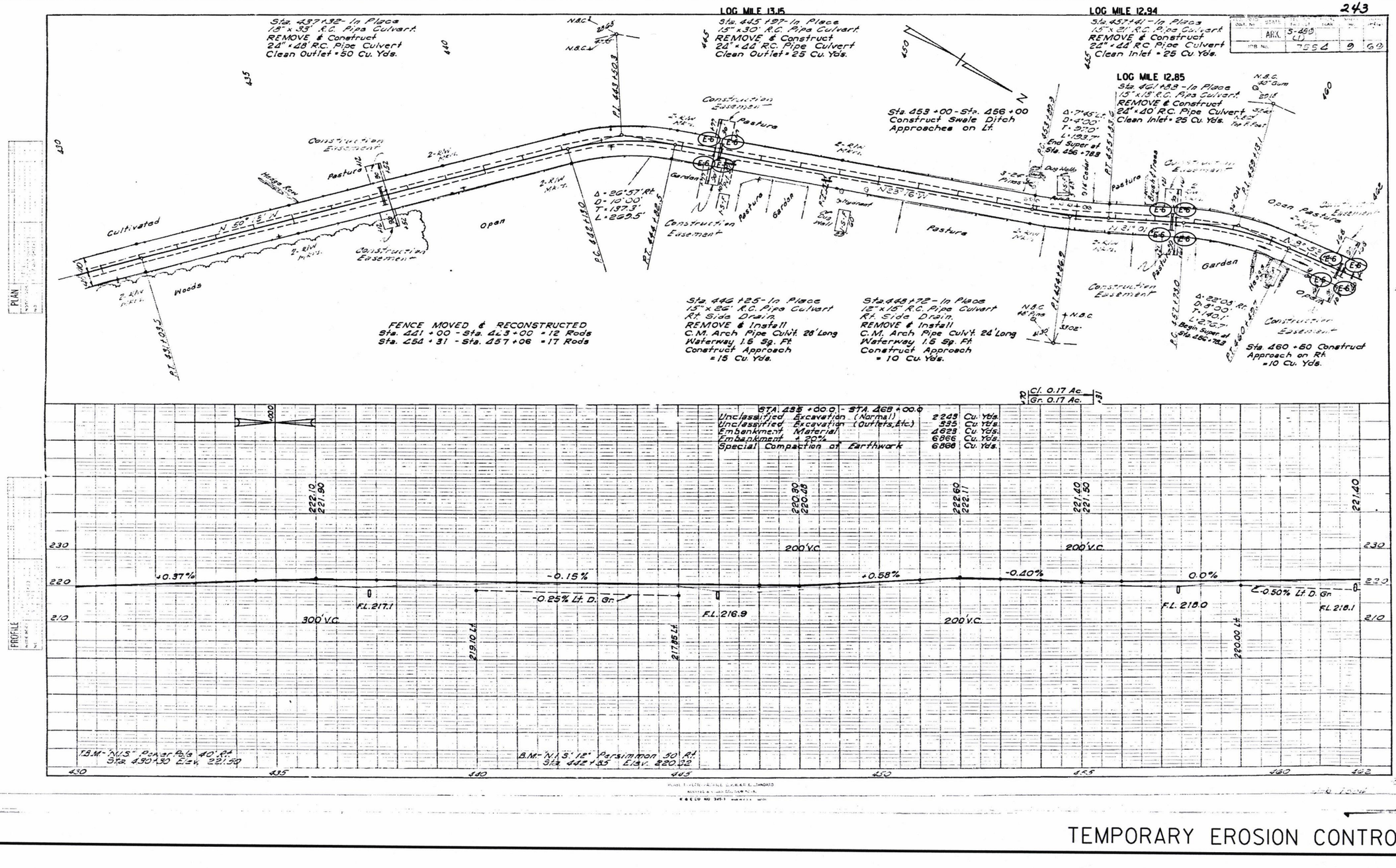
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	14	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

243

JOB NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
	ARK.	S-460 (2)		
JOB NO.		7554	9	60



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TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

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.		070265	15	37

(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

244

ARK. S-460 (1)
JOB No. 7584 | 10 | 60

LOG MILE 12.79
Sta. 465+19 - In Place
18" x 30' R.C. Pipe Culvert
REMOVE & Construct
24" x 44' R.C. Pipe Culvert
'L' Headwalls
Clean Inlet & Outlet
= 50 Cu. Yds.

LOG MILE 12.78
Sta. 465+69 - In Place
15" x 24' R.C. Pipe Culvert
REMOVE & Construct
24" x 42' R.C. Pipe Culvert
'NBC' Top F. Post
'L' Headwalls
Clean Inlet & Outlet
= 25 Cu. Yds.

Sta. 475+32 In Place
12" x 15' R.C. Pipe Culvert
Lt. Side Drain
REMOVE & Install
C.M. Arch Pipe Culvt. 30' Long
Waterway 1.5 Sq. Ft.
Construct Approach
= 50 Cu. Yds.

LOG MILE 12.59
Sta. 475+78 - In Place
Dbl. 7'x 7'x 24' R.C. Box Culvert
RETAIN & Extend
17 Rt & 7' Lt. to a Completed
Length of 48 Lin. Ft.
Clean Inlet & Outlet = 150 Cu. Yds.

LOG MILE 12.33
Sta. 488+85 - In Place
24" x 24' R.C. Pipe Culvert
REMOVE & Construct
30"x42" R.C. Pipe Culvert

Sta 491+00 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Lt. Side Drain
Construct Approach
= 20 Cu. Yds

FENCE MOVED & RECONSTRUCTED
Sta. 462+00 - Sta. 494+00 = 12.4 Rods

STA. 472+70 - 5'x5'x
STA. 475+78 - Dbl. 7'x7'
STA. 484+09 - Dbl. 8'x7'
} D.A. 2353 Acres C = 0.7

Sta 488+20 Construct Approach on Lt. = 20 Cu. Yds.

Δ = 45° 10' Lt.
D = 6° 00
T = 397.2'
L = 752.8'

Sta. 465+40 Construct 40' R. Turnouts Rt. & Lt. = 100 Cu. Yds.

Sta. 467+68 Construct Swale Ditch Approach on Rt.

LOG MILE 12.65
Sta. 472+70 - In Place
5'x5'x40' R.C. Box Culvert
(45° Rt. Fwd. Skew)
RETAIN & Extend
24' Rt. & 17' Lt. to a Completed
Length of 81 Lin. Ft.
Clean Inlet & Outlet = 50 Cu. Yds.

Sta. 474+20 Install
C.M. Arch Pipe Culvt. 30' Long
Waterway 1.5 Sq. Ft.
Rt. Side Drain
Construct Approach
= 50 Cu. Yds.

LOG MILE 12.43
Sta. 484+09 - In Place
Dbl. 8'x 7'x 26' R.C. Box Culvert
(13° Rt. Fwd. Skew)
RETAIN & Extend (With Straight Barrel)
5' Rt & 5' Lt. to a Completed
Length of 36 Lin. Ft.
Clean Inlet & Outlet = 150 Cu. Yd.

Sta. 494 Construct Approach on Rt. = 20 Cu. Yds.

Clearing 0.05 Acres
Grubbing 0.01 Acres

Clearing 0.31 Acres
Grubbing 0.31 Acres

Clearing 0.03 Acres
Grubbing 0.03

Clearing 2.15 Acres
Grubbing 0.15 Acres

Unclassified Excavation	STA. 468+00.0	3664 Cu. Yds.
Unclassified Excavation	STA. - 472+00.0 (Normal) (Outlets, Etc.)	55 Cu. Yds.
Embankment Material		5812 Cu. Yd.
Embankment 120%		9476 Cu. Yds.
Special Compaction of Earthwork		9476 Cu. Yds.

B.M. - 'NIS' 24" Pine 65' Rt.
Sta. 464+80 Elev. 218.75

T.B.M. - North End of East Hdwl. 12' Rt.
Sta. 475+86 - Elev. 212.37

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TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

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.	070265		16	37

② TEMPORARY EROSION CONTROL DETAILS

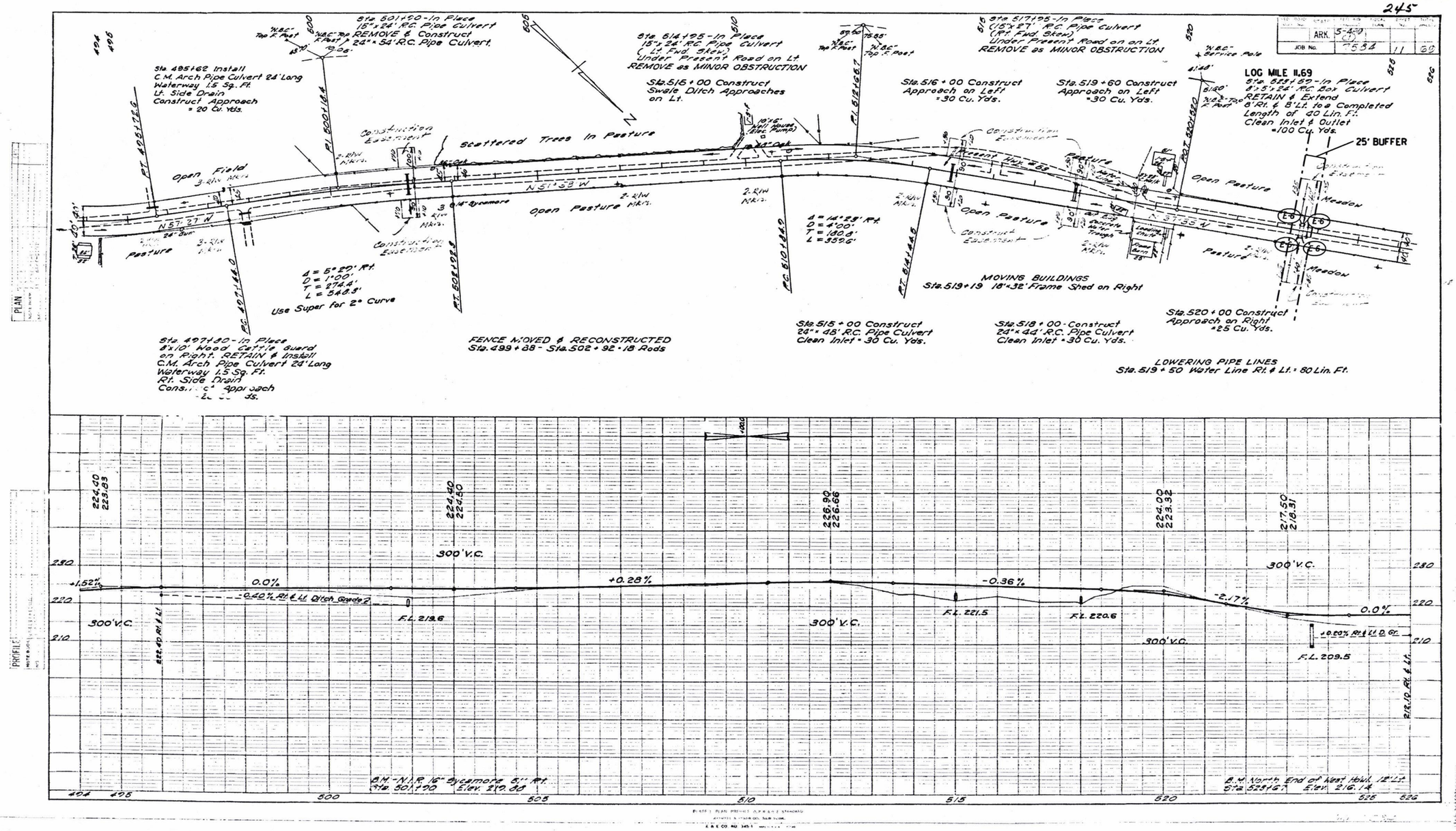
STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11425 TRINITY D. SMITH

4-25-18

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.



4/25/2018

R070265.DGN

TEMPORARY EROSION CONTROL DETAILS

REVISIONS

DATE OF REVISION	REVISION

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.		070265	17	37

② TEMPORARY EROSION CONTROL DETAILS

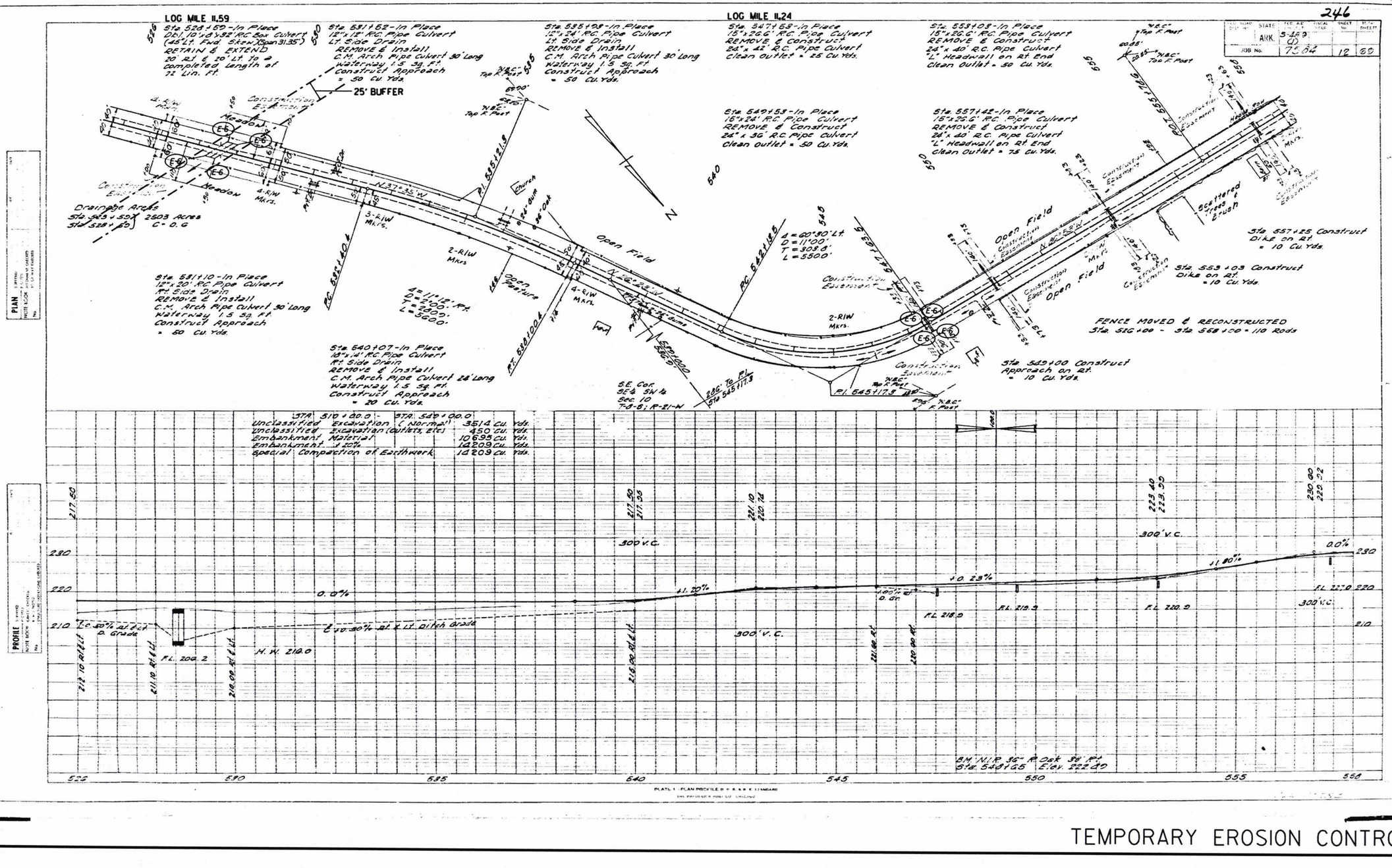
STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH

4-25-18

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.



TEMPORARY EROSION CONTROL DETAILS

4/25/2018

R070265.DGN

REVISIONS

DATE OF REVISION	REVISION

LEGEND

(E-6) = ROCK DITCH CHECKS

NOTE: PERIMETER CONTROLS SHALL BE PLACED AS CLEARING AND GRUBBING OPERATIONS ARE STARTED.

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.		070265	18	37

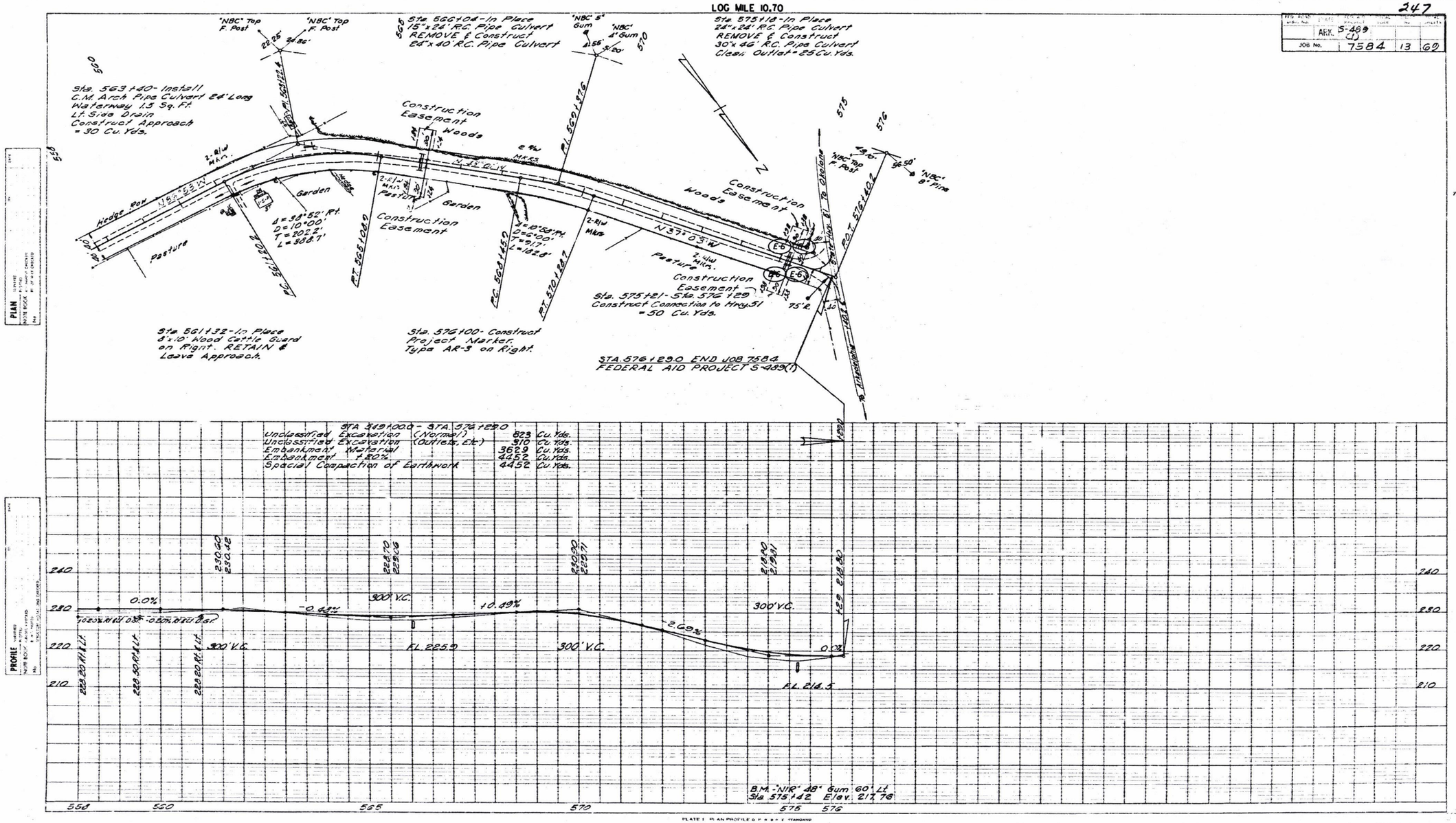
(2) TEMPORARY EROSION CONTROL DETAILS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

247

FED.ROAD DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
	ARK.	S-489 (1)		
JOB No.		7584	13	60

LOG MILE 10.70



Unclassified Excavation (Normal) 823 Cu. Yds.
Unclassified Excavation (Outlets, Etc.) 570 Cu. Yds.
Embankment Material 3629 Cu. Yds.
Embankment +20% 4452 Cu. Yds.
Special Compaction of Earthwork 4452 Cu. Yds.

PLATE 1 PLAN AND PROFILE SHEET STANDARD

4/25/2018

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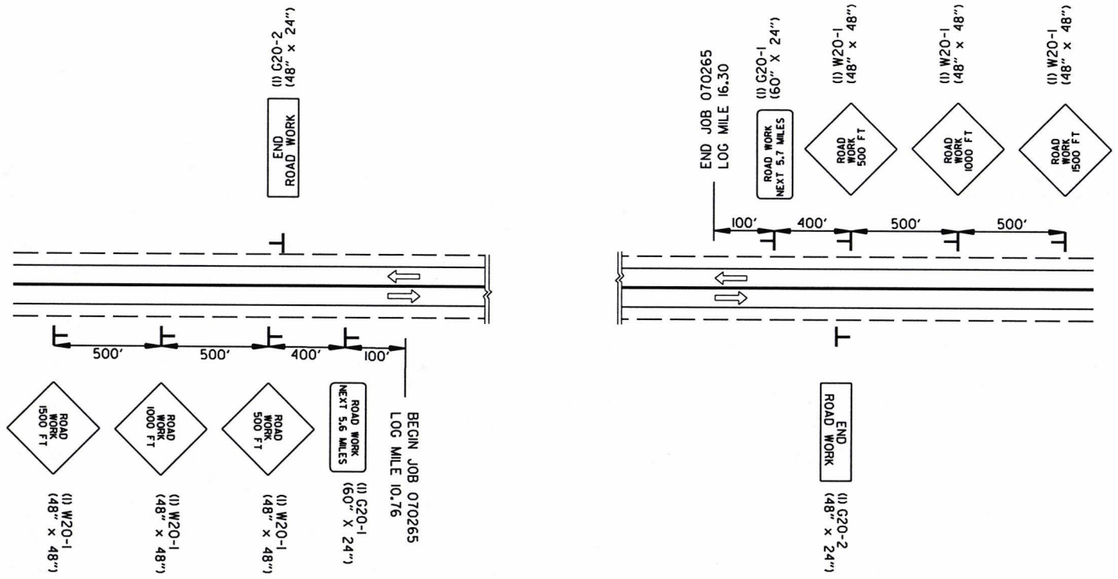
TEMPORARY EROSION CONTROL DETAILS

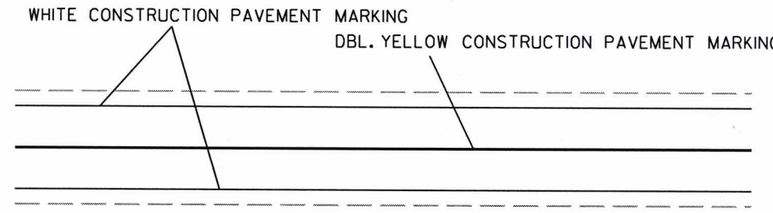
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		070265	19	37

(2) MAINTENANCE OF TRAFFIC DETAILS

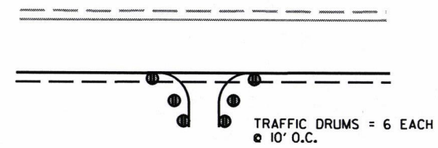
STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



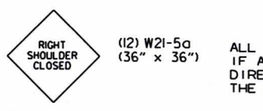
ADVANCE WARNING



CONSTRUCTION PAVEMENT MARKING DETAIL



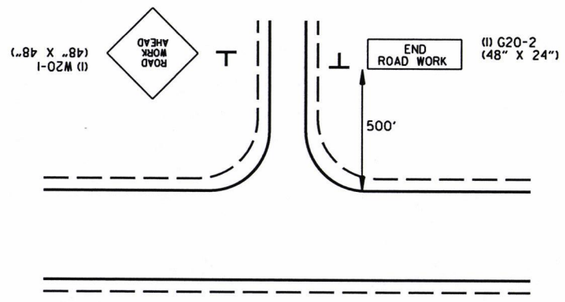
DRIVEWAY/TRAFFIC DRUM DETAIL



(12) W21-5a (36" x 36") ALL STAGES IF AND WHERE DIRECTED BY THE ENGINEER

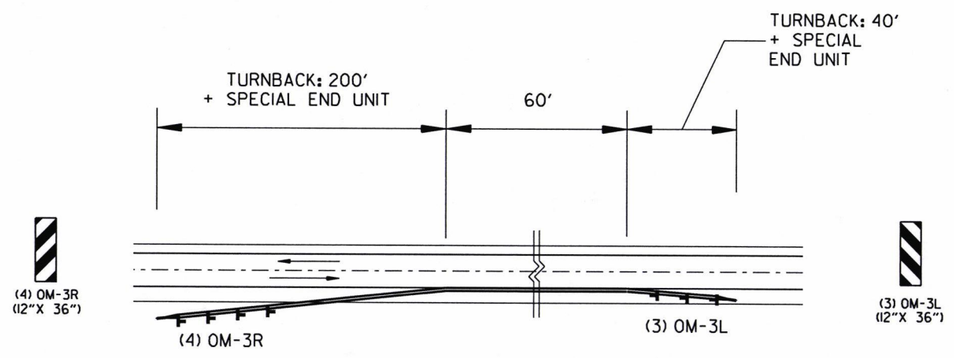
(12) R4-1 (24" X 30") ALL STAGES SPACES AT ½ MILE INTERVALS

(2) W8-1 (30" X 30") IF AND WHERE DIRECTED BY THE ENGINEER



ADVANCE WARNING - SIDE ROADS
(ALL ROADS)

LOG MILE 11.83 RT. GOLDSBY RD.
LOG MILE 12.79 LT. C.R. 10
LOG MILE 12.79 RT. C.R. 452
LOG MILE 15.52 RT. C.R. 451
LOG MILE 15.81 LT. NICOLE DR.
LOG MILE 16.17 RT. C.R. 4



REFER ALSO TO STANDARD DRAWING TC-5 FOR DETAILS OF PLACEMENT OF PCCB TURNBACKS.

NOTE: OM-3L & OM-3R SIGNS SHALL BE EQUALLY SPACED ALONG P.C.C.B. TURNBACK.

DETAIL OF OBJECT MARKERS
AT PRECAST CONCRETE BARRIER TURNBACKS

LOG MILE 11.59	LOG MILE 12.59	LOG MILE 15.17
LOG MILE 11.69	LOG MILE 12.65	LOG MILE 15.93
LOG MILE 12.43	LOG MILE 13.66	LOG MILE 16.00

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MAINTENANCE OF TRAFFIC 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.		070265	20	37

(2) MAINTENANCE OF TRAFFIC DETAILS

CONSTRUCTION SEQUENCE

INSTALL ADVANCE WARNING, END ROAD WORK, AND ROAD WORK AHEAD SIGNS AT THE LOCATIONS LISTED ON THE MAINTENANCE OF TRAFFIC DETAILS.

STAGE 1:
USE VERTICAL PANELS AND TRAFFIC DRUMS SPACED 55' ON CENTER TO DELINEATE THE WORK ZONE.
USE TRAFFIC DRUMS TO DELINEATE DRIVEWAYS AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
INSTALL P.C.C.B. AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
EXTEND DRAINAGE STRUCTURES ON THE RIGHT OF HWY. 53.
NOTCH HWY. 53 ON RIGHT AND PLACE 4" ACHM BASE COURSE (11/2").

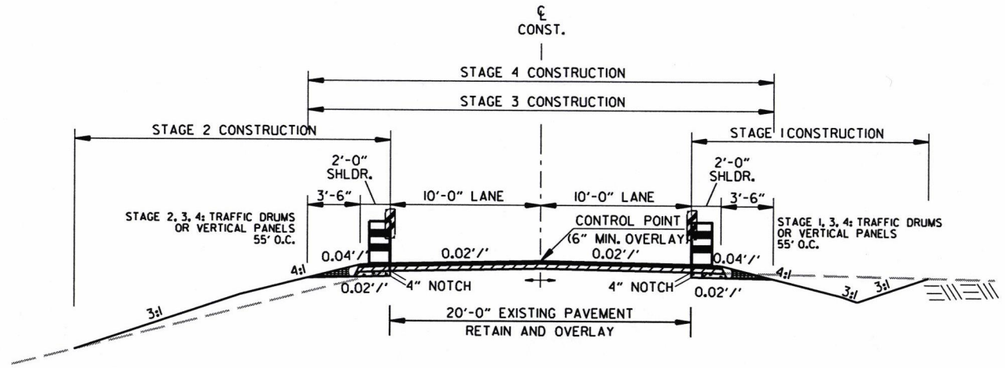
STAGE 2:
USE VERTICAL PANELS AND TRAFFIC DRUMS SPACED 55' ON CENTER TO DELINEATE THE WORK ZONE.
USE TRAFFIC DRUMS TO DELINEATE DRIVEWAYS AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
INSTALL P.C.C.B. AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
EXTEND DRAINAGE STRUCTURES ON THE LEFT OF HWY. 53.
NOTCH HWY. 53 ON LEFT AND PLACE 4" ACHM BASE COURSE (11/2").

STAGE 3:
USE VERTICAL PANELS AND TRAFFIC DRUMS SPACED 55' ON CENTER TO DELINEATE THE WORK ZONE.
USE TRAFFIC DRUMS TO DELINEATE DRIVEWAYS AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
PLACE 4" LIFT OF ACHM BINDER COURSE (1") BY CLOSING 1LANE AND ALTERNATING ONE-WAY OPERATIONS WITH TRAINED FLAGGERS AND SPOTTERS.
APPLY CONSTRUCTION PAVEMENT MARKINGS AS SHOWN IN THE MAINTENANCE OF TRAFFIC DETAILS.
NO CENTERLINE VERTICAL DIFFERENCE GREATER THAN 3" MAY REMAIN AT THE END OF ANY WORK DAY.

STAGE 4:
USE VERTICAL PANELS AND TRAFFIC DRUMS SPACED 55' ON CENTER TO DELINEATE THE WORK ZONE.
USE TRAFFIC DRUMS TO DELINEATE DRIVEWAYS AS SHOWN ON THE MAINTENANCE OF TRAFFIC DETAILS.
PLACE 2" LIFT OF ACHM SURFACE COURSE (1/2") BY CLOSING 1LANE AND ALTERNATING ONE-WAY OPERATIONS WITH TRAINED FLAGGERS AND SPOTTERS.
APPLY CONSTRUCTION PAVEMENT MARKINGS AS SHOWN IN THE MAINTENANCE OF TRAFFIC DETAILS.

END OF JOB:
APPLY PERMANENT PAVEMENT MARKINGS AS SHOWN IN THE PERMANENT PAVEMENT MARKING DETAILS.

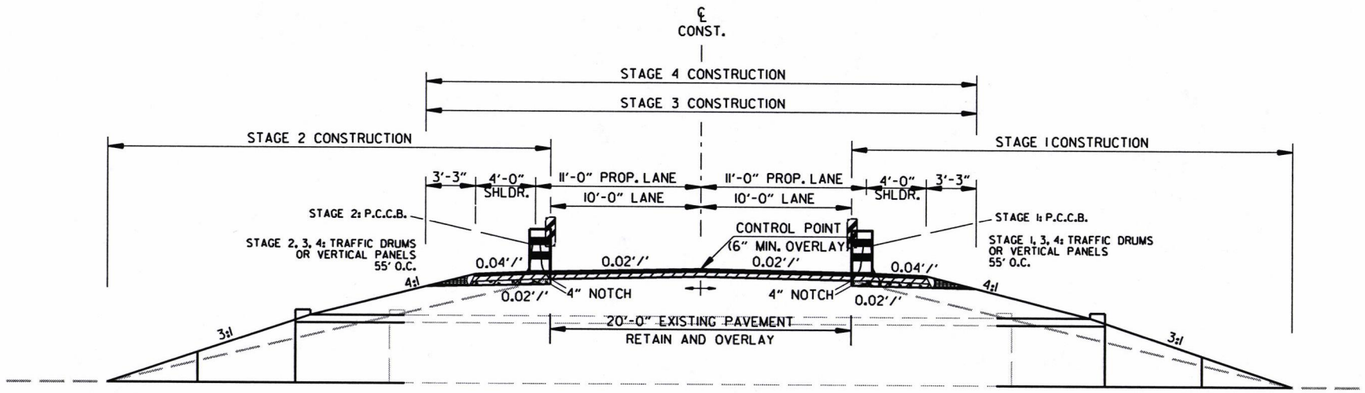
STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18



•TRANSITION FROM 6" OVERLAY TO 2" OVERLAY FROM L.M. 16.54 TO L.M. 16.19 (SEE SPECIAL DETAIL "DETAIL FOR TRANSITION").

HWY. 53
STAGE CONSTRUCTION

LOG MILE 10.76 TO LOG MILE 11.58
LOG MILE 11.60 TO LOG MILE 11.68
LOG MILE 11.69 TO LOG MILE 12.42
LOG MILE 12.44 TO LOG MILE 12.59
LOG MILE 12.60 TO LOG MILE 12.64
LOG MILE 12.66 TO LOG MILE 13.65
LOG MILE 13.66 TO LOG MILE 15.16
LOG MILE 15.18 TO LOG MILE 15.92
LOG MILE 15.94 TO LOG MILE 15.99
LOG MILE 16.01 TO LOG MILE 16.19•



HWY. 53
TYPICAL SECTION OF IMPROVEMENT - R.C. BOX CULVERTS

LOG MILE 11.58 TO LOG MILE 11.60
LOG MILE 11.68 TO LOG MILE 11.69
LOG MILE 12.42 TO LOG MILE 12.44
LOG MILE 12.59 TO LOG MILE 12.60
LOG MILE 12.64 TO LOG MILE 12.66
LOG MILE 13.65 TO LOG MILE 13.66
LOG MILE 15.16 TO LOG MILE 15.18
LOG MILE 15.92 TO LOG MILE 15.94
LOG MILE 15.99 TO LOG MILE 16.01

4/25/2018

R070265.DGN

MAINTENANCE OF TRAFFIC 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.		070265	21	37

(2) PERMANENT PAVEMENT MARKING DETAILS

PERMANENT PAVEMENT MARKINGS

REFLECTORIZED PAINT PAVEMENT MARKING WHITE (6") = 59136 LIN. FT.
REFLECTORIZED PAINT PAVEMENT MARKING YELLOW (6") = 59136 LIN. FT.
RAISED PAVEMENT MARKERS TYPE II (YEL/YEL) (80' O.C.) = 370 EACH

NOTE:

THE 6" 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.

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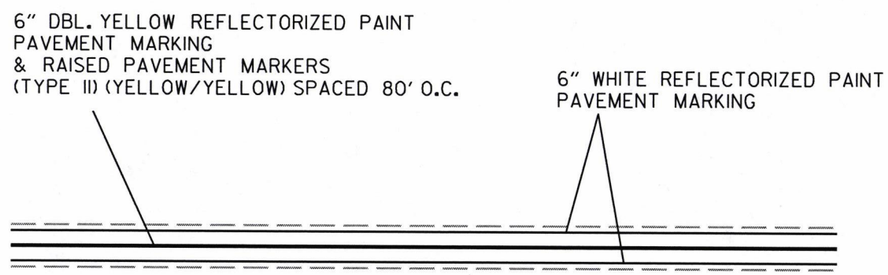

TYPICAL STRIPING DETAIL

R070265.DGN 4/25/2018

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.		070265	22	37

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
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ADVANCE WARNING SIGNS AND DEVICES

SIGN NUMBER	DESCRIPTION	SIGN SIZE	STAGE 1	STAGE 2	STAGE 3	STAGE 4	MAXIMUM NUMBER REQUIRED	TOTAL SIGNS REQUIRED		VERTICAL PANELS	TRAFFIC DRUMS	FURNISHING & INSTALLING PRECAST CONC. BARRIER	RELOCATING PRECAST CONCRETE BARRIER
			LIN. FT. - EACH					NO.	SQ. FT.	EACH		LIN. FT.	
W20-1	ROAD WORK 1500 FT.	48"x48"	3	3	3	3	3	3	48.0				
W20-1	ROAD WORK 1000 FT.	48"x48"	3	3	3	3	3	3	48.0				
W20-1	ROAD WORK 500 FT.	48"x48"	3	3	3	3	3	3	48.0				
W20-1	ROAD WORK AHEAD	48"x48"	6	6	6	6	6	6	96.0				
G20-2	END ROAD WORK	48"x24"	9	9	9	9	9	9	72.0				
G20-1	ROAD WORK NEXT xx MILES	60"x24"	3	3	3	3	3	3	30.0				
OM-3L	OBJECT MARKER	12"x36"	27	27			27	27	81.0				
OM-3R	OBJECT MARKER	12"x36"	36	36			36	36	108.0				
R4-1	DO NOT PASS	24"x30"	12	12	12	12	12	12	60.0				
W21-5a	RIGHT SHOULDER CLOSED	36"x36"	12	12	12	12	12	12	108.0				
W8-1	BUMP	30"x30"	2	2	2	2	2	2	12.5				
	VERTICAL PANELS		192	192			192			192			
	TRAFFIC DRUMS		709	697	859	859	859				859		
	FURNISHING AND INSTALLING PRECAST CONCRETE BARRIER		2934				2934					2934	
	RELOCATING PRECAST CONCRETE BARRIER			2934			2934						2934
TOTALS:									711.5	192	859	2934	2934

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

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.

CONSTRUCTION PAVEMENT MARKINGS AND PERMANENT PAVEMENT MARKINGS

DESCRIPTION	STAGE 3	STAGE 4	END OF JOB	CONSTRUCTION PAVEMENT MARKINGS	RAISED PAVEMENT MARKERS	REFLECTORIZED PAINT PAVEMENT MARKING	
					TYPE II (YEL/YEL)	6"	
					(YEL/YEL)	WHITE	YELLOW
	LIN. FT. - EACH			LIN. FT.	EACH	LIN. FT.	
CONSTRUCTION PAVEMENT MARKINGS	59136	59136		118272			
RAISED PAVEMENT MARKERS TYPE II (YEL/YEL)			370		370		
REFLECTORIZED PAINT PAVEMENT MARKING WHITE (6")			59136			59136	
REFLECTORIZED PAINT PAVEMENT MARKING YELLOW (6")			59136				59136
TOTALS:				118272	370	59136	59136

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

NOTE: THE 6" 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.

MAILBOXES

LOCATION	MAILBOXES	MAILBOX SUPPORTS	
		(SINGLE)	(DOUBLE)
	EACH		
* ENTIRE PROJECT-TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER	41	31	5
TOTALS:	41	31	5

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

EARTHWORK

	LOG MILE	LOG MILE	LOCATION / DESCRIPTION	UNCLASSIFIED EXCAVATION	COMPACTED EMBANKMENT	* SOIL STABILIZATION
				CU. YD.		TON
*	ENTIRE	PROJECT	STAGE 1-MAIN LANES-TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER	18500	18500	
*	ENTIRE	PROJECT	STAGE 2-MAIN LANES-TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER	18500	18500	
*	ENTIRE	PROJECT	CHANNEL CHANGE-TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER	1000		
*	ENTIRE	PROJECT	TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER			100
TOTALS:				38000	37000	100

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

BENCH MARKS

STATION	LOCATION	BENCH MARKS
		EACH
11.59	R.C. BOX CULVERT HEADWALL	1
11.69	R.C. BOX CULVERT HEADWALL	1
12.43	R.C. BOX CULVERT HEADWALL	1
12.59	R.C. BOX CULVERT HEADWALL	1
12.65	R.C. BOX CULVERT HEADWALL	1
13.66	R.C. BOX CULVERT HEADWALL	1
15.17	R.C. BOX CULVERT HEADWALL	1
15.93	R.C. BOX CULVERT HEADWALL	1
16.00	R.C. BOX CULVERT HEADWALL	1
TOTAL:		9

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

4/25/2018

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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.		070265	23	37

(2) QUANTITIES

SOIL LOG

LOG MILE	LATITUDE			LONGITUDE			LOCATION	DEPTH	LIQUID LIMIT	PLASTICITY INDEX	AASHTO CLASSIFICATION	COLOR
	DEG	MIN	SEC	DEG	MIN	SEC		FEET				
LM10.7	34	3	18.90	93	14	36.70	05RT	0-5	21	6	A-4(2)	GRAY
LM10.7	34	3	18.80	93	14	36.80	22RT	0-5	19	4	A-4(0)	BR/GR
LM10.7	34	3	18.80	93	14	36.80	22RT	0-5	28	15	A-6(4)	BR/GR
LM10.9	34	3	11.90	93	14	28.70	19LT	0-5	20	4	A-4(0)	BR/GR
LM10.9	34	3	11.80	93	14	28.80	05LT	0-5	22	7	A-4(3)	GRAY
LM11.1	34	3	10.00	93	14	16.90	05RT	0-5	27	10	A-4(7)	BROWN
LM11.1	36	3	9.90	93	14	16.90	20RT	0-5	29	11	A-6(9)	BROWN
LM11.3	34	3	8.20	93	14	4.20	04LT	0-5	20	7	A-4(2)	GRAY
LM11.3	34	3	8.30	93	14	4.00	20LT	0-5	18	4	A-4(0)	GRAY
LM11.5	34	2	56.80	93	13	55.60	05RT	0-5	22	7	A-4(2)	BR/GR
LM11.5	34	2	56.70	93	13	55.70	20RT	0-5	21	6	A-4(0)	BR/GR
LM11.7	34	2	48.30	93	13	47.40	05LT	0-5	31	14	A-6(11)	BROWN
LM11.7	34	2	48.40	93	13	47.20	25LT	0-5	38	20	A-6(18)	BROWN
LM11.9	34	2	40.90	93	13	39.00	05RT	0-5	21	6	A-4(3)	GRAY
LM11.9	34	2	40.80	93	13	39.10	20RT	0-5	22	6	A-4(3)	BROWN
LM12.1	34	2	35.00	93	13	28.90	20LT	0-5	24	9	A-4(4)	BROWN
LM12.1	34	2	34.90	93	13	29.00	05LT	0-5	22	7	A-4(3)	GRAY
LM12.3	34	2	26.40	93	13	21.10	04RT	0-5	21	7	A-4(1)	BR/GR
LM12.3	34	2	26.40	93	13	21.20	18RT	0-5	22	7	A-4(1)	BR/GR
LM12.5	34	2	16.70	93	13	18.60	20LT	0-5	26	13	A-6(2)	BROWN
LM12.5	34	2	16.70	93	13	18.60	20LT	0-5	ND	NP	A-4(0)	BROWN
LM12.5	34	2	16.70	93	13	18.80	05LT	0-5	21	5	A-4(0)	BR/GR
LM12.7	34	2	5.70	93	13	18.80	24RT	0-5	20	3	A-4(0)	BROWN
LM12.7	34	2	5.70	93	13	18.60	05RT	0-5	19	3	A-4(0)	BR/GR
LM12.9	34	1	56.70	93	13	15.30	05LT	0-5	22	7	A-4(2)	GRAY
LM12.9	34	1	56.70	93	13	15.10	20LT	0-5	21	6	A-4(2)	BROWN
LM13.1	34	1	46.80	93	13	9.80	06RT	0-5	21	6	A-4(1)	BROWN
LM13.1	34	1	46.70	93	13	9.90	22RT	0-5	23	8	A-4(3)	BROWN
LM13.3	34	1	39.90	93	13	0.90	05LT	0-5	19	4	A-4(0)	BROWN
LM13.3	34	1	40.10	93	13	0.70	25LT	0-5	20	6	A-4(1)	BROWN
LM13.5	34	1	33.60	93	12	51.20	05RT	0-5	18	2	A-4(0)	BR/GR
LM13.5	34	1	33.50	93	12	51.30	21RT	0-5	22	6	A-4(2)	BROWN
LM13.7	34	1	27.60	93	12	40.80	04LT	0-5	28	9	A-4(4)	RD/BR
LM13.7	34	1	27.60	93	12	40.70	20LT	0-5	31	13	A-6(6)	BROWN
LM13.7	34	1	27.60	93	12	40.70	20LT	0-5	31	11	A-6(9)	BROWN
LM13.9	34	1	21.80	93	12	30.00	05RT	0-5	26	8	A-4(5)	BROWN
LM13.9	34	1	21.60	93	12	30.10	27RT	0-5	34	17	A-6(13)	BROWN
LM14.1	34	1	18.30	93	12	18.40	04LT	0-5	ND	NP	A-4(0)	GRAY
LM14.1	34	1	18.50	93	12	18.30	20LT	0-5	ND	NP	A-4(0)	BR/GR
LM14.3	34	1	12.20	93	12	8.60	22RT	0-5	21	5	A-4(1)	BROWN
LM14.3	34	1	12.40	93	12	8.40	04RT	0-5	20	4	A-4(1)	BR/GR
LM14.5	34	1	6.90	93	11	57.70	22LT	0-5	21	6	A-4(2)	BROWN
LM14.5	34	1	6.70	93	11	57.80	05LT	0-5	25	9	A-4(5)	BROWN
LM14.7	34	0	59.70	93	11	48.10	04RT	0-5	ND	NP	A-4(0)	BR/GR
LM14.7	34	0	59.60	93	11	48.20	21RT	0-5	ND	NP	A-4(0)	GRAY
LM14.9	34	0	50.60	93	11	41.60	22LT	0-5	26	10	A-4(6)	BROWN
LM14.9	34	0	50.60	93	11	41.60	22LT	0-5	24	8	A-4(3)	BROWN
LM14.9	34	0	50.60	93	11	41.70	04LT	0-5	28	11	A-6(7)	BROWN
LM15.1	34	0	41.70	93	11	39.70	20RT	0-5	24	9	A-4(4)	BROWN
LM15.1	34	0	41.70	93	11	39.50	05RT	0-5	23	7	A-4(2)	BROWN
LM15.3	34	0	35.90	93	11	39.00	05LT	0-5	31	16	A-6(9)	BR/GR
LM15.3	34	0	35.90	93	11	38.80	22LT	0-5	27	12	A-6(6)	BROWN
LM15.5	34	0	29.60	93	11	33.40	22RT	0-5	25	11	A-6(6)	BROWN
LM15.5	34	0	26.70	93	11	33.30	06RT	0-5	26	12	A-6(6)	BR/GR
LM15.7	34	0	21.20	93	11	23.50	20RT	0-5	28	12	A-6(9)	BROWN
LM15.7	34	0	21.00	93	11	23.70	05LT	0-5	24	10	A-4(5)	BR/GR
LM15.9	34	0	12.30	93	11	15.50	05RT	0-5	30	16	A-6(8)	BROWN
LM15.9	34	0	12.20	93	11	15.70	21RT	0-5	28	14	A-6(6)	BROWN
LM16.1	34	0	4.00	93	11	8.90	20LT	0-5	35	18	A-6(8)	BR/GR
LM16.1	34	0	4.00	93	11	8.90	20LT	0-5	38	19	A-6(16)	BR/GR
LM16.1	34	0	3.90	93	11	9.00	04LT	0-5	34	18	A-6(14)	BR/GR
LM16.2	33	59	57.90	93	11	5.90	05RT	0-5	26	11	A-6(1)	BR/GR
LM16.2	33	59	57.80	93	11	6.10	25RT	0-5	23	9	A-4(3)	BR/GR

SOIL CHARACTERISTICS TABULATED ABOVE ARE REPRESENTATIVE AT THE LOCATION OF THE SAMPLE, AND FROM SURFACE INDICATIONS ARE TYPICAL FOR THE LIMITS SHOWN. THESE DATA ARE SHOWN FOR INFORMATION ONLY. THE STATE WILL NOT BE RESPONSIBLE FOR VARIATIONS IN THE SOIL CHARACTERISTICS AND/OR EXTENT OF SAME DIFFERING FROM THE ABOVE TABULATIONS.

DRIVEWAYS & TURNOUTS

LOG MILE	SIDE	LOCATION	WIDTH	ACHM SURFACE COURSE (1/2") VAR. LBS. PER SQ. YD. (PG 64-22)		TACK COAT		SIDE DRAINS	STANDARD DRAWINGS
			FEET	SQ. YD.	TON	GALLONS/ SQ. YD.	GALLON	18" LIN. FT.	
10.83	RT.	HWY. 53	10	43.33	4.77	0.17	7.37		
10.98	LT.	HWY. 53	16	52.00	5.72				
11.00	RT.	HWY. 53	16	52.00	5.72				
11.08	RT.	HWY. 53	16	52.00	5.72	0.17	8.84		
11.13	RT.	HWY. 53	16	52.00	5.72				
11.21	LT.	HWY. 53	16	52.00	5.72				
11.30	RT.	HWY. 53	16	52.00	5.72				
11.34	LT.	HWY. 53	16	52.00	5.72				
11.37	LT.	HWY. 53	16	52.00	5.72				
11.46	RT.	HWY. 53	20	57.78	6.36				
11.55	LT.	HWY. 53	16	52.00	5.72				
11.76	RT.	HWY. 53	18	54.89	6.04				
11.77	LT.	HWY. 53	24	63.56	6.99				
11.83	RT.	HWY. 53 - GOLDSBY RD.	16	44.80	4.93				
11.91	RT.	HWY. 53	16	52.00	5.72				
11.94	RT.	HWY. 53	16	52.00	5.72				
12.18	RT.	HWY. 53	18	54.89	6.04	0.17	9.33		
12.18	LT.	HWY. 53	16	52.00	5.72				
12.22	RT.	HWY. 53	16	52.00	5.72				
12.31	RT.	HWY. 53	16	52.00	5.72				
12.38	RT.	HWY. 53	16	52.00	5.72				
12.75	LT.	HWY. 53	16	52.00	5.72				
12.79	LT.	HWY. 53 - C.R. 10	20	146.69	16.14	0.17	24.94		
12.79	RT.	HWY. 53 - C.R. 452	20	146.69	16.14	0.17	24.94		
13.10	LT.	HWY. 53	18	54.89	6.04	0.17	9.33		
13.10	RT.	HWY. 53	16	52.00	5.72				
13.16	LT.	HWY. 53	16	52.00	5.72				
13.36	RT.	HWY. 53	16	52.00	5.72				
13.48	RT.	HWY. 53	16	52.00	5.72				
13.73	LT.	HWY. 53	20	57.78	6.36				
13.77	RT.	HWY. 53	16	52.00	5.72				
13.80	RT.	HWY. 53	16	52.00	5.72				
13.95	RT.	HWY. 53	16	52.00	5.72				
14.03	LT.	HWY. 53	16	52.00	5.72				
14.13	LT.	HWY. 53	16	52.00	5.72				
14.20	LT.	HWY. 53	16	52.00	5.72				
14.24	LT.	HWY. 53	16	52.00	5.72				
14.37	LT.	HWY. 53	22	60.67	6.67				
14.51	LT.	HWY. 53	16	52.00	5.72				
14.53	RT.	HWY. 53	16	52.00	5.72				
14.90	LT.	HWY. 53	16	52.00	5.72				
15.06	LT.	HWY. 53	16	52.00	5.72				
15.52	RT.	HWY. 53 - C.R. 451	16	44.80	4.93				
15.55	LT.	HWY. 53	16	52.00	5.72				
15.81	LT.	HWY. 53 - NICOLE DR.	22	56.80	6.25				
15.83	LT.	HWY. 53	16	52.00	5.72				
15.99	RT.	HWY. 53	16	52.00	5.72				
16.07	RT.	HWY. 53	16	52.00	5.72				
16.09	LT.	HWY. 53	30	72.22	7.94				
16.13	LT.	HWY. 53	28	69.33	7.63	0.17	11.79		
16.13	RT.	HWY. 53	36	80.89	8.90	0.17	13.75		
16.17	RT.	HWY. 53 - C.R. 4	24	60.80	6.69	0.17	10.34		
ENTIRE	PROJECT	TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER						600	PCC-1, PCM-1, PCP-1, PCP-2
TOTALS:				**2990.81**	**329.02**		**120.63**	**600**	

BASIS OF ESTIMATE:
ACHM SURFACE COURSE (1/2").....94.7% MIN. AGGR.....5.3% ASPHALT BINDER
MAXIMUM NUMBER OF GYRATIONS = 115 FOR PG 64-22

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

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.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

4/25/2018

R070265.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.		070265	24	37

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

4" PIPE UNDERDRAIN

LOG MILE	LOG MILE	LOCATIONS	4" PIPE UNDERDRAINS	UNDERDRAIN OUTLET PROTECTORS
			LIN. FT.	EACH
* ENTIRE PROJECT TO BE USED IF AND			15000	60
WHERE DIRECTED BY THE ENGINEER				
TOTALS:			15000	60

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

RUMBLE STRIPES IN ASPHALT SHOULDERS

LOG MILE	LOG MILE	LOCATION	* RUMBLE STRIPES IN ASPHALT SHOULDERS
			LIN.FT.
10.76	16.30	HWY. 53 - LT.	22695
10.76	16.30	HWY. 53 - RT.	22665
TOTAL:			45360

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

CLEARING AND GRUBBING

LOG MILE	LOG MILE	LOCATION	CLEARING	GRUBBING
			STATION	
* ENTIRE	PROJECT	HWY. 53	8	8
TOTALS:			8	8

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

CONCRETE DITCH PAVING

LOG MILE	LOG MILE	LOCATION	LENGTH	"W"	CONC. DITCH PAVING (TYPE B)	SOLID SODDING	WATER
			LIN. FT.	FEET	SQ. YD.	SQ. YD.	M. GAL.
* ENTIRE	PROJECT	HWY. 53	2000.00	6.33	1406.67	888.89	11.20
TOTALS:					1406.67	888.89	11.20

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

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

EROSION CONTROL MATTING

LOG MILE	LOG MILE	LOCATION	LENGTH	CLASS 3
			LIN. FT.	SQ. YD.
* ENTIRE	PROJECT	HWY. 53	2000.00	1777.78
TOTAL:				1777.78

NOTE: AVERAGE WIDTH = 8'-0"

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

CULVERT CLEAN OUT

LOG MILE	LOCATION	EACH
* ENTIRE PROJECT TO BE USED IF AND		10
WHERE DIRECTED BY THE ENGINEER		
TOTAL:		10

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

SELECTED PIPE BEDDING

LOCATION	SELECTED PIPE BEDDING
	CU.YD.
ENTIRE PROJECT TO BE USED IF	
AND WHERE DIRECTED BY THE	100
ENGINEER	
TOTAL:	100

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

EROSION CONTROL

LOG MILE	LOG MILE	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	CLEARING AND GRUBBING											900			33
* ENTIRE	PROJECT	STAGE 1						20.00	20.00	408.0	880	120	300	150	150	241
* ENTIRE	PROJECT	STAGE 2						20.00	20.00	408.0	880	120	300	150	150	241
* ENTIRE	PROJECT	PERMANENT SEEDING	35.00	70.00	35.00	3570.0	35.00									
* ENTIRE PROJECT TO BE USED IF AND WHERE DIRECTED BY THE ENGINEER.			8.75	17.50	8.75	892.5	8.75	10.00	10.00	204.0	440	60	375	150	150	204
TOTALS:			43.75	87.50	43.75	4462.5	43.75	50.00	50.00	1020.0	2200	300	1875	450	450	719

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.

4/25/2018

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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.		070265	25	37

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

STRUCTURES

LOG MILE	DESCRIPTION	REINFORCED CONCRETE PIPE (CLASS III) 24"	REINFORCED CONCRETE PIPE (CLASS III) 30"	FLARED END SECTIONS FOR R.C. PIPE CULVERTS 24"	FLARED END SECTIONS FOR R.C. PIPE CULVERTS 30"	SPAN	HEIGHT	LENGTH	CLASS S CONCRETE-ROADWAY	REINF. STEEL-ROADWAY (GRADE 60)	UNCL.EXC. FOR STR.-ROADWAY	SOLID SODDING	WATER	STD. DWG. NOS.
		LIN. FT.		EACH		LIN. FT.			CU.YD.	POUND	CU.YD.	SQ.YD.	M.GAL.	
10.70	REMOVE HEADWALLS LT. & RT. & EXTEND 30" X 46' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.		16		2							26	0.33	FES-1, FES-2, PCC-1
11.24	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 42' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
11.69	RETAIN & EXTEND 8' X 5' X 40' R.C. BOX CULVERT 7' LT. & 7' RT.					8	5	14	25.98	2388	20	17	0.21	R-100X-0, W-X003-1, RCB-1, RCB-2, RCB-3
12.33	REMOVE HEADWALLS LT. & RT. & EXTEND 30" X 42' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.		16		2							26	0.33	FES-1, FES-2, PCC-1
12.43	RETAIN & EXTEND DBL. 8' X 7' X 36' R.C. BOX CULVERT 7' LT. & 7' RT. ON 15° RT. FWD. SKEW					8	7	14	50.27	5878	31	24	0.30	R-215X-0, W-X153-1, RCB-1, RCB-2, RCB-3
12.59	RETAIN & EXTEND DBL. 7' X 7' X 48' R.C. BOX CULVERT 7' LT. & 7' RT.					7	7	14	45.70	5057	30	26	0.33	R-200X-0, W-X003-1, RCB-1, RCB-2, RCB-3
12.65	RETAIN & EXTEND 5' X 5' X 81' R.C. BOX CULVERT 9' LT. & 9' RT. ON 45° RT. FWD. SKEW					5	5	18	21.65	1935	18	20	0.25	R-100X-0, R-145X-0, W-X45, W-X453-1, RCB-1, RCB-2, RCB-3
12.78	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 42' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
12.79	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 44' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
12.85	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
12.94	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 44' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
13.15	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 44' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
13.66	RETAIN & EXTEND DBL. 8' X 6' X 46' R.C. BOX CULVERT 8' LT. & 8' RT. ON 30° LT. FWD. SKEW					8	6	16	51.03	4679	32	29	0.37	R-200X-X2, R-230X-01, W-X30, W-X303-1, RCB-1, RCB-2, RCB-3
13.75	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
13.81	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 48' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
13.94	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
14.05	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
14.17	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 44' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
14.28	REMOVE HEADWALLS LT. & RT. & EXTEND 30" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.		16		2							26	0.33	FES-1, FES-2, PCC-1
14.42	REMOVE HEADWALLS LT. & RT. & EXTEND 30" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.		16		2							26	0.33	FES-1, FES-2, PCC-1
14.56	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
14.66	REMOVE HEADWALLS LT. & RT. & EXTEND 30" X 40' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.		16		2							26	0.33	FES-1, FES-2, PCC-1
15.02	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 51' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
15.42	REMOVE HEADWALLS LT. & RT. & EXTEND 24" X 48' R.C. PIPE CULVERT 4' LT. & 4' RT. W/ FES LT. & RT.	16		2								16	0.20	FES-1, FES-2, PCC-1
15.93	RETAIN & EXTEND 6' X 5' X 43' R.C. BOX CULVERT 7' LT. ON 0° RT. FWD. SKEW & 7' RT. ON 5° RT. FWD. SKEW					6	5	14	20.77	1802	17	17	0.21	R-100X-0, W-X003-1, RCB-1, RCB-2, RCB-3
16.00	RETAIN & EXTEND 5' X 4' X 39' R.C. BOX CULVERT 7' LT. & 7' RT.					5	4	14	16.25	1433	14	15	0.19	R-100X-0, W-X003-1, RCB-1, RCB-2, RCB-3
SUBTOTALS:		**224**	**80**	**28**	**10**				**231.65**	**23172**	**162**	**502**	**6.31**	
						STRUCTURES OVER 20' - 0" SPAN								
11.59	RETAIN & EXTEND DBL. 10' X 8' X 72' R.C. BOX CULVERT 9' LT. & 9' RT. ON 45° LT. FWD. SKEW					10	8	18	80.71	9267	49	26	0.33	R-245X-02, W-X45, W-X453-1, RCB-1, RCB-2, RCB-3
15.17	RETAIN & EXTEND DBL. 10' X 7' X 63' R.C. BOX CULVERT 8' LT. & 8' RT. ON 45° LT. FWD. SKEW					10	7	18	71.87	9914	45	26	0.33	R-245X-02, W-X45, W-X453-1, RCB-1, RCB-2, RCB-3
SUBTOTALS:									**152.58**	**19181**	**94**	**52**	**0.66**	
TOTALS:		**224**	**80**	**28**	**10**				**384.23**	**42353**	**256**	**554**	**6.97**	

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.

4/25/2018

R070265.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.		070265	26	37

(2) QUANTITIES

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11425
TRINITY D. SMITH
4-25-18

COLD MILLING ASPHALT PAVEMENT

LOG MILE	LOG MILE	LOCATION	AVG. WIDTH	COLD MILLING ASPHALT PAVEMENT
			FEET	SQ. YD.
10.70	10.72	MAIN LANES	20.00	234.67
16.28	16.30	MAIN LANES	22.00	258.13
TOTAL:				492.80

NOTE: AVERAGE MILLING DEPTH 1".

ACHM PATCHING OF EXISTING ROADWAY

DESCRIPTION	TON
ENTIRE PROJECT - TO BE USED IF AND WHERE	150
DIRECTED BY THE ENGINEER	
TOTAL:	150

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

ASPHALT CONCRETE PATCHING FOR MAINTENANCE OF TRAFFIC

LOCATION	TON	TACK COAT
		GALLON
ENTIRE PROJECT - TO BE USED IF AND WHERE	140	280
DIRECTED BY THE ENGINEER		
TOTALS:	140	280

BASIS OF ESTIMATE:
ASPHALT CONCRETE PATCHING FOR MAINTENANCE OF TRAFFIC...25 TON/MILE
TACK COAT FOR MAINTENANCE OF TRAFFIC.....50 GAL./MILE

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

BASE AND SURFACING

LOG MILE	LOG MILE	LOCATION	LENGTH	AGGREGATE BASE COURSE (CLASS 7)		TACK COAT							ACHM BASE COURSE (1 1/2")				ACHM BINDER COURSE (1")				ACHM SURFACE COURSE (1/2")			
						(0.05 GAL. PER SQ. YD.)			(0.17 GAL. PER SQ. YD.)			TOTAL GALLONS	AVG. WID.	SQ.YD.	POUND / SQ.YD.	PG 64-22	AVG. WID.	SQ.YD.	POUND / SQ.YD.	PG 64-22	AVG. WID.	SQ.YD.	POUND / SQ.YD.	PG 64-22
			FEET	TON / STATION	TON	TOTAL WID. FEET	SQ.YD.	GALLONS	TOTAL WID. FEET	SQ.YD.	GALLONS		FEET			TON	FEET			TON	FEET			TON
MAIN LANES																								
10.70	10.72	HWY. 53-TRANSITION	105.60						20.00	234.67	39.89	39.89									22.00	258.13	220.00	28.39
10.72	10.76	HWY. 53-TRANSITION	211.20	22.50	47.52	29.00	680.53	34.03	20.00	469.33	79.79	113.82	4.67	109.59	440.00	24.11	24.33	570.94	VAR.	62.80	24.00	563.20	220.00	61.95
10.76	11.58	HWY. 53	4329.60	22.50	974.16	29.00	13950.93	697.55	20.00	9621.33	1635.63	2333.18	4.67	2246.58	440.00	494.25	24.33	11704.35	440.00	2574.96	24.00	11545.60	220.00	1270.02
11.58	11.60	HWY. 53-R.C. BOX CULVERTS	105.60	19.00	20.06	41.00	481.07	24.05	20.00	234.67	39.89	63.94	10.67	125.19	440.00	27.54	30.33	355.87	440.00	78.29	30.00	352.00	220.00	38.72
11.60	11.68	HWY. 53	422.40	22.50	95.04	29.00	1361.07	68.05	20.00	938.67	159.57	227.62	4.67	219.18	440.00	48.22	24.33	1141.89	440.00	251.22	24.00	1126.40	220.00	123.90
11.68	11.69	HWY. 53-R.C. BOX CULVERTS	52.80	19.00	10.03	41.00	240.53	12.03	20.00	117.33	19.95	31.98	10.67	62.60	440.00	13.77	30.33	177.94	440.00	39.15	30.00	176.00	220.00	19.36
11.69	12.42	HWY. 53	3854.40	22.50	867.24	29.00	12419.73	620.99	20.00	8565.33	1456.11	2077.10	4.67	2000.01	440.00	440.00	24.33	10419.73	440.00	2292.34	24.00	10278.40	220.00	1130.62
12.42	12.44	HWY. 53-R.C. BOX CULVERTS	105.60	19.00	20.06	41.00	481.07	24.05	20.00	234.67	39.89	63.94	10.67	125.19	440.00	27.54	30.33	355.87	440.00	78.29	30.00	352.00	220.00	38.72
12.44	12.59	HWY. 53	792.00	22.50	178.20	29.00	2552.00	127.60	20.00	1760.00	299.20	426.80	4.67	410.96	440.00	90.41	24.33	2141.04	440.00	471.03	24.00	2112.00	220.00	232.32
12.59	12.60	HWY. 53-R.C. BOX CULVERTS	52.80	19.00	10.03	41.00	240.53	12.03	20.00	117.33	19.95	31.98	10.67	62.60	440.00	13.77	30.33	177.94	440.00	39.15	30.00	176.00	220.00	19.36
12.60	12.64	HWY. 53	211.20	22.50	47.52	29.00	680.53	34.03	20.00	469.33	79.79	113.82	4.67	109.59	440.00	24.11	24.33	570.94	440.00	125.61	24.00	563.20	220.00	61.95
12.64	12.66	HWY. 53-R.C. BOX CULVERTS	105.60	19.00	20.06	41.00	481.07	24.05	20.00	234.67	39.89	63.94	10.67	125.19	440.00	27.54	30.33	355.87	440.00	78.29	30.00	352.00	220.00	38.72
12.66	13.65	HWY. 53	5227.20	22.50	1176.12	29.00	16843.20	842.16	20.00	11616.00	1974.72	2816.88	4.67	2712.34	440.00	596.71	24.33	14130.86	440.00	3108.79	24.00	13939.20	220.00	1533.31
13.65	13.66	HWY. 53-R.C. BOX CULVERTS	52.80	19.00	10.03	41.00	240.53	12.03	20.00	117.33	19.95	31.98	10.67	62.60	440.00	13.77	30.33	177.94	440.00	39.15	30.00	176.00	220.00	19.36
13.66	15.92	HWY. 53	11932.80	22.50	2684.88	29.00	38450.13	1922.51	20.00	26517.33	4507.95	6430.46	4.67	6191.80	440.00	1362.20	24.33	32258.34	440.00	7096.83	24.00	31820.80	220.00	3500.29
15.92	15.94	HWY. 53-R.C. BOX CULVERTS	105.60	19.00	20.06	41.00	481.07	24.05	20.00	234.67	39.89	63.94	10.67	125.19	440.00	27.54	30.33	355.87	440.00	78.29	30.00	352.00	220.00	38.72
15.94	15.99	HWY. 53	264.00	22.50	59.40	29.00	850.67	42.53	20.00	586.67	99.73	142.26	4.67	136.99	440.00	30.14	24.33	713.68	440.00	157.01	24.00	704.00	220.00	77.44
15.99	16.01	HWY. 53-R.C. BOX CULVERTS	105.60	19.00	20.06	41.00	481.07	24.05	20.00	234.67	39.89	63.94	10.67	125.19	440.00	27.54	30.33	355.87	440.00	78.29	30.00	352.00	220.00	38.72
16.01	16.15	HWY. 53	739.20	22.50	166.32	29.00	2381.87	119.09	20.00	1642.67	279.25	398.34	4.67	383.56	440.00	84.38	24.33	1998.30	440.00	439.63	24.00	1971.20	220.00	216.83
16.15	16.19	HWY. 53-TRANSITION	211.20	22.50	47.52	29.00	680.53	34.03	20.00	469.33	79.79	113.82	4.67	109.59	440.00	24.11	24.33	570.94	VAR.	62.80	24.00	563.20	220.00	61.95
16.19	16.28	HWY. 53-OVERLAY	475.20						34.00	1795.20	305.18	305.18									34.00	1795.20	220.00	197.47
16.28	16.30	HWY. 53-TRANSITION	105.60						20.00	234.67	39.89	39.89									34.00	398.93	220.00	43.88
TOTALS:					6474.31		93978.13	4698.91		66445.87	11295.79	15994.70		15443.94		3397.65		78534.18		17151.92		79927.46		8792.00

BASIS OF ESTIMATE:
ACHM SURFACE COURSE (1/2").....94.7% MIN. AGGR.....5.3% ASPHALT BINDER
ACHM BINDER COURSE (1").....95.7% MIN. AGGR.....4.3% ASPHALT BINDER
ACHM BASE COURSE (1 1/2").....96.0% MIN. AGGR.....4.0% ASPHALT BINDER
MAXIMUM NUMBER OF GYRATIONS = 115 FOR PG 64-22

4/25/2018

R070265.DGN

QUANTITIES

SUMMARY OF QUANTITIES

ITEM NUMBER	ITEM	QUANTITY	UNIT
201	CLEARING	8	STATION
201	GRUBBING	8	STATION
210	UNCLASSIFIED EXCAVATION	38000	CU. YD.
210	COMPACTED EMBANKMENT	37000	CU. YD.
SP & 210	SOIL STABILIZATION	100	TON
SS & 303	AGGREGATE BASE COURSE (CLASS 7)	6474	TON
SS & 401	TACK COAT	16395	GAL.
SP, SS, & 405	MINERAL AGGREGATE IN ACHM BASE COURSE (1 1/2")	3262	TON
SP, SS, & 405	ASPHALT BINDER (PG 64-22) IN ACHM BASE COURSE (1 1/2")	136	TON
SP, SS, & 406	MINERAL AGGREGATE IN ACHM BINDER COURSE (1")	16414	TON
SP, SS, & 406	ASPHALT BINDER (PG 64-22) IN ACHM BINDER COURSE (1")	738	TON
SP, SS, & 407	MINERAL AGGREGATE IN ACHM SURFACE COURSE (1/2")	8638	TON
SP, SS, & 407	ASPHALT BINDER (PG 64-22) IN ACHM SURFACE COURSE (1/2")	483	TON
412	COLD MILLING ASPHALT PAVEMENT	493	SQ. YD.
SP, SS, & 414	ASPHALT CONCRETE PATCHING FOR MAINTENANCE OF TRAFFIC	140	TON
SP, SS, & 415	ACHM PATCHING OF EXISTING ROADWAY	150	TON
601	MOBILIZATION	1.00	LUMP SUM
SP & 602	FURNISHING FIELD OFFICE	1	EACH
603	MAINTENANCE OF TRAFFIC	1.00	LUMP SUM
SS & 604	SIGNS	712	SQ. FT.
SS & 604	TRAFFIC DRUMS	859	EACH
604	FURNISHING AND INSTALLING PRECAST CONCRETE BARRIER	2934	LIN. FT.
604	RELOCATING PRECAST CONCRETE BARRIER	2934	LIN. FT.
604	CONSTRUCTION PAVEMENT MARKINGS	118272	LIN. FT.
SS & 604	VERTICAL PANELS	192	EACH
SS & 605	CONCRETE DITCH PAVING (TYPE B)	1407	SQ. YD.
SP	CULVERT CLEAN OUT	10	EACH
606	24" REINFORCED CONCRETE PIPE CULVERTS (CLASS III)	224	LIN. FT.
606	30" REINFORCED CONCRETE PIPE CULVERTS (CLASS III)	80	LIN. FT.
SP, SS, & 606	18" SIDE DRAIN	600	LIN. FT.
606	24" FLARED END SECTIONS FOR REINFORCED CONCRETE PIPE CULVERTS	28	EACH
606	30" FLARED END SECTIONS FOR REINFORCED CONCRETE PIPE CULVERTS	10	EACH
606	SELECTED PIPE BEDDING	100	CU. YD.
611	UNDERDRAIN OUTLET PROTECTORS	60	EACH
611	4" PIPE UNDERDRAINS	15000	LIN. FT.
620	LIME	88	TON
620	SEEDING	43.75	ACRE
SS & 620	MULCH COVER	93.75	ACRE
620	WATER	5500.7	M. GAL.
621	TEMPORARY SEEDING	50.00	ACRE
621	SILT FENCE	1875	LIN. FT.
621	SAND BAG DITCH CHECKS	2200	BAG
621	SEDIMENT BASIN	450	CU. YD.
621	OBLITERATION OF SEDIMENT BASIN	450	CU. YD.
621	SEDIMENT REMOVAL AND DISPOSAL	719	CU. YD.
621	ROCK DITCH CHECKS	300	CU. YD.
623	SECOND SEEDING APPLICATION	43.75	ACRE
624	SOLID SODDING	1443	SQ. YD.
626	EROSION CONTROL MATTING (CLASS 3)	1778	SQ. YD.
635	ROADWAY CONSTRUCTION CONTROL	1.00	LUMP SUM
637	MAILBOXES	41	EACH
637	MAILBOX SUPPORTS (SINGLE)	31	EACH
637	MAILBOX SUPPORTS (DOUBLE)	5	EACH
SP & 642	RUMBLE STRIPES IN ASPHALT SHOULDERS	45360	LIN. FT.
718	REFLECTORIZED PAINT PAVEMENT MARKING WHITE (6")	59136	LIN. FT.
718	REFLECTORIZED PAINT PAVEMENT MARKING YELLOW (6")	59136	LIN. FT.
721	RAISED PAVEMENT MARKERS (TYPE II)	370	EACH
801	UNCLASSIFIED EXCAVATION FOR STRUCTURES-ROADWAY	162	CU. YD.
802	CLASS S CONCRETE-ROADWAY	231.65	CU. YD.
804	REINFORCING STEEL-ROADWAY (GRADE 60)	23172	POUND
	STRUCTURES OVER 20' SPAN		
801	UNCLASSIFIED EXCAVATION FOR STRUCTURES-ROADWAY	94	CU. YD.
802	CLASS S CONCRETE-ROADWAY	152.58	CU. YD.
804	REINFORCING STEEL-ROADWAY (GRADE 60)	19181	POUND

REVISIONS

DATE	REVISION	SHEET NUMBER
06-05-18	ADDED SS 605-1 TO GOVERING SPECIFICATIONS & TO PAY ITEM IN SUMMARY.	3 & 27

SUMMARY OF QUANTITIES AND REVISIONS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11435
TIMOTHY D. SMITH
6-6-18

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED
06-05-18			

(2) SUMMARY OF QUANTITIES AND REVISIONS

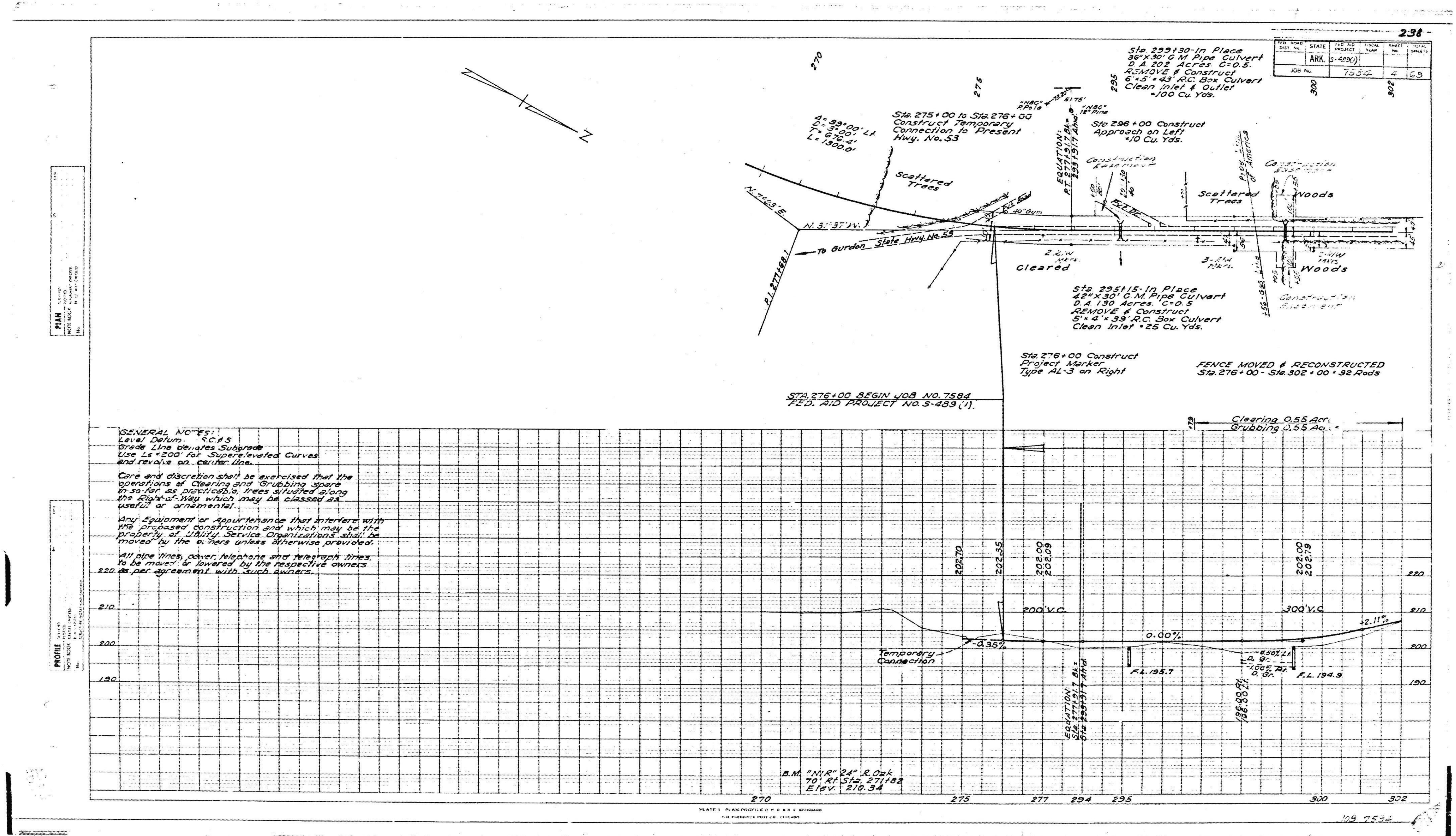
FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
6	ARK.		27	37

JOB NO. 070265

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.		070265	28	37

(2) PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY



PLAN AND PROFILE SHEETS

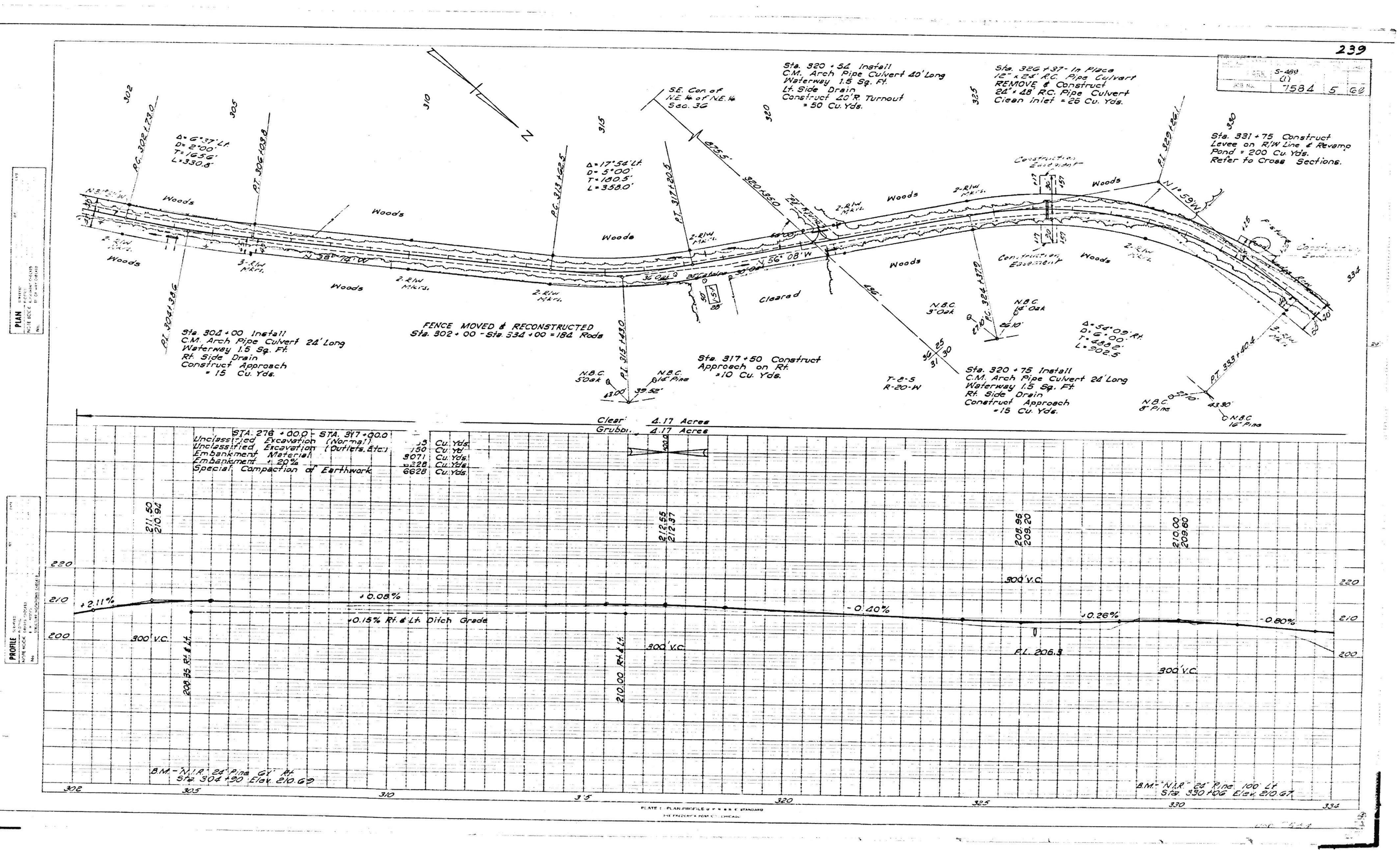
4/25/2018

R070265.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.		070265	29	37

(2) PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY



239
Sta. 320 + 54 Install C.M. Arch Pipe Culvert 40' Long Waterway 1.5 Sq. Ft. Lt. Side Drain Construct 40' R. Turnout = 50 Cu. Yds.
Sta. 326 + 37 - In Place 16" x 24" R.C. Pipe Culvert REMOVE & Construct 24" x 48 R.C. Pipe Culvert Clean Inlet = 25 Cu. Yds.
Sta. 331 + 75 Construct Levee on R/W Line & Revamp Pond = 200 Cu. Yds. Refer to Cross Sections.
SE. Cor. of N.E. ¼ of N.E. ¼ Sec. 36
Δ = 6°37' Lt. D = 2°00' T = 165.6' L = 330.8'
Δ = 17°54' Lt. D = 5°00' T = 180.5' L = 358.0'
Δ = 54°09' Rt. D = 6°00' T = 488.2' L = 902.5
Woods
Cleared
Construction Easement
Sta. 304 + 00 Install C.M. Arch Pipe Culvert 24' Long Waterway 1.5 Sq. Ft. Rt. Side Drain Construct Approach = 15 Cu. Yds.
FENCE MOVED & RECONSTRUCTED Sta. 302 + 00 - Sta. 334 + 00 = 184 Rods
Sta. 317 + 50 Construct Approach on Rt. = 10 Cu. Yds.
Sta. 320 + 75 Install C.M. Arch Pipe Culvert 24' Long Waterway 1.5 Sq. Ft. Rt. Side Drain Construct Approach = 15 Cu. Yds.
T-8-S R-20-W
Clear 4.17 Acres
Grubb. 4.17 Acres
STA. 276 + 00.0 - STA. 317 + 00.0
Unclassified Excavation (Normal)
Unclassified Excavation (Outlets, Etc.) 750 Cu. Yd.
Embankment Material 8071 Cu. Yds.
Embankment + 20%
Special Compaction of Earthwork 6628 Cu. Yds.
+2.11%
+0.08%
-0.40%
+0.26%
-0.80%
+0.15% Rt. & Lt. Ditch Grade
300' V.C.
F.L. 206.3
B.M. - N.I.R. 24" Pine 67' Rt. Sta. 304 + 90 Elev. 210.69
B.M. - N.I.R. 24" Pine 100' Lt. Sta. 330 + 06 Elev. 210.67
302
305
310
315
320
325
330
334

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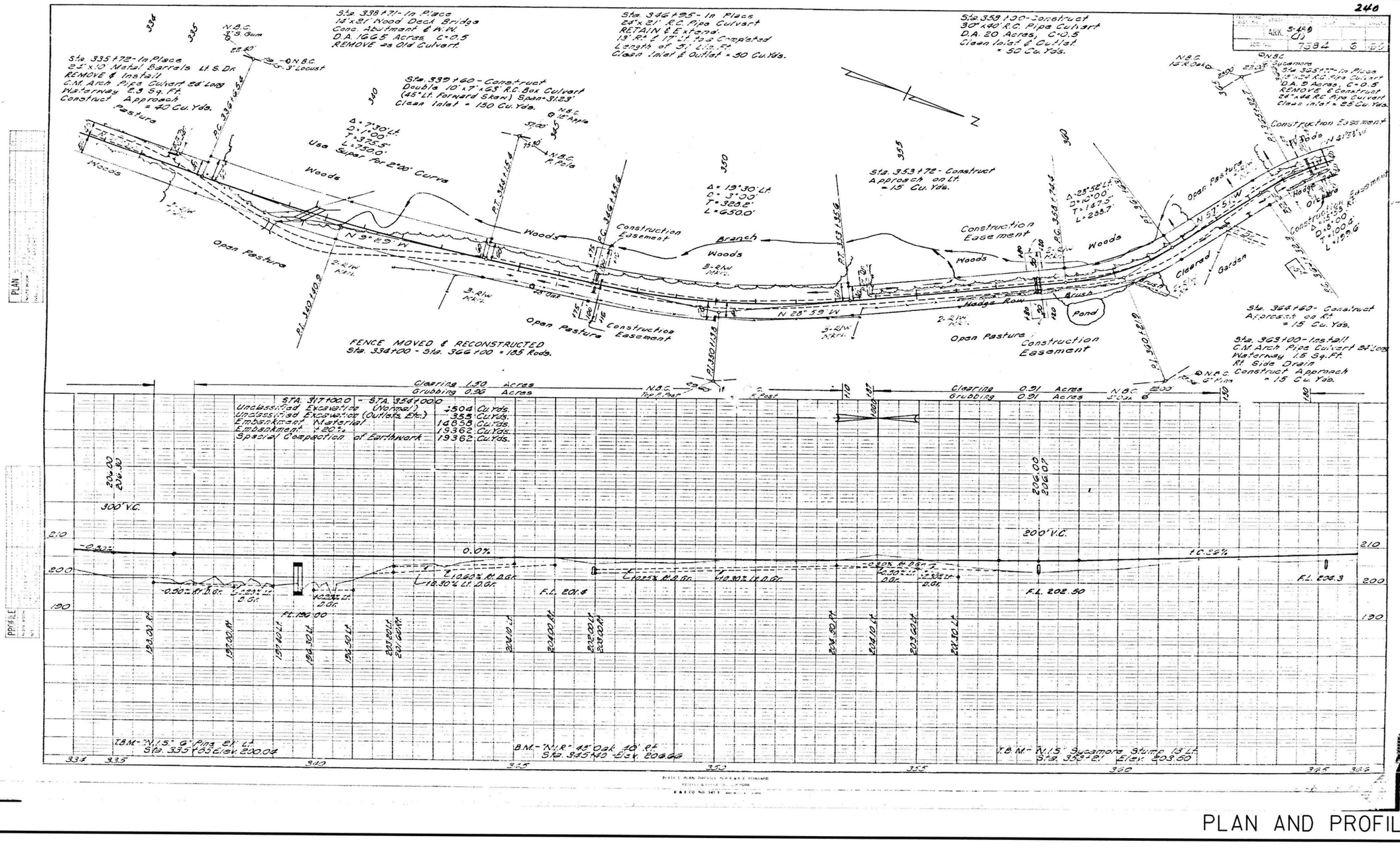
PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY

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.		070265	30	37
				(2) PLAN AND PROFILE SHEETS				



PLAN AND PROFILE SHEETS

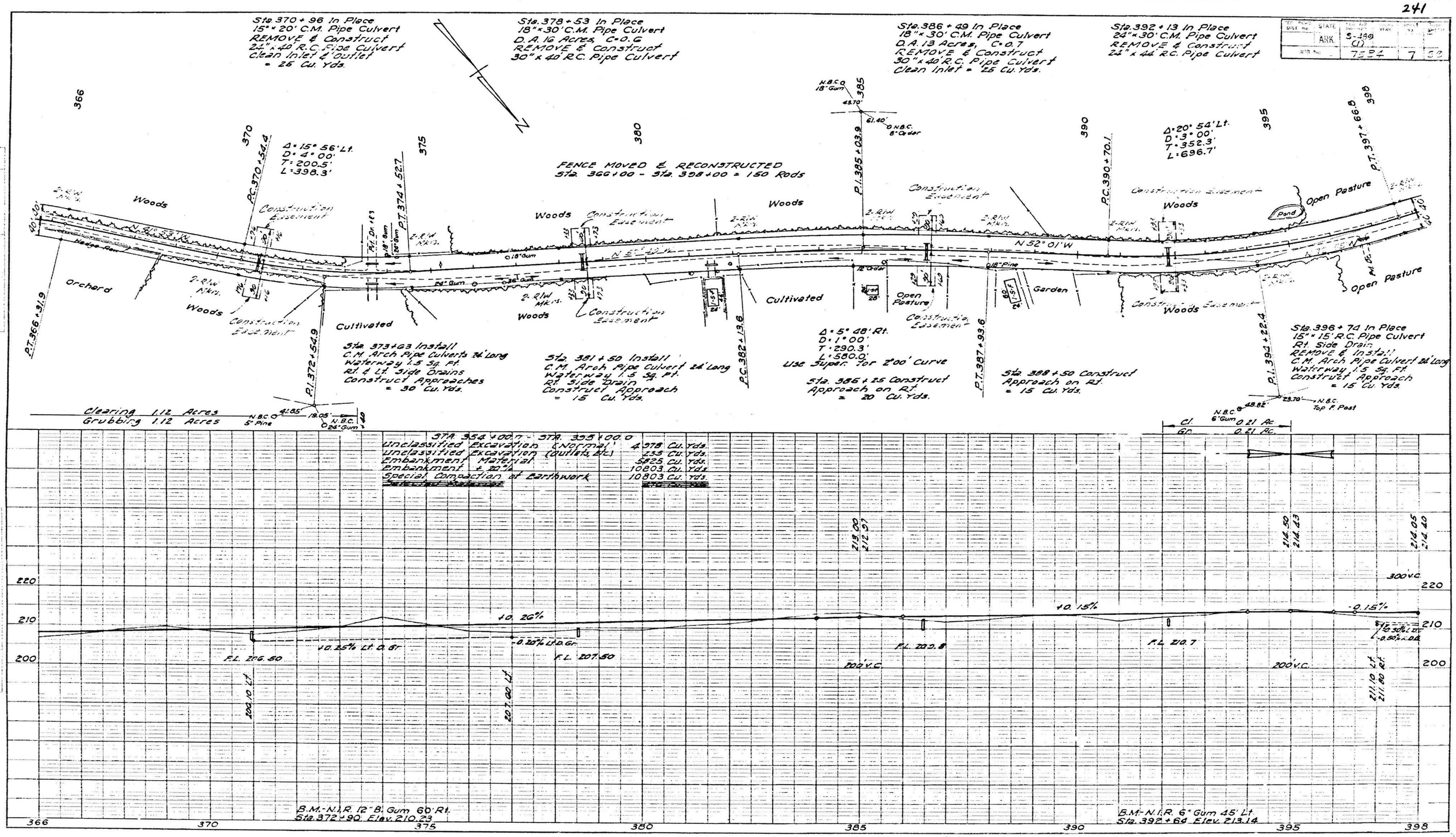
4/25/2018

R070265.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.	070265		31	37

(2) PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY



241
Sta. 370 + 96 In Place
15" × 20' C.M. Pipe Culvert
REMOVE & Construct
24" × 40' R.C. Pipe Culvert
Clean Inlet & Outlet
= 25 Cu. Yds.
Sta. 378 + 53 In Place
18" × 30' C.M. Pipe Culvert
D.A. 16 Acres, C = 0.6
REMOVE & Construct
30" × 40' R.C. Pipe Culvert
Sta. 386 + 49 In Place
18" × 30' C.M. Pipe Culvert
D.A. 13 Acres, C = 0.7
REMOVE & Construct
30" × 40' R.C. Pipe Culvert
Clean Inlet = 25 Cu. Yds.
Sta. 392 + 13 In Place
24" × 30' C.M. Pipe Culvert
REMOVE & Construct
24" × 44' R.C. Pipe Culvert
Δ = 15° 56' Lt.
D = 4° 00'
T = 200.5'
L = 398.3'
FENCE MOVED & RECONSTRUCTED
Sta. 366+00 - Sta. 398+00 = 150 Rods
Δ = 20° 54' Lt.
D = 3° 00'
T = 352.3'
L = 696.7'
P.C. 370 + 54.4
P.T. 374 + 52.7
P.T. 385 + 03.9
P.C. 390 + 70.1
P.T. 397 + 66.8
P.T. 366 + 31.9
P.I. 372 + 54.9
P.C. 382 + 13.6
P.T. 387 + 93.6
P.I. 394 + 22.4
N 52° 01' W
Woods
Orchard
Cultivated
Garden
Open Pasture
Construction Easement
Sta. 373 + 63 Install
C.M. Arch Pipe Culverts 24' Long
Waterway 1.5 Sq. Ft.
Rt. & Lt. Side Drains
Construct Approaches
= 30 Cu. Yds.
Sta. 381 + 50 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Rt. Side Drain
Construct Approach
= 15 Cu. Yds.
Δ = 5° 48' Rt.
D = 1° 00'
T = 290.3'
L = 580.0'
Use Super. for 2° 00' Curve
Sta. 386 + 25 Construct
Approach on Rt.
= 20 Cu. Yds.
Sta. 388 + 50 Construct
Approach on Rt.
= 15 Cu. Yds.
Sta. 396 + 74 In Place
15" × 15' R.C. Pipe Culvert
Rt. Side Drain
REMOVE & Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Construct Approach
= 15 Cu. Yds.
Clearing 1.12 Acres
Grubbing 1.12 Acres
STA. 354 + 00.0 - STA. 395 + 00.0
Unclassified Excavation (Normal) 4,978 Cu. Yds.
Unclassified Excavation (Outlets, Etc.) 235 Cu. Yds.
Embankment Material 5825 Cu. Yds.
Embankment + 20% 10803 Cu. Yds.
Special Compaction of Earthwork 10803 Cu. Yds.
+0.26%
+0.15%
-0.15%
F.L. 206.50
F.L. 207.50
F.L. 209.8
F.L. 210.7
200' V.C.
300' V.C.
B.M. - N.I.R. 12" B. Gum 60' Rt.
Sta. 372 + 90 Elev. 210.23
B.M. - N.I.R. 6" Gum 45' Lt.
Sta. 392 + 64 Elev. 213.14
366
370
375
380
385
390
395
398

PLAN AND PROFILE SHEETS

4/25/2018

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FOR INFORMATION ONLY

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.		070265	32	37
				(2) PLAN AND PROFILE SHEETS				

242

Sta.398+40 In Place
18"x 33" R.C. Pipe Culvert
0.A 2.6 Acres, C=0.5
REMOVE & Construct
36"x 40' R.C. Pipe Culvert
Clean Inlet & Outlet = 50 Cu. Yds.

T-8-S
R-21-W

Sta.399+74 In Place
15"x 15" R.C. Pipe Culvert
Rt. Side Drain
REMOVE & Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Construct Approach = 20 Cu. Yds.

Sta.403+00 Leave Approach on Lt.

Sta.404+86 In Place
24"x 28' C.M. Pipe Culvert
REMOVE & Construct
24"x 40' R.C. Pipe Culvert

Sta.408+00 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Rt. Side Drain
Construct Approach
=10 Cu. Yds.

Sta.410+81 In Place
12"x 30" R.C. Pipe Culvert
REMOVE & Construct
24"x 48' R.C. Pipe Culvert
Clean Inlet & Outlet
=25 Cu. Yds.
Use Super for 2° Curve

Sta.411+80 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft. - Lt. Side Drain
Construct Approach
=10 Cu. Yds.

Sta.413+65 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Lt. Side Drain
Construct Approach
=15 Cu. Yds.

Sta.414+34 In Place
24"x 28' C.M. Pipe Culvert
REMOVE & Construct
24"x 40' R.C. Pipe Culvert
Clean Outlet =25 Cu. Yds.

Sta.415+20 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Lt. Side Drain
Construct Approach
=10 Cu. Yds.

Sta.415+40 Construct
Approach on Right
=10 Cu. Yds.

Sta.419+20 In Place
16'x 24' Conc. T.T. Bridge
D.A. 365 Acres, C=0.5
REMOVE & Construct
Dbl. 8'x6'x16' R.C. Box Culvert
(30° Lt. Fwd. Skew)
Clean Inlet & Outlet =200 Cu. Yds.

Sta.427+00 - Sta.430+00
Construct 3'w.b. Ditch
Approaches on Lt.

Δ=17° 12' Rt.
D=4° 00'
T=216.6'
L=430.0'

Δ=2° 24' Rt.
D=1° 00'
T=120.0'
L=240.0

Δ=3° 06' Rt.
D=1° 00'
T=155.1'
L=310.0'
Use Super for 2° Curve

FENCE MOVED & RECONSTRUCTED
Sta.398+00 - Sta.430+00 =118 Rods

Clearing 0.18 Acres
Grubbing 0.18 Acres

STA. 395+00.0 – STA. 435+0.0

Unclassified Excavation	(Normal)	2822 Cu. Yds.
Unclassified Excavation	(Outlets, Etc.)	390 Cu. Yds.
Embankment Material		8925 Cu. Yds.
Embankment +20%		11747 Cu. Yds.
Special Compaction of Earthwork		11747 Cu. Yds.
Selected Material		150 Cu. Yds.

B.M. N.I.S. Fence Post 42' Rt.
Sta.416+05 Elev. 218.25

B.M. "X" on East End of North Curb of Br. 12' Rt.
Sta.419+32 Elev. 209.44

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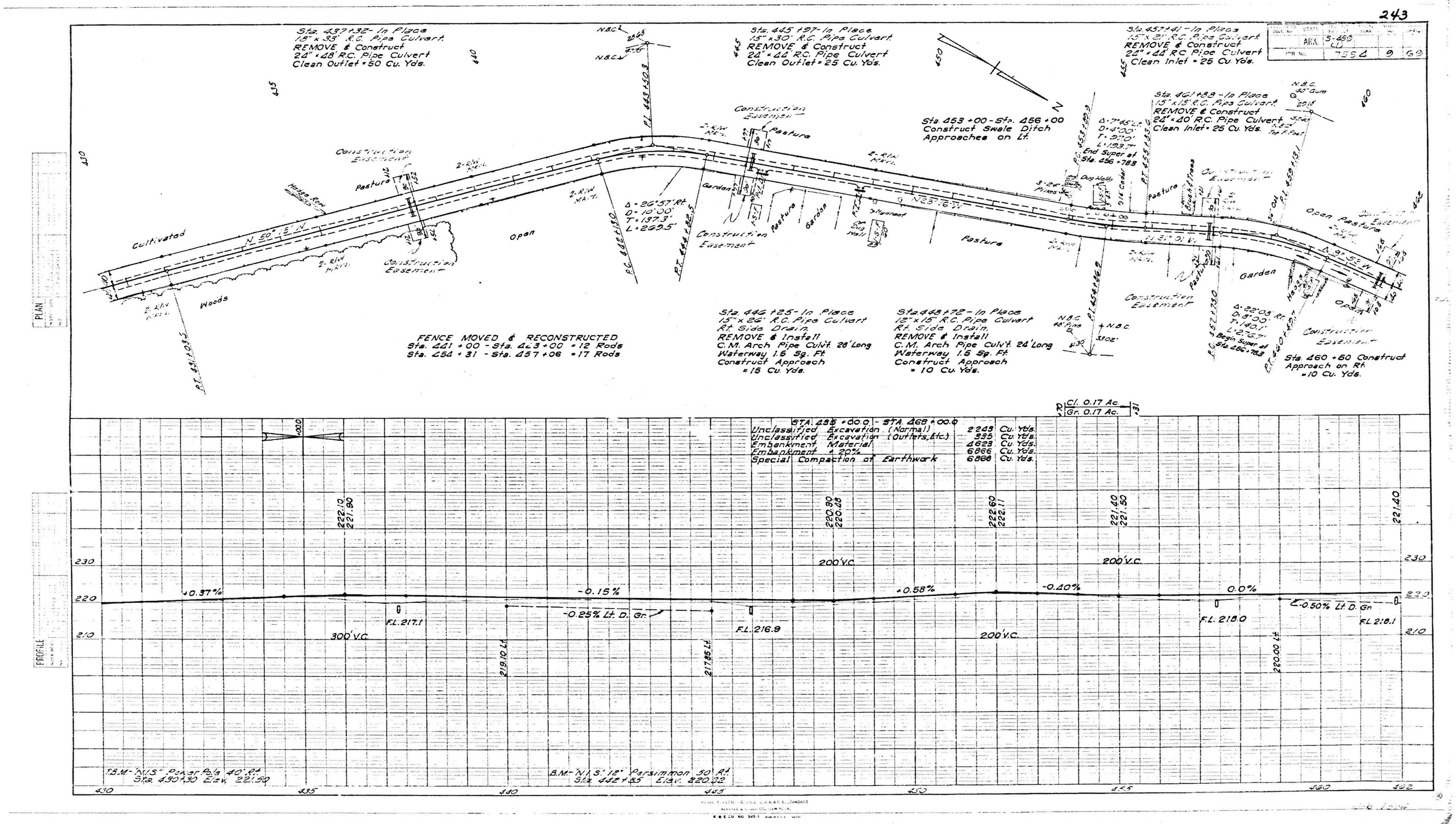
PLAN AND PROFILE SHEETS

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.		070265	33	37

(2) PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY



243
Sta. 437+32 - In Place 18"x33' R.C. Pipe Culvert. REMOVE & Construct 24"x48' R.C. Pipe Culvert Clean Outlet = 50 Cu. Yds.
Sta. 445+97 - In Place 15"x30' R.C. Pipe Culvert. REMOVE & Construct 24"x44' R.C. Pipe Culvert Clean Outlet = 25 Cu. Yds.
Sta. 457+41 - In Place 15"x21' R.C. Pipe Culvert REMOVE & Construct 24"x44' R.C. Pipe Culvert Clean Inlet = 25 Cu. Yds.
Sta. 461+88 - In Place 15"x15' R.C. Pipe Culvert REMOVE & Construct 24"x40' R.C. Pipe Culvert Clean Inlet = 25 Cu. Yds.
Sta. 453+00 - Sta. 456+00 Construct Swale Ditch Approaches on Lt.
Cultivated
Woods
Open
Pasture
Garden
Open Pasture
Construction Easement
P.I. 443+20.3
Δ = 26°57' Rt. D = 10°00' T = 137.3' L = 269.5'
P.C. 442+13.0
P.T. 444+82.5
N 50°8' W
N 23°16' W
N 31°01' W
Δ = 7°45' Lt. D = 4°00' T = 97.0' L = 193.7'
End Super at Sta. 456+78.3
Δ = 22°08' Rt. D = 8°00' T = 140.1' L = 276.7'
Begin Super at Sta. 456+78.3
P.T. 431+03.5
Sta. 446+25 - In Place 15"x26' R.C. Pipe Culvert Rt. Side Drain. REMOVE & Install C.M. Arch Pipe Culvt. 26' Long Waterway 1.6 Sq. Ft. Construct Approach = 15 Cu. Yds.
Sta. 448+72 - In Place 12"x15' R.C. Pipe Culvert Rt. Side Drain. REMOVE & Install C.M. Arch Pipe Culvt. 24' Long Waterway 1.6 Sq. Ft. Construct Approach = 10 Cu. Yds.
FENCE MOVED & RECONSTRUCTED
Sta. 441+00 - Sta. 443+00 = 12 Rods
Sta. 454+31 - Sta. 457+06 = 17 Rods
Sta. 460+60 Construct Approach on Rt. = 10 Cu. Yds.
Cl. 0.17 Ac.
Gr. 0.17 Ac.
STA. 435+00.0 - STA. 468+00.0
Unclassified Excavation (Normal) 2243 Cu. Yds.
Unclassified Excavation (Outlets, Etc.) 335 Cu. Yds.
Embankment Material 4623 Cu. Yds.
Embankment + 20% 6866 Cu. Yds.
Special Compaction of Earthwork 6866 Cu. Yds.
+0.37%
-0.15%
+0.58%
-0.40%
0.0%
-0.25% Lt. D. Gr.
-0.50% Lt. D. Gr.
300' V.C.
200' V.C.
F.L. 217.1
F.L. 216.9
F.L. 218.0
F.L. 218.1
T.B.M. - "N.I.S." Power Pole 40' Rt. Sta. 430+90 Elev. 221.50
B.M. - "N.I.S." 12" Persimmon 50' Rt. Sta. 442+83 Elev. 220.02
PLAN
PROFILE

PLAN AND PROFILE SHEETS

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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.		070265	34	37

(2) PLAN AND PROFILE SHEETS

244

Dist. No.	State	Fed. Aid Proj. No.	Sheet No.	Total Sheets
ARK.	S-460 (1)			
Job No.	7594	10	60	

Sta. 465+19 - In Place
18" x 30' R.C. Pipe Culvert
REMOVE & Construct
24' x 44' R.C. Pipe Culvert
'L' Headwalls
Clean Inlet & Outlet
= 50 Cu. Yds.

Sta. 465+69 - In Place
15"x 24' R.C. Pipe Culvert
REMOVE & Construct
24" x 42" R.C. Pipe Culvert
'NBC' Top 'L' Headwalls
F. Post Clean Inlet & Outlet
= 25 Cu. Yds.

'NBC' Top F. Post

Sta. 475+32 In Place
12"x 15' R.C. Pipe Culvert
Lt. Side Drain
REMOVE & Install
C.M. Arch Pipe Culvt 30' Long
Waterway 1.5 Sq. Ft.
Construct Approach
= 60 Cu. Yds.

Sta. 475+78 - In Place
Dbl. 7'x 7'x 24' R.C. Box Culvert
RETAIN & Extend
17' Rt. & 7' Lt. to a Completed
Length of 48 Lin. Ft.
Clean Inlet & Outlet = 150 Cu. Yds.

FENCE MOVED & RECONSTRUCTED
Sta. 462+00 - Sta. 494+00 = 124 Rods

Sta. 489+85 - In Place
24" x 24' R.C. Pipe Culvert
REMOVE & Construct
30"x42' R.C. Pipe Culvert

Sta. 491+00 Install
C.M. Arch Pipe Culvert 24' Long
Waterway 1.5 Sq. Ft.
Lt. Side Drain
Construct Approach
= 20 Cu. Yds.

STA. 472+70 - 5'x5'x
STA. 475+78 - Dbl. 7'x7'
STA. 484+09 - Dbl. 8'x7'
} D.A. 2.353 Acres C=0.7

Sta. 489+20 Construct
Approach on Lt.
= 20 Cu. Yds.

Δ = 13°15' Lt.
D = 2°30'
T = 266.2'
L = 530.0'

Δ = 45° 10' Lt.
D = 6° 00'
T = 397.2'
L = 752.8'

Open Pasture
Brush
Scattered Trees & Brush
Meadow
Open Field
pasture
Hedge
Fences
Construction Easement

P.I. 467+23.7
P.C. 465+59.1
P.T. 468+87.4
P.C. 470+72.0
P.C. 476+10.7
P.I. 478+17.9
P.T. 481+37.4
P.C. 488+19.8
P.I. 492+17.0

T-8-S
R-21-W

Δ = 9° 51' Rt.
D = 3°00'
T = 164.6'
L = 328.3'

Sta. 465+40 Construct
40' R. Turnouts Rt. & Lt.
= 100 Cu. Yds.

Sta. 467+68 Construct
Swale Ditch Approach
on Rt.

Sta. 472+70 - In Place
5'x5'x 40' R.C. Box Culvert
(45° Rt. Fwd. Skew)
RETAIN & Extend
24' Rt. & 17' Lt. to a Completed
Length of 81 Lin. Ft.
Clean Inlet & Outlet = 50 Cu. Yds.

Sta. 478+20 Install
C.M. Arch Pipe Culvt 30' Long
Waterway 1.5 Sq. Ft.
Rt. Side Drain
Construct Approach
= 50 Cu. Yds.

Sta. 484+09 - In Place
Dbl. 8'x 7'x 26' R.C. Box Culvert
(15° Rt. Fwd. Skew)
RETAIN & Extend (With Straight Barrel)
5' Rt. & 5' Lt. to a Completed
Length of 36 Lin. Ft.
Clean Inlet & Outlet = 150 Cu. Yd.

Sta. 484 Construct
Approach on Rt.
= 20 Cu. Yds.

'NBC' Top F. Post
'NBC' P. Pole
'NBC' Top F. Post
'NBC' Top F. Post

Clearing 0.05 Acres
Grubbing 0.05 Acres

Clearing 0.31 Acres
Grubbing 0.31 Acres

Clearing 0.03 Acres
Grubbing 0.03 Acres

Clearing 2.15 Acres
Grubbing 0.15 Acres

	STA. 468+00.0	STA. 491+00.0
Unclassified Excavation	(Normal)	3664 Cu. Yds.
Unclassified Excavation	(Outlets, Etc.)	55 Cu. Yds.
Embankment Material		5812 Cu. Yds.
Embankment 120%		9476 Cu. Yds.
Special Compaction of Earthwork		9476 Cu. Yds.

PROFILE

0.0%
-8.24%
+1.52%
0.0%
10.50% Rt & Lt Dr. Gr.
-0.50% Rt & Lt Dr. Gr.
300' V.C.
300' V.C.
300' V.C.

+0.10% Lt. D.B.
-0.50% Lt. D.B.
-0.60% Rt. D.B.
+1.00% Lt. D.B.
+0.60% Rt. D.B.

F.L. 217.6
F.L. 218.2
F.L. 206.4
F.L. 204.0
F.L. 204.1
F.L. 213.60

219.00 Rt & Lt
217.80 Rt
218.00 Lt
220.00 Lt
218.80 Rt
208.00 Rt & Lt
210.00 Rt & Lt
208.25 Rt & Lt

221.00
230
220
210
221.41
220.56
215.00
213.84
213.00
213.57

B.M. - N.S. 24" Pine 65' Rt.
Sta. 464+80 Elev. 218.75

T.B.M. - North End of East Hdwl. 12' Rt.
Sta. 475+86 - Elev. 212.37

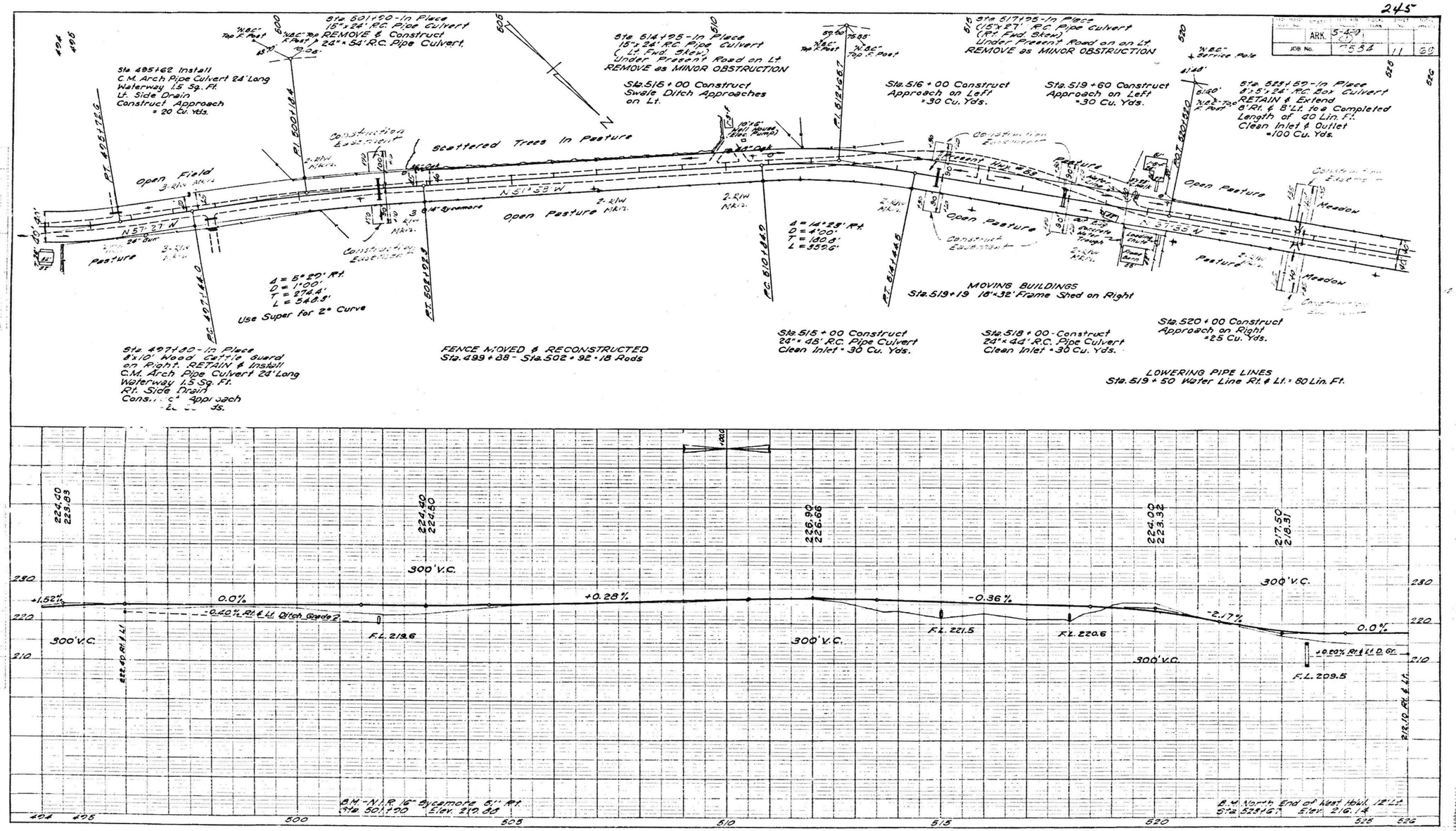
462 465 470 475 480 485 490 494

R070265.DGN 4/25/2018

PLAN AND PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY

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.		070265	35	37
				(2) PLAN AND PROFILE SHEETS				



PLAN AND PROFILE SHEETS

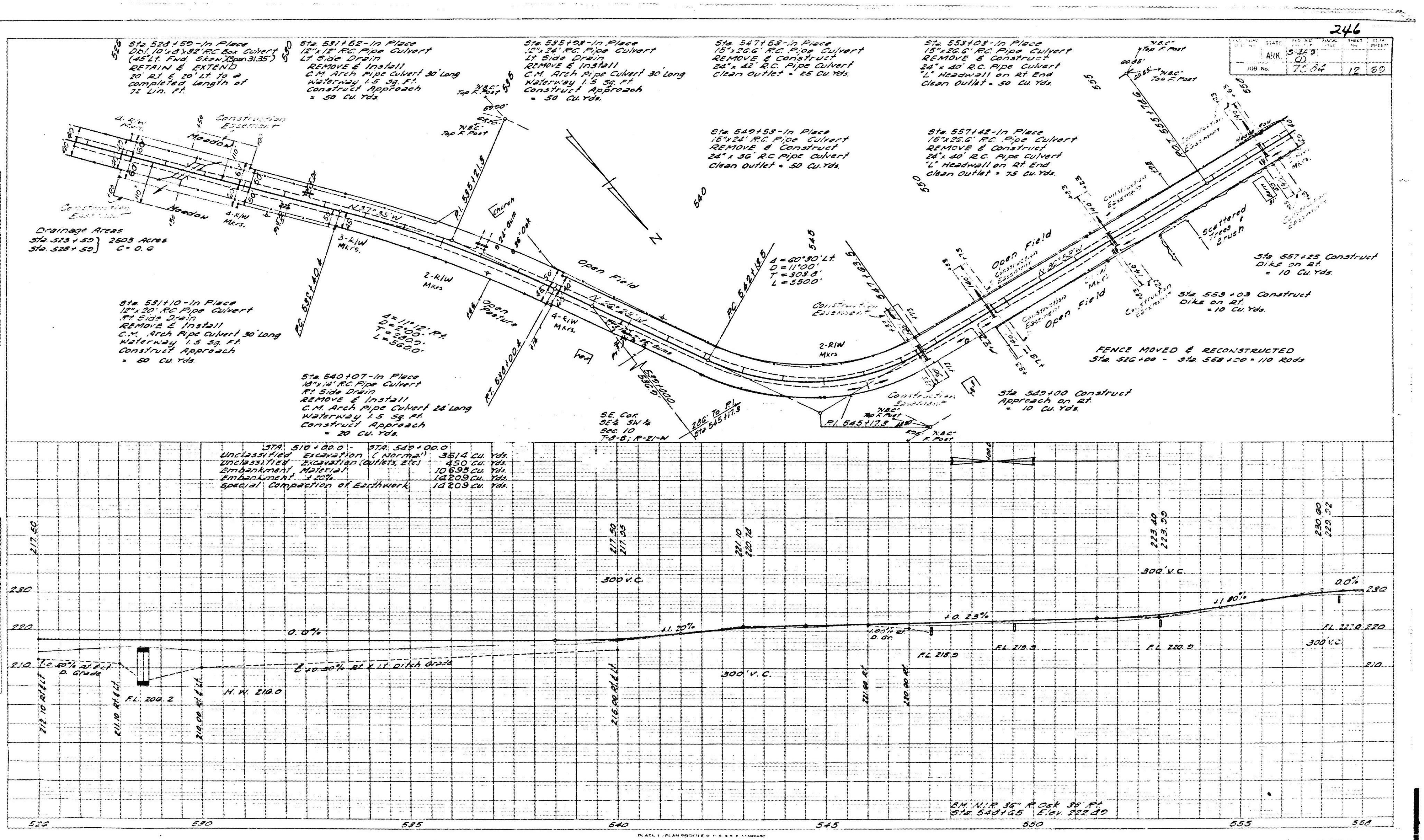
4/25/2018

R070265.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.		070265	36	37

(2) PLAN AND PROFILE SHEETS

FOR INFORMATION ONLY



246
Sta. 526+59 - In Place Dbl. 10'x8'x32' R.C. Box Culvert (45° Lt. Fwd. Skew)(Span 31.35') RETAIN & EXTEND 20' Rt. & 20' Lt. to a completed length of 72 Lin. Ft.
Sta. 531+62 - In Place 12"x12" R.C. Pipe Culvert Lt. Side Drain REMOVE & Install C.M. Arch Pipe Culvert 30' Long Waterway 1.5 Sq. Ft. Construct Approach = 50 Cu. Yds.
Sta. 535+98 - In Place 12"x24" R.C. Pipe Culvert Lt. Side Drain REMOVE & Install C.M. Arch Pipe Culvert 30' Long Waterway 1.5 Sq. Ft. Construct Approach = 50 Cu. Yds.
Sta. 547+68 - In Place 15"x26.6' R.C. Pipe Culvert REMOVE & Construct 24"x42' R.C. Pipe Culvert Clean outlet = 25 Cu. Yds.
Sta. 553+03 - In Place 15"x26.6' R.C. Pipe Culvert REMOVE & Construct 24"x40' R.C. Pipe Culvert "L" Headwall on Rt. End Clean Outlet = 50 Cu. Yds.
Sta. 549+59 - In Place 15"x24' R.C. Pipe Culvert REMOVE & Construct 24"x36' R.C. Pipe Culvert Clean outlet = 50 Cu. Yds.
Sta. 557+42 - In Place 15"x26.6' R.C. Pipe Culvert REMOVE & Construct 24"x40' R.C. Pipe Culvert "L" Headwall on Rt. End Clean outlet = 75 Cu. Yds.
Drainage Areas
Sta. 523+59 } 2503 Acres
Sta. 526+59 } C = 0.6
Sta. 531+10 - In Place 12"x20' R.C. Pipe Culvert Rt. Side Drain REMOVE & Install C.M. Arch Pipe Culvert 30' Long Waterway 1.5 Sq. Ft. Construct Approach = 50 Cu. Yds.
Sta. 540+07 - In Place 18"x4' R.C. Pipe Culvert Rt. Side Drain REMOVE & Install C.M. Arch Pipe Culvert 24' Long Waterway 1.5 Sq. Ft. Construct Approach = 20 Cu. Yds.
Δ = 11°12' Rt. D = 2°00' T = 280.0' L = 560.0'
Δ = 60°30' Lt. D = 11°00' T = 303.6' L = 550.0'
Open Field
Open Pasture
Meadow
Church
Scattered Trees & Brush
Sta. 557+25 Construct Dike on Rt. = 10 Cu. Yds.
Sta. 553+03 Construct Dike on Rt. = 10 Cu. Yds.
FENCE MOVED & RECONSTRUCTED Sta. 526+00 - Sta. 568+00 = 110 Rods
Sta. 549+00 Construct Approach on Rt. = 10 Cu. Yds.
SE. Cor. SE¼ SW¼ Sec. 10 T-8-S; R-21-W
P.I. 545+17.3
STA. 510+00.0 - STA. 540+00.0
Unclassified Excavation (Normal) 3514 Cu. Yds.
Unclassified Excavation (outlets, etc.) 450 Cu. Yds.
Embankment Material 10695 Cu. Yds.
Embankment + 20% 14209 Cu. Yds.
Special Compaction of Earthwork 14209 Cu. Yds.
300' V.C.
0.0%
+1.20%
+0.23%
+1.80%
F.L. 208.2
H.W. 218.0
F.L. 218.9
F.L. 219.3
F.L. 220.9
F.L. 227.0
BM: N.I.P. 36" R. Oak 39' Rt. Sta. 548+65 Elev. 222.89
526 530 535 540 545 550 555 558

4/25/2018

R070265.DGN

PLAN AND PROFILE SHEETS

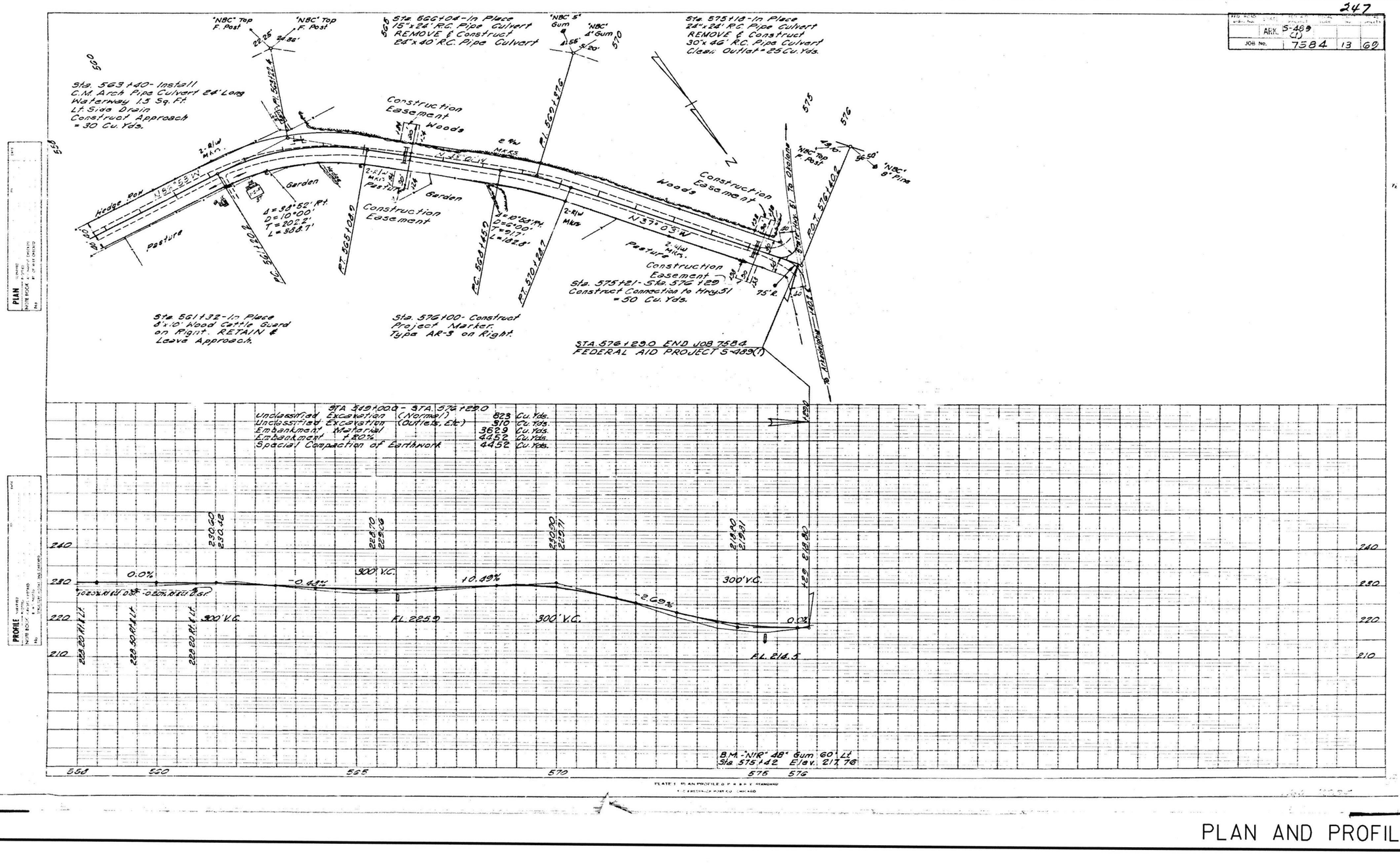
FOR INFORMATION ONLY

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.		070265	37	37

(2) PLAN AND PROFILE SHEETS

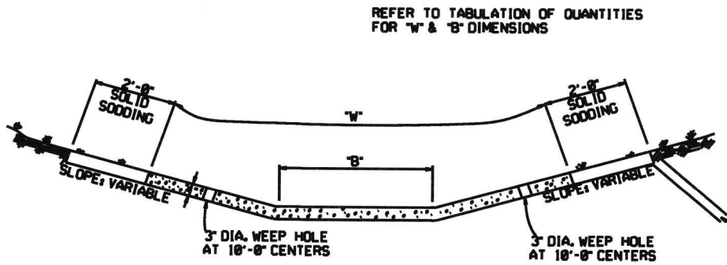
247

ARK.	S-489 (1)		
JOB No.	7584	13	69

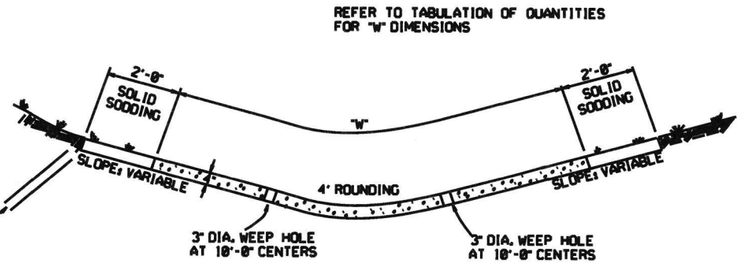


4/25/2018

R070265.DGN

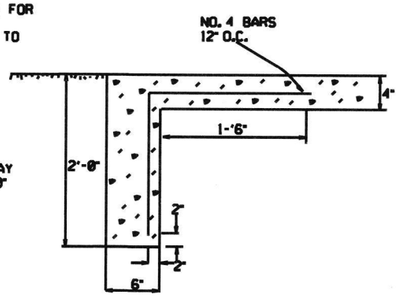


TYPE A

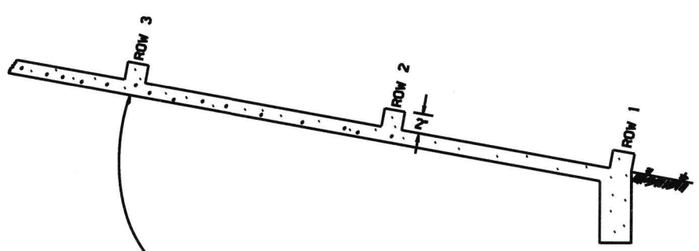


TYPE B

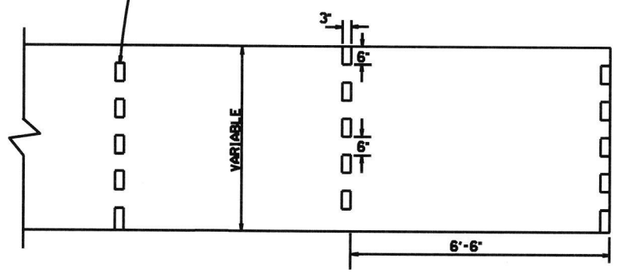
THE STEEL AND ADDITIONAL CONCRETE FOR THE WALLS SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED TO BE INCLUDED IN THE PRICE BID FOR "CONCRETE DITCH PAVING."



TOE WALL DETAIL FOR CONCRETE DITCH PAVING



ENERGY DISSIPATORS TO BE USED FOR THE ENTIRE LENGTH OF DITCH WHEN SLOPE OF DITCH PAVING EXCEEDS 7%. THE DISSIPATORS WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED TO BE INCLUDED IN THE PRICE BID FOR CONCRETE DITCH PAVING.



ENERGY DISSIPATORS
(NO SCALE)

GENERAL NOTES:

THE FULL WIDTH OF EACH SECTION SHALL BE POURED MONOLITHICALLY.

TOE WALLS TO BE CONSTRUCTED FULL WIDTH AT EACH END OF DITCH PAVING, AND POURED MONOLITHICALLY.

SOLID SOD ALONG DITCH PAVING TO BE PLACED WITHIN 14 DAYS OF DITCH PAVING CONSTRUCTION.

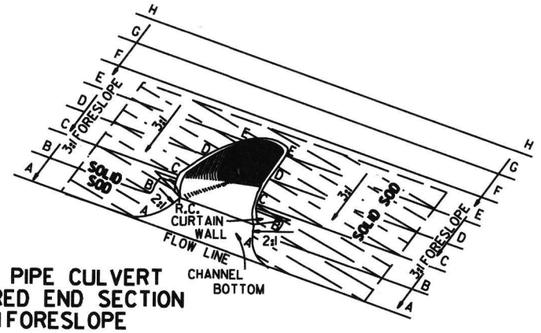
1" WIDE TRANSVERSE EXPANSION JOINTS SHALL BE PLACED IN CONCRETE DITCH PAVING AT 45' INTERVALS. THE SPACE SHALL BE FILLED WITH APPROVED JOINT FILLER COMPLYING WITH AASHTO M213.

DATE	REVISION	DATE FILM'D
12-8-16	CORRECTED ENERGY DISSIPATOR DRAWING AND NOTE	
11-17-10	ADDED GENERAL NOTE	
6-2-94	ADDED GENERAL NOTE ABOUT SOLID SODDING	
11-30-8	ELIMINATED MIN. ROWS OF ELEMENTS	111-30-89
7-15-88	REVISED DISSIPATOR NOTE	653-7-15-88
4-3-87	REVISED ENERGY DISSIPATOR	671-4-3-87
1-9-87	MODIFIED NOTE ON ENERGY DISS.	632-1-9-87
11-3-86	ADDED NOTE TO ENERGY DISS.	595-12-1-86
11-1-84	ENERGY DISSIPATOR DETAILS ADDED	508-11-1-84
11-1-84	EXCAVATION DETAILS ADDED TYPED A & B	
10-2-72	REVISED AND REDRAWN	508-10-2-72

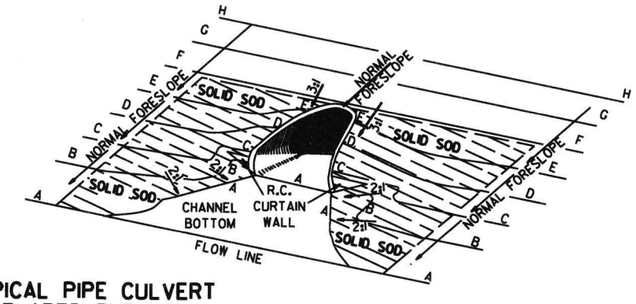
ARKANSAS STATE HIGHWAY COMMISSION

CONCRETE DITCH PAVING

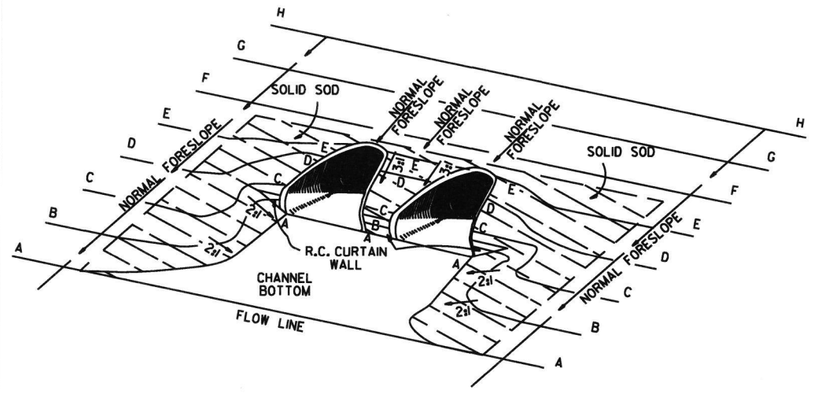
STANDARD DRAWING CDP-1



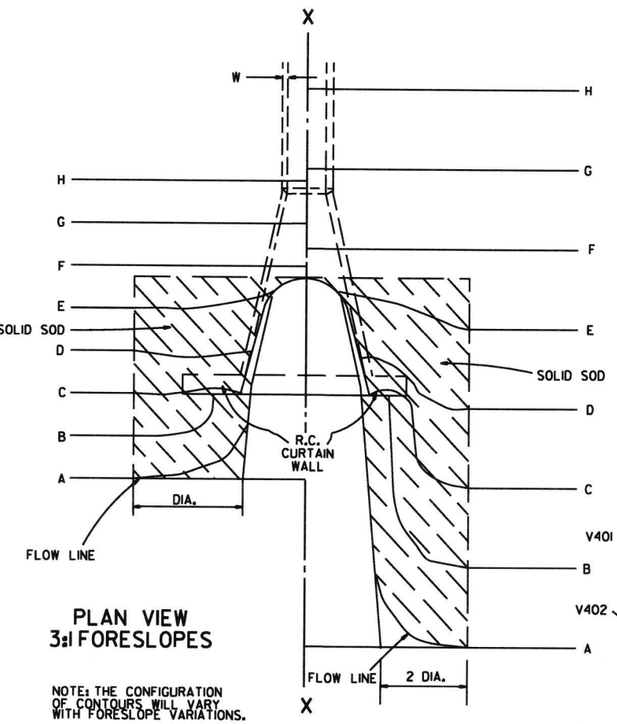
TYPICAL PIPE CULVERT
WITH FLARED END SECTION
& 3:1 FORESLOPE



TYPICAL PIPE CULVERT
WITH FLARED END SECTION
& FLATTENED ADJACENT SLOPES



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



PLAN VIEW
3:1 FORESLOPES

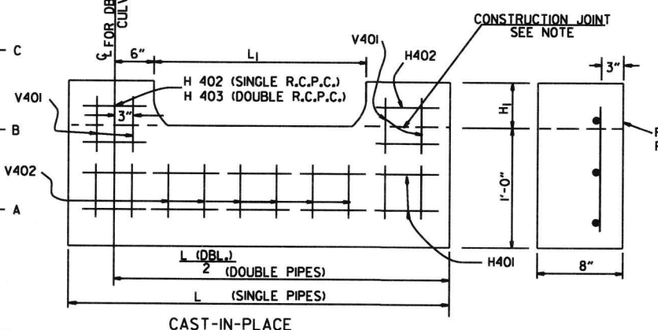
NOTE: THE CONFIGURATION OF CONTOURS WILL VARY WITH FORESLOPE VARIATIONS.

PLAN VIEW
FLATTENED FORESLOPES

R.C. CURTAIN WALL
DIMENSIONS & QUANTITIES

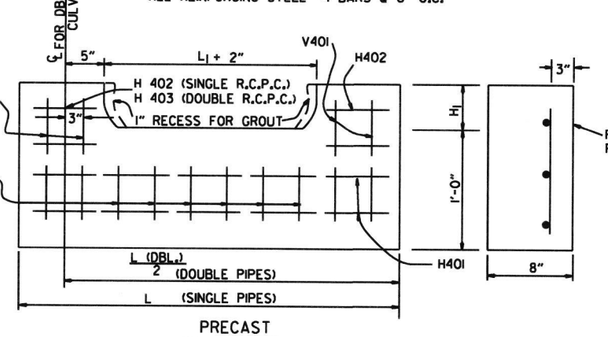
PIPE DIA.	H_1	L_1	L	L (DBL.)/2	SINGLE R.C.P.C.		DOUBLE R.C.P.C.	
					CONC.	REINF. STEEL	CONC.	REINF. STEEL
					CU. YDS.	LBS.	CU. YDS.	LBS.
18"	11½"	3'-5"	8'-0"	6'-3"	0.31	27.7	0.45	39.5
24"	1'-0½"	4'-6"	9'-6"	7'-6"	0.37	33.4	0.53	48.0
30"	1'-3½"	5'-7"	11'-0"	9'-0"	0.45	39.0	0.67	59.0
36"	1'-7"	6'-8"	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.



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

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.
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.

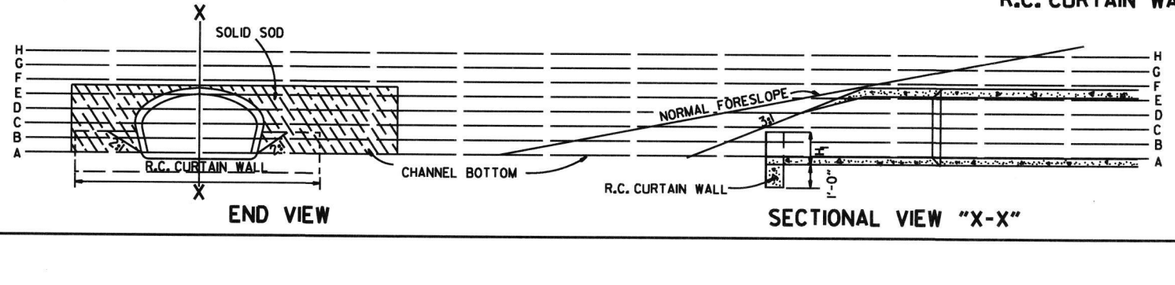
SOLID SODDING

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.

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.



END VIEW

SECTIONAL VIEW "X-X"

DATE	REVISION	FILMED
10-18-96	ADDED NOTE TO SOLID SODDING	
10-12-95	CORRECTED SPELLING	
11-1-94	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

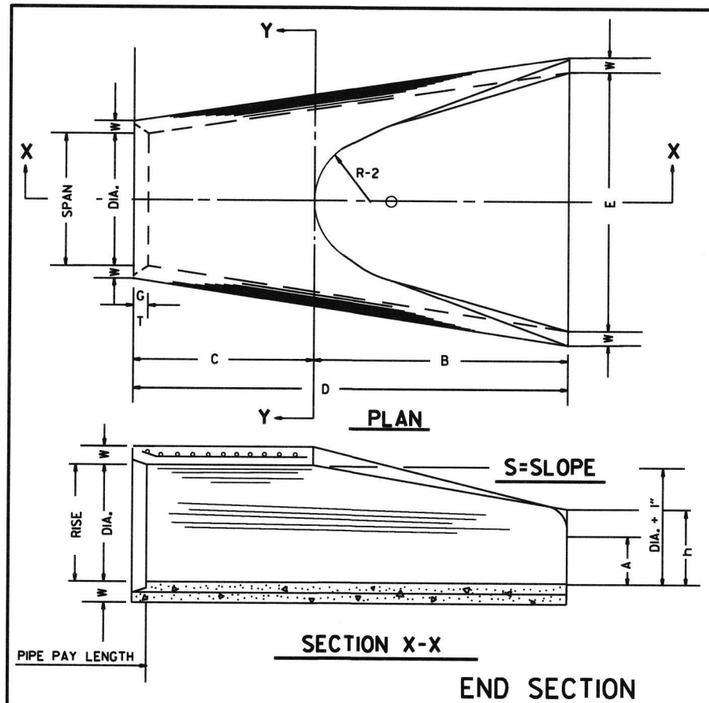
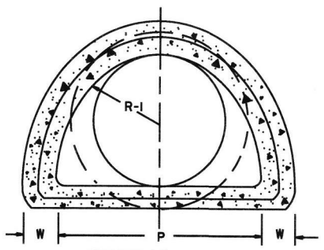
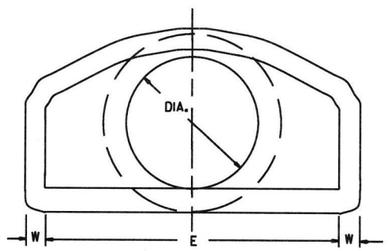


TABLE OF DIMENSIONS

DIA.	WALL	A	B	C	D	E	S	DIA. + I"	P	R-I	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"	33 3/16"	16 15/16"	14"	2½"	1600	1'-1½"
30"	3½"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"	3±1	31"	37"	18½"	15"	3¼"	1940	1'-4 5/8"
36"	4"	1'-3"	5'-3"	2'-10 1/4"	8'-1 1/4"	6'-0"	3±1	37"	47 1/8"	24 5/8"	20"	3½"	4100	1'-8"
42"	4½"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	3±1	43"	53 1/8"	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"	33 1/8"	24"	4"	8750	2'-10½"
60"	6"	2'-10"	6'-6"	1'-10"	8'-4"	8'-0"	3±1	61"	72½"	36 11/16"	24"	4"	9270	3'-5"
72"	7"	3'-10"	6'-6"	1'-10"	8'-4"	9'-0"	3±1	73"	77 11/16"	38 5/8"	24"	5"	13250	4'-6"



SECTION Y-Y



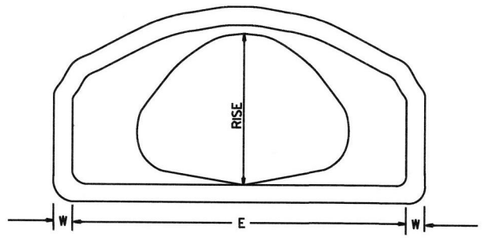
END VIEW

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

ARCH PIPE

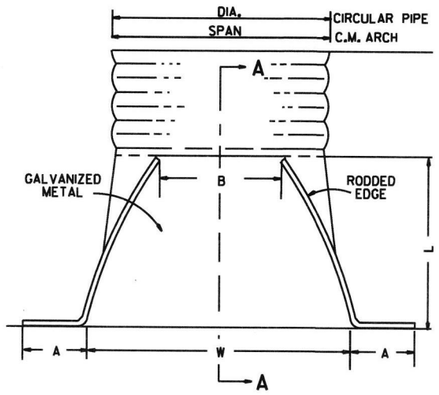
EQUIV. DIA.	• SPAN AASHTO M 206	• SPAN AHD NOMINAL	• RISE AASHTO M 206	• RISE AHD NOMINAL	W	A	B	C	D	E	P	R2	G-T	S
	INCHES													
15	18	18	11	11	2"	4"	2'-0"	4'-0"	6'-0"	3'-0"	29"	12"	1½"	2 1/2±1
18	22	22	13½	14	2½"	5"	2'-0"	4'-1"	6'-1"	3'-6"	32 1/8"	13"	2½"	2 1/2±1
21	26	26	15½	16	2¾"	7"	2'-3"	3'-10"	6'-1"	4'-0"	34 1/8"	14"	2½"	2 1/2±1
24	28½	29	18	18	3"	9"	2'-3"	3'-10"	6'-1"	5'-0"	36 15/16"	15"	2½"	2 1/2±1
30	36¼	36	22½	23	3½"	10"	3'-1"	3'-0½"	6'-1½"	6'-0"	47 15/16"	20"	3"	2 1/2±1
36	43¾	44	26 5/8	27	4"	10½"	4'-0"	2'-1½"	6'-1½"	6'-6"	54 15/16"	22"	3½"	2 1/2±1
42	51 1/8	51	31 5/16	31	4½"	11½"	4'-7"	1-10¼"	6'-5¼"	7'-2"	59½"	23"	3¾"	2 1/2±1
48	58½	59	36	36	5"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	7'-10"	70 7/16"	24"	4¼"	2 1/2±1
54	65	65	40	40	5½"	1'-7"	5'-3"	2'-11"	8'-2"	8'-6"	72 7/16"	24"	4¾"	2 1/4±1
60	73	73	45	45	6"	1'-10"	5'-6"	2'-8"	8'-2"	9'-0"	77 15/16"	24"	5"	2 1/4±1

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

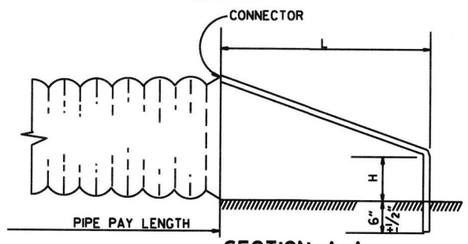


END VIEW
CONCRETE ARCH PIPE

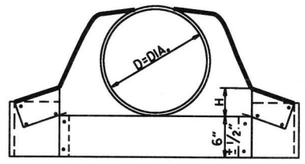
END SECTION FOR REINFORCED CONCRETE PIPE CULVERTS



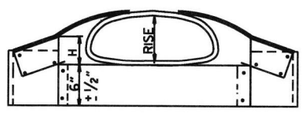
PLAN



SECTION A-A



CIRCULAR PIPE



C.M. ARCH PIPE

CIRCULAR PIPE

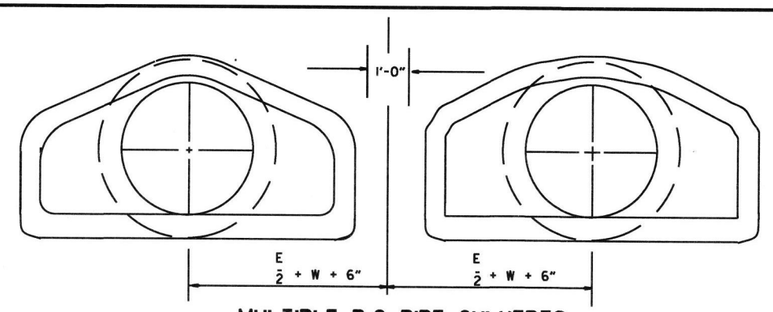
D. DIA.	GAUGE	A I" ±	B. MAX.	H I" ±	L 1½" ±	W 2" ±	S
		INCHES					
12	16	6	6	6	21	24	2 1/2±1
15	16	7	8	6	26	30	2 1/2±1
18	16	8	10	6	31	36	2 1/2±1
21	16	9	12	6	36	42	2 1/2±1
24	16	10	13	6	41	48	2 1/2±1
30	14	12	16	8	51	60	2 1/2±1
36	14	14	19	9	60	72	2 1/2±1
42	12	16	22	11	69	84	2 1/2±1
48	12	18	27	12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

C.M. ARCH PIPE

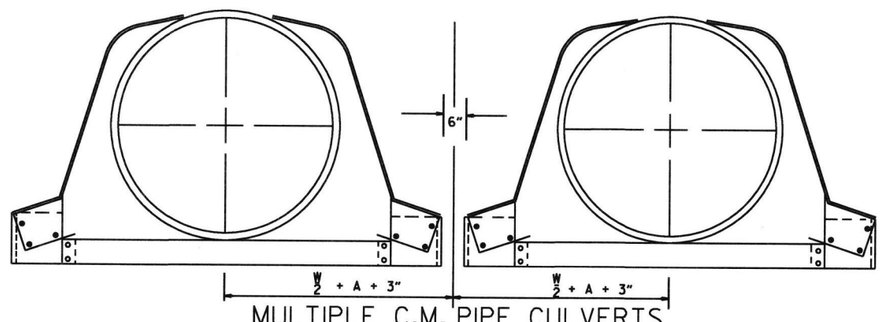
EQUIV. DIA.	SPAN	RISE	A I" ±	B MAX.	H I" ±	L 1½" ±	W 2" ±	S	GAUGE
	INCHES								
15"	17	13	7	9	6	19	30	2 1/2±1	16
18"	21	15	7	10	6	23	36	2 1/2±1	16
21"	24	18	8	12	6	28	42	2 1/2±1	16
24"	28	20	9	14	6	32	48	2 1/2±1	16
30"	35	24	10	16	6	39	60	2 1/2±1	14
36"	42	29	12	18	8	46	75	2 1/2±1	14
42"	49	33	13	21	9	53	85	2 1/2±1	12
48"	57	38	18	26	12	63	90	2 1/2±1	12
54"	64	43	18	30	12	70	102	2 1/4±1	12
60"	71	47	18	33	12	77	114	2 1/4±1	12

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

END SECTIONS FOR CORRUGATED METAL PIPE CULVERTS



MULTIPLE R.C. PIPE CULVERTS



MULTIPLE C.M. PIPE CULVERTS

DATE	REVISION	FILMED
10-18-96	REVISED ASTM REF. TO AASHTO	
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

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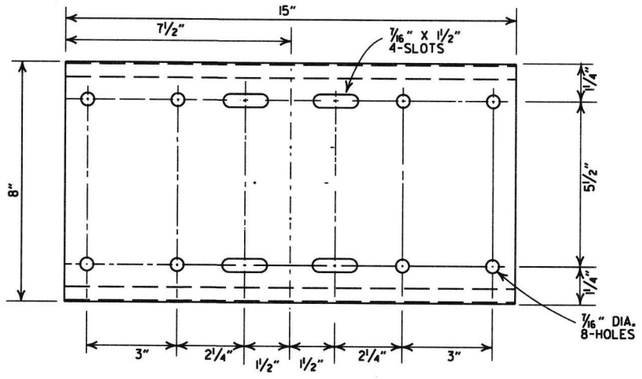
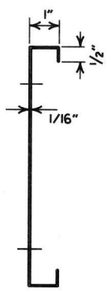
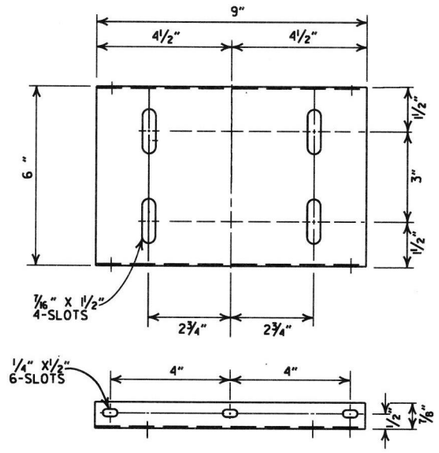
FLARED END SECTION

STANDARD DRAWING FES-2

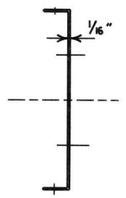


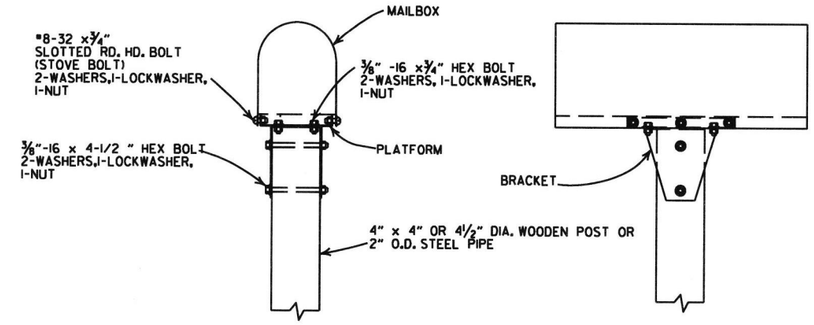
SHELF



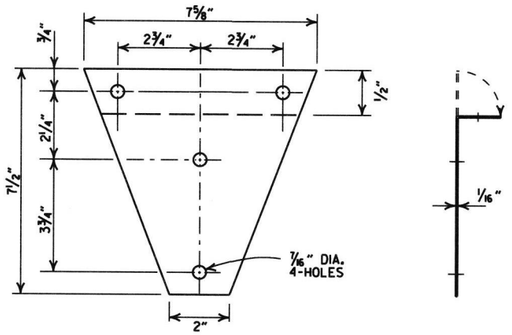


PLATFORM

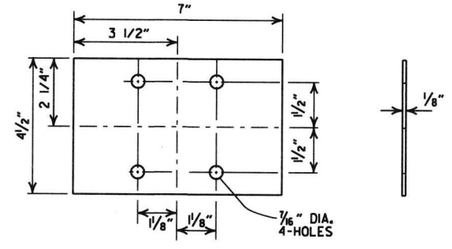




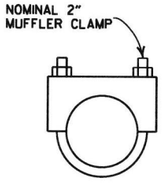
SINGLE INSTALLATION



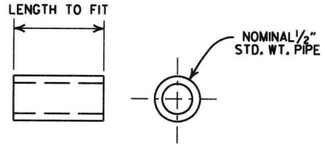
BRACKET



ANTI-TWIST PLATE



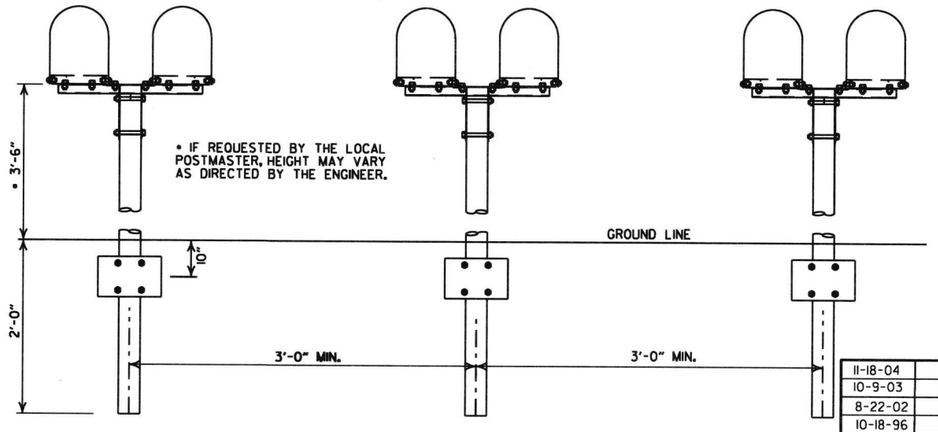
CLAMP



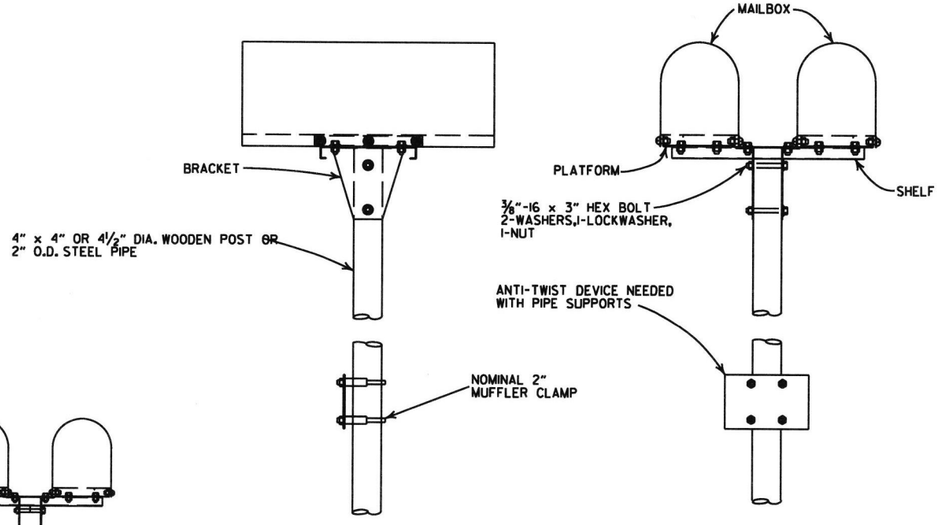
SPACER

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.



SPACING FOR MULTIPLE POST INSTALLATION



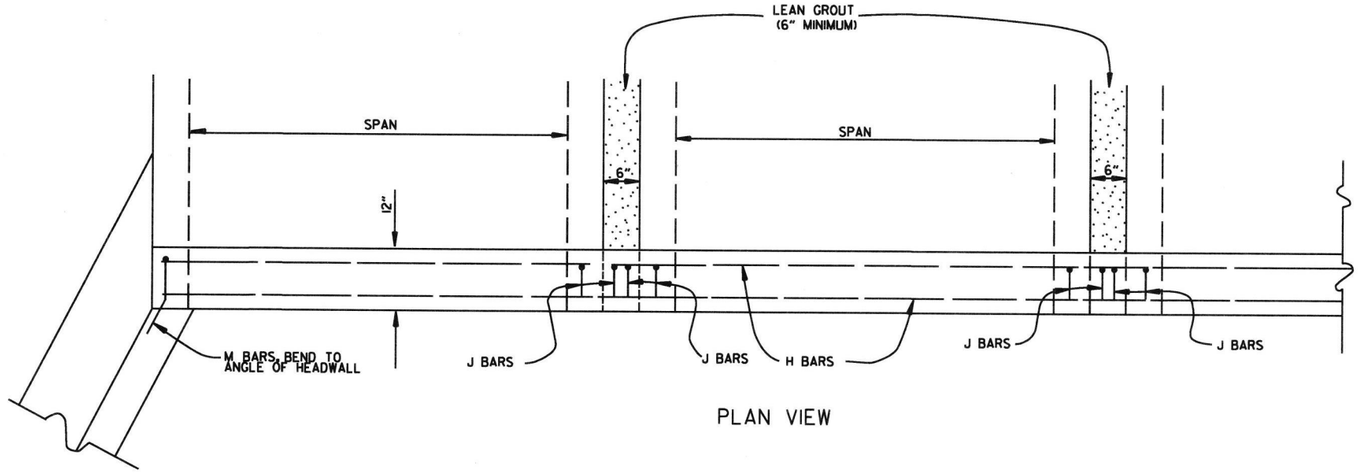
DOUBLE INSTALLATION

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	20-7-15-88	ISSUED

ARKANSAS STATE HIGHWAY COMMISSION

MAILBOX DETAILS

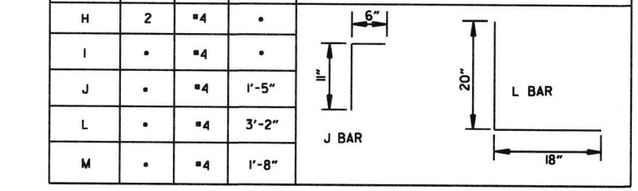
STANDARD DRAWING MB-1



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.

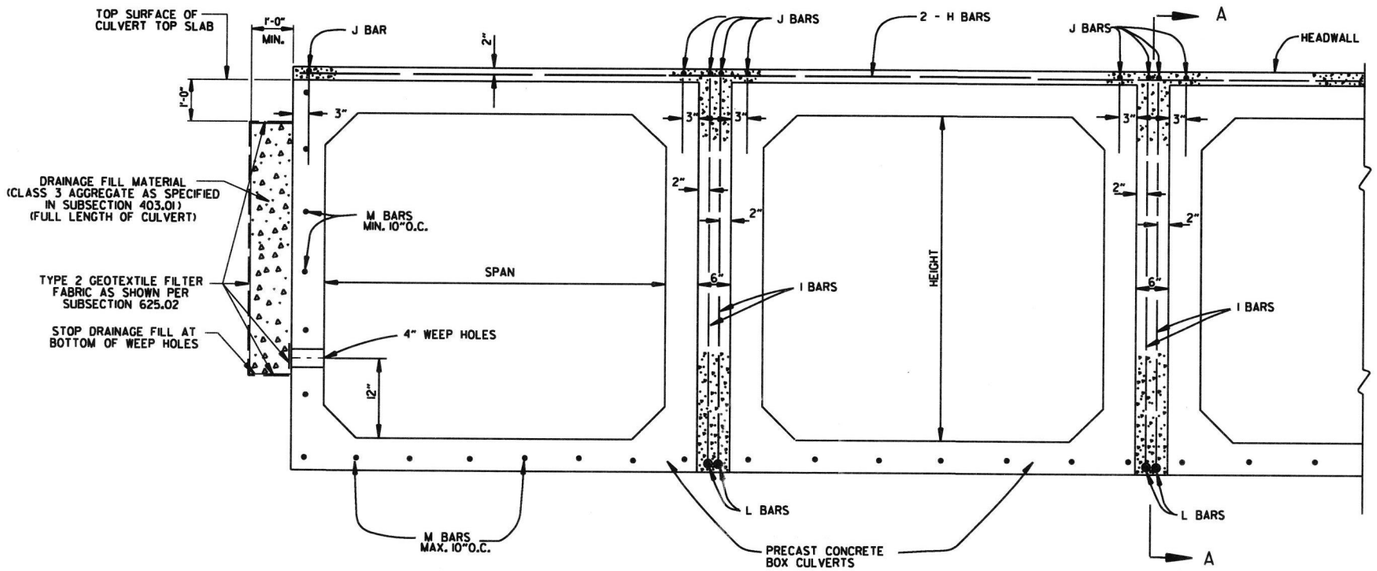
THE MEMBRANE WATERPROOFING WILL BE REQUIRED ON THE TOP EXTERNAL JOINT AND SHALL EXTEND 1 FOOT DOWN THE SIDES OF THE CULVERT.

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.

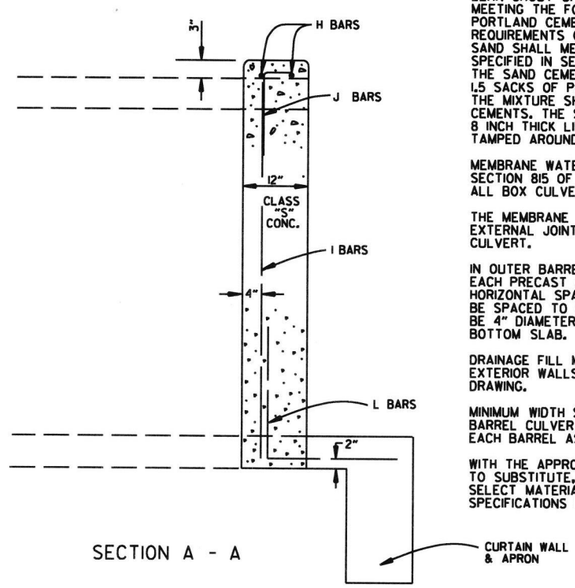
DRAINAGE FILL MATERIAL WITH GEOTEXTILE FABRIC IS REQUIRED AT THE EXTERIOR WALLS OF THE ASSEMBLED CULVERT, SEE DETAILS ON THIS DRAWING.

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.

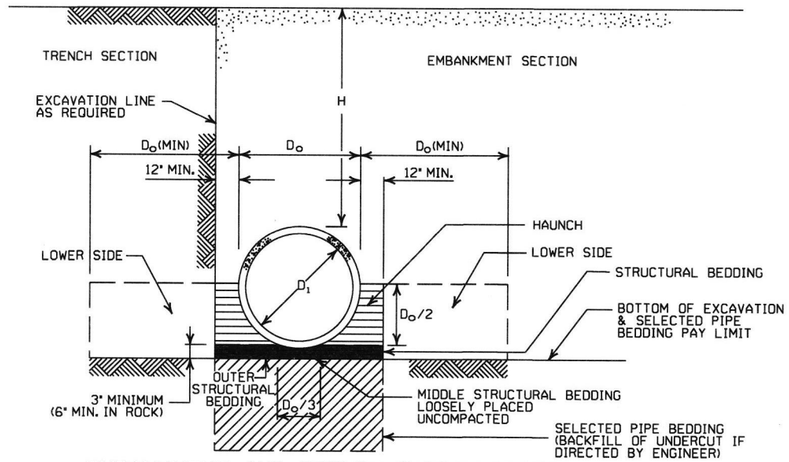
- LEGEND -

D_1 = 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.

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.

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."

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
		2⅔ 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

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

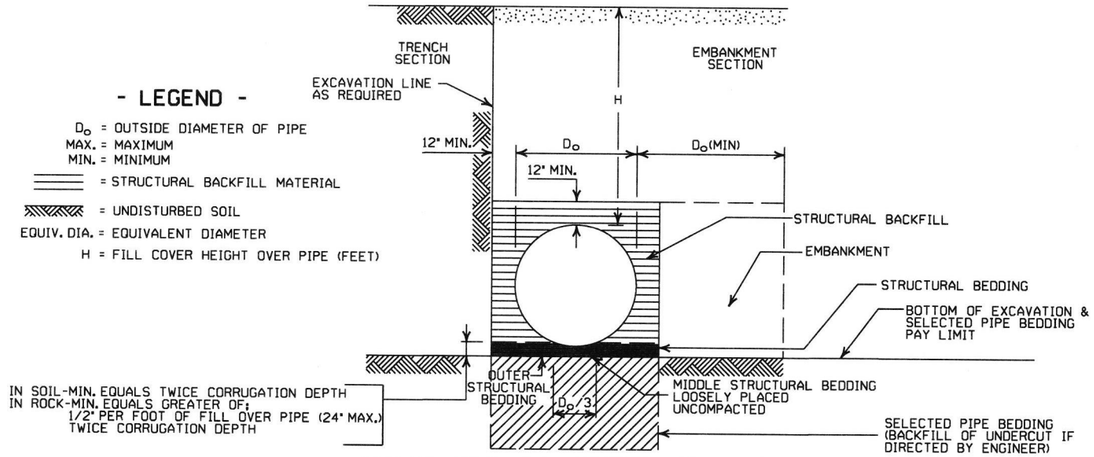
METAL THICKNESS IN INCHES			GAUGE NUMBER
STEEL		ALUMINUM	
ZINC COATED	UNCOATED		
0.064	0.0598	0.060	16
0.079	0.0747	0.075	14
0.109	0.1046	0.105	12
0.138	0.1345	0.135	10
0.168	0.1644	0.164	8

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.)	MAX. HEIGHT OF FILL, "H" (FT.)		MIN. THICKNESS REQUIRED INCHES	① MIN. HEIGHT OF FILL, "H" (FT.)	MAX. HEIGHT OF FILL, "H" (FT.)
				INSTALLATION	INSTALLATION			INSTALLATION	INSTALLATION
				TYPE 1	TYPE 1			TYPE 1	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		0.105	3	12
54	64x43	6	0.109	3	14		0.135	3	13
60	71x47	7	0.138	3	15		0.135	3	14
66	77x52	8	0.168	3	15		0.164	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		INSTALLATION			
				TYPE 2	TYPE 1	TYPE 2	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		

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.



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."

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

INSTALLATION TYPE	•• MATERIAL REQUIREMENTS FOR STRUCTURAL BACKFILL AND STRUCTURAL BEDDING
TYPE 2	•SELECTED MATERIALS (CLASS SM-1, SM-2 OR SM-4)

• AGGREGATE BASE COURSE (CLASS 4, 5, 6, OR 7) MAY BE USED IN LIEU OF SELECTED MATERIAL.

SM3 WILL NOT BE ALLOWED.

•• STRUCTURAL BEDDING MATERIAL SHALL HAVE A MAXIMUM PARTICLE SIZE OF 1INCH. STRUCTURAL BACKFILL MATERIAL SHALL BE FREE OF ORGANIC MATERIAL, STONES LARGER THAN 1.50 INCH IN GREATEST DIMENSION, OR FROZEN LUMPS.

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 HDPE PIPE.

MULTIPLE INSTALLATION OF HIGH DENSITY POLYETHYLENE PIPES

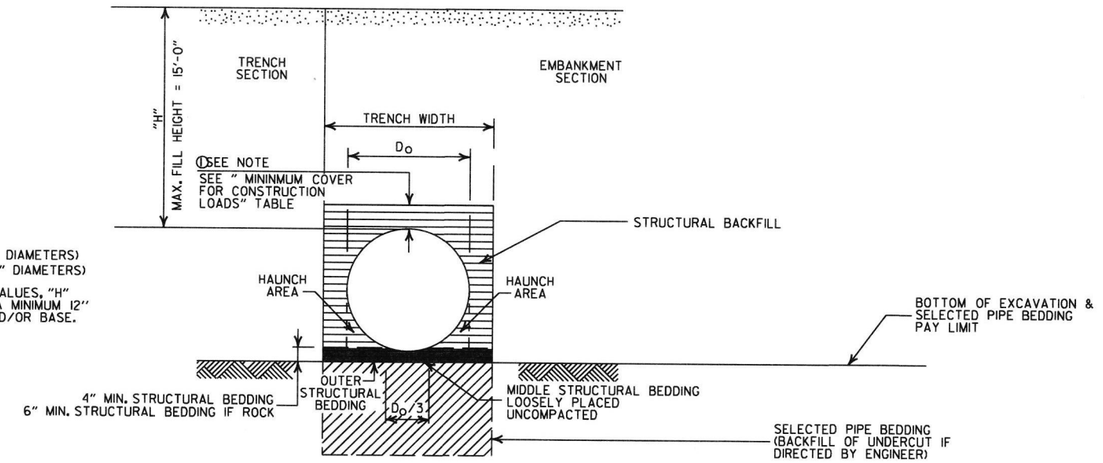
PIPE DIAMETER	CLEAR DISTANCE BETWEEN PIPES
18"	1'-6"
24"	2'-0"
30"	2'-6"
36"	3'-0"
42"	3'-6"
48"	4'-0"

MINIMUM TRENCH WIDTH BASED ON FILL HEIGHT "H"

PIPE DIAMETER	TRENCH WIDTH (FEET)	
	"H" < 10'-0"	"H" >OR= 10'-0"
18"	4'-6"	4'-6"
24"	5'-0"	6'-0"
30"	5'-6"	7'-6"
36"	6'-0"	9'-0"
42"	7'-0"	10'-6"
48"	8'-0"	12'-0"

①NOTE:
18" MIN. (18" - 30" DIAMETERS)
24" MIN. (36" - 48" DIAMETERS)

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



TYPE 2 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.

MINIMUM COVER FOR CONSTRUCTION LOADS

PIPE DIAMETER	② MIN. COVER (FEET) FOR INDICATED CONSTRUCTION LOADS			
	18.0-50.0 (KIPS)	50.0-75.0 (KIPS)	75.0-110.0 (KIPS)	110.0-175.0 (KIPS)
36" OR LESS	2'-0"	2'-6"	3'-0"	3'-0"
42" OR GREATER	3'-0"	3'-0"	3'-6"	4'-0"

②MINIMUM COVER SHALL BE MEASURED FROM TOP OF PIPE TO TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE. THE SURFACE SHALL BE MAINTAINED.

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. THE STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 8". THE LAYERS SHALL BE BROUGHT UP EVENLY AND SIMULTANEOUSLY TO THE ELEVATION OF THE MINIMUM COVER.
5. PIPE INSTALLATION MAY REQUIRE THE USE OF RESTRAINTS, WEIGHTING OR OTHER APPROVED METHODS IN ORDER TO HELP MAINTAIN GRADE AND ALIGNMENT.

GENERAL NOTES

1. PIPE SHALL CONFORM TO AASHTO M294, TYPE S. INSTALLATION SHALL CONFROM TO JOB SPECIAL PROVISION "PLASTIC PIPE" AND SECTION 606 OF THE STANDARD SPECIFICIATIONS FOR HIGHWAY CONSTRUCTION (CURRENT EDITION).
2. PLASTIC PIPE CULVERT DESIGN SHALL CONFORM TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION (2010) WITH 2010 INTERIMS.
3. THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE THE MINIMUM WIDTH PLUS A SUFFICIENT WIDTH TO ENSURE WORKING ROOM TO PROPERLY AND SAFELY PLACE AND COMPACT HAUNCHING AND OTHER BACKFILL MATERIAL.
4. 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.
5. 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."
6. 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 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."
7. FOR PIPE TYPES THAT ARE NOT SMOOTH ON THE OUTSIDE (CORRUGATED OR PROFILE WALLS), BACKFILL GRADATIONS SHOULD BE SELECTED THAT WILL PERMIT THE FILLING OF THE CORRUGATION OR PROFILE VALLEY.
8. HIGH DENSITY POLYETHYLENE PIPES OF DIAMETERS OTHER THAN SHOWN WILL NOT BE ALLOWED.
9. JOINTS FOR HDPE PIPE SHALL MEET THE REQUIREMENTS FOR SOIL TIGHTNESS AS SPECIFIED IN AASHTO SECTION 26.4.2.4 AND 30.4.2 "AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS." JOINTS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

- LEGEND -

H = FILL HEIGHT (FT.)
Ø = OUTSIDE DIAMETER OF PIPE
MAX. = MAXIMUM
MIN. = MINIMUM

= STRUCTURAL BACKFILL MATERIAL

= UNDISTURBED SOIL

DATE	REVISION	DATE FILMED
2-27-14	REVISED GENERAL NOTE 1.	
12-15-11	REVISED GENERAL NOTES & MINIMUM COVER NOTE	
11-17-10	ISSUED	

ARKANSAS STATE HIGHWAY COMMISSION

PLASTIC PIPE CULVERT (HIGH DENSITY POLYETHYLENE)

STANDARD DRAWING PCP-1

INSTALLATION TYPE	•• MATERIAL REQUIREMENTS FOR STRUCTURAL BACKFILL AND STRUCTURAL BEDDING
TYPE 2	•SELECTED MATERIALS (CLASS SM-1, SM-2, OR SM-4)

• AGGREGATE BASE COURSE (CLASS 4, 5, 6, OR 7) MAY BE USED IN LIEU OF SELECTED MATERIAL.

SM3 WILL NOT BE ALLOWED.

•• STRUCTURAL BEDDING MATERIAL SHALL HAVE A MAXIMUM PARTICLE SIZE OF 1INCH. STRUCTURAL BACKFILL MATERIAL SHALL BE FREE OF ORGANIC MATERIAL, STONES LARGER THAN 1.50 INCH IN GREATEST DIMENSION, OR FROZEN LUMPS.

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 PVC PIPE.

MINIMUM TRENCH WIDTH BASED ON FILL HEIGHT "H"

PIPE DIAMETER	TRENCH WIDTH (FEET)	
	"H" < 10'-0"	"H" >OR= 10'-0"
18"	4'-6"	4'-6"
24"	5'-0"	6'-0"
30"	5'-6"	7'-6"
36"	6'-0"	9'-0"

MULTIPLE INSTALLATION OF PVC PIPES

PIPE DIAMETER	CLEAR DISTANCE BETWEEN PIPES
18"	1'-6"
24"	2'-0"
30"	2'-6"
36"	3'-0"

MAXIMUM FILL HEIGHT BASED ON STRUCTURAL BACKFILL

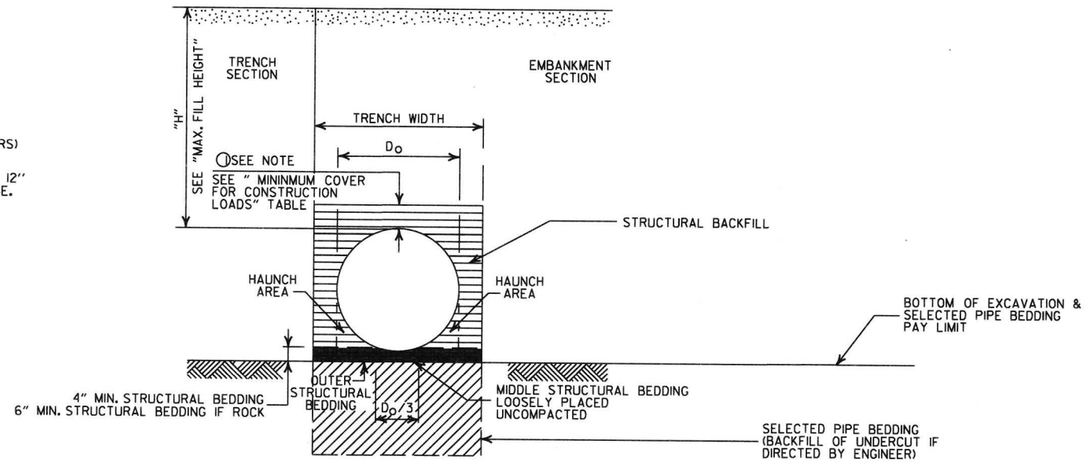
PIPE DIAMETER	"H"
18"	45'-0"
24"	45'-0"
30"	40'-0"
36"	40'-0"

① NOTE:
12" MIN. (18" - 36" DIAMETERS)
MINIMUM COVER VALUE, "H" SHALL INCLUDE A MINIMUM 12" OF PAVEMENT AND/OR BASE.

MINIMUM COVER FOR CONSTRUCTION LOADS

PIPE DIAMETER	② MIN. COVER (FEET) FOR INDICATED CONSTRUCTION LOADS			
	18.0-50.0 (KIPS)	50.0-75.0 (KIPS)	75.0-110.0 (KIPS)	110.0-175.0 (KIPS)
18" THRU 36"	2'-0"	2'-6"	3'-0"	3'-0"

②MINIMUM COVER SHALL BE MEASURED FROM TOP OF PIPE TO TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE. THE SURFACE SHALL BE MAINTAINED.



TYPE 2 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.

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. THE STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 8". THE LAYERS SHALL BE BROUGHT UP EVENLY AND SIMULTANEOUSLY TO THE ELEVATION OF THE MINIMUM COVER.
5. PIPE INSTALLATION MAY REQUIRE THE USE OF RESTRAINTS, WEIGHTING OR OTHER APPROVED METHODS IN ORDER TO HELP MAINTAIN GRADE AND ALIGNMENT.

GENERAL NOTES

1. PIPE SHALL CONFORM TO ASTM F949, CELL CLASS 12454. INSTALLATION SHALL CONFROM TO JOB SPECIAL PROVISION "PLASTIC PIPE" AND SECTION 606 OF THE STANDARD SPECIFICIATIONS FOR HIGHWAY CONSTRUCTION (CURRENT EDITION).
2. PLASTIC PIPE CULVERT DESIGN SHALL CONFORM TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION (2010) WITH 2010 INTERIMS.
3. THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE THE MINIMUM WIDTH PLUS A SUFFICIENT WIDTH TO ENSURE WORKING ROOM TO PROPERLY AND SAFELY PLACE AND COMPACT HAUNCHING AND OTHER BACKFILL MATERIAL.
4. 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.
5. 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."
6. 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 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."
7. FOR PIPE TYPES THAT ARE NOT SMOOTH ON THE OUTSIDE (CORRUGATED OR PROFILE WALLS), BACKFILL GRADATIONS SHOULD BE SELECTED THAT WILL PERMIT THE FILLING OF THE CORRUGATION OR PROFILE VALLEY.
8. PVC PIPES OF DIAMETERS OTHER THAN SHOWN WILL NOT BE ALLOWED.
9. JOINTS FOR PVC PIPE SHALL MEET THE REQUIREMENTS FOR SOIL TIGHTNESS AS SPECIFIED IN AASHTO SECTION 26.4.2.4 AND 30.4.2 "AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS." JOINTS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

- LEGEND -

H = FILL HEIGHT (FT.)
D_O = OUTSIDE DIAMETER OF PIPE
MAX. = MAXIMUM
MIN. = MINIMUM

= STRUCTURAL BACKFILL MATERIAL

= UNDISTURBED SOIL

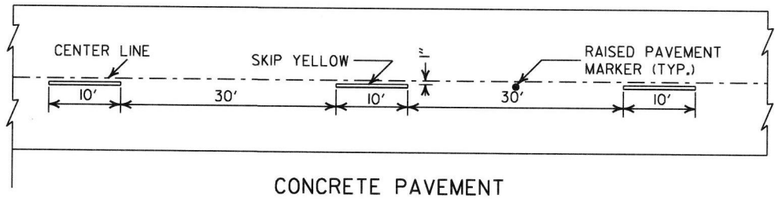
DATE	REVISION	DATE FILMED
2-27-14	REVISED GENERAL NOTE 1.	
12-15-11	REV GENERAL NOTES & MINIMUM COVER NOTE; DELETED SM3 MATERIAL	
11-17-10	ISSUED	

ARKANSAS STATE HIGHWAY COMMISSION

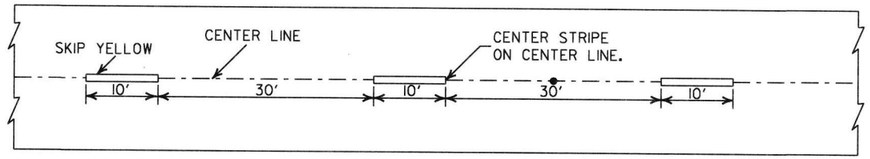
PLASTIC PIPE CULVERT (PVC F949)

STANDARD DRAWING PCP-2

NOTES:
1. REFER TO THE STRIPING DETAILS FOR PAVEMENT MARKING LINE WIDTHS.
2. THIS DRAWING SHALL BE USED IN CONJUNCTION WITH THE LATEST REVISED ADDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."
3. RAISED PAVEMENT MARKERS SHALL BE PLACED ON AN 80 FEET SPACING UNLESS OTHERWISE SHOWN IN THE PLANS.

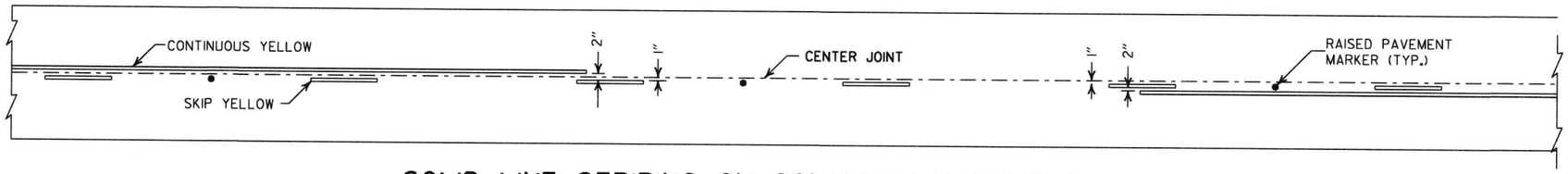


CONCRETE PAVEMENT

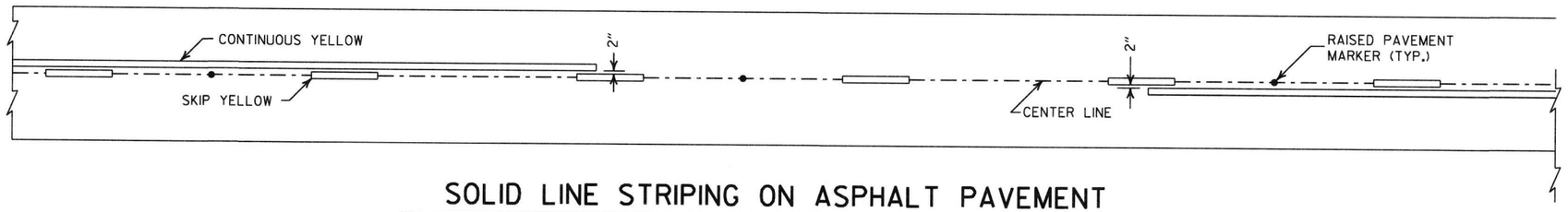


ASPHALT PAVEMENT

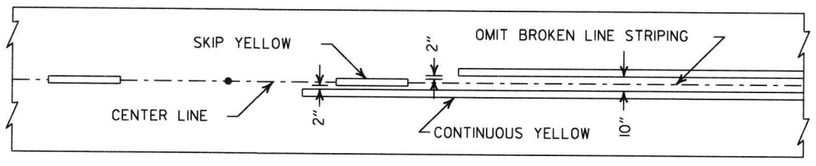
BROKEN LINE STRIPING



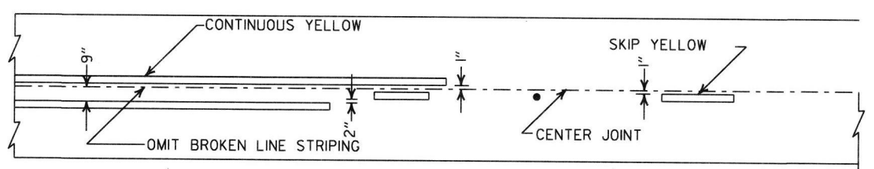
SOLID LINE STRIPING ON CONCRETE PAVEMENT



SOLID LINE STRIPING ON ASPHALT PAVEMENT

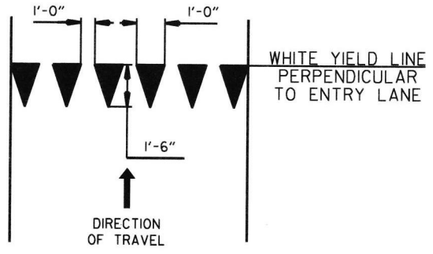


ASPHALT PAVEMENT

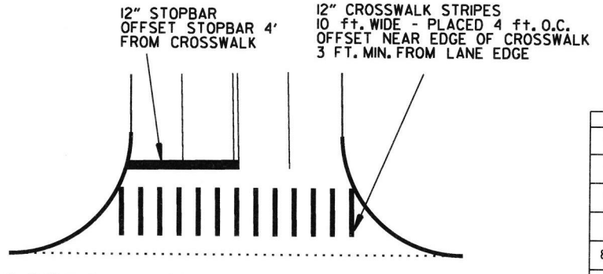


CONCRETE PAVEMENT

STRIPING AT ADJACENT NO PASSING LANES

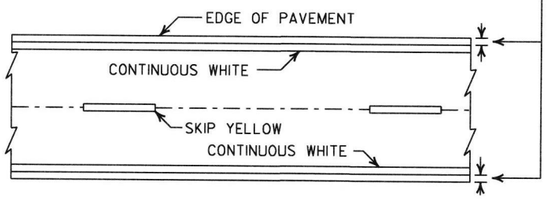


YIELD LINE DETAIL



CROSSWALK AND STOPBAR DETAILS

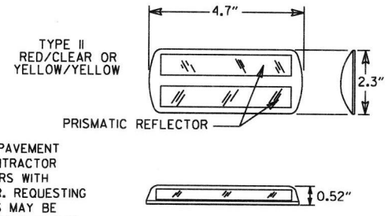
2" FOR ASPHALT OR CONCRETE PAVEMENT
6" FOR BITUMINOUS SURFACE TREATMENT



PAVEMENT EDGE LINE MARKING

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

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.



DETAIL OF STANDARD RAISED PAVEMENT MARKERS

DATE	REVISION	FILMED
6-1-17	ADDED YIELD LINE DETAIL	
5-12-16	REVISED LINE WIDTHS, SPACING, & NOTES	
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

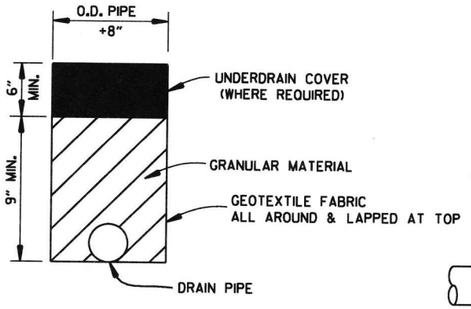
PAVEMENT MARKING DETAILS

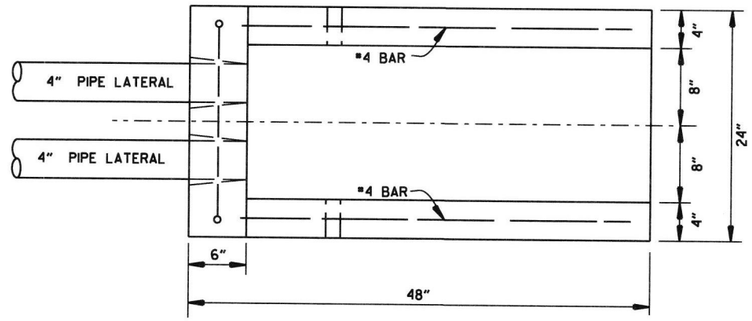
STANDARD DRAWING PM-1

NOTE:

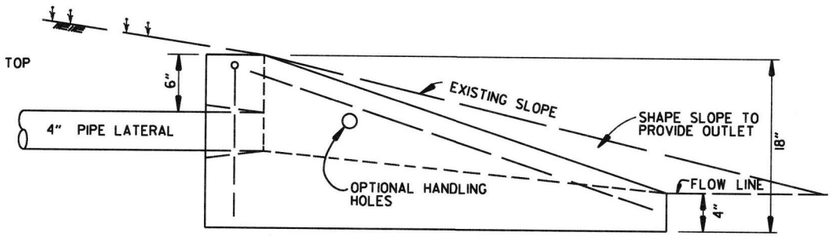
1. UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE UNDERDRAIN COVER SHALL BE THOROUGHLY COMPACTED EARTH AND SHALL BE SUBSIDIARY TO PIPE UNDERDRAIN.

2. GRANULAR MATERIAL SHALL BE WRAPPED WITH GEOTEXTILE FABRIC. LAP FABRIC 12" OR THE WIDTH OF THE TRENCH AT THE TOP.

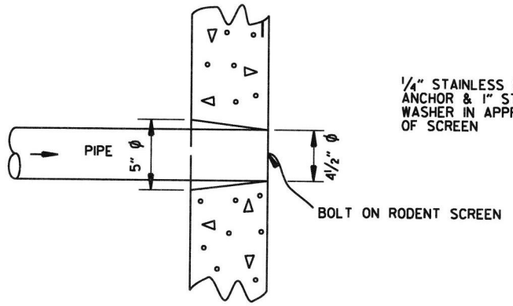




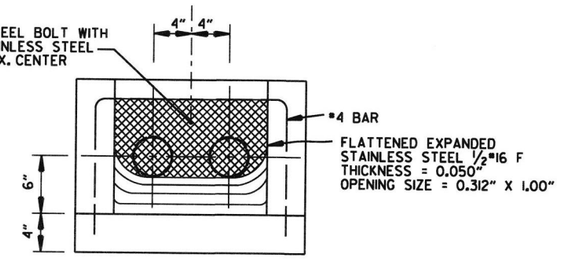
PLAN VIEW



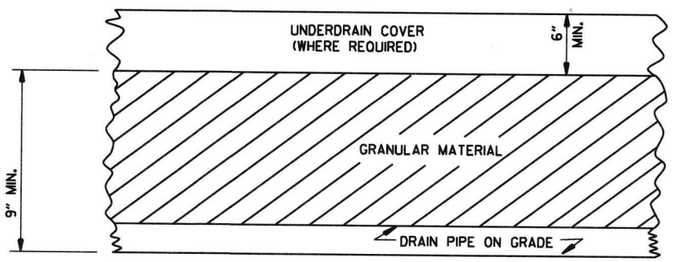
SIDE VIEW



DETAIL OF HOLE FOR 4" PIPE

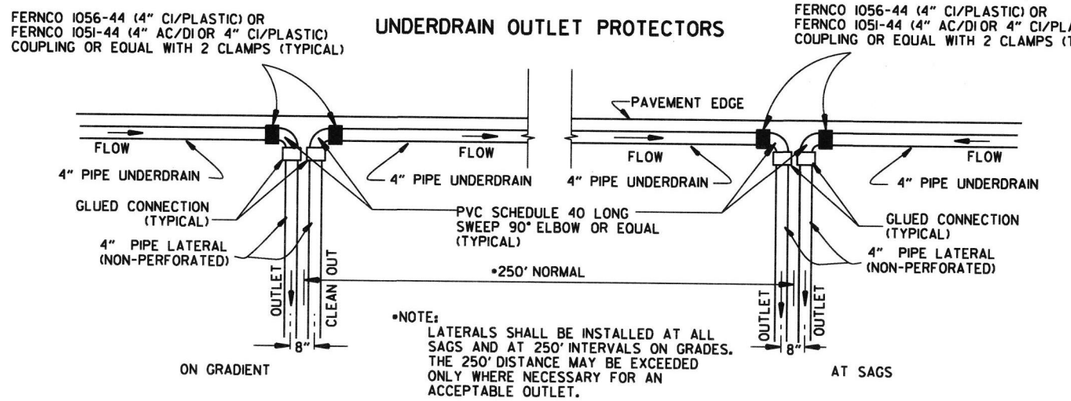


FRONT VIEW
(DETAIL OF RODENT SCREEN)



DETAILS OF PIPE UNDERDRAIN

UNDERDRAIN OUTLET PROTECTORS



DETAIL OF PIPE UNDERDRAIN LATERALS WHEN PLACED ALONG PAVEMENT EDGE

NOTE: PVC PIPE FOR LATERALS SHALL MEET THE REQUIREMENTS OF ASTM D 1785 (LATEST REVISION) FOR SCHEDULE 40 PIPE.

NOTES FOR PIPE UNDERDRAINS

1. GEOTEXTILE FABRIC SHALL MEET THE REQUIREMENTS OF SECTION 625 FOR TYPE I. PAYMENT FOR GEOTEXTILE FABRIC AND GRANULAR FILTER MATERIAL SHALL BE INCLUDED IN THE PRICE BID PER LIN. FT. FOR "4" PIPE UNDERDRAINS" IN ACCORDANCE WITH SECTION 611 OF THE STANDARD SPECIFICATIONS.

2. 4" NON-PERFORATED SCHEDULE 40 PVC PIPE LATERALS WITH OUTLET PROTECTORS SHALL BE INSTALLED AS SHOWN HEREON. LATERALS WILL BE MEASURED AND PAID FOR AS "4" PIPE UNDERDRAINS." UNDERDRAIN OUTLET PROTECTORS WILL BE MEASURED AND PAID FOR BY THE UNIT IN ACCORDANCE WITH SECTION 611 OF THE STANDARD SPECIFICATIONS.

3. EXISTING 4" PIPE UNDERDRAINS MAY BE CONNECTED TO PROPOSED DROP INLETS OR EXTENDED WHERE DIRECTED BY THE ENGINEER. PAYMENT FOR CONNECTING TO DROP INLETS SHALL BE CONSIDERED INCLUDED IN THE PRICE BID FOR "4" PIPE UNDERDRAINS."

4. THE LOCATION OF ALL LATERALS SHALL BE MARKED WITH 4" X 12" PERMANENT PAVEMENT MARKING TAPE (TYPE III WHITE) AT THE OUTSIDE EDGE OF THE SHOULDER, PLACED TRANSVERSE TO TRAFFIC. PAYMENT FOR THIS WORK SHALL BE INCLUDED IN THE PRICE BID FOR THE VARIOUS CONTRACT ITEMS.

5. PAYMENT FOR THE RODENT SCREEN SHALL BE INCLUDED IN THE PRICE BID PER EACH FOR "UNDERDRAIN OUTLET PROTECTORS."

6. ANY EXISTING UNDERDRAINS THAT INTERFERE WITH INSTALLATION OF THE NEW UNDERDRAIN SYSTEM SHALL BE REMOVED AND DISPOSED OF AS DIRECTED BY THE ENGINEER. PAYMENT WILL BE CONSIDERED INCLUDED IN THE PRICE BID FOR THE VARIOUS CONTRACT ITEMS. EXISTING UNDERDRAIN OUTLET PROTECTORS SHALL BE REMOVED UNDER THE ITEM "REMOVAL AND DISPOSAL OF UNDERDRAIN OUTLET PROTECTORS."

7. AT LOCATIONS WHERE A SINGLE LATERAL IS USED THE CONTRACTOR SHALL HAVE THE FOLLOWING OPTIONS: 1. INSTALL OUTLET PROTECTOR AS SHOWN ON STANDARD DRAWING PU-1 AND GROUT THE UNUSED HOLE OR 2. INSTALL AN OUTLET PROTECTOR WITH A SINGLE HOLE.

DATE	REVISION	DATE FILMED
12-8-16	ADDED NOTES FOR PIPE UNDERDRAINS, REVISED RODENT SCREEN DETAIL AND NOTES, REMOVED NOTE 1 FOR GRANULAR MATERIAL, ADDED NOTE FOR GEOTEXTILE FABRIC	
4-10-03	REVISED NOTE 3	
1-12-00	REVISED DETAIL OF UNDERDRAIN LATERALS	
11-18-98	REVISED NOTE	
10-18-96	REVISED MIN. DEPTH & GEOTEXTILE FABRIC	
4-26-96	ADDED LATERAL NOTE; 5½" TO 5"	
11-22-95	REVISED LATERALS	
7-20-95	REVISED LATERALS & ADDED NOTE	
11- 3-94	REVISED FOR DUAL LATERALS	11- 3-94
10- 1-92	SUBSTITUTED GEOTEXTILE	10- 1-92
8-15-91	ADDED POLYEDTHYLENE PIPE	8-15-91
11- 8-90	DELETED ALTERNATE NOTE	11- 8-90
1-25-90	ADDED 4" SNAP ADAPTER	1-25-90
11-30-89	DEL. (SUBGRADE); ADDED (WHERE REQUIRED)	11-30-89
7-15-88	ISSUED P.L.M.	647-7-15-88

ARKANSAS STATE HIGHWAY COMMISSION

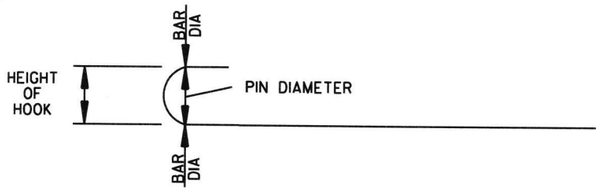
DETAILS OF PIPE UNDERDRAIN

STANDARD DRAWING PU-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

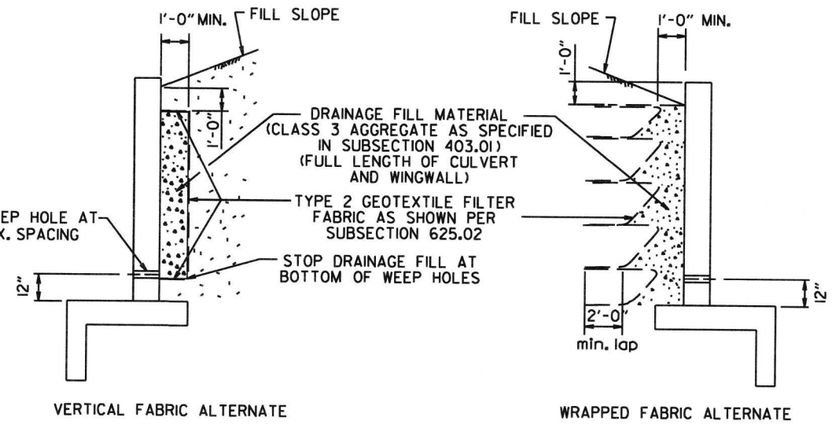
THE HOOKED BARS SHALL BE PLACED IN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOTTOM SLAB. THE STRAIGHT BARS SHALL BE PLACED IN THE TOP OF THE TOP SLAB AND THE BOTTOM OF THE BOTTOM SLAB. SEE TABLE BELOW FOR LENGTHS OF REPLACEMENT HOOKED AND STRAIGHT BARS.

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.

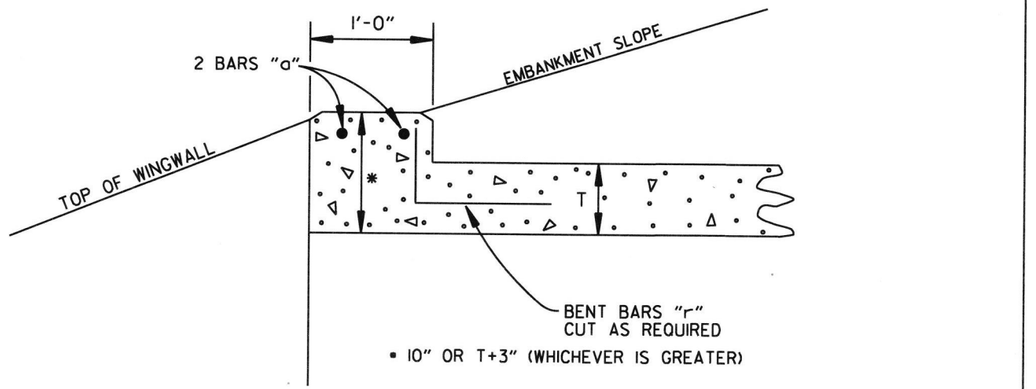
MEMBRANE WATERPROOFING SHALL BE APPLIED TO ALL CONSTRUCTION JOINTS IN THE TOP SLAB AND THE SIDEWALLS OF R.C. BOX CULVERTS AS DIRECTED BY THE ENGINEER. NO PAYMENT SHALL BE MADE FOR THIS ITEM, BUT PAYMENT WILL BE CONSIDERED TO BE INCLUDED IN THE VARIOUS ITEMS BID FOR THE R.C. BOX CULVERT.

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.

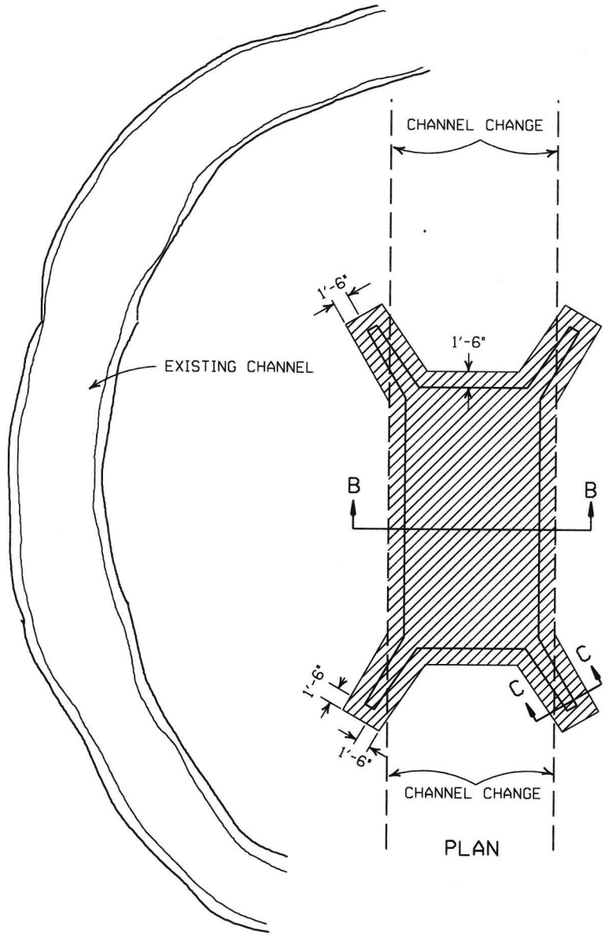
R.C. BOX CULVERT HEADWALL MODIFICATIONS

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

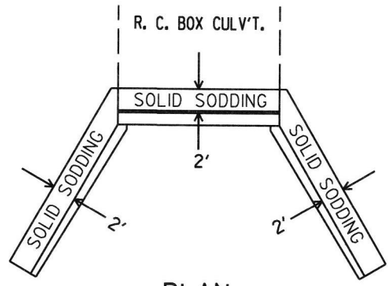
REINFORCED CONCRETE BOX CULVERT DETAILS

STANDARD DRAWING RCB-1



PLAN

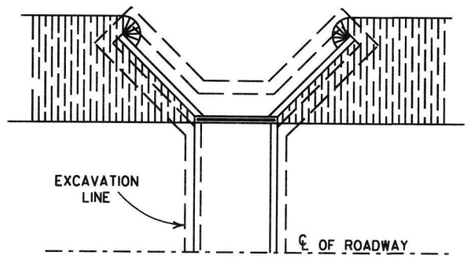
SOLID SODDING



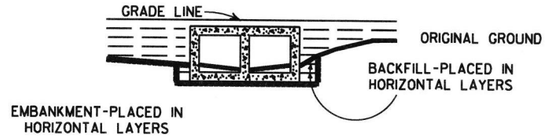
PLAN

PARTIAL SECTION SHOWING SOLID SODDING AT HEADWALLS AND WING WALLS

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

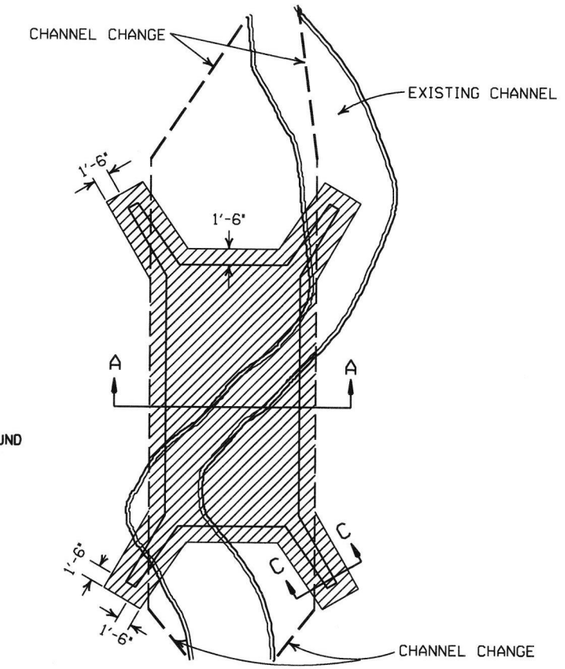


PLAN

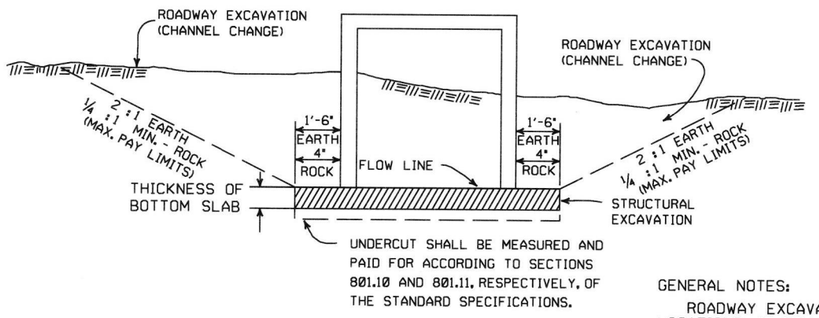


LONGITUDINAL SECTION

BACKFILL DETAILS FOR BOX CULVERT

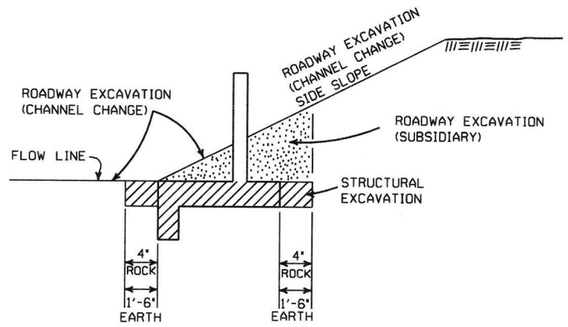


PLAN

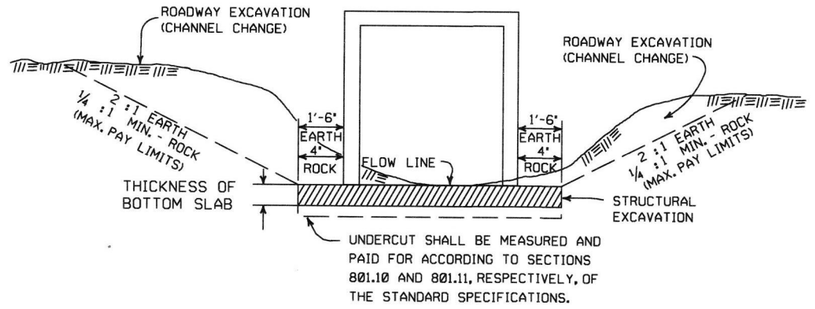


SECTION B-B

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.

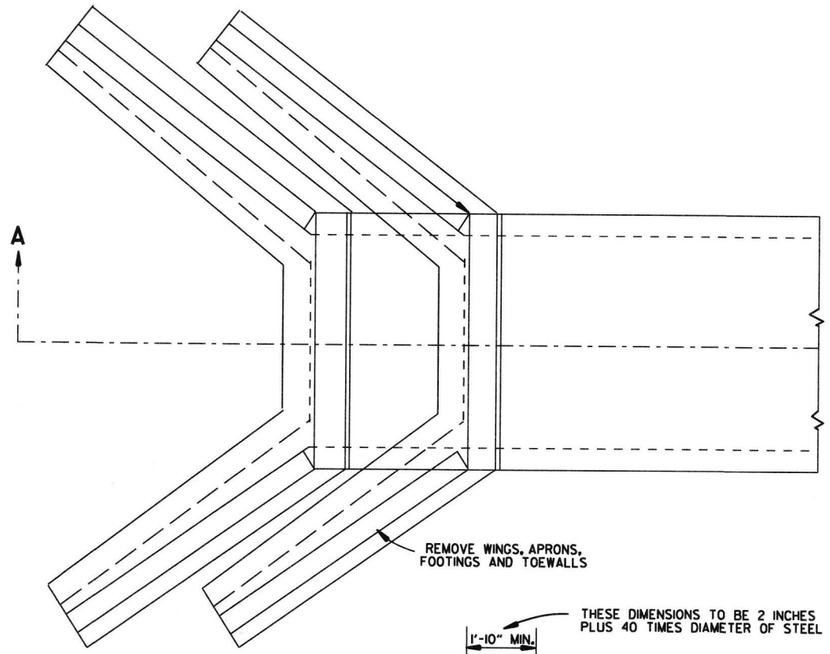
ROADWAY EXCAVATION SHOWN IN SECTION C-C ABOVE AS SUBSIDIARY WILL NOT BE MEASURED OR PAID FOR DIRECTLY, BUT PAYMENT WILL BE CONSIDERED TO BE INCLUDED IN THE VARIOUS ITEMS OF EXCAVATION.

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

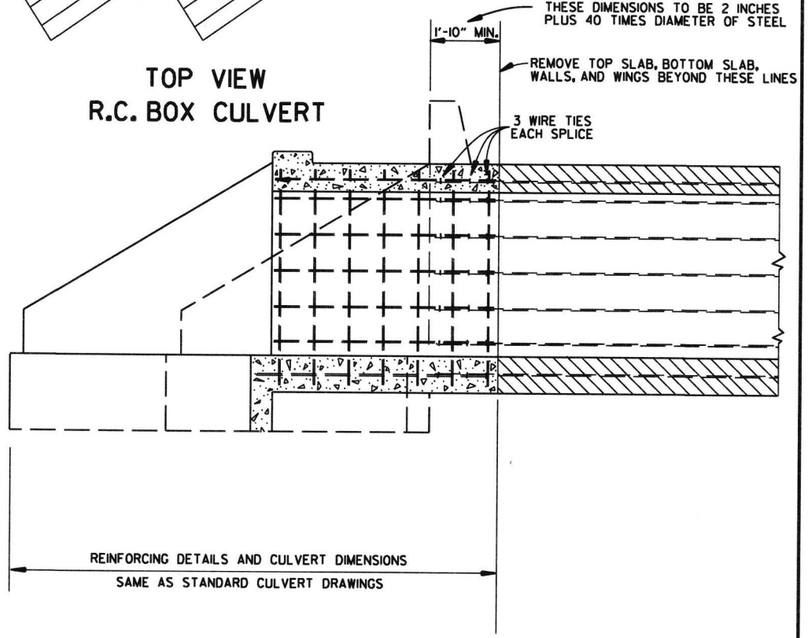
ARKANSAS STATE HIGHWAY COMMISSION

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

STANDARD DRAWING RCB-2

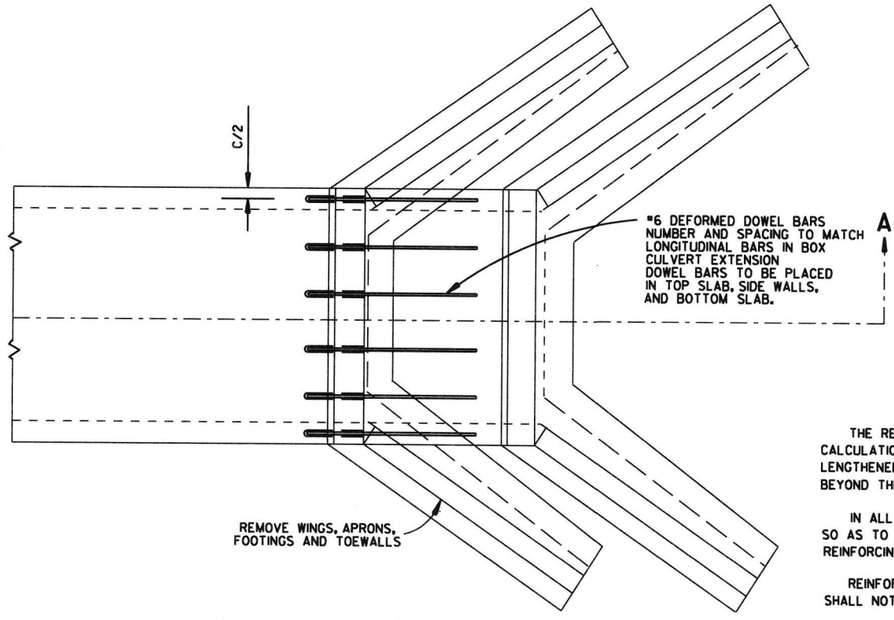


TOP VIEW
R.C. BOX CULVERT

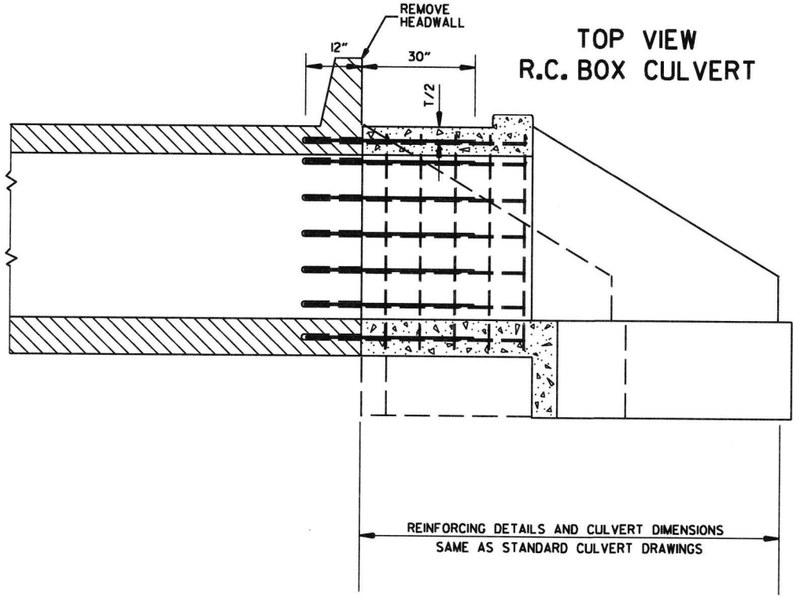


SECTION A-A

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

SUPERELEVATION TABLE FOR TWO - WAY TRAFFIC

DEGREE OF CURVE	30 MPH e	30 MPH Ls (FT) MINIMUM	30 MPH Ls (FT) DESIRABLE	40 MPH e	40 MPH Ls (FT) MINIMUM	40 MPH Ls (FT) DESIRABLE	50 MPH e	50 MPH Ls (FT) MINIMUM	50 MPH Ls (FT) DESIRABLE	55 MPH e	55 MPH Ls (FT) MINIMUM	55 MPH Ls (FT) DESIRABLE	60 MPH e	60 MPH Ls (FT) MINIMUM	60 MPH Ls (FT) DESIRABLE	70 MPH e	70 MPH Ls (FT) MINIMUM	70 MPH Ls (FT) DESIRABLE
0° 15'	N.C.			N.C.			N.C.			N.C.			N.C.			N.C.		
0° 30'	N.C.			N.C.			N.C.			N.C.			N.C.			N.C.		
0° 45'	N.C.			N.C.			R.C.			0.022			0.023			0.028		
1° 00'	N.C.			N.C.			0.021			0.026			0.030			0.037	275	300
1° 15'	N.C.			R.C.			0.026			0.032			0.037			0.046		
1° 30'	N.C.			0.021			0.031	200		0.037	225		0.043	250		0.054		
1° 45'	N.C.			0.025	175		0.036			0.043		300	0.049		300	0.062		
2° 00'	R.C.			0.028			0.040			0.048			0.055			0.070		
2° 15'	R.C.			0.031			0.045			0.053			0.061			0.078	300	
2° 30'	0.021			0.034			0.049			0.058			0.067			0.085	315	350
2° 45'	0.023			0.037			0.053			0.063			0.072			0.091	335	
3° 00'	0.025			0.040			0.057			0.067	230		0.077	260		0.096	350	400
3° 15'	0.027	150	200	0.043		200	0.061			0.072	245		0.082	275		0.098	360	
3° 30'	0.029			0.046			0.065	205		0.076	255		0.086	285		0.100	360	
3° 45'	0.031			0.049			0.069	215		0.080	265		0.090	295	350			
4° 00'	0.033			0.051			0.072	225		0.083	270		0.093	305				
4° 30'	0.037			0.056			0.078	240		0.087	280		0.096	315				
5° 00'	0.040			0.061			0.083	250		0.091	295	350	0.098	320				
5° 30'	0.043			0.066	185		0.088	260		0.094	300							
6° 00'	0.046			0.070	190		0.092	270		0.096	305							
6° 30'	0.050			0.074	200		0.095	280	300	0.100	315							
7° 00'	0.053			0.078	210		0.098	285										
7° 30'	0.056			0.081	215		0.099	290										
8° 00'	0.058			0.084	220		0.100	290										
8° 30'	0.061			0.087	225	250												
9° 00'	0.063			0.089	230													
10° 00'	0.068	160		0.094	235													
11° 00'	0.072	170		0.097	250													
12° 00'	0.076	175		0.099	250													
13° 00'	0.080	180		0.100	250													
14° 00'	0.083	190		D MAX = 13° 15'														
15° 00'	0.086	195																
16° 00'	0.089	200																
17° 00'	0.091	200																
18° 00'	0.093	205																
19° 00'	0.095	210																
20° 00'	0.097	215	250															
21° 00'	0.098	215																
22° 00'	0.099	215																
23° 00'	0.099	215																
24° 00'	0.100	220																

D MAX = 24° 45'

D MAX = 8° 15'

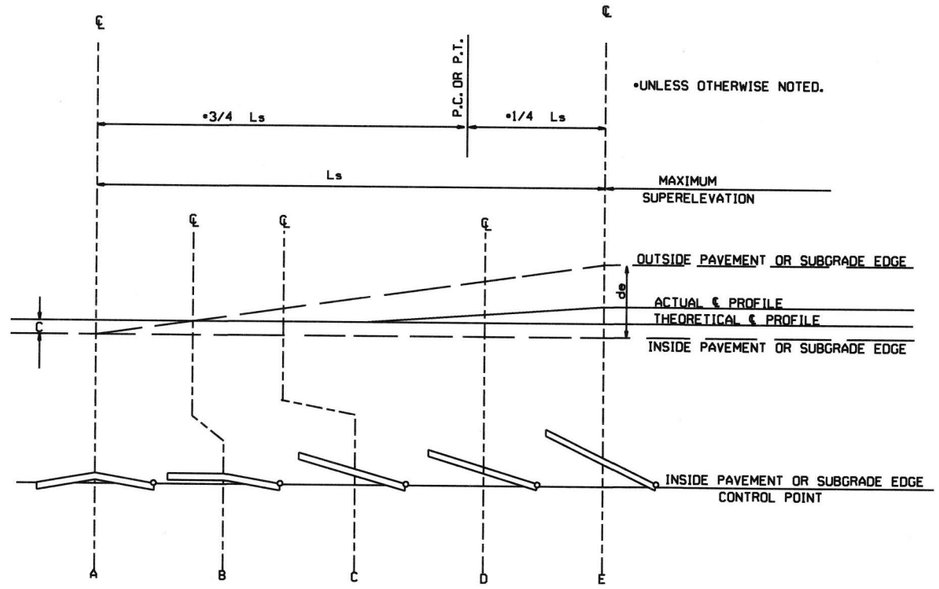
D MAX = 6° 30'

D MAX = 5° 15'

D MAX = 3° 30'

ABBREVIATIONS

NC - NORMAL CROWN
RC - REVERSE CROWN, SUPERELEVATION AT NORMAL CROWN SLOPE
e - RATE OF SUPERELEVATION (FT. PER FT.)
Ls - LENGTH OF SUPERELEVATION TRANSITION (FT.)
L - DISTANCE FROM BEGINNING OF SUPERELEVATION TRANSITION TO ANY POINT (FT.)
d - WIDTH OF PAVEMENT (FT.) OR WIDTH OF SUBGRADE (FT.)
C - NORMAL CROWN (FT.)



STANDARD METHOD WHEN SUPERELEVATION REVOLVES AROUND INNER SUBGRADE POINT OR INNER PAVEMENT EDGE

NOTE: MAINTAIN NORMAL CROWN ON INSIDE UNTIL SUPERELEVATION EXCEEDS 2C.

SUPERELEVATION FORMULA = $\frac{Lde}{Ls}$

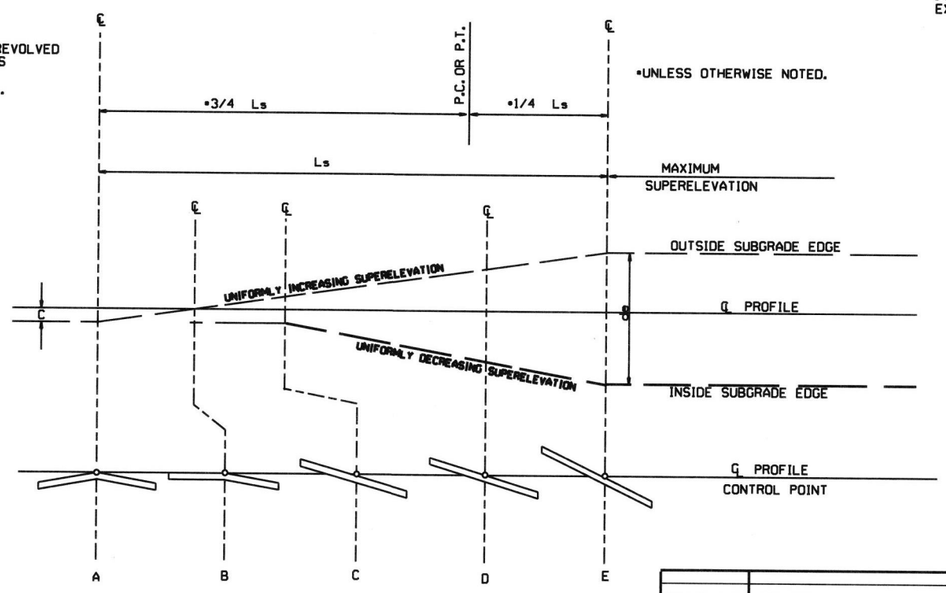
GENERAL NOTES

1. ON PAVEMENT WITH TWO-WAY TRAFFIC, THE SUPERELEVATION SHALL BE REVOLVED ON THE INSIDE PAVEMENT EDGE UNLESS OTHERWISE NOTED ON THE PLANS
2. SUPERELEVATION VALUES SHOWN ON THE CROSS SECTIONS ARE VALUES (+) OR (-) TO BE ADDED TO OR SUBTRACTED FROM THE POINT OF CONTROL.
3. LENGTHS FOR L MAY BE ROUNDED IN MULTIPLES OF 25 FT. OR 50 FT. TO PERMIT SIMPLER CALCULATIONS.
4. PAVEMENTS WIDER THAN 2 LANES SHALL HAVE ADDITIONAL TRANSITION LENGTHS AS FOLLOWS:

3 LANE UNDIVIDED - - - - - +20%
4 LANE UNDIVIDED - - - - - +50%
5 LANE UNDIVIDED - - - - - +80%
6 LANE UNDIVIDED - - - - - +100%

NOTE: MAINTAIN NORMAL CROWN ON INSIDE UNTIL SUPERELEVATION EXCEEDS 2C.

RATE OF SUPERELEVATION SHALL BE COMPUTED ON STRAIGHT LINE METHOD USING APPLICABLE Ls.



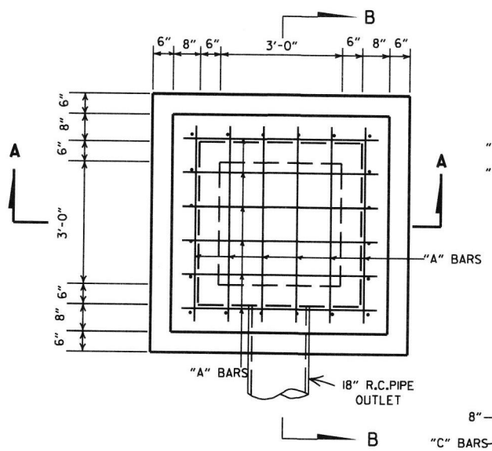
STANDARD METHOD WHEN SUPERELEVATION REVOLVES AROUND CENTER LINE

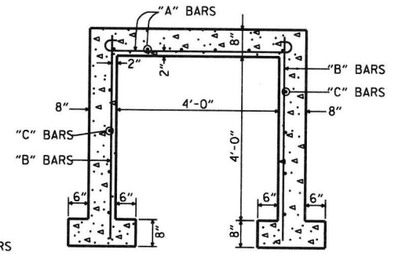
DATE	REVISION	DATE FILMED
10-18-96	ADDED FORMULA	
01-09-87	ISSUED	534-1-9-87

ARKANSAS STATE HIGHWAY COMMISSION

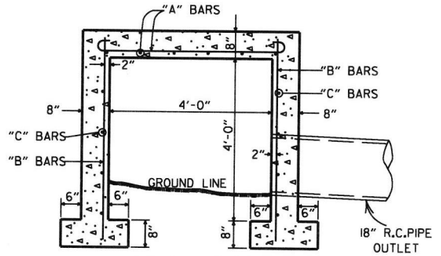
TABLES AND METHOD OF SUPERELEVATION FOR TWO-WAY TRAFFIC

STANDARD DRAWING SE-2





SEC A-A



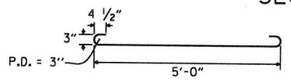
SEC B-B

NOTE: MAX FILL HEIGHT ABOVE TOP OF BOX = 13'-0".

STEEL SCHEDULE

BARS	NUMBER	LENGTH	SPACING
"A"	12	6'-0"	10"
"B"	20	5'-0"	10 ½"
"C"	16	5'-0"	12"

ALL STEEL TO BE #4 BARS



"A" BARS

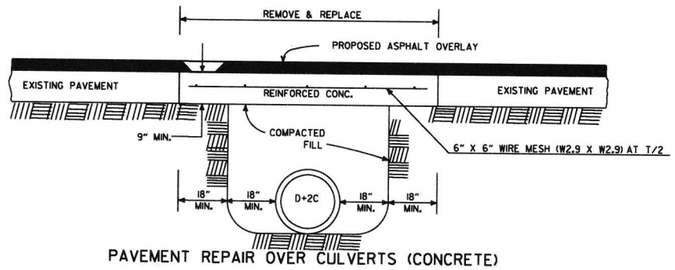
QUANTITIES

CONCRETE 3.31 CU. YDS.
REINFORCING STEEL 168 LB.

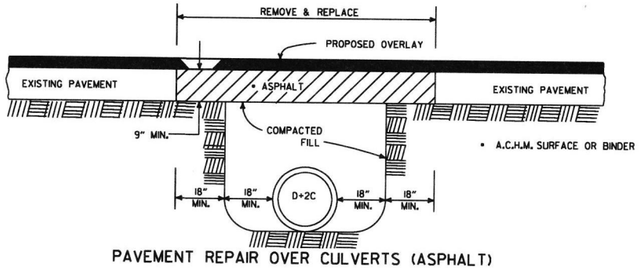
GENERAL NOTE:

THE PAY ITEMS FOR REINFORCED CONCRETE SPRING BOXES SHALL BE FOR THE QUANTITTIES OF CONCRETE OF THE CLASS SPECIFIED, REINFORCING STEEL, EXCAVATION FOR STRUCTURES AND 18" R.C. PIPE CULVERT.

REINFORCED CONCRETE SPRING BOX



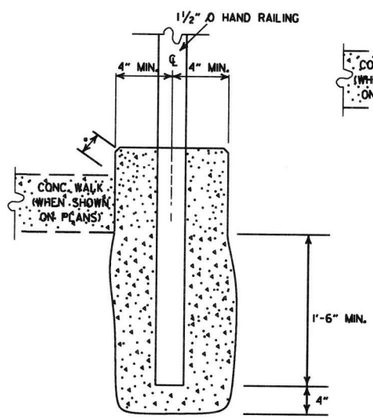
PAVEMENT REPAIR OVER CULVERTS (CONCRETE)



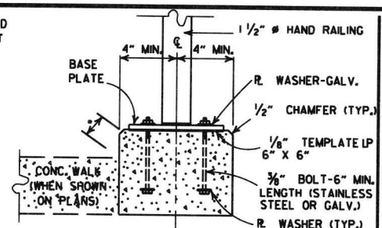
PAVEMENT REPAIR OVER CULVERTS (ASPHALT)

DETAIL SHOWING REPAIR OF EXISTING PAVEMENT AT CULVERT INSTALLATIONS

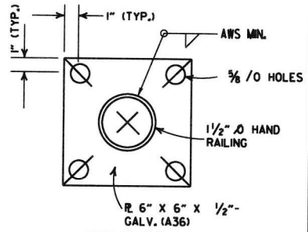
• A 2" MIN. HIGH CURB IS REQUIRED WHEN CONCRETE WALK IS ADJACENT TO THE HAND RAILING. PAYMENT FOR CURB SHALL BE CONSIDERED INCLUDED IN THE PRICE BID FOR CONCRETE WALKS.



DETAIL OF HAND RAILING SET IN CONCRETE

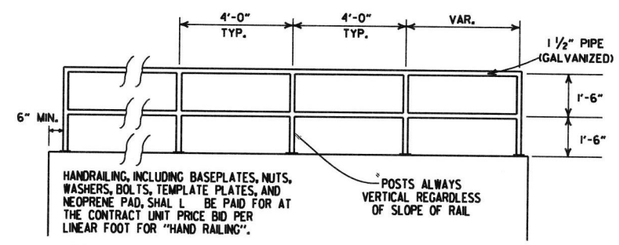


POST CONNECTION TO WALL

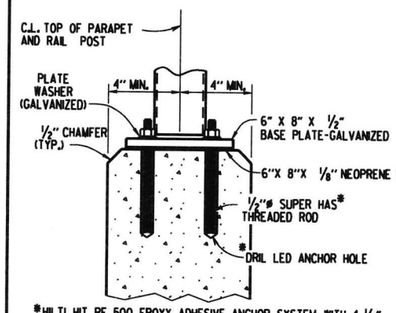


BASE PLATE

POST CONNECTION DETAILS



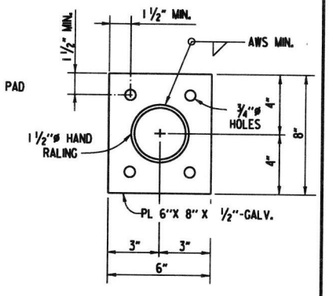
HAND RAILING SHAL L CONFORM TO SECTION 633.



*HILTI HIT RE 500 EPOXY ADHESIVE ANCHOR SYSTEM WITH 4 ½" EMBEDMENT OR APPROVED EQUAL.

THE ADHESIVE ANCHOR SYSTEM SHAL L BE INSTAL LED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

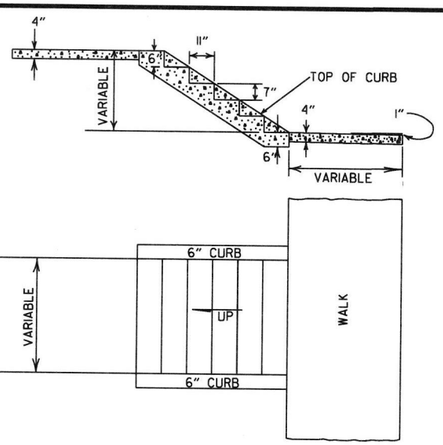
POST CONNECTION TO WALL



BASE PLATE

DETAILS OF ALTERNATE POST ANCHOR SYSTEM (EPOXY ADHESIVE ANCHORS)

HAND RAILING DETAILS



GENERAL NOTES

1. RISE AND TREAD DIMENSIONS OF STEPS MAY BE VARIED AS DIRECTED BY THE ENGINEER, HOWEVER, TREAD WIDTHS SHALL BE 11" MIN. ALL STEPS IN A FLIGHT SHALL HAVE CONSISTENT TREAD & RISER DIMENSIONS.
2. 1" TRANSVERSE EXPANSION JOINTS SHALL BE PLACED IN CONCRETE WALKS AT 45' INTERVALS.

DETAILS OF CONCRETE STEPS & WALKS

DATE	REVISION	DATE FILMED
9-12-13	REVISED REINFORCED CONCRETE SPRING BOX	
7-26-12	REMOVED RETAINING WALL DETAILS & REVISED HAND RAILING DETAILS	
4-17-08	REV. JOINT & FOOTING STEP DETAILS	
11-29-07	REVISED RETAINING WALL DRAINAGE	
5-25-06	REVISED PVMT REPAIR OVER CULVERTS (CONC); REVISED REINFORCED CONC SPRING BOX	
10-9-03	REVISED PIPE RAILING DETAILS TO HAND RAILING DETAILS	
4-10-03	REVISED RETAINING WALL DRAWING	
8-22-02	ADDED HAND RAILING DETAIL	
11-16-01	REVISED PVMT REPAIR OVER CULVERTS (CONC); CORRECTED SPELLING IN GENERAL NOTES	
11-18-98	ADDED GENERAL NOTES TO CONCRETE STEPS & WALKS	
7-02-98	ENLARGED PIPE	
4-03-97	ADDED NOTE TO STEEL BAR SCHED.	
10-18-96	CORRECTED SPELLING	
4-26-96	ADD WEEP HOLE;REV. JOINT SPACING IN RET. WALL	
6-2-94	CHANGED CONST. TO CONTRACTION JOINT	
10-1-92	CHANGED MESH FABRIC TO WIRE MESH	10-1-92
8-15-91	DELETED HDWL MODIFICATION DETAIL	8-15-91
11-8-90	DELETED COLD MIX FROM CULV'T. REPAIR	11-8-90
11-30-89	REV. RETAINING WALL STEEL SCHEDULE	11-30-89
11-17-88	V. BARS BEHIND ARROW	665-11-17-88
7-15-88	REV. PAVEMENT REPAIR ADDED HDWL. MODS, DEL. PIPE UNDERDRAINS	649-7-15-88
11-1-84	REV. TRENCH FOR PIPE UNDERDRAIN	510-11-1-84
1-4-83	ELIMINATED CONC. CLASS & ADDED CHAMFER NOTE	682-1-4-83
3-2-81	SPELLING OF "UNDERDRAIN"	721-3-2-81
4-20-79	REV. UNDERDRAIN DET& PAVEMENT REPAIR	674-4-20-79
2-2-76	12"MIN. GRAN. MAT'L. OVER PIPE	919-2-2-76
4-10-75	REM. SPECS. FOR GRAN. MAT'L.	568-4-10-75-853
5-22-74	GRANULAR MAT'L. TO BE SB-3	567-5-22-74-740
10-2-72	REVISED AND REDRAWN	564-10-16-72

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF SPECIAL ITEMS

STANDARD DRAWING SI - 1

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"

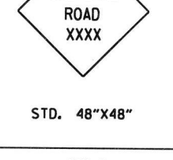
R4-1

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

R4-2

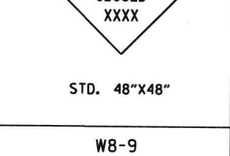
STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

R5-1



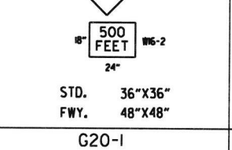
STD. 30"X30"
EXPWY. 36"X36"
SPECIAL 48"X48"

RII-2



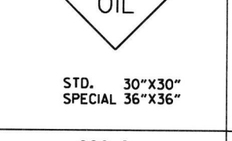
48"X30"

RII-3A



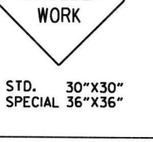
60"X30"

RII-4



60"X30"

W21-5a



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

WI-1

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

WI-2

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

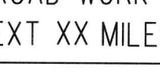
WI-3

STD. 48"X48"

WI-4

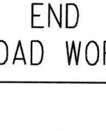
STD. 48"X48"

WI-6



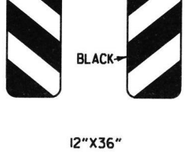
STD. 48"X24"
SPECIAL 60"X30"

WI-8



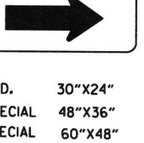
STD. 18"X24"
SPECIAL 24"X30"
EXPWY. 30"X36"
FWY. 36"X48"

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"

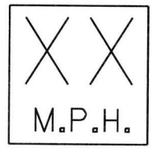
W8-7

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

W9-2

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

WI3-1



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"

WI-4b

STD. 48"X48"

R56-1

STD. 18"X18"

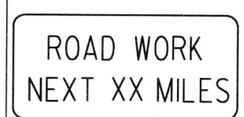
W8-11

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

W8-9

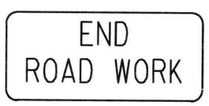
STD. 36"X36"
FWY. 48"X48"

G20-1



60"X24"

G20-2



48"X24"

OM-3L OM-3R

12"X36"

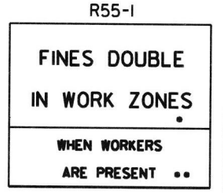
M4-9

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.

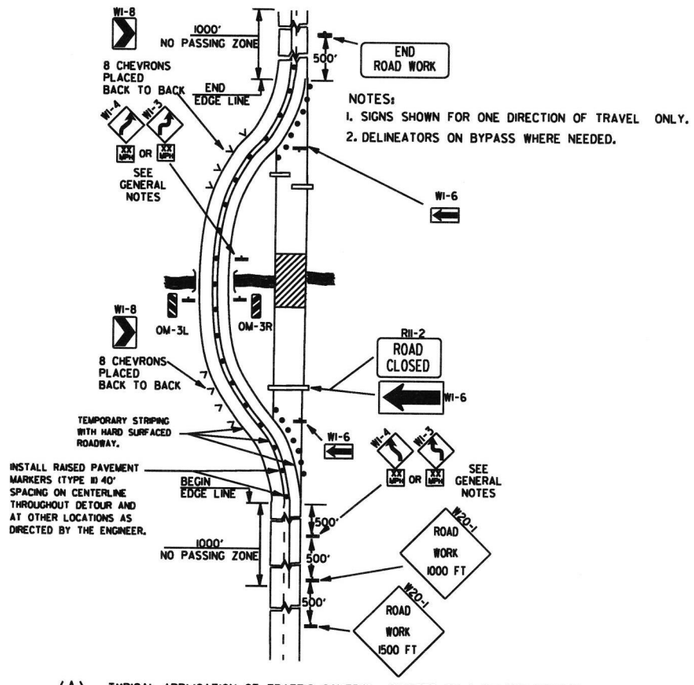
• NOTE: SUPPORTS FOR SIGNS, BARRICADES, AND VERTICAL PANELS THAT ARE DIFFERENT FROM THE REQUIREMENTS SHOWN IN NOTES 4 & 5, BUT MEET THE REQUIREMENTS OF NCHRP-350 OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH), WILL BE ACCEPTED. COMPLIANCE WITH THE REQUIREMENTS OF NCHRP-350 OR MANUAL FOR ASSESSING SAFETY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

DATE	REVISION	FILMED
4-13-17	DELETED RSP-1 & ADDED W21-5a	
9-2-15	REVISED REDUCED SPEED LIMIT AHEAD SIGNS REVISED ROAD WORK NEXT XX MILES	
12-15-11	REVISED W24-1	
11-17-10	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

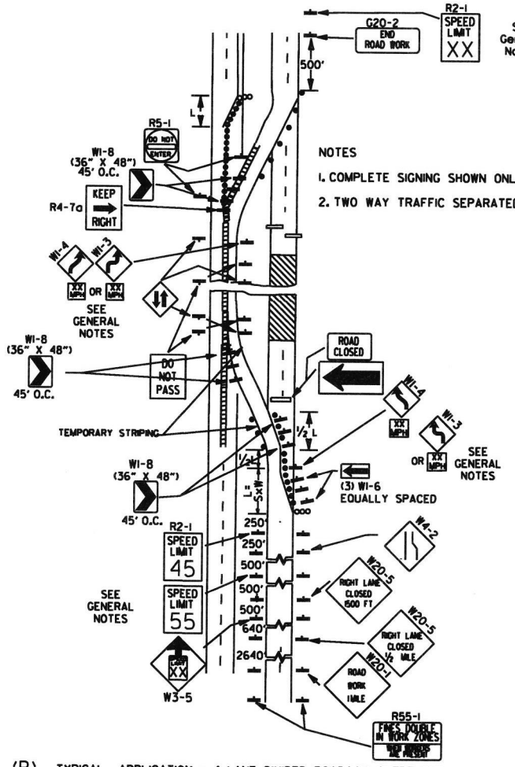
STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

STANDARD DRAWING TC-1



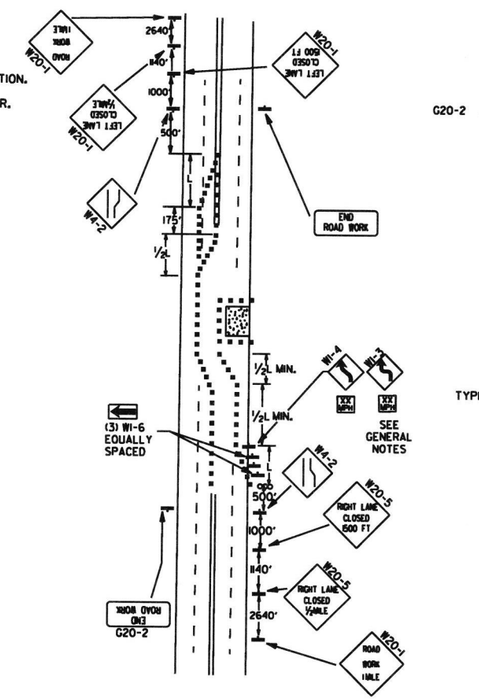
NOTES:
1. SIGNS SHOWN FOR ONE DIRECTION OF TRAVEL ONLY.
2. DELINEATORS ON BYPASS WHERE NEEDED.

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

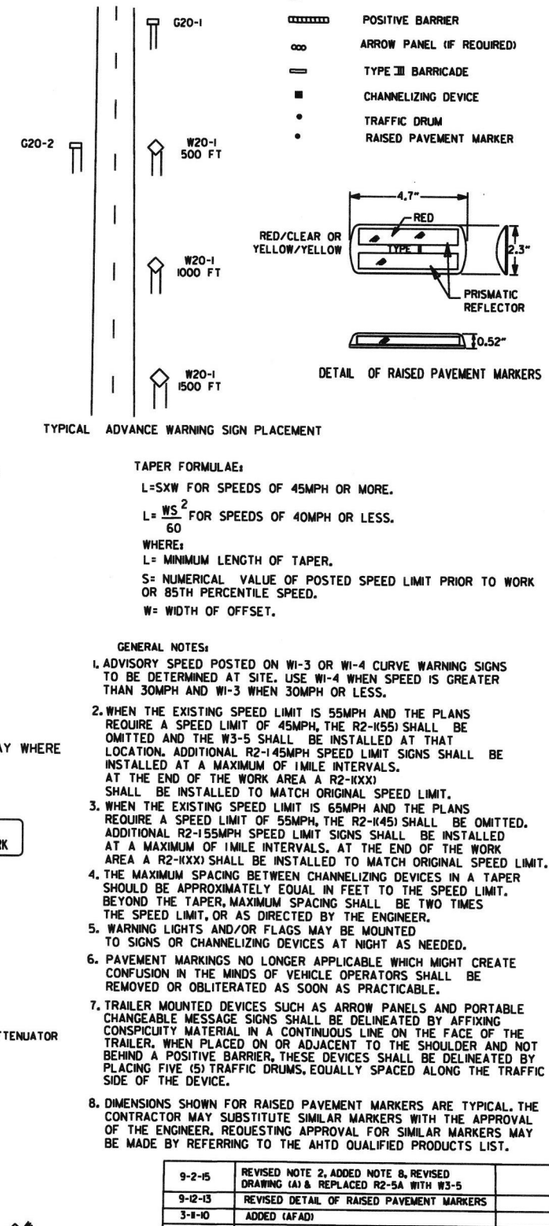


NOTES
1. COMPLETE SIGNING SHOWN ONLY IN CROSSOVER DIRECTION.
2. TWO WAY TRAFFIC SEPARATED WITH POSITIVE BARRIER.

(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.



TYPICAL ADVANCE WARNING SIGN PLACEMENT

TAPER FORMULAE:

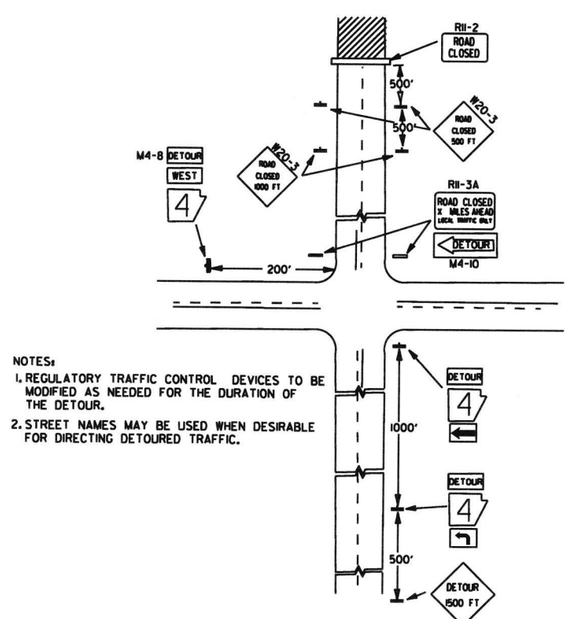
L=SXW FOR SPEEDS OF 45MPH OR MORE.

$L = \frac{WS^2}{60}$ 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.

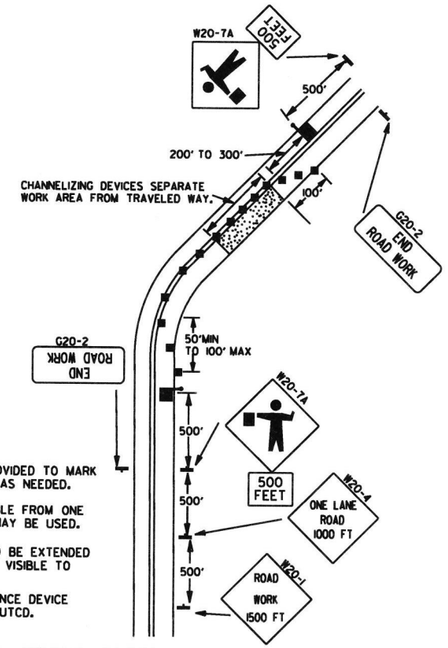
GENERAL NOTES:

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 1MILE 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 1MILE 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.



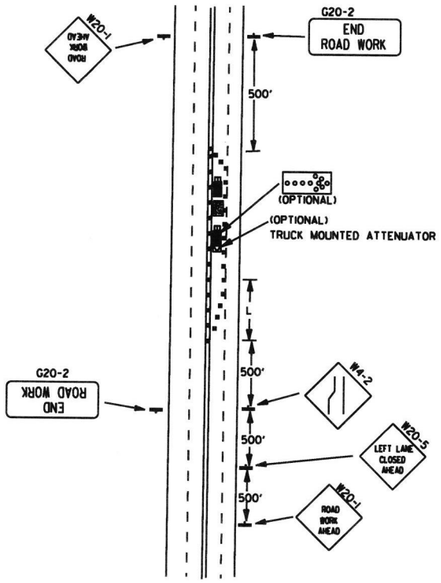
NOTES:
1. REGULATORY TRAFFIC CONTROL DEVICES TO BE MODIFIED AS NEEDED FOR THE DURATION OF THE DETOUR.
2. STREET NAMES MAY BE USED WHEN DESIRABLE FOR DIRECTING DETOURED TRAFFIC.

(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.



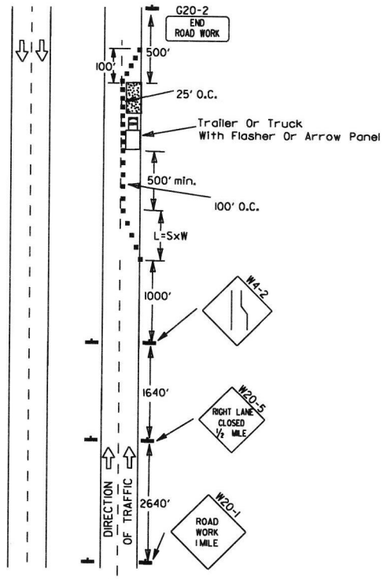
(F) TYPICAL APPLICATION - 4-LANE UNDIVIDED ROADWAY WITH INSIDE LANE CLOSED.

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	
3-1-10	ADDED (AFAD)	
11-20-08	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	

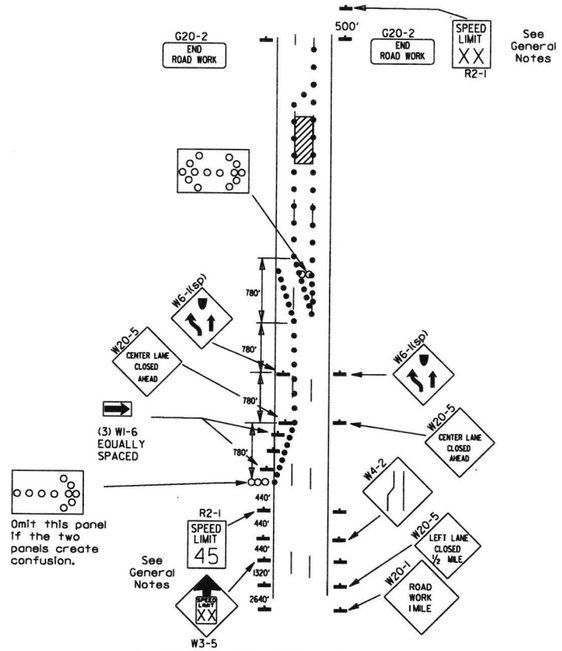
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

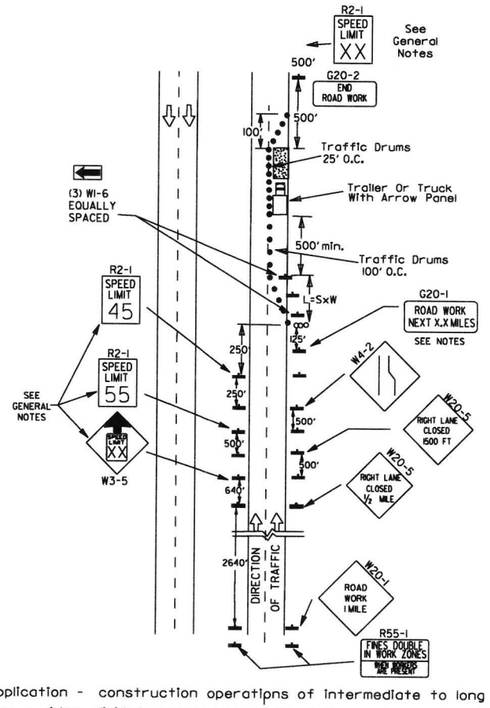
STANDARD DRAWING TC-2



(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.

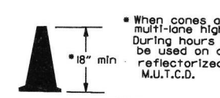
KEY:

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

GENERAL NOTES:

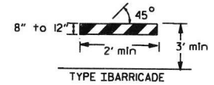
1. A speed limit reduction may be implemented ONLY when designated in the plan or when recommended by the Roadway Design Division.
2. When the existing speed limit is 55mph and the plans require a speed limit of 45mph, the R2-1(55) shall be omitted and the W3-5 shall be installed at that location. Additional 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



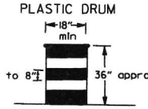
- When cones are used on freeways and multi-lane highways, they shall be 28" min. During hours of darkness, 28" cones shall be used on all roadways, and shall be reflectorized in accordance with the M.U.T.C.D.

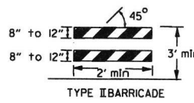
CONES



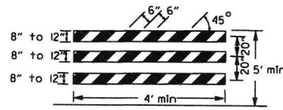
TYPE I BARRICADE

PLASTIC DRUM



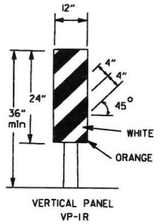


TYPE II BARRICADE



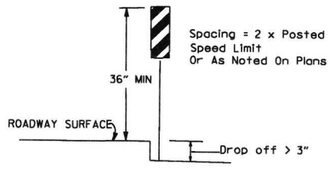
TYPE III BARRICADE

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



VERTICAL PANEL
VP-1R

VERTICAL PANEL PLACEMENT



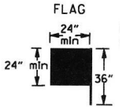
TRAFFIC CONTROL DEVICES
FOR
VERTICAL PAVEMENT DIFFERENTIALS

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.

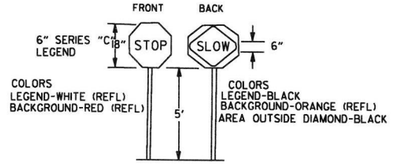
When the shoulder area is used as part of the traveled lane and there is insufficient width to place drums on the remaining shoulder width, then vertical panels shall be used.

FLAG

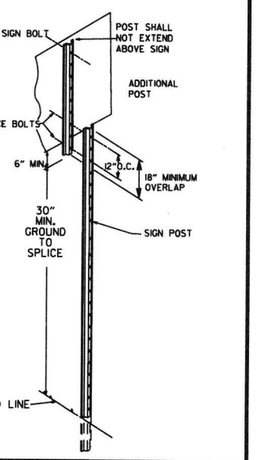


Flag shall be of good grade red material

STOP SLOW PADDLE



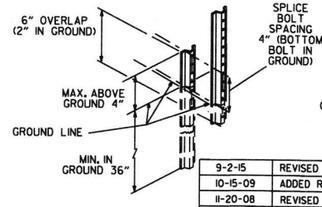
DETAIL OF SPLICES

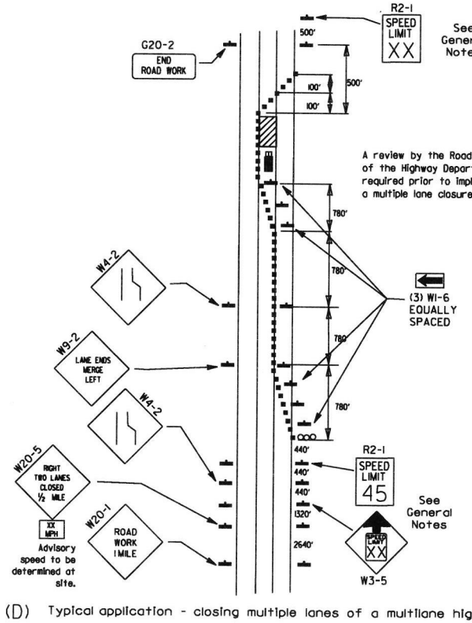


NOTES: USE SPLICES ONLY WHEN NECESSARY FOR INSTALLATION. TYPICAL INSTALLATION SHOULD HAVE NO SPLICES (SEE STD. DRAWING NO. SHS-2)

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.





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

DATE	REVISION	FILMED
9-2-15	REVISED NOTE 2 & REPLACED R2-5A WITH W3-5	
10-15-09	ADDED REFERENCE TO MASH	
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	

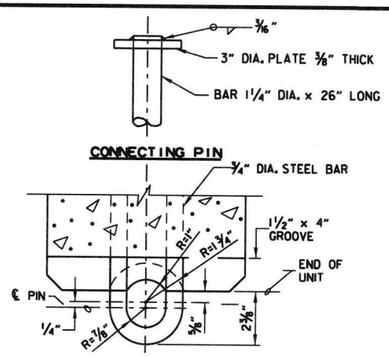
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

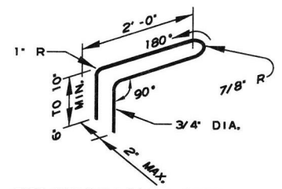
STANDARD DRAWING TC-3

REINFORCING BAR TABLE PER BARRIER UNIT

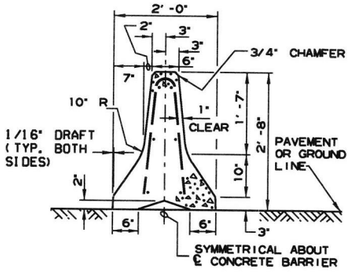
MARK	LOCATION	BAR SIZE	(NO. BARS)	SKETCH
H-1	HORIZONTAL IN BARRIER TIED INSIDE V-1 BARS	#5	(6)	19'-3"
H-2	CENTERED ABOVE DRAIN SLOTS LONG. & TRANSVERSELY	#5	(6)	6'-6"
H-3	TIED ABOVE H-1 BARS TO SUPPORT H-2, TIED TO V-1	#4	(2)	1'-6"
S-1	OVER LIFT HOLES	#4	(2)	2'-5", LIFTING HOLE, 90°, 3 3/8" R
S-2	HORIZ. AROUND SLOTS BETWEEN V-1'S @ DRAIN SLOTS	#4	(2)	1 1/2" R, SLOTS, 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", 4 3/8", 2'-1 3/8"



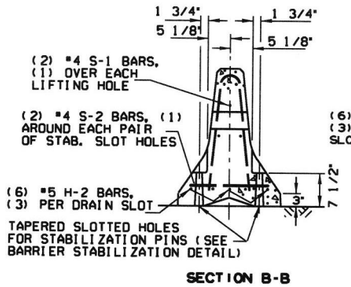
CONNECTION DETAILS



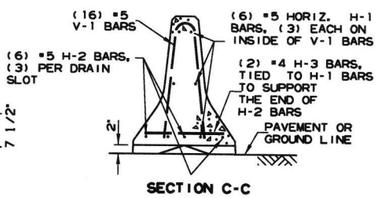
CONNECTION LOOP



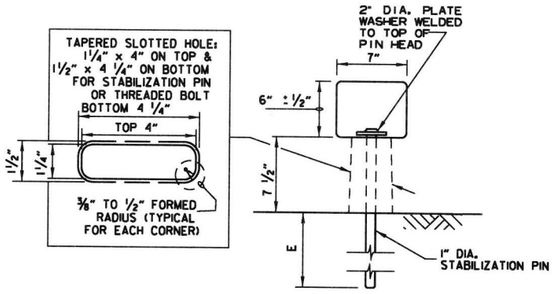
SECTION A-A



SECTION B-B



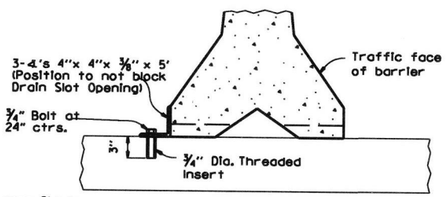
SECTION C-C



BARRIER STABILIZATION DETAIL

ROADWAY SECTION

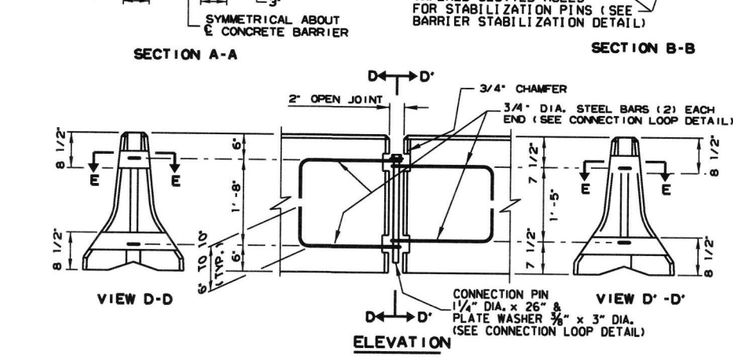
(E) 4" - Concrete Pavement
8" - Asphalt Pavement
12" - Shoulder Areas



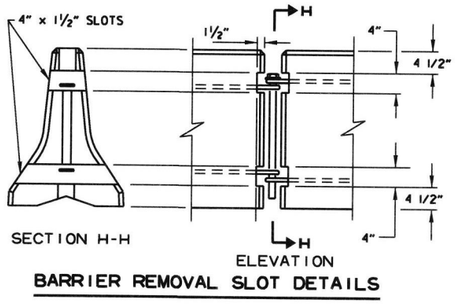
NOTE: 3/4" Threaded inserts shall be cast in place for all new bridge decks and drilled and grouted for existing bridge decks. Inserts shall have a minimum ultimate load capacity of 8000 lbs. in tension. After removal of barrier, bolts, and angles, the inserts shall be filled with approved non-shrink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

BARRIER STABILIZATION DETAIL

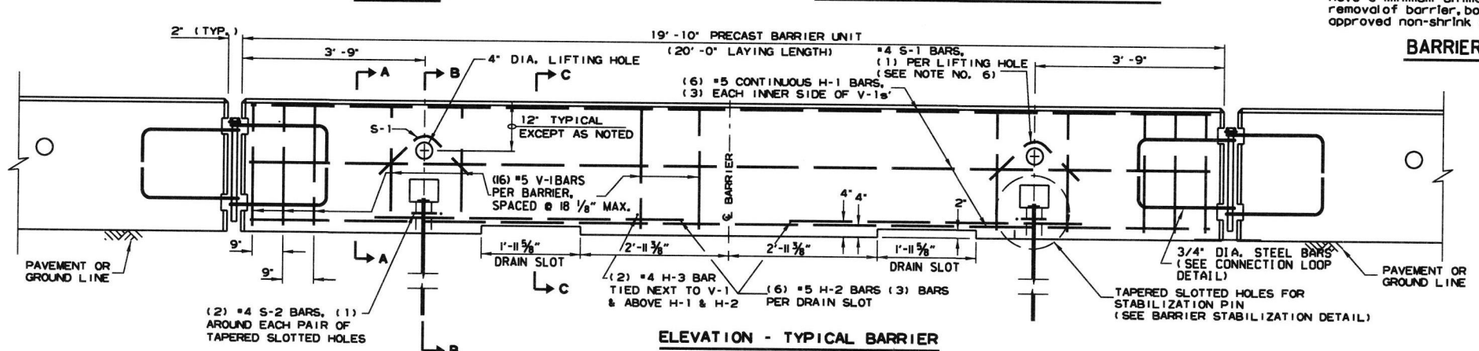
BRIDGE DECKS



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 walls 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.

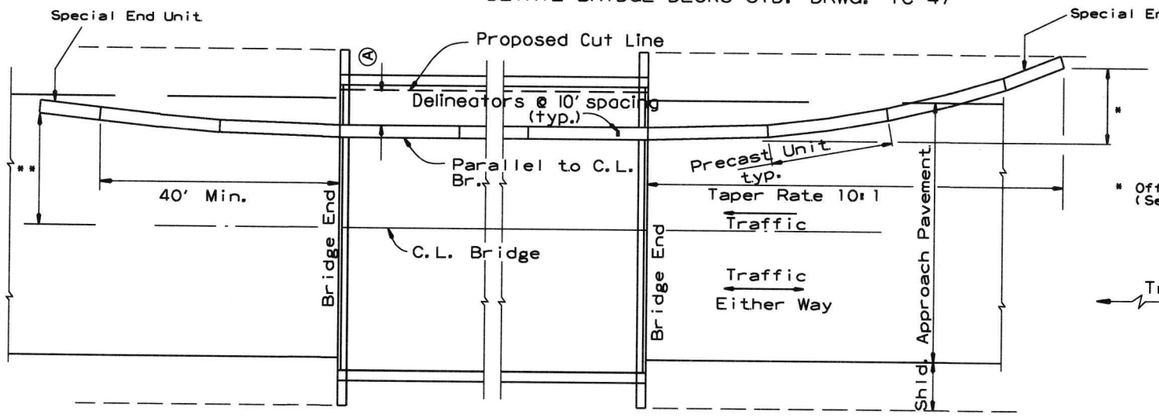
DATE	REVISION	FILMED
2-27-14	REVISED BARRIER STABILIZATION DETAIL	
10-15-09	ADDED REFERENCE TO MASH	
8-5-09	REV. NOTE 3 CONCERNING DRAIN SLOTS	
11-29-07	REVISED NOTE 3	
5-25-06	DELETED GENERAL NOTE 7	
11-18-04	REVISED BARRIER STABILIZATION DETAIL BRIDGE DECKS	
4-10-03	REVISED GENERAL NOTE 2	
8-22-02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

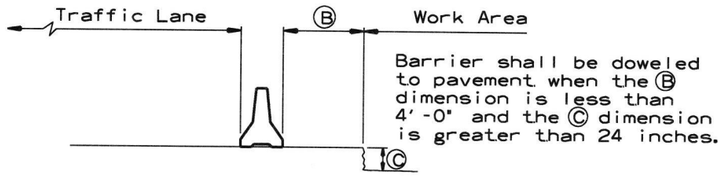


BARRIER PLACEMENT ALONG BRIDGE WITH OFFSET

No Scale

** Offset Distance for Two Way Traffic Only

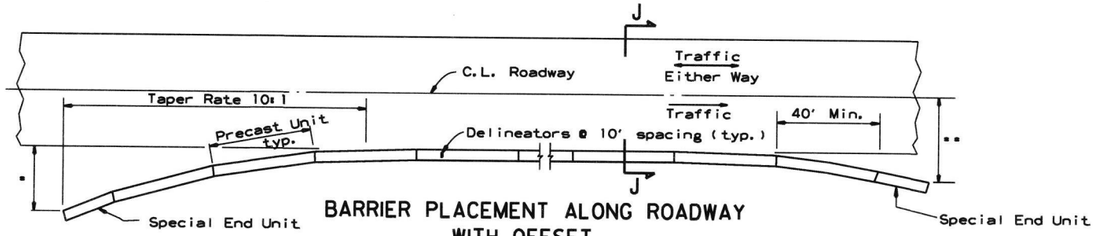
* Offset Distance (See Table)



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

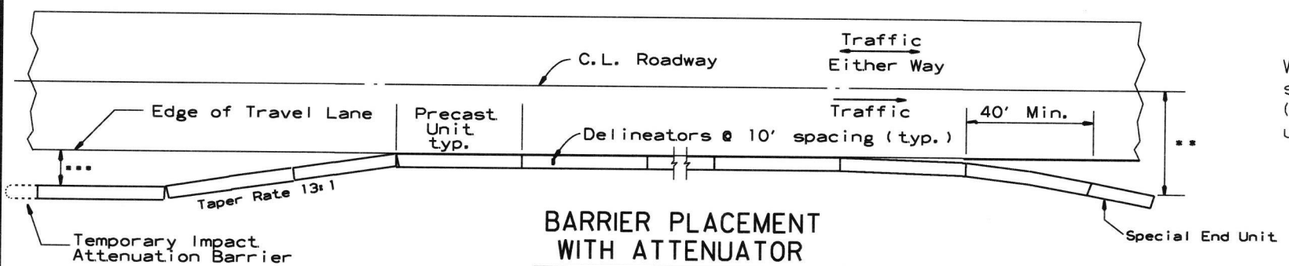
** Offset Distance For Two Way Traffic Only

* Offset Distance (See Table)

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.

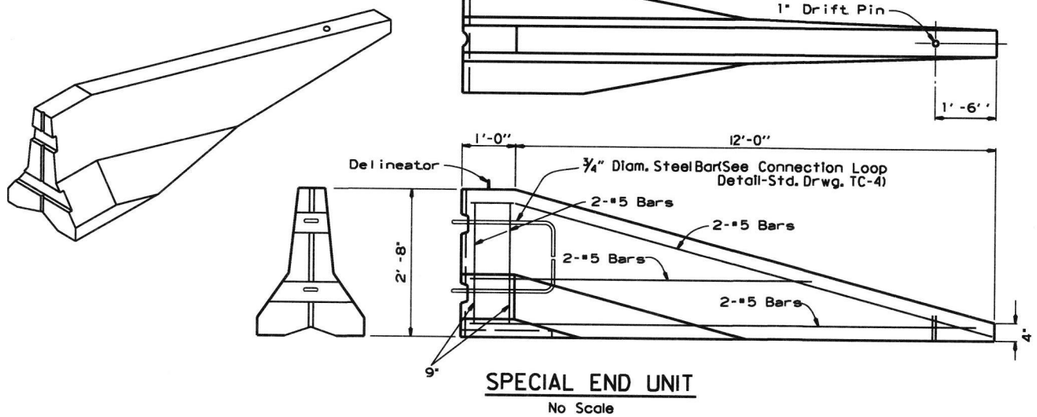


BARRIER PLACEMENT WITH ATTENUATOR

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	

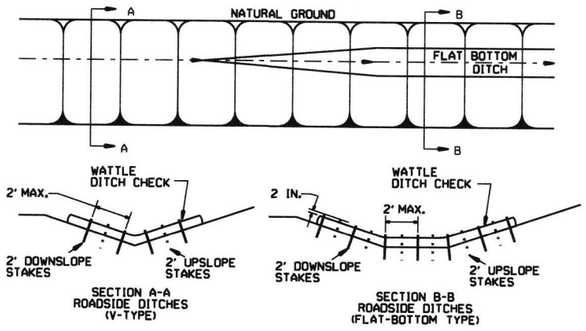
ARKANSAS STATE HIGHWAY COMMISSION

STANDARD TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION - TEMPORARY PRECAST BARRIER

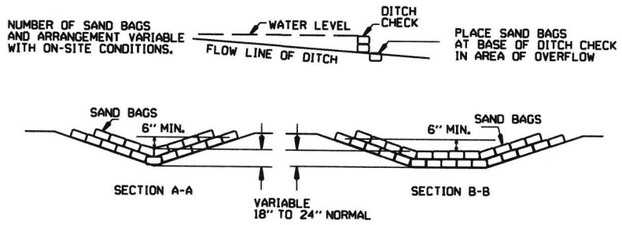
STANDARD DRAWING TC-5

GENERAL NOTES

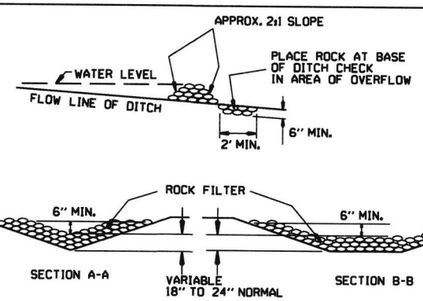
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.



WATTLE DITCH CHECK (E-1)



SAND BAG DITCH CHECK (E-5)

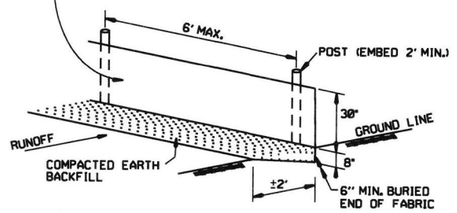


ROCK DITCH CHECK (E-6)

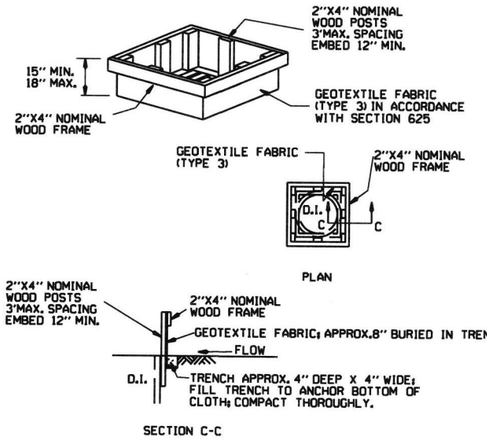
GENERAL NOTES

GEOTEXTILE FABRIC (TYPE 4) IN ACCORDANCE WITH SECTION 625

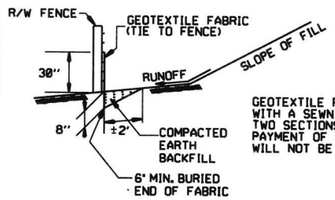
GEOTEXTILE FABRIC SHALL BE SPLICED TOGETHER WITH A SEWN SEAM ONLY AT A SUPPORT POST OR TWO SECTIONS OF FENCE MAY BE OVERLAPPED INSTEAD. PAYMENT OF ADDITIONAL MATERIAL FOR OVERLAP WILL NOT BE MADE.



SILT FENCE (E-11)

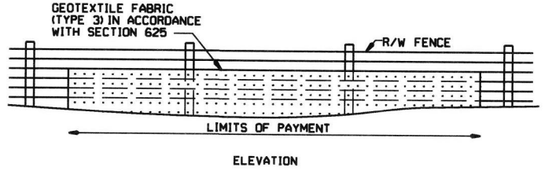


DROP INLET SILT FENCE (E-7)



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.



ELEVATION

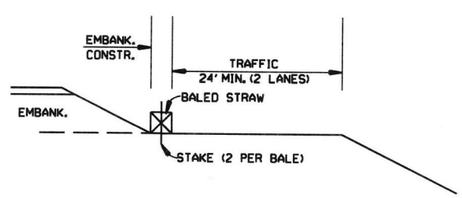
SILT FENCE ON R/W FENCE (E-4)

GENERAL NOTES

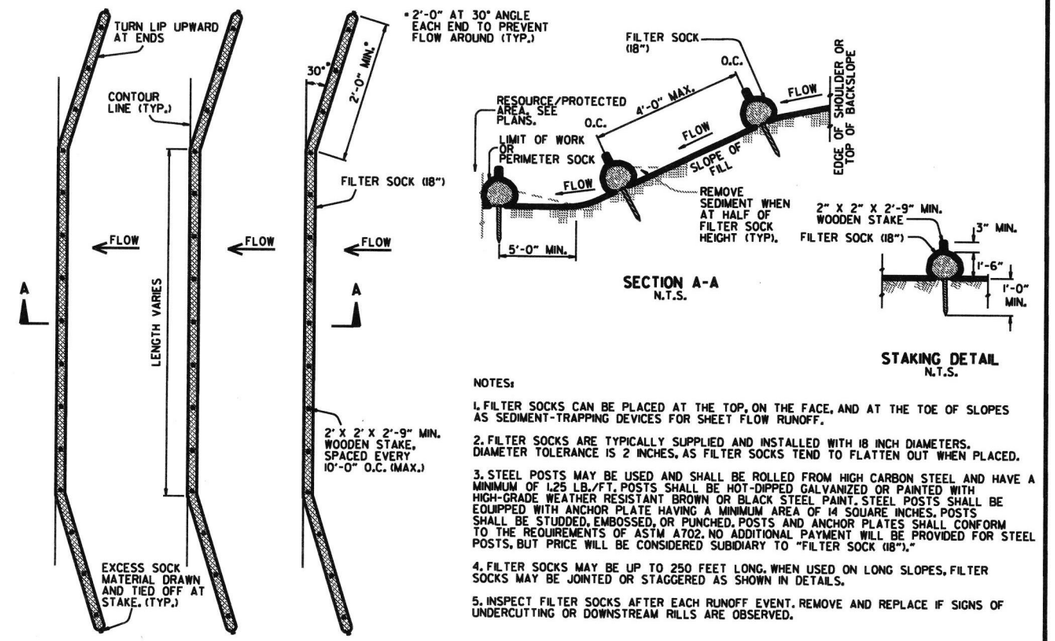
1. STRAW BALES SHALL BE INSTALLED SO THAT THE BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS OF THE BALES. THE BALES SHALL BE A MINIMUM OF 30 INCHES IN LENGTH.

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)



NOTES:

1. FILTER SOCKS CAN BE PLACED AT THE TOP, ON THE FACE, AND AT THE TOE OF SLOPES AS SEDIMENT-TRAPPING DEVICES FOR SHEET FLOW RUNOFF.

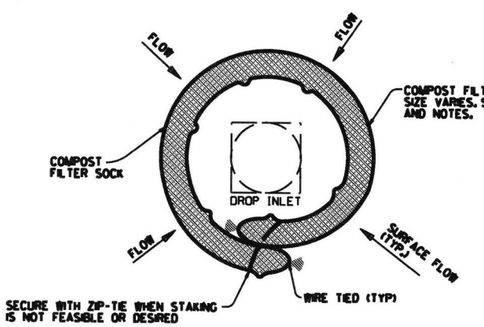
2. FILTER SOCKS ARE TYPICALLY SUPPLIED AND INSTALLED WITH 18 INCH DIAMETERS. DIAMETER TOLERANCE IS 2 INCHES. AS FILTER SOCKS TEND TO FLATTEN OUT WHEN PLACED.

3. STEEL POSTS MAY BE USED AND SHALL BE ROLLED FROM HIGH CARBON STEEL AND HAVE A MINIMUM OF 1.25 LB./FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH-GRADE WEATHER RESISTANT BROWN OR BLACK STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR STEEL POSTS, BUT PRICE WILL BE CONSIDERED SUBSIDIARY TO "FILTER SOCK (18")."

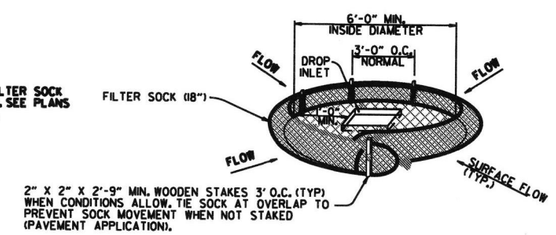
4. FILTER SOCKS MAY BE UP TO 250 FEET LONG, WHEN USED ON LONG SLOPES, FILTER SOCKS MAY BE JOINTED OR STAGGERED AS SHOWN IN DETAILS.

5. INSPECT FILTER SOCKS AFTER EACH RUNOFF EVENT. REMOVE AND REPLACE IF SIGNS OF UNDERCUTTING OR DOWNSTREAM RILLS ARE OBSERVED.

FILTER SOCK ALONG SLOPE (E-3)



DROP INLET PLAN VIEW
N.T.S.



DROP INLET PERSPECTIVE VIEW
N.T.S.

NOTES:

1. OVERLAP ENDS OF SOCK (1' MIN. 3' MAX.).

2. USE 18" DIA. SOCK IN NON-TRAFFIC AREAS OR AREAS WHERE SAFETY IS NOT A CONCERN.

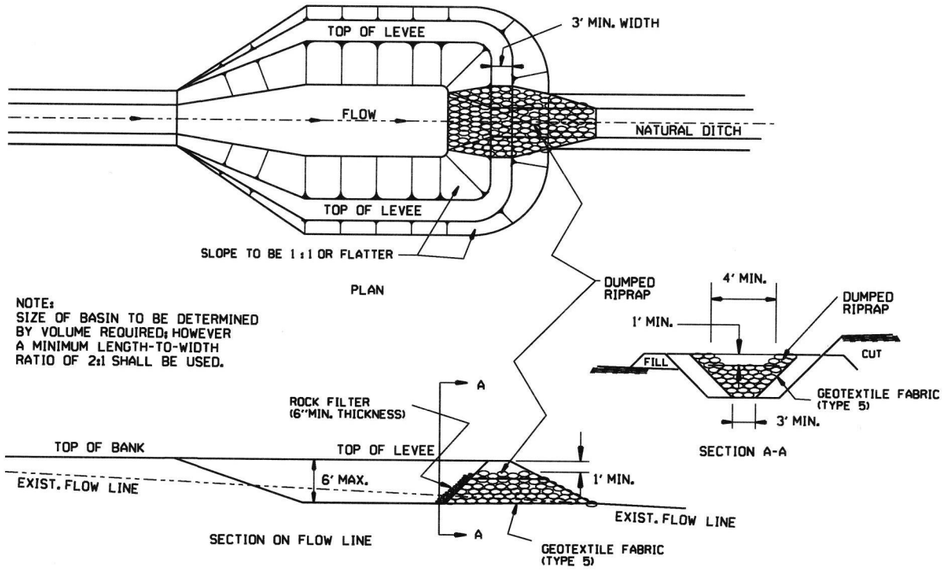
COMPOST FILTER SOCK DROP INLET PROTECTION (E-13)

DATE	REVISION	FILMED
11-16-17	ADDED FILTER SOCK E-3 AND E-13	
12-15-11	DELETED BALED STRAW DITCH CHECK & ADDED WATTLE DITCH CHECK	
11-18-98	ADDED NOTES	
07-02-98	ADDED BALED STRAW FILTER BARRIER (E-2)	
07-20-95	REVISED SILT FENCE E-4 AND E-11	7-20-95
07-15-94	REV. E-4 & E-11 MIN. 13" BURIED END OF FABRIC	
06-02-94	REVISED E-1,4,7 & 11; DELETED E-2 & 3	6-2-94
04-01-93	REDRAWN	
10-01-92	REDRAWN	
08-02-76	ISSUED R.D.M.	298-7-28-76

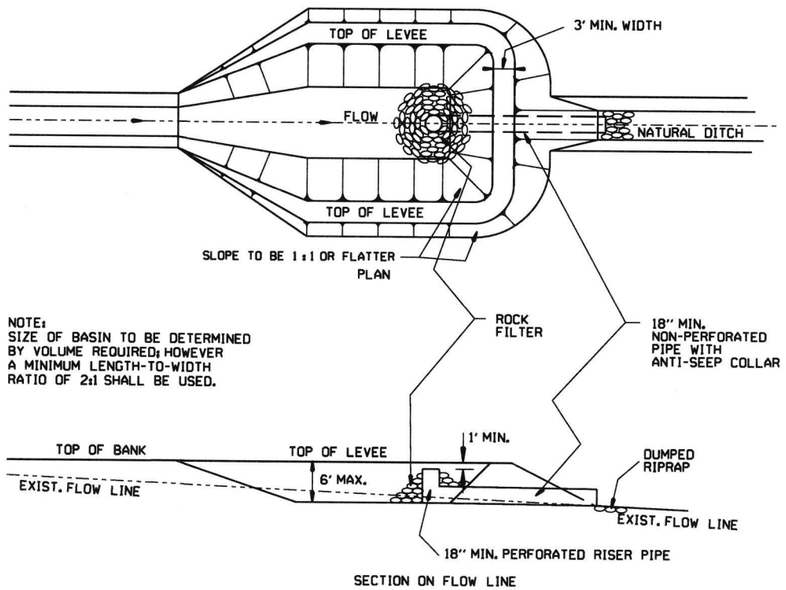
ARKANSAS STATE HIGHWAY COMMISSION

TEMPORARY EROSION CONTROL DEVICES

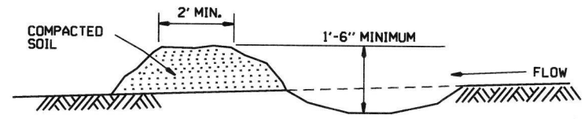
STANDARD DRAWING TEC-1



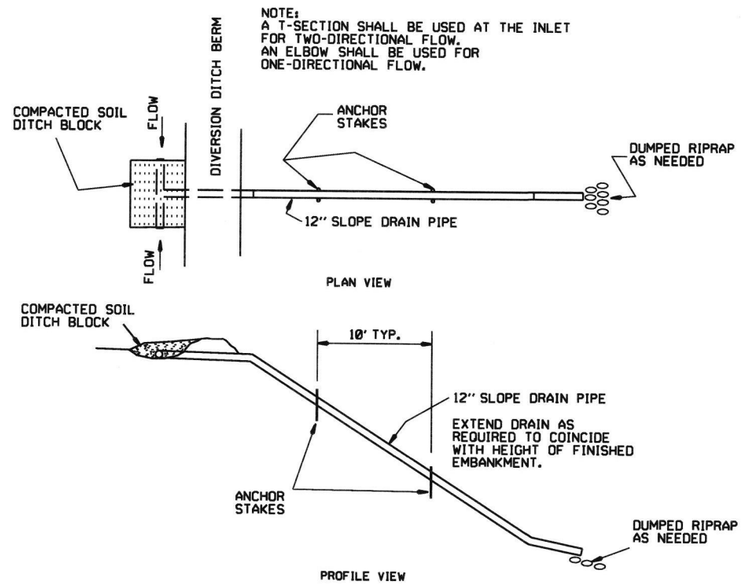
SEDIMENT BASIN WITH RIPRAP OUTLET (E-9)



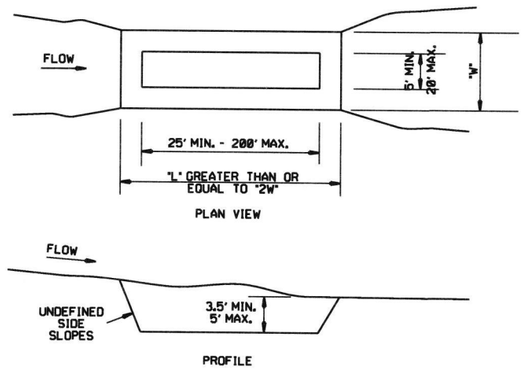
SEDIMENT BASIN WITH PIPE OUTLET (E-10)



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

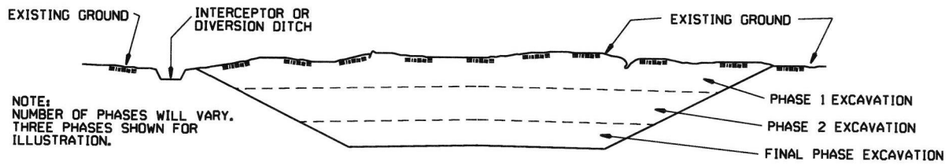
STANDARD DRAWING TEC-2

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



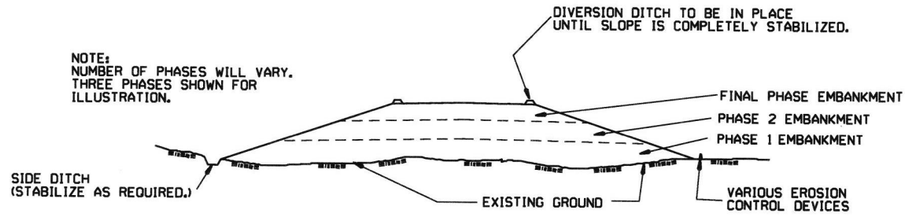
GENERAL NOTE

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.

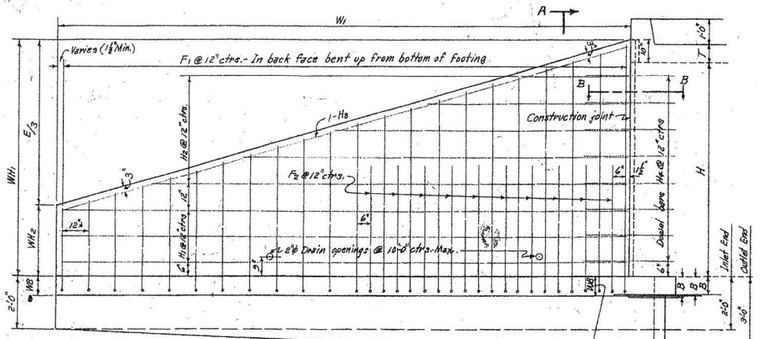
DATE	REVISION	FILMED
11-03-94	CORRECTED SPELLING	
6-2-94	Drawn & Issued	6-2-94

ARKANSAS STATE HIGHWAY COMMISSION

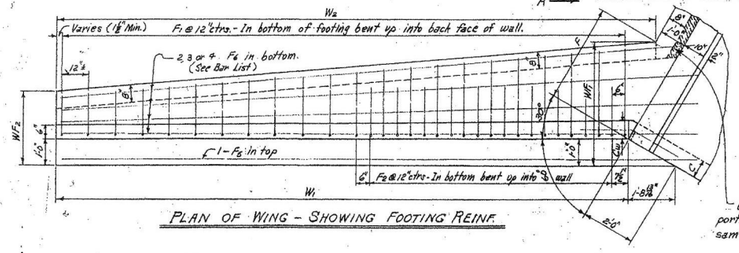
TEMPORARY EROSION CONTROL DEVICES

STANDARD DRAWING TEC-3

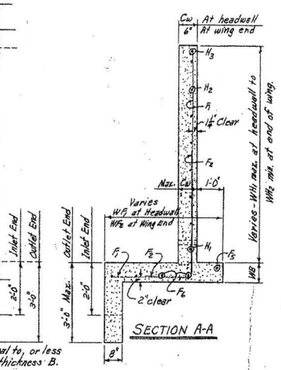
FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
JOB No.					



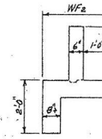
REAR ELEVATION OF WING - SHOWING BACK FACE REINF.



PLAN OF WING - SHOWING FOOTING REINF.

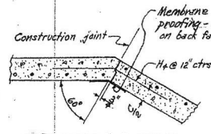


SECTION A-A

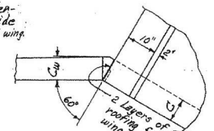


END VIEW OF WING

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



SECTION B-B THRU CONSTRUCTION JOINT



DETAIL AT TOP OF WING

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

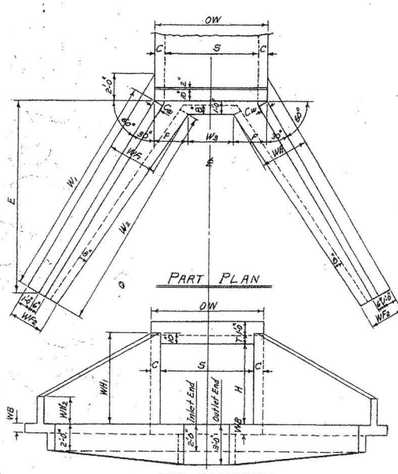
WING DIMENSIONS

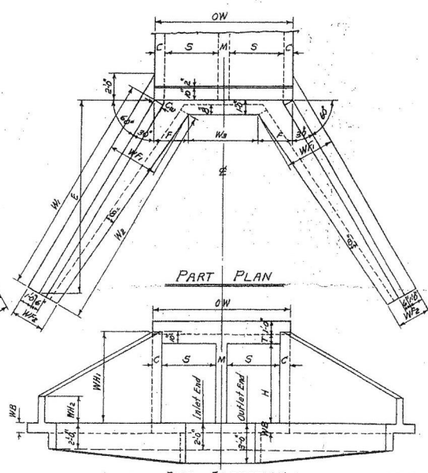
CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HEADWALL = C	WINGWALL HEIGHTS		WIDTHS OF WING FOOTINGS							* QUANTITY PER WING CLASS S CONCRETE	
			AT HEADWALL	AT END OF WING	AT HEADWALL	AT END OF WING	PERPENDICULAR FOOTING DIMENSION	PERPENDICULAR DIST. FROM HDWL. TO END OF WING	LENGTH OF WING WALLS	INSIDE FOOTING DIMENSION		INLET END	OUTLET END
H	WB	Cw	WH1	WH2	W5	W6	F	E	W1	W2		CU.YD.	CU.YD.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	0'-11⅜"	6'-6"	7'-6"	7'-1½"		0.889	0.986
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-4⅜"	8'-6"	9'-9⅜"	9'-5"		1.338	1.466
4'	7"	6"	4'-10"	1'-3"	3'-0"	2'-3"	1'-9"	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'-5⅝"	14'-7½"		2.478	2.668
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	12'-6"	14'-5⅝"	14'-7½"		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
		7⅝"	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"		3.588	3.803
7'	8⅝"	7⅝"	7'-10"	2'-4"	4'-2"	2'-9⅛"	3'-1⅛"	16'-6"	19'-0⅛"	19'-1⅜"		4.505	4.758
		8"	7'-10"	2'-4"	4'-2"	2'-9⅛"	3'-1⅛"	16'-6"	19'-0⅛"	19'-1⅜"		4.597	4.851
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-6"	18'-6"	21'-4⅝"	22'-0"		5.761	6.047

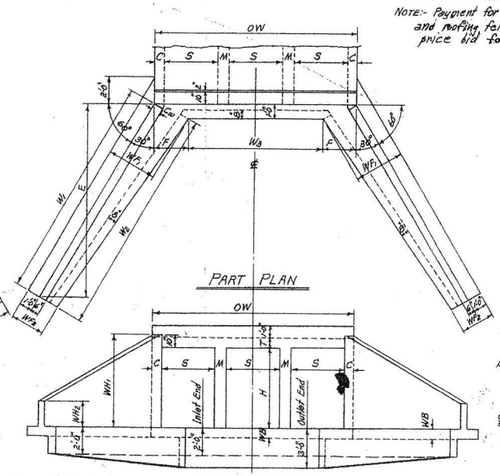
* Quantity per wing does not include headwall or that portion of apron or toewall for the length W5.

APRON DIMENSION W3 = (OW - 2F)

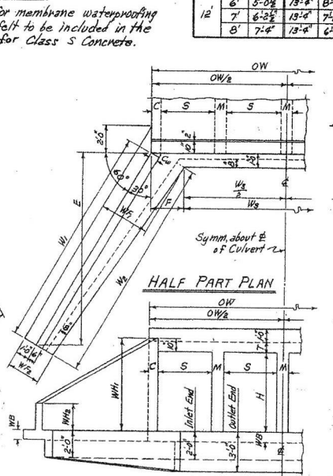
CLEAR SPAN	CLEAR HEIGHT	2 x FOOTING DIMENSION	SINGLE BARREL CULVERT		DOUBLE BARREL CULVERT		TRIPLE BARREL CULVERT		QUADRUPLE BARREL CULVERT		QUINTUPLE BARREL CULVERT	
			OW	W3	OW	W3	OW	W3	OW	W3	OW	W3
S	H	2F										
4'	2'	1'-11⅛"	5'-0"	3'-0⅛"	9'-8"	7'-8⅛"	14'-4"	12'-4⅛"	19'-0"	17'-0⅛"	23'-8"	21'-8⅛"
	3'	2'-8⅛"	5'-0"	2'-3⅛"	9'-8"	6'-11⅛"	14'-4"	11'-7⅛"	19'-0"	16'-3⅛"	23'-8"	20'-11⅛"
	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'-8⅜"	9'-8"	5'-4⅜"	14'-4"	10'-0⅜"	19'-0"	14'-8⅜"	23'-8"	19'-10⅜"
	6'	5'-0⅞"	5'-2"	0'-1⅛"	9'-11"	4'-10⅛"	14'-8"	9'-7⅛"	19'-5"	14'-4⅛"	24'-2"	19'-1⅛"
5'	3'	2'-8⅛"	6'-0"	3'-3⅛"	11'-8"	8'-11⅛"	17'-4"	14'-7⅛"	23'-0"	20'-3⅛"	28'-8"	26'-11⅛"
	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'-4⅜"	17'-4"	13'-0⅜"	23'-0"	18'-8⅜"	28'-8"	24'-4⅜"
	6'	5'-0⅞"	6'-2"	1'-1⅛"	11'-11"	6'-10⅛"	17'-8"	12'-7⅛"	23'-5"	18'-4⅛"	29'-2"	24'-1⅛"
	7'	6'-2⅝"	6'-5"	0'-0⅜"	12'-1"	5'-10⅜"	17'-11"	11'-8⅜"	23'-9"	17'-11⅜"	29'-7"	23'-4⅜"
6'	3'	2'-8⅛"	7'-0"	4'-3⅛"	13'-8"	10'-11⅛"	20'-4"	17'-7⅛"	27'-0"	24'-3⅛"	33'-8"	30'-11⅛"
	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'-4⅜"	20'-4"	16'-0⅜"	27'-0"	22'-8⅜"	33'-8"	29'-4⅜"
	6'	5'-0⅞"	7'-2"	2'-1⅛"	13'-11"	8'-10⅛"	20'-8"	15'-7⅛"	27'-5"	22'-4⅛"	34'-2"	29'-1⅛"
	7'	6'-2⅝"	7'-5"	1'-0⅜"	14'-1"	7'-10⅜"	20'-11"	14'-8⅜"	27'-9"	21'-11⅜"	34'-7"	28'-4⅜"
	8'	7'-1⅜"	7'-8"	0'-0"	14'-6"	6'-10"	21'-0"	13'-3"	27'-10"	20'-6"	34'-8"	27'-4"
7'	4'	3'-6"	8'-0"	4'-6"	15'-8"	12'-8"	23'-4"	19'-10"	31'-0"	27'-6"	38'-8"	35'-2"
	5'	4'-3⅜"	8'-0"	3'-8⅜"	15'-8"	11'-9⅜"	23'-4"	19'-0⅜"	31'-0"	26'-8⅜"	38'-8"	34'-4⅜"
	6'	5'-0⅞"	8'-2"	3'-1⅛"	15'-11"	10'-11⅛"	23'-8"	18'-7⅛"	31'-5"	26'-4⅛"	39'-2"	34'-1⅛"
	7'	6'-2⅝"	8'-5"	2'-0⅜"	16'-1"	9'-10⅜"	23'-11"	17'-8⅜"	31'-9"	25'-5⅜"	39'-7"	33'-4⅜"
	8'	7'-1⅜"	8'-8"	1'-0"	16'-6"	8'-10"	24'-0"	16'-3"	31'-10"	24'-0"	39'-8"	32'-4"
8'	4'	3'-6"	9'-10"	5'-6"	17'-8"	14'-8"	26'-8"	22'-10"	35'-0"	31'-6"	43'-8"	40'-0"
	5'	4'-3⅜"	9'-2"	4'-10⅜"	17'-11"	13'-9⅜"	26'-8"	22'-0⅜"	35'-5"	31'-1⅜"	44'-2"	39'-10⅜"
	6'	5'-0⅞"	9'-5"	4'-1⅛"	17'-11"	12'-10⅛"	26'-8"	21'-2⅛"	35'-5"	30'-5⅛"	44'-2"	39'-1⅛"
	7'	6'-2⅝"	9'-8"	3'-0⅜"	18'-1"	11'-10⅜"	26'-11"	20'-3⅜"	35'-9"	29'-6⅜"	44'-7"	38'-4⅜"
	8'	7'-1⅜"	9'-9"	2'-0"	18'-2"	10'-10"	27'-0"	19'-0"	35'-10"	28'-6"	44'-8"	37'-4"
9'	5'	4'-3⅜"	10'-2"	5'-10⅜"	19'-10"	15'-7⅜"	29'-8"	25'-4⅜"	39'-5"	35'-1⅜"	49'-2"	44'-10⅜"
	6'	5'-0⅞"	10'-3"	5'-1⅛"	20'-1"	15'-0⅛"	29'-10"	24'-5⅛"	39'-9"	34'-5⅛"	49'-7"	44'-1⅛"
	7'	6'-2⅝"	10'-3"	4'-0⅜"	20'-1"	13'-10⅜"	29'-10"	23'-3⅜"	39'-9"	33'-2⅜"	49'-7"	42'-8⅜"
	8'	7'-1⅜"	10'-10"	3'-0"	20'-6"	12'-10"	30'-0"	22'-0"	39'-10"	32'-0"	49'-8"	41'-8"
10'	5'	4'-3⅜"	11'-2"	6'-10⅜"	21'-11"	17'-7⅜"	32'-8"	28'-4⅜"	43'-5"	39'-1⅜"	54'-2"	49'-10⅜"
	6'	5'-0⅞"	11'-3"	6'-1⅛"	22'-1"	17'-0⅛"	32'-11"	27'-10⅛"	43'-9"	38'-5⅛"	54'-7"	49'-1⅛"
	7'	6'-2⅝"	11'-3"	5'-0⅜"	22'-1"	15'-10⅜"	32'-11"	26'-8⅜"	43'-9"	37'-2⅜"	54'-7"	47'-8⅜"
	8'	7'-1⅜"	11'-8"	4'-0"	22'-6"	14'-10"	33'-0"	25'-8"	43'-10"	36'-6"	54'-8"	47'-8"
11'	6'	5'-0⅞"	12'-4"	7'-3⅛"	24'-2"	19'-1⅛"	36'-0"	30'-11⅛"	47'-10"	42'-9⅛"		
	7'	6'-2⅝"	12'-5"	6'-1⅜"	24'-2"	17'-11⅜"	36'-0"	29'-9⅜"	47'-10"	41'-7⅜"		
	8'	7'-1⅜"	12'-8"	5'-0"	24'-6"	16'-10"	36'-0"	28'-8"	47'-10"	40'-6"		
12'	6'	5'-0⅞"	13'-1"	8'-3⅛"	26'-2"	21'-1⅛"	39'-0"	33'-11⅛"	51'-10"	46'-9⅛"		
	7'	6'-2⅝"	13'-1"	7'-1⅜"	26'-2"	19'-11⅜"	39'-0"	32'-9⅜"	51'-10"	45'-7⅜"		
	8'	7'-1⅜"	13'-6"	6'-0"	26'-2"	18'-10"	39'-0"	31'-8"	51'-10"	44'-6"		

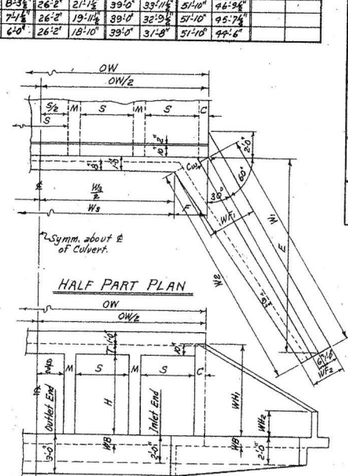






NOTE:- Plans and Elevations are not to scale.





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	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 STRAIGHT: Longitudinal in top of wing footing heel.			F4 STRAIGHT: Longitudinal in bottom of wing footing toe.			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.			H4 BENT: Dowels thru construction joint at headwall.				QUANTITY STEEL PER WING	BAR BENDING DIAGRAMS
H	SIZE	SPACING	NO. REQD	LENGTHS VARY MIN.	LENGTHS VARY MAX.	X MIN.	X MAX.	Y MIN.	Y MAX.	SIZE	SPACING	NO. REQD	LENGTH	X	Y	SIZE	NO. REQD	LENGTH	SIZE	NO. REQD	LENGTH	SIZE	SPACING	NO. REQD	LENGTHS VARY MAX.	LENGTHS VARY MIN.	SIZE	NO. REQD	LENGTH	SIZE	SPACING	NO. REQD	LENGTH	X	LB.	
2'	#3	18"	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	—	4'-0"	#8	1	7'-4"	#3	12"	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"	2	7'-6"	#3	12"	2	7'-6"	4'-0"	#8	1	9'-9"	#3	12"	3	2'-8"	1'-9"	41.1	
4'	#3	12"	13	2'-9"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—	#3	1	14'-3"	#3	3	13'-6"	#3	12"	1	11'-10"	#3	12"	3	10'-11"	4'-0"	#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"	#3	12"	2	14'-2"	#3	12"	3	10'-11"	4'-0"	#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'-6"	1'-4"	3'-3"	#3	1	19'-0"	#3	3	18'-6"	#3	12"	2	16'-6"	#3	12"	4	14'-4"	4'-0"	#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'-8"	#4	4	21'-0"	#4	12"	2	18'-9"	#4	12"	5	17'-9"	4'-0"	#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'-8"	#4	12"	3	21'-1"	#4	12"	5	17'-9"	4'-0"	#4	1	21'-10"	#4	12"	8	3'-6"	1'-9"	356.4	

NOTE:- Dimensions are to bar centers.

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

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WINGWALL	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"	108.0	4.50	5.46	6.42	7.38	8.34
	3'	6"	7"	169.8	6.26	7.27	8.17	9.13	10.09
	4'	6"	7"	259.6	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	6.97	7.68	8.79	9.96	11.12
	4'	6"	7"	259.6	8.56	9.70	10.87	10.03	13.20
	5'	6"	7"	357.8	10.96	12.10	13.26	14.43	15.59
	6'	7"	8"	583.1	14.77	15.96	17.15	18.34	19.54
	7'	7⅛"	8⅛"	1184.6	18.92	20.15	21.37	22.59	23.80
6'	3'	6"	7"	164.9	6.68	8.06	9.42	10.80	12.18
	4'	6"	7"	259.6	8.75	10.14	11.49	12.87	14.25
	5'	6"	7"	357.8	11.15	12.53	13.89	15.27	16.65
	6'	7"	8"	583.1	14.98	16.39	17.78	19.18	20.59
	7'	7⅛"	8⅛"	1184.6	19.15	20.58	22.00	23.43	24.86
	8'	8"	9"	1925.6	24.09	25.63	26.96	28.39	29.83
7'	4'	6"	7"	259.6	8.97	10.58	12.15	13.76	15.35
	5'	6"	7"	357.8	11.36	12.97	14.59	16.15	17.75
	6'	7"	8"	583.1	15.20	16.82	18.42	20.04	21.66
	7'	7⅛"	8⅛"	1184.6	19.38	21.02	22.64	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	15.92	17.27	19.09	20.93	22.75
	7'	7⅛"	8⅛"	1184.6	19.59	21.46	23.30	25.16	26.99
	8'	8"	9"	1925.6	24.54	26.97	28.29	30.11	31.96
9'	5'	7"	7"	357.8	12.26	14.04	16.87	18.45	20.97
	6'	7⅛"	8"	583.1	15.96	18.04	20.09	22.19	24.23
	7'	7⅛"	8⅛"	1184.6	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	12.99	14.80	17.05	19.26	21.52
	6'	7⅛"	8"	583.1	16.17	18.30	20.77	22.99	25.28
	7'	7⅛"	8⅛"	1184.6	20.09	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"	9"	583.1	16.69	19.27	21.76	24.23	
	7'	8"	8⅛"	1184.6	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	22.95	25.18	
	7'	8"	8⅛"	1184.6	20.87	23.69	26.90	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.

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

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS

4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS
SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES.

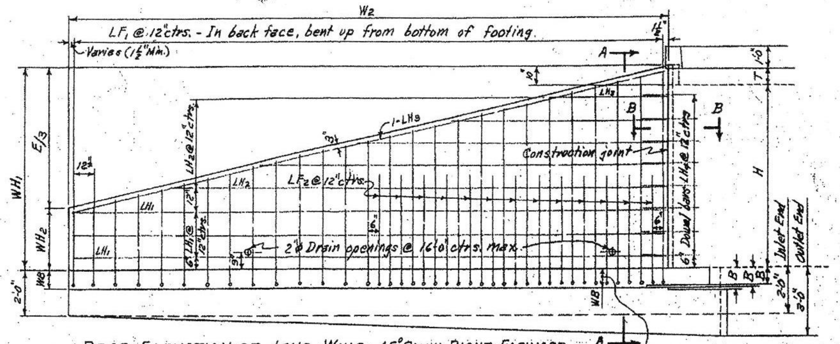
3:1 SLOPES
ALL DEPTHS OF COVER FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X003-1

Designed By:- W.C.H. 8-20-62. Checked By:- RHS 1-9-63
Drawn By:- W.C.H. 12-4-62. Checked By:- RHS 1-31-63
Quantities By:- W.C.H. 12-14-62. Rechecked By:- RHS 3-29-63

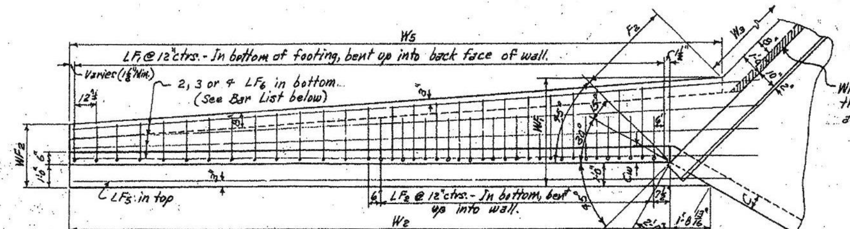
MYLAR

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



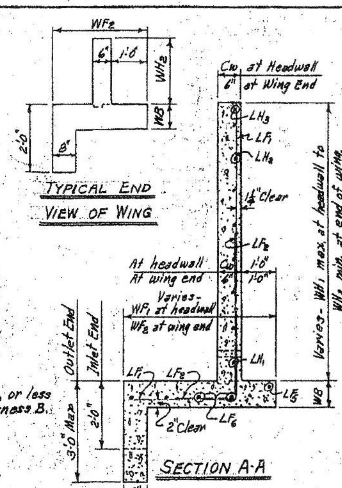
REAR ELEVATION OF LONG WING - 15° SKEW RIGHT FORWARD
SHOWING BACK FACE REINFORCING

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



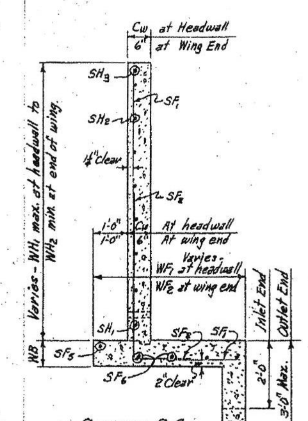
PLAN OF LONG WING - 15° SKEW RIGHT FORWARD
SHOWING FOOTING REINFORCING

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



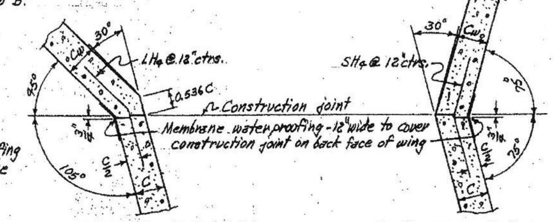
TYPICAL END VIEW OF WING

SECTION A-A

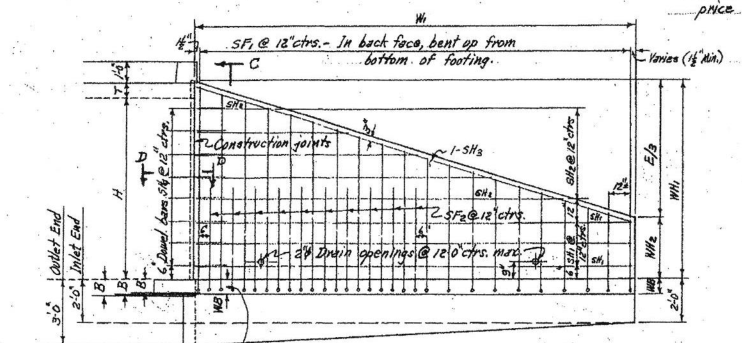


SECTION C-C

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

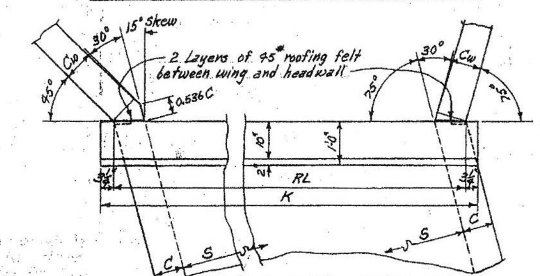


SECTION B-B SECTION D-D
SECTIONS THRU CONSTRUCTION JOINTS

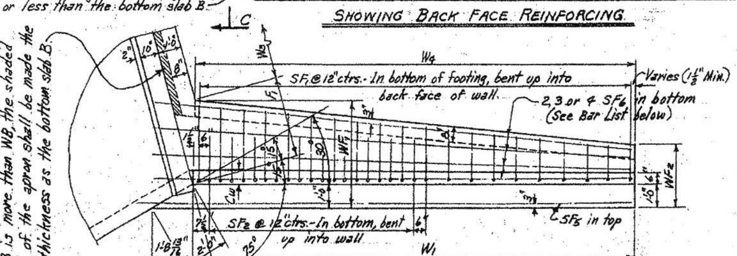


WB may be more, equal to, or less than the bottom slab B.

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

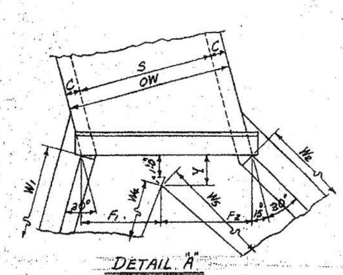


DETAILS AT TOP OF WINGS
15° SKEW RIGHT FORWARD



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

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



DETAIL "A"

TABLE "A" - DIMENSIONS FOR DETAIL "A"

S	H	F1	F2	W4	W5	W3	Y
5'	7'	3'-0"	3'-5 5/8"	16'-10 1/2"	25'-0 3/4"	0"	1'-0 1/4"
6'	8'	3'-6"	4'-1 1/8"	19'-0 1/4"	28'-3 1/2"	0"	1'-1"

REGULAR WING DIMENSIONS - 3:1 SLOPES

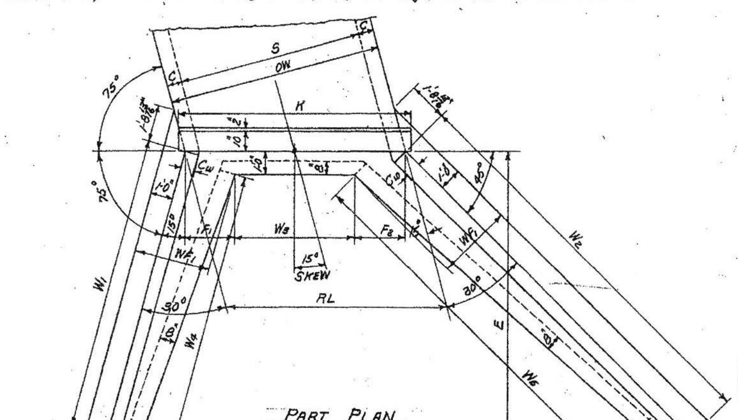
Clear Height of Box	Thickness of Wing Footing	Thickness of Wing at Hdwl. = C	Wingwall Heights: At Headwall	Wingwall Heights: At End of Wing	Widths of Wing Footings: At Headwall	Widths of Wing Footings: At End of Wing	Footing Dimension Parallel with Headwall: Short Wing	Footing Dimension Parallel with 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.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	1'-1 3/8"	0'-10 5/8"	6'-6"	6'-8 3/4"	9'-2 1/4"	6'-0 1/2"	9'-1 1/4"	0.789	1.094	0.876	1.212
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1 1/2"	1'-5 1/2"	1'-4 1/4"	8'-6"	8'-9 1/2"	12'-0 1/4"	8'-2 1/2"	12'-3 1/4"	1.186	1.650	1.300	1.808
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	1'-9 5/8"	1'-10"	10'-6"	10'-10 1/2"	14'-10 1/4"	10'-4 1/2"	15'-5 1/4"	1.656	2.305	1.797	2.502
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4 1/2"	2'-1 3/4"	2'-3 5/8"	12'-6"	12'-11 1/4"	17'-8 1/4"	12'-6 1/4"	18'-7 1/4"	2.196	3.059	2.363	3.295
		7"	5'-10"	1'-8"	3'-4"	2'-4 1/2"	2'-1 3/4"	2'-3 5/8"	12'-6"	12'-11 1/4"	17'-8 1/4"	12'-6 1/4"	18'-7 1/4"	2.287	3.188	2.455	3.424
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-5 7/8"	2'-9 1/4"	14'-6"	15'-0 1/4"	20'-6"	14'-8 1/4"	21'-9"	3.052	4.242	3.246	4.517
		7 1/2"	6'-10"	2'-0"	3'-8"	2'-6"	2'-5 7/8"	2'-9 1/4"	14'-6"	15'-0 1/4"	20'-6"	14'-8 1/4"	21'-9"	3.114	4.329	3.309	4.605
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-5 7/8"	2'-9 1/4"	14'-6"	15'-0 1/4"	20'-6"	14'-8 1/4"	21'-9"	3.177	4.417	3.371	4.693
⊕ 7'	8 1/2"	7 1/2"	7'-10"	2'-4"	4'-2"	2'-7 1/2"	3'-0 3/8"	3'-5 3/4"	16'-6"	17'-1"	23'-4"	16'-10 3/4"	25'-1"	3.998	5.560	4.220	5.877
		8"	7'-10"	2'-4"	4'-2"	2'-7 1/2"	3'-0 3/8"	3'-5 3/4"	16'-6"	17'-1"	23'-4"	16'-10 3/4"	25'-1"	4.079	5.675	4.301	5.991
⊕ 8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-6 3/8"	4'-2 1/4"	18'-6"	19'-1 3/4"	26'-2"	19'-1 1/4"	28'-5"	5.111	7.111	5.360	7.470

* 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 5'x7' and 6'x8' Box Culverts.

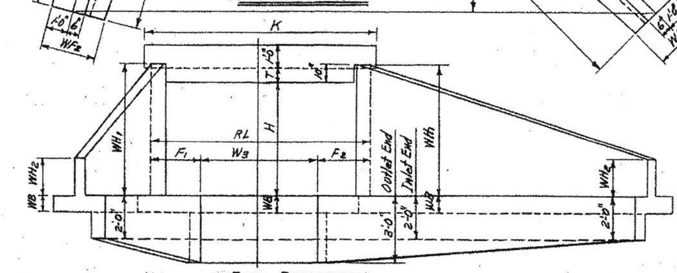
QUANTITIES

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"	117	4.79	5.78	6.77	7.77	8.76
	3'	6"	7"	176	6.65	7.64	8.63	9.63	10.62
	4'	6"	7"	267	8.85	9.84	10.84	11.83	12.82
	5'	6"	7"	379	11.40	12.38	13.38	14.37	15.36
	6'	7"	8"	626	15.95	16.96	17.98	18.51	19.53
5'	3'	6"	7"	176	6.87	8.07	9.28	10.48	11.69
	4'	6"	7"	267	9.08	10.28	11.48	12.69	13.90
	5'	6"	7"	379	11.61	12.81	14.02	15.23	16.44
	6'	7"	8"	626	15.67	16.90	18.14	19.38	20.61
	7'	7 1/2"	8 1/2"	1210	20.11	21.36	22.62	23.88	25.14
6'	3'	6"	7"	176	7.09	8.52	9.92	11.36	12.78
	4'	6"	7"	267	9.29	10.73	12.13	13.56	14.98
	5'	6"	7"	379	11.83	13.26	14.67	16.10	17.53
	6'	7"	8"	626	15.89	17.35	18.79	20.25	21.70
	7'	7 1/2"	8 1/2"	1210	20.33	21.81	23.28	24.76	26.24
	8'	8"	9"	1533	25.56	27.05	28.53	30.02	31.50
7'	4'	6"	7"	267	9.52	11.18	12.81	14.47	16.09
	5'	6"	7"	379	12.05	13.72	15.35	17.01	18.63
	6'	7"	8"	626	16.12	17.80	19.45	21.13	22.78
	7'	7 1/2"	8 1/2"	1210	20.56	22.26	23.94	25.64	27.33
	8'	8"	9"	1533	25.80	27.50	29.20	30.90	32.60
8'	4'	6"	7"	267	9.75	11.65	13.51	15.41	17.23
	5'	7"	7"	379	12.76	14.68	16.55	18.47	20.31
	6'	7"	8"	626	16.39	18.26	20.14	22.06	23.90
	7'	7 1/2"	8 1/2"	1210	20.78	22.72	24.62	26.55	28.42
	8'	8"	9"	1533	26.03	27.96	29.86	31.80	33.71
9'	5'	7"	7"	379	12.99	15.15	17.25	19.40	21.45
	6'	7 1/2"	8"	626	16.89	19.07	21.19	23.36	25.42
	7'	7 1/2"	8 1/2"	1210	21.01	23.19	25.31	27.48	29.54
	8'	8"	9"	1533	26.25	28.42	30.55	32.72	34.78
10'	5'	7"	7"	379	13.23	16.62	17.95	20.24	22.59
	6'	7 1/2"	8"	626	17.13	19.54	21.89	24.20	26.56
	7'	7 1/2"	8 1/2"	1210	21.44	23.66	26.01	28.32	30.68
	8'	8"	9"	1533	26.48	28.89	31.25	33.56	35.92
11'	6'	8"	8"	626	17.67	20.34	22.92	25.48	—
	7'	8"	8 1/2"	1210	21.88	24.55	27.13	29.69	—
	8'	8"	9"	1533	26.70	29.37	31.96	34.52	—
12'	6'	8"	8"	626	17.91	20.84	23.64	26.46	—
	7'	8"	8 1/2"	1210	22.11	25.04	27.85	30.67	—
	8'	8"	9"	1533	26.93	29.86	32.67	35.49	—

⊛ For reinforcing steel in Headwalls and Aprons, see Drawings listed below.



PART PLAN



END ELEVATION

SINGLE BARREL CULVERT - 15° SKEW RIGHT FORWARD
Details of Culvert with 15° Skew Left Forward is reversed, see Drwg. No. W-X15

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-X15. For values of RL, K, and W3 for each box, see the 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 in wings.

GENERAL NOTES:-

CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have 3/4" chamfers.

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

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

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

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

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-215X-1	R-315X-1	R-415X-1	R-515X-1
	R-215X-2	R-315X-2		

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.
SF5 & LF5 — Straight — Longitudinal in top of wing footing heel.
SF6 & LF6 — Straight — Longitudinal in bottom of wing footing toe.

H	Short or Long	SF1&LF1 Size	Spacing	No. Reqd	Lengths Vary Min.	Lengths Vary Max.	X Min.	X Max.	Y Min.	Y Max.	SF2&LF2 Size	Spacing	No. Reqd	Length	X	Y	SF5&LF5 Size	No. Reqd	Length	SF6&LF6 Size	No. Reqd	Length
2'	Short	#3	12"	7	1'-7"	3'-11"	0'-8"	1'-0"	1'-0"	3'-0"	—	—	—	—	—	—	#3	1	9'-2"	#3	2	7'-10"
	Long	#3	12"	10	1'-7"	3'-11"	0'-8"	1'-0"	0'-10"	3'-0"	—	—	—	—	—	—	#3	1	11'-8"	#3	2	10'-10"
3'	Short	#3	12"	9	2'-2"	5'-3"	0'-10"	1'-4"	1'-5"	4'-0"	—	—	—	—	—	—	#3	1	11'-3"	#3	2	10'-0"
	Long	#3	12"	13	1'-11"	5'-2"	0'-10"	1'-3"	1'-2"	4'-0"	—	—	—	—	—	—	#3	1	14'-6"	#3	2	14'-0"
4'	Short	#3	12"	11	2'-7"	6'-7"	0'-11"	1'-8"	1'-9"	5'-0"	—	—	—	—	—	—	#3	1	13'-4"	#3	3	12'-2"
	Long	#3	12"	15	2'-6"	6'-6"	0'-11"	1'-7"	1'-8"	5'-0"	—	—	—	—	—	—	#3	1	17'-4"	#3	3	17'-2"
5'	Short	#3	12"	13	3'-1"	7'-11"	1'-1"	2'-0"	2'-1"	6'-0"	#3	12"	4	3'-6"	1'-1"	2'-6"	#3	1	15'-5"	#3	3	14'-4"
	Long	#3	12"	18	3'-0"	7'-10"	1'-1"	1'-11"	2'-0"	6'-0"	#3	12"	5	3'-6"	1'-1"	2'-6"	#3	1	20'-2"	#3	3	20'-4"
6'	Short	#4	12"	16	3'-4"	9'-4"	1'-2"	2'-4"	2'-3"	7'-1"	#3	12"	4	4'-6"	1'-4"	3'-3"	#3	1	17'-6"	#3	3	16'-6"
	Long	#4	12"	21	3'-5"	9'-3"	1'-2"	2'-3"	2'-4"	7'-1"	#3	12"	5	4'-6"	1'-4"	3'-3"	#3	1	23'-0"	#3	3	23'-6"
7'	Short	#4	12"	18	3'-9"	10'-10"	1'-3"	2'-10"	2'-7"	8'-1"	#4	12"	7	5'-6"	1'-7"	4'-0"	#4	1	19'-7"	#4	4	18'-9"
	Long	#4	12"	24	3'-10"	10'-8"	1'-3"	2'-8"	2'-8"	8'-1"	#4	12"	9	5'-6"	1'-7"	4'-0"	#4	1	25'-10"	#4	4	26'-10"
8'	Short	#4	12"	20	4'-4"	12'-5"	1'-5"	3'-4"	3'-0"	9'-2"	#4	12"	10	6'-6"	1'-10"	4'-9"	#4	1	21'-8"	#4	4	21'-0"
	Long	#4	12"	27	4'-4"	12'-3"	1'-5"	3'-2"	3'-0"	9'-2"	#4	12"	13	6'-6"	1'-10"	4'-9"	#4	1	28'-8"	#4	4	30'-3"

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.
SH4 & LH4 — Bent — Dowels thru construction joint at headwall.

H	Short or Long	SH1&LH1 Size	Spacing	No. Reqd	Length	SH2&LH2 Size	Spacing	No. Reqd	Lengths Vary Max.	Lengths Vary Min.	SH3&LH3 Size	No. Reqd	Length	SH4&LH4 Size	Spacing	No. Reqd	Length	X	Quantity: Reinforcing Steel per Wing - Lbs. Short Wing	Long Wing
2'	Short	#3	12"	1	6'-5"	#3	12"	1	—	3'-6"	#3	1	6'-10"	#3	12"	2	2'-8"	1'-4"	24.9	33.4
	Long	#3	12"	1	8'-11"	#3	12"	1	—	4'-8"	#3	1	9'-1"	#3	12"	2	"	"		
3'	Short	#3	12"	1	8'-6"	#3	12"	2	6'-7"	3'-6"	#3	1	9'-0"	#3	12"	3	"	"	37.7	50.3
	Long	#3	12"	1	11'-9"	#3	12"	2	8'-11"	4'-8"	#3	1	12'-0"	#3	12"	3	"	"		
4'	Short	#3	12"	1	10'-7"	#3	12"	3	9'-8"	3'-6"	#3	1	11'-2"	#3	12"	4	"	"	57.3	76.4
	Long	#3	12"	1	14'-7"	#3	12"	3	18'-2"	4'-8"	#3	1	14'-11"	#3	12"	4	"	"		
5'	Short	#3	12"	2	12'-8"	#3	12"	3	9'-8"	3'-6"	#3	1	13'-4"	#3	12"	5	"	"	81.1	108.4
	Long	#3	12"	2	17'-5"	#3	12"	3	13'-2"	4'-8"	#3	1	17'-10"	#3	12"	5	"	"		
6'	Short	#3	12"	2	14'-9"	#3	12"	4	12'-9"	3'-6"	#3	1	15'-6"	#3	12"	6	"	"	134.8	178.1
	Long	#3	12"	2	20'-3"	#3	12"	4	17'-5"	4'-8"	#3	1	20'-9"	#3	12"	6	2'-8"	1'-4"		
7'	Short	#4	12"	2	16'-10"	#4	12"	5	15'-10"	3'-6"	#4	1	17'-8"	#4	12"	7	3'-6"	1'-9"	259.5	345.2
	Long	#4	12"	2	23'-1"	#4	12"	5	21'-8"	4'-8"	#4	1	23'-8"	#4	12"	7	"	"		
8'	Short	#4	12"	3	18'-11"	#4	12"	5	15'-10"	3'-6"	#4	1	19'-10"	#4	12"	8	"	"	328.0	438.3
	Long	#4	12"	3	25'-11"	#4	12"	5	21'-8"	4'-8"	#4	1	26'-7"	#4	12"	8	3'-6"	1'-9"		

BAR BENDING DIAGRAM: SF1 & SF2, LF1 & LF2 (Y, X, 3" Pin); SH4 & LH4 (X, 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".

Designed By- W.C.H. 5-13-63 Checked By-
Drawn By- W.C.H. 6-20-63 Checked By- B.H.S. 8-7-63
Quantities By- W.C.H. 9-23-63 Checked By-

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

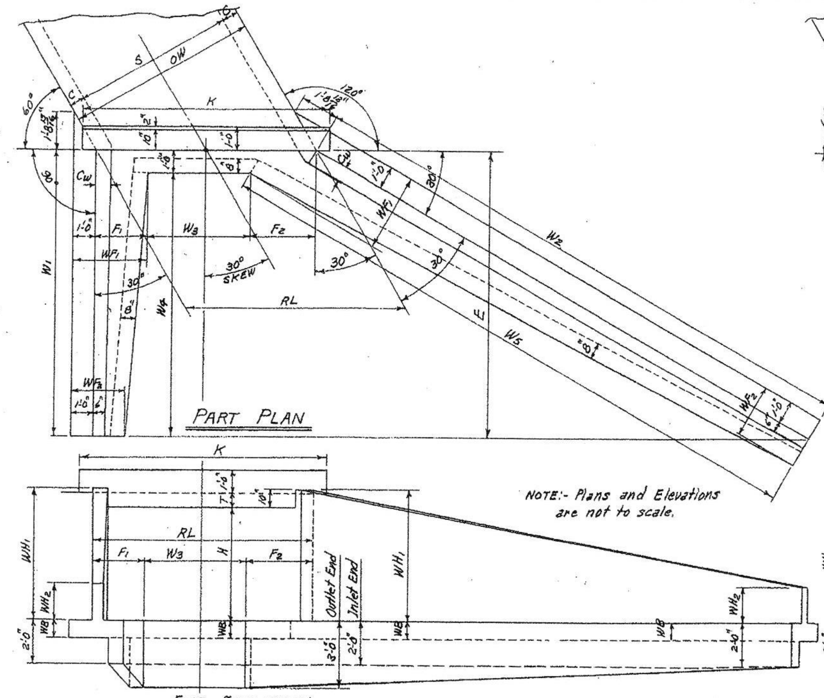
CLASS S CONCRETE

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 — 3:1 SLOPES
SINGLES, DOUBLES, TRIPLES, — ALL DEPTHS OF COVER
QUADRUPLES & QUINTUPLES — FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X153-1

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

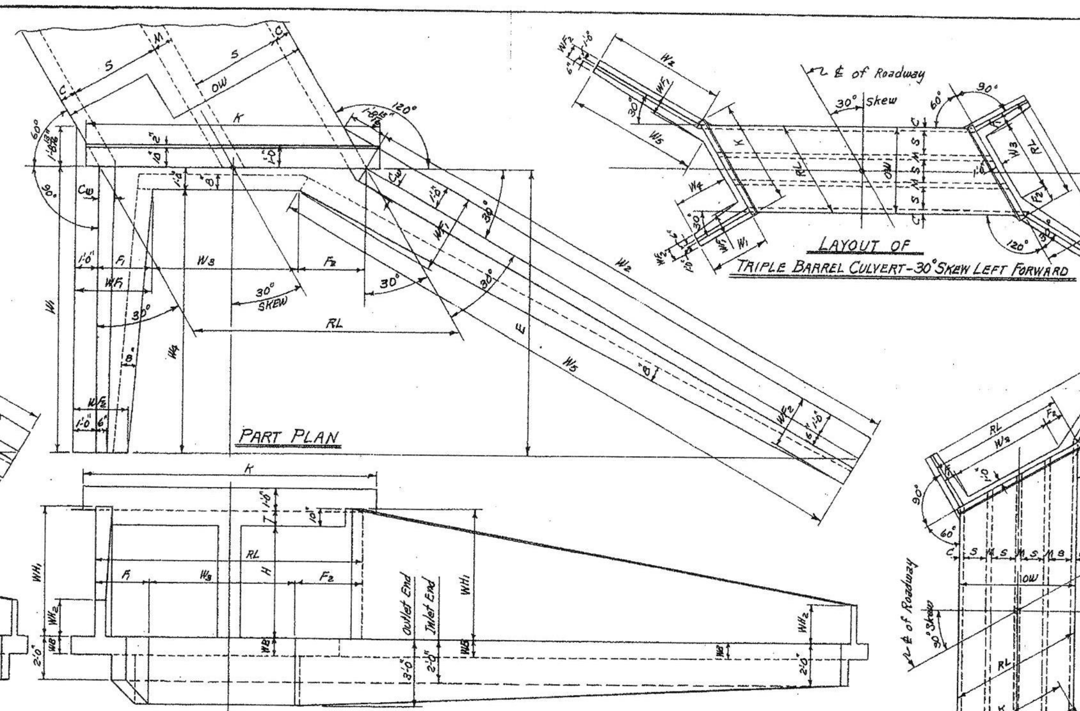


NOTE:- Plans and Elevations are not to scale.

END ELEVATION

SINGLE BARREL CULVERT-30° SKEW RIGHT FORWARD

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



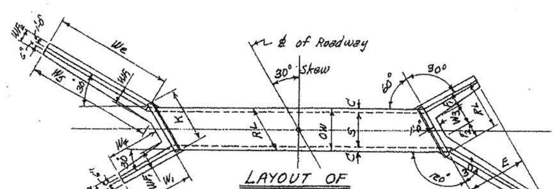
END ELEVATION

DOUBLE BARREL CULVERT-30° SKEW RIGHT FORWARD

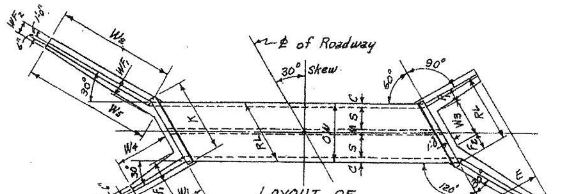
Details of Culvert with 30° Skew Left Forward is reversed, see Layout below.

LAYOUT OF TRIPLE BARREL CULVERT-30° SKEW LEFT FORWARD

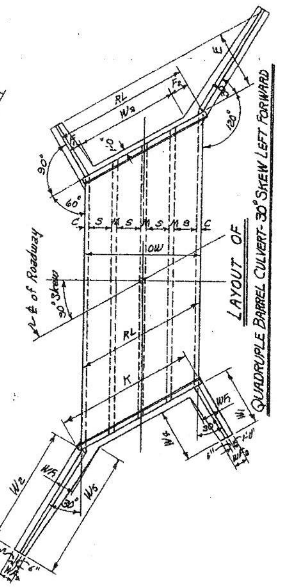
NOTE:- The length of the wings for the Plans, Elevations, and Layouts, as drawn, are proportioned for 3:1 slopes. For 2:1 slopes the wings are proportionally shorter, while for 4:1 slopes they are longer.



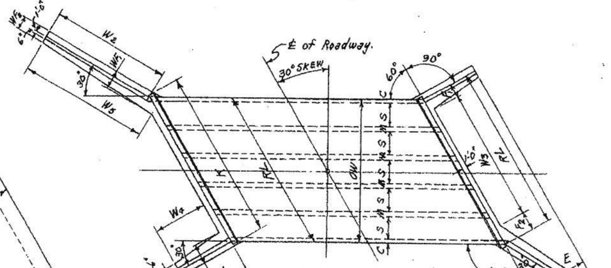
LAYOUT OF SINGLE BARREL CULVERT-30° SKEW LEFT FORWARD



LAYOUT OF DOUBLE BARREL CULVERT-30° SKEW LEFT FORWARD



LAYOUT OF QUADRUPLE BARREL CULVERT-30° SKEW LEFT FORWARD

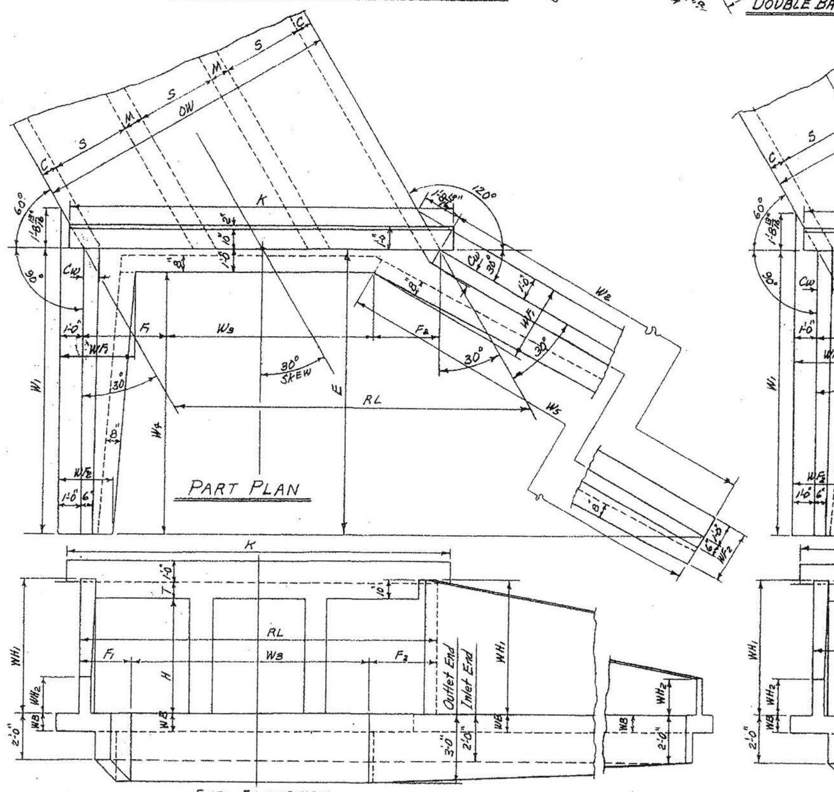


LAYOUT OF QUINTUPLE BARREL CULVERT-30° SKEW LEFT FORWARD

ROADWAY LENGTH RL — HEADWALL LENGTH K — APRON DIMENSION W_3

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
				RL = OW x 1.1547								K = RL+(1'-1⅞")								W_3 = RL-(F_1+F_2)			
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'-11¼"	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'-11¼"	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'-11¼"	18'-1"	10'-8"	19'-5"	22'-5"	23'-7"	16'-1¾"	24'-2"	27'-10⅞"	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'-6¾"	27'-8½"	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'-7⅛"	8'-2½"	17'-4"	20'-0¼"	21'-2"	14'-9"	23'-0"	26'-6¾"	27'-8½"	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'-5⅞"	17'-8"	20'-4¾"	21'-6¾"	14'-1½"	23'-5"	27'-0½"	28'-2¼"	20'-9¼"	29'-2"	33'-8¾"	34'-10"	27'-5"
		7'	7'-9¼"	6'-3"	7'-2⅝"	8'-4½"	Ⓐ 0"	12'-1"	13'-11⅛"	15'-1¼"	6'-2¼"	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'-11¼"	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'-7¼"
		4'	4'-3¼"	7'-0"	"	"	3'-9¾"	13'-8"	"	"	11'-6⅛"	20'-4"	"	"	19'-2½"	27'-0"	"	"	26'-11"	33'-8"	"	"	34'-7¼"
		5'	5'-3¼"	7'-0"	8'-1"	9'-2⅞"	2'-9¾"	13'-8"	15'-9⅜"	16'-11¼"	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'-7¼"
		6'	6'-3¼"	7'-2"	8'-3¼"	9'-5⅛"	2'-0"	13'-11"	16'-0⅞"	17'-2⅜"	9'-9⅝"	20'-8"	23'-10⅜"	25'-0¼"	17'-7¼"	27'-5"	31'-7⅞"	32'-9¾"	25'-4¾"	34'-2"	39'-5¼"	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'-4½"	27'-9"	32'-0½"	33'-2¼"	24'-3¼"	34'-7"	39'-11¼"	41'-1"	32'-2"
		8'	9'-3¼"	7'-4"	8'-5⅝"	9'-7½"	Ⓐ 0"	14'-2"	16'-4¼"	17'-6¼"	7'-1"	21'-0"	24'-3"	25'-4⅜"	14'-11¾"	27'-10"	32'-1¾"	33'-3½"	22'-10½"	34'-8"	40'-0⅜"	41'-2¼"	30'-9¼"
	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'-9¾"	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'-9¾"	39'-4½"
		6'	6'-3¼"	8'-2"	9'-5¼"	10'-7"	3'-2"	15'-11"	18'-4½"	19'-6½"	12'-1¼"	23'-8"	27'-4"	28'-5¾"	21'-0¾"	31'-5"	36'-3⅜"	37'-5¼"	30'-0"	39'-2"	45'-2⅜"	46'-4½"	38'-11½"
		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'-9⅞"	28'-10⅞"	39'-7"	45'-8½"	46'-10⅛"	37'-11¼"
		8'	9'-3¼"	8'-4"	9'-7½"	10'-9⅜"	0'-4¼"	16'-2"	18'-8"	19'-9¾"	9'-4¾"	24'-0"	27'-8⅞"	28'-10½"	18'-5¼"	31'-10"	36'-9⅛"	37'-11"	27'-6"	39'-8"	45'-9⅝"	46'-11½"	36'-6½"
	8'	4'	4'-3¼"	9'-0"	10'-4¾"	11'-6½"	6'-1½"	17'-8"	20'-4¾"	21'-6¾"	16'-1½"	26'-4"	30'-4⅞"	31'-6¾"	26'-1¾"	35'-0"	40'-5"	41'-6¾"	36'-1¾"	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'-3⅞"	35'-9"	41'-3⅜"	42'-5⅛"	33'-6½"	44'-7"	51'-5¾"	52'-7½"	43'-8½"
		8'	9'-3¼"	9'-4"	10'-9⅜"	11'-11¼"	1'-6⅛"	18'-2"	20'-11¾"	22'-1½"	11'-8½"	27'-0"	31'-2⅛"	32'-4"	21'-11"	35'-10"	41'-4½"	42'-6½"	32'-1¼"	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'-11¾"	39'-5"	45'-6⅛"	46'-8"	40'-3"	49'-2"	56'-9¼"	57'-11¼"	51'-6"
		6'	6'-3¼"	10'-3"	11'-10"	13'-0"	5'-6¾"	20'-1"	23'-2¼"	24'-4¼"	16'-11"	29'-11"	34'-6½"	35'-8½"	28'-3¼"	39'-9"	45'-10⅜"	47'-0⅜"	39'-7½"	49'-7"	57'-3"	58'-5"	50'-11¾"
		7'	7'-9¼"	10'-3"	11'-10"	13'-0"	4'-0¾"	20'-1"	23'-2¼"	24'-4¼"	15'-5"	29'-11"	34'-6½"	35'-8½"	26'-9¼"	39'-9"	45'-10⅜"	47'-0⅜"	38'-1½"	49'-7"	57'-3"	58'-5"	49'-5¾"
		8'	9'-3¼"	10'-4"	11'-11¼"	13'-1"	2'-8"	20'-2"	23'-3½"	24'-5¼"	14'-0½"	30'-0"	34'-7⅜"	35'-9½"	25'-4¼"	39'-10"	46'-0"	47'-1¾"	36'-8¾"	49'-8"	57'-4¼"	58'-6"	48'-1"
	10'	5'	5'-3¼"	11'-2"	12'-10¾"	14'-0½"	7'-7½"	21'-11"	25'-3¾"	26'-5½"	20'-0½"	32'-8"	37'-8⅝"	38'-10½"	32'-5½"	43'-5"	50'-1⅛"	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'-7⅞"	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"	13'-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'-9¼"	41'-4¼"	54'-8"	63'-1½"	64'-3¼"	53'-10¼"
	11'	6'	6'-3¼"	12'-4"	14'-2⅞"	15'-4⅞"	7'-11⅝"	24'-2"	27'-10⅞"	29'-0¾"	21'-7⅞"	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'-1⅞"	36'-0"	"	"	33'-9½"	47'-10"	"	"	47'-5½"	—	—	—	—
		8'	9'-3¼"	12'-4"	"	"	4'-11⅝"	24'-2"	"	"	18'-7⅞"	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'-11¼"	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'-5¼"	39'-0"	"	"	37'-3¼"	51'-10"	"	"	52'-1"	—	—	—	—
		8'	9'-3¼"	13'-4"	"	"	6'-1½"	26'-2"	"	"	20'-11¼"	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'-11¾"	Ⓐ 0"	16'-5"	18'-11½"	20'-1⅛"	8'-2¼"	24'-4"	28'-1½"	29'-3"	17'-4"	32'-3"	37'-2⅞"	38'-4¾"	26'-5¾"	40'-2"	46'-4⅞"	47'-6½"	35'-7¼"
	8'	9'	10'-9¼"	9'-6"	10'-11⅝"	12'-1½"	0'-2⅞"	18'-5"	21'-3¼"	22'-5"	10'-6"	27'-4"	31'-6⅞"	32'-8½"	20'-9½"	36'-3"	41'-10¼"	43'-0¼"	31'-1"	45'-2"	52'-1⅞"	53'-3¾"	41'-4¾"
		10'	12'-3¼"	9'-8"	11'-2"	12'-3¾"	Ⓐ 0"	18'-8"	21'-6¾"	22'-8½"	9'-3½"	27'-8"	31'-11⅜"	33'-1¼"	19'-8¼"	36'-8"	42'-4⅛"	43'-6"	30'-0¾"	45'-8"	52'-8¾"	53'-10¾"	40'-5½"
	9'	9'	10'-9¼"	10'-6"	12'-1½"	13'-3¼"	1'-4¼"	20'-5"	23'-6⅞"	24'-8¾"	12'-9¾"	30'-4"	35'-0⅛"	36'-2¼"	24'-3"	40'-3"	46'-5⅞"	47'-7½"	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'-1⅜"	40'-8"	46'-11½"	48'-1¼"	34'-8¼"	50'-8"	58'-6"	59'-8"	46'-2¾"
		11'	13'-9¼"	10'-10"	12'-6⅛"	13'-8"	Ⓐ 0"	20'-10"	24'-0⅜"	25'-2½"	10'-3½"	30'-10"	35'-7¼"	36'-9"	21'-10"	40'-10"	47'-1¾"	48'-3⅜"	33'-4½"	50'-10"	58'-8⅜"	59'-10¼"	44'-11¼"
	10'	9'	10'-9¼"	11'-6"	13'-3⅜"	14'-5¼"	2'-6⅛"	22'-5"	25'-10⅝"	27'-0½"	15'-3¼"	33'-4"	38'-5⅞"	39'-7¾"	27'-8¾"	44'-3"	51'-1⅛"	52'-3"	40'-4"	55'-2"	63'-8⅜"	64'-10¼"	52'-11¼"
		10'	12'-3¼"	11'-8"	13'-5¾"	14'-7½"	1'-2⅜"	22'-8"	26'-2⅛"	27'-4"	13'-10⅜"	33'-8"	38'-10½"	40'-0¼"	26'-7¼"	44'-8"	51'-7"	52'-8¾"	39'-3¾"	55'-8"	64'-3⅜"	65'-5¼"	52'-0"
		11'	13'-9¼"	11'-10"	13'-8"	14'-9¾"	Ⓐ 0"	22'-10"	26'-4⅜"	27'-6¼"	12'-7¼"	33'-10"	39'-0¾"	40'-2¾"	25'-3½"	44'-10"	51'-9¼"	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'-3½"	34'-0"	39'-3⅛"	40'-5"	24'-0"	45'-0"	51'-11½"	53'-1½"	36'-8¼"	56'-0"	64'-8"	65'-9¾"	49'-4¾"
	11'	9'	10'-9¼"	12'-6"	14'-5½"	15'-7"	3'-8"	24'-5"	28'-2⅜"	29'-4¼"	17'-5"	36'-4"	41'-11½"	43'-1¼"	31'-2¼"	48'-3"	55'-8⅝"	56'-10½"	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'-7½"	—	—	—	—
		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'-5½"	49'-0"	56'-7"	57'-8¾"	41'-3¾"	—	—	—	—
	12'	9'	10'-9¼"	13'-6"	15'-7⅛"	16'-9"	4'-9⅞"	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'-9½"	31'-11¼"	18'-6¼"	39'-8"	45'-9⅝"	46'-11½"	33'-6½"	52'-8"	60'-9¾"	61'-11¾"	48'-6½"	—	—	—	—
		11'	13'-9¼"	13'-10"	15'-11⅝"	17'-1½"	2'-2½"	26'-10"	30'-11⅞"	32'-1¾"	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'-2⅜"	62'-4¼"	45'-11¼"	—	—	—	—

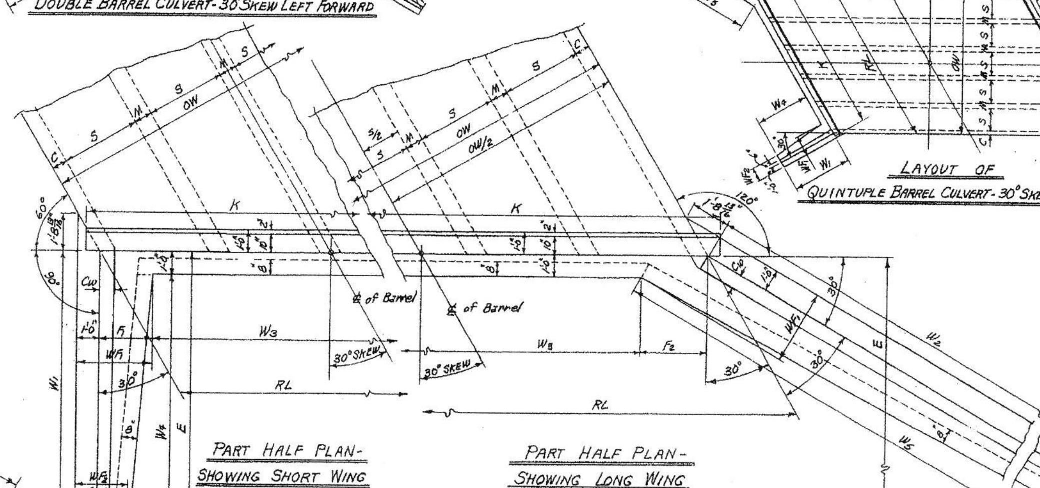
Ⓐ Special case for these boxes, See Detail "A" and Table "A" for revised values of F_1, F_2, W_4 and W_5, when apron width is more than 1'-0" and W_3=0". For Details "A" and Tables "A" for each slope, see Drawing Nos. W-X302-1, W-X302-2, or W-X303-1, W-X303-2, or W-X304-1, W-X304-2.



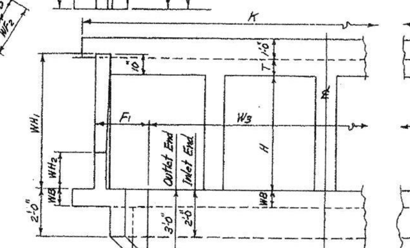
END ELEVATION

TRIPLE BARREL CULVERT- 30° SKEW RIGHT FORWARD

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



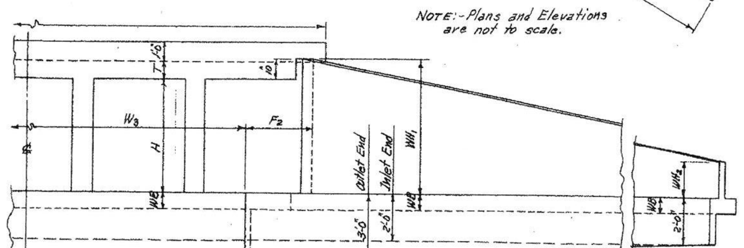
NOTE:-Plans and Elevations are not to scale.



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 END ELEVATION

QUINTUPLE BARREL CULVERT-30° SKEW RT. FWD.

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

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

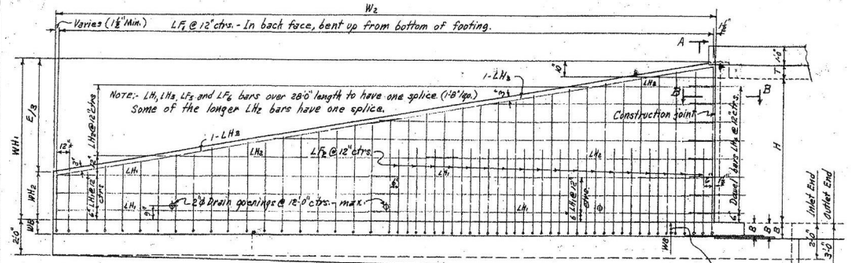
DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 30° SKEW

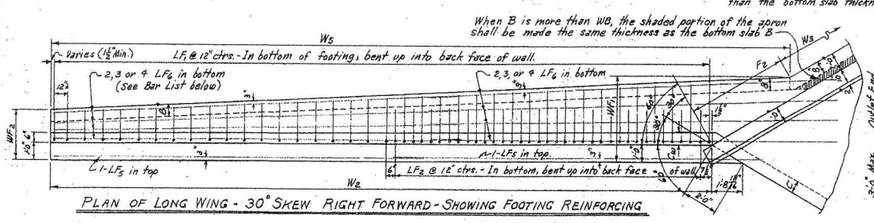
4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS — 2:1, 3:1 & 4:1 SLOPES

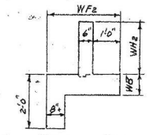
SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER H=2', 3', 4', 5', 6', 7', 8', 9', 10', 11' & 12'.

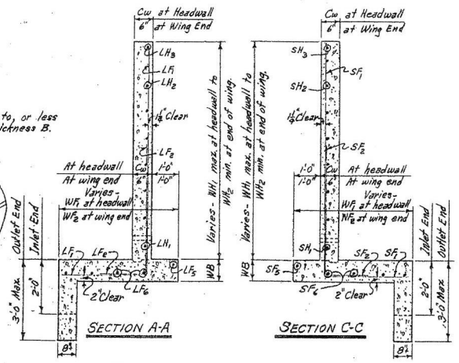
STANDARD DRAWING No. W-X30

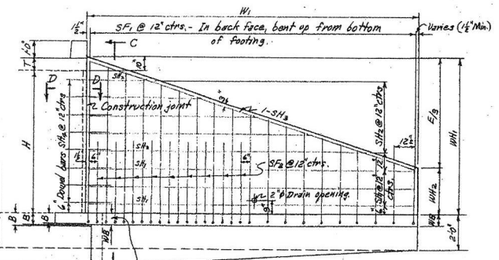
Designed by:- W.C.H. 5-16-63 Checked by:-
Drawn by:- W.C.H. 7-15-63 Checked by:- RHS 8-21-63
Quantities by:- Checked by:-

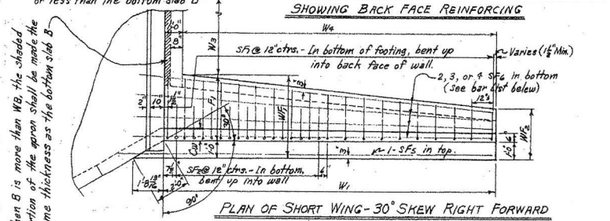


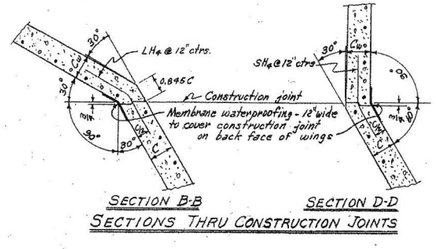


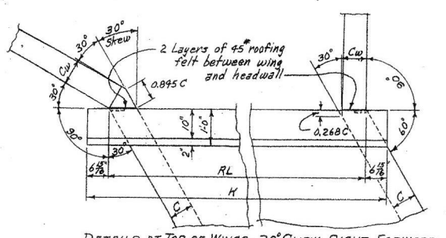


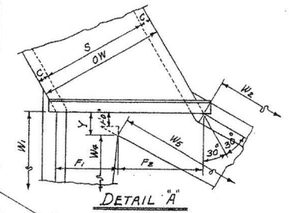


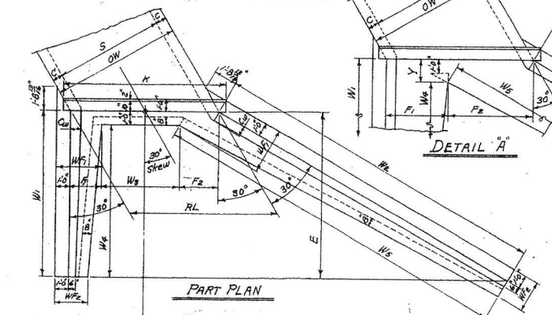


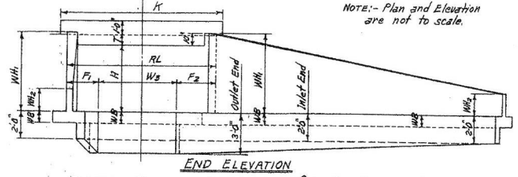












FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
JOB No.					

Designed By:- W.C.H 5-13-63 Checked By:-
Drawn By:- W.C.H. 7-26-63 Checked By:- BHS 8-19-63
Quantities By:- W.C.H. 1-7-64 Checked By:- DMT 7-15-64

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

TYPICAL END VIEW OF WING

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

SECTION A-A

SECTION C-C

REGULAR WING DIMENSIONS - 3:1 SLOPES

CLEAR HEIGHT OF BOX	THICKNESS OF WING FOOTING	THICKNESS OF WING AT HDWL = C	WINGWALL HEIGHTS		WIDTHS OF WING FOOTINGS		FOOTING DIMENSION - PARALLEL WITH HEADWALL		PERPENDICULAR DIST. FROM HDWL TO END OF WING	LENGTHS OF WINGWALLS		INSIDE FOOTING DIMENSION		* QUANTITY PER WING CLASS S CONCRETE			
			AT HEADWALL	AT END OF WING	AT HEADWALL	AT END OF WING	SHORT WING	LONG WING		SHORT WING	LONG WING	SHORT WING	LONG WING	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'-11¼"	6'-6"	6'-6"	13'-0"	5'-6"	13'-3¾"	0.752	1.599	0.836	1.717
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-8"	1'-7¼"	8'-6"	8'-6"	17'-0"	7'-6"	17'-10¾"	1.130	2.340	1.239	2.565
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	2'-0"	2'-3¼"	10'-6"	10'-6"	21'-0"	9'-6"	22'-5½"	1.577	3.270	1.711	3.552
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11¼"	12'-6"	12'-6"	25'-0"	11'-6"	27'-0½"	2.093	4.341	2.252	4.680
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11¼"	12'-6"	12'-6"	25'-0"	11'-6"	27'-0½"	2.179	4.524	2.337	4.862
⊙ 6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	2.908	6.024	3.092	6.419
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	2.966	6.147	3.150	6.543
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	3.025	6.272	3.208	6.667
⊙ 7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	16'-6"	16'-6"	33'-0"	15'-6"	36'-5¾"	3.811	7.895	4.019	8.350
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	16'-6"	16'-6"	33'-0"	15'-6"	36'-5¾"	3.887	8.057	4.095	8.512
⊙ 8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	5'-7¼"	18'-6"	18'-6"	37'-0"	17'-6"	41'-4¼"	4.874	10.097	5.107	10.612

* 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'-7⅞"	3'-3¾"	0"	1'-1⅞"	13'-4¼"	31'-3½"
5'	7'	3'-1⅝"	4'-1"	0"	1'-3¼"	15'-2⅜"	35'-10¾"
6'	8'	3'-7½"	4'-10⅛"	0"	1'-4¾"	17'-1¼"	40'-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"	141	5.80	6.90	8.01	9.12	10.23
	3'	6"	7"	213	8.08	9.18	10.29	11.40	12.51
	4'	6"	7"	327	10.78	11.88	12.99	14.10	15.21
	5'	6"	7"	460	13.90	15.00	16.11	17.22	18.32
	6'	7"	8"	762	18.85	19.99	21.13	22.27	23.41
5'	3'	6"	7"	213	8.33	9.67	11.01	12.36	13.70
	4'	6"	7"	327	11.03	12.36	13.71	15.06	16.40
	5'	6"	7"	460	14.14	15.48	16.83	18.17	19.52
	6'	7"	8"	762	19.11	20.48	21.86	23.24	24.62
	7'	7½"	8½"	1474	24.51	25.94	27.35	28.75	30.16
6'	3'	6"	7"	213	8.57	10.17	11.73	13.33	14.92
	4'	6"	7"	327	11.27	12.86	14.43	16.03	17.62
	5'	6"	7"	460	14.38	15.98	17.55	19.15	20.73
	6'	7"	8"	762	19.35	20.98	22.59	24.21	25.83
	7'	7½"	8½"	1474	24.79	26.44	28.08	29.73	31.38
	8'	8"	9"	1870	31.15	32.87	34.51	36.17	37.83
7'	4'	6"	7"	327	11.52	13.37	15.19	17.05	18.85
	5'	6"	7"	460	14.63	16.49	18.31	20.16	21.97
	6'	7"	8"	762	19.61	21.48	23.32	25.20	27.04
	7'	7½"	8½"	1474	25.05	26.94	28.82	30.71	32.59
	8'	8"	9"	1870	31.47	33.37	35.25	37.16	39.05
8'	4'	6"	7"	327	11.77	13.89	15.97	18.09	20.12
	5'	7"	7"	460	15.46	17.60	19.70	21.83	23.89
	6'	7"	8"	762	19.86	21.98	24.05	26.17	28.20
	7'	7½"	8½"	1474	25.80	27.46	29.58	31.73	33.81
	8'	8"	9"	1870	31.72	33.88	36.00	38.16	40.27
9'	5'	7"	7"	460	15.72	18.13	20.47	22.87	25.15
	6'	7½"	8"	762	20.50	22.93	25.29	27.71	30.01
	7'	7½"	8½"	1474	25.55	27.98	30.34	32.76	35.07
	8'	8"	9"	1870	31.97	34.39	36.76	39.18	41.49
10'	5'	7"	7"	460	15.98	18.65	21.25	23.80	26.42
	6'	7½"	8"	762	20.76	23.45	26.07	28.64	31.28
	7'	7½"	8½"	1474	25.81	28.50	31.12	33.70	36.34
	8'	8"	9"	1870	32.22	34.91	37.54	40.12	42.76
11'	6'	8"	8"	762	21.39	24.38	27.25	30.11	——
	7'	8"	8½"	1474	26.55	29.53	32.41	35.27	——
	8'	8"	9"	1870	32.47	35.45	38.33	41.19	——
12'	6'	8"	8"	762	21.66	24.93	28.05	31.20	——
	7'	8"	8½"	1474	26.81	30.08	33.21	36.36	——
	8'	8"	9"	1870	32.73	35.99	39.13	42.28	——

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

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

SECTION B-B

SECTION D-D

SECTIONS THRU CONSTRUCTION JOINTS

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

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

DETAILS AT TOP OF WINGS - 30° SKEW RIGHT FORWARD

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 of wings.

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 (or two bars) of each length									SF2 & LF2 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.			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.			SH4 & LH4 BENT Dowels thru construction joint at headwall.					BAR BENDING DIAGRAM	QUANTITY REINFORCING STEEL PER WING - LBS.	
H	SHORT OR LONG	SIZE	SPACING	NO. REQ'D	LENGTHS VARY MIN.	LENGTHS VARY MAX.	X MIN.	X MAX.	Y MIN.	Y MAX.	SIZE	SPACING	NO. REQ'D	LENGTH	X	Y	SIZE	NO. REQ'D	LENGTH	SIZE	NO. REQ'D	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTHS VARY MAX.	LENGTHS VARY MIN.	SIZE	NO. REQ'D	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTH	X		SHORT WING	LONG WING
2'	Short	#3	12"	7	1'-7"	3'-11"	0'-8"	1'-0"	1'-0"	3'-0"	—	—	—	—	—	—	#3	1	9'-0"	#3	2	8'-0"	#3	12"	1	6'-3"	#3	12"	1	—	3'-3"	#3	1	6'-7"	#3	12"	2	2'-8"	1'-4"		24.7	45.6
	Long	#3	12"	14	1'-5"	3'-11"	0'-8"	1'-0"	0'-10"	3'-0"	—	—	—	—	—	—	#3	1	15'-6"	#3	2	15'-6"	#3	12"	1	12'-8"	#3	12"	1	—	6'-6"	#3	1	12'-11"	#3	12"	2	"	"			
3'	Short	#3	12"	9	2'-1"	5'-3"	0'-10"	1'-4"	1'-4"	4'-0"	—	—	—	—	—	—	#3	1	11'-0"	#3	2	10'-0"	#3	12"	1	8'-3"	#3	12"	2	6'-3"	3'-3"	#3	1	8'-8"	#3	12"	3	"	"		37.0	69.5
	Long	#3	12"	18	1'-11"	5'-3"	0'-10"	1'-4"	1'-2"	4'-0"	—	—	—	—	—	—	#3	1	19'-6"	#3	2	20'-2"	#3	12"	1	16'-8"	#3	12"	2	12'-6"	6'-6"	#3	1	16'-11"	#3	12"	3	"	"			
4'	Short	#3	12"	11	2'-6"	6'-7"	0'-11"	1'-8"	1'-8"	5'-0"	—	—	—	—	—	—	#3	1	13'-0"	#3	3	12'-0"	#3	12"	1	10'-3"	#3	12"	3	9'-3"	3'-3"	#3	1	10'-9"	#3	12"	4	"	"		56.2	107.2
	Long	#3	12"	22	2'-4"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—	#3	1	23'-6"	#3	3	24'-0"	#3	12"	1	20'-8"	#3	12"	3	18'-6"	6'-6"	#3	1	21'-0"	#3	12"	4	"	"			
5'	Short	#3	12"	13	2'-11"	7'-11"	1'-0"	2'-0"	2'-0"	6'-0"	#3	12"	3	3'-6"	1'-1"	2'-6"	#3	1	15'-0"	#3	3	14'-0"	#3	12"	2	12'-3"	#3	12"	3	9'-3"	3'-3"	#3	1	12'-11"	#3	12"	5	"	"	NOTE:- Dimensions are to bar centers.	78.0	152.2
	Long	#3	12"	26	2'-9"	7'-10"	1'-0"	1'-11"	1'-10"	6'-0"	#3	12"	6	3'-6"	1'-1"	2'-6"	#3	1	27'-6"	#3	6	15'-7"	#3	12"	2	24'-8"	#3	12"	3	18'-6"	6'-6"	#3	1	25'-1"	#3	12"	5	"	"			
6'	Short	#4	12"	15	3'-6"	9'-4"	1'-2"	2'-4"	2'-5"	7'-1"	#3	12"	3	4'-6"	1'-4"	3'-3"	#3	1	17'-0"	#3	3	16'-0"	#3	12"	2	14'-3"	#3	12"	4	12'-3"	3'-3"	#3	1	15'-0"	#3	12"	6	"	"		127.8	253.1
	Long	#4	12"	30	3'-4"	9'-3"	1'-2"	2'-3"	2'-3"	7'-1"	#3	12"	6	4'-6"	1'-4"	3'-3"	#3	2	16'-8"	#3	6	18'-0"	#3	12"	4	15'-2"	#3	12"	4	24'-6"	6'-6"	#3	2	15'-5"	#3	12"	6	2'-8"	1'-4"			
7'	Short	#4	12"	17	3'-11"	10'-10"	1'-3"	2'-10"	2'-9"	8'-1"	#4	12"	6	5'-6"	1'-7"	4'-0"	#4	1	19'-0"	#4	4	18'-0"	#4	12"	2	16'-3"	#4	12"	5	15'-3"	3'-3"	#4	1	17'-1"	#4	12"	7	3'-6"	1'-9"		267.0	489.8
	Long	#4	12"	34	3'-9"	10'-8"	1'-3"	2'-8"	2'-7"	8'-1"	#4	12"	12	5'-6"	1'-7"	4'-0"	#4	2	18'-8"	#4	8	20'-4"	#4	12"	4	17'-2"	#4	12"	5	*30'-6"	6'-6"	#4	2	17'-5"	#4	12"	7	"	"			
8'	Short	#4	12"	19	4'-6"	12'-5"	1'-5"	3'-4"	3'-2"	9'-2"	#4	12"	9	6'-6"	1'-10"	4'-9"	#4	1	21'-0"	#4	4	20'-0"	#4	12"	3	18'-3"	#4	12"	5	15'-3"	3'-3"	#4	1	19'-3"	#4	12"	8	"	"		312.9	622.3
	Long	#4	12"	38	4'-4"	12'-3"	1'-5"	3'-2"	3'-0"	9'-2"	#4	12"	18	6'-6"	1'-10"	4'-9"	#4	2	20'-8"	#4	8	22'-9"	#4	12"	6	19'-2"	#4	12"	5	*30'-6"	6'-6"	#4	2	19'-6"	#4	12"	8	3'-6"	1'-9"			

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

* Length without splice. Bars over 28'-0" length may be spliced. (1'-8" lap.)

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

GENERAL NOTES:-

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

CLASS S CONCRETE

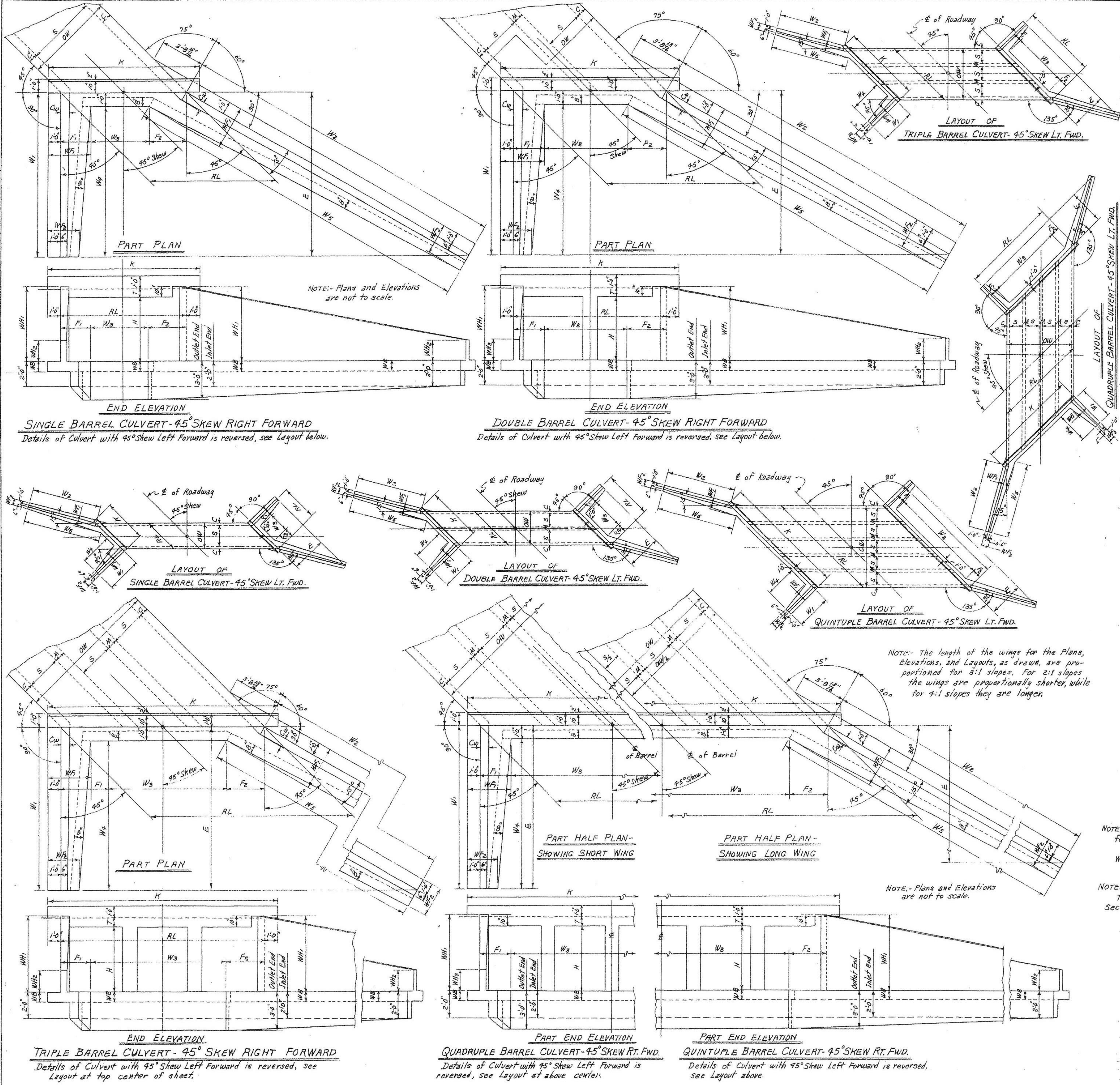
ARKANSAS STATE HIGHWAY COMMISSION
DETAILS OF STANDARD WINGS
FOR
REINFORCED CONCRETE BOX CULVERTS
30° SKEW

4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS
SINGLES, DOUBLES, TRIPLES,
QUADRUPLES & QUINTUPLES.

3:1 SLOPES.
ALL DEPTHS OF COVER
FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X303-1

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



ROADWAY LENGTH RL — HEADWALL LENGTH K — APRON DIMENSION W_3

$RL = OW \times 1.41421$ — $K = RL + (2'0")$ — $W_3 = RL - (F_1 + F_2)$

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-X452-1, W-X453-1 or W-X454-1. (For H=8'-0" or less)	4'	2'	2'-3¼"	5'-0"	7'-0⅞"	9'-0⅞"	4'-9⅝"	9'-8"	13'-8"	15'-8"	11'-4⅞"	14'-4"	20'-3¼"	22'-3¼"	18'-0"	19'-0"	26'-10½"	28'-10½"	24'-7¼"	23'-8"	33'-5⅝"	35'-5¾"	31'-2½"
		3'	3'-3¼"	5'-0"	"	"	3'-9⅝"	9'-8"	"	"	10'-4⅞"	14'-4"	"	"	17'-0"	19'-0"	"	"	23'-7¼"	23'-8"	"	"	30'-2½"
		4'	4'-3¼"	5'-0"	"	"	2'-9⅝"	9'-8"	"	"	9'-4⅞"	14'-4"	"	"	16'-0"	19'-0"	"	"	22'-7¼"	23'-8"	"	"	29'-2½"
		5'	5'-3¼"	5'-0"	7'-0⅞"	9'-0⅞"	1'-9⅝"	9'-8"	13'-8"	15'-8"	8'-4⅞"	14'-4"	20'-3¼"	22'-3¼"	15'-0"	19'-0"	26'-10½"	28'-10½"	21'-7¼"	23'-8"	33'-5⅝"	35'-5¾"	28'-2½"
		6'	6'-3¼"	5'-2"	7'-3⅝"	9'-3⅝"	1'-0½"	9'-11"	14'-0¼"	16'-0¼"	7'-9⅛"	14'-8"	20'-8⅞"	22'-9"	14'-5¾"	19'-5"	27'-5½"	29'-5½"	21'-2¼"	24'-2"	34'-2⅛"	36'-2"	27'-10¾"
	5'	3'	3'-3¼"	6'-0"	8'-5⅞"	10'-5⅞"	5'-2⅝"	11'-8"	16'-6"	18'-6"	13'-2¾"	17'-4"	24'-6⅛"	26'-6¼"	21'-3"	23'-0"	32'-6⅜"	34'-6¼"	29'-3"	28'-8"	40'-6½"	42'-6½"	37'-3¼"
		4'	4'-3¼"	6'-0"	"	"	4'-2⅝"	11'-8"	"	"	12'-2¾"	17'-4"	"	"	20'-3"	23'-0"	"	"	28'-3"	28'-8"	"	"	36'-3¼"
		5'	5'-3¼"	6'-0"	8'-5⅞"	10'-5⅞"	3'-2⅝"	11'-8"	16'-6"	18'-6"	11'-2¾"	17'-4"	24'-6⅛"	26'-6¼"	19'-3"	23'-0"	32'-6⅜"	34'-6¼"	27'-3"	28'-8"	40'-6½"	42'-6½"	35'-3¼"
		6'	6'-3¼"	6'-2"	8'-8⅝"	10'-8⅝"	2'-5⅜"	11'-11"	16'-10¼"	18'-10¼"	10'-7"	17'-8"	24'-11⅞"	27'-0"	18'-8¾"	23'-5"	33'-1⅜"	35'-1½"	26'-10⅞"	29'-2"	41'-3"	43'-3"	34'-11⅜"
		7'	7'-9¼"	6'-3"	8'-10⅛"	10'-10⅛"	1'-0⅞"	12'-1"	17'-1"	19'-1"	9'-3⅞"	17'-11"	25'-4"	27'-4"	17'-6¾"	23'-9"	33'-7"	35'-7"	26'-9¾"	29'-7"	41'-10"	43'-10"	34'-0¾"
	6'	3'	3'-3¼"	7'-0"	9'-10¾"	11'-10¾"	6'-7⅝"	13'-8"	19'-3⅞"	21'-4"	16'-0¾"	20'-4"	28'-9⅛"	30'-9"	25'-5¾"	27'-0"	38'-2¼"	40'-2¼"	34'-11"	33'-8"	47'-7⅜"	49'-7¼"	44'-4"
		4'	4'-3¼"	7'-0"	"	"	5'-7⅝"	13'-8"	"	"	15'-0¾"	20'-4"	"	"	24'-5¾"	27'-0"	"	"	33'-11"	33'-8"	"	"	43'-4"
		5'	5'-3¼"	7'-0"	9'-10¾"	11'-10¾"	4'-7⅝"	13'-8"	19'-3⅞"	21'-4"	14'-0¾"	20'-4"	28'-9⅛"	30'-9"	23'-5¾"	27'-0"	38'-2¼"	40'-2¼"	32'-11"	33'-8"	47'-7⅜"	49'-7¼"	42'-4"
		6'	6'-3¼"	7'-2"	10'-1⅝"	12'-1½"	3'-10⅜"	13'-11"	19'-8⅛"	21'-8¼"	13'-5"	20'-9"	29'-2¾"	31'-2¾"	22'-11⅛"	27'-5"	38'-9¼"	40'-9¼"	32'-6"	34'-2"	48'-3⅞"	50'-3⅜"	42'-0½"
		7'	7'-9¼"	7'-3"	10'-3"	12'-3"	2'-5⅞"	14'-1"	19'-11"	21'-11"	12'-1¾"	20'-11"	29'-7"	31'-7"	21'-9¾"	27'-9"	39'-3"	41'-3"	31'-5¾"	34'-7"	48'-10⅞"	50'-11"	41'-1¾"
		8'	9'-3¼"	7'-4"	10'-4½"	12'-4½"	1'-1¼"	14'-2"	20'-0⅜"	22'-0½"	10'-9¼"	21'-0"	29'-8⅜"	31'-8½"	20'-5¼"	27'-10"	39'-4⅜"	41'-4¼"	30'-1"	34'-8"	49'-0¼"	51'-0¼"	39'-9"
	7'	4'	4'-3¼"	8'-0"	11'-3¾"	13'-3¾"	7'-0½"	15'-8"	22'-1⅞"	24'-1¾"	17'-10½"	23'-4"	33'-0"	35'-0"	28'-8¾"	31'-0"	43'-10⅛"	45'-10"	39'-6¾"	38'-8"	54'-8¼"	56'-8¼"	50'-5"
		5'	5'-3¼"	8'-0"	11'-3¾"	13'-3¾"	6'-0½"	15'-8"	22'-1⅞"	24'-1¾"	16'-10½"	23'-4"	33'-0"	35'-0"	27'-8¾"	31'-0"	43'-10⅛"	45'-10"	38'-6¾"	38'-8"	54'-8¼"	56'-8¼"	49'-5"
		6'	6'-3¼"	8'-2"	11'-6⅝"	13'-6½"	5'-3⅜"	15'-11"	22'-6⅛"	24'-6"	16'-2¾"	23'-8"	33'-5⅜"	35'-5½"	27'-2¼"	31'-5"	44'-5⅝"	46'-5¼"	38'-2"	39'-2"	55'-4⅝"	57'-4⅝"	49'-1½"
		7'	7'-9¼"	8'-3"	11'-8"	13'-8"	3'-10⅝"	16'-1"	22'-9"	24'-9"	14'-11¾"	23'-11"	33'-9⅞"	35'-10"	26'-0¾"	31'-9"	44'-10⅞"	46'-10¾"	37'-1½"	39'-7"	55'-11¾"	57'-11¾"	48'-2½"
		8'	9'-3¼"	8'-4"	11'-9⅜"	13'-9½"	2'-6¼"	16'-2"	22'-10⅜"	24'-10¼"	13'-7"	24'-0"	33'-11¼"	35'-11¼"	24'-8"	31'-10"	45'-0¼"	47'-0¼"	35'-9"	39'-8"	56'-1⅛"	58'-1¼"	46'-10"
	8'	4'	4'-3¼"	9'-0"	12'-8¾"	14'-8¾"	8'-5½"	17'-8"	24'-11⅞"	26'-11¾"	20'-8½"	26'-4"	37'-2⅞"	39'-3"	32'-11¾"	35'-0"	49'-6"	51'-6"	45'-2¾"	43'-8"	61'-9"	63'-9"	57'-5¾"
		5'	5'-3¼"	9'-2"	12'-11⅝"	14'-11½"	7'-8⅜"	17'-11"	25'-4"	27'-4"	20'-0¾"	26'-8"	37'-8½"	39'-8½"	32'-5¼"	35'-5"	50'-1"	52'-1"	44'-9¾"	44'-2"	62'-5½"	64'-5½"	57'-2¼"
		6'	6'-3¼"	9'-2"	12'-11⅝"	14'-11½"	6'-8⅜"	17'-11"	25'-4"	27'-4"	19'-0¾"	26'-8"	37'-8½"	39'-8½"	31'-5¼"	35'-5"	50'-1"	52'-1"	43'-9¾"	44'-2"	62'-5½"	64'-5½"	56'-2¼"
		7'	7'-9¼"	9'-3"	13'-1"	15'-1"	5'-3¾"	18'-1"	25'-6⅞"	27'-7"	17'-9¾"	26'-11"	38'-0¾"	40'-0¾"	30'-3½"	35'-9"	50'-6¾"	52'-6¾"	42'-9½"	44'-7"	63'-0⅝"	65'-0½"	55'-3⅛"
		8'	9'-3¼"	9'-4"	13'-2½"	15'-2½"	3'-11⅛"	18'-2"	25'-8¼"	27'-8¼"	16'-5"	27'-0"	38'-2¼"	40'-2¼"	28'-11"	35'-10"	50'-8"	52'-8"	41'-5"	44'-8"	63'-2"	65'-2"	53'-10¾"
	9'	5'	5'-3¼"	10'-2"	14'-4½"	16'-4½"	9'-1⅜"	19'-11"	28'-2"	30'-2"	22'-10¾"	29'-8"	41'-11½"	43'-11½"	36'-8¼"	39'-5"	55'-8⅞"	57'-9"	50'-5¾"	49'-2"	69'-6⅜"	71'-6¼"	64'-3¼"
		6'	6'-3¼"	10'-3"	14'-6"	16'-6"	8'-2¾"	20'-1"	28'-4⅞"	30'-4¾"	22'-1½"	29'-11"	42'-3¾"	44'-3¾"	36'-0½"	39'-9"	56'-2⅝"	58'-2½"	49'-11¼"	49'-7"	70'-1½"	72'-1½"	63'-10¼"
		7'	7'-9¼"	10'-3"	14'-6"	16'-6"	6'-8¾"	20'-1"	28'-4⅞"	30'-4¾"	20'-7½"	29'-11"	42'-3¾"	44'-3¾"	34'-6½"	39'-9"	56'-2⅝"	58'-2½"	48'-5¼"	49'-7"	70'-1½"	72'-1½"	62'-4¼"
		8'	9'-3¼"	10'-4"	14'-7⅜"	16'-7¼"	5'-4⅛"	20'-2"	28'-6¼"	30'-6¼"	19'-3"	30'-0"	42'-5⅛"	44'-5"	33'-2"	39'-10"	56'-4"	58'-4"	47'-0¾"	49'-8"	70'-2⅞"	72'-3"	60'-11¾"
	10'	5'	5'-3¼"	11'-2"	15'-9⅛"	17'-9⅛"	10'-6¼"	21'-11"	31'-0"	33'-0"	25'-8¾"	32'-8"	46'-2⅜"	48'-2¼"	40'-11"	43'-5"	61'-4¾"	63'-4¾"	56'-1½"	54'-2"	76'-7¼"	78'-7¼"	71'-4"
		6'	6'-3¼"	11'-3"	15'-11"	17'-11"	9'-7⅜"	22'-1"	31'-2¾"	33'-2¾"	24'-11½"	32'-11"	46'-6⅝"	48'-6½"	40'-3¼"	43'-9"	61'-10½"	63'-10½"	55'-7¼"	54'-7"	77'-2¼"	79'-2¼"	70'-11"
		7'	7'-9¼"	11'-3"	15'-11"	17'-11"	8'-1¾"	22'-1"	31'-2¾"	33'-2¾"	23'-5½"	32'-11"	46'-6⅝"	48'-6½"	38'-9¼"	43'-9"	61'-10½"	63'-10½"	54'-1¼"	54'-7"	77'-2¼"	79'-2¼"	69'-5"
		8'	9'-3¼"	11'-4"	16'-0⅜"	18'-0¼"	6'-9¼"	22'-2"	31'-4⅛"	33'-4¼"	22'-1"	33'-0"	46'-8"	48'-8"	37'-4¾"	43'-10"	61'-11⅞"	64'-0"	52'-8¾"	54'-8"	77'-3¾"	79'-3¾"	68'-0½"
	11'	6'	6'-3¼"	12'-4"	17'-5⅛"	19'-5⅛"	11'-2⅛"	24'-2"	34'-2⅛"	36'-2"	27'-11"	36'-0"	50'-11"	52'-11"	44'-7¾"	47'-10"	67'-7¾"	69'-7¾"	61'-4½"	—	—	—	—
		7'	7'-9¼"	12'-4"	"	"	9'-8⅛"	24'-2"	"	"	26'-5"	36'-0"	"	"	43'-1¾"	47'-10"	"	"	59'-10½"	—	—	—	—
		8'	9'-3¼"	12'-4"	"	"	8'-2⅛"	24'-2"	"	"	24'-11"	36'-0"	"	"	41'-7¾"	47'-10"	"	"	58'-4½"	—	—	—	—
	12'	6'	6'-3¼"	13'-4"	18'-10¼"	20'-10¼"	12'-7⅛"	26'-2"	37'-0⅛"	39'-0"	30'-8¾"	39'-0"	55'-1⅞"	57'-1¾"	48'-10¾"	51'-10"	73'-3⅝"	75'-3¾"	67'-0½"	—	—	—	—
		7'	7'-9¼"	13'-4"	"	"	11'-1⅛"	26'-2"	"	"	29'-2¾"	39'-0"	"	"	47'-4¾"	51'-10"	"	"	65'-6½"	—	—	—	—
		8'	9'-3¼"	13'-4"	"	"	9'-7⅛"	26'-2"	"	"	27'-8¾"	39'-0"	"	"	45'-10¾"	51'-10"	"	"	64'-0½"	—	—	—	—
W-X452-2, W-X453-2 or W-X454-2. (For H=9'-0" & over)	7'																						
		9'	10'-9¼"	8'-6"	12'-0¼"	14'-0¼"	1'-3"	16'-5"	23'-2⅝"	25'-2½"	12'-5⅜"	24'-4"	34'-5"	36'-5"	23'-7¾"	32'-3"	45'-7¼"	47'-7¼"	34'-10"	40'-2"	56'-9⅝"	58'-9¾"	46'-0½"
	8'	9'	10'-9¼"	9'-6"	13'-5¼"	15'-5¼"	2'-8"	18'-5"	26'-0½"	28'-0½"	15'-3¼"	27'-4"	38'-7⅞"	40'-8"	27'-10¾"	36'-3"	51'-3¼"	53'-3¼"	40'-6"	45'-2"	63'-10⅛"	65'-10⅛"	53'-1¼"
		10'	12'-3¼"	9'-8"	13'-8"	15'-8"	1'-4⅞"	18'-8"	26'-4¾"	28'-4¾"	14'-1½"	27'-8"	39'-1½"	41'-1½"	26'-10½"	36'-8"	51'-10¼"	53'-10¼"	39'-7"	45'-8"	64'-7"	66'-7"	52'-3¾"
	9'	9'	10'-9¼"	10'-6"	14'-10¼"	16'-10¼"	4'-1"	20'-5"	28'-10½"	30'-10½"	18'-1¼"	30'-4"	42'-10¾"	44'-10¾"	32'-1½"	40'-3"	56'-11⅛"	58'-11"	46'-1¾"	50'-2"	70'-11⅜"	72'-11½"	60'-2¼"
		10'	12'-3¼"	10'-8"	15'-1"	17'-1"	2'-9¾"	20'-8"	29'-2¾"	31'-2¾"	16'-11½"	30'-8"	43'-4⅜"	45'-4½"	31'-1¼"	40'-8"	57'-6⅞"	59'-6¾"	45'-3"	50'-9"	71'-7⅞"	73'-7¾"	59'-4½"
		11'	13'-9¼"	10'-10"	15'-3⅞"	17'-3¾"	1'-6⅝"	20'-10"	29'-5½"	31'-5½"	15'-8½"	30'-10"	43'-7¼"	45'-7¼"	29'-10"	40'-10"	57'-9"	59'-9"	43'-11¾"	50'-10"	71'-10⅝"	73'-10¾"	58'-1½"
	10'	9'	10'-9¼"	11'-6"	16'-3⅛"	18'-3½"	5'-6"	22'-5"	31'-8⅜"	33'-8¼"	20'-11¼"	33'-4"	47'-1⅝"	49'-1¾"	36'-4½"	44'-3"	62'-7"	64'-7"	51'-9¾"	55'-2"	78'-0¼"	80'-0¼"	67'-3"
		10'	12'-3¼"	11'-8"	16'-6"	18'-6"	4'-2¾"	22'-8"	32'-0⅝"	34'-0¾"	19'-9½"	33'-8"	47'-7⅜"	49'-7¼"	35'-4¼"	44'-8"	63'-2"	65'-2"	50'-10¾"	55'-8"	78'-8¾"	80'-8¾"	66'-5½"
		11'	13'-9¼"	11'-10"	16'-8⅞"	18'-8¾"	2'-11⅝"	22'-10"	32'-3½"	34'-3½"	18'-6¼"	33'-10"	47'-10½"	49'-10¼"	34'-1"	44'-10"	63'-4⅞"	65'-5"	49'-7¾"	55'-10"	78'-11½"	80'-11½"	65'-2¼"
		12'	15'-3¼"	12'-0"	16'-11⅝"	18'-11¾"	1'-8⅜"	23'-0"	32'-6¾"	34'-6¼"	17'-3"	34'-0"	48'-1"	50'-1"	32'-9¾"	45'-0"	63'-7⅝"	65'-7¾"	48'-4½"	56'-0"	79'-2⅜"	81'-2¼"	63'-11½"
	11'	9'	10'-9¼"	12'-6"	17'-8⅛"	19'-8¼"	6'-10⅝"	24'-5"	34'-6⅞"	36'-6¼"	23'-9¼"	36'-4"	51'-4⅝"	53'-4½"	40'-7¼"	48'-3"	68'-2⅞"	70'-2¾"	57'-5½"	—	—	—	—
		10'	12'-3¼"	12'-8"	17'-11"	19'-11"	5'-7¾"	24'-8"	34'-10⅝"	36'-10½"	22'-7½"	36'-8"	51'-10¼"	53'-10¼"	39'-7"	48'-8"	68'-9⅞"	70'-10"	56'-6¾"	—	—	—	—
		11'	13'-9½"	12'-10"	18'-1¾"	20'-1¾"	4'-4½"	24'-10"	35'-1⅜"	37'-1½"	21'-4⅛"	36'-10"	52'-1⅛"	54'-1"	38'-3¾"	48'-10"	69'-0¾"	71'-0¾"	55'-3½"	—	—	—	—
		12'	15'-3¼"	13'-0"	18'-4⅝"	20'-4½"	3'-1⅛"	25'-0"	35'-4¼"	37'-4½"	20'-1"	37'-0"	52'-3⅞"	54'-4"	37'-0⅝"	49'-0"	69'-3½"	71'-3½"	54'-0¼"	—	—	—	—
	12'	9'	10'-9¼"	13'-6"	19'-1⅛"	21'-1"	8'-3⅞"	26'-5"	37'-4¼"	39'-4¼"	26'-7"	39'-4"	55'-7½"	57'-7½"	44'-10¼"	52'-3"	73'-10¾"	75'-10¾"	63'-1½"	—	—	—	—
		10'	12'-3½"	13'-8"	19'-3⅞"	21'-4"	7'-0¾"	26'-8"	37'-8½"	39'-8¼"	25'-5¼"	39'-8"	56'-1⅛"	58'-1"	43'-10"	52'-8"	74'-5¼"	76'-5¾"	62'-2½"	—	—	—	—
		11'	13'-9¼"	13'-10"	19'-6⅜"	21'-6⅜"	5'-9½"	26'-10"	37'-11⅜"	39'-11½"	24'-2¼"	39'-10"	56'-4"	58'-4"	42'-6¾"	52'-10"	74'-8⅝"	76'-8½"	60'-11½"	—	—	—	—
		12'	15'-3¼"	14'-0"	19'-9⅝"	21'-9½"	4'-6⅜"	27'-0"	38'-2¼"	40'-2¼"	22'-11"	40'-0"	56'-6⅞"	58'-6¾"	41'-3½"	53'-0"	74'-11½"	76'-11½"	59'-8¼"	—	—	—	—

NOTE:- This drawing to be used in conjunction with Standard Wing Drawings for 45° Skews for each slope as listed below.

2:1 Slopes	3:1 Slopes	4:1 Slopes
W-X452-1 or W-X452-2	W-X453-1 or W-X453-2	W-X454-1 or W-X454-2.

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

SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-145X-0	R-245X-01	R-345X-01	R-445X-01	R-545X-01
	R-245X-02	R-345X-02	R-445X-02	R-545X-02
R-145X-1	R-245X-1	R-345X-1	R-445X-1	
	R-245X-2	R-345X-2		

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 45° SKEW

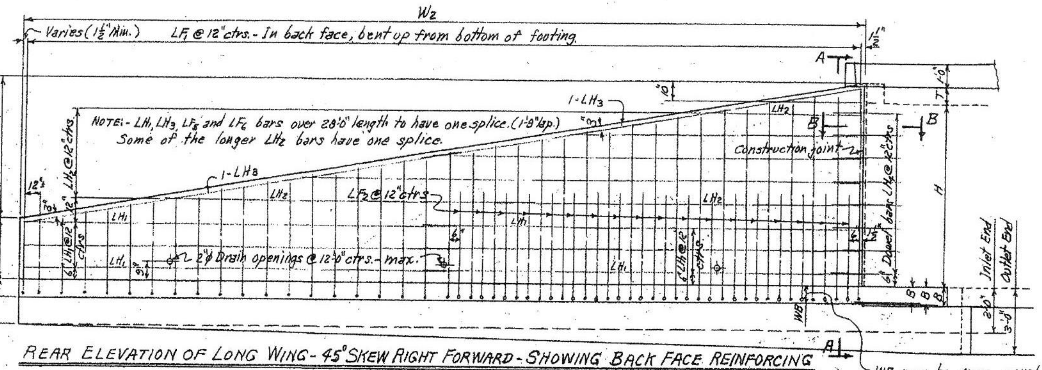
4, 5, 6, 7, 8, 9, 10, 11 & 12 SPANS — 2:1, 3:1 & 4:1 SLOPES

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-X45

Designed by:- W.C.H. 5-16-63 — Checked by:-
Drawn by:- W.C.H. 6-15-64 — Checked by:- J.E.M. 6-23-64
Quantities by:- — Checked by:-

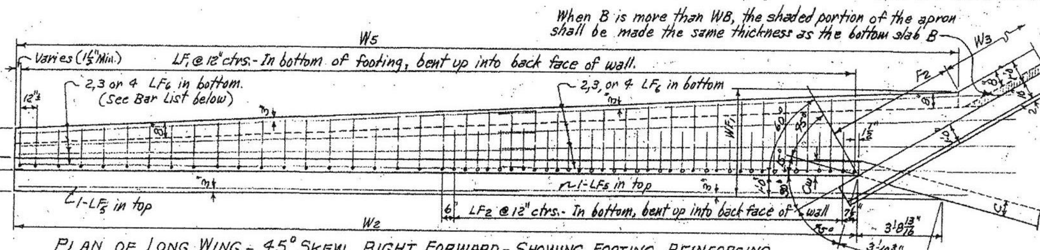
FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
JOB No.					



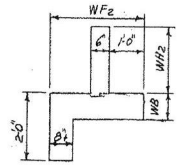
REAR ELEVATION OF LONG WING - 45° SKEW RIGHT FORWARD - SHOWING BACK FACE REINFORCING

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

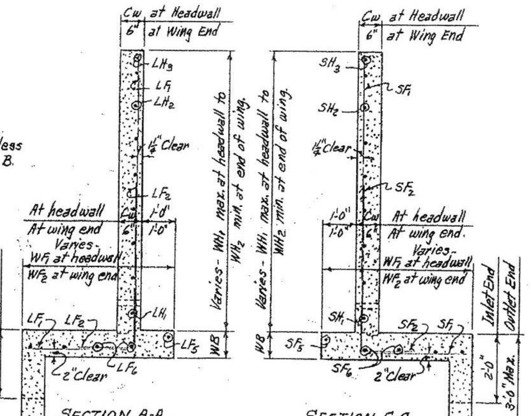
When B is more than WB, the shaded portion of the apron shall be made the same thickness as the bottom slab B.



PLAN OF LONG WING - 45° SKEW RIGHT FORWARD - SHOWING FOOTING REINFORCING

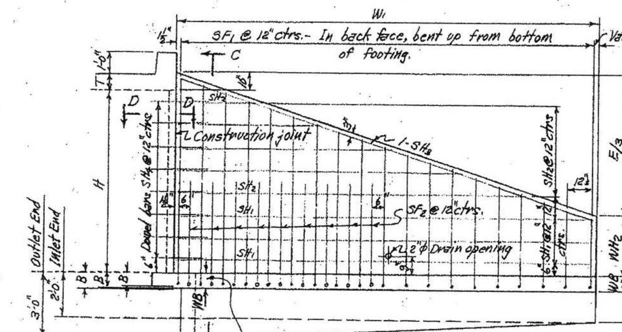


TYPICAL END VIEW OF WING



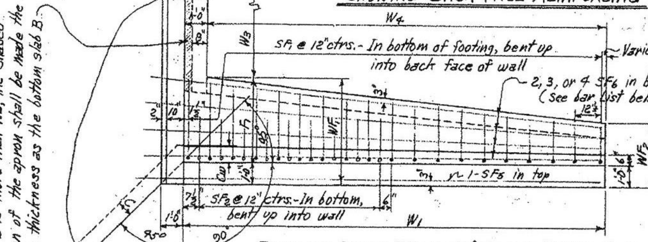
SECTION A-A

SECTION C-C



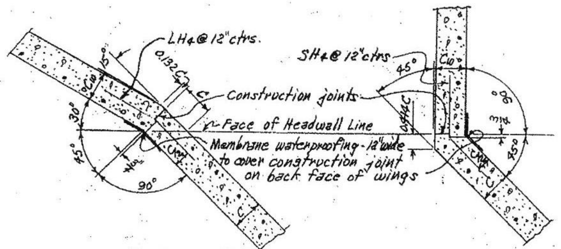
WB may be more, equal to, or less than the bottom slab B.

REAR ELEVATION OF SHORT WING - 45° SKEW RIGHT FORWARD - SHOWING BACK FACE REINFORCING



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

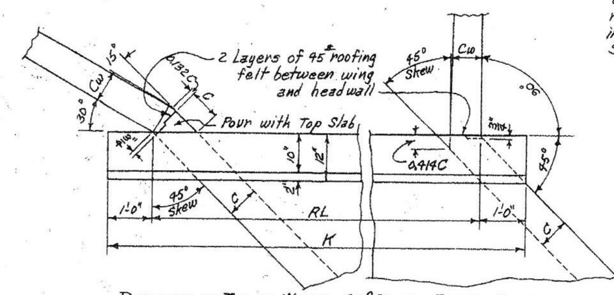
PLAN OF SHORT WING - 45° SKEW RIGHT FORWARD SHOWING FOOTING REINFORCING



SECTION B-B

SECTION D-D

SECTIONS THRU CONSTRUCTION JOINTS



DETAILS AT TOP OF WINGS - 45° SKEW RIGHT FORWARD

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

REGULAR WING DIMENSIONS - 3:1 SLOPES

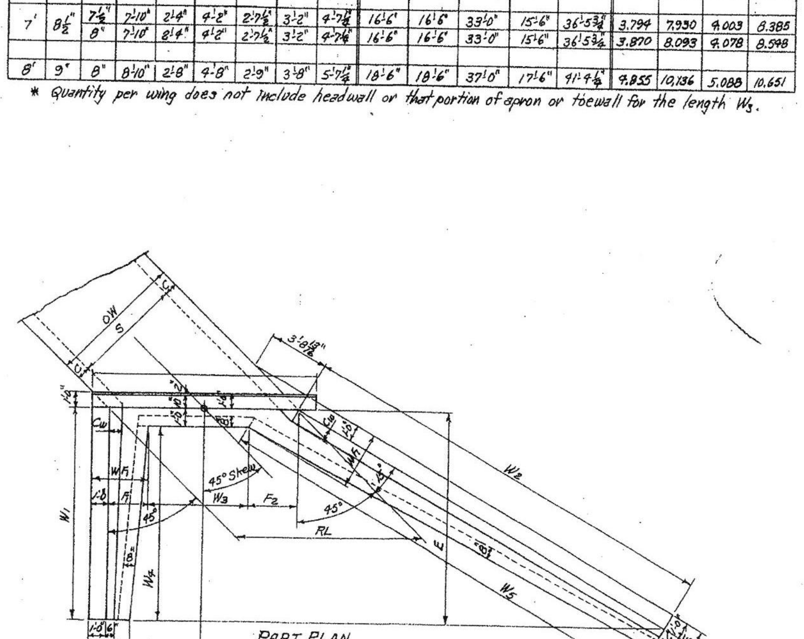
Clear Height of Box	Thickness of Wing Footing	Thickness of Wing at Hdwl.=C	Wingwall Heights: At Headwall	Wingwall Heights: At End of Wing	Widths of Wing Footings: At Headwall	Widths of Wing Footings: At End of Wing	Footing Dimension - Parallel with Headwall: Short Wing	Footing Dimension - Parallel with Headwall: Long Wing	Perpendicular Dist. from Hdwl. to End of Wing	Lengths of Wingwalls: Short Wing	Lengths of Wingwalls: Long Wing	Inside Footing Dimension: Short Wing	Inside Footing Dimension: 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	WH_1	WH_2	WF_1	WF_2	F_1	F_2	E	W_1	W_2	W_4	W_5	Cu.Yd.	Cu.Yd.	Cu.Yd.	Cu.Yd.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	1'-4"	0'-11¾"	6'-6"	6'-6"	13'-0"	5'-6"	13'-3¾"	0.743	1.572	0.827	1.741
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-8"	1'-7¼"	8'-6"	8'-6"	17'-0"	7'-6"	17'-10¾"	1.120	2.364	1.229	2.590
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	2'-0"	2'-3¼"	10'-6"	10'-6"	21'-0"	9'-6"	22'-5½"	1.567	3.295	1.700	3.577
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11¼"	12'-6"	12'-6"	25'-0"	11'-6"	27'-0½"	2.082	4.367	2.241	4.705
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-4"	2'-11¼"	12'-6"	12'-6"	25'-0"	11'-6"	27'-0½"	2.166	4.551	2.325	4.889
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	2.894	6.055	3.078	6.450
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	2.952	6.180	3.135	6.575
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-8"	3'-7¼"	14'-6"	14'-6"	29'-0"	13'-6"	31'-7½"	3.009	6.305	3.192	6.700
7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	16'-6"	16'-6"	33'-0"	15'-6"	36'-5¾"	3.794	7.930	4.003	8.385
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-2"	4'-7¼"	16'-6"	16'-6"	33'-0"	15'-6"	36'-5¾"	3.870	8.093	4.078	8.548
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	5'-7¼"	18'-6"	18'-6"	37'-0"	17'-6"	41'-4¼"	4.855	10.136	5.088	10.651

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

QUANTITIES

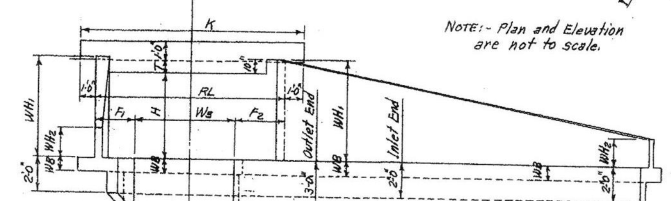
Clear Span	Clear Height	Thickness of Wing at Headwall	Thickness of Wing Footing	⊕ Reinforcing Steel - for 4 Wings	Class S Concrete - 4 Wings (Headwalls, Wingwalls, Footings, Toewalls and Aprons): Single Barrel Culvert	Double Barrel Culvert	Triple Barrel Culvert	Quadruple Barrel Culvert	Quintuple Barrel Culvert
S	H	Cw	WB	Lb.	Cu.Yd.	Cu.Yd.	Cu.Yd.	Cu.Yd.	Cu.Yd.
4'	2'	6"	7"	142	6.15	7.50	8.86	10.22	11.58
	3'	6"	7"	214	8.44	9.79	11.14	12.50	13.86
	4'	6"	7"	328	11.13	12.48	13.84	15.20	16.56
	5'	6"	7"	463	14.25	15.60	16.96	18.32	19.68
	6'	7"	8"	763	19.23	20.62	22.02	23.41	24.81
5'	3'	6"	7"	214	8.74	10.38	12.03	13.67	15.32
	4'	6"	7"	328	11.43	13.07	14.72	16.37	18.02
	5'	6"	7"	463	14.55	16.19	17.84	19.49	21.14
	6'	7"	8"	763	19.53	21.21	22.90	24.59	26.28
	7'	7½"	8½"	1475	24.98	26.69	28.41	30.14	31.86
6'	3'	6"	7"	214	9.03	10.99	12.91	14.86	16.79
	4'	6"	7"	328	11.73	13.69	15.60	17.56	19.48
	5'	6"	7"	463	14.85	16.80	18.72	20.68	22.60
	6'	7"	8"	763	19.83	21.82	23.79	25.78	27.76
	7'	7½"	8½"	1475	25.28	27.30	29.31	31.33	33.35
	8'	8"	9"	1872	31.70	33.74	35.75	37.79	39.81
7'	4'	6"	7"	328	12.04	14.31	16.54	18.81	21.02
	5'	6"	7"	463	15.15	17.43	19.65	21.93	24.13
	6'	7"	8"	763	20.14	22.44	24.69	26.99	29.24
	7'	7½"	8½"	1475	25.59	27.91	30.21	32.58	34.83
	8'	8"	9"	1872	32.02	34.35	36.66	38.99	41.31
8'	4'	6"	7"	328	12.35	14.95	17.49	20.08	22.57
	5'	7"	7"	463	16.05	18.67	21.24	23.86	26.37
	6'	7"	8"	763	20.45	23.07	25.64	28.26	30.77
	7'	7½"	8½"	1475	25.90	28.54	31.13	33.78	36.32
	8'	8"	9"	1872	32.33	34.97	37.56	40.21	42.80
9'	5'	7"	7"	463	16.37	19.32	22.18	25.02	27.91
	6'	7½"	8"	763	21.16	24.13	27.02	29.89	32.81
	7'	7½"	8½"	1475	26.21	29.18	32.08	34.94	37.86
	8'	8"	9"	1872	32.63	35.61	38.51	41.37	44.29
10'	5'	7"	7"	463	16.69	19.96	23.14	26.27	29.47
	6'	7½"	8"	763	21.48	24.77	27.99	31.13	34.36
	7'	7½"	8½"	1475	26.53	29.82	33.04	36.19	39.42
	8'	8"	9"	1872	32.95	36.25	39.46	42.62	45.85
11'	6'	8"	8"	763	22.18	25.83	29.35	32.84	—
	7'	8"	8½"	1475	27.33	30.99	34.51	38.01	—
	8'	8"	9"	1872	33.26	36.91	40.43	43.93	—
12'	6'	8"	8"	763	22.50	26.51	30.33	34.19	—
	7'	8"	8½"	1475	27.66	31.66	35.49	39.35	—
	8'	8"	9"	1872	33.58	37.58	41.41	45.27	—

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



PART PLAN

Note:- Plan and Elevation are not to scale.



END ELEVATION

SINGLE BARREL CULVERT - 45° SKEW RIGHT FORWARD

Details of Culvert with 45° Skew Left Forward is reversed, see Drawing No. W-X45.

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-X45.
For values of RL, K and W_3 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 in wings.

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

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

Clear Height H	Wing Location (Short or Long)	SF_1 & LF_1 Bent (In bottom of footing, bent up into back face of wing. One bar (or two bars) of each length.): Size	Spacing	No. Req'd	Lengths Vary Min.	Lengths Vary Max.	X Min.	X Max.	Y Min.	Y Max.	SF_2 & LF_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
2'	Short	#3	12"	7	1'-7"	3'-11"	0'-8"	1'-0"	1'-0"	3'-0"	—	—	—	—	—	—
	Long	#3	12"	14	1'-5"	3'-11"	0'-8"	1'-0"	0'-10"	3'-0"	—	—	—	—	—	—
3'	Short	#3	12"	9	2'-1"	5'-3"	0'-10"	1'-4"	1'-4"	4'-0"	—	—	—	—	—	—
	Long	#3	12"	18	1'-11"	5'-3"	0'-10"	1'-4"	1'-2"	4'-0"	—	—	—	—	—	—
4'	Short	#3	12"	11	2'-6"	6'-7"	0'-11"	1'-8"	1'-8"	5'-0"	—	—	—	—	—	—
	Long	#3	12"	22	2'-4"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—
5'	Short	#3	12"	13	2'-11"	7'-11"	1'-0"	2'-0"	2'-0"	6'-0"	#3	12"	3	3'-6"	1'-1"	2'-6"
	Long	#3	12"	26	2'-9"	7'-10"	1'-0"	1'-11"	1'-10"	6'-0"	#3	12"	6	3'-6"	1'-1"	2'-6"
6'	Short	#4	12"	15	3'-6"	9'-4"	1'-2"	2'-4"	2'-5"	7'-1"	#3	12"	3	4'-6"	1'-4"	3'-3"
	Long	#4	12"	30	3'-4"	9'-3"	1'-2"	2'-3"	2'-3"	7'-1"	#3	12"	6	4'-6"	1'-4"	3'-3"
7'	Short	#4	12"	17	3'-11"	10'-10"	1'-3"	2'-10"	2'-9"	8'-1"	#4	12"	6	5'-6"	1'-7"	4'-0"
	Long	#4	12"	34	3'-9"	10'-8"	1'-3"	2'-8"	2'-7"	8'-1"	#4	12"	12	5'-6"	1'-7"	4'-0"
8'	Short	#4	12"	19	4'-6"	12'-5"	1'-5"	3'-4"	3'-2"	9'-2"	#4	12"	9	6'-6"	1'-10"	4'-9"
	Long	#4	12"	38	4'-4"	12'-3"	1'-5"	3'-2"	3'-0"	9'-2"	#4	12"	18	6'-6"	1'-10"	4'-9"

Clear Height H	Wing Location	SF_5 & LF_5 Straight (Longitudinal in top of wing footing heel): Size	No. Req'd	Length	SF_6 & LF_6 Straight (Longitudinal in bottom of wing footing toe): Size	No. Req'd	Length	SH_1 & LH_1 Straight (Horizontal in back face of wing): Size	Spacing	No. Req'd	Length	SH_2 & LH_2 Straight (Horizontal in back face of wing. One bar of each length. ※): Size	Spacing	No. Req'd	Lengths Vary Max.	Lengths Vary Min.
2'	Short	#3	1	8'-4"	#3	2	8'-0"	#3	12"	1	6'-3"	#3	12"	1	—	3'-3"
	Long	#3	1	17'-6"	#3	2	15'-6"	#3	12"	1	12'-8"	#3	12"	1	—	6'-6"
3'	Short	#3	1	10'-4"	#3	2	10'-0"	#3	12"	1	8'-3"	#3	12"	2	6'-3"	3'-3"
	Long	#3	1	21'-6"	#3	2	20'-2"	#3	12"	1	16'-8"	#3	12"	2	12'-6"	6'-6"
4'	Short	#3	1	12'-4"	#3	3	12'-0"	#3	12"	1	10'-3"	#3	12"	3	9'-3"	3'-3"
	Long	#3	1	25'-6"	#3	3	24'-10"	#3	12"	1	20'-8"	#3	12"	3	18'-6"	6'-6"
5'	Short	#3	1	14'-4"	#3	3	14'-0"	#3	12"	2	12'-3"	#3	12"	3	9'-3"	3'-3"
	Long	#3	2	15'-8"	#3	6	15'-7"	#3	12"	2	24'-8"	#3	12"	3	18'-6"	6'-6"
6'	Short	#3	1	16'-4"	#3	3	16'-0"	#3	12"	2	14'-3"	#3	12"	4	12'-3"	3'-3"
	Long	#3	2	17'-8"	#3	6	18'-0"	#3	12"	4	15'-2"	#3	12"	4	24'-6"	6'-6"
7'	Short	#4	1	18'-4"	#4	4	18'-0"	#4	12"	2	16'-3"	#4	12"	5	15'-3"	3'-3"
	Long	#4	2	19'-8"	#4	8	20'-4"	#4	12"	4	17'-2"	#4	12"	5	※30'-6"	6'-6"
8'	Short	#4	1	20'-4"	#4	4	20'-0"	#4	12"	3	18'-3"	#4	12"	5	15'-3"	3'-3"
	Long	#4	2	21'-8"	#4	8	22'-9"	#4	12"	6	19'-2"	#4	12"	5	※30'-6"	6'-6"

Clear Height H	Wing Location	SH_3 & LH_3 Straight (In back face of wing at top - on slope): Size	No. Req'd	Length	SH_4 & LH_4 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	1	6'-7"	#3	12"	2	2'-8"	1'-4"	24.4	46.3
	Long	#3	1	12'-11"	#3	12"	2	"	"		
3'	Short	#3	1	8'-8"	#3	12"	3	"	"	36.8	70.3
	Long	#3	1	16'-11"	#3	12"	3	"	"		
4'	Short	#3	1	10'-9"	#3	12"	4	"	"	55.9	107.9
	Long	#3	1	21'-0"	#3	12"	4	"	"		
5'	Short	#3	1	12'-11"	#3	12"	5	"	"	77.7	153.7
	Long	#3	1	25'-1"	#3	12"	5	"	"		
6'	Short	#3	1	15'-0"	#3	12"	6	"	"	127.6	253.9
	Long	#3	2	15'-5"	#3	12"	6	2'-8"	1'-4"		
7'	Short	#4	1	17'-1"	#4	12"	7	3'-6"	1'-9"	246.5	491.1
	Long	#4	2	17'-5"	#4	12"	7	"	"		
8'	Short	#4	1	19'-3"	#4	12"	8	"	"	312.5	623.6
	Long	#4	2	19'-6"	#4	12"	8	3'-6"	1'-9"		

Bar Bending Diagram: SF_1 & SF_2, LF_1 & LF_2 (3" Pin); SH_4; LH_4. 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".

※ Length without splice. Bars over 28'-0" length may be spliced. (1'-8" lap)

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-145X-0	R-245X-01	R-345X-01	R-445X-01	R-545X-01
	R-245X-02	R-345X-02	R-445X-02	R-545X-02
R-145X-1	R-245X-1	R-345X-1	R-445X-1	
	R-245X-2	R-345X-2		

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS 45° SKEW

4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS — 3:1 SLOPES
SINGLES, DOUBLES, TRIPLES, — ALL DEPTHS OF COVER
QUADRUPLES & QUINTUPLES — FOR H = 8'-0" OR LESS

STANDARD DRAWING No. W-X453-1

Designed By- W.C.H. 5-13-63 Checked By- J.E.M. 7-21-64
Drawn By- W.C.H. 6-5-64 Checked By- J.E.M. 7-21-64
Quantities By- W.C.H. 7-2-64 Checked By- J.E.M. 7-21-64

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

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

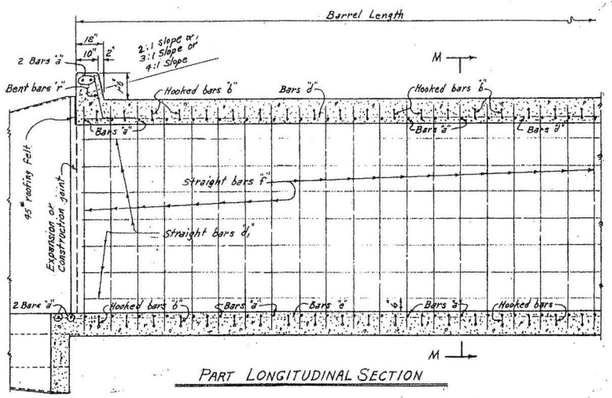
DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	"a" bars STRAIGHT In Top and Bottom Slabs of Barrel. 2 Add'l in Apron and Headwall- Each. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	"b" bars BENT - See Diagram below. In Top and Bottom Slabs of Barrel. Alternate with "a" bars. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X
0'-0" TO 5'-0" MAXIMUM	1 @ 4'	2'	#5	13"	120	120	4'-9"	#6	13"	110	110	5'-10"	4'-6"
		3'			120	120	4'-9"			110	110	5'-10"	4'-8"
		4'			120	120	4'-9"			110	110	5'-10"	4'-9"
		5'			120	120	4'-9"			110	110	5'-10"	4'-9"
		6'			120	120	4'-11"			110	110	6'-0"	4'-10"
	1 @ 5'	3'	#6	13"	120	120	5'-9"	#6	13"	110	110	6'-10"	5'-8"
		4'			120	120	5'-9"			110	110	6'-10"	5'-8"
		5'			120	120	5'-9"			110	110	6'-10"	5'-8"
		6'			120	120	5'-11"			110	110	7'-0"	5'-10"
		7'			120	120	6'-0"			110	110	7'-1"	5'-11"
	1 @ 6'	3'	#6	12"	128	128	6'-9"	#6	12"	118	118	7'-10"	6'-8"
		4'			128	128	6'-9"			118	118	7'-10"	6'-8"
		5'			128	128	6'-9"			118	118	7'-10"	6'-8"
		6'			128	128	6'-11"			118	118	8'-0"	6'-10"
		7'			128	128	7'-0"			118	118	8'-1"	6'-11"
		8'			128	128	7'-1"			118	118	8'-2"	7'-0"
	1 @ 7'	4'	#6	11"	140	140	7'-9"	#6	11"	130	130	8'-10"	7'-8"
		5'			140	140	7'-9"			130	130	8'-10"	7'-8"
		6'			140	140	7'-11"			130	130	9'-0"	7'-10"
		7'			140	140	8'-0"			130	130	9'-1"	7'-11"
		8'			140	140	8'-1"			130	130	9'-2"	8'-0"
		9'			140	140	8'-3"			130	130	9'-4"	8'-2"
	1 @ 8'	4'	#7	11"	128	128	8'-9"	#6	12"	118	118	9'-10"	8'-8"
		5'			128	128	8'-11"			118	118	10'-0"	8'-10"
		6'			128	128	8'-11"			118	118	10'-0"	8'-10"
		7'			128	128	9'-0"			118	118	10'-1"	8'-11"
		8'			128	128	9'-1"			118	118	10'-2"	9'-0"
		9'			128	128	9'-3"			118	118	10'-4"	9'-2"
		10'			128	128	9'-4"			118	118	10'-5"	9'-3"
	1 @ 9'	5'	#7	11"	140	140	9'-11"	#6	11"	130	130	11'-0"	9'-10"
		6'			140	140	10'-0"			130	130	11'-1"	9'-11"
		7'			140	140	10'-0"			130	130	11'-1"	9'-11"
		8'			140	140	10'-1"			130	130	11'-2"	10'-0"
		9'			140	140	10'-3"			130	130	11'-4"	10'-2"
		10'			140	140	10'-5"			130	130	11'-6"	10'-4"
		11'			140	140	10'-7"			130	130	11'-8"	10'-6"
	1 @ 10'	5'	#7	12"	128	128	10'-11"	#7	11"	118	118	12'-2"	10'-10"
		6'			128	128	11'-0"			118	118	12'-3"	10'-11"
		7'			128	128	11'-0"			118	118	12'-3"	10'-11"
		8'			128	128	11'-1"			118	118	12'-4"	11'-0"
		9'			128	128	11'-3"			118	118	12'-6"	11'-2"
		10'			128	128	11'-5"			118	118	12'-8"	11'-4"
		11'			128	128	11'-7"			118	118	12'-10"	11'-6"
		12'			128	128	11'-9"			118	118	13'-0"	11'-8"
	1 @ 11'	6'	#7	11"	140	140	12'-1"	#7	11"	130	130	13'-4"	12'-0"
		7'			140	140	12'-1"			130	130	13'-4"	12'-0"
		8'			140	140	12'-1"			130	130	13'-4"	12'-0"
		9'			140	140	12'-3"			130	130	13'-6"	12'-2"
		10'			140	140	12'-5"			130	130	13'-8"	12'-4"
		11'			140	140	12'-7"			130	130	13'-10"	12'-6"
		12'			140	140	12'-9"			130	130	14'-0"	12'-8"
	1 @ 12'	6'	#8	12"	128	128	13'-1"	#7	11"	118	118	14'-6"	13'-0"
		7'			128	128	13'-1"			118	118	14'-6"	13'-0"
		8'			128	128	13'-1"			118	118	14'-6"	13'-0"
		9'			128	128	13'-3"			118	118	14'-6"	13'-2"
		10'			128	128	13'-5"			118	118	14'-8"	13'-4"
		11'			128	128	13'-7"			118	118	14'-10"	13'-6"
		12'			128	128	13'-9"			118	118	15'-0"	13'-8"

DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	"d" bars STRAIGHT Longitudinal in Top Slab of Barrel SIZE	SPACING	NO. REQ'D	LENGTH	"d1" bars STRAIGHT Longitudinal in Sidewalls SIZE	SPACING	NO. REQ'D	LENGTH	"e" bars. Longitudinal in Bottom Slab of Barrel SIZE	SPACING	NO. REQ'D	LENGTH	"f" bars STRAIGHT Verticals in Side walls SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
0'-0" TO 5'-0" MAXIMUM	1 @ 4'	2'	#5	10½"	6	2 @ 30'-6" for 60'-0 Length Barrel. (1'-3" Lap)	#4	12"	4	2 @ 30'-6" for 60'-0 Length Barrel. (1'-3" Lap)	#4	12"	5	2 @ 31'-6" for 60'-0 Length Barrel. (1'-3" Lap)	#4	12"	120	120	2'-11"
		3'			6				6				5				120	120	3'-11"
		4'			6				8				5				120	120	4'-11"
		5'			6				10				5				120	120	5'-11"
		6'			6				12				5				120	120	6'-11"
	1 @ 5'	3'	#5	10½"	7		#4	12"	6		#4	12"	6		#4	12"	120	120	4'-0"
		4'			7				8				6				120	120	5'-0"
		5'			7				10				6				120	120	6'-0"
		6'			7				12				6				120	120	7'-0"
		7'			7				14				6				120	120	8'-0"
	1 @ 6'	3'	#5	10½"	8		#4	12"	6		#4	12"	7		#4	12"	120	120	4'-1"
		4'			8				8				7				120	120	5'-1"
		5'			8				10				7				120	120	6'-1"
		6'			8				12				7				120	120	7'-1"
		7'			8				14				7				120	120	8'-1"
		8'			8				16				7		#5	12"	120	120	9'-1"
	1 @ 7'	4'	#5	10½"	9		#4	12"	8		#4	12"	8		#4	12"	120	120	5'-2"
		5'			9				10				8				120	120	6'-2"
		6'			9				12				8				120	120	7'-2"
		7'			9				14				8				120	120	8'-2"
		8'			9				16				8		#5	12"	120	120	9'-2"
		9'			9				18				8				120	120	10'-2"
	1 @ 8'	4'	#5	10"	11		#4	12"	8		#4	12"	9		#4	12"	120	120	5'-8"
		5'			11				10				9				120	120	6'-8"
		6'			11				12				9				120	120	7'-8"
		7'			11				14				9				120	120	8'-8"
		8'			11				16				9				120	120	9'-8"
		9'			11				18				9				120	120	10'-8"
		10'			11				20				9				120	120	11'-8"
	1 @ 9'	5'	#5	10"	12		#4	12"	10		#4	12"	10		#4	12"	120	120	6'-5"
		6'			12				12				10				120	120	7'-5"
		7'			12				14				10				120	120	8'-5"
		8'			12				16				10				120	120	9'-5"
		9'			12				18				10				120	120	10'-5"
		10'			12				20				10				120	120	11'-5"
		11'			12				22				10				120	120	12'-5"
	1 @ 10'	5'	#5	10"	13		#4	12"	10		#4	12"	11		#4	12"	120	120	6'-6"
		6'			13				12				11				120	120	7'-6"
		7'			13				14				11				120	120	8'-6"
		8'			13				16				11				120	120	9'-6"
		9'			13				18				11				120	120	10'-6"
		10'			13				20				11				120	120	11'-6"
		11'			13				22				11				120	120	12'-6"
		12'			13				24				11				120	120	13'-6"
	1 @ 11'	6'	#5	9½"	15		#4	12"	12		#4	12"	12		#4	12"	120	120	7'-7"
		7'			15				14				12				120	120	8'-7"
		8'			15				16				12				120	120	9'-7"
		9'			15				18				12				120	120	10'-7"
		10'			15				20				12				120	120	11'-7"
		11'			15				22				12				120	120	12'-7"
		12'			15				24				12				120	120	13'-7"
	1 @ 12'	6'	#5	9½"	16		#4	12"	12		#4	12"	13		#4	12"	120	120	7'-8"
		7'			16				14				13				120	120	8'-8"
		8'			16				16				13				120	120	9'-8"
		9'			16				18				13				120	120	10'-8"
		10'			16				20				13				120	120	11'-8"
		11'			16				22				13				120	120	12'-8"
		12'			16				24				13				120	120	13'-8"

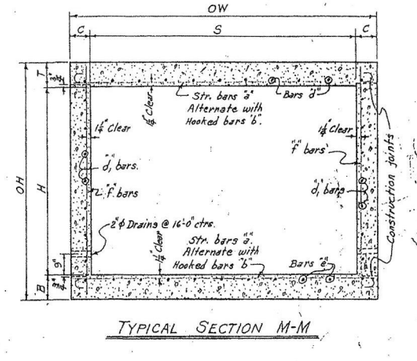
DIMENSIONS AND QUANTITIES

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	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.
5'-0"	1 @ 4'	2'	8	5'-0"	6"	6"	6"	3'-1½"	0.282	41.49	17.95	66.35
		3'	12	5'-0"		6"	6"	4'-1½"	0.319	44.16	19.62	66.35
		4'	16	5'-0"	7"	6"	6½"	5'-1½"	0.356	46.83	21.29	66.35
		5'	20	5'-0"		6"	6"	6'-1½"	0.394	49.50	22.96	66.35
		6'	24	5'-2"		7"		7'-1½"	0.974	52.96	24.63	67.75
	1 @ 5'	3'	15	6'-0"		6"		4'-2½"	0.380	55.55	22.19	101.27
		4'	20	6'-0"		6"		5'-2½"	0.417	58.23	23.86	101.27
		5'	25	6'-0"	7½"	6"	7"	6'-2½"	0.454	60.90	25.53	101.27
		6'	30	6'-2"		7"		7'-2½"	0.535	64.49	27.20	103.27
		7'	35	6'-3"		7½"		8'-2½"	0.604	67.63	28.87	104.27
	1 @ 6'	3'	18	7'-0"		6"		4'-3½"	0.446	66.23	29.76	118.96
		4'	24	7'-0"		6"		5'-3½"	0.483	68.96	26.93	118.96
		5'	30	7'-0"	8"	6"	7½"	6'-3½"	0.520	71.64	28.10	118.96
		6'	36	7'-2"		7"		7'-3½"	0.602	75.31	29.77	120.96
		7'	42	7'-3"		7½"		8'-3½"	0.671	78.98	31.44	121.97
		8'	48	7'-4"		8"		9'-3½"	0.746	80.47	33.11	122.97
	1 @ 7'	4'	28	8'-0"		6"		5'-5"	0.568	81.32	29.01	136.88
		5'	35	8'-0"		6"		6'-5"	0.605	84.00	30.68	136.88
		6'	42	8'-2"	8½"	7"	8½"	7'-5"	0.688	87.76	32.35	138.88
		7'	49	8'-3"		7½"		8'-5"	0.757	90.98	34.02	139.88
		8'	56	8'-4"		8"		9'-5"	0.832	96.65	35.69	140.88
		9'	63	8'-6"		9"		10'-5"	0.996	105.59	37.36	142.89
	1 @ 8'	4'	32	9'-0"		6"		5'-7"	0.676	95.26	33.32	194.07
		5'	40	9'-2"		7"		6'-7"	0.754	98.12	34.99	196.80
		6'	48	9'-2"		7"		7'-7"	0.787	101.79	36.66	196.80
		7'	56	9'-3"	9½"	7½"	9½"	8'-7"	0.867	105.05	38.33	198.16
		8'	64	9'-4"		8"		9'-7"	0.942	110.81	40.00	199.52
		9'	72	9'-6"		9"		10'-7"	1.057	119.92	41.67	202.25
		10'	80	9'-8"		10"		11'-7"	1.184	126.67	43.34	204.97
	1 @ 9'	5'	45	10'-2"		7"		6'-8"	0.844	119.72	37.56	219.61
		6'	54	10'-3"		7½"		7'-8"	0.910	118.04	39.23	220.97
		7'	63	10'-3"		7½"		8'-8"	0.957	120.71	40.90	220.97
		8'	72	10'-4"	10"	8"	10"	9'-8"	1.033	126.54	42.57	222.33
		9'	81	10'-6"		9"		10'-8"	1.198	135.80	44.24	224.02
		10'	90	10'-8"		10"		11'-8"	1.276	192.68	45.91	227.78
		11'	99	10'-10"		11"		12'-8"	1.496	160.90	47.58	230.51
	1 @ 10'	5'	50	11'-2"		7"		6'-9½"	0.957	130.64	40.13	292.64
		6'	60	11'-3"		7½"		7'-9½"	1.024	133.39	41.80	294.00
		7'	70	11'-3"		7½"		8'-9½"	1.071	136.64	43.47	294.00
		8'	80	11'-4"	10½"	8"	11"	9'-9½"	1.147	142.55	45.14	295.36
		9'	90	11'-6"		9"		10'-9½"	1.263	151.92	46.81	298.09
		10'	100	11'-8"		10"		11'-9½"	1.391	158.89	48.98	300.81
		11'	110	11'-10"		11"		12'-9½"	1.532	166.71	50.15	253.59
		12'	120	12'-0"		12"		13'-9½"	1.685	170.67	51.82	256.26
	1 @ 11'	6'	66	12'-4"	11"	8"	11⅝"	7'-10½"	1.153	155.16	96.12	268.62
		7'	77	12'-4"		8"		8'-10½"	1.202	157.88	97.79	268.62
		8'	88	12'-4"		8"		9'-10½"	1.252	163.06	99.96	268.62
		9'	99	12'-6"		9"		10'-10½"	1.368	172.60	51.18	271.39
		10'	110	12'-8"		10"		11'-10½"	1.497	179.70	52.80	274.07
		11'	121	12'-10"		11"		12'-10½"	1.688	187.67	54.97	276.79
		12'	132	13'-0"		12"		13'-10½"	1.792	193.79	56.14	278.52
	1 @ 12'	6'	72	13'-9"	12"	8"	12¼"	8'-0"	1.284	172.20	98.69	357.62
		7'	84	13'-9"		8"		9'-0"	1.333	174.87	50.36	357.62
		8'	96	13'-9"		8"		10'-0"	1.383	180.15	52.031	357.62
		9'	108	13'-6"	11⅜"	9"	12½"	11'-0"	1.500	189.85	58.70	361.18
		10'	120	13'-8"		10"		12'-0"	1.630	197.07	55.37	369.74
		11'	132	13'-10"		11"		13'-0"	1.772	205.16	57.04	368.30
		12'	144	14'-0"		12"		14'-0"	1.926	217.95	58.71	371.86

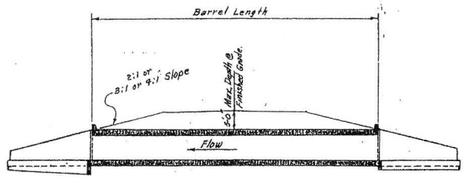
W-X002-1, W-X003-1 or W-X004-1 and W-X002-2, W-X003-2 or W-X004-2.



PART LONGITUDINAL SECTION



TYPICAL SECTION M-M



LONGITUDINAL SECTION

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM Bars "b".
#6	3"	5"	1'-2"	K, Pin Diam., X
#7	3½"	5¾"	1'-4"	

NOTE:- Dimensions are to centers of bars.

DOWEL BARS FOR TWO HEADWALLS

SPAN	SIZE	SPACING	NO. REQ'D	LENGTH	X
4'	#4	11"c	12	2'-6"	1'-3"
5'	#4	11"c	14	2'-7"	1'-3⅜"
6'	#4	11"c	16	2'-8"	1'-4"
7'	#4	11"c	18	2'-9"	1'-4⅝"
8'	#4	11½"c	20	2'-11"	1'-5⅝"
9'	#4	11½"c	22	3'-0"	1'-6"
10'	#4	11½"c	24	3'-1"	1'-6⅝"
11'	#4	12"c	26	3'-2"	1'-7"
12'	#4	12"c	28	3'-3"	1'-7⅝"

Bars "f" Dowel bars in Headwalls. (X, 12")

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'-6". 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 SINGLES — 3:1 OR 4:1 SLOPES UNDER 5'-0" COVER

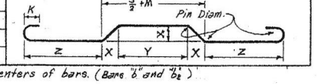
STANDARD DRAWING NO. R-100X-0

Designed By:- W.C.H. 1-23-63. Checked By:- JAG 5-24-63
Drawn By:- W.C.H. 2-8-63. Checked By:- JAG 5-24-63
Quantities By:- W.C.H. 2-12-63. Checked By:- JAG 5-24-63

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

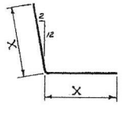
BAR LIST FOR BARREL SECTION 60'-0" IN LENGTH

DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	"a" bars					"b" bars								"b_2" bars								"c" bars					"d" bars				"d_1" bars				"e" bars				"f" bars				
			STRAIGHT					BENT - See Diagram below.								BENT - See Diagram below.								STRAIGHT					STRAIGHT												STRAIGHT				
			In Top and Bottom Slab of Barrel. 2 Add'l in Apron and Headwall.-Each.					In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars.								In Top of Bottom Slab bent down under Division Wall - hooked. Alternate with "a" and "c" bars.								In Top and Bottom Slab of Barrel. Alternate with "b" and "b_2" bars.					Longitudinal in Top Slab of Barrel.				Longitudinal in Sidewalls and Division Walls.				Longitudinal in Bottom Slab of Barrel.				Vertical in Sidewalls and Division Walls.				
D	S	H	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	Y	Z	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	Y	Z	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTH	SIZE	SPACING	NO. REQ'D	LENGTH	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
0'-0" TO 5'-0" MAXIMUM.	2 @ 4'	2'	#5	12"	128	128	9'-5"	#5	12"	59	59	10'-6"	0'-3"	2'-2½"	3'-4"	#5	12"	59	59	10'-6"	0'-2½"	2'-3½"	3'-4"	#5	12"	120	120	4'-8"	#5	12"	14	2 @ 30'-8" for 60'-0" Length Barrel (1'-8" Lap)	#4	12"	8	2 @ 30'-6" for 60'-0" Length Barrel (1'-3" Lap)	#4	12"	14	2 @ 31'-6" for 60'-0" Length Barrel (1'-3" Lap)	#4	12"	240	240	2'-10"
		3'			128	128	9'-5"			59	59	10'-6"	0'-3"	2'-2½"	3'-4"			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"			120	120	4'-8"			14				12				14				240	240	3'-10"
		4'			128	128	9'-5"			59	59	10'-6"	0'-3"	2'-2½"	3'-4"			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"			120	120	4'-8"			14				16				14				240	240	4'-10"
		5'			128	128	9'-5"			59	59	10'-6"	0'-3"	2'-2½"	3'-4"			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"			120	120	4'-8"			14				20				14				240	240	5'-10"
		6'			128	128	9'-8"			59	59	10'-9"	0'-3"	2'-3½"	3'-5"			59	59	10'-9"	0'-2½"	2'-4½"	3'-5"			120	120	4'-9"			14				24				14				240	240	6'-10"
	2 @ 5'	3'	#6	12"	128	128	11'-5"	#5	12"	59	59	12'-7"	0'-3½"	2'-7½"	4'-1"	#5	12"	59	59	12'-6"	0'-3"	2'-8½"	4'-1"	#6	12"	120	120	5'-8"	#5	11½"	16		#4	12"	12		#4	12"	16		#4	12"	240	240	3'-11"
		4'			128	128	11'-5"			59	59	12'-7"	0'-3½"	2'-7½"	4'-1"			59	59	12'-6"	0'-3"	2'-8½"	4'-1"			120	120	5'-8"			16				16				16				240	240	4'-11"
		5'			128	128	11'-5"			59	59	12'-7"	0'-3½"	2'-7½"	4'-1"			59	59	12'-6"	0'-3"	2'-8½"	4'-1"			120	120	5'-8"			16				20				16				240	240	5'-11"
		6'			128	128	11'-8"			59	59	12'-10"	0'-3½"	2'-8½"	4'-2"			59	59	12'-9"	0'-3"	2'-9½"	4'-2"			120	120	5'-9"			16				24				16				240	240	6'-11"
		7'			128	128	11'-10"			59	59	13'-0"	0'-3½"	2'-9½"	4'-2½"			59	59	12'-11"	0'-3"	2'-10½"	4'-2½"			120	120	5'-10"			16				28				16				240	240	7'-11"
	2 @ 6'	3'	#6	11"	140	140	13'-5"	#5	11"	65	65	14'-7"	0'-4"	3'-0½"	4'-10"	#5	11"	65	65	14'-7"	0'-4"	3'-0½"	4'-10"	#6	11"	132	132	6'-8"	#5	11½"	18		#4	12"	12		#4	12"	18		#4	12"	240	240	4'-0"
		4'			140	140	13'-5"			65	65	14'-7"	0'-4"	3'-0½"	4'-10"			65	65	14'-7"	0'-4"	3'-0½"	4'-10"			132	132	6'-8"			18				16				18				240	240	5'-0"
		5'			140	140	13'-5"			65	65	14'-7"	0'-4"	3'-0½"	4'-10"			65	65	14'-7"	0'-4"	3'-0½"	4'-10"			132	132	6'-8"			18				20				18				240	240	6'-0"
		6'			140	140	13'-8"			65	65	14'-10"	0'-4"	3'-1½"	4'-11"			65	65	14'-10"	0'-4"	3'-1½"	4'-11"			132	132	6'-9"			18				24				18				240	240	7'-0"
		7'			140	140	13'-10"			65	65	15'-0"	0'-4"	3'-2½"	4'-11½"			65	65	15'-0"	0'-4"	3'-2½"	4'-11½"			132	132	6'-10"			18				28				18				240	240	8'-0"
		8'			140	140	13'-11"			65	65	15'-1"	0'-4"	3'-2½"	5'-0"			65	65	15'-1"	0'-4"	3'-2½"	5'-0"			132	132	6'-10"			18				32				18			10"	288	288	9'-0"
	2 @ 7'	4'	#6	12"	128	128	15'-5"	#6	12"	59	59	16'-9"	0'-4½"	3'-5"	5'-7"	#6	12"	59	59	16'-9"	0'-4½"	3'-5"	5'-7"	#6	12"	120	120	7'-8"	#5	11½"	20		#4	12"	16		#4	12"	20		#4	12"	240	240	5'-1"
		5'			128	128	15'-5"			59	59	16'-9"	0'-4½"	3'-5"	5'-7"			59	59	16'-9"	0'-4½"	3'-5"	5'-7"			120	120	7'-8"			20				20				20				240	240	6'-1"
		6'			128	128	15'-8"			59	59	17'-0"	0'-4½"	3'-6"	5'-8"			59	59	17'-0"	0'-4½"	3'-6"	5'-8"			120	120	7'-9"			20				24				20				240	240	7'-1"
		7'			128	128	15'-10"			59	59	17'-2"	0'-4½"	3'-7"	5'-8½"			59	59	17'-2"	0'-4½"	3'-7"	5'-8½"			120	120	7'-10"			20				28				20				240	240	8'-1"
		8'			128	128	15'-11"			59	59	17'-3"	0'-4½"	3'-7"	5'-9"			59	59	17'-3"	0'-4½"	3'-7"	5'-9"			120	120	7'-10"			20				32				20			10"	288	288	9'-1"
		9'			128	128	16'-2"			59	59	17'-6"	0'-4½"	3'-8"	5'-10"			59	59	17'-6"	0'-4½"	3'-8"	5'-10"			120	120	7'-11"			20				36				20		#5	12"	240	240	10'-1"
	2 @ 8'	4'	#6	11"	140	140	17'-5"	#6	11"	65	65	18'-10"	0'-5"	3'-10"	6'-4"	#6	11"	65	65	18'-10"	0'-5"	3'-10"	6'-4"	#6	11"	132	132	8'-8"	#5	11½"	23		#4	12"	16		#4	12"	22		#4	12"	240	240	5'-2"
		5'			140	140	17'-8"			65	65	19'-1"	0'-5"	3'-11"	6'-5"			65	65	19'-1"	0'-5"	3'-11"	6'-5"			132	132	8'-9"			23				20				22				240	240	6'-2"
		6'			140	140	17'-8"			65	65	19'-1"	0'-5"	3'-11"	6'-5"			65	65	19'-1"	0'-5"	3'-11"	6'-5"			132	132	8'-9"			23				24				22				240	240	7'-2"
		7'			140	140	17'-10"			65	65	19'-3"	0'-5"	4'-0"	6'-5½"			65	65	19'-3"	0'-5"	4'-0"	6'-5½"			132	132	8'-10"			23				28				22				240	240	8'-2"
		8'			140	140	17'-11"			65	65	19'-4"	0'-5"	4'-0"	6'-6"			65	65	19'-4"	0'-5"	4'-0"	6'-6"			132	132	8'-10"			23				32				22			10"	288	288	9'-2"
		9'			140	140	18'-2"			65	65	19'-7"	0'-5"	4'-1"	6'-7"			65	65	19'-7"	0'-5"	4'-1"	6'-7"			132	182	8'-11"			23				36				22		#5	12"	240	240	10'-2"
		10'			140	140	18'-5"			65	65	19'-10"	0'-5"	4'-2"	6'-8"			65	65	19'-10"	0'-5"	4'-2"	6'-8"			132	132	9'-0"			23				40				22			11"	264	264	11'-2"
	2 @ 9'	5'	#6	11"	140	140	19'-8"	#6	11"	65	65	21'-1"	0'-5½"	4'-4"	7'-2"	#6	11"	65	65	21'-1"	0'-5¾"	4'-3½"	7'-2"	#6	11"	132	132	9'-9"	#5	11½"	26		#4	12"	20		#4	12"	25		#4	12"	240	240	6'-3"
		6'			140	140	19'-10"			65	65	21'-3"	0'-5½"	4'-5"	7'-2½"			65	65	21'-3"	0'-5¾"	4'-4½"	7'-2½"			132	132	9'-10"			26				24				25				240	240	7'-3"
		7'			140	140	19'-10"			65	65	21'-3"	0'-5½"	4'-5"	7'-2½"			65	65	21'-3"	0'-5¾"	4'-4½"	7'-2½"			132	132	9'-10"			26				28				25				240	240	8'-3"
		8'			140	140	19'-11"			65	65	21'-4"	0'-5½"	4'-5"	7'-3"			65	65	21'-4"	0'-5¾"	4'-4½"	7'-3"			132	132	9'-10"			26				32				25			10"	288	288	9'-3"
		9'			140	140	20'-2"			65	65	21'-7"	0'-5½"	4'-6"	7'-4"			65	65	21'-7"	0'-5¾"	4'-5½"	7'-4"			132	132	9'-11"			26				36				25		#5	12"	240	240	10'-3"
		10'			140	140	20'-5"			65	65	21'-10"	0'-5½"	4'-7"	7'-5"			65	65	21'-10"	0'-5¾"	4'-6½"	7'-5"			132	132	10'-0"			26				40				25			11"	264	264	11'-3"
		11'			140	140	20'-7"			65	65	22'-0"	0'-5½"	4'-7"	7'-6"			65	65	22'-0"	0'-5¾"	4'-6½"	7'-6"			132	132	10'-0"			26				44				25			10"	288	288	12'-3"
	2 @ 10'	5'	#7	12"	128	128	21'-8"	#6	12"	59	59	23'-2"	0'-6"	4'-9"	7'-11"	#6	12"	59	59	23'-2"	0'-6½"	4'-8"	7'-11"	#7	12"	120	120	10'-9"	#5	11½"	28		#4	12"	20		#4	12"	27		#4	12"	240	240	6'-4"
		6'			128	128	21'-10"			59	59	23'-4"	0'-6"	4'-10"	7'-11½"			59	59	23'-4"	0'-6½"	4'-9"	7'-11½"			120	120	10'-10"			28				24				27				240	240	7'-4"
		7'			128	128	21'-10"			59	59	23'-4"	0'-6"	4'-10"	7'-11½"			59	59	23'-4"	0'-6½"	4'-9"	7'-11½"			120	120	10'-10"			28				28				27				240	240	8'-4"
		8'			128	128	21'-11"			59	59	23'-5"	0'-6"	4'-10"	8'-0"			59	59	23'-5"	0'-6½"	4'-9"	8'-0"			120	120	10'-10"			28				32				27			10"	288	288	9'-4"
		9'			128	128	22'-2"			59	59	23'-8"	0'-6"	4'-11"	8'-1"			59	59	23'-8"	0'-6½"	4'-10"	8'-1"			120	120	10'-11"			28				36				27		#5	12"	240	240	10'-4"
		10'			128	128	22'-5"			59	59	23'-11"	0'-6"	5'-0"	8'-2"			59	59	23'-11"	0'-6½"	4'-11"	8'-2"			120	120	11'-0"			28				40				27			11"	264	264	11'-4"
		11'			128	128	22'-7"			59	59	24'-1"	0'-6"	5'-0"	8'-3"			59	59	24'-1"	0'-6½"	4'-11"	8'-3"			120	120	11'-0"			28				44				27			10"	288	288	12'-4"
		12'			128	128	22'-9"			59	59	24'-3"	0'-6"	5'-0"	8'-4"			59	59	24'-3"	0'-6½"	4'-11"	8'-4"			120	120	11'-0"			28				48				27	#6	12"	240	240	13'-4"
	2 @ 11'	6'	#7	12"	128	128	23'-11"	#6	12"	59	59	25'-5"	0'-6½"	5'-3"	8'-9"	#6	12"	59	59	25'-6"	0'-7½"	5'-1"	8'-9"	#7	12"	120	120	11'-10"	#5	11½"	30		#4	12"	24		#4	12"	29		#4	12"	240	240	7'-6"
		7'			128	128	23'-11"			59	59	25'-5"	0'-6½"	5'-3"	8'-9"			59	59	25'-6"	0'-7½"	5'-1"	8'-9"			120	120	11'-10"			30				28				29				240	240	8'-6"
		8'			128	128	23'-11"			59	59	25'-5"	0'-6½"	5'-3"	8'-9"			59	59	25'-6"	0'-7½"	5'-1"	8'-9"			120	120	11'-10"			30				32				29			10"	288	288	9'-6"
		9'			128	128	24'-2"			59	59	25'-8"	0'-6½"	5'-4"	8'-10"			59	59	25'-9"	0'-7½"	5'-2"	8'-10"			120	120	11'-11"			30				36				29	#5	12"	240	240	10'-6"
		10'			128	128	24'-5"			59	59	25'-11"	0'-6½"	5'-5"	8'-11"			59	59	26'-0"	0'-7½"	5'-3"	8'-11"			120	120	12'-0"			30				40				29			11"	264	264	11'-6"
		11'			128	128	24'-7"			59	59	26'-1"	0'-6½"	5'-5"	9'-0"			59	59	26'-2"	0'-7½"	5'-3"	9'-0"			120	120	12'-0"			30				44				29			10"	288	288	12'-6"
		12'			128	128	24'-9"			59	59	26'-3"	0'-6½"	5'-5"	9'-1"			59	59	26'-4"	0'-7½"	5'-3"	9'-1"			120	120	12'-0"			30				48				29	#6	12"	240	240	13'-6"
	2 @ 12'	6'	#7	11"	140	140	25'-11"	#6	11"	65	65	27'-5"	0'-7"	5'-8"	9'-6"	#6	11"	65	65	27'-7"	0'-8½"	5'-5"	9'-6"	#7	11"	132	132	12'-10"	#5	11½"	32		#4	12"	24		#4	12"	31		#4	12"	240	240	7'-7"
		7'			140	140	25'-11"			65	65	27'-5"	0'-7"	5'-8"	9'-6"			65	65	27'-7"	0'-8½"	5'-5"	9'-6"			132	132	12'-10"			32				28				31				240	240	8'-7"
		8'			140	140	25'-11"			65	65	27'-5"	0'-7"	5'-8"	9'-6"			65	65	27'-7"	0'-8½"	5'-5"	9'-6"			132	132	12'-10"			32				32				31			10"	288	288	9'-7"
		9'			140	140	26'-2"			65	65	27'-8"	0'-7"	5'-9"	9'-7"			65	65	27'-10"	0'-8½"	5'-6"	9'-7"			132	132	12'-11"			32				36				31	#5	12"	240	240	10'-7"
		10'			140	140	26'-5"			65	65	27'-11"	0'-7"	5'-10"	9'-8"			65	65	28'-1"	0'-8½"	5'-7"	9'-8"			132	132	13'-0"			32				40				31			11"	264	264	11'-7"
		11'			140	140	26'-7"			65	65	28'-1"	0'-7"	5'-10"	9'-9"			65	65	28'-3"	0'-8½"	5'-7"	9'-9"			132	132	13'-0"			32				44				31			10"	288	288	12'-7"
		12			140	140	26'-9"			65	65	28'-3"	0'-7"	5'-10"	9'-10"			65	65	28'-5"	0'-8½"	5'-7"	9'-10"			132	132	13'-0"			32				48				31	#6	12"	240	240	13'-7"

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM FOR Bars "b" and "b_2".
#5	2½"	4¼"	0'-11½"	
#6	3"	5"	1'-2"	

NOTE:- Dimensions are to centers of bars. (Bars "b" and "b_2")

DOWEL BARS FOR TWO HEADWALLS

2 SPANS @	SIZE	SPACING	NO. REQ'D	LENGTH	X	Bars "r" Dowel bars in Headwalls.
4'	#4	12"±	20	2'-5"	1'-2½"	
5'	#4	12"±	24	2'-6"	1'-3"	
6'	#4	12"±	28	2'-7"	1'-3½"	
7'	#4	12"±	32	2'-8"	1'-4"	
8'	#4	12"±	36	2'-9"	1'-4½"	
9'	#4	12"±	40	2'-10"	1'-5"	
10'	#4	12"±	46	2'-11"	1'-5½"	
11'	#4	12"±	50	3'-0"	1'-6"	
12'	#4	12"±	54	3'-1"	1'-6½"	

Designed by:- W.C.H. 1-17-63.
Drawn by:- W.C.H. 2-15-63.
Quantities by:- W.C.H. 2-19-63.

Checked by:- RHS 5-14-63
Checked by:- RHS 5-24-63
Checked by:- RHS 5-24-63

DIMENSIONS — QUANTITIES

MAX. DESIGN DEPTH OF COVER	BARREL DIMENSIONS: CLEAR SPANS	CLEAR HEIGHT	SQ.FT. OPENING	OVERALL WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF DIVISION WALL	THICKNESS OF BOTTOM SLAB	OVERALL HEIGHT	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	M	B	OH	CU.YD.	LB.	LB.	LB.
5'-0"	2 @ 4'	2'	16	9'-8"	6½"	6"	8"	6"	3'-0½"	0.496	88.15	42.71	129.56
		3'	24	9'-8"		6"	8"		4'-0½"	0.558	93.49	46.05	129.56
		4'	32	9'-8"		6"	8"		5'-0½"	0.620	98.84	49.39	129.56
		5'	40	9'-8"		6"	8"		6'-0½"	0.682	104.18	52.73	129.56
		6'	48	9'-11"		7"	9"		7'-0½"	0.809	110.74	56.07	131.65
	2 @ 5'	3'	30	11'-8"	7"	6"	8"	6½"	4'-1½"	0.671	123.34	51.19	198.64
		4'	40	11'-8"		6"	8"		5'-1½"	0.733	128.68	54.53	198.64
		5'	50	11'-8"		6"	8"		6'-1½"	0.795	134.03	57.87	198.64
		6'	60	11'-11"		7"	9"		7'-1½"	0.922	140.89	61.21	201.64
		7'	70	12'-1"		7½"	10"		8'-1½"	1.044	147.34	64.55	203.65
	2 @ 6'	3'	36	13'-8"	7½"	6"	8"	7½"	4'-3"	0.818	148.50	56.34	233.58
		4'	48	13'-8"		6"	8"		5'-3"	0.880	153.85	59.68	233.58
		5'	60	13'-8"		6"	8"		6'-3"	0.941	159.19	63.02	233.58
		6'	72	13'-11"		7"	9"		7'-3"	1.070	166.20	66.36	236.59
		7'	84	14'-1"		7½"	10"		8'-3"	1.192	172.74	69.70	238.59
		8'	96	14'-2"		8"	10"		9'-3"	1.298	183.36	73.04	239.59
	2 @ 7'	4'	56	15'-8"	8"	6"	8"	8"	5'-4"	1.021	178.15	64.83	268.97
		5'	70	15'-8"		6"	8"		6'-4"	1.082	183.49	68.17	268.97
		6'	84	15'-11"		7"	9"		7'-4"	1.212	190.59	71.51	271.97
		7'	98	16'-1"		7½"	10"		8'-4"	1.334	197.19	74.85	273.98
		8'	112	16'-2"		8"	10"		9'-4"	1.440	207.89	78.19	274.98
		9'	126	16'-5"		9"	11"		10'-4"	1.616	225.25	81.53	277.98
	2 @ 8'	4'	64	17'-8"	8½"	6"	8"	8½"	5'-5"	1.174	210.37	71.71	304.80
		5'	80	17'-11"		7"	9"		6'-5"	1.295	217.63	75.05	307.81
		6'	96	17'-11"		7"	9"		7'-5"	1.366	222.97	78.39	307.81
		7'	112	18'-1"		7½"	10"		8'-5"	1.489	229.68	81.73	309.81
		8'	128	18'-2"		8"	10"		9'-5"	1.595	240.47	85.07	310.81
		9'	144	18'-5"		9"	11"		10'-5"	1.772	258.08	88.41	313.82
		10'	160	18'-8"		10"	12"		11'-5"	1.967	271.07	91.75	316.82
	2 @ 9'	5'	90	19'-11"	9"	7"	9"	9¼"	6'-6¼"	1.477	239.37	82.77	345.92
		6'	108	20'-1"		7½"	10"		7'-6¼"	1.594	246.08	86.11	347.43
		7'	126	20'-1"		7½"	10"		8'-6¼"	1.671	251.43	89.45	347.43
		8'	144	20'-2"		8"	10"		9'-6¼"	1.778	262.26	92.79	348.43
		9'	162	20'-5"		9"	11"		10'-6¼"	1.956	279.95	96.13	351.43
		10'	180	20'-8"		10"	12"		11'-6¼"	2.152	292.97	99.47	354.43
		11'	198	20'-10"		11"	12"		12'-6¼"	2.328	306.86	102.81	356.44
	2 @ 10'	5'	100	21'-11"	9½"	7"	9"	10"	6'-7½"	1.674	279.64	87.92	479.99
		6'	120	22'-1"		7½"	10"		7'-7½"	1.792	286.50	91.26	482.71
		7'	140	22'-1"		7½"	10"		8'-7½"	1.869	291.85	94.60	482.71
		8'	160	22'-2"		8"	10"		9'-7½"	1.976	302.77	97.94	484.08
		9'	180	22'-5"		9"	11"		10'-7½"	2.155	320.74	101.28	488.16
		10'	200	22'-8"		10"	12"		11'-7½"	2.352	333.99	104.62	492.25
		11'	220	22'-10"		11"	12"		12'-7½"	2.529	348.01	107.96	494.98
		12'	240	23'-0"		12"	12"		13'-7½"	2.718	370.23	111.30	497.70
	2 @ 11'	6'	132	24'-2"	10"	8"	10"	11"	7'-9"	2.048	309.36	96.41	530.03
		7'	154	24'-2"		8"	10"		8'-9"	2.128	314.70	99.75	530.03
		8'	176	24'-2"		8"	10"		9'-9"	2.208	325.12	103.09	530.03
		9'	198	24'-5"		9"	11"		10'-9"	2.388	343.25	106.43	534.12
		10'	220	24'-8"		10"	12"		11'-9"	2.586	356.57	109.77	538.21
		11'	242	24'-10"		11"	12"		12'-9"	2.764	370.67	113.11	540.93
		12'	264	25'-0"		12"	12"		13'-9"	2.954	393.05	116.45	543.66
	2 @ 12'	6'	144	26'-2"	10½"	8"	10"	12"	7'-10½"	2.299	353.31	101.55	576.43
		7'	168	26'-2"		8"	10"		8'-10½"	2.379	358.65	104.89	576.43
		8'	192	26'-2"		8"	10"		9'-10½"	2.459	369.12	108.23	576.43
		9'	216	26'-5"		9"	11"		10'-10½"	2.640	387.52	111.57	580.52
		10'	240	26'-8"		10"	12"		11'-10½"	2.840	401.07	114.91	584.60
		11'	264	26'-10"		11"	12"		12'-10½"	3.018	415.31	118.25	587.33
		12'	288	27'-0"		12"	12"		13'-10½"	3.208	437.88	121.59	590.05

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.

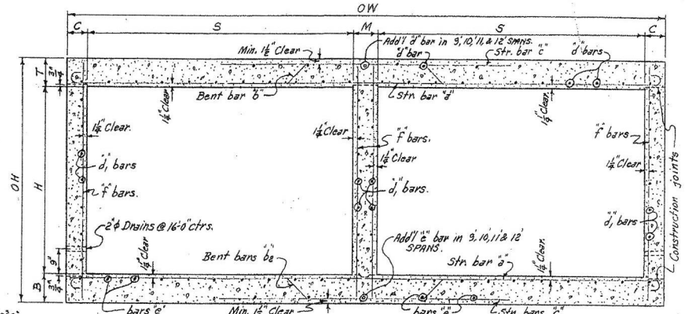
CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls, division walls and slabs shall be only where shown on plans.

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

DESIGN LIVE LOAD

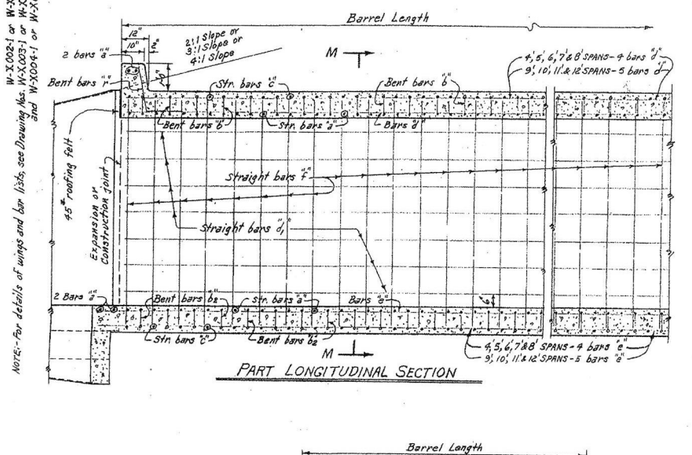
H20-S16 LOADING A.A.S.H.O. 1961
AND
SPECIAL MILITARY LOADING
Two 24,000 lb. Axles @ 4'-0" ctrs.

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

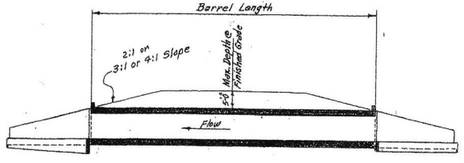


TYPICAL SECTION M-M

NOTE:- For details of wings and bar lists, see Drawing Nos. W-X002-1 or W-X002-2, W-X003-1 or W-X003-2, and W-X004-1 or W-X004-2.



PART LONGITUDINAL SECTION



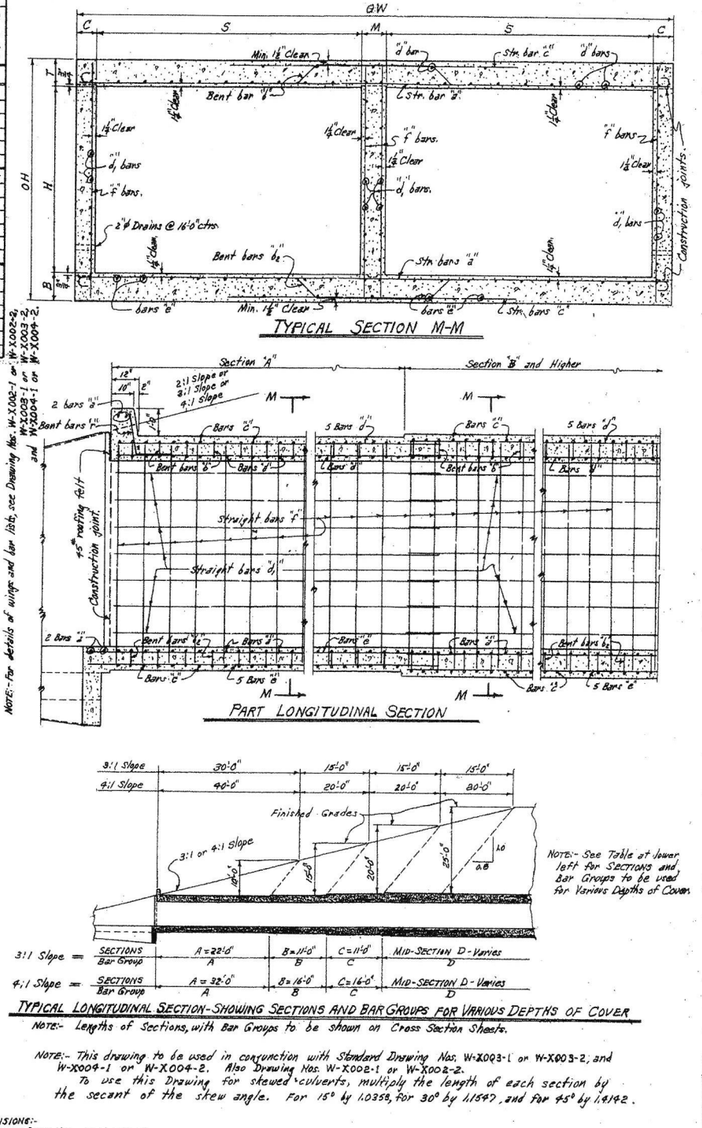
LONGITUDINAL SECTION

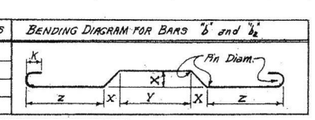
NOTE:- This drawing to be used in conjunction with Standard Wing Drawing Nos. W-X003-1 or W-X003-2 and W-X004-1 or W-X004-2. Also Drawing Nos. W-X002-1 or W-X002-2.

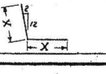
CLASS S CONCRETE

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
DOUBLES — UNDER 5'-0" COVER
STANDARD DRAWING NO. R-200X-0.







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

BAR LIST FOR VARIOUS SECTIONS OF BARREL

NOTE:- Bars for each Section to be marked with the Section letter, thus for Section B, the bars should be marked Ba, Bb, Bb2, Bc, Bd, Bd1, Be and Bf.

SECTION & BAR GROUP	LENGTHS OF SECTION	DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	"a" bars					"b" bars							
					STRAIGHT					BENT - See Diagram below.							
					In Top and Bottom Slab of Barrel 2 Add'l in Apron and Headwall - Each.					In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars.							
		D	S	H	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	Y	Z
SECTION "A" & BAR GROUP "A"	3:1 = 22'-0" 4:1 = 32'-0"	0' TO 10'-0"	2 @ 8'	5'	#5	13"	46	64	17'-8"	#6	13"	20	29	19'-1"	0'-5¾"	3'-8"	6'-6"
				6'			46	64	17'-8"			20	29	19'-1"	0'-5¾"	3'-8"	6'-6"
				7'			46	64	17'-10"			20	29	19'-3"	0'-5¾"	3'-9"	6'-6½"
				8'			46	64	17'-11"			20	29	19'-4"	0'-5¾"	3'-9"	6'-7"
				9'			46	64	18'-2"			20	29	19'-7"	0'-5¾"	3'-10"	6'-8"
				10'			46	64	18'-5"			20	29	19'-10"	0'-5¾"	3'-11"	6'-9"
			2 @ 10'	6'	#5	12"	48	68	21'-10"	#6	12"	22	32	23'-4"	0'-7¼"	4'-7½"	7'-11½"
				7'			48	68	21'-10"			22	32	23'-4"	0'-7¼"	4'-7½"	7'-11½"
				8'			48	68	21'-11"			22	32	23'-5"	0'-7¼"	4'-7½"	8'-0"
				9'			48	68	22'-2"			22	32	23'-8"	0'-7¼"	4'-8½"	8'-1"
				10'			48	68	22'-5"			22	32	23'-11"	0'-7¼"	4'-9½"	8'-2"
				11'			48	68	22'-7"			22	32	24'-1"	0'-7¼"	4'-9½"	8'-3"
				12'			48	68	22'-9"			22	32	24'-3"	0'-7¼"	4'-9½"	8'-4"
			2 @ 12'	6'	#5	11"	52	74	25'-11"	#7	11"	24	35	27'-8"	0'-8¾"	5'-4½"	9'-6"
				7'			52	74	25'-11"			24	35	27'-8"	0'-8¾"	5'-4½"	9'-6"
				8'			52	74	25'-11"			24	35	27'-8"	0'-8¾"	5'-4½"	9'-6"
				9'			52	74	26'-2"			24	35	27'-11"	0'-8¾"	5'-5½"	9'-7"
				10'			52	74	26'-5"			24	35	28'-2"	0'-8¾"	5'-6½"	9'-8"
				11'			52	74	26'-7"			24	35	28'-4"	0'-8¾"	5'-6½"	9'-9"
				12'			52	74	26'-9"			24	35	28'-6"	0'-8¾"	5'-6½"	9'-10"
SECTION "B" & BAR GROUP "B"	3:1 = 11'-0" 4:1 = 16'-0"	10'-0" TO 15'-0"	2 @ 8'	5'	#5	12"	22	32	17'-8"	#6	12"	11	16	19'-2"	0'-6¾"	3'-6"	6'-6"
				6'			22	32	17'-8"			11	16	19'-2"	0'-6¾"	3'-6"	6'-6"
				7'			22	32	17'-10"			11	16	19'-4"	0'-6¾"	3'-7"	6'-6½"
				8'			22	32	17'-11"			11	16	19'-5"	0'-6¾"	3'-7"	6'-7"
				9'			22	32	18'-2"			11	16	19'-8"	0'-6¾"	3'-8"	6'-8"
				10'			22	32	18'-5"			11	16	19'-11"	0'-6¾"	3'-9"	6'-9"
			2 @ 10'	6'	#5	12"	22	32	21'-10"	#7	12"	11	16	23'-7"	0'-8½"	4'-5½"	7'-11½"
				7'			22	32	21'-10"			11	16	23'-7"	0'-8½"	4'-5½"	7'-11½"
				8'			22	32	21'-11"			11	16	23'-8"	0'-8½"	4'-5½"	8'-0"
				9'			22	32	22'-2"			11	16	23'-11"	0'-8½"	4'-6½"	8'-1"
				10'			22	32	22'-5"			11	16	24'-2"	0'-8½"	4'-7½"	8'-2"
				11'			22	32	22'-7"			11	16	24'-4"	0'-8½"	4'-7½"	8'-3"
				12'			22	32	22'-9"			11	16	24'-6"	0'-8½"	4'-7½"	8'-4"
			2 @ 12'	6'	#6	13"	20	30	25'-11"	#8	13"	10	15	28'-0"	0'-10¼"	5'-1"	9'-6"
				7'			20	30	25'-11"			10	15	28'-0"	0'-10¼"	5'-1"	9'-6"
				8'			20	30	25'-11"			10	15	28'-0"	0'-10¼"	5'-1"	9'-6"
				9'			20	30	26'-2"			10	15	28'-3"	0'-10¼"	5'-2"	9'-7"
				10'			20	30	26'-5"			10	15	28'-6"	0'-10¼"	5'-3"	9'-8"
				11'			20	30	26'-7"			10	15	28'-8"	0'-10¼"	5'-3"	9'-9"
				12'			20	30	26'-9"			10	15	28'-10"	0'-10¼"	5'-3"	9'-10"
SECTION "C" & BAR GROUP "C"	3:1 = 11'-0" 4:1 = 16'-0"	15'-0" TO 20'-0"	2 @ 8'	5'	#5	12"	22	32	17'-8"	#6	12"	11	16	19'-3"	0'-7¾"	3'-4"	6'-6"
				6'			22	32	17'-8"			11	16	19'-3"	0'-7¾"	3'-4"	6'-6"
				7'			22	32	17'-10"			11	16	19'-5"	0'-7¾"	3'-5"	6'-6½"
				8'			22	32	17'-11"			11	16	19'-6"	0'-7¾"	3'-5"	6'-7"
				9'			22	32	18'-2"			11	16	19'-9"	0'-7¾"	3'-6"	6'-8"
				10'			22	32	18'-5"			11	16	20'-0"	0'-7¾"	3'-7"	6'-9"
			2 @ 10'	6'	#6	13"	20	30	21'-11"	#8	13"	10	15	23'-11"	0'-9¾"	4'-2½"	8'-0"
				7'			20	30	21'-11"			10	15	23'-11"	0'-9¾"	4'-2½"	8'-0"
				8'			20	30	22'-0"			10	15	24'-0"	0'-9¾"	4'-2½"	8'-0½"
				9'			20	30	22'-3"			10	15	24'-3"	0'-9¾"	4'-3½"	8'-1½"
				10'			20	30	22'-5"			10	15	24'-6"	0'-9¾"	4'-4½"	8'-2½"
				11'			20	30	22'-7"			10	15	24'-7"	0'-9¾"	4'-4½"	8'-3"
				12'			20	30	22'-9"			10	15	24'-9"	0'-9¾"	4'-4½"	8'-4"
			2 @ 12'	6'	#6	11"	24	34	25'-11"	#8	11"	12	17	28'-2"	1'-0¼"	4'-9½"	9'-6"
				7'			24	34	25'-11"			12	17	28'-2"	1'-0¼"	4'-9½"	9'-6"
				8'			24	34	26'-0"			12	17	28'-3"	1'-0¼"	4'-9½"	9'-6¾"
				9'			24	34	26'-3"			12	17	28'-6"	1'-0¼"	4'-10½"	9'-7½"
				10'			24	34	26'-5"			12	17	28'-8"	1'-0¼"	4'-11½"	9'-8½"
				11'			24	34	26'-7"			12	17	28'-10"	1'-0¼"	4'-11½"	9'-9½"
				12'			24	34	26'-9"			12	17	29'-0"	1'-0¼"	4'-11½"	9'-10½"
SECTION "D" & BAR GROUP "D"	Varies with Length of Barrel	20'-0" TO 25'-0"	2 @ 8'	5'	#5	11"	Varies with length of Barrel.	Varies with length of Barrel.	17'-8"	#6	11"	Varies with length of Barrel.	Varies with length of Barrel.	19'-4"	0'-8¾"	3'-2"	6'-6"
				6'					17'-9"					19'-5"	0'-8¾"	3'-2"	6'-6½"
				7'					18'-0"					19'-8"	0'-8¾"	3'-3"	6'-7½"
				8'					18'-1"					19'-9"	0'-8¾"	3'-3"	6'-8"
				9'					18'-4"					20'-0"	0'-8¾"	3'-4"	6'-9"
				10'					18'-7"					20'-3"	0'-8¾"	3'-5"	6'-10"
			2 @ 10'	6'	#6	12"			21'-11"	#8	12"			24'-0"	0'-10¾"	4'-0½"	8'-0"
				7'					22'-0"					24'-1"	0'-10¾"	4'-0½"	8'-0½"
				8'					22'-1"					24'-3"	0'-10¾"	4'-0½"	8'-1½"
				9'					22'-4"					24'-6"	0'-10¾"	4'-1½"	8'-2½"
				10'					22'-7"					24'-9"	0'-10¾"	4'-2½"	8'-3½"
				11'					22'-9"					24'-10"	0'-10¾"	4'-2½"	8'-4"
				12'					22'-10"					25'-0"	0'-10¾"	4'-2½"	8'-4½"
			2 @ 12'	6'	#6	10"			25'-11"	#8	10"			28'-3"	1'-1¼"	4'-6½"	9'-6"
				7'					26'-0"					28'-4"	1'-1¼"	4'-6½"	9'-6¾"
				8'					26'-2"					28'-6"	1'-1¼"	4'-6½"	9'-7½"
				9'					26'-5"					28'-9"	1'-1¼"	4'-7½"	9'-8½"
				10'					26'-7"					28'-11"	1'-1¼"	4'-8½"	9'-9½"
				11'					26'-9"					29'-1"	1'-1¼"	4'-8½"	9'-10½"
				12'					26'-11"					29'-3"	1'-1¼"	4'-8½"	9'-11½"

SECTION & BAR GROUP	CLEAR SPAN	CLEAR HEIGHT	"b2" bars								"c" bars				
			BENT - See Diagram below								STRAIGHT				
			In Top of Bottom Slab bent down under Division Wall - hooked. Alternate with "a" and "c" bars.								In Top and Bottom Slab of Barrel. Alternate with "b" and "b2" bars.				
	S	H	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	Y	Z	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
SECTION "A" & BAR GROUP "A"	2 @ 8'	5'	#6	13"	20	29	19'-2"	0'-6¼"	3'-7"	6'-6"	#7	13"	42	60	8'-9"
		6'			20	29	19'-2"	0'-6¼"	3'-7"	6'-6"			42	60	8'-9"
		7'			20	29	19'-4"	0'-6¼"	3'-8"	6'-6½"			42	60	8'-10"
		8'			20	29	19'-5"	0'-6¼"	3'-8"	6'-7"			42	60	8'-10"
		9'			20	29	19'-8"	0'-6¼"	3'-9"	6'-8"			42	60	8'-11"
		10'			20	29	19'-11"	0'-6¼"	3'-10"	6'-9"			42	60	9'-0"
	2 @ 10'	6'	#6	12"	22	32	23'-5"	0'-8"	4'-6"	7'-11½"	#8	12"	44	64	10'-10"
		7'			22	32	23'-5"	0'-8"	4'-6"	7'-11½"			44	64	10'-10"
		8'			22	32	23'-6"	0'-8"	4'-6"	8'-0"			44	64	10'-10"
		9'			22	32	23'-9"	0'-8"	4'-7"	8'-1"			44	64	10'-11"
		10'			22	32	24'-0"	0'-8"	4'-8"	8'-2"			44	64	11'-0"
		11'			22	32	24'-2"	0'-8"	4'-8"	8'-3"			44	64	11'-0"
		12'			22	32	24'-4"	0'-8"	4'-8"	8'-4"			44	64	11'-0"
	2 @ 12'	6'	#7	11"	24	35	27'-9"	0'-9¾"	5'-2½"	9'-6"	#8	11"	48	70	12'-10"
		7'			24	35	27'-9"	0'-9¾"	5'-2½"	9'-6"			48	70	12'-10"
		8'			24	35	27'-9"	0'-9¾"	5'-2½"	9'-6"			48	70	12'-10"
		9'			24	35	28'-0"	0'-9¾"	5'-3½"	9'-7"			48	70	12'-11"
		10'			24	35	28'-3"	0'-9¾"	5'-4½"	9'-8"			48	70	13'-0"
		11'			24	35	28'-5"	0'-9¾"	5'-4½"	9'-9"			48	70	13'-0"
		12'			24	35	28'-7"	0'-9¾"	5'-4½"	9'-10"			48	70	13'-0"
SECTION "B" & BAR GROUP "B"	2 @ 8'	5'	#6	12"	11	16	19'-3"	0'-7¼"	3'-5"	6'-6"	#7	12"	22	32	8'-9"
		6'			11	16	19'-3"	0'-7¼"	3'-5"	6'-6"			22	32	8'-9"
		7'			11	16	19'-5"	0'-7¼"	3'-6"	6'-6½"			22	32	8'-10"
		8'			11	16	19'-6"	0'-7¼"	3'-6"	6'-7"			22	32	8'-10"
		9'			11	16	19'-9"	0'-7¼"	3'-7"	6'-8"			22	32	8'-11"
		10'			11	16	20'-0"	0'-7¼"	3'-8"	6'-9"			22	32	9'-0"
	2 @ 10'	6'	#7	12"	11	16	23'-8"	0'-9½"	4'-3½"	7'-11½"	#8	12"	22	32	10'-10"
		7'			11	16	23'-8"	0'-9½"	4'-3½"	7'-11½"			22	32	10'-10"
		8'			11	16	23'-9"	0'-9½"	4'-3½"	8'-0"			22	32	10'-10"
		9'			11	16	24'-0"	0'-9½"	4'-4½"	8'-1"			22	32	10'-11"
		10'			11	16	24'-3"	0'-9½"	4'-5½"	8'-2"			22	32	11'-0"
		11'			11	16	24'-5"	0'-9½"	4'-5½"	8'-3"			22	32	11'-0"
		12'			11	16	24'-7"	0'-9½"	4'-5½"	8'-4"			22	22	11'-0"
	2 @ 12'	6'	#8	13"	10	15	28'-1"	0'-11¼"	4'-11½"	9'-6"	#9	13"	20	30	12'-10"
		7'			10	15	28'-1"	0'-11¼"	4'-11½"	9'-6"			20	30	12'-10"
		8'			10	15	28'-1"	0'-11¼"	4'-11½"	9'-6"			20	30	12'-10"
		9'			10	15	28'-4"	0'-11¼"	5'-0½"	9'-7"			20	30	12'-11"
		10'			10	15	28'-7"	0'-11¼"	5'-1½"	9'-8"			20	30	13'-0"
		11'			10	15	28'-9"	0'-11¼"	5'-1½"	9'-9"			20	30	13'-0"
		12'			10	15	28'-11"	0'-11¼"	5'-1½"	9'-10"			20	30	13'-0"
SECTION "C" & BAR GROUP "C"	2 @ 8'	5'	#6	12"	11	16	19'-3"	0'-8¼"	3'-3"	6'-6"	#8	12"	22	32	8'-9"
		6'			11	16	19'-3"	0'-8¼"	3'-3"	6'-6"			22	32	8'-9"
		7'			11	16	19'-5"	0'-8¼"	3'-4"	6'-6½"			22	32	8'-10"
		8'			11	16	19'-6"	0'-8¼"	3'-4"	6'-7"			22	32	8'-10"
		9'			11	16	19'-9"	0'-8¼"	3'-5"	6'-8"			22	32	8'-11"
		10'			11	16	20'-0"	0'-8¼"	3'-6"	6'-9"			22	32	9'-0"
	2 @ 10'	6'	#8	13"	10	15	24'-0"	0'-10½"	4'-1"	8'-0"	#9	13"	20	30	10'-10"
		7'			10	15	24'-0"	0'-10½"	4'-1"	8'-0"			20	30	10'-10"
		8'			10	15	24'-1"	0'-10½"	4'-1"	8'-0½"			20	30	10'-10"
		9'			10	15	24'-4"	0'-10½"	4'-2"	8'-1½"			20	30	10'-11"
		10'			10	15	24'-7"	0'-10½"	4'-3"	8'-2½"			20	30	11'-0"
		11'			10	15	24'-8"	0'-10½"	4'-3"	8'-3"			20	30	11'-0"
		12'			10	15	24'-10"	0'-10½"	4'-3"	8'-4"			20	30	11'-0"
	2 @ 12'	6'	#8	11"	12	17	28'-2"	1'-0¾"	4'-8½"	9'-6"	#9	11"	24	34	12'-10"
		7'			12	17	28'-2"	1'-0¾"	4'-8½"	9'-6"			24	34	12'-10"
		8'			12	17	28'-3"	1'-0¾"	4'-8½"	9'-6¾"			24	34	12'-10"
		9'			12	17	28'-6"	1'-0¾"	4'-9½"	9'-7½"			24	34	12'-11"
		10'			12	17	28'-8"	1'-0¾"	4'-10½"	9'-8½"			24	34	13'-0"
		11'			12	17	28'-10"	1'-0¾"	4'-10½"	9'-9½"			24	34	13'-0"
		12'			12	17	29'-0"	1'-0¾"	4'-10½"	9'-10½"			24	34	13'-0"
SECTION "D" & BAR GROUP "D"	2 @ 8'	5'	#6	11"	Varies with length of Barrel.	Varies with length of Barrel.	19'-4"	0'-9¼"	3'-1"	6'-6"	#8	11"	Varies with length of Barrel.	Varies with length of Barrel.	8'-9"
		6'					19'-5"	0'-9¼"	3'-1"	6'-6½"					8'-9"
		7'					19'-8"	0'-9¼"	3'-2"	6'-7½"					8'-10"
		8'					19'-9"	0'-9¼"	3'-2"	6'-8"					8'-10"
		9'					20'-0"	0'-9¼"	3'-3"	6'-9"					8'-11"
		10'					20'-3"	0'-9¼"	3'-4"	6'-10"					9'-0"
	2 @ 10'	6'	#8	12"			24'-1"	0'-11½"	3'-11"	8'-0"	#9	12"			10'-10"
		7'					24'-2"	0'-11½"	3'-11"	8'-0½"					10'-10"
		8'					24'-3"	0'-11½"	3'-11"	8'-1½"					10'-10"
		9'					24'-6"	0'-11½"	4'-0"	8'-2½"					10'-11"
		10'					24'-9"	0'-11½"	4'-1"	8'-3½"					11'-0"
		11'					24'-11"	0'-11½"	4'-1"	8'-4"					11'-0"
		12'					25'-0"	0'-11½"	4'-1"	8'-4½"					11'-0"
	2 @ 12'	6'	#8	10"			28'-3"	1'-2¼"	4'-5½"	9'-6"	#9	10"			12'-10"
		7'					28'-5"	1'-2¼"	4'-5½"	9'-6¾"					12'-10"
		8'					28'-6"	1'-2¼"	4'-5½"	9'-7½"					12'-10"
		9'					28'-9"	1'-2¼"	4'-6½"	9'-8½"					12'-11"
		10'					29'-0"	1'-2¼"	4'-7½"	9'-9½"					13'-0"
		11'					29'-2"	1'-2¼"	4'-7½"	9'-10½"					13'-0"
		12'					29'-4"	1'-2¼"	4'-7½"	9'-11½"					13'-0"

SECTION & BAR GROUP	CLEAR SPAN	CLEAR HEIGHT	"d" bars				"d1" bars				"e" bars				"f" bars				
			STRAIGHT												STRAIGHT				
			Longitudinal in Top Slab of Barrel				Longitudinal in Sidewalls and Division Walls				Longitudinal in Bottom Slab of Barrel				Vertical in Sidewalls and Division Walls				
	S	H	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	No. REQ'D	LENGTH	SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
SECTION "A" & BAR GROUP "A"	2 @ 8'	5'	#4	12"	23	33'-3" for 32'-0" Section	#4	12"	20	33'-3" for 32'-0" Section	#4	12"	23	34'-3" for 32'-0" Section	#4	12"	88	128	6'-4"
		6'			23				24				23				88	128	7'-4"
		7'			23				28				23			10"	108	156	8'-4"
		8'			23				32				23		#5	11"	96	140	9'-4"
		9'			23				36				23			10"	108	156	10'-4"
		10'			23				40				23		#6	12"	88	128	11'-4"
	2 @ 10'	6'	#4	12"	27		#4	12"	24		#4	12"	27		#4	12"	88	128	7'-7"
		7'			27				28				27			10"	108	156	8'-7"
		8'			27				32				27		#5	12"	88	128	9'-7"
		9'			27				36				27			10"	108	156	10'-7"
		10'			27				40				27		#6	12"	88	128	11'-7"
		11'			27				44				27			11"	96	140	12'-7"
		12'			27				48				27			10"	108	156	13'-7"
	2 @ 12'	6'	#4	12"	31		#4	12"	24		#4	12"	31		#4	12"	88	128	7'-11"
		7'			31				28				31				88	128	8'-11"
		8'			31				32				31		#5	12"	88	128	9'-11"
		9'			31				36				31			10"	108	156	10'-11"
		10'			31				40				31		#6	12"	88	128	11'-11"
		11'			31				44				31			11"	96	140	12'-11"
		12'			31				48				31			9"	120	172	13'-11"
SECTION "B" & BAR GROUP "B"	2 @ 8'	5'	#4	12"	23	34'-3" for 33'-0" Length Section	#4	12"	20	34'-3" for 33'-0" Length Section.	#4	12"	23	34'-3" for 33'-0" Length Section.	#4	12"	44	64	6'-6"
		6'			23				24				23				44	64	7'-6"
		7'			23				28				23		#5	12"	44	64	8'-6"
		8'			23				32				23			9"	60	84	9'-6"
		9'			23				36				23		#6	11"	48	68	10'-6"
		10'			23				40				23			10"	56	80	11'-6"
	2 @ 10'	6'	#4	12"	27		#4	12"	24		#4	12"	27		#4	12"	44	64	7'-10"
		7'			27				28				27		#5	12"	44	64	8'-10"
		8'			27				32				27			9"	60	88	9'-10"
		9'			27				36				27		#6	12"	44	64	10'-10"
		10'			27				40				27			10"	56	80	11'-10"
		11'			27				44				27			9"	60	88	12'-10"
		12'			27				48				27			8"	64	96	13'-10"
	2 @ 12'	6'	#4	12"	31		#4	12"	24		#4	12"	31		#4	12"	44	64	8'-2"
		7'			31				28				31			9"	60	88	9'-2"
		8'			31				32				31		#6	12"	44	64	10'-2"
		9'			31				36				31			11"	48	68	11'-2"
		10'			31				40				31			9"	60	88	12'-2"
		11'			31				44				31		#7	11"	48	72	13'-2"
		12'			31				48				31			10"	52	76	14'-2"
SECTION "C" & BAR GROUP "C"	2 @ 8'	5'	#4	12"	23		#4	12"	20		#4	12"	23		#4	12"	44	64	6'-8"
		6'			23				24				23				44	64	7'-8"
		7'			23				28				23		#5	11"	48	68	8'-8"
		8'			23				32				23		#6	11"	48	68	9'-8"
		9'			23				36				23			10"	52	76	10'-8"
		10'			23				40				23		#7	10"	52	76	11'-8"
	2 @ 10'	6'	#4	12"	27		#4	12"	24		#4	12"	27		#4	12"	44	64	8'-0"
		7'			27				28				27		#5	12"	44	64	9'-0"
		8'			27				32				27		#6	12"	44	64	10'-0"
		9'			27				36				27			10"	52	76	11'-0"
		10'			27				40				27		#7	12"	44	64	12'-0"
		11'			27				44				27			10"	52	76	13'-0"
		12'			27				48				27			9"	60	84	14'-0"
	2 @ 12'	6'	#4	11"	33		#4	12"	24		#4	11"	33		#4	12"	44	64	8'-5"
		7'			33				28				33		#5	11"	48	68	9'-5"
		8'			33				32				33		#6	12"	44	64	10'-5"
		9'			33				36				33			10"	52	76	11'-5"
		10'			33				40				33		#7	11"	48	68	12'-5"
		11'			33				44				33			10"	56	76	13'-5"
		12'			33				48				33			8"	64	96	14'-5"
SECTION "D" & BAR GROUP "D"	2 @ 8'	5'	#4	12"	23	Varies with length of Barrel.	#4	12"	20	Varies with length of Barrel.	#4	12"	23	Varies with length of Barrel.	#4	12"	Varies with length of Barrel.	Varies with length of Barrel.	6'-10"
		6'			23				24				23			10"			7'-10"
		7'			23				28				23		#5	10"			8'-10"
		8'			23				32				23			11"			9'-10"
		9'			23				36				23		#6	9"			10'-10"
		10'			23				40				23			8"			11'-10"
	2 @ 10'	6'	#4	12"	27		#4	12"	24		#4	12"	27		#4	12"			8'-2"
		7'			27				28				27		#5	11"			9'-2"
		8'			27				32				27		#6	12"			10'-2"
		9'			27				36				27			10"			11'-2"
		10'			27				40				27		#7	11"			12'-2"
		11'			27				44				27			9"			13'-2"
		12'			27				48				27			8"			14'-2"
	2 @ 12'	6'	#4	10½"	35		#4	12"	24		#4	10½"	35		#4	12"			8'-8"
		7'			35				28				35		#5	11"			9'-8"
		8'			35				32				35		#6	12"			10'-8"
		9'			35				36				35			10"			11'-8"
		10'			35				40				35		#7	11"			12'-8"
		11'			35				44				35			9"			13'-8"
		12'			35				48				35			8"			14'-8"

DIMENSIONS / QUANTITIES

MAX. DESIGN DEPTH OF COVER	BARREL DIMENSIONS									UNIT QUANTITIES			
	CLEAR SPANS	CLEAR HEIGHT	SQ. FT. OPENING	OVERALL WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF DIVISION WALL	THICKNESS OF BOTTOM SLAB	OVERALL HEIGHT	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	M	B	OH	CU.YD.	LB.	LB.	LB.
SECTION "A" - 10'-0"	2 @ 8'	5'	80	17'-11"	9¼"	7"	9"	9¾"	6'-7"	1.406	181.08	55.11	250.28
		6'	96	17'-11"		7"	9"		7'-7"	1.477	186.42	58.45	250.28
		7'	112	18'-1"		7½"	10"		8'-7"	1.601	197.32	61.79	251.67
		8'	128	18'-2"		8"	10"		9'-7"	1.707	216.14	65.13	252.37
		9'	144	18'-5"		9"	11"		10'-7"	1.886	229.56	68.47	254.46
		10'	160	18'-8"		10"	12"		11'-7"	2.082	250.08	71.81	256.54
	2 @ 10'	6'	120	22'-1"	10¾"	7½"	10"	11½"	7'-10¼"	1.979	245.98	65.13	315.55
		7'	140	22'-1"		7½"	10"		8'-10¼"	2.057	255.91	68.47	315.55
		8'	160	22'-2"		8"	10"		9'-10¼"	2.164	271.47	71.81	316.25
		9'	180	22'-5"		9"	11"		10'-10¼"	2.345	288.86	75.15	318.34
		10'	200	22'-8"		10"	12"		11'-10¼"	2.544	309.86	78.49	320.42
		11'	220	22'-10"		11"	12"		12'-10¼"	2.722	326.26	81.83	321.81
		12'	240	23'-0"		12"	12"		13'-10¼"	2.913	345.24	85.17	323.20
	2 @ 12'	6'	144	26'-2"	12½"	8"	10"	13½"	8'-2"	2.581	335.91	71.81	383.92
		7'	168	26'-2"		8"	10"		9'-2"	2.662	341.25	75.15	383.92
		8'	192	26'-2"		8"	10"		10'-2"	2.742	361.47	78.49	383.92
		9'	216	26'-5"		9"	11"		11'-2"	2.925	379.59	81.83	386.00
		10'	240	26'-8"		10"	12"		12'-2"	3.128	401.88	85.17	388.09
		11'	264	26'-10"		11"	12"		13'-2"	3.308	418.23	88.51	389.48
		12'	288	27'-0"		12"	12"		14'-2"	3.500	448.85	91.85	390.87
SECTION "B" - 15'-0"	2 @ 8'	5'	80	17'-11"	10¼"	7"	9"	10¾"	6'-9"	1.516	191.78	55.11	
		6'	96	17'-11"		7"	9"		7'-9"	1.587	197.13	58.45	
		7'	112	18'-1"		7½"	10"		8'-9"	1.712	216.41	61.79	
		8'	128	18'-2"		8"	10"		9'-9"	1.819	236.89	65.13	
		9'	144	18'-5"		9"	11"		10'-9"	1.999	257.15	68.47	
		10'	160	18'-8"		10"	12"		11'-9"	2.198	275.52	71.81	
	2 @ 10'	6'	120	22'-1"	12"	7½"	10"	13"	8'-1"	2.167	273.01	65.13	
		7'	140	22'-1"		7½"	10"		9'-1"	2.244	291.60	68.47	
		8'	160	22'-2"		8"	10"		10'-1"	2.352	312.64	71.81	
		9'	180	22'-5"		9"	11"		11'-1"	2.595	327.68	75.15	
		10'	200	22'-8"		10"	12"		12'-1"	2.737	352.57	78.49	
		11'	220	22'-10"		11"	12"		13'-1"	2.916	373.76	81.83	
		12'	240	23'-0"		12"	12"		14'-1"	3.108	399.33	85.17	
	2 @ 12'	6'	144	26'-2"	14¼"	8"	10"	15"	8'-5¼"	2.849	369.91	71.81	
		7'	168	26'-2"		8"	10"		9'-5¼"	2.929	383.42	75.15	
		8'	192	26'-2"		8"	10"		10'-5¼"	3.004	417.52	78.49	
		9'	216	26'-5"		9"	11"		11'-5¼"	3.190	431.74	81.83	
		10'	240	26'-8"		10"	12"		12'-5¼"	3.395	461.14	85.17	
		11'	264	26'-10"		11"	12"		13'-5¼"	3.577	485.07	88.51	
		12'	288	27'-0"		12"	12"		14'-5¼"	3.771	510.58	91.85	
SECTION "C" - 20'-0"	2 @ 8'	5'	80	17'-11"	11¼"	7"	9"	11¾"	6'-11"	1.627	203.81	55.11	
		6'	96	17'-11½"		7¼"	9"		7'-11"	1.710	208.65	58.45	
		7'	112	18'-1½"		7¾"	10"		8'-11"	1.838	231.57	61.79	
		8'	128	18'-2½"		8¼"	10"		9'-11"	1.947	258.58	65.13	
		9'	144	18'-5½"		9¼"	11"		10'-11"	2.130	276.52	68.47	
		10'	160	18'-8½"		10¼"	12"		11'-11"	2.331	318.47	71.81	
	2 @ 10'	6'	120	22'-2"	13½"	8"	10"	14¼"	8'-3¾"	2.380	320.35	65.13	
		7'	140	22'-2"		8"	10"		9'-3¾"	2.460	339.19	68.47	
		8'	160	22'-3"		8½"	10"		10'-3¾"	2.572	365.09	71.81	
		9'	180	22'-6"		9½"	11"		11'-3¾"	2.760	389.39	75.15	
		10'	200	22'-8½"		10¼"	12"		12'-3¾"	2.948	413.08	78.49	
		11'	220	22'-10"		11"	12"		13'-3¾"	3.110	446.06	81.83	
		12'	240	23'-0"		12"	12"		14'-3¾"	3.303	475.09	85.17	
	2 @ 12'	6'	144	26'-2"	16"	8"	10"	16½"	8'-8½"	3.106	426.82	75.15	
		7'	168	26'-2"		8"	10"		9'-8½"	3.186	448.87	78.49	
		8'	192	26'-3½"		8¾"	10"		10'-8½"	3.316	473.02	81.83	
		9'	216	26'-6"		9½"	11"		11'-8½"	3.492	498.31	85.17	
		10'	240	26'-8½"		10¼"	12"		12'-8½"	3.682	531.56	88.51	
		11'	264	26'-10½"		11¼"	12"		13'-8½"	3.867	556.63	91.85	
		12'	288	27'-0½"		12¼"	12"		14'-8½"	4.064	605.99	95.19	
SECTION "D" - 25'-0"	2 @ 8'	5'	80	17'-11"	12¼"	7"	9"	12¾"	7'-1"	1.737	216.88	55.11	
		6'	96	18'-0½"		7¾"	9"		8'-1"	1.846	226.87	58.45	
		7'	112	18'-3"		8½"	10"		9'-1"	1.992	250.52	61.79	
		8'	128	18'-4½"		9¼"	10"		10'-1"	2.122	278.89	65.13	
		9'	144	18'-7"		10"	11"		11'-1"	2.295	300.76	68.47	
		10'	160	18'-10"		11"	12"		12'-1"	2.503	326.17	71.81	
	2 @ 10'	6'	120	22'-2"	14½"	8"	10"	15¼"	8'-5¾"	2.517	341.89	65.13	
		7'	140	22'-3"		8½"	10"		9'-5¾"	2.626	365.08	68.47	
		8'	160	22'-4½"		9¼"	10"		10'-5¾"	2.758	388.03	71.81	
		9'	180	22'-7½"		10¼"	11"		11'-5¾"	2.952	412.78	75.15	
		10'	200	22'-10½"		11¼"	12"		12'-5¾"	3.165	446.12	78.49	
		11'	220	23'-0"		12"	12"		13'-5¾"	3.334	489.97	81.83	
		12'	240	23'-1½"		12¾"	12"		14'-5¾"	3.512	518.78	85.17	
	2 @ 12'	6'	144	26'-2"	17½"	8"	10"	18"	8'-11½"	3.349	465.12	78.49	
		7'	168	26'-3½"		8¾"	10"		9'-11½"	3.475	489.73	81.83	
		8'	192	26'-5"		9½"	10"		10'-11½"	3.610	513.90	85.17	
		9'	216	26'-8"		10½"	11"		11'-11½"	3.811	539.78	88.51	
		10'	240	26'-10½"		11¼"	12"		12'-11½"	4.009	578.93	91.85	
		11'	264	27'-0½"		12¼"	12"		13'-11½"	4.202	619.28	95.19	
		12'	288	27'-2½"		13¼"	12"		14'-11½"	4.407	649.51	98.53	

TYPICAL SECTION M-M

NOTE:- For details of wings and bar lists, see Drawing Nos. W-X002-1 or W-X002-2, W-X003-1 or W-X003-2, and W-X004-1 or W-X004-2.

PART LONGITUDINAL SECTION

NOTE:- See Table at lower left for SECTIONS and Bar Groups to be used for Various Depths of Cover.

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

NOTE:- Lengths of Sections, with Bar Groups to be shown on Cross Section Sheets.

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.
To use this Drawing for skewed culverts, multiply the length of each section by the secant of the skew angle. For 15° by 1.0353, for 30° by 1.1547, and for 45° by 1.4142.

REVISIONS:-
Wing Drwg. Nos.- W.C.H. 1-14-63.

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS
#6	3"	5"	1'-1½"
#7	3½"	5¾"	1'-3¾"
#8	4"	6½"	1'-6"

BENDING DIAGRAM FOR BARS "b" and "b2"

DOWEL BARS FOR TWO HEADWALLS S	SIZE	SPACING	No. REQ'D	LENGTH	X
8'	#4	12½"	36	3'-0"	1'-6"
10'	#4	12½"	46	3'-2"	1'-7"
12'	#4	12"	54	3'-6"	1'-9"

Bars "i"
Dowel bars in Headwalls

NOTE:- Dimension are to centers of bars. ("b" and "b2").

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
10.0' to 14.5'	✓			B
15.0' to 19.5'	✓	✓		C
20.0' to 25.0'	✓	✓	✓	D

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, division walls and slabs shall be only where shown on plans.

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

DESIGN LIVE LOAD

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

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

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION
DETAILS OF STANDARD BARREL SECTIONS
FOR
REINFORCED CONCRETE BOX CULVERTS
8', 10' & 12' SPANS   3:1 OR 4:1 SLOPES
DOUBLES   OVER 5'-0" COVER
STANDARD DRAWING No. R-200X-X2

Designed by: W.C. Haigh 6-26-62   Checked by:- R.H.S. 7-16-62
Drawn by: W.C. Haigh 7-6-62   Checked by:- R.H.S. 7-20-62
Quantities by: W.C. Haigh 7-5-62   Checked by:- R.H.S. 7-19-62

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
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 Slab of Barrel. SIZE	SPACING	NO. REQ'D	LENGTH	"b" bars BENT - See Diagram below. In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars. SIZE	SPACING	NO. REQ'D	LENGTH	X	Y	Z	"b2" bars BENT - See Diagram below. In Top of Bottom Slab bent down under Division Wall - hooked. Alternate with "a" and "c" bars. SIZE	SPACING	NO. REQ'D	LENGTH	X	Y	Z
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	120	9'-9"	#5	12"	59	10'-10"	0'-3"	2'-3½"	3'-5½"	#5	12"	59	10'-10"	0'-2½"	2'-4½"	3'-5½"
		3'			120	9'-9"			59	10'-10"	"	2'-3½"	3'-5½"			59	10'-10"	"	2'-4½"	3'-5½"
		4'			120	9'-9"			59	10'-10"	"	2'-3½"	3'-5½"			59	10'-10"	"	2'-4½"	3'-5½"
		5'			120	9'-9"			59	10'-10"	"	2'-3½"	3'-5½"			59	10'-10"	"	2'-4½"	3'-5½"
		6'			120	10'-0"			59	11'-1"	0'-3"	2'-4½"	3'-6½"			59	11'-1"	0'-2½"	2'-5½"	3'-6½"
	2 @ 5'	3'	#6	12"	120	11'-10"	#5	12"	59	12'-11"	0'-3½"	2'-8"	4'-3"	#5	12"	59	12'-11"	0'-3"	2'-9"	4'-3"
		4'			120	11'-10"			59	12'-11"	"	2'-8"	4'-3"			59	12'-11"	"	2'-9"	4'-3"
		5'			120	11'-10"			59	12'-11"	"	2'-8"	4'-3"			59	12'-11"	"	2'-9"	4'-3"
		6'			120	12'-1"			59	13'-2"	"	2'-9"	4'-4"			59	13'-2"	"	2'-10"	4'-4"
		7'			120	12'-3"			59	13'-4"	0'-3½"	2'-10"	4'-4½"			59	13'-4"	0'-3"	2'-11"	4'-4½"
	2 @ 6'	3'	#6	11"	132	13'-11"	#5	11"	65	15'-0"	0'-4"	3'-2"	5'-0"	#5	11"	65	15'-0"	0'-4"	3'-2"	5'-0"
		4'			132	13'-11"			65	15'-0"	"	3'-2"	5'-0"			65	15'-0"	"	3'-2"	5'-0"
		5'			132	13'-11"			65	15'-0"	"	3'-2"	5'-0"			65	15'-0"	"	3'-2"	5'-0"
		6'			132	14'-2"			65	15'-3"	"	3'-3"	5'-1"			65	15'-3"	"	3'-3"	5'-1"
		7'			132	14'-4"			65	15'-5"	"	3'-4"	5'-1½"			65	15'-5"	"	3'-4"	5'-1½"
		8'			132	14'-5"			65	15'-6"	0'-4"	3'-4"	5'-2"			65	15'-6"	0'-4"	3'-4"	5'-2"
	2 @ 7'	4'	#6	12"	120	15'-11"	#6	12"	59	17'-3"	0'-4½"	3'-7"	5'-9"	#6	12"	59	17'-3"	0'-4½"	3'-7"	5'-9"
		5'			120	15'-11"			59	17'-3"	"	3'-7"	5'-9"			59	17'-3"	"	3'-7"	5'-9"
		6'			120	16'-2"			59	17'-6"	"	3'-8"	5'-10"			59	17'-6"	"	3'-8"	5'-10"
		7'			120	16'-4"			59	17'-8"	"	3'-9"	5'-10½"			59	17'-8"	"	3'-9"	5'-10½"
		8'			120	16'-5"			59	17'-9"	"	3'-9"	5'-11"			59	17'-9"	"	3'-9"	5'-11"
		9'			120	16'-8"			59	18'-0"	0'-4½"	3'-10"	6'-0"			59	18'-0"	0'-4½"	3'-10"	6'-0"
	2 @ 8'	4'	#6	11"	132	18'-0"	#6	11"	65	19'-5"	0'-5"	4'-0"	6'-6½"	#6	11"	65	19'-5"	0'-5"	4'-0"	6'-6½"
		5'			132	18'-3"			65	19'-8"	"	4'-1"	6'-7½"			65	19'-8"	"	4'-1"	6'-7½"
		6'			132	18'-3"			65	19'-8"	"	4'-1"	6'-7½"			65	19'-8"	"	4'-1"	6'-7½"
		7'			132	18'-5"			65	19'-10"	"	4'-2"	6'-8"			65	19'-10"	"	4'-2"	6'-8"
		8'			132	18'-6"			65	19'-11"	"	4'-2"	6'-8½"			65	19'-11"	"	4'-2"	6'-8½"
		9'			132	18'-9"			65	20'-2"	"	4'-3"	6'-9½"			65	20'-2"	"	4'-3"	6'-9½"
		10'			132	19'-0"			65	20'-5"	0'-5"	4'-4"	6'-10½"			65	20'-5"	0'-5"	4'-4"	6'-10½"
	2 @ 9'	5'	#6	11"	132	20'-4"	#6	11"	65	21'-9"	0'-5½"	4'-6"	7'-5"	#6	11"	65	21'-9"	0'-5¾"	4'-5½"	7'-5"
		6'			132	20'-6"			65	21'-11"	"	4'-7"	7'-5½"			65	21'-11"	"	4'-6½"	7'-5½"
		7'			132	20'-6"			65	21'-11"	"	4'-7"	7'-5½"			65	21'-11"	"	4'-6½"	7'-5½"
		8'			132	20'-7"			65	22'-0"	"	4'-7"	7'-6"			65	22'-0"	"	4'-6½"	7'-6"
		9'			132	20'-10"			65	22'-3"	"	4'-8"	7'-7"			65	22'-3"	"	4'-7½"	7'-7"
		10'			132	21'-1"			65	22'-6"	"	4'-9"	7'-8"			65	22'-6"	"	4'-8½"	7'-8"
		11'			132	21'-3"			65	22'-8"	0'-5½"	4'-9"	7'-9"			65	22'-8"	0'-5¾"	4'-8½"	7'-9"
	2 @ 10'	5'	#7	12"	120	22'-5"	#6	12"	59	23'-11"	0'-6"	5'-0"	8'-2"	#6	12"	59	23'-11"	0'-6½"	4'-11"	8'-2"
		6'			120	22'-7"			59	24'-1"	"	5'-1"	8'-2½"			59	24'-1"	"	5'-0"	8'-2½"
		7'			120	22'-7"			59	24'-1"	"	5'-1"	8'-2½"			59	24'-1"	"	5'-0"	8'-2½"
		8'			120	22'-8"			59	24'-2"	"	5'-1"	8'-3"			59	24'-2"	"	5'-0"	8'-3"
		9'			120	22'-11"			59	24'-5"	"	5'-2"	8'-4"			59	24'-5"	"	5'-1"	8'-4"
		10'			120	23'-2"			59	24'-8"	"	5'-3"	8'-5"			59	24'-8"	"	5'-2"	8'-5"
		11'			120	23'-4"			59	24'-10"	"	5'-3"	8'-6"			59	24'-10"	"	5'-2"	8'-6"
		12'			120	23'-6"			59	25'-0"	0'-6"	5'-3"	8'-7"			59	25'-0"	0'-6½"	5'-2"	8'-7"
	2 @ 11'	6'	#7	12"	120	24'-9"	#6	12"	59	26'-3"	0'-6½"	5'-5"	9'-1"	#6	12"	59	26'-4"	0'-7½"	5'-3"	9'-1"
		7'			120	24'-9"			59	26'-3"	"	5'-5"	9'-1"			59	26'-4"	"	5'-3"	9'-1"
		8'			120	24'-9"			59	26'-3"	"	5'-5"	9'-1"			59	26'-4"	"	5'-3"	9'-1"
		9'			120	25'-0"			59	26'-6"	"	5'-6"	9'-2"			59	26'-7"	"	5'-4"	9'-2"
		10'			120	25'-3"			59	26'-9"	"	5'-7"	9'-3"			59	26'-10"	"	5'-5"	9'-3"
		11'			120	25'-5"			59	26'-11"	"	5'-7"	9'-4"			59	27'-0"	"	5'-5"	9'-4"
		12'			120	25'-7"			59	27'-1"	0'-6½"	5'-7"	9'-5"			59	27'-2"	0'-7½"	5'-5"	9'-5"
	2 @ 12'	6'	#7	11"	132	26'-10"	#6	11"	65	28'-4"	0'-7"	5'-11"	9'-10"	#6	11"	65	28'-6"	0'-8½"	5'-8"	9'-10"
		7'			132	26'-10"			65	28'-4"	"	5'-11"	9'-10"			65	28'-6"	"	5'-8"	9'-10"
		8'			132	26'-10"			65	28'-4"	"	5'-11"	9'-10"			65	28'-6"	"	5'-8"	9'-10"
		9'			132	27'-1"			65	28'-7"	"	6'-0"	9'-11"			65	28'-9"	"	5'-9"	9'-11"
		10'			132	27'-4"			65	28'-10"	"	6'-1"	10'-0"			65	29'-0"	"	5'-10"	10'-0"
		11'			132	27'-6"			65	29'-0"	"	6'-1"	10'-1"			65	29'-2"	"	5'-10"	10'-1"
		12'			132	27'-8"			65	29'-2"	0'-7"	6'-1"	10'-2"			65	29'-4"	0'-8½"	5'-10"	10'-2"

DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	"c" bars STRAIGHT In Top and Bottom Slab of Barrel. Alt. with "b" and "b2" bars. SIZE	SPACING	NO. REQ'D	LENGTH	"d" bars STRAIGHT Longitudinal in Top Slab of Barrel SIZE	SPACING	NO. REQ'D	LENGTH	"d1" bars STRAIGHT Longitudinal in Sidewalls and Division Wall 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 and Division Wall SIZE	SPACING	NO. REQ'D	LENGTH	"k" bars STRAIGHT 2 in Top of Headwalls and Aprons - Each. SIZE	NO. REQ'D	LENGTH
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	120	4'-10"	#5	12"	14	2 @ 30'-8" for 60'-0" Length Barrel (1'-8" Lap)	#4	12"	8	2 @ 30'-6" for 60'-0" Length Barrel (1'-3" Lap)	#4	12"	14	2 @ 31'-6" for 60'-0" Length Barrel (1'-3" Lap)	#4	12"	240	2'-10"	#5	8	10'-3"
		3'			120	4'-10"			14				12				14				240	3'-10"		8	"
		4'			120	4'-10"			14				16				14				240	4'-10"		8	"
		5'			120	4'-10"			14				20				14				240	5'-10"		8	"
		6'			120	4'-11"			14				24				14				240	6'-10"		8	10'-6"
	2 @ 5'	3'	#6	12"	120	5'-10"	#5	11½"	16		#4	12"	12		#4	12"	16		#4	12"	240	3'-11"	#6	8	12'-4"
		4'			120	5'-10"			16				16				16				240	4'-11"		8	"
		5'			120	5'-10"			16				20				16				240	5'-11"		8	"
		6'			120	5'-11"			16				24				16				240	6'-11"		8	12'-7"
		7'			120	6'-0"			16				28				16				240	7'-11"		8	12'-9"
	2 @ 6'	3'	#6	11"	132	6'-11"	#5	11½"	18		#4	12"	12		#4	12"	18		#4	12"	240	4'-0"	#6	8	14'-5"
		4'			132	6'-11"			18				16				18				240	5'-0"		8	"
		5'			132	6'-11"			18				20				18				240	6'-0"		8	"
		6'			132	7'-0"			18				24				18				240	7'-0"		8	14'-8"
		7'			132	7'-1"			18				28				18				240	8'-0"		8	14'-10"
		8'			132	7'-1"			18				32				18			10"	288	9'-0"		8	14'-11"
	2 @ 7'	4'	#6	12"	120	7'-11"	#5	11½"	20		#4	12"	16		#4	12"	20		#4	12"	240	5'-1"	#6	8	16'-6"
		5'			120	7'-11"			20				20				20				240	6'-1"		8	"
		6'			120	8'-0"			20				24				20				240	7'-1"		8	16'-9"
		7'			120	8'-1"			20				28				20				240	8'-1"		8	16'-11"
		8'			120	8'-1"			20				32				20			10"	288	9'-1"		8	17'-0"
		9'			120	8'-2"			20				36				20		#5	12"	240	10'-1"		8	17'-3"
	2 @ 8'	4'	#6	11"	132	9'-0"	#5	11½"	23		#4	12"	16		#4	12"	22		#4	12"	240	5'-2"	#6	8	18'-7"
		5'			132	9'-0"			23				20				22				240	6'-2"		8	18'-10"
		6'			132	9'-0"			23				24				22				240	7'-2"		8	"
		7'			132	9'-2"			23				28				22				240	8'-2"		8	19'-0"
		8'			132	9'-2"			23				32				22			10"	288	9'-2"		8	19'-1"
		9'			132	9'-3"			23				36				22		#5	12"	240	10'-2"		8	19'-4"
		10'			132	9'-4"			23				40				22			11"	264	11'-2"		8	19'-7"
	2 @ 9'	5'	#6	11"	132	10'-1"	#5	11½"	26		#4	12"	20		#4	12"	25		#4	12"	240	6'-3"	#6	8	20'-11"
		6'			132	10'-2"			26				24				25				240	7'-3"		8	21'-1"
		7'			132	10'-2"			26				28				25				240	8'-3"		8	"
		8'			132	10'-2"			26				32				25			10"	288	9'-3"		8	21'-2"
		9'			132	10'-3"			26				36				25		#5	12"	240	10'-3"		8	21'-5"
		10'			132	10'-4"			26				40				25			11"	264	11'-3"		8	21'-8"
		11'			132	10'-4"			26				44				25			10"	288	12'-3"		8	21'-10"
	2 @ 10'	5'	#7	12"	120	11'-2"	#5	11½"	28		#4	12"	20		#4	12"	27		#4	12"	240	6'-4"	#7	8	22'-11"
		6'			120	11'-3"			28				24				27				240	7'-4"		8	23'-1"
		7'			120	11'-3"			28				28				27				240	8'-4"		8	"
		8'			120	11'-3"			28				32				27			10"	288	9'-4"		8	23'-2"
		9'			120	11'-4"			28				36				27		#5	12"	240	10'-4"		8	23'-6"
		10'			120	11'-5"			28				40				27			11"	264	11'-4"		8	23'-9"
		11'			120	11'-5"			28				44				27			10"	288	12'-4"		8	23'-11"
		12'			120	11'-5"			28				48				27		#6	12"	240	13'-4"		8	24'-1"
	2 @ 11'	6'	#7	12"	120	12'-3"	#5	11½"	30		#4	12"	24		#4	12"	29		#4	12"	240	7'-6"	#7	8	25'-3"
		7'			120	12'-3"			30				28				29				240	8'-6"		8	"
		8'			120	12'-3"			30				32				29			10"	288	9'-6"		8	"
		9'			120	12'-4"			30				36				29		#5	12"	240	10'-6"		8	25'-6"
		10'			120	12'-5"			30				40				29			11"	264	11'-6"		8	25'-10"
		11'			120	12'-5"			30				44				29			10"	288	12'-6"		8	26'-0"
		12'			120	12'-5"			30				48				29		#6	12"	240	13'-6"		8	26'-2"
	2 @ 12'	6'	#7	11"	132	13'-3"	#5	11½"	32		#4	12"	24		#4	12"	31		#4	12"	240	7'-7"	#7	8	27'-4"
		7'			132	13'-3"			32				28				31				240	8'-7"		8	"
		8'			132	13'-3"			32				32				31			10"	288	9'-7"		8	"
		9'			132	13'-4"			32				36				31		#5	12"	240	10'-7"		8	27'-7"
		10'			132	13'-6"			32				40				31			11"	264	11'-7"		8	27'-10"
		11'			132	13'-6"			32				44				31			10"	288	12'-7"		8	28'-0"
		12'			132	13'-6"			32				48				31		#6	12	240	13'-7"		8	28'-3"

NOTE:- The "a", "b", "b2", and "c" bars are to be placed parallel with the headwalls, spacing to be parallel with barrel.

DIMENSIONS · QUANTITIES

MAX. DESIGN DEPTH OF COVER D	BARREL DIMENSIONS: CLEAR SPAN 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	UNIT QUANTITIES: CLASS S CONC. PER LIN. FT. OF BARREL CU. YD.	REINFORCING STEEL: PER LIN. FT. OF BARREL LB.	ADDITIONAL: PER LAP LB.	TWO HEADWALLS & APRONS LB.
5'-0"	2 @ 4'	2'	16	9'-8"	6½"	6"	8"	6"	3'-0½"	10'-0"	10'-6½"	0.496	89.89	42.71	136.52
		3'	24	9'-8"		6"	8"		4'-0½"	"	"	0.558	95.23	46.05	136.52
		4'	32	9'-8"		6"	8"		5'-0½"	"	"	0.620	100.58	49.39	136.52
		5'	40	9'-8"		6"	8"		6'-0½"	"	"	0.682	105.92	52.73	136.52
		6'	48	9'-11"		7"	9"		7'-0½"	10'-3⅛"	10'-9⅝"	0.809	112.48	56.07	138.60
	2 @ 5'	3'	30	11'-8"	7"	6"	8"	6½"	4'-1½"	12'-1"	12'-7½"	0.671	125.87	51.19	209.65
		4'	40	11'-8"		6"	8"		5'-1½"	"	"	0.733	131.22	54.53	209.65
		5'	50	11'-8"		6"	8"		6'-1½"	"	"	0.795	136.56	57.87	209.65
		6'	60	11'-11"		7"	9"		7'-1½"	12'-4"	12'-10½"	0.922	143.93	61.21	212.66
		7'	70	12'-1"		7½"	10"		8'-1½"	12'-6⅛"	13'-0½"	1.044	149.87	64.55	214.66
	2 @ 6'	3'	36	13'-8"	7½"	6"	8"	7½"	4'-3"	14'-1¾"	14'-8¾"	0.818	151.91	56.34	245.60
		4'	48	13'-8"		6"	8"		5'-3"	"	"	0.880	157.25	59.68	245.60
		5'	60	13'-8"		6"	8"		6'-3"	"	"	0.941	162.60	63.02	245.60
		6'	72	13'-11"		7"	9"		7'-3"	14'-5"	14'-11½"	1.070	169.60	66.36	248.60
		7'	84	14'-1"		7½"	10"		8'-3"	14'-7"	15'-1½"	1.192	176.15	69.70	250.61
		8'	96	14'-2"		8"	10"		9'-3"	14'-8"	15'-2½"	1.298	186.76	73.04	251.61
	2 @ 7'	4'	56	15'-8"	8"	6"	8"	8"	5'-4"	16'-2⅝"	16'-9"	1.021	181.91	64.83	281.99
		5'	70	15'-8"		6"	8"		6'-4"	"	"	1.082	187.25	68.17	281.99
		6'	84	15'-11"		7"	9"		7'-4"	16'-5¾"	17'-0½"	1.212	194.35	71.51	284.99
		7'	98	16'-1"		7½"	10"		8'-4"	16'-7⅞"	17'-2¼"	1.334	200.94	74.85	286.99
		8'	112	16'-2"		8"	10"		9'-4"	16'-8⅜"	17'-3¼"	1.440	211.64	78.19	288.00
		9'	126	16'-5"		9"	11"		10'-4"	17'-0"	17'-6½"	1.616	229.01	81.53	291.00
	2 @ 8'	4'	64	17'-8"	8½"	6"	8"	8½"	5'-5"	18'-3½"	18'-10"	1.174	215.29	71.71	322.50
		5'	80	17'-11"		7"	9"		6'-5"	18'-6⅝"	19'-1"	1.295	222.27	75.05	325.50
		6'	96	17'-11"		7"	9"		7'-5"	"	"	1.366	227.62	78.39	325.50
		7'	112	18'-1"		7½"	10"		8'-5"	18'-8⅝"	19'-3"	1.489	234.60	81.73	327.50
		8'	128	18'-2"		8"	10"		9'-5"	18'-9¾"	19'-4¼"	1.595	245.39	85.07	328.50
		9'	144	18'-5"		9"	11"		10'-5"	19'-0¾"	19'-7¼"	1.772	268.00	88.41	331.51
		10'	160	18'-8"		10"	12"		11'-5"	19'-3⅞"	19'-10½"	1.967	275.99	91.75	334.51
	2 @ 9'	5'	90	19'-11"	9"	7"	9"	9¼"	6'-6¼"	20'-7⅛"	21'-2"	1.477	244.83	82.77	364.23
		6'	108	20'-1"		7½"	10"		7'-6¼"	20'-9¼"	21'-4"	1.594	251.54	86.11	366.23
		7'	126	20'-1"		7½"	10"		8'-6¼"	"	"	1.671	256.89	89.45	366.23
		8'	144	20'-2"		8"	10"		9'-6¼"	20'-10⅜"	21'-5"	1.778	267.72	92.79	367.23
		9'	162	20'-5"		9"	11"		10'-6¼"	21'-1⅝"	21'-8¼"	1.956	285.41	96.13	370.24
		10'	180	20'-8"		10"	12"		11'-6¼"	21'-4⅞"	21'-11¼"	2.152	298.43	99.97	373.24
		11'	198	20'-10"		11"	12"		12'-6¼"	21'-6⅞"	22'-1½"	2.328	312.32	102.81	375.24
	2 @ 10'	5'	100	21'-11"	9½"	7"	9"	10"	6'-7½"	22'-8¼"	23'-2¾"	1.674	286.66	87.92	500.43
		6'	120	22'-1"		7½"	10"		7'-7½"	22'-10⅜"	23'-4⅝"	1.792	293.52	91.26	503.15
		7'	140	22'-1"		7½"	10"		8'-7½"	"	"	1.869	298.87	94.60	503.15
		8'	160	22'-2"		8"	10"		9'-7½"	22'-11⅜"	23'-5¾"	1.976	309.79	97.94	504.52
		9'	180	22'-5"		9"	11"		10'-7½"	23'-2⅞"	23'-9"	2.155	327.76	101.28	509.97
		10'	200	22'-8"		10"	12"		11'-7½"	23'-5⅝"	24'-0"	2.352	341.02	104.62	514.06
		11'	220	22'-10"		11"	12"		12'-7½"	23'-7⅝"	24'-2"	2.529	355.04	107.96	516.78
		12'	240	23'-0"		12"	12"		13'-7½"	23'-9⅝"	24'-4¼"	2.718	377.25	111.30	519.51
	2 @ 11'	6'	132	24'-2"	10"	8"	10"	11"	7'-9"	25'-0⅛"	25'-6¾"	2.048	316.97	96.41	551.83
		7'	154	24'-2"		8"	10"		8'-9"	"	"	2.128	322.31	99.75	551.83
		8'	176	24'-2"		8"	10"		9'-9"	"	"	2.208	332.74	103.09	551.83
		9'	198	24'-5"		9"	11"		10'-9"	25'-3⅜"	25'-9¾"	2.388	350.87	106.43	555.92
		10'	220	24'-8"		10"	12"		11'-9"	25'-6⅛"	26'-1"	2.586	364.19	109.77	561.37
		11'	242	24'-10"		11"	12"		12'-9"	25'-8⅛"	26'-3"	2.769	378.28	113.11	564.10
		12'	264	25'-0"		12"	12"		13'-9"	25'-10⅝"	26'-5"	2.954	400.66	116.45	566.82
	2 @ 12'	6'	144	26'-2"	10½"	8"	10"	12"	7'-10½"	27'-1"	27'-7½"	2.299	362.26	101.55	599.59
		7'	168	26'-2"		8"	10"		8'-10½"	"	"	2.379	367.60	104.89	599.59
		8'	192	26'-2"		8"	10"		9'-10½"	"	"	2.459	378.07	108.23	599.59
		9'	216	26'-5"		9"	11"		10'-10½"	27'-4⅛"	27'-10⅜"	2.640	396.47	111.57	603.68
		10'	240	26'-8"		10"	12"		11'-10½"	27'-7¼"	28'-1¾"	2.840	410.39	114.91	607.77
		11'	264	26'-10"		11"	12"		12'-10½"	27'-9⅜"	28'-3⅝"	3.018	424.63	118.25	610.49
		12'	288	27'-0"		12"	12"		13'-10½"	27'-11⅜"	28'-6"	3.208	447.20	121.59	614.58

TYPICAL SECTION M-M

NOTE:- For details of wings and bar lists, see 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.

PART LONGITUDINAL SECTION N-N

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, side walls, division walls and slabs shall be only where shown on plans.

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

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM FOR BARS "b" and "b2"
#5	2½"	4¼"	0'-11½"	
#6	3"	5"	1'-2"	

NOTE:- Dimensions are to centers of bars.

DOWEL BARS FOR TWO HEADWALLS

2 SPANS @	SIZE	SPACING	NO. REQ'D	LENGTH	X	Bars "r" Dowel bars in Headwalls
4'	#4	12"±	20	2'-5"	1'-2½"	
5'	#4	12"±	24	2'-6"	1'-3"	
6'	#4	12"±	28	2'-7"	1'-3½"	
7'	#4	12"±	32	2'-8"	1'-4"	
8'	#4	12"±	38	2'-9"	1'-4½"	
9'	#4	12"±	42	2'-10"	1'-5"	
10'	#4	12"±	46	2'-11"	1'-5½"	
11'	#4	12"±	50	3'-0"	1'-6"	
12'	#4	12"±	54	3'-1"	1'-6½"	

TOP-SLAB REINFORCING · BOTTOM SLAB REINFORCING

PART PLAN AT END OF CULVERT

NOTE:- The "a", "b", "b2" and "c" bars are placed parallel with the headwall. The "d" bars in top of top slab and "e" bars in bottom of bottom slab are not shown.

LONGITUDINAL SECTION N-N

LAYOUT OF DOUBLE BARREL CULVERT

15° SKEW LEFT FORWARD

15° Skew Right Forward is reversed.

DESIGN LIVE LOAD

H20-S16 LOADING A.A.S.H.O. 1961

AND

SPECIAL MILITARY LOADING

Two 24000 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-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
DOUBLES
2:1, 3:1 OR 4:1 SLOPES
UNDER 5'-0" COVER
STANDARD DRAWING NO. R-215X-0

Designed by: W.C.H. 1-17-63
Drawn by: W.C.H. 8-23-63
Quantities by: W.C.H. 8-26-63
Checked by: R.H.S. 5-14-63
Checked by: R.H.S. 10-7-63
Checked by: R.G. 12-16-63

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

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

"a" bars: STRAIGHT. In Top and Bottom Slab of Barrel.
"a_1" bars (▼): STRAIGHT. In Top and Bottom Slab of Barrel - (Four of each Length).
"b" bars: BENT - See Diagrams below. In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars.

DEPTH OF COVER D	CLEAR SPAN S	CLEAR HEIGHT H	"a" SIZE	"a" SPACING	"a" NO. REQ'D	"a" LENGTH	"a_1" SIZE	"a_1" SPACING	"a_1" NO. REQ'D	"a_1" LENGTH MAX.	"a_1" LENGTH MIN.	"b" SIZE	"b" SPACING	"b" NO. REQ'D	"b" LENGTH	"b" X	"b" Y	"b" Z
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	112	9'-5"	#5	12"	16	7'-8"	2'-5"	#5	12"	54	10'-6"	0'-3"	2'-2½"	3'-4"
		3'			112	9'-5"			16	"	"			54	10'-6"	"	"	"
		4'			112	9'-5"			16	"	"			54	10'-6"	"	"	"
		5'			112	9'-5"			16	"	"			54	10'-6"	"	"	"
		6'			112	9'-8"			16	7'-11"	2'-8"			54	10'-9"	0'-3"	2'-3½"	3'-5"
	2 @ 5'	3'	#6	12"	110	11'-5"	#6	12"	20	9'-8"	2'-8"	#5	12"	53	12'-7"	0'-3½"	2'-7½"	4'-1"
		4'			110	11'-5"			20	"	"			53	12'-7"	"	"	"
		5'			110	11'-5"			20	"	"			53	12'-7"	"	"	"
		6'			110	11'-8"			20	9'-11"	2'-11"			53	12'-10"	"	2'-8½"	4'-2"
		7'			110	11'-10"			20	10'-1"	3'-1"			53	13'-0"	0'-3½"	2'-9½"	4'-2½"
	2 @ 6'	3'	#6	11"	118	13'-5"	#6	11"	24	11'-10"	3'-11"	#5	11"	56	14'-7"	0'-4"	3'-0½"	4'-10"
		4'			118	13'-5"			24	"	"			56	14'-7"	"	"	"
		5'			118	13'-5"			24	"	"			56	14'-7"	"	"	"
		6'			118	13'-8"			28	12'-1"	2'-7"			56	14'-10"	"	3'-1½"	4'-11"
		7'			118	13'-10"			28	12'-3"	2'-9"			56	15'-0"	"	3'-2½"	4'-11½"
		8'			118	13'-11"			28	12'-4"	2'-10"			56	15'-1"	0'-4"	"	5'-0"
	2 @ 7'	4'	#6	12"	106	15'-5"	#6	12"	28	13'-8"	3'-2"	#6	12"	50	16'-9"	0'-4½"	3'-5"	5'-7"
		5'			106	15'-5"			28	"	"			50	"	"	"	"
		6'			106	15'-8"			28	13'-11"	3'-5"			50	17'-0"	"	3'-6"	5'-8"
		7'			106	15'-10"			28	14'-1"	3'-7"			50	17'-2"	"	3'-7"	5'-8½"
		8'			106	15'-11"			28	14'-2"	3'-8"			50	17'-3"	"	"	5'-9"
		9'			106	16'-2"			28	14'-5"	3'-11"			50	17'-6"	0'-4½"	3'-8"	5'-10"
	2 @ 8'	4'	#6	11"	112	17'-5"	#6	11"	36	15'-10"	3'-2"	#6	11"	54	18'-10"	0'-5"	3'-10"	6'-4"
		5'			112	17'-8"			36	16'-1"	3'-5"			54	19'-1"	"	3'-11"	6'-5"
		6'			112	17'-8"			36	"	"			54	19'-1"	"	"	"
		7'			112	17'-10"			36	16'-3"	3'-7"			54	19'-3"	"	4'-0"	6'-5½"
		8'			112	17'-11"			36	16'-4"	3'-8"			54	19'-4"	"	"	6'-6"
		9'			112	18'-2"			36	16'-7"	3'-11"			53	19'-7"	"	4'-1"	6'-7"
		10'			112	18'-5"			36	16'-10"	4'-2"			53	19'-10"	0'-5"	4'-2"	6'-8"

"b_1" bars (▼): BENT - See Diagrams below. In Bottom of Top Slab - some bent up over Division Wall - one end hooked. (2 of Each Length) Alternate with "a_1" and "c" or "c_1" bars.
"b_2" bars: BENT - See Diagrams below. In Top of Bottom Slab - bent down under Division Wall - hooked. Alternate with "a" and "c" bars.

D	S	H	"b_1" SIZE	"b_1" SPACING	"b_1" NO. REQ'D	"b_1" LENGTH MAX.	"b_1" LENGTH MIN.	"b_1" L MAX.	"b_1" L MIN.	"b_2" SIZE	"b_2" SPACING	"b_2" NO. REQ'D	"b_2" LENGTH	"b_2" X	"b_2" Y	"b_2" Z
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	6	9'-2"	3'-6"	8'-6"	3'-0"	#5	12"	56	10'-6"	0'-2½"	2'-3½"	3'-4"
		3'			6	"	"	"	"			56	10'-6"	"	"	"
		4'			6	"	"	"	"			56	10'-6"	"	"	"
		5'			6	"	"	"	"			56	10'-6"	"	"	"
		6'			6	9'-5"	3'-9"	8'-9"	3'-3"			56	10'-9"	0'-2½"	2'-4½"	3'-5"
	2 @ 5'	3'	#5	12"	10	11'-2"	4'-0"	10'-6"	3'-6"	#5	12"	55	12'-6"	0'-3"	2'-8½"	4'-1"
		4'			10	"	"	"	"			55	12'-6"	"	"	"
		5'			10	"	"	"	"			55	12'-6"	"	"	"
		6'			10	11'-5"	4'-3"	10'-9"	3'-9"			55	12'-9"	"	2'-9½"	4'-2"
		7'			10	11'-7"	4'-5"	10'-11"	3'-11"			55	12'-11"	0'-3"	2'-10½"	4'-2½"
	2 @ 6'	3'	#5	11"	14	13'-4"	3'-7"	12'-7"	3'-1"	#5	11"	58	14'-7"	0'-4"	3'-0½"	4'-10"
		4'			14	"	"	"	"			58	14'-7"	"	"	"
		5'			14	"	"	"	"			58	14'-7"	"	"	"
		6'			14	13'-7"	3'-10"	12'-10"	3'-4"			58	14'-10"	"	3'-1½"	4'-11"
		7'			14	13'-9"	4'-0"	13'-0"	3'-6"			58	15'-0"	"	3'-2½"	4'-11½"
		8'			14	13'-10"	4'-1"	13'-1"	3'-7"			58	15'-1"	0'-4"	"	5'-0"
	2 @ 7'	4'	#6	12"	14	15'-4"	4'-7"	14'-6"	4'-0"	#6	12"	52	16'-9"	0'-4½"	3'-5"	5'-7"
		5'			14	"	"	"	"			52	"	"	"	"
		6'			16	15'-7"	3'-1"	14'-9"	2'-6"			52	17'-0"	"	3'-6"	5'-8"
		7'			16	15'-9"	3'-3"	14'-11"	2'-8"			52	17'-2"	"	3'-7"	5'-8½"
		8'			16	15'-10"	3'-4"	15'-0"	2'-9"			52	17'-3"	"	"	5'-9"
		9'			16	16'-1"	3'-7"	15'-3"	3'-0"			52	17'-6"	0'-4½"	3'-8"	5'-10"
	2 @ 8'	4'	#6	11"	18	17'-6"	4'-6"	16'-7"	3'-11"	#6	11"	56	18'-10"	0'-5"	3'-10"	6'-4"
		5'			20	17'-9"	3'-2"	16'-10"	2'-7"			56	19'-1"	"	3'-11"	6'-5"
		6'			20	"	"	"	"			56	"	"	"	"
		7'			20	17'-11"	3'-4"	17'-0"	2'-9"			56	19'-3"	"	4'-0"	6'-5½"
		8'			20	18'-0"	3'-5"	17'-1"	2'-10"			56	19'-4"	"	"	6'-6"
		9'			20	18'-3"	3'-8"	17'-4"	3'-1"			55	19'-7"	"	4'-1"	6'-7"
		10'			20	18'-6"	3'-11"	17'-7"	3'-4"			55	19'-10"	0'-5"	4'-2"	6'-8"

"b_3" bars (▼): BENT - See Diagrams below. In Top of Bottom Slab - some bent down under Division Wall - one end hooked. (2 of Each Length) Alternate with "a_1" and "c" or "c_1" bars.
"c" bars: STRAIGHT. In Top and Bottom Slab of Barrel. Alternate with "b" and "b_2" bars.
"c_1" bars (▼): STRAIGHT. In Top and Bottom Slab of Barrel. Alt. with "b_1" & "b_3" bars. (Four of each Length.)

D	S	H	"b_3" SIZE	"b_3" SPACING	"b_3" NO. REQ'D	"b_3" LENGTH MAX.	"b_3" LENGTH MIN.	"b_3" L MAX.	"b_3" L MIN.	"c" SIZE	"c" SPACING	"c" NO. REQ'D	"c" LENGTH	"c_1" SIZE	"c_1" SPACING	"c_1" NO. REQ'D	"c_1" LENGTH MAX.	"c_1" LENGTH MIN.
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	6	9'-2"	3'-6"	8'-6"	3'-0"	#5	12"	116	4'-8"	#5	12"	4	3'-7"	—
		3'			6	"	"	"	"			116	4'-8"			4	"	—
		4'			6	"	"	"	"			116	4'-8"			4	"	—
		5'			6	"	"	"	"			116	4'-8"			4	"	—
		6'			6	9'-5"	3'-9"	8'-9"	3'-3"			116	4'-9"			4	3'-9"	—
	2 @ 5'	3'	#5	12"	10	11'-2"	4'-0"	10'-6"	3'-6"	#6	12"	114	5'-8"	#6	12"	8	5'-1"	3'-4"
		4'			10	"	"	"	"			114	5'-8"			8	"	"
		5'			10	"	"	"	"			114	5'-8"			8	"	"
		6'			10	11'-5"	4'-3"	10'-9"	3'-9"			114	5'-9"			8	5'-3"	3'-6"
		7'			10	11'-7"	4'-5"	10'-11"	3'-11"			114	5'-10"			8	5'-4"	3'-7"
	2 @ 6'	3'	#5	11"	14	13'-4"	3'-7"	12'-7"	3'-1"	#6	11"	126	6'-8"	#6	11"	8	5'-4"	3'-9"
		4'			14	"	"	"	"			126	6'-8"			8	"	"
		5'			14	"	"	"	"			126	6'-8"			8	"	"
		6'			14	13'-7"	3'-10"	12'-10"	3'-4"			126	6'-9"			8	5'-6"	3'-11"
		7'			14	13'-9"	4'-0"	13'-0"	3'-6"			126	6'-10"			8	5'-7"	4'-0"
		8'			14	13'-10"	4'-1"	13'-1"	3'-7"			126	6'-10"			8	5'-8"	4'-1"
	2 @ 7'	4'	#6	12"	14	15'-4"	4'-7"	14'-6"	4'-0"	#6	12"	114	7'-8"	#6	12"	12	6'-4"	2'-10"
		5'			14	"	"	"	"			114	7'-8"			12	"	"
		6'			16	15'-7"	3'-1"	14'-9"	2'-6"			114	7'-9"			12	6'-6"	3'-0"
		7'			16	15'-9"	3'-3"	14'-11"	2'-8"			114	7'-10"			12	6'-7"	3'-1"
		8'			16	15'-10"	3'-4"	15'-0"	2'-9"			114	7'-10"			12	6'-8"	3'-2"
		9'			16	16'-1"	3'-7"	15'-3"	3'-0"			114	7'-11"			12	6'-10"	3'-4"
	2 @ 8'	4'	#6	11"	18	17'-6"	4'-6"	16'-7"	3'-11"	#6	11"	120	8'-8"	#6	11"	16	8'-4"	3'-7"
		5'			20	17'-9"	3'-2"	16'-10"	2'-7"			120	8'-9"			16	8'-6"	3'-9"
		6'			20	"	"	"	"			120	8'-9"			16	"	"
		7'			20	17'-11"	3'-4"	17'-0"	2'-9"			120	8'-10"			16	8'-7"	3'-10"
		8'			20	18'-0"	3'-5"	17'-1"	2'-10"			120	8'-10"			16	8'-8"	3'-11"
		9'			20	18'-3"	3'-8"	17'-4"	3'-1"			120	8'-11"			16	8'-10"	4'-1"
		10'			20	18'-6"	3'-11"	17'-7"	3'-4"			124	9'-0"			16	7'-5"	2'-8"

"d" bars: STRAIGHT. Longitudinal in Top Slab of Barrel.
"d_1" bars: STRAIGHT. Longitudinal in Sidewalls and Division Wall.
"e" bars: STRAIGHT. Longitudinal in Bottom Slab of Barrel.
"f" bars: STRAIGHT. Verticals in Sidewalls and Division Wall.
"k_1" bars (▼): STRAIGHT. In Bottom of Headwalls.
"k_2" bars (▼): STRAIGHT. In Top of Headwalls and Aprons (2 Each).

D	S	H	"d" SIZE	"d" SPACING	"d" NO. REQ'D	"d" LENGTH	"d_1" SIZE	"d_1" SPACING	"d_1" NO. REQ'D	"d_1" LENGTH	"e" SIZE	"e" SPACING	"e" NO. REQ'D	"e" LENGTH	"f" SIZE	"f" SPACING	"f" NO. REQ'D	"f" LENGTH	"k_1" SIZE	"k_1" NO. REQ'D	"k_1" LENGTH	"k_2" SIZE	"k_2" NO. REQ'D	"k_2" LENGTH
0'-0" TO 5'-0" MAXIMUM	2 @ 4'	2'	#5	12"	14	2 @ 30'-8" for 60'-0" Length Barrel (1'-8" Lap).	#4	12"	8	2 @ 30'-6" for 60'-0" Length Barrel (1'-3" Lap).	#4	12"	14	2 @ 31'-8" for 60'-0" Length Barrel (1'-3" Lap).	#4	12"	240	2'-10"	#5	6	10'-11"	#5	8	12'-0"
		3'			14				12				14				240	3'-10"		6	"		8	"
		4'			14				16				14				240	4'-10"		6	"		8	"
		5'			14				20				14				240	5'-10"		6	"		8	"
		6'			14				24				14				240	6'-10"		6	11'-2"		8	12'-4"
	2 @ 5'	3'	#5	11½"	16		#4	12"	12		#4	12"	16		#4	12"	240	3'-11"	#6	6	13'-2"	#6	8	14'-4"
		4'			16				16				16				240	4'-11"		6	"		8	"
		5'			16				20				16				240	5'-11"		6	"		8	"
		6'			16				24				16				240	6'-11"		6	13'-6"		8	14'-8"
		7'			16				28				16				240	7'-11"		6	13'-8"		8	14'-10"
	2 @ 6'	3'	#5	11½"	18		#4	12"	12		#4	12"	18		#4	12"	240	4'-0"	#6	6	15'-6"	#6	8	16'-8"
		4'			18				16				18				240	5'-0"		6	"		8	"
		5'			18				20				18				240	6'-0"		6	"		8	"
		6'			18				24				18				240	7'-0"		6	15'-9"		8	16'-11"
		7'			18				28				18				240	8'-0"		6	16'-0"		8	17'-2"
		8'			18				32				18			10"	288	9'-0"		6	16'-1"		8	17'-3"
	2 @ 7'	4'	#5	11½"	20		#4	12"	16		#4	12"	20		#4	12"	240	5'-1"	#6	6	17'-10"	#6	8	19'-0"
		5'			20				20				20				240	6'-1"		6	"		8	"
		6'			20				24				20				240	7'-1"		6	18'-1"		8	19'-3"
		7'			20				28				20				240	8'-1"		6	18'-3"		8	19'-5"
		8'			20				32				20			10"	288	9'-1"		6	18'-5"		8	19'-6"
		9'			20				36				20		#5	12"	240	10'-1"		6	18'-8"		8	19'-10"
	2 @ 8'	4'	#5	11½"	23		#4	12"	16		#4	12"	22		#4	12"	240	5'-2"	#6	6	20'-1"	#6	8	21'-3"
		5'			23				20				22				240	6'-2"		6	20'-5"		8	21'-7"
		6'			23				24				22				240	7'-2"		6	"		8	"
		7'			23				28				22				240	8'-2"		6	20'-7"		8	21'-9"
		8'			23				32				22			10"	288	9'-2"		6	20'-8"		8	21'-10"
		9'			23				36				22		#5	12"	240	10'-2"		6	21'-0"		8	22'-2"
		10'			23				40				22			11"	264	11'-2"		6	21'-3"		8	22'-5"

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM FOR BARS "b" AND "b_2"	BAR SIZE	PIN DIAM.	K	ADD FOR 1 HOOK	BENDING DIAGRAM FOR BARS "b_1" AND "b_3".
#5	2½"	4¼"	0'-11½"		#5	2½"	4¼"	0'-5¾"	
#6	3"	5"	1'-2"		#6	3"	5"	0'-7"	

NOTE:- Dimensions are to centers of bars (b, b_1, b_2, & b_3). The X, Y & Z values for "b_1" bars are same as for "b" bars and for "b_3" bars same as for "b_2" bars.

SPAN	SIZE	SPACING	NO. REQ'D	LENGTH	X	Dowel bars "r" in Two Headwalls.
4'	#4	12"±	24	2'-5"	1'-2½"	
5'	#4	12"±	28	2'-6"	1'-3"	
6'	#4	12"±	32	2'-7"	1'-3½"	
7'	#4	12"±	36	2'-8"	1'-4"	
8'	#4	12"±	42	2'-9"	1'-4½"	

▼ These bars are in the skewed portion of barrel only. The length of "a_1" and "c_1" bars and overall length L of "b_1" and "b_3" bars vary by 1'-9" for 12" spacing and 1'-7" for 11" spacing.

In the regular portion of the barrel begin and end with a set of "a" & "c" bars. If the spacing is such that the last set of bars would be "b" & "b_2" bars, use a set of "a" & "c" bars instead.

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

TYPICAL SECTION M-M

LONGITUDINAL SECTION N-N'

LAYOUT OF DOUBLE BARREL CULVERT

30° SKEW LEFT FORWARD

30° Skew Right Forward is reversed

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 HEADWALLS K	* CLASS S CONC. PER LIN. FT. OF BARREL CU. YD.	REINFORCING STEEL TOTAL FOR 60'-0" LENGTH OF BARREL LB.	REINFORCING STEEL PER LIN. FT. OF BARREL LB.	REINFORCING STEEL ADDITIONAL PER LAP LB.
5'-0"	2 @ 4'	2'	16	9'-8"	6½"	6"	8"	6"	3'-0½"	11'-2"	12'-3¾"	0.496	5523	88.15	42.71
		3'	24	9'-8"		6"	8"		4'-0½"	"	"	0.558	5846	93.49	46.05
		4'	32	9'-8"		6"	8"		5'-0½"	"	"	0.620	6170	98.84	49.39
		5'	40	9'-8"		6"	8"		6'-0½"	"	"	0.682	6483	104.18	52.73
		6'	48	9'-11"		7"	9"		7'-0½"	11'-5½"	12'-7¼"	0.809	6897	110.74	56.07
	2 @ 5'	3'	30	11'-8"	7"	6"	8"	6½"	4'-1½"	13'-5¾"	14'-7½"	0.671	7818	123.34	51.19
		4'	40	11'-8"		6"	8"		5'-1½"	"	"	0.733	8142	128.68	54.53
		5'	50	11'-8"		6"	8"		6'-1½"	"	"	0.795	8465	134.03	57.87
		6'	60	11'-11"		7"	9"		7'-1½"	13'-9⅛"	14'-11"	0.922	8894	140.89	61.21
		7'	70	12'-1"		7½"	10"		8'-1½"	13'-11½"	15'-1¼"	1.044	9291	147.34	64.55
	2 @ 6'	3'	36	13'-8"	7½"	6"	8"	7½"	4'-3"	15'-9⅜"	16'-11¼"	0.818	9398	148.50	56.34
		4'	48	13'-8"		6"	8"		5'-3"	"	"	0.880	9721	153.85	59.68
		5'	60	13'-8"		6"	8"		6'-3"	"	"	0.941	10,044	159.19	63.02
		6'	72	13'-11"		7"	9"		7'-3"	16'-0⅞"	17'-2¾"	1.070	10,496	166.20	66.36
		7'	84	14'-1"		7½"	10"		8'-3"	16'-3¼"	17'-5"	1.192	10,903	172.74	69.70
		8'	96	14'-2"		8"	10"		9'-3"	16'-4¼"	17'-6¼"	1.298	11,548	183.36	73.04
	2 @ 7'	4'	56	15'-8"	8"	6"	8"	8"	5'-4"	18'-1⅛"	19'-3"	1.021	11,081	178.15	64.83
		5'	70	15'-8"		6"	8"		6'-4"	"	"	1.082	11,405	183.49	68.17
		6'	84	15'-11"		7"	9"		7'-4"	18'-4½"	19'-6½"	1.212	12,069	190.59	71.51
		7'	98	16'-1"		7½"	10"		8'-4"	18'-6⅝"	19'-8¾"	1.334	12,479	197.19	74.85
		8'	112	16'-2"		8"	10"		9'-4"	18'-8"	19'-9¾"	1.440	13,084	207.89	78.19
		9'	126	16'-5"		9"	11"		10'-4"	18'-11½"	20'-1½"	1.616	14,148	225.25	81.53
	2 @ 8'	4'	64	17'-8"	8½"	6"	8"	8½"	5'-5"	20'-4¾"	21'-6¾"	1.174	13,251	210.37	71.71
		5'	80	17'-11"		7"	9"		6'-5"	20'-8¼"	21'-10"	1.295	13,731	217.63	75.05
		6'	96	17'-11"		7"	9"		7'-5"	"	"	1.366	14,054	222.97	78.39
		7'	112	18'-1"		7½"	10"		8'-5"	20'-10⅝"	22'-0½"	1.489	14,402	229.68	81.73
		8'	128	18'-2"		8"	10"		9'-5"	20'-11¾"	22'-1½"	1.595	15,131	240.47	85.07
		9'	144	18'-5"		9"	11"		10'-5"	21'-3¼"	22'-5"	1.772	16,154	258.08	88.41
		10'	160	18'-8"		10"	12"		11'-5"	21'-6¾"	22'-8½"	1.967	16,999	271.07	91.75

* For quanities in wings see Standard Wing Drawings listed below. Total steel quantities listed above include one lap of longitudinal bars.

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 add'l 33'-0" length of barrel over 32'-0". Lap longitudinal bars 30 diam. min.

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.

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.

Designed by:- W.C.H. 1-17-63. Checked by:- R.H.S. 5-14-63
Drawn by:- W.C.H. 2-26-64 Checked by:-
Quantities by:- W.C.H. 4-3-64 Checked by:-

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

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

4', 5', 6', 7' AND 8' SPANS
DOUBLES

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

STANDARD DRAWING No. R-230X-01

BAR LIST FOR BARREL SECTION 60'-0" IN LENGTH - TWO 45° SKEWED ENDS.

Note:- For Details of Standard Wings and bar lists, see Drawing No. W-X452-1 or W-X452-2; W-X453-1 or W-X453-2, and W-X454-1 or W-X454-2. Also W-X45.

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

DEPTH OF COVER	CLEAR SPANS	CLEAR HEIGHT	"a" bars STRAIGHT In Top and Bottom Slabs of Barrel.			"d" 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.				"b" bars BENT - See Diagrams below In Top and Bottom Slabs of Barrel- one end hooked. (Four of each Length) Alternate with "a" bars.					"d" bars STRAIGHT Longitudinal in Top Slab of Barrel.			"d" bars STRAIGHT Longitudinal in Sidewalls.			"e" bars STRAIGHT Longitudinal in Bottom Slab of Barrel.			"f" bars STRAIGHT Verticals in Sidewalls.			"h" bars In Bottom of Headwall.		"h2" bars In Top of Headwall and Apron. (2 Each)	
D	S	H	SIZE	SPACING	NO. REQD	LENGTH	SPACING	NO. REQD	LENGTH	X	SIZE	SPACING	NO. REQD	LENGTH MAX.	LENGTH MIN.	X MAX.	X MIN.	SIZE	SPACING	NO. REQD	LENGTH	SIZE	SPACING	NO. REQD	LENGTH	SIZE	SPACING	NO. REQD	LENGTH	SIZE	SPACING	NO. REQD	LENGTH	SIZE	NO. REQD	LENGTH	SIZE	NO. REQD	LENGTH
0'-0 TO 5'-0" MAXIMUM	1 @ 4'	2'	#5	13"	104	4'-9"	#6	13"	104	5'-10"	4'-8"	#6	13"	8	4'-9"	3'-8"	4'-2"	3'-1"	#5	12"	6	10½"	#4	12"	4	#4	12"	5	#5	12"	120	2'-8"	#5	6	6'-9"	B	8'-10"
		3'			104	4'-9"			104	5'-10"	"			8	"	"	"	"			7				6			6			120	3'-11"		6	"			
		4'			104	4'-9"			104	5'-10"	"			8	"	"	"	"			8				8			7			120	4'-11"		6	"	B	"
		5'			104	4'-9"			104	5'-10"	"			8	"	"	"	"			10				10			8			120	5'-11"	#5	6	"		
		6'			104	4'-11"			104	6'-0"	4'-10"			8	4'-11"	3'-10"	4'-9"	3'-8"			12				12			9			120	6'-11"		6	6'-11"	B	9'-0"
	1 @ 5'	3'	#5	13"	102	5'-9"	#6	13"	102	6'-10"	5'-8"	#6	13"	12	5'-9"	3'-7"	5'-2"	3'-0"	#5	12"	6	10½"	#4	12"	6	#4	12"	6	#5	12"	120	4'-0"	#6	6	8'-1"	B	10'-3"
		4'			102	5'-9"			102	6'-10"	"			12	"	"	"	"			8				8			8			120	5'-0"		6	"	B	"
		5'			102	5'-9"			102	6'-10"	"			12	5'-11"	3'-9"	5'-4"	3'-2"			10				10			10			120	6'-0"		6	"		
		6'			102	5'-11"			102	7'-0"	5'-10"			12	6'-0"	3'-10"	5'-5"	3'-3"			12				12			12			120	7'-0"		6	8'-4"	B	10'-5"
		7'			102	6'-0"			102	7'-1"	5'-11"			12	6'-1"	3'-11"	5'-6"	3'-3"			14				14			14			120	8'-0"		6	9'-5"	B	10'-7"
	1 @ 6'	3'	#6	12"	110	6'-9"	#6	12"	108	7'-10"	6'-8"	#6	12"	14	6'-9"	3'-9"	6'-2"	3'-2"	#5	12"	8	10½"	#4	12"	6	#4	12"	7	#5	12"	120	4'-1"	#6	6	9'-2"	B	11'-7"
		4'			110	6'-9"			108	7'-10"	"			16	"	"	"	"			8				8			8			120	5'-1"		6	"	B	"
		5'			110	6'-9"			108	7'-10"	"			16	"	"	"	"			10				10			8			120	6'-1"		6	"	B	"
		6'			108	6'-11"			108	8'-0"	6'-10"			20	6'-11"	2'-11"	6'-5"	2'-5"			12				12			10			120	7'-1"		6	9'-9"	B	11'-10"
		7'			108	7'-0"			108	8'-1"	6'-11"			20	7'-0"	3'-0"	6'-5"	2'-5"			14				14			12			120	8'-1"		6	9'-3"	B	12'-0"
		8'			108	7'-1"			108	8'-2"	7'-0"			20	7'-1"	3'-1"	6'-6"	2'-6"			16				16			14			120	9'-1"	#5	6	10'-0"	B	12'-1"
	1 @ 7'	4'	#6	11"	116	7'-9"	#6	11"	116	8'-10"	7'-8"	#6	11"	24	7'-10"	3'-8"	7'-3"	2'-8"	#5	12"	8	10½"	#4	12"	8	#4	12"	8	#5	12"	120	5'-2"	#6	6	10'-11"	B	13'-0"
		5'			116	7'-9"			116	8'-10"	"			24	"	"	"	"			9				9			9			120	6'-2"		6	"	B	"
		6'			116	7'-11"			116	9'-0"	7'-10"			24	8'-0"	3'-5"	7'-5"	2'-10"			10				10			10			120	7'-2"		6	11'-2"	B	13'-3"
		7'			116	8'-0"			116	9'-1"	7'-11"			24	8'-2"	3'-7"	7'-7"	3'-0"			12				12			12			120	8'-2"		6	11'-5"	B	13'-5"
		8'			116	8'-1"			114	9'-2"	8'-0"			24	8'-3"	3'-9"	7'-9"	3'-0"			14				14			14			120	8'-3"		6	11'-8"	B	13'-6"
		9'			116	8'-2"			116	9'-3"	8'-1"			24	8'-4"	3'-10"	7'-10"	3'-1"			16				16			16			120	8'-4"		6	11'-11"	B	13'-7"
	1 @ 8'	4'	#7	12"	104	8'-9"	#6	12"	104	9'-10"	8'-8"	#6	12"	24	8'-9"	3'-9"	8'-2"	3'-2"	#5	12"	8	10½"	#4	12"	8	#4	12"	9	#5	12"	120	5'-4"	#7	6	12'-8"	B	14'-5"
		5'			104	8'-9"			104	9'-10"	8'-8"			28	8'-11"	3'-11"	8'-3"	3'-2"			10				10			10			120	6'-4"		6	12'-7"	B	14'-8"
		6'			104	9'-0"			104	10'-1"	8'-10"			28	9'-0"	3'-10"	8'-5"	2'-5"			12				12			12			120	7'-4"		6	12'-10"	B	14'-10"
		7'			104	9'-1"			104	10'-2"	9'-0"			28	9'-1"	3'-11"	8'-6"	2'-6"			14				14			14			120	8'-4"		6	13'-1"	B	15'-0"
		8'			104	9'-2"			104	10'-3"	9'-1"			28	9'-2"	3'-11"	8'-7"	2'-6"			16				16			16			120	8'-4"		6	13'-4"	B	15'-1"
		9'			104	9'-3"			104	10'-4"	9'-2"			28	9'-3"	3'-12"	8'-8"	2'-7"			18				18			18			120	8'-4"		6	13'-7"	B	15'-2"
		10'			102	10'-6"			102	10'-6"	9'-4"			28	9'-5"	3'-13"	8'-9"	2'-8"			20				20			20			120	8'-4"		6	13'-10"	B	15'-3"
		5'			112	9'-11"			110	11'-0"	9'-10"			32	10'-0"	3'-7"	9'-5"	3'-0"			12				12			10			120	6'-5"		6	14'-0"	B	16'-4"
		6'			112	10'-0"			110	11'-1"	9'-11"			32	10'-1"	3'-8"	9'-6"	3'-1"			12				12			12			120	7'-5"		6	14'-1"	B	16'-3"
	1 @ 9'	7'	#7	11"	112	10'-0"	#7	11"	110	11'-1"	9'-11"	#6	11"	32	"	"	"	"	#5	12"	12	10½"	#4	12"	12	#4	12"	12	#5	12"	120	8'-5"	#8	6	14'-2"	B	16'-4"
		8'			112	10'-1"			110	11'-2"	10'-0"			32	10'-2"	3'-9"	9'-7"	3'-2"			14				14			14			120	6'-6"		6	14'-3"	B	16'-5"
		9'			112	10'-2"			110	11'-3"	10'-1"			32	10'-3"	3'-10"	9'-8"	3'-3"			16				16			16			120	6'-7"		6	14'-4"	B	16'-6"
		10'			112	10'-3"			110	11'-4"	10'-2"			32	10'-4"	3'-11"	9'-9"	3'-3"			18				18			18			120	6'-8"		6	14'-5"	B	16'-7"
		11'			112	10'-4"			110	11'-5"	10'-3"			32	10'-5"	3'-12"	9'-10"	3'-4"			20				20			20			120	6'-9"		6	14'-6"	B	16'-8"
		12'			112	10'-5"			110	11'-6"	10'-4"			32	10'-6"	3'-13"	9'-11"	3'-4"			22				22			22			120	6'-10"		6	14'-7"	B	16'-9"
		5'			100	10'-11"			100	12'-2"	10'-10"			36	11'-0"	3'-6"	10'-4"	2'-9"			13				13			11			120	6'-11"		6	14'-8"	B	16'-10"
		6'			100	11'-0"			100	12'-3"	10'-10"			36	11'-1"	3'-7"	10'-5"	2'-9"			13				13			11			120	7'-0"		6	14'-9"	B	16'-11"
	1 @ 10'	7'	#7	12"	100	11'-0"	#7	12"	100	12'-3"	10'-10"	#6	12"	36	"	"	"	"	#5	12"	13	10½"	#4	12"	13	#4	12"	13	#5	12"	120	8'-6"	#8	6	14'-10"	B	17'-0"
		8'			100	11'-1"			100	12'-4"	10'-11"			36	11'-2"	3'-8"	10'-7"	2'-10"			14				14			14			120	6'-11"		6	15'-0"	B	17'-1"
		9'			100	11'-2"			100	12'-5"	11'-0"			36	11'-3"	3'-9"	10'-8"	2'-10"			16				16			16			120	7'-1"		6	15'-1"	B	17'-2"
		10'			100	11'-3"			100	12'-6"	11'-1"			36	11'-4"	3'-10"	10'-9"	2'-10"			18				18			18			120	7'-2"		6	15'-2"	B	17'-3"
		11'			100	11'-4"			100	12'-7"	11'-2"			36	11'-5"	3'-11"	10'-10"	2'-10"			20				20			20			120	7'-3"		6	15'-3"	B	17'-4"
		12'			100	11'-5"			100	12'-8"	11'-3"			36	11'-6"	3'-12"	10'-11"	2'-10"			22				22			22			120	7'-4"		6	15'-4"	B	17'-5"
		6'			108	12'-1"			104	13'-4"	12'-0"			44	12'-3"	4'-1"	11'-7"	3'-2"			12				12			12			120	7'-5"		6	15'-5"	B	17'-6"
		7'			106	12'-1"			104	13'-4"	"			44	"	"	"	"			14				14			14			120	7'-6"		6	15'-6"	B	17'-7"
		8'			106	12'-1"			104	13'-4"	"			44	12'-4"	4'-0"	11'-8"	3'-1"			15				15			15			120	7'-7"		6	15'-7"	B	17'-8"
	1 @ 11'	9'	#7	11"	106	12'-2"	#7	11"	106	13'-5"	12'-2"	#7	11"	44	12'-5"	4'-2"	11'-9"	3'-1"	#5	12"	15	10½"	#4	12"	15	#4	12"	15	#5	12"	120	7'-8"	#8	6	15'-8"	B	17'-9"
		10'			106	12'-3"			106	13'-6"	12'-3"			44	12'-6"	4'-3"	11'-10"	3'-2"			15				15			15			120	7'-9"		6	15'-9"	B	17'-10"
		11'			106	12'-3"			106	13'-7"	12'-4"			44	12'-7"	4'-3"	11'-11"	3'-2"			15				15			15			120	7'-10"		6	15'-10"	B	17'-11"
		12'			106	12'-4"			104	13'-8"	12'-5"			44	12'-8"	4'-3"	12'-0"	3'-2"			15				15			15			120	7'-11"		6	15'-11"	B	18'-0"
		6'			96	13'-1"			96	14'-9"	13'-6"			44	13'-2"	3'-2"	12'-6"	2'-6"			16				16			16			120	8'-0"		6	16'-0"	B	18'-1"
		7'			96	13'-1"			96	14'-9"	"			44	"	"	"	"			16				16			16			120	8'-1"		6	16'-1"	B	18'-2"
		8'			96	13'-1"			96	14'-9"	"			44	13'-3"	3'-4"	12'-8"	2'-8"			16				16			16			120	8'-2"		6	16'-2"	B	18'-3"
	1 @ 12'	9'	#8	12"	96	13'-3"	#8	12"	96	14'-10"	13'-7"	#7	12"	44	13'-4"	3'-5"	12'-9"	2'-8"	#5	12"	16	10½"	#4	12"	16	#4	12"	16	#5	12"	120	8'-3"	#8	6	16'-3"	B	18'-4"
		10'			96	13'-3"			96	14'-10"	13'-8"			44	13'-6"	3'-6"	12'-10"	2'-10"			16				16			16			120	8'-4"		6	16'-4"	B	18'-5"
		11'			96	13'-3"			96	14'-10"	13'-9"			44	13'-7"	3'-7"	12'-11"	2'-10"			16				16			16			120	8'-5"		6	16'-5"	B	18'-6"
		12'			96	13'-3"			96	15'-0"	13'-8"			44	13'-8"	3'-10"	13'-1"	2'-11"			16				16			16			120	8'-6"		6	16'-6"	B	18'-7"

These bars are in the skewed portion of barrel only. The length of "a" bars and overall length X of "b" bars vary by 1'-1" for 13" spacing, 1'-0" for 12" spacing and 0'-11" for 11" spacing.

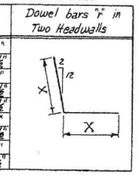
BAR SIZE	PIN DIAM	K	ADD FOR HOOKS	BENDING DIAGRAMS FOR BARS "b" & "b1"
#6	3"	5"	1'-8"	2 HOOKS: "b" bars, Pin diam., X
#7	3½"	5⅝"	1'-9"	
#6	3"	5"	0'-7"	1 HOOK: "b1" bars, Pin diam., X
#7	3½"	5⅝"	0'-8"	

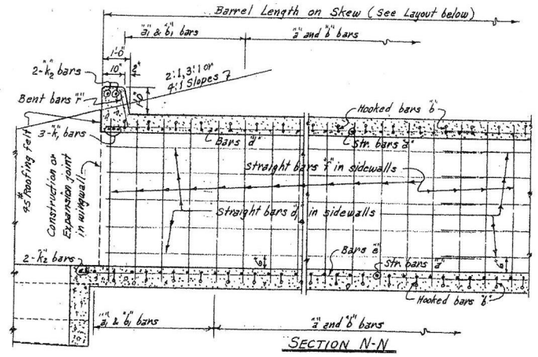
Note:- Dimensions are to centers of bars. ("b" and "b1")

DOWEL BARS FOR TWO HEADWALLS

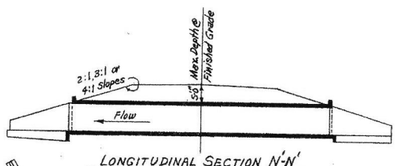
SPAN	SIZE	SPACING	NO. REQD	LENGTH	X
4'	#4	12"	16	2'-6"	1'-3"
5'	#4	12"	18	2'-7"	1'-3½"
6'	#4	12"	22	2'-8"	1'-4"
7'	#4	12"	24	2'-9"	1'-4½"
8'	#4	12"	28	2'-11"	1'-5½"
9'	#4	12"	30	3'-0"	1'-6"
10'	#4	12"	34	3'-1"	1'-6½"
11'	#4	12"	36	3'-2"	1'-7"
12'	#4	12"	40	3'-3"	1'-7½"

Dowel bars "f" in Two Headwalls

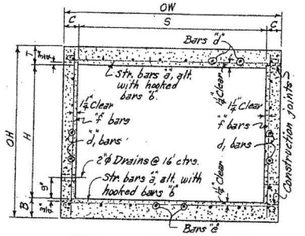




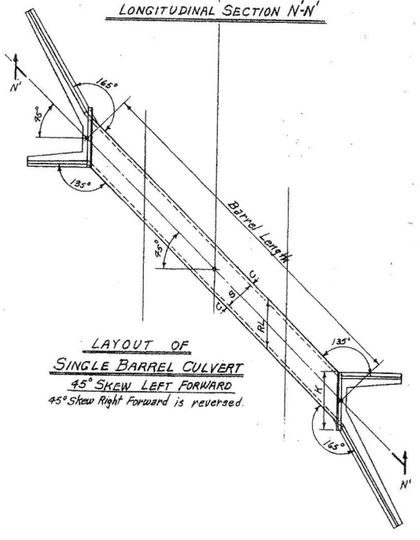
SECTION N-N



LONGITUDINAL SECTION N'-N'



TYPICAL SECTION M-M

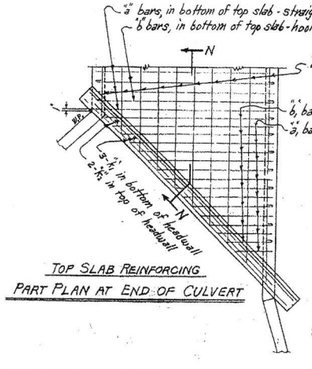


LAYOUT OF SINGLE BARREL CULVERT
45° SKEW LEFT FORWARD
45° Skew Right Forward is reversed.

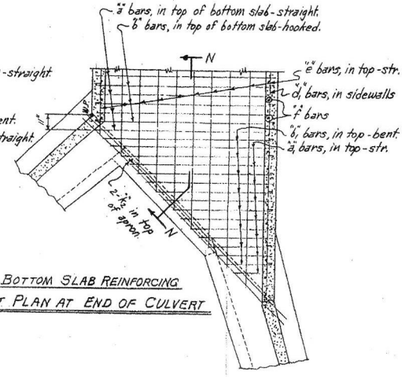
DESIGN LIVE LOAD
H20-S16 LOADING A.A.S.H.O. 1961
AND
SPECIAL MILITARY LOADING
Two 24,000 Lb. Axles @ 4'-0" ctrs.

UNIT STRESSES:-
Class S Concrete (n=10) 1200 #/in²
Reinforcing Steel 20,000 #/in²

Note:- This drawing to be used in conjunction with Standard Wing Drawing Nos. W-X452-1 or W-X452-2, W-X453-1 or W-X453-2, and W-X454-1 or W-X454-2. Also W-X45.



TOP SLAB REINFORCING
PART PLAN AT END OF CULVERT



BOTTOM SLAB REINFORCING
PART PLAN AT END OF 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 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 92'-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.

BARREL DIMENSIONS											QUANTITIES		
MAX. DESIGN DEPTH OF COVER	CLEAR SPANS	CLEAR HEIGHT	SQ. FT. OPENING	OVERALL "a" WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF BOTTOM SLAB	OVERALL HEIGHT	ROADWAY LENGTH	LENGTH OF HEADWALL	REINFORCING STEEL CLASS S CONC. PER LIN. FT. OF BARREL	REINFORCING STEEL TOTAL FOR 60'-0" LENGTH OF BARREL	REINFORCING STEEL PER LIN. FT. OF BARREL
												ADDITIONAL PER LAP	
D	S	H	A	OW	T	C	B	OH	RL	K	CU.YD.	LB.	LB.
5'-0"	1 @ 4'	2'	8	5'-0"		6"		3'-1⅞"	7'-0⅝"	9'-0⅞"	0.282	2635	41.49	17.95
		3'	12	5'-0"		6"		4'-1⅞"	"	"	0.319	2797	99.16	19.62
		4'	16	5'-0"	7"	6"	6½"	5'-1⅞"	"	"	0.356	2958	96.83	21.29
		5'	20	5'-0"		6"		6'-1⅞"	"	"	0.394	3120	99.50	22.96
		6'	24	5'-2"		7"		7'-1⅝"	7'-3⅝"	9'-3⅝"	0.474	3336	52.96	24.63
	1 @ 5'	3'	15	6'-0"		6"		4'-2¾"	8'-0⅝"	10'-0⅝"	0.380	3572	55.55	22.19
		4'	20	6'-0"		6"		5'-2¾"	"	"	0.417	3733	58.23	23.86
		5'	25	6'-0"	7⅞"	6"	7"	6'-2¾"	"	"	0.454	3895	60.90	25.53
		6'	30	6'-2"		7"		7'-2¾"	8'-8⅝"	10'-8⅝"	0.535	4115	64.99	27.20
		7'	35	6'-3"		7½"		8'-2¾"	8'-10⅝"	10'-10⅝"	0.604	9308	67.63	28.87
	1 @ 6'	3'	18	7'-0"		6"		4'-3⅝"	9'-10⅝"	11'-10⅝"	0.996	4260	66.29	29.76
		4'	24	7'-0"		6"		5'-3⅝"	"	"	0.983	9421	68.96	26.43
		5'	30	7'-0"		6"		6'-3⅝"	"	"	0.520	9583	71.64	28.10
		6'	36	7'-2"		6"	7⅞"	7'-3⅝"	10'-1⅝"	12'-1⅝"	0.602	9813	75.31	29.77
		7'	42	7'-3"	8'	7"		8'-3⅝"	10'-3"	12'-3"	0.671	5008	78.98	31.44
		8'	48	7'-4"		8"		9'-3⅝"	10'-4⅝"	12'-4⅝"	0.796	5610	88.97	33.11
	1 @ 7'	4'	28	8'-0"		6"		5'-5"	11'-3⅝"	13'-3⅝"	0.568	5308	81.32	29.01
		5'	35	8'-0"		6"		6'-5"	"	"	0.605	5464	84.00	30.68
		6'	42	8'-2"		7"	8½"	7'-5"	11'-5⅝"	13'-4⅝"	0.688	5700	87.76	32.35
		7'	49	8'-3"		7½"		8'-5"	11'-6"	13'-8"	0.757	5901	90.98	34.02
		8'	56	8'-4"		8"		9'-5"	11'-9⅝"	13'-9⅝"	0.832	6219	96.65	35.69
		9'	63	8'-6"		9"		10'-5"	12'-0⅝"	14'-0⅝"	0.946	6976	105.59	37.36
	1 @ 8'	4'	32	9'-0"		6"		5'-7"	12'-8⅝"	14'-8⅝"	0.676	6196	95.26	33.32
		5'	40	9'-2"		7"		6'-7"	12'-11⅝"	14'-11⅝"	0.756	6923	99.12	34.99
		6'	48	9'-3"		7½"	9½"	7'-7"	"	"	0.797	6589	101.79	36.66
		7'	56	9'-3"	9"	7½"		8'-7"	13'-1"	15'-1"	0.867	6788	105.05	38.33
		8'	64	9'-5"		8"		9'-7"	13'-2⅝"	15'-2⅝"	0.942	7141	110.81	40.00
		9'	72	9'-6"		9"		10'-7"	13'-5⅛"	15'-5⅛"	1.057	7701	119.92	41.67
		10'	80	9'-8"		10"		11'-7"	13'-8"	15'-8"	1.184	8121	126.67	43.34
	1 @ 9'	5'	50	11'-2"		7"		6'-9½"	15'-3½"	17'-3½"	0.957	8572	134.64	44.13
		6'	60	11'-3"		7½"		7'-9½"	15'-11"	17'-11"	1.022	8784	133.98	41.80
		7'	70	11'-3"		7½"		8'-9½"	"	"	1.071	8994	136.66	43.47
		8'	80	11'-4"	10½"	8"	11"	9'-9½"	16'-0⅝"	18'-0⅝"	1.142	9306	142.55	45.14
		9'	90	11'-6"		9"		10'-9½"	16'-3⅝"	18'-3⅝"	1.263	9891	151.92	46.81
		10'	100	11'-8"		10"		11'-9½"	16'-6"	18'-6"	1.391	10,310	158.83	48.48
		11'	110	11'-10"		11"		12'-9½"	16'-8⅝"	18'-9⅝"	1.532	10,785	166.71	50.15
		12'	120	12'-0"		12"		13'-9½"	16'-11⅝"	19'-0⅝"	1.685	11,324	178.67	51.82
	1 @ 10'	6'	66	12'-8"		7"		7'-10⅝"	17'-5⅝"	19'-5⅝"	1.153	10,378	155.16	46.12
		7'	77	12'-8"		8"		8'-10⅝"	"	"	1.202	10,539	157.83	47.79
		8'	88	12'-8"		8"		9'-10⅝"	"	"	1.252	10,855	163.06	49.46
		9'	99	12'-8"	11"	9"	11½"	10'-10⅝"	17'-8⅝"	19'-8⅝"	1.368	11,493	172.60	51.13
		10'	110	12'-8"		10"		11'-10⅝"	17'-11"	19'-11"	1.497	11,886	179.70	52.80
		11'	121	12'-10"		11"		12'-10⅝"	18'-1⅝"	20'-1⅝"	1.638	12,379	187.67	54.47
		12'	132	13'-0"		12"		13'-10⅝"	18'-4⅝"	20'-4⅝"	1.792	13,071	199.79	56.14
	1 @ 11'	6'	72	13'-6"		7"		8'-0"	19'-0⅝"	21'-0⅝"	1.284	11,920	172.80	48.69
		7'	84	13'-6"		8"		9'-0"	"	"	1.333	11,581	174.87	50.36
		8'	96	13'-8"		8"		10'-0"	"	"	1.383	11,899	184.15	52.03
		9'	108	13'-8"	11½"	9"	12½"	11'-0"	19'-1⅝"	21'-1"	1.500	12,500	189.85	53.70
		10'	120	13'-8"		10"		12'-0"	19'-3⅝"	21'-3"	1.630	12,948	197.07	55.37
		11'	132	13'-10"		11"		13'-0"	19'-6⅛"	21'-6⅛"	1.772	13,446	205.16	57.04
		12'	144	14'-0"		12"		14'-0"	19'-9⅛"	21'-9⅛"	1.926	14,212	217.95	58.71

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

Designed by:- W.C.H. 1-23-63. Checked by:- R.M.S. 5-8-63
Drawn by:- W.C.H. 7-10-64 Checked by:-
Quantities by:- W.C.H. 9-30-64 Checked by:-

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS
FOR
REINFORCED CONCRETE BOX CULVERTS
45° 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-145X-0

FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOT SHE
6	ARK.				
JOB No.					

BAR LIST FOR BARREL SECTION 60'-0" IN LENGTH – TWO 45° SKEWED ENDS.

DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	"a" bars STRAIGHT In Top and Bottom Slab of Barrel.				"a₁" bars STRAIGHT In Top and Bottom Slab of Barrel. (four of each length)				"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 BENT - See Diagrams below. In Bottom of Top Slab - some bent up over Division Wall - one end hooked. (2 of Each Length) Alternate with "a₁" and "c" or "c₁" bars.					
D	S	H	SIZE	SPACING	No. REQD	LENGTH	SIZE	SPACING	No. REQD	LENGTH MAX.	LENGTH MIN.	SIZE	SPACING	No. REQD	LENGTH	X	Y	Z	SIZE	SPACING	No. REQD	LENGTH MAX.	LENGTH MIN.	L MAX.	L MIN.
0'-0" TO 5'-0" MAXIMUM	2 @ 9'	5'	#6	11"	92	19'-8"	#7	11"	76	18'-9"	2'-3"	#6	11"	43	2'-1"	0'-5⅞"	4'-9"	7'-2"	#6	11"	38	20'-1"	3'-3"	19'-2"	2'-8"
		6'			92	19'-10"			76	18'-11"	2'-5"			43	2'-1⅜"	"	4'-5"	7'-2⅝"			38	20'-8"	3'-5"	19'-6"	2'-10"
		7'			92	19'-10"			76	"	"			43	2'-1⅝"	"	"	"			38	"	"	"	"
		8'			92	19'-11"			76	19'-0"	2'-6"			43	2'-1⅞"	"	"	7'-3"			38	20'-6"	3'-6"	19'-5"	2'-11"
		9'			90	20'-2"			76	19'-3"	2'-9"			43	2'-1⅞"	"	4'-5"	7'-4"			38	20'-9"	3'-9"	19'-8"	3'-2"
		10'			90	20'-5"			76	19'-6"	3'-0"			43	2'-2⅛"	"	"	7'-5"			38	20'-10"	3'-10"	19'-11"	2'-4"
		11'			90	20'-7"			76	19'-8"	3'-2"			42	2'-2⅛"	0'-5⅝"	"	7'-6"			40	21'-0"	3'-3"	20'-1"	2'-8"
	2 @ 10'	5'	#6	12"	80	21'-8"	#7	12"	74	20'-8"	2'-8"	#6	12"	38	2'-3⅝"	0'-6"	4'-9"	7'-11"	#6	12"	38	22'-1"	3'-8"	21'-1"	3'-1"
		6'			80	21'-10"			74	20'-10"	2'-10"			38	2'-3⅞"	"	4'-9"	7'-11⅝"			38	22'-3"	3'-10"	21'-3"	3'-3"
		7'			80	21'-10"			74	"	"			38	2'-4⅛"	"	"	"			38	"	"	"	"
		8'			80	21'-11"			74	20'-11"	2'-11"			38	2'-4⅜"	"	"	8'-0"			38	22'-5"	3'-11"	21'-5"	3'-4"
		9'			80	22'-2"			74	21'-2"	3'-2"			37	2'-3⅝"	"	4'-11"	8'-1"			40	22'-7"	3'-12"	21'-7"	2'-7"
		10'			78	22'-5"			80	21'-5"	2'-5"			37	2'-4⅛"	"	5'-0"	8'-2"			40	22'-10"	3'-6"	21'-10"	2'-10"
		11'			78	22'-7"			80	21'-9"	2'-7"			37	2'-4⅝"	"	"	8'-3"			40	23'-0"	3'-7"	22'-0"	3'-0"
		12'			78	22'-9"			80	21'-9"	2'-9"			37	2'-5⅛"	0'-6"	5'-0"	8'-4"			40	23'-2"	3'-9"	22'-2"	3'-2"
	2 @ 11'	6'	#7	12"	74	23'-11"	#7	12"	84	22'-11"	2'-11"	#6	12"	35	2'-5⅝"	0'-6½"	5'-3"	8'-9"	#6	12"	44	24'-4"	2'-11"	23'-4"	2'-9"
		7'			76	23'-11"			86	"	"			35	2'-5⅞"	"	"	"			44	"	"	"	"
		8'			76	23'-11"			86	"	"			35	2'-5⅞"	"	"	"			44	"	"	"	"
		9'			76	24'-2"			86	23'-2"	3'-2"			35	2'-6⅛"	"	5'-4"	8'-10"			44	24'-5"	3'-2"	23'-7"	2'-7"
		10'			74	24'-5"			88	23'-5"	2'-5"			35	2'-6⅜"	"	5'-5"	8'-11"			44	24'-10"	3'-5"	23'-10"	2'-10"
		11'			74	24'-7"			88	23'-7"	2'-7"			35	2'-6⅝"	"	"	9'-0"			44	25'-0"	3'-7"	24'-0"	3'-0"
		12'			74	24'-9"			88	23'-9"	2'-9"			35	2'-7⅛"	0'-6⅝"	5'-5"	9'-1"			44	25'-2"	3'-9"	24'-2"	3'-2"
	2 @ 12'	6'	#7	11"	78	25'-11"	#7	11"	100	25'-0"	3'-0"	#6	11"	36	2'-7⅝"	0'-7"	5'-8"	9'-6"	#6	11"	52	26'-5"	3'-1"	25'-5"	2'-6"
		7'			78	25'-11"			100	"	"			36	2'-7⅞"	"	"	"			52	"	"	"	"
		8'			78	25'-11"			100	"	"			36	2'-7⅞"	"	"	"			52	"	"	"	"
		9'			76	26'-2"			106	25'-3"	2'-6"			36	2'-8⅛"	"	5'-9"	9'-7"			52	26'-8"	3'-4"	25'-8"	2'-9"
		10'			76	26'-5"			106	25'-6"	2'-7"			36	2'-8⅜"	"	5'-10"	9'-8"			52	26'-11"	3'-7"	25'-11"	3'-0"
		11'			76	26'-7"			106	25'-8"	2'-9"			36	2'-8⅝"	"	"	9'-9"			52	27'-1"	3'-9"	26'-1"	3'-2"
		12'			76	26'-9"			106	25'-10"	2'-11"			36	2'-9⅛"	0'-7⅛"	5'-10"	9'-10"			52	27'-3"	3'-11"	26'-3"	3'-5"

DEPTH OF COVER	CLEAR SPAN	CLEAR HEIGHT	"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 BENT - See Diagrams below. In Top of Bottom Slab - some bent down under Division Wall - one end hooked. (2 of Each Length) Alternate with "a₁" and "c" or "c₁" bars.						"c" bars STRAIGHT In Top and Bottom Slab of Barrel. Alternate with "b" bars.			"c₁" bars STRAIGHT In Top and Bottom Slab of Barrel. Alt. with "b₂" & "b₃" bars. (Four of each Length)			"d" bars STRAIGHT Longitudinal in Top Slab of Barrel.		"d₁" bars STRAIGHT Longitudinal in Sidewalls and Division Wall.		"e" bars STRAIGHT Longitudinal in Bottom Slab of Barrel.		"f" bars STRAIGHT Verticals in Sidewalls and Division Wall.			"h₁" bars STRAIGHT In Bottom of Headwalls		"h₂" bars STRAIGHT In Top of Headwalls and Aprons. (2 Each)	
D	S	H	SIZE	SPACING	No. REQD	LENGTH			SIZE	SPACING	No. REQD	LENGTH			SIZE	SPACING	No. REQD	SIZE	SPACING	No. REQD	LENGTH			SIZE	SPACING	No. REQD	LENGTH	SIZE	SPACING	No. REQD	LENGTH	SIZE	No. REQD	LENGTH	SIZE	No. REQD	LENGTH
0'-0" TO 5'-0" MAXIMUM	2 @ 9'	5'	#6	12"	95	21'-1"	0'-5⅞"	4'-9"	#6	12"	38	20'-1"	3'-3"	19'-2"	#6	12"	112	#7	12"	32	9'-3"	2'-10"	#7	12"	24	#4	12"	20	#4	12"	25	#4	12"	240	6'-3"	#8	6	27'-9"	#8	6	27'-9"
		6'			95	21'-3"	"	4'-9"			38	20'-8"	3'-5"	19'-6"			112			32	9'-4"	2'-11"			24			24			25			240	7'-3"						
		7'			95	21'-3"	"	"			38	"	"	"			112			32	9'-5"	3'-0"			24			28			25			240	8'-3"						
		8'			95	21'-4"	"	"			38	20'-6"	3'-6"	19'-5"			112			32	9'-7"	3'-2"			24			32			25			288	9'-3"						
		9'			95	21'-7"	"	4'-5"			38	20'-9"	3'-9"	19'-8"			112			32	9'-9"	3'-5"			24			36			25			288	10'-3"						
		10'			95	21'-8"	"	4'-6"			38	20'-10"	3'-10"	19'-11"			112			32	9'-11"	3'-8"			24			36			25			288	11'-3"						
		11'			94	22'-0"	0'-5½"	"			40	21'-0"	3'-3"	20'-1"			112			36	9'-10"	2'-6"			24			40			25			288	12'-3"						
	2 @ 10'	5'	#6	12"	40	23'-2"	0'-6½"	4'-8"	#6	12"	38	22'-1"	3'-8"	21'-1"	#7	12"	100	#7	12"	36	10'-3"	2'-9"	#7	12"	28	#4	12"	20	#4	12"	25	#4	12"	240	6'-4"	#8	6	30'-7"	#8	6	30'-7"
		6'			40	23'-8"	"	4'-9"			38	22'-3"	3'-10"	21'-3"			100			36	10'-3"	2'-9"			28			24			27			240	6'-11"						
		7'			40	23'-8"	"	"			38	"	"	"			100			36	10'-4"	2'-10"			28			28			27			240	7'-4"						
		8'			40	23'-5"	"	4'-10"			38	22'-5"	3'-11"	21'-5"			100			36	10'-5"	2'-10"			28			32			27			240	8'-3"						
		9'			39	23'-11"	"	4'-11"			40	22'-7"	3'-12"	21'-7"			100			36	10'-6"	2'-11"			28			36			27			240	9'-2"						
		10'			39	24'-3"	"	5'-0"			40	22'-10"	3'-14"	21'-10"			100			36	10'-7"	2'-11"			28			40			27			288	10'-3"						
		11'			39	24'-5"	"	"			40	23'-0"	3'-15"	22'-0"			100			36	10'-8"	2'-12"			28			44			27			288	11'-3"						
		12'			39	24'-8"	"	5'-1"			40	23'-2"	3'-16"	22'-2"			100			36	10'-9"	2'-12"			28			48			27			288	12'-3"						
	2 @ 11'	6'	#7	12"	44	24'-4"	0'-6½"	5'-3"	#6	12"	40	24'-1"	2'-11"	23'-4"	#7	12"	100	#7	12"	36	10'-10"	2'-9"	#7	12"	30	#4	12"	20	#4	12"	29	#5	12"	240	7'-6"	#9	6	33'-3"	#9	6	33'-3"
		7'			44	"	"	"			40	"	"	"			100			36	"	"			30			24			29			240	8'-6"						
		8'			44	"	"	"			40	"	"	"			100			36	10'-11"	2'-10"			30			28			29			240	9'-6"						
		9'			44	24'-9"	0'-6½"	5'-4"			40	24'-6"	3'-2"	23'-7"			100			36	11'-0"	2'-11"			30			32			29			240	10'-6"						
		10'			44	24'-11"	"	5'-5"			40	24'-11"	3'-3"	23'-10"			98			36	11'-1"	3'-1"			30			36			29			240	11'-6"						
		11'			44	25'-1"	"	"			40	25'-4"	3'-4"	24'-0"			98			36	11'-3"	3'-3"			30			40			29			240	12'-6"						
		12'			44	25'-4"	"	5'-6"			40	25'-9"	3'-5"	24'-2"			98			36	11'-4"	3'-4"			30			44			29			240	13'-6"						
	2 @ 12'	6'	#7	11"	52	26'-5"	3'-1"	25'-5"	#6	11"	38	27'-3"	0'-8½"	5'-5"	#7	11"	106	#7	11"	32	12'-1"	2'-11"	#7	11"	32	#4	12"	20	#4	12"	31	#6	12"	240	7'-9"	#9	6	36'-2"	#9	6	36'-2"
		7'			52	"	"	"			38	27'-5"	"	"			106			32	12'-2"	3'-0"			32			24			31			240	8'-9"						
		8'			52	"	"	"			38	27'-7"	"	"			106			32	12'-3"	3'-1"			32			28			31			240	9'-9"						
		9'			52	26'-8"	3'-4"	25'-8"			38	27'-9"	3'-2"	25'-10"			106			32	12'-4"	3'-2"			32			32			31			240	10'-9"						
		10'			52	26'-11"	3'-5"	26'-0"			38	28'-0"	3'-3"	26'-0"			106			32	12'-5"	3'-3"			32			36			31			240	11'-9"						
		11'			52	27'-1"	3'-7"	26'-1"			38	28'-2"	3'-4"	26'-2"			106			32	12'-6"	3'-4"			32			40			31			240	12'-9"						
		12'			52	27'-3"	3'-9"	26'-3"			38	28'-5"	3'-5"	26'-3"			106			32	12'-7"	3'-5"			32			44			31			240	13'-9"						

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS
#6	3"	5"	1'-2"

BENDING DIAGRAM FOR BARS "b" AND "b₂"

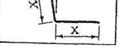
BAR SIZE	PIN DIAM.	K	ADD FOR 1 HOOK
#6	3"	5'	0'-7"

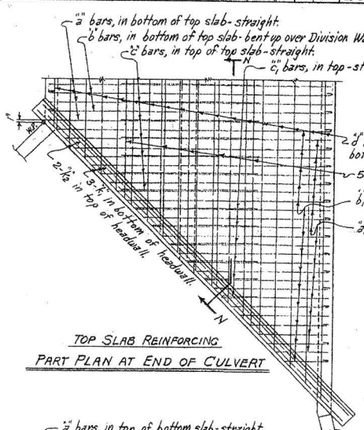
BENDING DIAGRAM FOR BARS "b₁" AND "b₃"

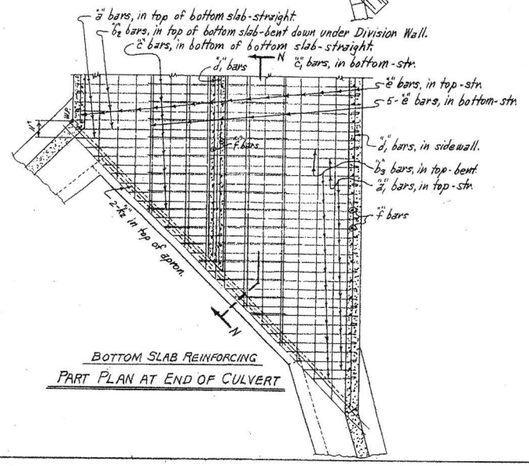
NOTE:- Dimensions are to centers of bars (b, b₁, b₂, & b₃). The X, Y & Z values for "b₁" bars are same as "b" bars and for "b₃" bars same as for "b₂" bars.

SPAN	SIZE	SPACING	No. REQD	LENGTH	X
9'	#4	12"	58	2'-10"	1'-5"
10'	#4	12"	64	2'-11"	1'-5½"
11'	#4	12"	70	3'-0"	1'-6"
12'	#4	12"	76	3'-1"	1'-6½"

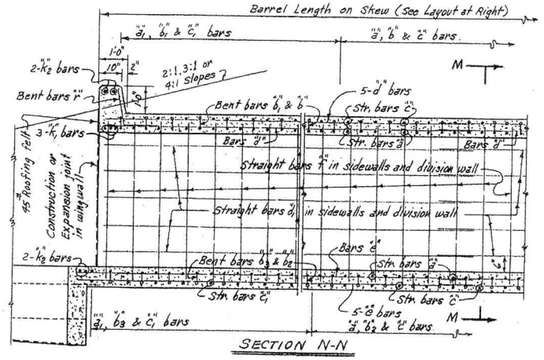
Dowel bars "r" in Two Headwalls

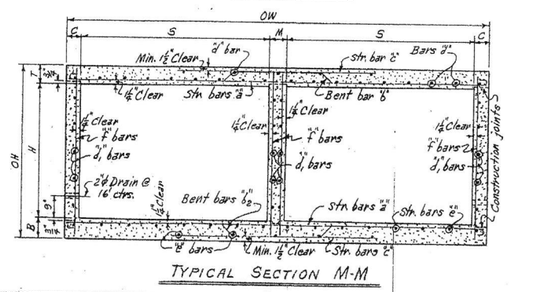




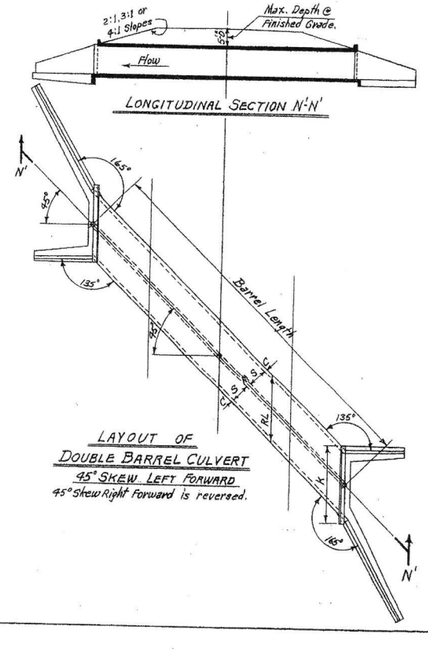


NOTE:- For Details of Standard Wings and bar lists, see Drawing No. W-X452-1 or W-X452-2; W-X453-1 or W-X453-2, and W-X454-1 or W-X454-2. Also W-X45.





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'-0" for 12" spacing and 0'-11" for 11" spacing.
In the regular portion of the barrel begin and end with a set of "a" and "c" bars. If the spacing is such that the last set of bars would be "b" & "b₂" bars, use a set of "a" & "c" bars instead.



MAX. DESIGN DEPTH OF COVER	CLEAR SPANS	BARREL DIMENSIONS: CLEAR HEIGHT	SQ. FT. OPENING	OVERALL WIDTH	THICKNESS OF THE SLAB	THICKNESS OF SIDEWALLS	THICKNESS OF DIVISION SLAB	THICKNESS OF DIVISION WALL	OVERALL HEIGHT	ROADWAY LENGTH	LENGTH OF HEADWALLS	* QUANTITIES: CLASS S CONC. PER LIN. FT. OF BARREL	REINFORCING STEEL: TOTAL FOR LENGTH OF BARREL	PER LIN. FT. OF BARREL	ADDITIONAL FOR LAP
D	S	H	A	OW	T	C	M	B	OH	RL	K	CU.YD.	LB.	LB.	LB.
5'-0"	2 @ 9'	5'	90	19'-11"	9"		7"	9"	6'-6⅝"	28'-2"	30'-2"	1.477	15,689	239.37	82.77
		6'	108	20'-1"			7⅛"	10"	7'-6⅝"	28'-3"	30'-3⅛"	1.594	16,139	246.08	86.11
		7'	126	20'-1"			7⅛"	10"	8'-6⅝"	"	"	1.471	16,957	251.93	89.95
		8'	144	20'-2"			8"	10"	9'-6⅝"	28'-6"	30'-6⅝"	1.778	17,128	262.26	92.79
		9'	162	20'-5"			9"	11"	10'-6⅝"	28'-10"	30'-10⅝"	1.956	18,177	279.35	96.13
		10'	180	20'-8"			10"	12"	11'-6⅝"	29'-2"	31'-2⅝"	2.152	19,069	292.97	99.97
		11'	198	20'-10"			11"	12"	12'-6⅝"	29'-5"	31'-5⅝"	2.328	20,980	306.84	102.81
	2 @ 10'	5'	100	21'-11"	9"	9½"	7"	9"	6'-7½"	31'-0"	33'-0"	1.476	18,280	279.64	87.92
		6'	120	22'-1"			7⅛"	10"	7'-7½"	31'-2⅝"	33'-2⅝"	1.592	18,726	286.50	91.24
		7'	140	22'-1"			7⅛"	10"	8'-7½"	"	"	1.869	19,049	291.85	94.60
		8'	160	22'-2"			8"	10"	9'-7½"	31'-5⅝"	33'-5⅝"	1.976	19,798	302.77	97.94
		9'	180	22'-5"			9"	11"	10'-7½"	31'-8⅝"	33'-8⅝"	2.155	20,811	320.74	101.28
		10'	200	22'-8"			10"	12"	11'-7½"	32'-0⅝"	34'-0⅝"	2.352	21,573	333.99	104.62
		11'	220	22'-10"			11"	12"	12'-7½"	32'-3⅝"	34'-3⅝"	2.529	22,201	348.01	107.96
		12'	240	23'-0"			12"	12"	13'-7½"	32'-6⅝"	34'-6⅝"	2.718	23,800	370.23	111.30
	2 @ 10'	6'	132	24'-2"	9"	9½"	8"	10"	7'-8"	34'-2⅝"	36'-2"	2.048	20,556	309.36	96.91
		7'	154	24'-2"			8"	10"	8'-8"	"	"	2.128	20,880	319.70	99.75
		8'	176	24'-3"			8"	10"	9'-8"	"	"	2.208	21,507	325.12	103.09
		9'	198	24'-5"		10"	9"	11"	10'-8"	34'-5⅝"	36'-5⅝"	2.388	22,559	343.25	106.43
		10'	220	24'-8"			10"	12"	11'-8"	34'-8⅝"	36'-8⅝"	2.596	23,419	356.57	109.77
		11'	242	24'-10"			11"	12"	12'-8"	35'-1⅝"	37'-1⅝"	2.769	24,301	370.67	113.11
		12'	264	25'-0"			12"	12"	13'-8"	35'-4⅝"	37'-4⅝"	2.954	25,689	393.05	116.45
	2 @ 12'	6'	144	26'-1"	9"	10½"	8"	10"	7'-10"	37'-1⅝"	39'-1"	2.239	23,332	359.31	101.55
		7'	168	26'-2"			8"	10"	8'-10"	"	"	2.379	23,656	358.65	104.89
		8'	192	26'-2"			8"	10"	9'-10"	"	"	2.459	24,286	369.12	108.23
		9'	216	26'-5"		12"	9"	11"	10'-10"	37'-4⅝"	39'-4⅝"	2.640	25,980	387.52	111.57
		10'	240	26'-8"			10"	12"	11'-10"	37'-8⅝"	39'-8⅝"	2.840	26,252	401.07	114.91
		11'	264	26'-10"			11"	12"	12'-10"	38'-0⅝"	40'-0⅝"	3.018	27,200	415.31	118.25
		12'	288	27'-0"			12"	12"	13'-10"	38'-3⅝"	40'-3⅝"	3.208	28,597	437.88	121.59

* For quantities in wings see Standard Wing Drawings listed below.
Total steel quantities listed above include one lap of longitudinal bars.

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 add'l 33'-0" length of barrel over 32'-0". Lap longitudinal bars 30 diam. min.
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.

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-X452-1 or W-X452-2, W-X453-1 or W-X453-2, and W-X454-1 or W-X454-2. Also W-X45.

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS 45° SKEW

9', 10', 11' AND 12' SPANS — 2:1, 3:1 OR 4:1 SLOPES
DOUBLES — UNDER 5'-0" COVER

STANDARD DRAWING NO. R-245X-02

Designed by:- W.C.H. 1-17-62. Checked by:- R.H.S. 5-14-63
Drawn by:- W.C.H. 7-15-64 Checked by:-
Quantities by:- W.C.H. 10-5-65. Checked by:-