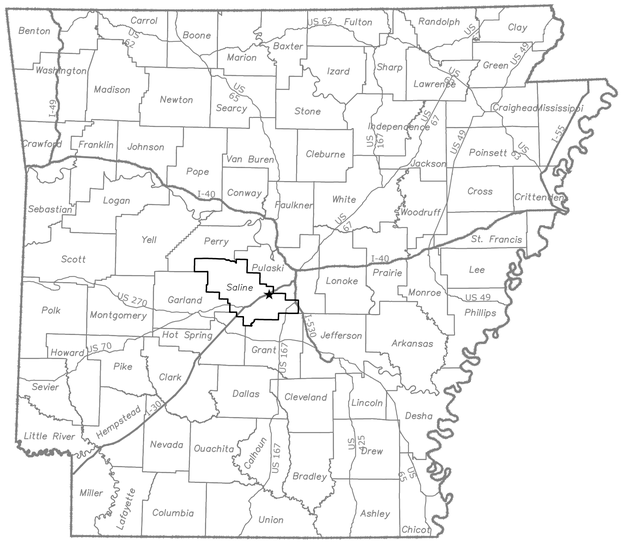
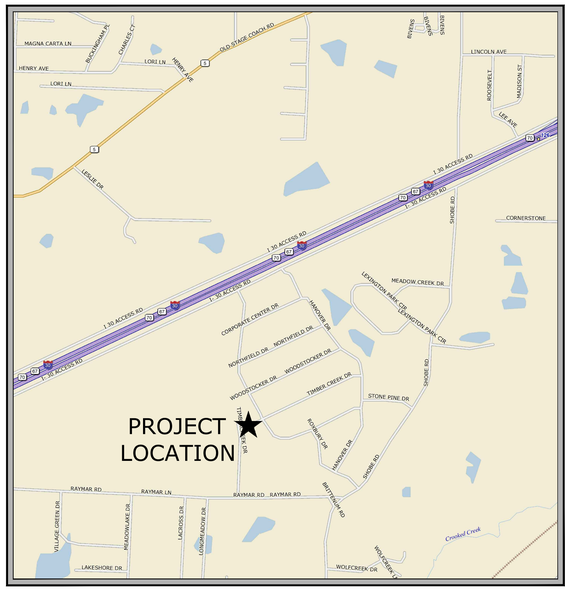
TIMBERCREEK DRIVE
CULVERT REPLACEMENT

BRYANT, ARKANSAS



LOCATION MAP



VICINITY MAP

INDEX TO DRAWINGS

JULY 2019

MCE PROJECT NUMBER 19-5766

Know what's below. Call before you dig.

REVISIONS		
REV	DATE	DESCRIPTION

McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE
http://www.mce.us.com
7302 KANIS ROAD
LITTLE ROCK, ARKANSAS 72204
501-371-0272
LITTLE ROCK, AR • FAYETTEVILLE, AR • FORT SMITH, AR • TULSA, OK

McCLELLAND CONSULTING ENGINEERS No. 24 CERTIFICATE OF AUTH ARKANSAS ENGINEER

STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER No.10307 JAMES S. WHISKER 07-03-19

ORIGINAL SIGNATURE ON FILE

TIMBERCREEK DRIVE CULVERT REPLACEMENT ---- MCE #19-5766

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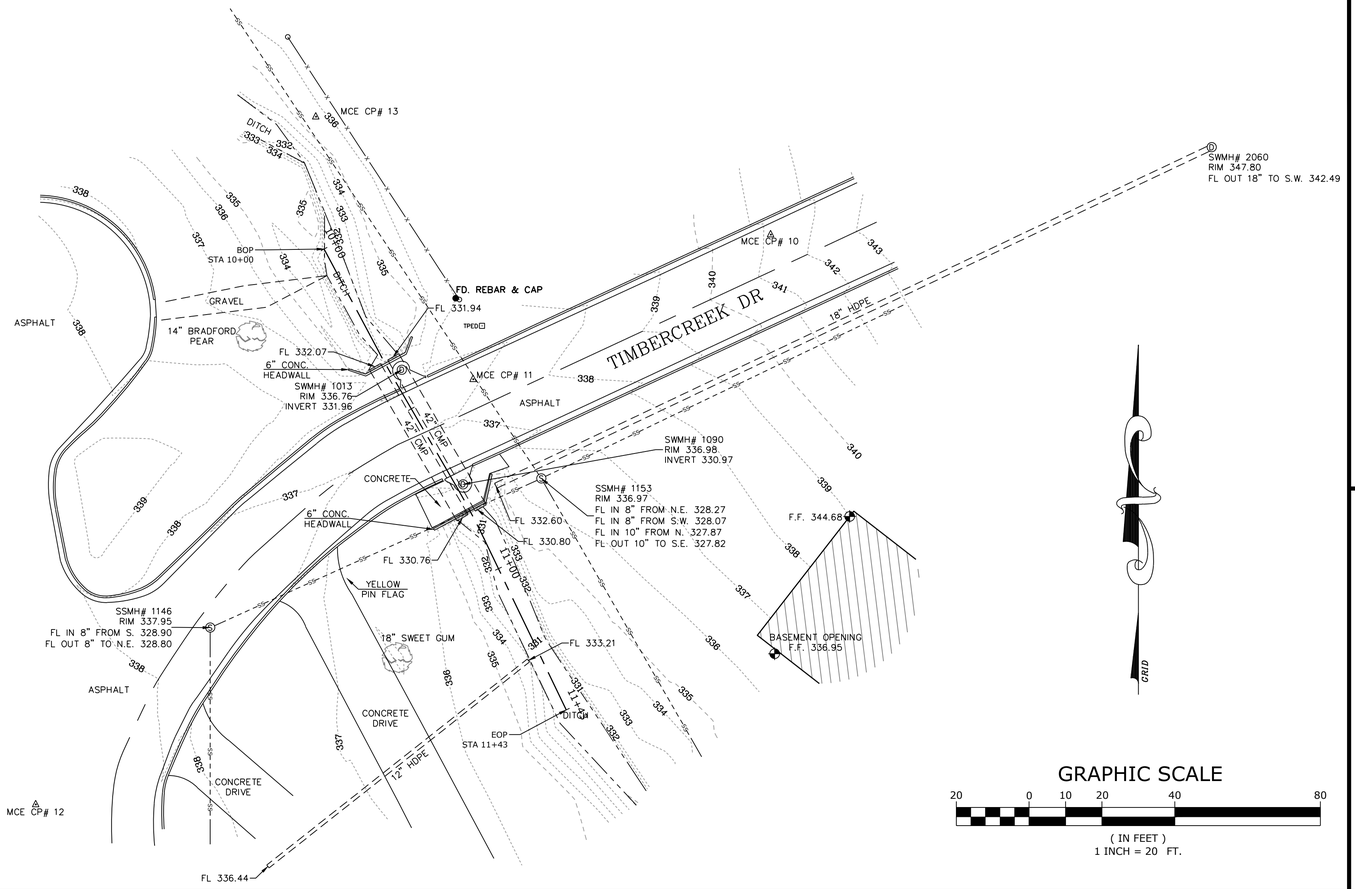


GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 INCH = 20 FT.

SURVEYOR'S NOTES:

HORIZONTAL COORDINATES FOR THIS PROJECT ARE ARKANSAS STATE PLANE SOUTH ZONE AND ELEVATIONS ARE NAVD88 BASED ON THE P.A.G.I.S. PREFERENCE STATION.

CONTOUR INTERVAL = 1 FOOT.

THIS IS A TOPOGRAPHIC SURVEY ONLY AND IN NO WAY SHOULD BE INTERPRETED AS A PROPERTY BOUNDARY SURVEY. ANY PROPERTY LINES SHOWN ARE FOR REFERENCE ONLY AND HAVE NOT BEEN VERIFIED.

FIELD WORK FOR THIS SURVEY WAS COMPLETED JUNE, 2018.

NO STATEMENT IS MADE CONCERNING SUBSURFACE CONDITIONS.

BURIED UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN BASED ON VISUAL INSPECTION OF MANHOLES AND OTHER SURFACE FEATURES. McCLELLAND CONSULTING ENGINEERS HAS ACCURATELY DEPICTED THE UNDERGROUND AND SUBSURFACE FEATURES TO THE BEST OF THEIR KNOWLEDGE AND ABILITY. ANY CONSTRUCTION AT THIS SITE SHOULD ONLY BE DONE AFTER CONTACTING ARKANSAS ONE CALL AT 1-800-482-8998 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.

MANHOLE AND DRAIN GRATE INFORMATION WERE GATHERED BY VISUAL INSPECTION AND ARE CONNECTED AND DESCRIBED ONLY AS COULD BE DETERMINED THROUGH SAID VISUAL INSPECTION.

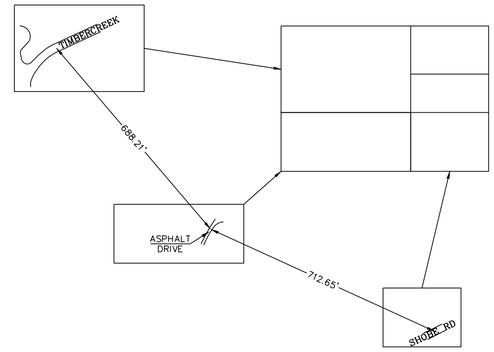
LEGEND

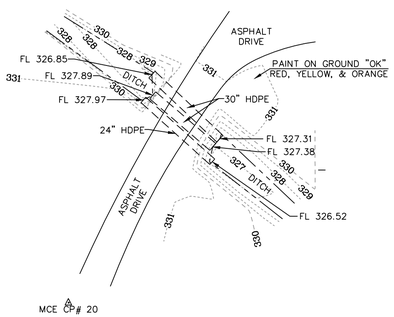
- SURVEY CONTROL MONUMENT (TYPE AS NOTED)
- ELEVATION BENCHMARK OR LOCATION OF BUILDING FLOOR ELEVATION
- FOUND SURVEY BOUNDARY MARKER (TYPE AS NOTED)
- STORM WATER MANHOLE
- SANITARY SEWER MANHOLE
- TPED TELEPHONE PEDESTAL
- TREE (TYPE AS NOTED)
- CURB LINE
- FENCE
- STORM WATER LINE
- SANITARY SEWER LINE
- PROPERTY LINE
- RIGHT OF WAY LINE
- DITCH OR STREAM LINE

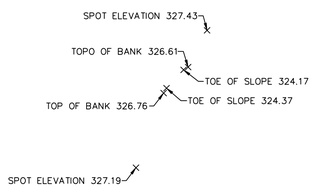
CONTROL DATA

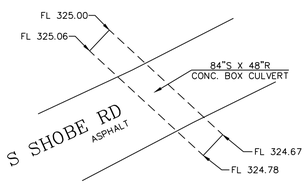
Point #	Northing	Easting	Elevation	Description
10	2026913.4210	1173620.4540	341.15	PK NAIL
11	2026873.6960	1173538.7490	337.02	PK NAIL
12	2026756.9640	1173418.6600	338.87	PK NAIL
13	2026945.7860	1173495.5720	335.77	60D NAIL
20	2026283.8710	1173940.5440	332.23	PK NAIL
21	2026205.8010	1173903.8090	339.82	PK NAIL

SHEET LAYOUT









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PRELIMINARY
NOT FOR CONSTRUCTION

ORIGINAL SIGNATURE ON FILE

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TIMBERCREEK DRIVE CULVERT REPLACEMENT

BRYANT, AR

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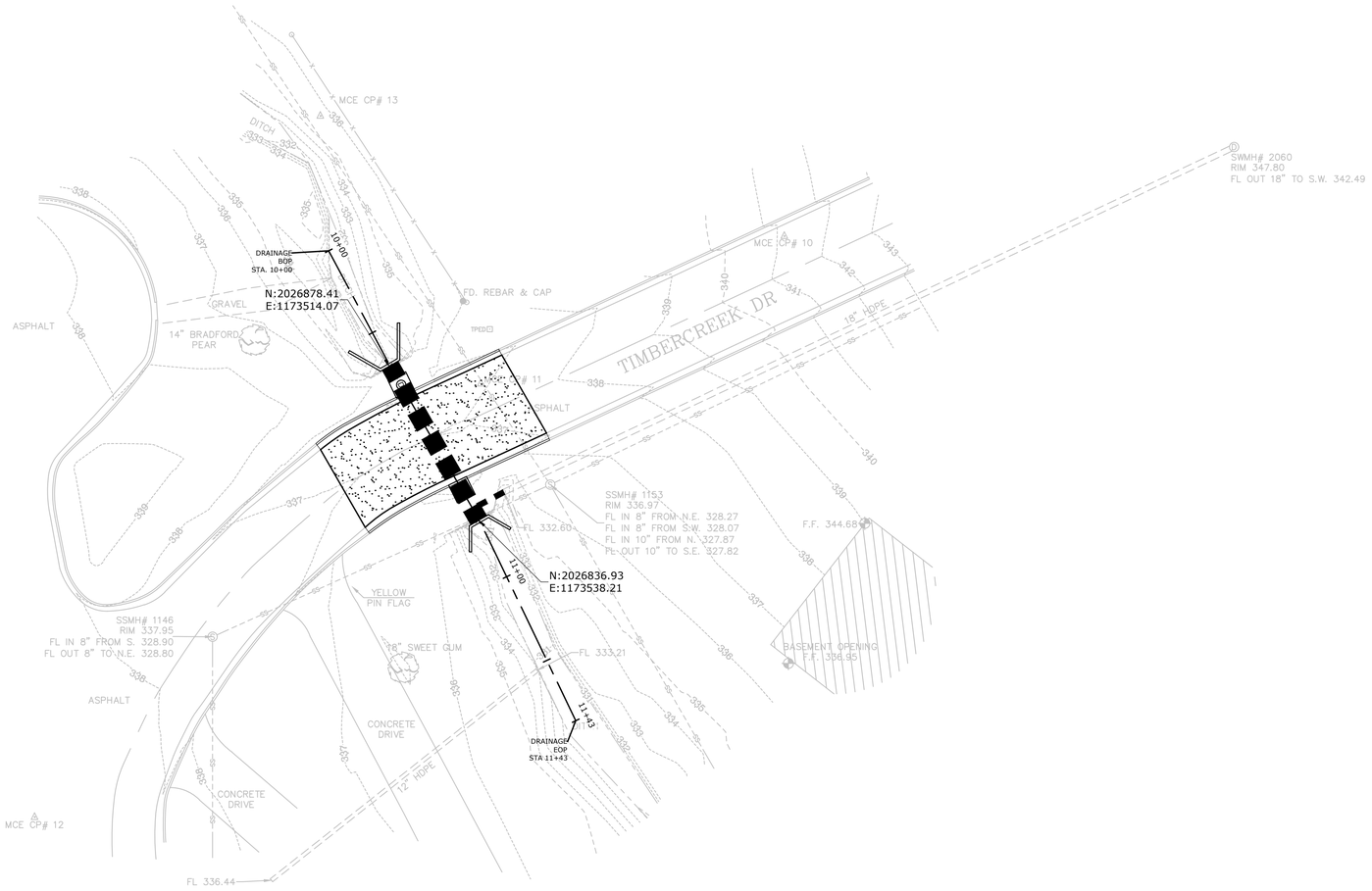
REVISIONS		
REV	DATE	DESCRIPTION

TOPOGRAPHIC SURVEY

SURVEY MNGR: KLS	DRAWN BY : JDM
DATE: 06/12/2019	REVISION:
SCALE: 1"=20'	JOB NUMBER: 19-5766

2

W:\2019\19-5766 TIMBERCREEK DR. CULVERT REPLACEMENT\DESIGN DRAWINGS\CIVIL\19-5766-S1 TOPO.DWG



PLAN SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20ft.

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STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No.10307
JAMES S. WHISKER
07-03-19

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TIMBERCREEK DRIVE CULVERT REPLACEMENT

BRYANT, AR

811 Know what's below. Call before you dig.

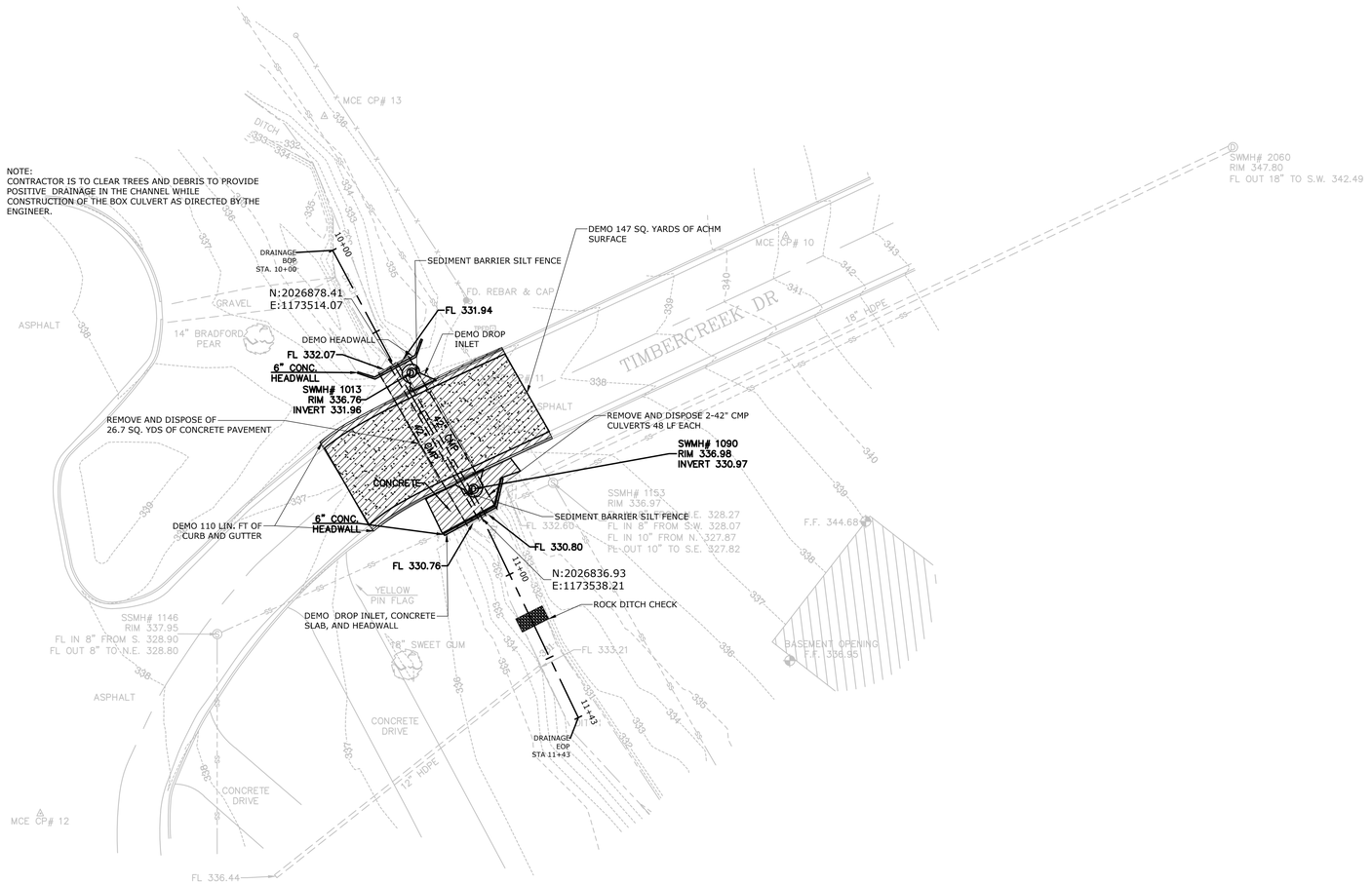
REVISIONS	DESCRIPTION	DATE
REV		

PROJECT OVERVIEW

DESIGNED BY: JJW	DRAWN BY : JAM
DATE: JULY 2019	REVISION:
SCALE: 1"=20'	JOB NUMBER: 19-5766

3

W:\2019\19-5766 TIMBERCREEK DR. CULVERT REPLACEMENT\DESIGN DRAWINGS\CIVIL\19-5766-DESIGN.DWG



PLAN SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20ft.

PROPOSED LEGEND

- LIMITS OF PAVEMENT AND / OR STRUCTURE DEMOLITION
- REMOVE AND DISPOSE TREE
- TP — TREE PROTECTION
- LIMITS OF DEMOLITION
- LAYDOWN / STORAGE AREA

GENERAL DEMOLITION NOTES

1. ALL AREAS WITHIN THE LIMITS OF DISTURBANCE TO BE DEMOLISHED AND REMOVED UNLESS OTHERWISE NOTED ON THIS PLAN.
2. THE CONTRACTOR IS REQUIRED TO NOTIFY THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS PRIOR TO EXCAVATING IN ORDER THAT UNDERGROUND UTILITIES IN THE AREA CAN BE LOCATED.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE TOPOGRAPHICAL SURVEY FOR REFERENCE. THE LOCATION OF KNOWN SUBSURFACE STRUCTURES, PIPES, POWER, GAS, PHONE, ETC. ARE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING INFORMATION AND SATISFYING HIMSELF TO AS TO THE LOCATION OF THE AFOREMENTIONED ITEMS, SHOWN AND NOT SHOWN. ALL REPAIRS OR RELOCATIONS NECESSARY SHALL BE MADE AS REQUIRED BY THE OWNER OF THE UTILITY OR STRUCTURE. THE COST OF SUCH REPAIRS OR RELOCATIONS NECESSARY SHALL BE BORNE BY THE CONTRACTOR.
4. CONTRACTOR SHALL DISPOSE OF ALL MATERIALS RESULTING FROM DEMOLITION IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS THAT GOVERN SUCH OPERATIONS.
5. ALL ABANDONED SERVICE LINES SHALL BE DISCONNECTED AND CAPPED PER UTILITY COMPANIES REQUIREMENTS. COORDINATE ALL DISCONNECTIONS WITH UTILITY COMPANIES.
6. CONTRACTOR IS TO BRING TO THE ATTENTION OF THE CIVIL ENGINEER ANY AREA OF DEMOLITION IN QUESTION BEFORE PROCEEDING WITH WORK.
7. CONTRACTOR TO REVIEW AND COORDINATE DEMOLITION LIMITS WITH PROPOSED CONSTRUCTION PLANS.
8. EXISTING CLEAN TOPSOIL TO BE STOCKPILED FOR FUTURE USE ON THIS SITE AND IS TO BE COORDINATED BY THE GENERAL CONTRACTOR.
9. ALL EXISTING WATER, GAS AND / OR ELECTRICAL METERS AS NOTED TO BE ABANDONED AND / OR REMOVED WITHIN THE PROJECT AREA ARE TO BE RETURNED TO THE APPROPRIATE AUTHORITY.

GENERAL EROSION CONTROL NOTES

1. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES AND CONFORM TO FEDERAL, STATE, OR LOCAL REQUIREMENTS. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DIRECTED BY PERMITTING AGENCY AND OWNER OR AS DICTATED BY CONDITIONS AT NO ADDITIONAL COST TO OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.
2. PERMIT FOR ANY CONSTRUCTION ACTIVITY MUST BE MAINTAINED ON SITE AT ALL TIMES.
3. CONTRACTOR SHALL MINIMIZE CLEARING TO THE MAXIMUM EXTENT PRACTICAL OR AS REQUIRED BY THE GENERAL PERMIT.
4. GENERAL CONTRACTOR SHALL DENOTE ON PLAN THE TEMPORARY PARKING AND STORAGE AREA WHICH SHALL ALSO BE USED AS THE EQUIPMENT MAINTENANCE AND CLEANING AREA, EMPLOYEE PARKING AREA, AND AREA FOR LOCATING PORTABLE FACILITIES, OFFICE TRAILERS, AND TOILET FACILITIES.
5. ALL WASH WATER SHALL BE DETAINED AND PROPERLY TREATED OR DISPOSED.
6. SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOTATION BOOMS SHALL BE MAINTAINED ON SITE OR READILY AVAILABLE TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS.
7. DUST ON THE SITE SHALL BE CONTROLLED. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
8. RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DEPOSITED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE PREMISES THROUGH THE ACTION OF WIND OR STORM WATER DISCHARGE INTO DRAINAGE DITCHES OR WATERS OF THE STATE.
9. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS STOPPED FOR AT LEAST 14 DAYS, SHALL BE TEMPORARILY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 14 DAYS FROM THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS.
10. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION ENTRANCES IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. IF WASHING IS USED, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IT IS CARRIED OFF THE SITE.
11. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
12. SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.
13. CONTRACTOR SHALL DESIGNATE/IDENTIFY AREAS INSIDE THE LIMITS OF DISTURBANCE, FOR WASTE DISPOSAL AND DELIVERY AND MATERIAL STORAGE.
14. ALL BMP's SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED BY A MINIMUM OF 80% GRASS COVERAGE.
15. ALL DEWATERING ACTIVITIES SHALL CONFORM TO ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. DISCHARGED WATER MUST BE PROPERLY TREATED BEFORE RELEASING FROM THE SITE.

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LICENSED PROFESSIONAL ENGINEER
No.10307
JAMES S. WHISKER
07-03-19
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TIMBERCREEK DRIVE CULVERT REPLACEMENT
BRYANT, AR

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REVISIONS

REV	DATE	DESCRIPTION

DEMO & EROSION CONTROL PLAN

DESIGNED BY:	DRAWN BY :
JJW	JAM
DATE:	REVISION:
JULY 2019	
SCALE:	JOB NUMBER:
1"=20'	19-5766

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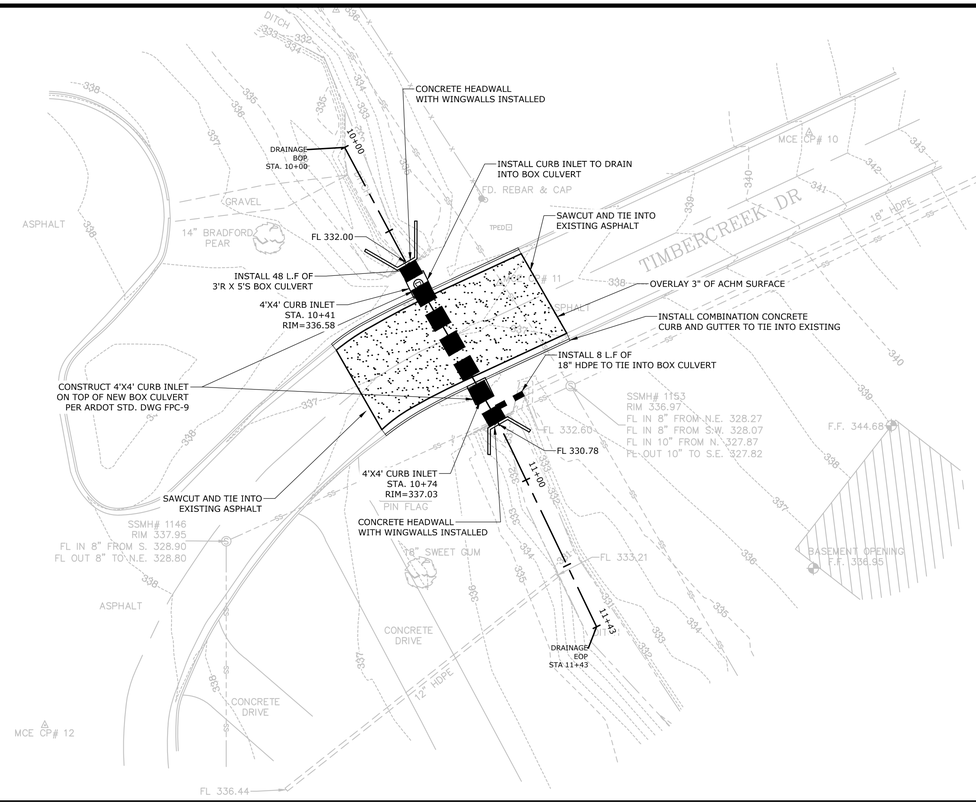


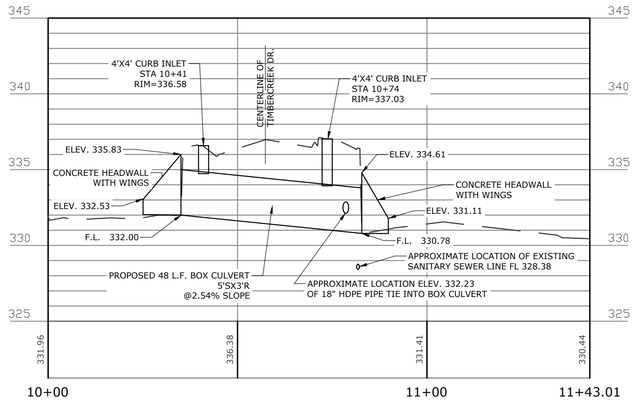
GENERAL SITE NOTES

1. CONTRACTOR SHALL RETAIN A FULL SET OF LATEST APPROVED CONSTRUCTION PLANS ON SITE DURING CONSTRUCTION ACTIVITIES.
2. CONSTRUCTION METHODS AND MATERIALS NOT SPECIFIED IN THESE PLANS ARE TO MEET OR EXCEED THE SITE WORK SPECIFICATIONS PROVIDED BY McCLELLAND CONSULTING ENGINEERS, INC. OR AS SPECIFIED BY THE OWNER'S RESIDENT REPRESENTATIVE.
3. ALL CONSTRUCTION WORK AND UTILITY WORK OUTSIDE OF PROPERTY BOUNDARIES SHALL BE PERFORMED IN COOPERATION WITH AND IN ACCORDANCE WITH REGULATIONS OF THE AUTHORITIES CONCERNED.
4. PUBLIC CONVENIENCE AND SAFETY:
   THE CONTRACTOR SHALL CONDUCT THE WORK IN A MANNER THAT WILL INSURE, AS FAR AS PRACTICABLE, THE LEAST OBSTRUCTION TO TRAFFIC AND SHALL PROVIDE FOR THE CONVENIENCE AND SAFETY OF THE GENERAL PUBLIC AND RESIDENTS ALONG AND ADJACENT TO HIGHWAYS IN THE CONSTRUCTION AREA IN AN ADEQUATE AND SATISFACTORY MANNER IN ACCORDANCE WITH THE ARKANSAS DOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
5. UNLESS OTHERWISE NOTED, ALL CURBING INDICATED SHALL BE 24" CONCRETE CURB AND GUTTER.
6. ALL DIMENSIONS, UNLESS OTHERWISE NOTED, ARE FROM THE FACE OF CURB, FACE OF BUILDING, OR CENTERLINE OF STRIPE.
7. CONTRACTOR SHALL REFER TO PROJECT SPECIFICATIONS AND GEOTECHNICAL REPORT DETAILS FOR PAVING DESIGN AND PROPER MATERIALS.
8. ALL RADII FOR CURBS ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
9. ALL RADII ON CURBS ARE 3'-0" UNLESS OTHERWISE NOTED.
10. GENERAL CONTRACTOR SHALL COORDINATE AND COMPLY WITH ALL UTILITY COMPANIES INVOLVED IN PROJECT AND PAY ALL REQUIRED FEES AND COSTS.
11. ALL WORK TO BE DONE IN STRICT ACCORDANCE WITH THE OWNER'S STANDARD SITE SPECIFICATIONS.

PLAN SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20ft.



5 X 3 BOX CULVERT

SCALE:
1"=20' HORIZ.
1"=5' VERT.

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TIMBERCREEK DRIVE CULVERT REPLACEMENT

BRYANT, AR

Know what's below. Call before you dig.

REVISIONS

REV	DATE	DESCRIPTION

PLAN AND PROFILE

DESIGNED BY:	DRAWN BY :
JJW	JAM
DATE:	REVISION:
JULY 2019	
SCALE:	JOB NUMBER:
AS SHOWN	19-5766

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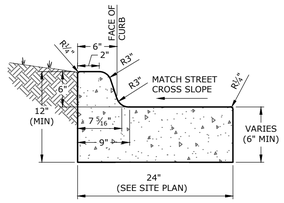
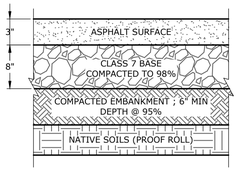


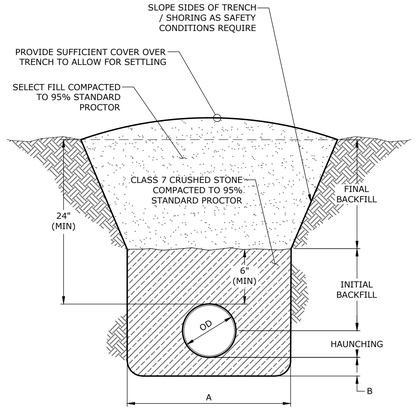
NOTES:
1. CONCRETE FOR CURB AND GUTTER TO BE CLASS A WITH A COMPRESSIVE STRENGTH OF 3,500 PSI AT 28 DAYS (MIN).
2. ALL CURB AND GUTTER SHALL HAVE A BROOMED FINISH UNLESS OTHERWISE SPECIFIED.
3. SAW CUT JOINTS AT 15' O.C. SEAL WITH ONE PART COLD APPLIED SILICONE JOINT SEALER OR OTHER APPROVED SEALANT. ALL JOINTS TO BE SEALED PRIOR TO FINAL ASPHALT PLACEMENT.
4. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL (ASPHALT IMPREGNATED FIBERBOARD OR OTHER APPROVED MATERIAL) AT STATIONARY STRUCTURES, (DROP INLETS, END OF CURBS, DRIVEWAYS - SEE DETAIL) OR AS DIRECTED BY ENGINEER.

TYPE 'A' STANDARD CONCRETE CURB & GUTTER
NTS



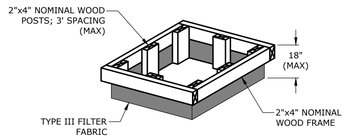
NOTES:
1. MATERIALS TO BE COMPACTED AT OPTIMAL MOISTURE CONTENT BASED UPON GEOTECHNICAL RECOMMENDATIONS.
2. ACHM SURFACE COURSE SHALL ADHERE TO SECTION 407-1 (TYPE II), AHTD STANDARD SPECIFICATIONS, 1996 EDITION.
3. BASE COURSE SHALL ADHERE TO SECTION 303, AHTD STANDARD SPECIFICATIONS, 2014 EDITION.

STANDARD DUTY ASPHALT PAVING
NTS

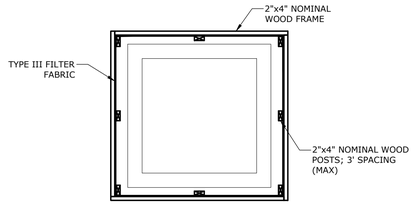


TRENCHING, BACKFILL, & BEDDING TABLE	
'A'	OD + 24" (MIN) OD + 36" (MAX)
'B'	.10 x OD (4" MIN)

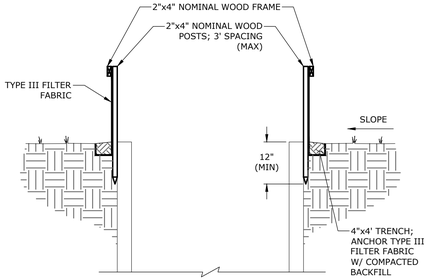
STORM SEWER TRENCHING, BACKFILL, & BEDDING
NTS



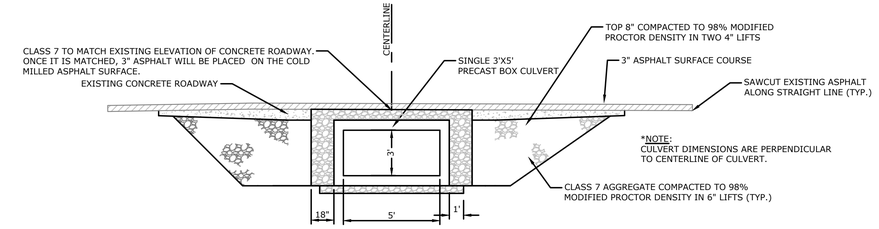
ISOMETRIC VIEW



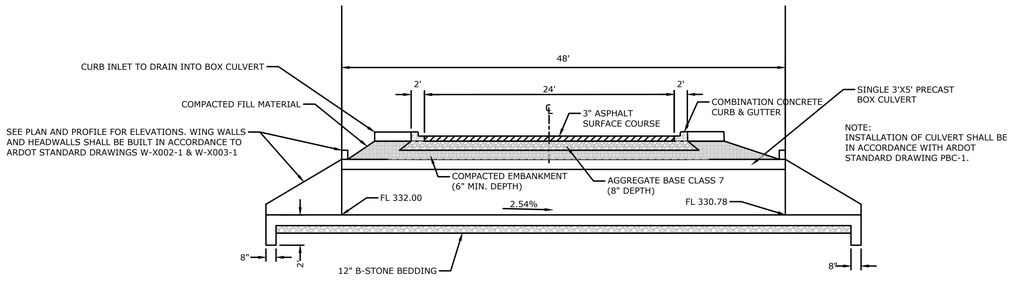
PLAN



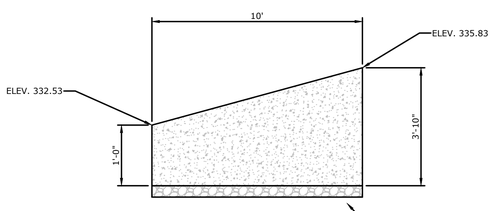
SECTION A



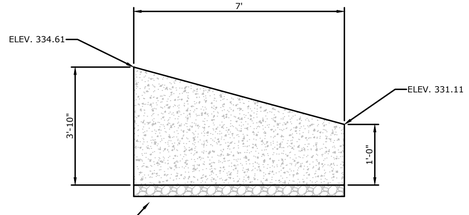
PROFILE - ROAD CENTERLINE
N.T.S



PROFILE - CENTERLINE OF CULVERT
N.T.S



NORTH WING WALL DETAIL
N.T.S.



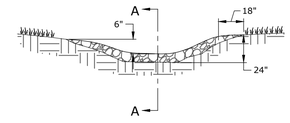
SOUTH WING WALL DETAIL
N.T.S.

NOTES:
CONCRETE BOX CULVERT, HEADWALLS, AND WINGWALLS PER ARDOT STANDARDS. WINGWALLS TO BE INSTALLED ON BOTH SIDES OF THE BOX CULVERT.

TEMPORARY GRATE INLET, JUNCTION BOX, & OPEN LID SEDIMENT FILTER
NTS

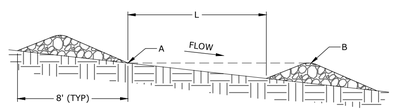
NOTES:
1. CHECK DAM(S) SHALL BE CONSTRUCTED W/ ROCK SIZES BETWEEN 3" AND 15". THE SPILLWAY SHALL BE 6" (MIN) LOWER THAN ABUTMENT.
2. MAXIMUM SPACING BETWEEN DAM(S) SHALL BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM.
3. EXTEND THE ABUTMENTS 18" INTO THE CHANNEL BANKS.

MAINTENANCE & INSPECTIONS:
1. REMOVE ALL SEDIMENT FROM BEHIND ANY CHECK DAM(S) WHEN IT REACHES ½ THE HEIGHT OF DAM(S), OR AS NEEDED. ALL REMOVED SEDIMENT SHALL BE LOCATED TO AN AREA THAT WILL NOT CONTRIBUTE TO SEDIMENT RUNOFF TO ANY OFFSITE AREA AND CAN BE PERMANENTLY STABILIZED.
2. ALL CHECK DAM(S) SHALL BE INSPECTED PERIODICALLY FOR DAMAGE AFTER ALL SIGNIFICANT STORM EVENTS (>1" IN 24 HRS) AND DURING WINTER MONTHS. REPAIRS SHALL BE MADE PROMPTLY TO BRING CHECK DAM(S) BACK TO A FUNCTIONAL STATE. ANY EROSION AROUND AND / OR UNDER THE DAM(S) SHALL BE REPAIRED IMMEDIATELY.
3. CONTRACTOR TO REMOVE ALL CHECK DAM(S) WHEN SITE STABILIZATION IS COMPLETE.



UPSTREAM VIEW

NOTES:
1. 'L' IS THE DISTANCE WHERE THE ELEVATION OF POINTS 'A' AND 'B' ARE THE SAME.



TEMPORARY ROCK CHECK DAM
NTS

SECTION A

McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE
7302 KANIS ROAD
LITTLE ROCK, ARKANSAS 72204
(501) 371-0272
HTTP://WWW.MCE-US.COM

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No.10307
JAMES S. WHISKER
07-03-19
ORIGINAL SIGNATURE ON FILE

©2019

TIMBERCREEK DRIVE CULVERT REPLACEMENT
BRYANT, ARKANSAS

Know what's below. Call before you dig. 811

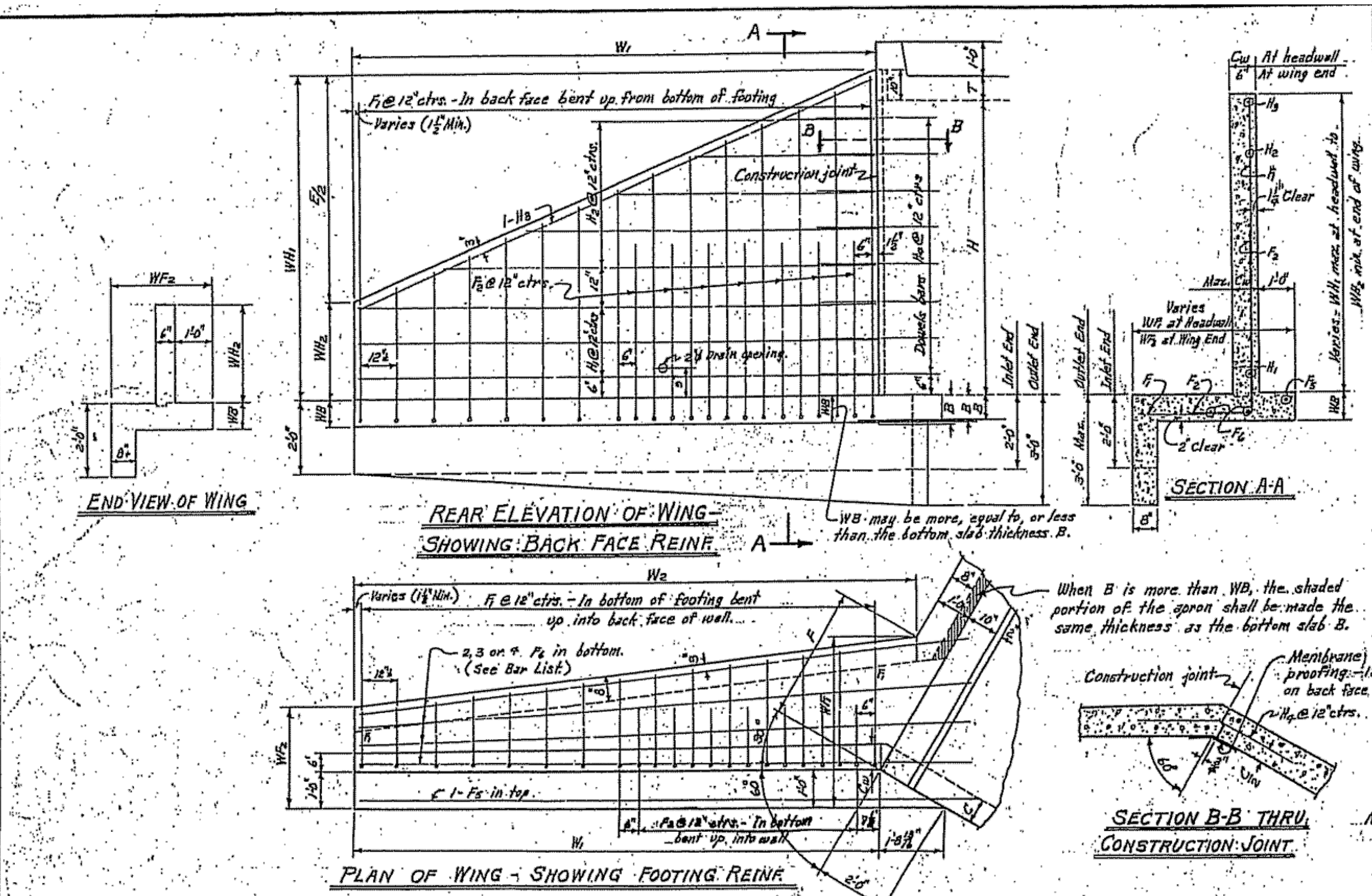
REVISIONS		
REV	DATE	DESCRIPTION

MISCELLANEOUS DETAILS

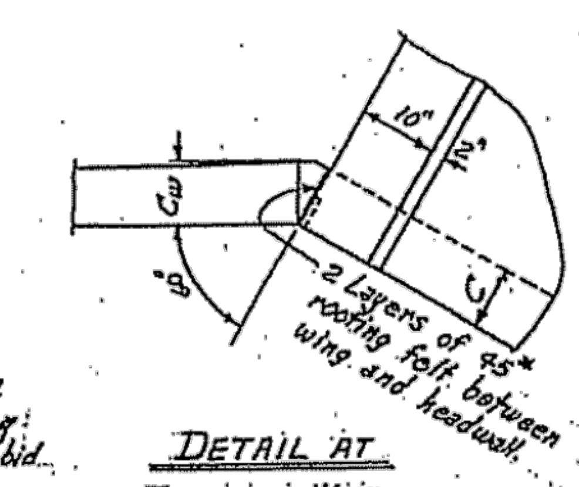
DESIGNED BY: JJW	DRAWN BY : JAM
DATE: JULY 2019	REVISION: ----
SCALE: NTS	JOB NUMBER: 19-5766

W:\2019\19-5766 TIMBERCREEK DR. CULVERT REPLACEMENT\DESIGN DRAWINGS\CIVIL\19-5766-MD1.DWG

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



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: AT HEADWALL	WINGWALL HEIGHTS: AT END OF WING	WIDTHS OF WING FOOTINGS: AT HEADWALL	WIDTHS OF WING FOOTINGS: AT END OF WING	PERPENDICULAR FOOTING DIMENSION	PERPENDICULAR DIST. FROM HDWL. TO END OF WING	LENGTH OF WINGWALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING CLASS S CONCRETE: INLET END	OUTLET END
H.	WB	Cw	WH1	WH2	WF1	WF2	F	E	W1	W2	CU. YD.	CU. YD.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	0'-11¾"	4'-4"	5'-0"	4'-7½"	0.604	0.670
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-4⅜"	5'-8"	6'-6½"	6'-4½"	0.908	0.996
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	1'-9"	7'-0"	8'-1"	8'-1"	1.267	1.376
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	8'-4"	9'-7½"	9'-9¾"	1.679	1.810
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	8'-4"	9'-7½"	9'-9¾"	1.750	1.881
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	9'-8"	11'-2"	11'-6½"	2.330	2.483
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	9'-8"	11'-2"	11'-6½"	2.379	2.531
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	9'-8"	11'-2"	11'-6½"	2.427	2.580
7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1¼"	11'-0"	12'-8½"	13'-4½"	3.054	3.230
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1¼"	11'-0"	12'-8½"	13'-4½"	3.117	3.293
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	12'-4"	14'-3"	15'-2⅛"	3.905	4.104

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

APRON DIMENSION W3

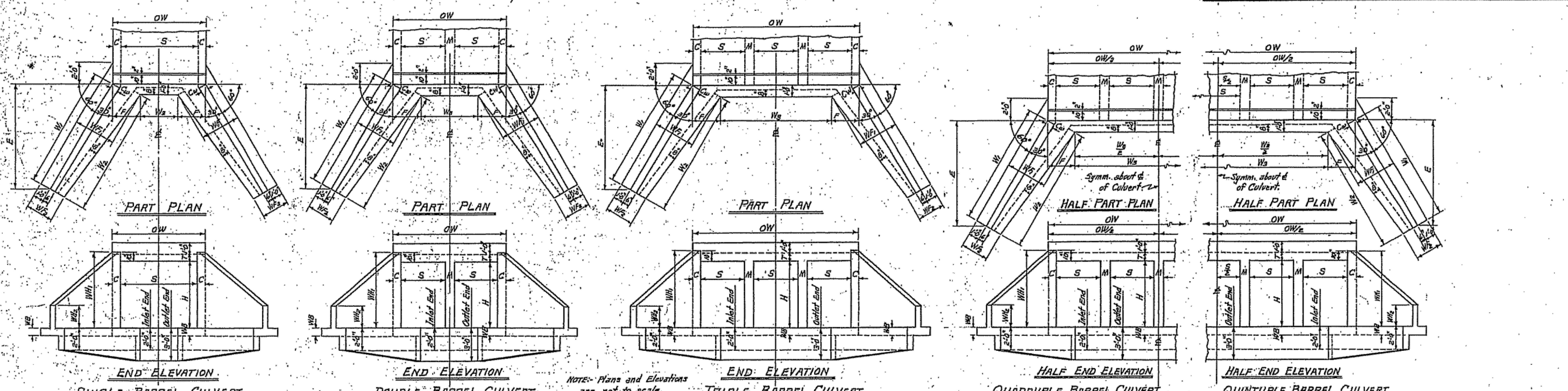
W3 = (OW - 2F)

CLEAR SPAN	CLEAR HEIGHT	2 X FOOTING DIMENSION	SINGLE BARREL CULVERT OW	W3	DOUBLE BARREL CULVERT OW	W3	TRIPLE BARREL CULVERT OW	W3	QUADRUPLE BARREL CULVERT OW	W3	QUINTUPLE BARREL CULVERT OW	W3
S.	H.	2F.	OW	W3	OW	W3	OW	W3	OW	W3	OW	W3
4'	2'	1'-11½"	5'-0"	3'-0½"	9'-8"	7'-8½"	14'-4"	12'-4½"	19'-0"	17'-0½"	23'-8"	21'-8½"
	3'	2'-8¾"	5'-0"	2'-3¼"	9'-8"	6'-11¼"	14'-4"	11'-7¼"	19'-0"	16'-3¼"	23'-8"	20'-11¼"
	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'-3¼"	5'-0"	0'-8¾"	9'-8"	5'-4¾"	14'-4"	10'-0¾"	19'-0"	14'-8¾"	23'-8"	19'-4¾"
	6'	5'-0½"	5'-2"	0'-1½"	9'-11"	4'-10½"	14'-8"	9'-7½"	19'-5"	14'-4½"	24'-2"	19'-1½"
5'	3'	2'-8¾"	6'-0"	3'-3¼"	11'-8"	8'-11¼"	17'-4"	14'-7¼"	23'-0"	20'-3¼"	28'-8"	25'-11¼"
	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'-3¼"	6'-0"	1'-8¾"	11'-8"	7'-4¾"	17'-4"	13'-0¾"	23'-0"	18'-8¾"	28'-8"	24'-4¾"
	6'	5'-0½"	6'-2"	1'-1½"	11'-11"	6'-10½"	17'-8"	12'-7½"	23'-5"	18'-4½"	29'-2"	24'-1½"
	7'	6'-2½"	6'-3"	0'-0½"	12'-1"	5'-10½"	17'-11"	11'-8½"	23'-9"	17'-6½"	29'-7"	23'-4½"
6'	3'	2'-8¾"	7'-0"	4'-3¼"	13'-8"	10'-11¼"	20'-4"	17'-7¼"	27'-0"	24'-3¼"	33'-8"	30'-11¼"
	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'-3¼"	7'-0"	2'-8¾"	13'-8"	9'-4¾"	20'-4"	16'-0¾"	27'-0"	22'-8¾"	33'-8"	29'-4¾"
	6'	5'-0½"	7'-2"	2'-1½"	13'-11"	8'-10½"	20'-8"	15'-7½"	27'-5"	22'-4½"	34'-2"	29'-1½"
	7'	6'-2½"	7'-3"	1'-0½"	14'-1"	7'-10½"	20'-11"	14'-8½"	27'-9"	21'-6½"	34'-7"	28'-4½"
	8'	7'-4"	7'-4"	0'-0"	14'-2"	6'-10"	21'-0"	13'-8"	27'-10"	20'-6"	34'-8"	27'-4"
7'	4'	3'-6"	8'-0"	4'-6"	15'-8"	12'-2"	23'-4"	19'-10"	31'-0"	27'-6"	38'-8"	35'-2"
	5'	4'-3¼"	8'-0"	3'-8¾"	15'-8"	11'-4¾"	23'-4"	19'-0¾"	31'-0"	26'-8¾"	38'-8"	34'-4¾"
	6'	5'-0½"	8'-2"	3'-1½"	15'-11"	10'-10½"	23'-8"	18'-7½"	31'-5"	26'-4½"	39'-2"	34'-1½"
	7'	6'-2½"	8'-3"	2'-0½"	16'-1"	9'-10½"	23'-11"	17'-8½"	31'-9"	25'-6½"	39'-7"	33'-4½"
	8'	7'-4"	8'-4"	1'-0"	16'-2"	8'-10"	24'-0"	16'-8"	31'-10"	24'-6"	39'-8"	32'-4"
8'	4'	3'-6"	9'-0"	5'-6"	17'-8"	14'-2"	26'-4"	22'-10"	35'-0"	31'-6"	43'-8"	40'-2"
	5'	4'-3¼"	9'-2"	4'-10¾"	17'-11"	13'-7¾"	26'-8"	22'-4¾"	35'-5"	31'-1¾"	44'-2"	39'-10¾"
	6'	5'-0½"	9'-2"	4'-1½"	17'-11"	12'-10½"	26'-8"	21'-7½"	35'-5"	30'-4½"	44'-2"	39'-1½"
	7'	6'-2½"	9'-3"	3'-0½"	18'-1"	11'-10½"	26'-11"	20'-8½"	35'-9"	29'-6½"	44'-7"	38'-4½"
	8'	7'-4"	9'-4"	2'-0"	18'-2"	10'-10"	27'-0"	19'-8"	35'-10"	28'-6"	44'-8"	37'-4"
9'	5'	4'-3¼"	10'-2"	5'-10¾"	19'-11"	15'-7¾"	29'-8"	25'-4¾"	39'-5"	35'-1¾"	49'-2"	44'-10¾"
	6'	5'-0½"	10'-3"	5'-2½"	20'-1"	15'-0½"	29'-11"	24'-10½"	39'-9"	34'-8½"	49'-7"	44'-6½"
	7'	6'-2½"	10'-3"	4'-0½"	20'-1"	13'-10½"	29'-11"	23'-8½"	39'-9"	33'-6½"	49'-7"	43'-4½"
	8'	7'-4"	10'-4"	3'-0"	20'-2"	12'-10"	30'-0"	22'-8"	39'-10"	32'-6"	49'-8"	42'-4"
10'	5'	4'-3¼"	11'-2"	6'-10¾"	21'-11"	17'-7¾"	32'-8"	28'-4¾"	43'-5"	39'-1¾"	54'-2"	49'-10¾"
	6'	5'-0½"	11'-3"	6'-2½"	22'-1"	17'-0½"	32'-11"	27'-10½"	43'-9"	38'-8½"	54'-7"	49'-6½"
	7'	6'-2½"	11'-3"	5'-0½"	22'-1"	15'-10½"	32'-11"	26'-8½"	43'-9"	37'-6½"	54'-7"	48'-4½"
	8'	7'-4"	11'-4"	4'-0"	22'-2"	14'-10"	33'-0"	25'-8"	43'-10"	36'-6"	54'-8"	47'-4"
11'	6'	5'-0½"	12'-4"	7'-3½"	24'-2"	19'-1½"	36'-0"	30'-11½"	47'-10"	42'-9½"		
	7'	6'-2½"	12'-4"	6'-1½"	24'-2"	17'-11½"	36'-0"	29'-9½"	47'-10"	41'-7½"		
	8'	7'-4"	12'-4"	5'-0"	24'-2"	16'-10"	36'-0"	28'-8"	47'-10"	40'-6"		
12'	6'	5'-0½"	13'-4"	8'-3½"	26'-2"	21'-1½"	39'-0"	33'-11½"	51'-10"	46'-9½"		
	7'	6'-2½"	13'-4"	7'-1½"	26'-2"	19'-11½"	39'-0"	32'-9½"	51'-10"	45'-7½"		
	8'	7'-4"	13'-4"	6'-0"	26'-2"	18'-10"	39'-0"	31'-8"	51'-10"	44'-6"		

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	REINFORCING ⊗ STEEL FOR 4 WINGS	CLASS S CONCRETE - 4 WINGS (Headwalls, Wingwalls, Footings, Toewalls and Aprons): SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.
4'	2'	6"	7"	81.0	3.30	4.25	5.21	6.17	7.13
	3'	6"	7"	119.8	4.45	5.41	6.37	7.33	8.29
	4'	6"	7"	183.3	5.83	6.78	7.74	8.70	9.66
	5'	6"	7"	253.2	7.41	8.37	9.33	10.29	11.25
	6'	7"	8"	415.4	9.97	10.95	11.94	12.93	13.92
5'	3'	6"	7"	119.8	4.67	5.83	6.99	8.16	9.33
	4'	6"	7"	183.3	6.04	7.20	8.36	9.53	10.70
	5'	6"	7"	253.2	7.63	8.78	9.95	11.12	12.28
	6'	7"	8"	415.4	10.19	11.38	12.57	13.77	14.96
	7'	7½"	8½"	797.6	12.98	14.19	15.41	16.63	17.85
6'	3'	6"	7"	119.8	4.88	6.26	7.62	9.00	10.38
	4'	6"	7"	183.3	6.25	7.63	8.99	10.37	11.75
	5'	6"	7"	253.2	7.83	9.22	10.57	11.96	13.33
	6'	7"	8"	415.4	10.40	11.81	13.20	14.61	16.01
	7'	7½"	8½"	797.6	13.19	14.63	16.04	17.47	18.90
	8'	8"	9"	1004.9	16.50	17.93	19.36	20.79	22.23
7'	4'	6"	7"	183.3	6.47	8.07	9.64	11.25	12.85
	5'	6"	7"	253.2	8.05	9.66	11.23	12.84	14.44
	6'	7"	8"	415.4	10.62	12.25	13.84	15.46	17.08
	7'	7½"	8½"	797.6	13.42	15.06	16.68	18.32	19.96
	8'	8"	9"	1004.9	16.72	18.37	20.00	21.65	23.29
8'	4'	6"	7"	183.3	6.69	8.52	10.32	12.15	13.95
	5'	7"	7"	253.2	8.59	10.44	12.26	14.11	15.92
	6'	7"	8"	415.4	10.84	12.69	14.51	16.36	18.17
	7'	7½"	8½"	797.6	13.63	16.50	17.34	19.21	21.03
	8'	8"	9"	1004.9	16.94	18.81	20.65	22.51	24.36
9'	5'	7"	7"	253.2	8.81	10.90	12.92	15.00	17.02
	6'	7½"	8"	415.4	11.27	13.38	15.42	17.52	19.56
	7'	7½"	8½"	797.6	13.85	15.96	18.00	20.10	22.14
	8'	8"	9"	1004.9	17.16	19.26	21.31	23.41	25.45
10'	5'	7"	7"	253.2	9.04	11.35	13.60	15.81	18.08
	6'	7½"	8"	415.4	11.50	13.83	16.10	18.33	20.61
	7'	7½"	8½"	797.6	14.08	16.41	18.68	20.91	23.20
	8'	8"	9"	1004.9	17.38	19.71	21.98	24.22	26.50
11'	6'	8"	8"	415.4	11.93	14.51	17.00	19.47	
	7'	8"	8½"	797.6	14.56	17.15	19.64	22.11	
	8'	8"	9"	1004.9	17.59	20.18	22.67	25.14	
12'	6'	8"	8"	415.4	12.16	14.99	17.70	20.42	
	7'	8"	8½"	797.6	14.79	17.62	20.33	23.06	
	8'	8"	9"	1004.9	17.82	20.65	23.36	26.09	

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



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.

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.

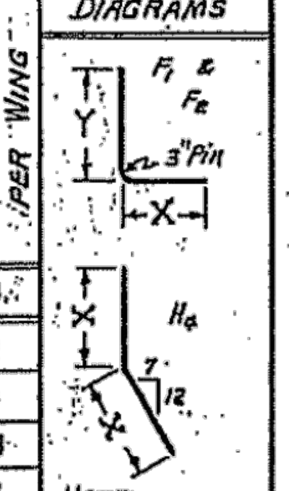
SINGLES	DOUBLES	TRIPLES	QUADRUPLES	QUINTUPLES
R-100X-0	R-200X-0	R-300X-0	R-400X-0	R-500X-0
R-100X-X1	R-200X-X1	R-300X-X1	R-400X-X1	R-500X-X1
R-100X-X2	R-200X-X2	R-300X-X2	R-400X-X2	
	R-200X-X3	R-300X-X3		

BAR LIST FOR ONE WING - 4 REQUIRED

F1 — Bent: In bottom of footing, bent up into back face of wing. One bar of each length.
F2 — Bent: In bottom of footing, bent up into back face of wing. Alt. with F1 bars.
F5 — Straight: Longitudinal in top of wing footing heel.
F6 — 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.

H	F1 Size	F1 Spacing	F1 No. Reqd	F1 Lengths Vary Min.	F1 Lengths Vary Max.	F1 X Min.	F1 X Max.	F1 Y Min.	F1 Y Max.	F2 Size	F2 Spacing	F2 No. Reqd	F2 Length	F2 X	F2 Y	F5 Size	F5 No. Reqd	F5 Length	F6 Size	F6 No. Reqd	F6 Length	H1 Size	H1 Spacing	H1 No. Reqd	H1 Length	H2 Size	H2 Spacing	H2 No. Reqd	H2 Lengths Vary Max.	H2 Lengths Vary Min.	H3 Size	H3 No. Reqd	H3 Length	H4 Size	H4 Spacing	H4 No. Reqd	H4 Length	H4 X	Quantity Reinforcing Steel per Wing LB.
2'	#3	12"	6	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	—	—	—	—	—	—	#3	1	7'-6"	#3	2	6'-3"	#3	12"	1	4'-9"	#3	12"	1	—	2'-8"	#3	1	5'-1"	#3	12"	2	2'-8"	1'-4"	20.2
3'	#3	12"	7	2'-2"	5'-3"	0'-10"	1'-4"	1'-5"	4'-0"	—	—	—	—	—	—	#3	1	9'-0"	#3	2	8'-0"	#3	12"	1	6'-3"	#3	12"	2	5'-0"	2'-8"	#3	1	6'-9"	#3	12"	3	2'-8"	1'-4"	29.9
4'	#3	12"	9	2'-4"	6'-7"	0'-11"	1'-8"	1'-6"	5'-0"	—	—	—	—	—	—	#3	1	10'-7"	#3	3	9'-9"	#3	12"	1	7'-10"	#3	12"	3	7'-4"	2'-8"	#3	1	8'-6"	#3	12"	4	2'-8"	1'-4"	45.8
5'	#3	12"	10	3'-0"	7'-10"	1'-1"	1'-11"	2'-0"	6'-0"	#3	12"	3	3'-6"	1'-1"	2'-6"	#3	1	12'-1"	#3	3	11'-6"	#3	12"	2	9'-4"	#3	12"	3	7'-4"	2'-8"	#3	1	10'-1"	#3	12"	5	2'-8"	1'-4"	68.3
6'	#4	12"	12	3'-5"	9'-3"	1'-2"	2'-3"	2'-4"	7'-1"	#3	12"	3	4'-6"	1'-4"	3'-3"	#3	1	13'-8"	#3	3	13'-3"	#3	12"	2	10'-11"	#3	12"	4	9'-8"	2'-8"	#3	1	11'-9"	#3	12"	6	2'-8"	1'-4"	103.8
7'	#4	12"	13	4'-1"	10'-9"	1'-4"	2'-9"	2'-10"	8'-1"	#4	12"	5	5'-6"	1'-7"	4'-0"	#4	1	15'-2"	#4	4	15'-0"	#4	12"	2	12'-5"	#4	12"	5	12'-0"	2'-8"	#4	1	13'-5"	#4	12"	7	3'-6"	1'-9"	199.4
8'	#4	12"	15	4'-5"	12'-3"	1'-5"	3'-2"	3'-1"	9'-2"	#4	12"	7	6'-6"	1'-10"	4'-9"	#4	1	16'-9"	#4	4	16'-9"	#4	12"	3	14'-0"	#4	12"	5	12'-6"	2'-8"	#4	1	15'-2"	#4	12"	8	3'-6"	1'-9"	251.2

BAR BENDING DIAGRAMS



NOTE:- Dimensions are to bar centers.

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

Designed by- W.C.H. · Drawn by- W.C.H. · Quantities by- W.C.H. · Checked by- J.E.M.

CLASS S CONCRETE

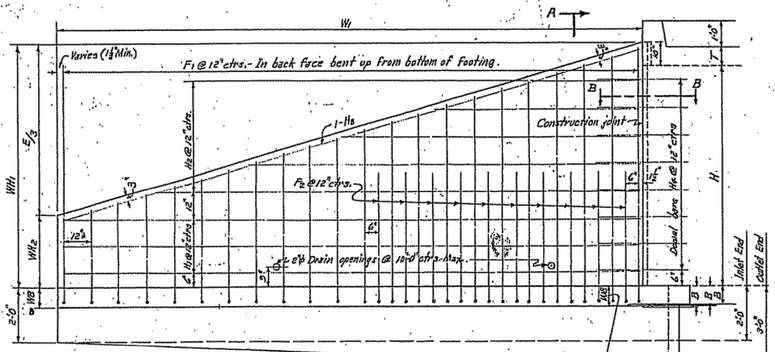
ARKANSAS STATE HIGHWAY COMMISSION

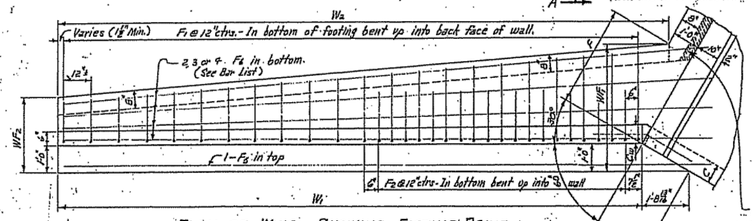
DETAILS OF STANDARD WINGS FOR REINFORCED CONCRETE BOX CULVERTS

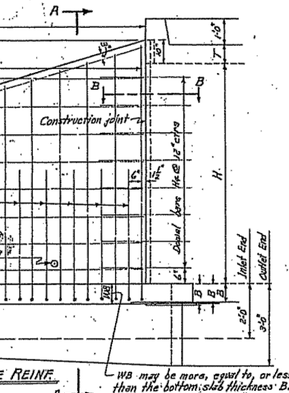
4', 5', 6', 7', 8', 9', 10', 11' & 12' SPANS — 2:1 SLOPES

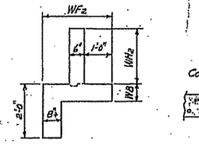
SINGLES, DOUBLES, TRIPLES, QUADRUPLES & QUINTUPLES. — ALL DEPTHS OF COVER FOR H = 8'-0" OR LESS

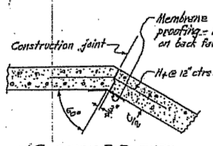
STANDARD DRAWING No. W-X002-1

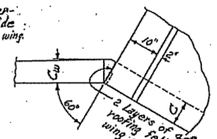


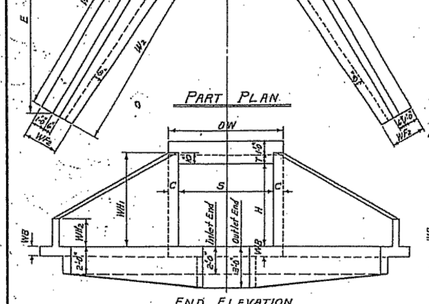


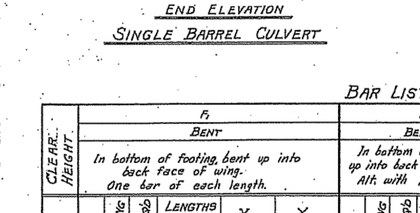












FED. ROAD No.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET No.	TOTAL SHEETS
6	ARK.				
JOB No.					

REAR ELEVATION OF WING - SHOWING BACK FACE REINF.

SECTION A-A

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

PLAN OF WING - SHOWING FOOTING REINF.

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

END VIEW OF WING

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		PERPENDICULAR FOOTING DIMENSION	PERPENDICULAR DIST. FROM HDWL. TO END OF WING	LENGTH OF WINGWALLS	INSIDE FOOTING DIMENSION	* QUANTITY PER WING CLASS S CONCRETE	
			AT HEADWALL	AT END OF WING	AT HEADWALL	AT END OF WING					INLET END	OUTLET END
H	WB	Cw	WH1	WH2	WF1	WF2	F	E	W1	W2	CU.YD.	CU.YD.
2'	7"	6"	2'-10"	0'-8"	2'-4"	2'-0"	0'-11¾"	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'-9¾"	9'-7½"	1.338	1.466
4'	7"	6"	4'-10"	1'-4"	3'-0"	2'-3"	1'-9"	10'-6"	12'-1½"	12'-1½"	1.868	2.027
5'	7"	6"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	12'-6"	14'-5¼"	14'-7½"	2.478	2.668
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	12'-6"	14'-5¼"	14'-7½"	2.582	2.772
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	14'-6"	16'-9"	17'-1½"	3.440	3.661
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	14'-6"	16'-9"	17'-1½"	3.511	3.732
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6¼"	14'-6"	16'-9"	17'-1½"	3.582	3.803
7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1¼"	16'-6"	19'-0⅛"	19'-8¾"	4.505	4.758
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1¼"	16'-6"	19'-0⅛"	19'-8¾"	4.597	4.851
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	18'-6"	21'-4¼"	22'-4"	5.761	6.047

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

APRON DIMENSION W3

CLEAR SPAN	CLEAR HEIGHT	2 × FOOTING DIMENSION	W3 = (OW - 2F)									
			SINGLE BARREL CULVERT		DOUBLE BARREL CULVERT		TRIPLE BARREL CULVERT		QUADRUPLE BARREL CULVERT		QUINTUPLE BARREL CULVERT	
S	H	2F	OW	W3	OW	W3	OW	W3	OW	W3	OW	W3
4'	2'	1'-11½"	5'-0"	3'-0½"	9'-8"	7'-8½"	14'-4"	12'-4½"	19'-0"	17'-0½"	23'-8"	21'-8½"
	3'	2'-8¾"	5'-0"	2'-3¼"	9'-8"	6'-11¼"	14'-4"	11'-7¼"	19'-0"	16'-3¼"	23'-8"	20'-11¼"
	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'-3¼"	5'-0"	0'-8¾"	9'-8"	5'-4¾"	14'-4"	10'-0¾"	19'-0"	14'-8¾"	23'-8"	19'-4¾"
	6'	5'-0½"	5'-2"	0'-1½"	9'-11"	4'-10½"	14'-8"	9'-7½"	19'-5"	14'-4½"	24'-2"	19'-1½"
5'	3'	2'-8¾"	6'-0"	3'-3¼"	11'-8"	8'-11¼"	17'-4"	14'-7¼"	23'-0"	20'-3¼"	28'-8"	25'-11¼"
	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'-3¼"	6'-0"	1'-8¾"	11'-8"	7'-4¾"	17'-4"	13'-0¾"	23'-0"	18'-8¾"	28'-8"	24'-4¾"
	6'	5'-0½"	6'-2"	1'-1½"	11'-11"	6'-10½"	17'-8"	12'-7½"	23'-5"	18'-4½"	29'-2"	24'-1½"
	7'	6'-2½"	6'-3"	0'-0½"	12'-1"	5'-10½"	17'-11"	11'-8½"	23'-9"	17'-6½"	29'-7"	23'-4½"
6'	3'	2'-8¾"	7'-0"	4'-3¼"	13'-8"	10'-11¼"	20'-4"	17'-7¼"	27'-0"	24'-3¼"	33'-8"	30'-11¼"
	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'-3¼"	7'-0"	2'-8¾"	13'-8"	9'-4¾"	20'-4"	16'-0¾"	27'-0"	22'-8¾"	33'-8"	29'-4¾"
	6'	5'-0½"	7'-2"	2'-1½"	13'-11"	8'-10½"	20'-8"	15'-7½"	27'-5"	22'-4½"	34'-2"	29'-1½"
	7'	6'-2½"	7'-3"	1'-0½"	14'-1"	7'-10½"	20'-11"	14'-8½"	27'-9"	21'-6½"	34'-7"	28'-4½"
	8'	7'-4"	7'-4"	0'-0"	14'-2"	6'-10"	21'-0"	13'-8"	27'-10"	20'-6"	34'-8"	27'-4"
7'	4'	3'-6"	8'-0"	4'-6"	15'-8"	12'-2"	23'-4"	19'-10"	31'-0"	27'-6"	38'-8"	35'-2"
	5'	4'-3¼"	8'-0"	3'-8¾"	15'-8"	11'-4¾"	23'-4"	19'-0¾"	31'-0"	26'-8¾"	38'-8"	34'-4¾"
	6'	5'-0½"	8'-2"	3'-1½"	15'-11"	10'-10½"	23'-8"	18'-7½"	31'-5"	26'-4½"	39'-2"	34'-1½"
	7'	6'-2½"	8'-3"	2'-0½"	16'-1"	9'-10½"	23'-11"	17'-8½"	31'-9"	25'-6½"	39'-7"	33'-4½"
	8'	7'-4"	8'-4"	1'-0"	16'-2"	8'-10"	24'-0"	16'-8"	31'-10"	24'-6"	39'-8"	32'-4"
8'	4'	3'-6"	9'-0"	5'-6"	17'-8"	14'-2"	26'-4"	22'-10"	35'-0"	31'-6"	43'-8"	40'-2"
	5'	4'-3¼"	9'-2"	4'-10¾"	17'-11"	13'-7¾"	26'-8"	22'-4¾"	35'-5"	31'-1¾"	44'-2"	39'-10¾"
	6'	5'-0½"	9'-2"	4'-1½"	17'-11"	12'-10½"	26'-8"	21'-7½"	35'-5"	30'-4½"	44'-2"	39'-1½"
	7'	6'-2½"	9'-3"	3'-0½"	18'-1"	11'-10½"	26'-11"	20'-8½"	35'-9"	29'-6½"	44'-7"	38'-4½"
	8'	7'-4"	9'-4"	2'-0"	18'-2"	10'-10"	27'-0"	19'-8"	35'-10"	28'-6"	44'-8"	37'-4"
9'	5'	4'-3¼"	10'-2"	5'-10¾"	19'-11"	15'-7¾"	29'-8"	25'-4¾"	39'-5"	35'-1¾"	49'-2"	44'-10¾"
	6'	5'-0½"	10'-3"	5'-2½"	20'-1"	15'-0½"	29'-11"	24'-10½"	39'-9"	34'-8½"	49'-7"	44'-6½"
	7'	6'-2½"	10'-3"	4'-0½"	20'-1"	13'-10½"	29'-11"	23'-8½"	39'-9"	33'-6½"	49'-7"	43'-4½"
	8'	7'-4"	10'-4"	3'-0"	20'-2"	12'-10"	30'-0"	22'-8"	39'-10"	32'-6"	49'-8"	42'-4"
10'	5'	4'-3¼"	11'-2"	6'-10¾"	21'-11"	17'-7¾"	32'-8"	28'-4¾"	43'-5"	39'-1¾"	54'-2"	49'-10¾"
	6'	5'-0½"	11'-3"	6'-2½"	22'-1"	17'-0½"	32'-11"	27'-10½"	43'-9"	38'-8½"	54'-7"	49'-6½"
	7'	6'-2½"	11'-3"	5'-0½"	22'-1"	15'-10½"	32'-11"	26'-8½"	43'-9"	37'-6½"	54'-7"	48'-4½"
	8'	7'-4"	11'-4"	4'-0"	22'-2"	14'-10"	33'-0"	25'-8"	43'-10"	36'-6"	54'-8"	47'-4"
11'	6'	5'-0½"	12'-4"	7'-3½"	24'-2"	19'-1½"	36'-0"	30'-11½"	47'-10"	42'-9½"		
	7'	6'-2½"	12'-4"	6'-1½"	24'-2"	17'-11½"	36'-0"	29'-9½"	47'-10"	41'-7½"		
	8'	7'-4"	12'-4"	5'-0"	24'-2"	16'-10"	36'-0"	28'-8"	47'-10"	40'-6"		
12'	6'	5'-0½"	13'-4"	8'-3½"	26'-2"	21'-1½"	39'-0"	33'-11½"	51'-10"	46'-9½"		
	7'	6'-2½"	13'-4"	7'-1½"	26'-2"	19'-11½"	39'-0"	32'-9½"	51'-10"	45'-7½"		
	8'	7'-4"	13'-4"	6'-0"	26'-2"	18'-10"	39'-0"	31'-8"	51'-10"	44'-6"		

QUANTITIES

CLEAR SPAN	CLEAR HEIGHT	THICKNESS OF WING AT HEADWALL	THICKNESS OF WING FOOTING	⊗ REINFORCING STEEL - FOR 4 WINGS	CLASS S CONCRETE - 4 WINGS HEADWALLS, WINGWALLS, FOOTINGS, TOEWALLS AND APRONS				
					SINGLE BARREL CULVERT	DOUBLE BARREL CULVERT	TRIPLE BARREL CULVERT	QUADRUPLE BARREL CULVERT	QUINTUPLE BARREL CULVERT
S	H	Cw	WB	LB.	CU.YD.	CU.YD.	CU.YD.	CU.YD.	CU.YD.
4'	2'	6"	7"	108.0	4.50	5.46	6.42	7.38	8.34
	3'	6"	7"	164.4	6.26	7.21	8.17	9.13	10.09
	4'	6"	7"	254.6	8.33	9.28	10.24	11.20	12.16
	5'	6"	7"	357.8	10.72	11.68	12.64	13.60	14.56
	6'	7"	8"	583.1	14.55	15.53	16.52	17.51	18.49
5'	3'	6"	7"	164.4	6.47	7.63	8.79	9.96	11.12
	4'	6"	7"	254.6	8.54	9.70	10.87	10.03	13.20
	5'	6"	7"	357.8	10.94	12.10	13.26	14.43	15.59
	6'	7"	8"	583.1	14.77	15.96	17.15	18.34	19.54
	7'	7½"	8½"	1134.6	18.94	20.15	21.37	22.59	23.80
6'	3'	6"	7"	164.4	6.68	8.06	9.42	10.80	12.18
	4'	6"	7"	254.6	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'	7½"	8½"	1134.6	19.15	20.58	22.00	23.43	24.86
	8'	8"	9"	1425.6	24.09	25.53	26.96	28.39	29.83
7'	4'	6"	7"	254.6	8.97	10.58	12.15	13.76	15.35
	5'	6"	7"	357.8	11.36	12.97	14.54	16.15	17.75
	6'	7"	8"	583.1	15.20	16.82	18.42	20.04	21.66
	7'	7½"	8½"	1134.6	19.38	21.02	22.64	24.28	25.92
	8'	8"	9"	1425.6	24.32	25.97	27.60	29.25	30.89
8'	4'	6"	7"	254.6	9.19	11.03	12.82	14.65	16.45
	5'	7"	7"	357.8	12.03	13.89	15.70	17.55	19.36
	6'	7"	8"	583.1	15.42	17.27	19.09	20.93	22.75
	7'	7½"	8½"	1134.6	19.59	21.46	23.30	25.16	26.99
	8'	8"	9"	1425.6	24.54	26.41	28.24	30.11	31.96
9'	5'	7"	7"	357.8	12.26	14.34	16.37	18.45	20.47
	6'	7½"	8"	583.1	15.94	18.04	20.09	22.19	24.23
	7'	7½"	8½"	1134.6	19.81	21.91	23.96	26.06	28.10
	8'	8"	9"	1425.6	24.76	26.86	28.91	31.00	33.05
10'	5'	7"	7"	357.8	12.49	14.80	17.05	19.26	21.52
	6'	7½"	8"	583.1	16.17	18.50	20.77	22.99	25.28
	7'	7½"	8½"	1134.6	20.04	22.37	24.64	26.87	29.15
	8'	8"	9"	1425.6	24.98	27.31	29.58	31.81	34.10
11'	6'	8"	8"	583.1	16.69	19.27	21.76	24.23	
	7'	8"	8½"	1134.6	20.64	23.22	25.71	28.18	
	8'	8"	9"	1425.6	25.19	27.77	30.27	32.74	
12'	6'	8"	8"	583.1	16.92	19.75	22.45	25.18	
	7'	8"	8½"	1134.6	20.87	23.69	26.40	29.13	
	8'	8"	9"	1425.6	25.42	28.25	30.96	33.69	

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

PART PLAN

END ELEVATION

SINGLE BARREL CULVERT

PART PLAN

END ELEVATION

DOUBLE BARREL CULVERT

NOTE:- Plans and Elevations are not to scale.

PART PLAN

END ELEVATION

TRIPLE BARREL CULVERT

HALF PART PLAN

HALF END ELEVATION

QUADRUPLE BARREL CULVERT

HALF PART PLAN

HALF END ELEVATION

QUINTUPLE BARREL CULVERT

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 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

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.						F5 STRAIGHT: Longitudinal in top of wing footing heel.			F6 STRAIGHT: Longitudinal in bottom of wing footing toe.		
H	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
2'	#3	12"	8	1'-6"	3'-10"	0'-8"	1'-0"	0'-11"	2'-11"	—	—	—	—	—	—	#3	1	9'-8"	#3	2	8'-6"
3'	#3	12"	10	2'-2"	5'-2"	0'-10"	1'-3"	1'-5"	4'-0"	—	—	—	—	—	—	#3	1	12'-0"	#3	2	11'-0"
4'	#3	12"	13	2'-4"	6'-6"	0'-11"	1'-7"	1'-6"	5'-0"	—	—	—	—	—	—	#3	1	14'-4"	#3	3	13'-6"
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"
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"
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'-4"	#4	4	21'-0"
8'	#4	12"	22	4'-4"	12'-3"	1'-5"	3'-2"	3'-0"	9'-2"	#4	12"	10	6'-6"	1'-10"	4'-9"	#4	1	23'-8"	#4	4	23'-9"

CLEAR HEIGHT	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 REINFORCING STEEL PER WING
H	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	LB.
2'	#3	12"	1	7'-2"	#3	12"	1	—	4'-0"	#3	1	7'-4"	#3	12"	2	2'-8"	1'-4"	27.0
3'	#3	12"	1	9'-6"	#3	12"	2	7'-6"	4'-0"	#3	1	9'-9"	#3	12"	3	2'-8"	1'-4"	41.1
4'	#3	12"	1	11'-10"	#3	12"	3	10'-11"	4'-0"	#3	1	12'-2"	#3	12"	4	2'-8"	1'-4"	63.7
5'	#3	12"	2	14'-2"	#3	12"	3	10'-11"	4'-0"	#3	1	14'-7"	#3	12"	5	2'-8"	1'-4"	89.5
6'	#3	12"	2	16'-6"	#3	12"	4	14'-4"	4'-0"	#3	1	17'-0"	#3	12"	6	2'-8"	1'-4"	145.8
7'	#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"	3	21'-1"	#4	12"	5	17'-9"	4'-0"	#4	1	21'-10"	#4	12"	8	3'-6"	1'-9"	356.4

BAR BENDING DIAGRAMS

NOTE:- Dimensions are to bar centers.

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

Drawn By- W.C.H. 12-7-62 Checked By- RHS 1-9-63
Quantities By- W.C.H. 12-14-62 Checked By- RHS 1-31-63
Rechecked By- RHS 3-29-63

ARKANSAS STATE HIGHWAY COMMISSION

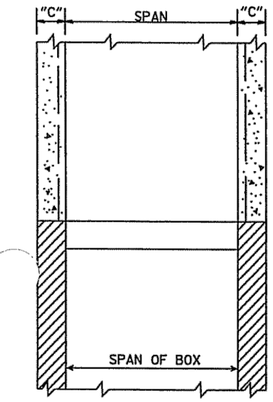
DETAILS OF STANDARD WINGS
FOR
REINFORCED CONCRETE BOX CULVERTS

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

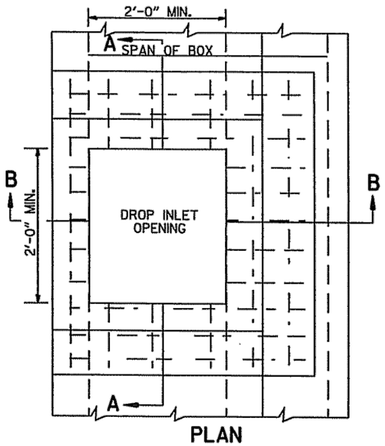
3:1 SLOPES
ALL DEPTHS OF COVER
FOR H = 8'-0" OR LESS

STANDARD DRAWING NO. W-X003-1

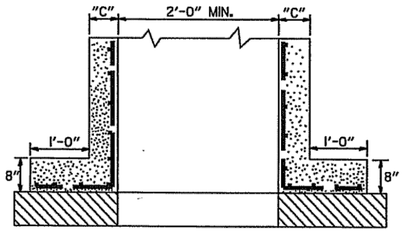
MYLAR



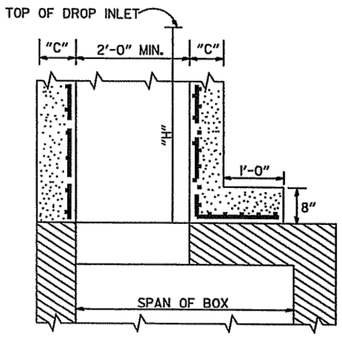
SECTION B-B



PLAN

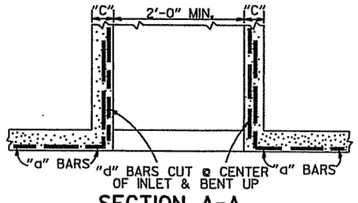


SECTION A-A

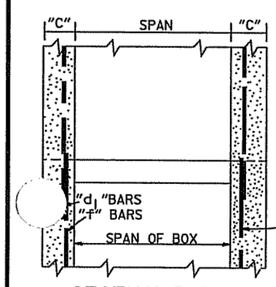


SECTION B-B

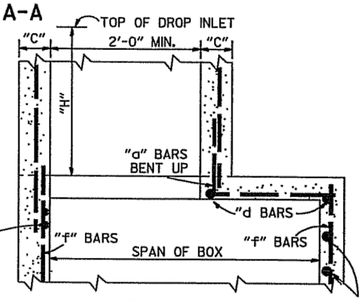
METHOD OF CONSTRUCTING DROP INLET ON EXISTING R.C. BOX CULVERT



SECTION A-A



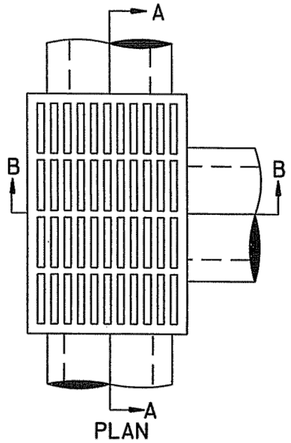
SECTION B-B



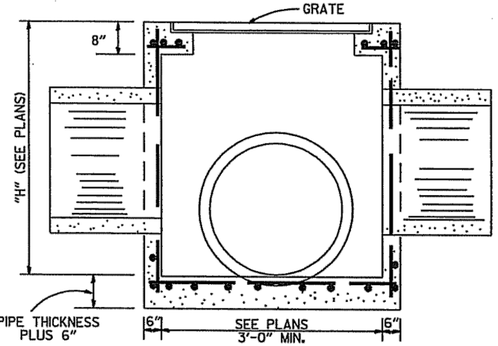
SECTION B-B

METHOD OF CONSTRUCTING DROP INLET ON NEW R.C. BOX CULVERT

NOTE: "C" DIMENSIONS AND REINFORCING BAR SIZES, SHALL CONFORM TO THOSE SHOWN ON STANDARD DRAWING FOR DROP INLET.

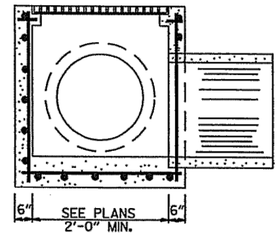


PLAN



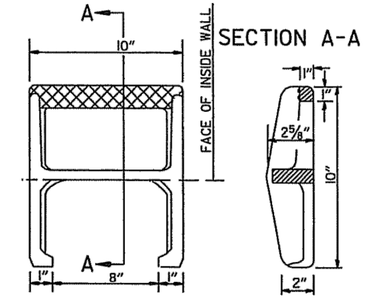
SECTION A-A

NOTE: REINF. BARS TO BE #4 BARS ON 6" CTRS. WITH 1½" MIN. COVER. THIS TYPE DROP INLET TO BE USED WHERE NOT SUBJECTED TO TRAFFIC.



SECTION B-B

DROP INLET (TYPE E)

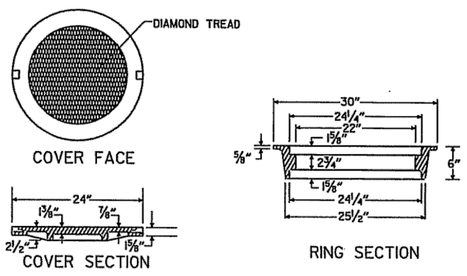


APPROX. WEIGHT = 11 LBS. (CAST IRON)

PLAN

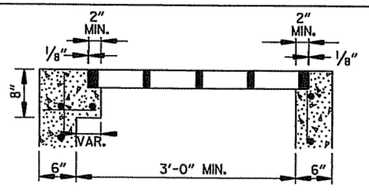
NOTE: THIS DETAIL IS TYPICAL. OTHERS MAY BE USED WITH PRIOR APPROVAL OF THE ENGINEER.

DETAIL OF STEP FOR DROP INLET

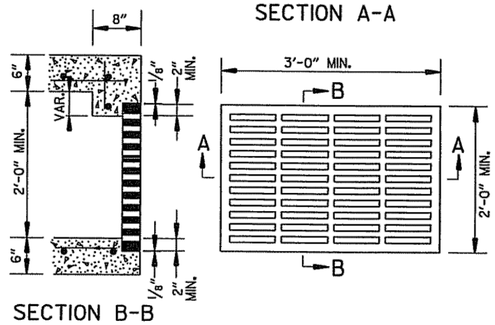


APPROXIMATE TOTAL WEIGHT = 333 LBS.

HEAVY DUTY RING & COVER



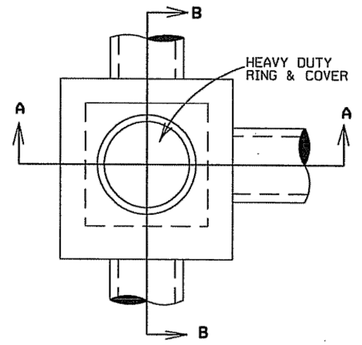
SECTION A-A



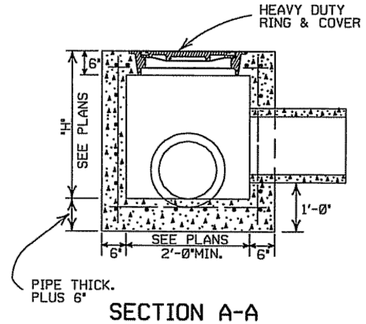
SECTION B-B

APPROXIMATE MINIMUM WATERWAY OPENING = 260 SQ. IN.

GRATE FOR TYPE E DROP INLET

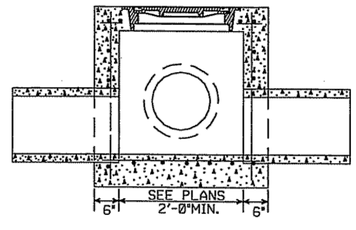


PLAN



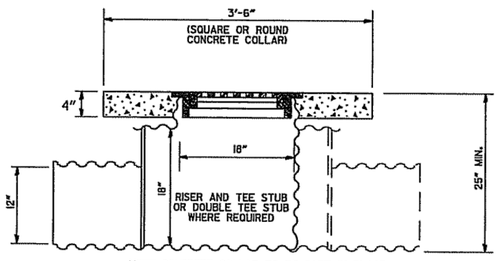
SECTION A-A

NOTE: REINF. BARS TO BE #4 BARS ON 6" CTRS. WITH 1½" MIN. COVER. THIS TYPE JUNCTION BOX TO BE USED WHERE NOT SUBJECTED TO TRAFFIC.

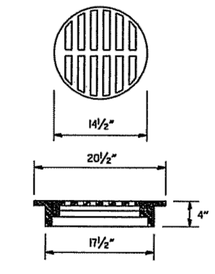


SECTION B-B

JUNCTION BOX (TYPE E)



NOTE: CONCRETE COLLAR TO BE CAST IN PLACE. 12" PIPE CULVERTS TO BE MEASURED AND PAID FOR AS " 12" SIDE DRAIN ".



USE NEENAH R-5901-C OR EQUIVALENT BICYCLE SAFE FRAME AND GRATE

DETAIL OF YARD DRAIN

GENERAL NOTES:

1. ALL EXPOSED CORNERS SHALL BE ¾" CHAMFERED.
2. STEPS SHALL BE INSTALLED ON 16" CENTERS ON ALL INLETS 4'-0" HIGH OR OVER, OR AS APPROVED BY THE ENGINEER.
3. EXPANSION JOINT MATERIAL SHALL BE ¾" PREFORMED FIBER.
4. GRATE OR GRATE AND FRAME SHALL BE CONSTRUCTED OF CAST IRON AND SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS AASHTO M 105 CLASS 35B. GRATE MAY BE USED WITHOUT FRAME.
5. GRATE AND FRAME SHALL NOT BE PAINTED.
6. GRATE SHALL BE BICYCLE SAFE.
7. HEAVY DUTY RING SHALL ALWAYS BE INSTALLED WITH FLANGE ON TOP.
8. HEAVY DUTY RING AND COVER SHALL BE CONSTRUCTED OF CAST IRON AND SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS AASHTO M105 CLASS 35B & AASHTO M306.
9. HEAVY DUTY RING AND COVER SHALL NOT BE PAINTED.
10. DIMENSIONS SHOWN FOR RING AND COVER ARE TYPICAL. THE CONTRACTOR MAY SUBSTITUTE SIMILAR CASTINGS WITH THE APPROVAL OF THE ENGINEER. REQUESTING APPROVAL FOR CASTING DESIGNS MAY BE MADE BY REFERRING TO PREVIOUSLY APPROVED DRAWINGS.

DATE REV.	REVISION	DATE FILMED
11-16-01	ADDED NOTE 10	
1-12-00	REVISED HEAVY DUTY RING & COVER	
7-02-98	CHANGED GRATE DETAIL, DELETED DI (TYPE D), REPLACED RING & COVER W/HEAVY DUTY RING & COVER, ADDED JUNCTION BOX (TYPE E)	
6-26-97	ADDED DIMENSION TO TYPE IV-A	
10-18-96	ADDED DETAIL OF YARD DRAIN	
8-15-91	DELETE TYPE IV GRATE	
7-15-88	REVISED STEP DETAIL	
5-20-83	REVISED DETAILS OF GRATES (TYPE IV & IV-A)	
2-4-83	ADDED GENERAL NOTE NO. 4	
3-2-81	ADDED TYPE IV-A GRATE	
5-22-74	DELETED INLET (TYPE F) & GRATE (TYPE III)	
10-2-72	REVISED AND REDRAWN	

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF DROP INLETS & JUNCTION BOXES

STANDARD DRAWING FPC-9

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 STRAIGHT In Top and Bottom Slabs of Barrel. 2 Addl's in Apron and Headwall - Each. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	"b" bars BENT - See Diagram below. In Top and Bottom Slabs of Barrel. Alternate with "a" bars. SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH	X	"d" bars STRAIGHT. Longitudinal in Top Slab of Barrel SIZE	SPACING	NUMBER REQ'D	LENGTH	"d1" bars STRAIGHT. Longitudinal in Sidewalls SIZE	SPACING	NUMBER REQ'D	LENGTH	"e" bars. STRAIGHT. Longitudinal in Bottom Slab of Barrel SIZE	SPACING	NUMBER REQ'D	LENGTH	"f" bars STRAIGHT Verticals in Side walls SIZE	SPACING	NUMBER REQ'D 3:1	NUMBER REQ'D 4:1	LENGTH
D	S	H																												
0'-0" to 5'-0" Maximum	1 @ 4'	2'	#5	13"	120	120	4'-9"			110	110	5'-10"	4'-8"	#5	10½"	6	#4	12"	4			5	#4	12"	4	#4	12"	120	120	2'-11"
		3'			120	120	4'-9"			110	110	5'-10"	4'-8"			6			6			5			5			120	120	3'-11"
		4'			120	120	4'-9"			110	110	5'-10"	4'-8"			6			8			5			5			120	120	4'-11"
		5'			120	120	4'-9"			110	110	5'-10"	4'-8"			6			10			5			5			120	120	5'-11"
		6'			120	120	4'-11"			110	110	6'-0"	4'-10"			6			12			5			5			120	120	6'-11"
	1 @ 5'	3'			120	120	5'-9"			110	110	6'-10"	5'-8"			6			6			6			6			120	120	4'-0"
		4'			120	120	5'-9"			110	110	6'-10"	5'-8"			7			8			6			6			120	120	5'-0"
		5'	#6	13"	120	120	5'-11"	#6	13"	110	110	6'-10"	5'-8"	#5	10⅝"	7	#4	12"	10	#4	12"	6	#4	12"	6	#4	12"	120	120	5'-11"
		6'			120	120	5'-11"			110	110	7'-0"	5'-10"			7			12			6			6			120	120	7'-0"
		7'			120	120	6'-0"			110	110	7'-1"	5'-11"			7			16			6			6			120	120	8'-0"
		3'			128	128	6'-9"			118	118	7'-10"	6'-8"			8			6			7			7			120	120	4'-1"
		4'			128	128	6'-9"			118	118	7'-10"	6'-8"			8			8			7			7			120	120	5'-1"
	1 @ 6'	5'			128	128	6'-9"			118	118	7'-10"	6'-8"			8			10			7			7			120	120	6'-1"
		6'	#6	12"	128	128	6'-11"	#6	12"	118	118	8'-1"	6'-10"	#5	10½"	8	#4	12"	12	#4	12"	7	#4	12"	7	#4	12"	120	120	7'-1"
		7'			128	128	7'-0"			118	118	8'-1"	6'-11"			8			14			8			7			120	120	8'-1"
		8'			128	128	7'-1"			118	118	8'-2"	7'-0"			8			16			8			7			120	120	9'-1"
		4'			130	130	7'-9"			130	130	8'-10"	7'-8"			8			6			8			8	#5	12"	120	120	5'-2"
		5'			130	130	7'-9"			130	130	8'-10"	7'-8"			9			8			8			8	#4	12"	120	120	6'-2"
	1 @ 7'	6'			130	130	7'-11"			130	130	9'-0"	7'-10"			9			10			8			8			120	120	7'-2"
		7'	#6	11"	130	130	8'-0"	#6	11"	130	130	9'-1"	7'-11"	#5	10½"	9	#4	12"	12	#4	12"	8	#4	12"	8			120	120	8'-2"
		8'			130	130	8'-2"			130	130	9'-2"	8'-0"			9			14			8			8			120	120	9'-2"
		9'			130	130	8'-3"			130	130	9'-4"	8'-2"			9			18			8			8			120	120	10'-2"
		4'			128	128	8'-9"			118	118	9'-10"	8'-8"			11			8			9			9			120	120	5'-3"
		5'			128	128	8'-11"			118	118	10'-0"	8'-10"			11			10			9			9			120	120	6'-5"
		6'			128	128	8'-11"			118	118	10'-0"	8'-10"			11			12			9			9			120	120	7'-5"
	1 @ 8'	7'	#7	12"	128	128	9'-0"	#6	12"	118	118	10'-1"	8'-11"	#5	10"	11	#4	12"	14	#4	12"	9	#4	12"	9			120	120	8'-5"
		8'			128	128	9'-1"			118	118	10'-2"	9'-0"			11			16			9			9			120	120	9'-5"
		9'			128	128	9'-3"			118	118	10'-4"	9'-2"			11			18			9			9			120	120	10'-5"
		10'			128	128	9'-5"			118	118	10'-6"	9'-4"			11			20			9			9			120	120	11'-5"
		5'			140	140	9'-11"			130	130	11'-0"	9'-10"			12			10			10			10	#5	12"	120	120	6'-5"
		6'			140	140	10'-0"			130	130	11'-1"	9'-11"			12			12			10			10			120	120	7'-5"
		7'			140	140	10'-0"			130	130	11'-1"	9'-11"			12			14			10			10			120	120	8'-5"
	1 @ 9'	8'	#7	11"	140	140	10'-1"	#6	11"	130	130	11'-2"	10'-0"	#5	10"	12	#4	12"	16	#4	12"	10	#4	12"	10			120	120	9'-5"
		9'			140	140	10'-3"			130	130	11'-4"	10'-2"			12			18			10			10			120	120	10'-5"
		10'			140	140	10'-5"			130	130	11'-6"	10'-4"			12			20			10			10	#5	11"	132	132	11'-5"
		11'			140	140	10'-7"			130	130	11'-8"	10'-6"			12			22			10			10		10'	144	144	12'-5"
		5'			128	128	10'-11"			118	118	12'-2"	10'-10"			13			10			11			11			120	120	6'-9"
		6'			128	128	11'-0"			118	118	12'-3"	10'-11"			13			12			11			11			120	120	7'-9"
		7'			128	128	11'-0"			118	118	12'-3"	10'-11"			13			14			11			11			120	120	8'-9"
	1 @ 10'	8'	#7	12"	128	128	11'-1"	#7	12"	118	118	12'-4"	11'-0"	#5	10"	13	#4	12"	16	#4	12"	12	#4	12"	12			120	120	9'-9"
		9'			128	128	11'-3"			118	118	12'-5"	11'-1"			13			18			12			12			120	120	10'-9"
		10'			128	128	11'-5"			118	118	12'-6"	11'-2"			13			20			12			12			120	120	11'-9"
		11'			128	128	11'-7"			118	118	12'-10"	11'-6"			13			22			12			12			120	120	12'-9"
		12'			128	128	11'-9"			118	118	13'-0"	11'-8"			13			24			12			12	#6	12"	120	120	13'-6"
		6'			140	140	12'-1"			130	130	13'-2"	12'-0"			15			12			12			12			120	120	7'-7"
		7'			140	140	12'-1"			130	130	13'-4"	12'-0"			15			14			12			12	#4	12"	120	120	8'-7"
	1 @ 11'	8'			140	140	12'-2"			130	130	13'-4"	12'-0"			15			16			12			12			120	120	9'-7"
		9'	#7	11"	140	140	12'-3"	#7	11"	130	130	13'-6"	12'-2"	#5	9½"	15	#4	12"	18	#4	12"	12	#4	12"	12			120	120	10'-7"
		10'			140	140	12'-5"			130	130	13'-8"	12'-3"			15			20			12			12	#5	11"	132	132	11'-7"
		11'			140	140	12'-7"			130	130	13'-10"	12'-6"			15			22			12			12		10'	144	144	12'-6"
		12'			140	140	12'-9"			130	130	14'-0"	12'-8"			15			24			12			12	#6	12"	120	120	13'-6"
		6'			128	128	13'-1"			118	118	14'-4"	13'-0"			16			12			13			13					
		7'			128	128	13'-1"			118	118	14'-4"	13'-0"			16			14			13			13	#4	12"			
	1 @ 12'	8'			128	128	13'-1"			118	118	14'-4"	13'-0"			16			16			13			13					
		9'	#8	12"	128	128	13'-3"	#7	12"	118	118	14'-4"	13'-2"	#5	9½"	16	#4	12"	18	#4	12"	13	#4	12"	13					
		10'			128	128	13'-5"			118	118	14'-5"	13'-3"			16			20			13			13	#5	11"			
		11'			128	128	13'-7"			118	118	14'-10"	13'-4"			16			22			13			13		10'			
		12'			128	128	13'-9"			118	118	15'-0"	13'-5"			16			24			13			13	#6	12"			

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

BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM Bars "b"
#6	3"	5"	1'-2"	K, Pin Diam., X
#7	3½"	5⅝"	1'-9"	

NOTE:- Dimensions are to centers of bars.

DOWEL BARS FOR TWO HEADWALLS

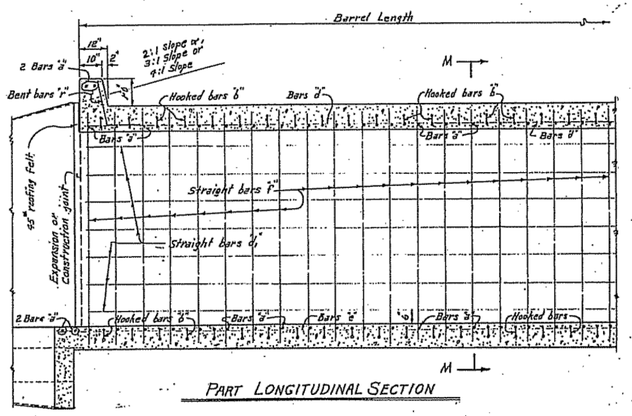
SPAN	SIZE	SPACING	NUMBER REQ'D	LENGTH	X
4'	#4	11"	12	2'-6"	1'-3"
5'	#4	11"	14	2'-7"	1'-3⅞"
6'	#4	11"	16	2'-8"	1'-4"
7'	#4	11"	18	2'-9"	1'-4⅛"
8'	#4	11⅛"	20	2'-11"	1'-5⅛"
9'	#4	11⅛"	22	3'-0"	1'-6"
10'	#4	11⅛"	24	3'-1"	1'-6⅛"
11'	#4	12"	26	3'-2"	1'-7"
12'	#4	12"	28	3'-3"	1'-7⅛"

Bars "f" Dowel bars in Headwalls.

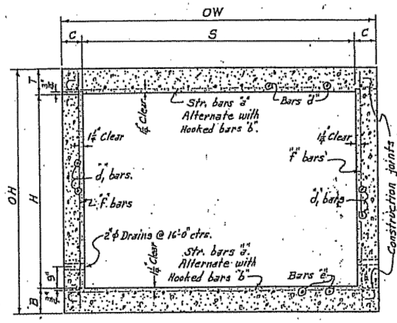
DIMENSIONS — QUANTITIES

MAX. DESIGN DEPTH OF COVER	BARREL DIMENSIONS: CLEAR SPAN	CLEAR HEIGHT	SQ. FT. OPENING	OVERALL WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDEWALLS	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	B	OH	CU.YD.	LB.	LB.	LB.
5'-0"	1 @ 4'	2'	8	5'-0"		6"	6½"	3'-1⅛"	0.282	41.89	17.95	66.35
		3'	12	5'-0"		6"		4'-1⅛"	0.319	44.16	19.62	66.35
		4'	16	5'-0"	7"	6"		5'-1⅛"	0.356	46.83	21.29	66.35
		5'	20	5'-0"		6"		6'-1⅛"	0.394	49.50	22.96	66.35
		6'	24	5'-12"		7"		7'-1⅛"	0.474	52.96	29.63	67.75
	1 @ 5'	3'	15	6'-0"		6"		4'-2⅜"	0.380	55.55	22.19	101.27
		4'	20	6'-0"		6"		5'-2⅜"	0.417	58.23	23.86	101.27
		5'	25	6'-0"		6"		6'-2⅜"	0.454	60.90	25.53	101.27
		6'	30	6'-12"		7"		7'-2⅜"	0.535	64.49	27.20	103.27
		7'	35	6'-13"		7½"		8'-2⅜"	0.604	67.63	28.87	104.27
	1 @ 6'	3'	18	7'-0"		6"		4'-3½"	0.496	66.29	29.76	118.96
		4'	24	7'-0"		6"		5'-3½"	0.983	68.96	26.93	118.96
		5'	30	7'-0"		6"		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'-9"		7½"		8'-3½"	0.671	78.98	31.94	121.97
		8'	48	7'-9"	8"	8"	7½"	9'-3½"	0.746	88.97	33.11	122.97
	1 @ 7'	4'	28	8'-0"		6"		5'-3"	0.568	81.32	29.01	136.88
		5'	35	8'-0"		6"		6'-3"	0.605	84.00	30.68	136.88
		6'	42	8'-2"		7"		7'-3"	0.688	87.76	32.35	138.88
		7'	49	8'-3"	8½"	7½"	8½"	8'-3"	0.757	90.98	34.02	139.88
		8'	56	8'-9"		8"		9'-3"	0.832	96.65	35.69	140.88
		9'	63	8'-10"		9"		10'-3"	0.946	105.59	37.36	142.89
	1 @ 8'	4'	32	9'-0"		6"		5'-7"	0.676	95.26	33.32	198.07
		5'	40	9'-2"		7"		6'-7"	0.759	99.12	34.99	196.80
		6'	48	9'-2"		7"		7'-7"	0.797	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'-6"		8"		9'-7"	0.992	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	114.72	37.56	219.61
		6'	54	10'-3"		7½"		7'-8"	0.910	118.06	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	222.13
		9'	81	10'-6"		9"		10'-8"	1.198	135.80	44.24	222.02
		10'	90	10'-8"		10"		11'-8"	1.276	192.68	45.91	222.78
		11'	99	10'-10"		11"		12'-8"	1.916	150.40	47.58	230.57
	1 @ 10'	5'	50	11'-2"		7"		6'-9½"	0.957	130.64	40.13	242.64
		6'	60	11'-3"		7½"		7'-9½"	1.024	133.89	41.80	244.00
		7'	70	11'-3"		7½"		8'-9½"	1.071	136.64	43.47	244.00
		8'	80	11'-5"	10⅝"	8"	11"	9'-9½"	1.147	142.55	45.14	245.36
		9'	90	11'-6"		9"		10'-9½"	1.263	151.92	96.81	248.09
		10'	100	11'-8"		10"		11'-9½"	1.391	158.89	98.98	250.81
		11'	110	11'-10"		11"		12'-9½"	1.532	166.71	50.15	253.54
		12'	120	12'-0"		12"		13'-9½"	1.695	178.67	51.82	256.26
	1 @ 11'	6'	66	12'-3"		8"		7'-10½"	1.153	155.16	96.12	268.62
		7'	77	12'-3"		8"		8'-10½"	1.202	157.83	97.79	268.62
		8'	88	12'-4"		8"		9'-10½"	1.252	163.06	99.96	268.62
		9'	99	12'-6"	11"	9"	11⅛"	10'-10½"	1.368	172.60	51.13	271.39
		10'	110	12'-8"		10"		11'-10½"	1.497	179.70	52.80	274.07
		11'	121	12'-10"		11"		12'-10½"	1.638	187.67	54.97	276.79
		12'	132	13'-0"		12"		13'-10½"	1.792	199.79	56.14	278.52
	1 @ 12'	6'	72	13'-9"		8"		8'-0"	1.284	172.20	98.69	357.62
		7'	84	13'-10"		8"		9'-0"	1.333	176.87	50.36	357.62
		8'	96	13'-9"		8"		10'-0"	1.383	180.15	52.031	357.62
		9'	108	13'-8"	11¾"	9"	12⅛"	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

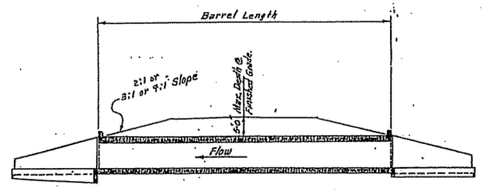
W-X002-1, W-X003-1, W-X004-1 or W-X002-2, W-X003-2 and W-X004-2



PART LONGITUDINAL SECTION



TYPICAL SECTION M-M



LONGITUDINAL SECTION

GENERAL NOTES:-
CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" chamfers.
REINFORCING STEEL:- Reinforcing to be deformed bars of intermediate or hard grade.
BAR LAPS:- In computing the quantities of steel from the tables add one lap for each additional 30'-0" length of barrel over 30'-0". Lap longitudinal bars 30 diameters.
CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls and slabs shall be only where shown on plans.
SPECIFICATIONS:- Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.

DESIGN LIVE LOAD

H20-S16 LOADING A.A.S.H.O. 1961
AND
SPECIAL MILITARY LOADING
Two 28,000 Lb. Axles @ 9'-0" ctrs.

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

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

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION

DETAILS OF STANDARD BARREL SECTIONS FOR REINFORCED CONCRETE BOX CULVERTS

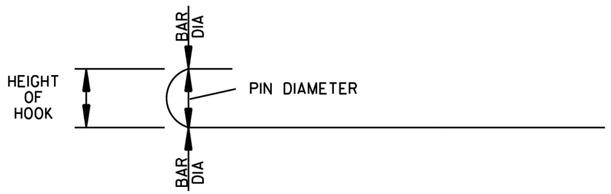
4, 5, 6, 7, 8, 9, 10, 11 & 12' SPANS — 3:1 OR 4:1 SLOPES
SINGLES — UNDER 5'-0" COVER

STANDARD DRAWING NO. R-100X-0

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

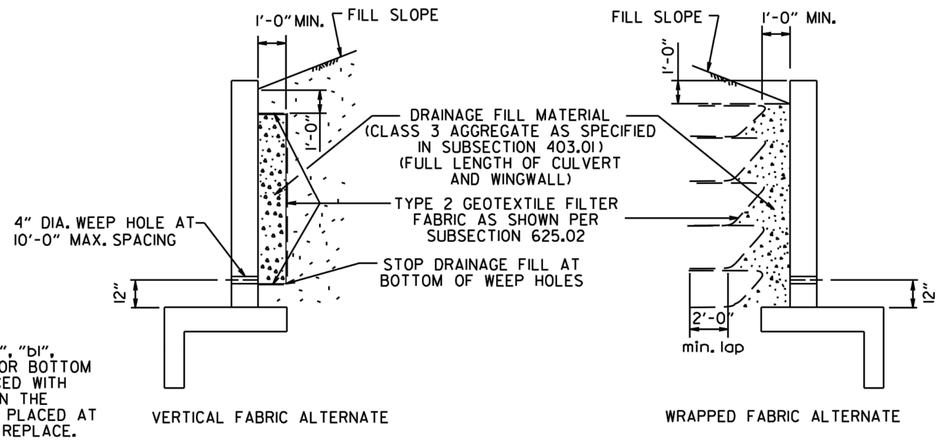
THE HOOKED BARS SHALL BE PLACED IN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOTTOM SLAB. THE STRAIGHT BARS SHALL BE PLACED IN THE TOP OF THE TOP SLAB AND THE BOTTOM OF THE BOTTOM SLAB. SEE TABLE BELOW FOR LENGTHS OF REPLACEMENT HOOKED AND STRAIGHT BARS.

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.

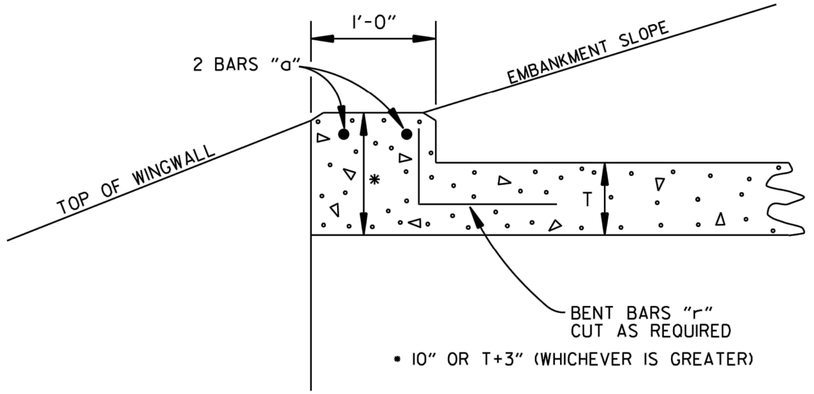
MEMBRANE WATERPROOFING SHALL BE APPLIED TO ALL CONSTRUCTION JOINTS IN THE TOP SLAB AND THE SIDEWALLS OF R.C. BOX CULVERTS AS DIRECTED BY THE ENGINEER. NO PAYMENT SHALL BE MADE FOR THIS ITEM, BUT PAYMENT WILL BE CONSIDERED TO BE INCLUDED IN THE VARIOUS ITEMS BID FOR THE R.C. BOX CULVERT.

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.

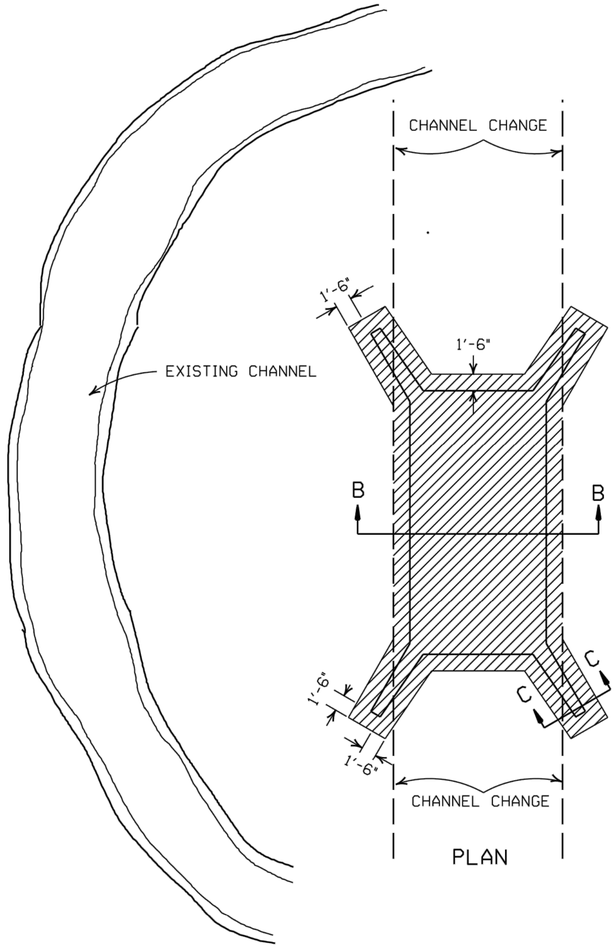
R.C. BOX CULVERT HEADWALL MODIFICATIONS

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

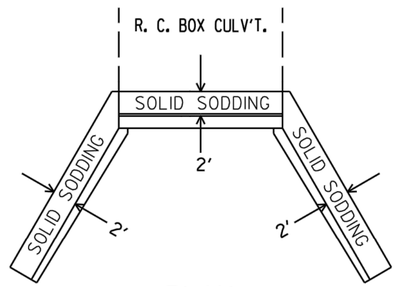
REINFORCED CONCRETE BOX CULVERT DETAILS

STANDARD DRAWING RCB-1



PLAN

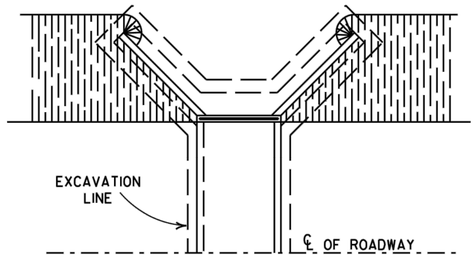
SOLID SODDING



PLAN

PARTIAL SECTION SHOWING SOLID SODDING AT HEADWALLS AND WING WALLS

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



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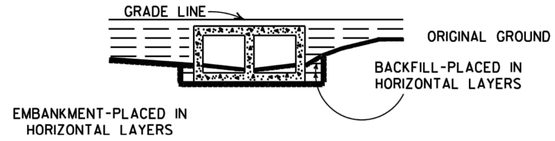
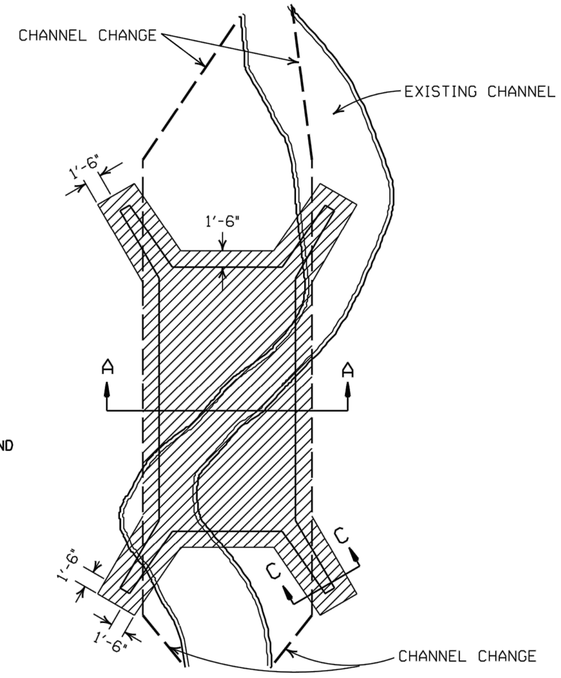
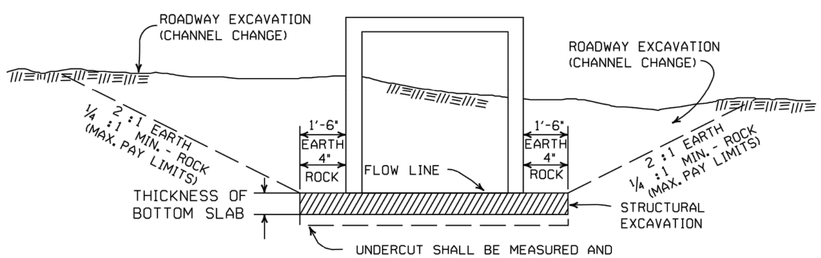


LONGITUDINAL SECTION

BACKFILL DETAILS FOR BOX CULVERT

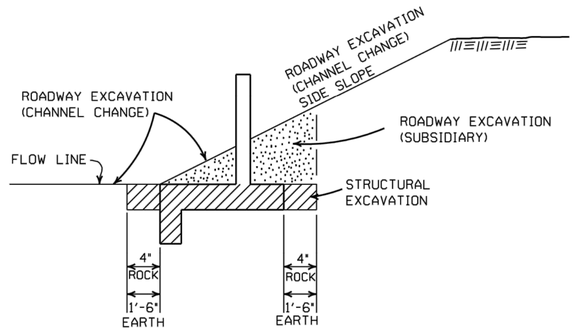


PLAN

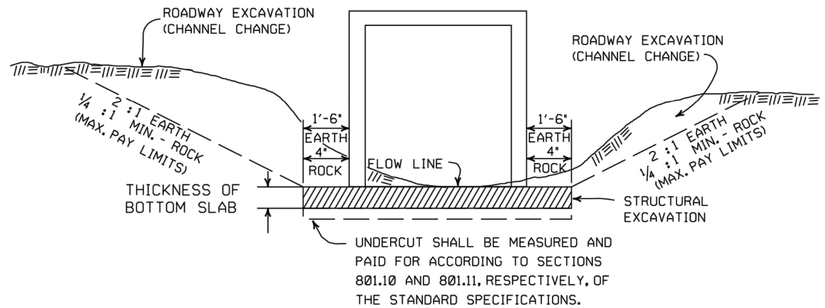


SECTION B-B

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

PROJECT MANUAL

TIMBERCREEK DRIVE
CULVERT REPLACEMENT

BRYANT, ARKANSAS

CERTIFICATE OF AUTH. McCLELLAND CONSULTING ENGINEERS No. 24 ARKANSAS-ENGINEER

JULY, 2019

STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER No. 10307 JAMES S. WHISKER 07-03-19

MCE PROJECT NO. 19-5766

MCE DESIGNED TO SERVE McCLELLAND CONSULTING ENGINEERS, INC.

PROJECT MANUAL

TIMBERCREEK DRIVE
CULVERT REPLACEMENT
BRYANT, ARKANSAS

JULY, 2019

MCE PROJECT NO. 19-5766

Prepared By:
McClelland Consulting Engineers, Inc.
P. O. Box 34087
Little Rock, Arkansas 72203
Phone 501/371-0272
Fax 501/371-9932

TIMBERCREEK DRIVE CULVERT REPLACEMENT
BRYANT, ARKANSAS
19-5766

TABLE OF CONTENTS

DOCUMENT 00030
ADVERTISEMENT FOR BIDS

Bids: July 30, 2019

PROJECT: TIMBERCREEK DRIVE CULVERT REPLACEMENT

MCE Project No.: 19-5766

McClelland Consulting Engineers, Inc.
7302 Kanis Road
P. O. Box 34087
Little Rock, Arkansas 72203
Phone: (501) 371-0272

The City of Bryant will receive sealed bids on a General Contract to install a new culvert crossing on Timbercreek Drive and improve the drainage for the area.

Bids shall be on a unit price basis.

The City of Bryant, Arkansas will receive Bids until 12:00 p.m. Local Time on July 30, 2019 at Bryant Public Works, 1017 SW 2nd Street, Bryant, Arkansas 72022. Bids received after this time will not be accepted. Bids will be opened and publicly read aloud at 2:00 p.m. on July 30, 2019 at the address above. All interested parties are invited to attend.

Pursuant to Ark. Code Ann. § 22-9-203, the Owner encourages all small, minority, and women business enterprises to submit bids for capital improvements. Encouragement is also made to all general contractors that in the event they subcontract portions of their work, consideration is given to the identified groups.

Digital copies of the bid documents are available at http://www.mce.us.com for a fee of $15. These documents may be downloaded by selecting this project from the "Current Bids" link, and be entering Quest Project Number 6430662 on the "Browse Projects" page. For assistance and free membership registration, contact QuestCDN at (952) 233-1632 or info@questcdn.com. Addendums to the bid package will be issued through the online MCE Plan Holders List; therefore, all prime bidders shall be responsible for downloading the bid documents from the MCE online plan room in order to be included in the Plan Holders List and submit a bid. Bidders must enter the addenda numbers in the Proposal to verify receipt.

Each Bid must be submitted on the prescribed form and accompanied by a certified check or bid bond executed on the prescribed form, payable to the City of Bryant, Arkansas in an amount not less than 5 percent of the amount bid. The bid proposal and work of the proposed contract shall be in accordance with all applicable federal, state, county, and local laws, ordinances and regulations.

For information concerning the proposed Work, contact Jeremy Waits at the Engineer's office.

The attention of the Bidder is directed to the applicable federal and state requirements and conditions of employment to be observed and minimum wage rates to be paid under this contract. Any Bid may be rejected which contains material omissions, or irregularities, or in which any of the unit prices are obviously unbalanced in the opinion of the Owner. Also, a bid may be rejected if it, in any manner, shall fail to conform to the conditions of the Bidding Requirements and Contract Documents.

The Owner reserves the right to waive irregularities, reject bids, choose the most qualified bidder for the Project, and to postpone award of the Contract for a period of time which shall not exceed beyond 90 days from the bid opening date.

CITY OF BRYANT, ARKANSAS

DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

PARAGRAPH NO./TITLE

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DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

1. FORMAT

The Contract Documents are divided into Parts, Divisions, and Sections in keeping with accepted industry practice in order to separate categories of subject matter for convenient reference thereto. Generally, there has been no attempt to divide the Specification Sections into work performed by the various building trades, work by separate subcontractors, or work required for separate facilities in the Project.

2. SPECIFICATION LANGUAGE

"Command" type sentences are used in Contract Documents. These refer to and are directed to the Contractor.

3. GENERAL DESCRIPTION OF THE PROJECT

A general description of the Work to be done is contained in the ADVERTISEMENT FOR BIDS. The scope is indicated on the accompanying Drawings and specified in applicable parts of these Contract Documents.

4. QUALIFICATION OF CONTRACTORS

The prospective bidders must meet the statutorily prescribed requirements before Award of Contract by the Owner.

Owner and Engineer shall review each Bidder's qualifications before a Contract will be awarded for the work contemplated herein. The Owner will conduct investigations, as necessary, to determine the performance record and ability of the apparent low Bidder to perform the size and type of work specified under this Contract. Upon request, the Bidder shall submit information as deemed necessary by the Owner to evaluate the Bidder's qualifications.

In general, when bidding on a project that **DOES NOT** include Federal Funding, the Bidder must be a Licensed Contractor in the State of Arkansas before a bid is submitted. If a project **DOES** include Federal Funding, the Bidder must have an application on file with the State of Arkansas Contractor's Licensing Board and be in the process of obtaining a Contractor's License in the State of Arkansas. Before the Owner and Contractor enter into a Contract Agreement, the Contractor must have their License in hand. For any questions concerning Contractor's Licensing Requirements contact the State Licensing Board at (501) 372-4661.

5. MINORITY PARTICIPATION

Pursuant to Ark. Code Ann. § 22-9-203, the Owner encourages all small, minority, and women business enterprises to submit bids for capital improvements. Encouragement is also made to all general contractors that in the event they subcontract portions of their work, consideration is given to the identified groups.

6. DOCUMENT INTERPRETATION

The Contract Documents governing the Work proposed herein consist of the Drawings and all material bound herewith. These Contract Documents are intended to be mutually cooperative and to provide all details reasonably required for the execution of the proposed Work. Any person contemplating the submission of a Bid shall have thoroughly examined all of the various parts of these Documents and, should there be any doubt as to the meaning or intent of said Contract Documents, the Bidder should request of the Engineer, in writing (received by the Engineer at least 5 working days prior to bid opening), an interpretation thereof.

Any interpretation or change in said Contract Documents will be made only in writing, in the form of Addenda to the Documents, which will be furnished to all Bidders receiving a set of the Documents. Bidders shall submit with their Bids, or indicate receipt, of all Addenda. The Owner or Engineer will not be responsible for any other explanation or interpretations of said Documents not issued in writing by Addendum.

7. BIDDER'S UNDERSTANDING

Each Bidder must inform himself of the conditions relating to the execution of the Work, and it is assumed that he will inspect the site and make himself thoroughly familiar with all the Contract Documents. Failure to do so will not relieve the successful Bidder of his obligation to enter into a Contract and complete the contemplated Work in strict accordance with the Contract Documents. It shall be the Bidder's obligation to verify for himself and to his complete satisfaction all information concerning site and subsurface conditions.

Information derived from topographic maps, or from Drawings showing location of utilities and structures will not in any way relieve the Contractor from any risk, or from proper examination of the site and additional investigations as he may elect, or from proper fulfillment of all the terms of the Contract Documents.

Each Bidder shall inform himself of, and the Bidder awarded a Contract shall comply with, federal, state, and local laws, statutes, and ordinances relative to the execution of the Work. This requirement includes, but is not limited to, applicable regulations concerning minimum wage rates; nondiscrimination in the employment of labor; protection of public and employee safety and of health environment protection, the protection of natural resources, fire protection, burning and nonburning requirements, permits, fees, contractor's license, nonresident contractors' notice and bond requirements, and similar subjects.

8. PROJECT MANUAL AND DRAWINGS

No return of Drawings is required.

9. TYPE OF BID

Unit prices shall be submitted in the appropriate places on the Bid form. The total amount to be paid to the Contractor shall be the total amount of the unit price items as adjusted based on quantities installed and/or any adjustment for additions or deletions resulting from change orders during construction.

10. TRENCH AND EXCAVATION SAFETY SYSTEM

IN ACCORDANCE WITH **ARK. CODE ANN.§ 22-9-212**, BIDDERS MUST PROVIDE A SEPARATE PRICE FOR TRENCH AND EXCAVATION SAFETY PROGRAMS IN THE SPACE PROVIDED ON THE BID FORM. FAILURE TO DO SO WILL SUBJECT THE BIDDER TO DISQUALIFICATION.

11. PREPARATION OF BIDS

All blank spaces on the Bid Form must be filled in, preferably in BLACK ink. No changes shall be made in the phraseology of the forms. In case of discrepancy between unit prices and totals, unit prices will prevail.

Any Bid which contains material omissions, or irregularities, or in which any of the prices are obviously unbalanced in the opinion of the Owner may be rejected. Also, a bid may be rejected if, in any manner, it shall fail to conform to the conditions of the published ADVERTISEMENT FOR BIDS, Bidding Requirements, and Contract Documents.

Only one bid from any individual, firm, partnership, or corporation, under the same or different names, will be considered. Should it appear to the Owner that any Bidder is interested in more than one bid for Work contemplated, all bids in which such Bidder is interested will be rejected. The Bidder shall sign his Bid Form on the blank space provided therefor. If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign Contracts on behalf of the corporation. If Bidder is a partnership or sole proprietorship, the true name of the firm shall be set forth above, together with the signature of the sole proprietor, partner, or partners authorized to sign Contracts in behalf of the firm. If signature is by an agent, other than an officer of a corporation or a member of a partnership or sole proprietor, a notarized power-of-attorney must be on file with the Owner prior to opening of bids or submitted with the Bid.

12. STATE AND LOCAL SALES AND USE TAXES

Unless the Supplementary Conditions contains a statement that the Owner is exempt from state sales tax on materials incorporated into the Work, due to the qualification of the Work under this Contract, all state and local sales and use taxes, as required by the laws and statutes of the state and its political subdivisions, shall be paid by the Contractor. Prices quoted in the Bid shall include all nonexempt sales and use taxes, unless provision is made in the Bid Form to separately itemize the tax.

13. SUBMISSION OF BIDS

All Bids must be submitted not later than the time prescribed, at the place, and in the manner set forth in the ADVERTISEMENT FOR BIDS. Bids must be made on the Bid Form provided herein. Each Bid must be submitted in a sealed envelope, so marked as to indicate its contents without being opened, and addressed in conformance with the instructions in the ADVERTISEMENT FOR BIDS.

14. TIE BIDS

If two or more sealed bids are equal in amount, meet specifications, and are the lowest received at the bid opening, then the apparent low bidder will be determined by lot (placing the name of the tie bidders into a container and drawing one name). The drawing will be done by Owner personnel, or another person designated by the Owner in the presence of a witness and tie bidders. The witness shall be an employee of the Owner or Engineer. Documentation of the drawing must be included on the bid tabulation and be signed by those present. Nothing in the above and foregoing will diminish the Owner's reserved right to reject any and all bids and/or to waive formalities.

15. TELEGRAPHIC OR WRITTEN MODIFICATION OF BID

Any Bidder may modify his bid by telegraphic or written communication at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the Owner prior to the closing time. The telegraphic or written communication should not reveal the bid price; it shall, however, state the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

16. WITHDRAWAL OF BID

Any Bid may be withdrawn prior to the scheduled time for the opening of bids either by telegraphic or written request, or in person. No Bid may be withdrawn after the time scheduled for opening of Bids, unless the time specified in Item, AWARD OF CONTRACT, of these INSTRUCTIONS TO BIDDERS shall have elapsed.

17. BID SECURITY

Each bid shall include a bid security in the amount of five percent of the total bid offered. The bidder shall be required to submit a bidder's deposit, which includes enclosing a cashier's check payable to the order of the OWNER drawn upon a bank or trust company doing business in Arkansas or by a corporate bid bond in an amount equal to five (5) percent of the bid.

The Attorney-in-Fact who executes this bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond.

If the Bidder elects to furnish a Bid Bond, he shall use the Bid Bond form bound herewith or one conforming substantially thereto in form and content.

The bid bond shall indemnify the Owner against failure of the Contractor to execute and deliver the contract and necessary Performance and Payment Bonds for faithful performance of the contract. The bid bond shall provide that the Contractor or surety must pay the damage, loss, cost, and expense subject to the amount of the bid security directly arising out the Contractor's default in failing to execute and deliver the contract and bonds.

Owner will have the right to retain the bid security of bidders to whom an award is being considered until the Contract has been executed and bonds have been furnished, or until specified time has elapsed so that bids may be withdrawn, or until all bids have been rejected.

18. RETURN OF BID SECURITY

Within fifteen (15) days after the award of the Contract, the Owner will return the bid securities to all Bidders whose Bids are not to be further considered in awarding the Contract. Retained bid securities will be held until the Contract has been finally executed, after which all bid securities, other than Bidders' bonds and any guarantees which have been forfeited, will be returned to the respective Bidders whose Bids they accompanied.

19. AWARD OF CONTRACT

Within ninety (90) calendar days after the opening of Bids, unless otherwise stated in the ADVERTISEMENT FOR BIDS or SUPPLEMENTARY CONDITIONS of these Documents, the Owner will accept one of the Bids or will act in accordance with BASIS OF AWARD, below. The acceptance of the Bid will be by written notice of award, mailed or delivered to the office designated on the Bid Form. In the event of failure of the lowest responsible and responsive qualified Bidder to sign and return the Contract with acceptable Performance and Payment Bonds, as prescribed herein, the Owner may award the Contract to the next lowest responsible and responsive qualified Bidder. Such award, if made, will be made within ninety (90) days after the opening of Bids.

20. BASIS OF AWARD

If, at the time this Contract is to be awarded, the Total Base Bid of the lowest acceptable Bid exceeds the funds then estimated by the Owner as available, the Owner may reject all bids or take other action as best serves the Owner's interests. The basis of the award will be as stated in the bid.

21. EXECUTION OF CONTRACT

The successful Bidder shall, within fifteen (15) consecutive days after receiving notice of award, sign and deliver to the Owner the Contract hereto attached, together with the acceptable bonds as required in these Documents. Within fifteen (15) consecutive days after receiving the signed Contract with acceptable bonds from the successful Bidder, the Owner's authorized agent will sign the Contract. Signature by both parties constitutes execution of the Contract.

The successful bidder shall conform to the Rules and Regulations of Arkansas Department of Finance and Administration concerning nonresident contractor's notice and bond requirements.

22. PERFORMANCE AND PAYMENT BONDS

The successful Bidder shall furnish a Performance and Payment Bond in the amount equal to one hundred percent (100%) of the contract price on the forms provided in the Contract Documents as security for faithful performance of the Contract and payment of all obligations arising thereunder within ten days after receipt of the Notice of Award. The bond shall be written by a

surety company qualified and authorized to do business in the State of Arkansas and shall be listed on the current U. S. Department of Treasury, Circular Number 570, or amendments thereto, in the Federal Register of acceptable Sureties for Federal projects. The bond shall be executed by a resident agent licensed by the State Insurance Commissioner to represent the surety company in Arkansas. The bond shall be written in favor of the Owner. Bond company rating by "AM Best Rating Company" to be "A-" or above and have a Positive or Stable Rating Outlooks.

The Attorney-in-Fact who executes this Performance Bond and Payment Bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond. All Contracts, Performance and Payment Bonds, and respective powers-of-attorney will have the same date.

If the Surety on any Bond furnished by Contractor is declared bankrupt, or becomes insolvent, or its right to do business is terminated in any location where any part of the project is located, or ceases to meet the requirements of the preceding paragraph, the Contractor shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to Owner.

Before execution of the Contract Documents, the Contractor shall submit the Bonds (in triplicate) to the Owner. The Bonds shall be submitted **WITHOUT DATES**, as they will be dated by the Owner at the same time as the Contracts are executed.

23. FAILURE TO EXECUTE CONTRACT AND FURNISH BOND

Failure to deliver bonds as specified above shall be considered as having abandoned the Contract, and the bid security will be retained by the Owner as liquidated damages.

24. PERFORMANCE OF WORK BY CONTRACTOR

The Contractor shall perform on the site, and with his own organization, work equivalent to at least forty percent ***(70 percent for water and sewer projects)*** of the total amount of the Work to be performed under this Contract. Contractors submitting bids where forty percent of Work is not with their own forces shall be deemed a "Brokerage Contractor" and the bid may be rejected by Owner. If determined during the "Award of Contract" phase that the Contractor is not going to be performing forty percent of Work as bid, the Contractor's bid may be subject to rejection and forfeiture of Bid Bond.

If, during the progress of the Work hereunder, the Contractor requests a reduction of the percentage and the Engineer determines that it would be to the Owner's advantage, the percentage of the work required to be performed by the Contractor's own organization may be reduced, PROVIDED prior written approval of such reduction is obtained by the Contractor from the Engineer.

Each bidder must furnish with his bid a list of the items that he will perform with his own forces and the estimated total cost of these items.

25. TIME OF COMPLETION

The time of completion of the Work to be performed under this Contract is of the essence of the Contract. Delays and extensions of time may be allowed in accordance with the provisions stated in Document 00700 - GENERAL CONDITIONS. The time allowed for the completion of the Work is stated in Document 00500 - Contract.

26. PROVISION OF REQUIRED INSURANCE

The Bidder's attention is directed to the insurance requirements set forth in the General Conditions (amended in the Supplementary Conditions, if appropriate). Submittal of a bid indicates full understanding and intent to comply with the insurance requirements which are a condition of the contract.

END OF SECTION

DOCUMENT 00200

INFORMATION AVAILABLE TO BIDDERS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Arkansas Prevailing Wage is exempt.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

END OF SECTION

DOCUMENT 00300

BID FORM

NOTE TO BIDDER: Please use BLACK ink for completing this Bid form.

To. _____

Address: _____

_____

_____

Project Title: **TIMBERCREEK DRIVE CULVERT REPLACEMENT**

Engineer's
Project No.: **19-5766**

Date: _____ Arkansas Contractor's License No.: _____

Bidder: _____

Address: _____

Bidder's person to contact for additional information on this Bid:

Name: _____

Telephone: _____

ADDENDA

The Bidder hereby acknowledges that he/she has received Addenda Numbers:

_____ to these Specifications.
(Bidder insert number of each addendum received.)

INSURANCE AND BONDING REQUIREMENTS

The Bidder hereby acknowledges that he/she has read and understands the performance bond, payment bond, and insurance requirements for this project as specified in the General Conditions. If awarded a construction contract, the Bidder agrees to furnish the required bonds and insurance certificates within fifteen (15) days of the date the award is made.

Signature _____ Title _____

MEASUREMENT AND PAYMENT

The Bidder hereby acknowledges that he/she has read and understands Section 01025 - Measurement and Payment completely prior to completing this Bid Form.

Signature _____ Title _____

BIDDER'S DECLARATION AND UNDERSTANDING

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the Owner, and that the Bid is made without any connection or collusion with any person submitting another Bid on this Contract.

The Bidder further declares that he has carefully examined the Contract Documents for the construction of the project, that he has personally inspected the site, that he has satisfied himself as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the said quantities with the detailed requirements of the Contract Documents, and that this Bid is made according to the provisions and under the terms of the Contract Documents, which Documents are hereby made a part of this Bid.

The Bidder further agrees that he has exercised his own judgment and has utilized all data which he believes pertinent from the Engineer, Owner, and other sources in arriving at his own conclusions.

The Bidder states that he has experience in and is qualified to perform the work herein specified and, if he does not have craftsmen experienced and qualified in any phase of the work for which this Bid is offered, that he will subcontract the work under said phase to a contractor who does have the necessary experience and qualifications.

CONTRACT EXECUTION AND BONDS

The Bidder agrees that if this Bid is accepted, he will, within 15 days after notice of award, sign the Contract in the form annexed hereto, and will at that time, deliver to the Owner the Performance Bond and Payment Bond required herein, and will, to the extent of his Bid, furnish all machinery, tools, apparatus, and other means of construction and do the work and furnish all the materials necessary to complete all work as specified or indicated in the Contract Documents.

CERTIFICATES OF INSURANCE, PAYMENT BOND, AND PERFORMANCE BOND

The Bidder further agrees to furnish the Owner, before executing the Contract, the certificates of insurance, Payment Bond, and Performance Bond as specified in these Documents.

START OF CONSTRUCTION, CONTRACT COMPLETION TIME, AND LIQUIDATED DAMAGES

Start of Construction, Contract Completion Time, and Liquidated Damages are stated in Document 00500 - Contract.

SALES AND USE TAXES

The Bidder agrees that all federal, state, and local sales and use taxes are included in the stated bid prices for the work.

UNIT PRICE BASE BID

Any Bid may be rejected which contains material omissions, or irregularities, or in which any of the unit prices are obviously unbalanced in the opinion of the Owner. Also, a bid may be rejected if, in any manner it shall fail to conform to the conditions of the published Bidding Requirements and Contract Documents.

The bidder agrees to accept as full payment for the work proposed herein the amount computed under the provisions of the Contract Documents and based on the following unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved. The bidder agrees that the unit prices represent a true measure of the labor and materials required to perform the work, including all allowances for overhead and profit for each type and unit of work called for in the Contract Documents.

Item No.	Item Description	Unit	Quantity	Unit Price	Total
1	Erosion Control	LS	1	$	$
2	Removal and Disposal of Culverts	LS	1	$	$
3	Removal and Disposal of Drop Inlets	EA	2	$	$
4	Removal and Disposal of Curb and Gutter	LF	110	$	$
5	Removal and Disposal of Concrete Pavement	SY	27	$	$
6	Removal and Disposal of Concrete Slab	SY	26	$	$
7	Removal and Disposal of Headwall	EA	2	$	$
8	Removal and Disposal of Wingwalls	EA	4	$	$
9	Embankment (Plan Quantity)	CY	36	$	$
10	Aggregate Base Course (Class 7)	TON	40	$	$
11	Cold Milling	SY	147	$	$
12	ACHM Surface	TON	25	$	$
13	Maintenance of Traffic	LS	1	$	$
14	5' S x 3' R Reinforced Concrete Box Culvert (Prefabricated or Cast-in-Place)	LF	48	$	$
15	Concrete Headwalls (Cast-in-Place)	EA	2	$	$
16	Concrete Wingwalls (Cast-in-Place)	EA	4	$	$
17	18" HDPE Pipe Culvert	LF	8	$	$
18	Drop Inlet	EA	2	$	$
19	Selected Bedding for Culvert (B-Stone)	CY	20	$	$
20	Combination Concrete Curb and Gutter	LF	110	$	$

Item No.	Item Description	Unit	Quantity	Unit Price	Total
21	Solid Sodding	SY	10	$	$
22	Arkansas Code Ann. 22-9-212, Trench and Excavation Safety System	LS	1	$	$
23	Miscellaneous (Mobilization, Demobilization, Bonds, Insurance, As-Built Record Drawings, Seeding of Construction Area, and Any Items not Covered Elsewhere to Complete the Project per the Drawings and Specifications)	LS	1	$	$

TOTAL AMOUNT BID $_____

_____

Words

BASIS OF AWARD

The Bidder understands that the Contract will be awarded to the most qualified bidder with the lowest Total Base Bid that the Owner may choose that makes the Project cost acceptable to the Owner. The Owner reserves the right to waive irregularities, reject bids, choose the most qualified bidder for the Project, and to postpone award of the Contract for a period of time which shall not exceed beyond 90 days from the bid opening date.

PAYMENT SCHEDULE

A detailed payment schedule for each structure or unit shall be submitted by the successful low Bidder. The successful low Bidder shall meet with the Engineer and Owner in Little Rock, Arkansas, to review the format and details of the payment schedule. This meeting shall be held within 5 days of notification that the Contractor is the low Bidder. The purpose of the meeting shall be to establish an acceptable format for the payment schedule. The construction detailed payment schedule shall be completed by the Contractor 14 days after the meeting and submitted to the Engineer and Owner for review and approval. Failure of the Contractor to submit the payment schedule as required may result in the Owner's rejection of the Bid or delay in processing the Contractor's request for a progress payment.

SUBCONTRACTORS

The Bidder further certifies that proposals from the following subcontractors were used in the preparation of this Bid; and if awarded a contract, Bidder agrees to not enter into Contracts with others for these divisions of the Work without written approval from the Owner and Engineer.

Subcontractor	**Subcontractor**
Arkansas Contractor License #	Arkansas Contractor License #
Street Address, City, State, Zip Code	Street Address, City, State, Zip Code
Subcontractor	**Subcontractor**
Arkansas Contractor License #	Arkansas Contractor License #
Street Address, City, State, Zip Code	Street Address, City, State, Zip Code

SUPPLIERS/VENDORS

The Bidder shall list the suppliers/vendors where material for this Project will be purchased from and successful Bidder shall updated suppliers/vendors during construction of the Project.

Supplier/Vendor Name	**Supplier/Vendor Name**
Street Address, City, State, Zip Code	Street Address, City, State, Zip Code
Phone Number	Phone Number
Supplier/Vendor Name	**Supplier/Vendor Name**
Street Address, City, State, Zip Code	Street Address, City, State, Zip Code
Phone Number	Phone Number

PERFORMANCE OF WORK BY CONTRACTOR

The Bidder shall perform at least 40 percent of the work with his own forces (70 percent for water and sewer line projects) (refer to Paragraph 24, INSTRUCTIONS TO BIDDERS. Bids from so called "Brokerage Contractors" will not be considered.) List below the items that the Bidder will perform with his own forces, if awarded this Contract, and fill in the blank showing the estimated total cost of these items.

Estimated total cost of the above items the Bidder states that will be performed with his own forces, if awarded Contract:

_____Dollars ($_____)
(Words)

EXPERIENCE OF BIDDER

The Bidder states that he is an experienced Contractor and has completed similar projects within the last 5 years. (List similar projects, with types, names of clients, construction costs, and references with telephone numbers. Use additional sheets if necessary.)

SURETY

If the Bidder is awarded a construction Contract on this Bid, the Surety who provides the Performance and Payment Bond will be:

_____ whose address is:

_____
Street, City, State Zip Code

BIDDER

The name of the Bidder submitting this Bid is:

_____ doing business at:

_____
Street, City, State, Zip Code

which is the address to which all communications concerned with this Bid and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this Bid, or of the partnership, or of all persons interested in this Bid as principals are as follows:

_____

_____

_____

If Sole Proprietor or Partnership

IN WITNESS hereto the undersigned has set his (its) hand this _____ day of _____, 20___.

_____
Signature of Bidder

_____
Title

If Corporation

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed

and its seal affixed by its duly authorized officers this ____day of _____, 20___.

_____
Name of Corporation

(SEAL)

By_____

Title_____

Attest_____
Secretary

DOCUMENT 00350

BID BOND

STATE OF ARKANSAS

KNOW ALL MEN BY THESE PRESENTS, that we:

_____

Principal and Contractor, and _____

_____

hereinafter called Surety, are held and firmly bound unto the **City of Bryant, Arkansas** and represented by its Mayor and City Council, hereinafter called Owner, in the sum of

_____DOLLARS ($_____)

lawful money of the United States of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Principal contemplates submitting or has submitted a bid to the Owner for the furnishing of all labor, materials (except those to be specifically furnished by the Owner), equipment, machinery, tools, apparatus, means of transportation for, and the performance of the work covered in the Bid and the detailed Drawings and Specifications, entitled:

TIMBERCREEK DRIVE CULVERT REPLACEMENT – 19-5766
Bryant, Arkansas

WHEREAS, it was a condition precedent to the submission of said bid that a cashier's check, certified check, or bid bond in the amount of 5 percent of the base bid be submitted with said bid as a guarantee that the Bidder would, if awarded the Contract, enter into a written Contract with the Owner for the performance of said Contract within 15 consecutive calendar days after written notice having been given of the award of the Contract.

NOW, THEREFORE, the conditions of this obligation are such that if the Principal within 15 consecutive calendar days after written notice of such acceptance enters into a written Contract with the Owner and furnishes a Contract Surety Bond in an amount equal to 100 percent of the base bid, satisfactory to the Owner, then this obligation shall be void; otherwise the sum herein stated shall be due and payable to the Owner and the Surety herein agrees to pay said sum immediately upon demand of the Owner in good and lawful money of the United States of America, as liquidated damages for failure thereof of said Principal.

IN WITNESS WHEREOF, the said_____, as Principal herein, has caused these presents to be signed in its name by its_____ and attested by its _____under its corporate seal, and the said _____ as Surety herein, has caused these presents to be signed in its name by its_____ _____ under its corporate seal, this _____ day of _____ A.D., 20__.

Signed, sealed and delivered
in the presence of:

_____
Principal-Contractor

_____

By_____

_____
As to Principal

_____
Title

_____

Surety

_____

_____
Attorney-in-Fact
(Power-of-Attorney to be Attached)

_____
As to Surety

By_____
Agent

NOTICE OF AWARD

TO:

PROJECT: TIBERCREEK DRIVE CULVERT REPLACEMENT – 19-5766

The OWNER has considered the BID submitted by you on July 30, 2019 for the above described WORK in response to its Advertisement for Bids and Instructions to Bidders.

You are hereby notified that your BID has been accepted in the amount of:

_____ Dollars ($_____)

You are required by the Instructions to Bidders to execute the Contract and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, and certificates of insurance within fifteen (15) calendar days from the date of this Notice to you.

If you fail to execute said Contract and to furnish said BONDS within fifteen (15) days from the date of this Notice, said OWNER will be entitled to consider your bid in default, to annul this Notice of Award and to declare your Bid Security forfeited. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this_____ day of _____, 20___.

BRYANT, ARKANSAS
Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by_____,

this the_____ day of _____, 20

By _____

Title _____

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:
Amount:
Description (*Name and Location*): **TIMBERCREEK DRIVE CULVERT REPLACEMENT – 19-5766**
BRYANT, ARKANSAS

BOND

Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ (Seal)	_____ (Seal)
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.

2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
   2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
   2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
   2.3 Owner has agreed to pay the Balance of the Contract Price to:
      1. Surety in accordance with the terms of the Contract; or
      2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.

3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:

   3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
   3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
   3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
   3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
      1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
      2. Deny liability in whole or in part and notify Owner citing reasons therefor.

4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other party*):

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*: **TIMBERCREEK DRIVE CULVERT REPLACEMENT – 19-5766**
BRYANT, ARKANSAS

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

    5.1 Claimants who do not have a direct contract with the Contractor,

        5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2 Pay or arrange for payment of any undisputed amounts.

    7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

(2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

DOCUMENT 00500

CONTRACT

PROJECT: TIMBERCREEK DRIVE CULVERT REPLACEMENT

PROJECT NUMBER: 19-5766

THIS AGREEMENT, made and entered into on the ____ day of_____,20__, by and between_____ herein called the Contractor, and the **City of Bryant, Arkansas**, hereinafter called the Owner:

W I T N E S S E T H:

That the Contractor, for the consideration hereinafter fully set out, hereby agrees with the Owner as follows:

1. That the Contractor shall furnish all the materials, and perform all of the work in manner and form as provided by the following enumerated Drawings, Specifications, and Documents, which are attached hereto and made a part hereof, as if fully contained herein and are entitled **Timbercreek Drive Culvert Replacement – 19-5766,** dated July 2019.

Advertisement for Bids	Payment Bond
Instructions to Bidders	General Conditions
Bid and Acceptance Thereof	Supplemental Conditions
Performance Bond	Specifications
	Drawings (See Sheet Index below)

SHEET INDEX

Sheet No.	Description
1	Cover
2	Topographic Survey
3	Project Overview
4	Demo and Erosion Control Plan
5	Plan and Profile
6	Miscellaneous Details
7	ARDOT W-X002-1
8	ARDOT W-X003-1
9	ARDOT FPC-9
10	ARDOT R-100X-1
11	ARDOT RCB-1
12	ARDOT RCB-2

2. That the Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement in lawful money of the United States, the amount of:

_____ Dollars ($_____).

3. The Work will be completed and ready for final payment in accordance with the General Conditions within 90 days after the date when the Contract Time commences to run as provided in Notice to Proceed.

4. Liquidated Damages: Owner and Contractor recognize that time is of the essence of this Agreement and the Owner will suffer financial loss if the Work is not completed within the time specified in above, plus any extensions thereof allowed in accordance with the General Conditions. They also recognize the delays, expense, and difficulties involved in proving the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner Three Hundred and Fifty Dollars ($350.00) for each day that expires after the time specified in Paragraph 3 for completion and readiness for final payment.

5. That within 30 days of receipt of an approved payment request, the Owner shall make partial payments to the Contractor on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the Contractor, LESS the retainage provided in the General Conditions, which is to be withheld by the Owner until all work within a particular part has been performed strictly in accordance with this Agreement and until such work has been accepted by the Owner.

6. That upon submission by the Contractor of evidence satisfactory to the Owner that all payrolls, material bills, and other costs incurred by the Contractor in connection with the construction of the work have been paid in full, final payment on account of this Agreement shall be made within 60 days after the completion by the Contractor of all work covered by this Agreement and the acceptance of such work by the Owner.

7. It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bond hereto attached for its faithful performance and payment, the Owner shall deem the Surety or Sureties upon such bond to be unsatisfactory or if, for any reason such bond ceases to be adequate to cover the performance of the work, the Contractor shall, at his expense, within 5 days after the receipt of notice from the Owner, furnish an additional bond or bonds in such form and amount and with such Surety or Sureties as shall be satisfactory to the Owner. In such event, no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Owner.

8. No additional work or extras shall be done unless the same shall be duly authorized by appropriate action by the Owner in writing.

9. The Owner and Contractor agree that any controversy or claim arising out of or relating to the Contract, or breach thereof, shall be settled by arbitration administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgement on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and date first above written, in three (3) counterparts, each of which shall, without proof or accounting for the other counterpart be deemed an original Contract.

SEAL:

_____
CONTRACTOR

WITNESSES: By_____

_____ _____
Title

BRYANT, ARKANSAS
OWNER

ATTEST: By_____

_____ _____
Clerk Title

Approved as to form:

_____ Attorney for Owner

NOTICE TO PROCEED

TO:

PROJECT: TIMBERCREEK DRIVE CULVERT REPLACEMENT – 19-5766

You are hereby notified to commence WORK in accordance with the Contract dated _____ on or before _____ , and you are to complete the WORK within **90** consecutive calendar days thereafter. The date of completion of all WORK is therefore _____**, 20__.**

BRYANT, ARKANSAS
Owner

By _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____ this the _____ day of _____ 20____.

By _____

Title _____

DOCUMENT 00700
GENERAL CONDITIONS
TABLE OF CONTENT

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DOCUMENT 00700

GENERAL CONDITIONS

These General Conditions contain contractual-legal Articles which establish the requirements and conditions governing responsibility, policy, and procedures that apply during the construction and warranty period. This part of the Contract Documents is preprinted. Any modifications to the following Articles that are special to the Project under consideration will be made in the Supplementary Conditions. Requirements and conditions which have special significance to the Contract for the contemplated Work on this Project are as set forth in the remaining Sections of these Contract Documents.

DEFINITIONS

Wherever in the Contract Documents the following terms are used, the intent and meaning shall be interpreted as follows:

1. AS APPROVED

The words "as approved", unless otherwise qualified, shall be understood to be followed by the words "by the Engineer".

2. AS SHOWN, AND AS INDICATED

The words "as shown" and "as indicated" shall be understood to be followed by the words "on the Drawings".

3. BIDDER

The person or persons, partnership, firm, or corporation submitting a Bid for the Work contemplated.

4. CONTRACT

The "Contract" is the written agreement covering the performance of the Work and the furnishing of labor, materials, incidental services, tools, and equipment in the construction of the Work. It includes supplemental agreements amending or extending the Work contemplated and which may be required to complete the Work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments, or extensions to the Contract and include Contract Change Orders.

5. CONTRACT DOCUMENTS

The "Contract Documents" consist of the Bidding Requirements, Contract forms, Conditions of the Contract, the Specifications, and the Drawings, including all modifications thereof, incorporated into the Documents before their execution, and including all other requirements incorporated by specific reference thereto. These form the Contract.

6. CONTRACTOR

The person or persons, partnership, firm, or corporation who enters into the Contract awarded him by the Owner.

7. DAYS

Unless otherwise specifically stated, the term "days" will be understood to mean calendar days.

8. DRAWINGS

The term "Drawings" refers to the official Drawings, profiles, cross sections, elevations, details, and other working drawings and supplementary drawings, or reproductions thereof, sealed by the Engineer, which show the location, character, dimensions, and details of the Work to be performed. Drawings may either be bound in the same book as the Project Manual or bound separately and are a part of the Contract Documents, regardless of the method of binding.

9. ENGINEER

The person or organization identified as such in the Contract. The term "Engineer" means the Engineer or his authorized representative.

10. NOTICE

The term "notice" or the requirement to notify, as used in the Contract Documents or applicable state or federal statutes, shall signify a written communication delivered in person or by certified or registered mail to the individual, or to a member of the firm, or to an officer of the corporation for whom it is intended. Certified or registered mail shall be addressed to the last business address known to him who gives the notice.

11. OR EQUAL

The term "or equal" shall be understood to indicate that the "equal" product is the same or better than the product named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the Project design requirements will be made by the Engineer. Such "equal" products shall not be purchased or installed by the Contractor without the Engineer's written approval.

12. OWNER

The person, organization, or public body identified as such in the Contract.

13. PLANS (See Drawings).

14. SPECIFICATIONS

Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto. Where standard specifications, such as those of ASTM, AASHTO, etc., have been referred to, the applicable portions of such standard specifications shall become a part of these Contract Documents.

Where portions of the Work traverse or cross federal, state, county, or local highways, roads, streets, or railroads, and the agency in control of such property has established standard specifications governing items of Work that differ from these Specifications, the most stringent requirements shall apply.

The Contractor shall comply with all regulations and requirements of the State Highway Department and the City and County Road Departments wherever the Work traverses or crosses state, city, or county roads.

15. NOTICE TO PROCEED

A written notice given by the Owner to the Contractor (with a copy to the Engineer) fixing the date on which the Contract time will commence to run and on which the Contractor shall start to perform his obligation under the Contract. The Notice to Proceed shall be given within 30 days following execution of the Contract by the Owner.

16. SUBSTANTIAL COMPLETION

"Substantial completion" shall be that degree of completion of the Project, or a defined portion of the Project, sufficient to provide the Owner, at his discretion, the full-time use of the Project or defined portion of the Project for the purposes for which it was intended.

Such substantial completion shall not relieve the Contractor from liquidated damages should the Owner have added costs after the completion date, i.e., if additional construction observation, interest paid, loss of revenue, or other expenses continue to be charged to the Owner.

17. WORK

The word "Work" within these Contract Documents shall include all material, labor, and tools; all appliances, machinery, transportation, and appurtenances necessary to perform and complete the Contract; and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure. As used herein, "provide" shall be understood to mean "provide complete in place", that is, "furnish and install".

CONTRACT DOCUMENTS

18. INTENT OF CONTRACT DOCUMENTS

The Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. The intent of the Documents is to include all Work (except specific items to be furnished by the Owner) necessary for completion of the Contract. Materials or Work described in words which so applied have a well-known technical and trade meaning shall be held to refer to such recognized standards.

19. DISCREPANCIES AND OMISSIONS

Any discrepancies or omissions found in the Contract Documents shall be reported to the Engineer immediately. The Engineer will clarify discrepancies or omissions, in writing, within a reasonable time.

In resolving inconsistencies among two or more Sections of the Contract Documents, precedence shall be given in the following order:

1. CONTRACT
2. SUPPLEMENTARY CONDITIONS
3. SPECIFICATIONS
4. INSTRUCTIONS TO BIDDERS
5. GENERAL CONDITIONS
6. DRAWING(S)

Figure dimensions on Drawings shall take precedence over scale dimensions. Detailed Drawings shall take precedence over general Drawings. It is understood and agreed that the Work shall be performed and completed according to the true spirit, meaning, and intent of these Documents.

20. ALTERATIONS - CHANGES IN WORK

The Owner, with or without notice to the Sureties and without invalidating the Contract, may order changes in the Work within the general scope of the Contract by altering, adding to, or deducting from the Work, the Contract being adjusted accordingly. To effect a change in the work a letter must be written by the OWNER to the ENGINEER stating any changes the OWNER requires in the project plans or specifications. Changes may necessitate a **Change Order** for the project and will be prepared by the ENGINEER and submitted to the CONTRACTOR and the OWNER for approval *prior to* effecting the change on the project. All such Work shall be executed under the conditions of the original Contract, except as specifically adjusted at the time of ordering such change.

*****NOTE:** The OWNER shall not direct the CONTRACTOR to change work. *******

In giving instructions, the Engineer may order minor changes in the Work not involving extra cost and not inconsistent with the purposes of the Project, but otherwise, except in an emergency endangering life or property, additions or deductions from the Work shall be performed only in pursuance of an approved Change Order from the Owner, signed or countersigned by the Engineer, or a Change Order from the Engineer stating that the Owner has authorized the deduction, addition, or change, and no claim for additional payment shall be valid unless so ordered.

If the Work is reduced by alterations, such action shall not constitute a claim for damages based on loss of anticipated profits.

21. SUB-SURFACE CONDITIONS FOUND DIFFERENT

Should the Contractor encounter sub-surface and/or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, the Contractor shall immediately give notice to the Engineer of such conditions before they are disturbed. The Engineer will thereupon promptly investigate the conditions, and if the Engineer finds that they materially differ from those shown on the Drawings or indicated in the Specifications, the Engineer will at once make such changes in the Drawings and/or the Specifications as he may find necessary. Any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in the Paragraph titled "Changes in Work."

22. VERIFICATION OF CONTRACT DOCUMENTS

The Contractor shall thoroughly examine and become familiar with all of the various parts of these Contract Documents and determine the nature and location of the Work, the general and local conditions and all other matters which can in any way affect the Work under this Contract. Failure to make an examination necessary for this determination shall not release the Contractor from the obligations of this Contract. The Contractor warrants that no verbal agreement or conversation with any officer, agent, or employee of the Owner or with the Engineer either

before or after the execution of this Contract, has affected or modified any of the terms or obligations herein contained.

23. DOCUMENTS TO BE KEPT ON THE JOB SITE

The Contractor shall keep one copy of the Contract Documents on the job site, in good order, available to the Engineer and to his representatives.

The Contractor shall maintain on a daily basis at the job site, and make available to the Engineer on request, one current record set of the Drawings which have been accurately marked up to indicate all modifications in the completed Work that differ from the design information shown on the Drawings. Upon substantial completion of the Work, the Contractor shall give the Engineer one complete set of marked up record Drawings.

Failure of the Contractor to submit accurate Record Drawings to the Engineer will be adequate justification for postponement of the Final Inspection and Final Payment.

24. ADDITIONAL CONTRACT DOCUMENTS

The Engineer will furnish to the Contractor on request and free of charge, three copies of the Project Manual and three sets of full-size Drawings. Additional copies of the Project Manual and the Drawings may be obtained on request by paying the price as shown in the Invitation to Bid for the Contract Documents.

25. OWNERSHIP OF DRAWINGS

All Drawings, Plans, Specifications, and copies thereof furnished by the Engineer and the Owner are their property. They are not to be used on other work and, with the exception of the signed Contract set, are to be returned to them on request at the completion of the Work. Any reuse of these materials without specific written verification or adaptation by the Engineer and the Owner will be at the risk of the user and without liability or legal expense to the Engineer and the Owner.

Such user shall hold the Engineer and the Owner harmless from any and all damages, including reasonable attorneys' fees, from any and all claims arising from any such reuse. Any such verification and adaptation by the Engineer and the Owner will entitle the Engineer to further compensation at rates to be agreed upon by the user, the Engineer and the Owner. All models are the property of the Owner.

THE ENGINEER

26. AUTHORITY OF THE ENGINEER

The Engineer shall be the Owner's representative during the construction period. His authority and responsibility shall be limited to the provisions set forth in these Contract Documents. The Engineer shall have the authority to reject Work and material which does not conform to the Contract Documents. However, neither the Engineer's authority to act under this provision, nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, their

respective Sureties, any of their agents or employees, or any other person performing any of the Work.

27. DUTIES AND RESPONSIBILITIES OF THE ENGINEER

The Engineer will make periodic visits to the site of the Project to observe the progress and quality of the Work and to determine, in general, if the Work is proceeding in accordance with the intent of the Contract Documents. He shall not be required to make comprehensive or continuous inspections to check quality or quantity of the Work, and he shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work.

Visits and observations made by the Engineer shall not relieve the Contractor of his obligation to conduct comprehensive inspections of the Work and to furnish materials and perform acceptable Work, and to provide adequate safety precautions, in conformance with the intent of the Contract.

The Engineer will make decisions, in writing, on all claims of the Owner or the Contractor arising from interpretation or execution of the Contract Documents. Such decision shall be necessary before the Contractor can receive additional money under the terms of the Contract. Changes in Work ordered by the Engineer will be made in compliance with the Article titled, ALTERATIONS - CHANGES IN WORK.

One or more construction observers may be assigned to observe the Work for compliance with the Contract Documents and to act in matters of construction under this Contract. It is understood that such construction observers shall have the power to issue instructions and make decisions within the limitations of the authority of the Engineer. The Contractor shall furnish all reasonable assistance required by the Engineer or construction observer for proper review of the Work. Construction observers shall not have the power or authority to delete, increase, modify or otherwise change the requirements of the Contract Documents.

The above-mentioned observation shall not relieve the Contractor of his obligations to conduct comprehensive inspections of the Work and to furnish materials and perform acceptable Work and to provide adequate safety precautions, in conformance with the intent of the Contract.

28. REJECTED MATERIAL

Any material condemned or rejected by the Engineer or his authorized construction observer because of nonconformity with the Contract Documents shall be removed at once from the vicinity of the Work by the Contractor at his own expense, and the same shall not be used on the Work.

29. UNNOTICED DEFECTS

Any defective Work or material that may be discovered by the Engineer during construction or before the final acceptance of Work, or before final payment has been made, or during the guarantee period, shall be removed and replaced by Work and materials which shall conform to the provisions of the Contract Documents. Failure on the part of the Engineer to condemn or reject bad or inferior Work or materials shall not be construed to imply acceptance of such Work

or materials. The Owner shall reserve and retain all of its rights and remedies at law against the Contractor and its surety for correction of any and all latent defects discovered after the guarantee period.

30. RIGHT TO RETAIN IMPERFECT WORK

If any part or portion of the Work done or material furnished under this Contract shall prove defective and not in accordance with the Drawings and Specifications, and if the imperfection in the same shall not be of sufficient magnitude or importance as to make the Work dangerous or unsuitable, or if the removal of such Work will create conditions which are dangerous or undesirable, the Owner shall have the right and authority to retain such Work but shall make such deductions in the final payment therefore as may be just and reasonable. The Owner shall also have the option to require, at no added cost to the Owner, extended warranties, maintenance bonds, or other remedies to provide for repair or reconstruction of imperfect Work.

31. LINES AND GRADES

The Contractor shall stake-out Work for this Contract and set the lines and grades necessary to complete the Work and shall keep the Engineer informed a reasonable time in advance of the times and places at which he wishes to do Work in order that the Engineer may review the lines and grades set by the Contractor and in order that the Engineer may make the necessary measurements for payment to the Contractor. All stakes, marks, and other information shall be carefully preserved by the Contractor, and in case of their careless or unnecessary destruction or removal by him or his employees, such stakes, marks, and other information will be replaced at the Contractor's expense.

Figured dimensions, when given in the Drawings, shall be accurately followed, even though they may differ from scaled measurements. No Work shown on the Drawings, the dimensions of which are not figured, shall be executed until instructions have been obtained from the Engineers as to the dimensions to be used. Large-scale and full-size drawings shall be followed in preference to small-scale drawings. The Engineer will provide the Contractor with bench marks to be used to establish grades and will also provide a baseline to be used to establish the proper lines. All Work done under this Contract shall be done to the lines and grades shown on the Drawings. The Contractor shall stake-out Work for this Contract and set the lines and grades necessary to complete the Work and shall keep the Engineer informed a reasonable time in advance of the times and places at which he wishes to do Work in order that the Engineer may review the lines and grades set by the Contractor and in order that the Engineer may make the necessary measurements for payment to the Contractor.

The Contractor shall furnish without charge competent persons from his force and such tools, stakes, surveying instruments, and other materials as the Engineer may require for reviewing the Contractor's stake-out of the Work and in making measurements for payment estimates or for surveys to establish temporary or permanent reference marks in connection with said Work.

Any Work done without lines, grades, and levels being reviewed by the Engineer, or other representative of the Engineer, may be ordered removed and replaced at the Contractor's cost and expense. The Contractor shall carefully preserve all monuments, bench marks, reference points, and stakes, and in case of willful or careless destruction of the same, he will be charged with the resulting expense of replacement and shall be responsible for any mistakes or loss of

time that may be caused by their unnecessary loss or disturbance. In the event that the stakes and marks placed by the Engineer are destroyed through carelessness on the part of the Contractor, and that the destruction of these stakes and marks causes a delay in the Work, the Contractor shall have no claim for damages or extensions of time.

In the case of any permanent monuments or bench marks which must of necessity be removed or disturbed in the construction of the Work, the Contractor shall carefully protect and preserve the same until they can be properly referenced and relocated. The Contractor shall also furnish at his own expense such materials and assistance as are necessary for the proper replacement of monuments or bench marks that have been moved or destroyed.

32. SHOP DRAWING SUBMITTAL PROCEDURE

The Contractor shall submit a sufficient number of copies to allow the Engineer to retain four copies (2 for himself; 2 for the Owner) for review, such shop drawings, electrical diagrams, and catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for construction, except as noted below.

Should the Contractor fail to submit acceptable shop drawings on the second submittal, one copy will be returned to him and the cost of the Engineer's time to review subsequent submittals on the unacceptable item will be deducted from the Contractor's monthly payment invoice. Shop drawings shall be submitted in sufficient time to allow the Engineer not less than 20 regular working days per submittal for examining the shop drawings.

These shop drawings shall be accurate, distinct, and complete and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications.
Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the shop drawings, or other approved means, that he (the Contractor) has checked the shop drawings, and that the Work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with Work of all other trades involved.

The practice of submitting incomplete or unchecked shop drawings for the Engineer to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, clearly indicate that they have not been checked by the Contractor will be considered as not complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.
When the shop drawings have been reviewed by the Engineer, two (2) sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the shop drawing may be rejected and one (1) set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the shop drawings in quadruplicate, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to resubmitted shop drawings other than those changes indicated by the Engineer, unless such changes are clearly described in a letter accompanying the resubmitted shop drawings.

The review of such shop drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements or for deviations from the Contract Drawings or Specifications unless the Contractor has called attention to such deviations in writing by a letter accompanying the shop drawings and the Engineer approves the change or deviation in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment.

33. ADDITIONAL DETAIL DRAWINGS AND INSTRUCTIONS

The Engineer will furnish, with reasonable promptness, additional instructions by means of drawings or otherwise, if, in the Engineer's opinion, such are required for the proper execution of the Work. All such drawings and instructions will be consistent with the Contract Documents, true developments thereof, and reasonably inferable therefrom.

THE CONTRACTOR AND HIS EMPLOYEES

34. INDEPENDENT CONTRACTOR

The Contractor shall perform all Work under this Contract as an Independent Contractor and shall not be considered as an agent of the Owner or of the Engineer, nor shall the Contractor's subcontractors or employees be subagents of the Owner or of the Engineer.

The Contractor shall employ only employees who are competent and skillful in their respective line of work, and local labor shall be given preference. Whenever the Engineer or the Owner notify the Contractor that any person on this work is, in their opinion, incompetent, disorderly, or refuses to carry out the provisions of this Contract, or uses threatening or abusive language to any person representing the Owner on the work or is otherwise unsatisfactory, such person shall be immediately discharged from the Project and shall not be re-employed thereon except with the consent of the Engineer by the Owner.

35. SUBCONTRACTING

Within 30 days after the execution of the Contract, the Contractor shall submit to the Engineer the names of all subcontractors proposed for the Work, including the names of any subcontractors that were submitted with the Bid. The Contractor shall not employ any subcontractors that the Engineer may object to as lacking capability to properly perform Work of the type and scope anticipated. No changes will be allowed from the approved subcontractor list without written approval of the Engineer.

The Contractor agrees that he is as fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the Owner.

36. INSURANCE AND LIABILITY

A. GENERAL

The Contractor shall provide (from insurance companies acceptable to the Owner) the insurance coverage designated hereinafter and pay all costs.

Before execution of the Contract, Contractor shall furnish the Owner with complete copies of all certificates of insurance specified herein showing the type, amount, class of operations covered, effective dates, and date of expiration of policies. Each Certificate shall contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least thirty (30) days prior written notice has been give to the Owner.

In case of the breach of any provision of this Article, the Owner, at his option, may take out and maintain, at the expense of the Contractor, such insurance as the Owner may deem proper and may deduct the cost of such insurance from any monies which may be due or become due the Contractor under this Contract.

All insurance contracts and certificates shall be executed by a licensed resident agent of the insurance company, and in all ways comply with the insurance laws of the State of Arkansas. Further, the said insurance company shall be duly licensed and qualified to do business in the State of Arkansas, and have an A.M. Best rating of A- or better and have a Positive or Stable Rating Outlooks.

In the event any Work under this Contract is performed by a subcontractor, the Contractor shall be responsible for any liability directly or indirectly arising out of the Work performed under this Contract by a subcontractor, which liability is not covered by the subcontractor's insurance.

The Contractor's and any subcontractor's general liability and automobile liability insurance policies shall include the Owner and Engineer, their officers, agents, subconsultants and employees as additional insureds for any claims arising out of Work performed under this Contract. Certificates of insurance shall explicitly name the Owner and Engineer as additional insureds. Inclusion of either party as "certificate holder" does not meet this requirement.

B. WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY INSURANCE

Worker's Compensation Insurance in statutory limits shall be secured and maintained as required by the laws of the State of Arkansas. In addition, Employer's Liability Insurance in an amount not less than $500,000 for each accident, $500,000 for each employee regarding disease, and $500,000 policy limit regarding disease shall cover all employees who have performed any of the obligations assumed by the Contractor under these Contract Documents. This insurance will protect the Contractor against any and all claims resulting from injuries, sickness, disease, or death to employees engaged in work under this Contract. The Contractor shall require the subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees

to be engaged in such Work. Workers Compensation and Employers Liability must include a Waiver of Subrogation in favor of the Owner and the Engineer.

Where Work under this Contract includes any water or navigational exposure, coverage shall be included to cover the Federal Longshoremen's and Harborworker's Act and the Federal Jones Act when applicable.

C. COMMERCIAL GENERAL LIABILITY INSURANCE

The Contactor shall maintain during the life of this Contract such *independent contractor's* general liability, completed operations and products liability, and automobile liability insurance as will provide coverage for claims for damages for bodily injury, including accidental death, as well as for claims for property damage which may arise directly or indirectly from performance of the Work under this Contract. The general liability policy should also specifically ensure the contractual liability assumed by the Contractor under Article 38, Indemnity. The General Liability policy must provide coverage on an occurrence basis, not a claims-made basis. A Waiver of Subrogation is to be provided in favor of the Owner and the Engineer in regards to General Liability. A Designated Construction Project Aggregate (also known as Per Project Aggregate) liability limit is required also. The Contractor's General Liability policy is to be primary and non-contributory.

Required limits of General Liability Insurance
General Aggregate: Not less than $2,000,000
Completed Operations Aggregate: Not less than $2,000,000
Each Occurrence of Injury or Property Damage: Not less than $1,000,000 Combined Single Limit

D. COMMERCIAL AUTO LIABILITY INSURANCE

The Contractor shall maintain during the life of this Contract automobile liability insurance that will provide coverage for claims for damages for bodily injury, including accidental death, as well as for claims for property damage which may arise directly or indirectly from performance of the Work under this Contract.

Commercial Automobile Liability Insurance
Shall include Personal Injury and Property Damage coverage for "Any Auto", "Hired Autos", and "Non-Owned Auto" at a Combined Single Limit of not less than $1,000,000.

E. EXCESS UMBRELLA LIABILITY INSURANCE

$2,000,000 limit of liability policy shall be provided in additional limits to underlying Limits required for General Liability, Auto Liability, and Employers Liability.

F. OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY INSURANCE

The Contractor shall indemnify and save harmless the Owner and Engineer from and against all losses and all suits, claims, demands, judgments, actions, and payment of every description and nature brought or recovered against him by reason of any

omission or act of the Contractor, his agents, or employees in the execution of the work or in the guarding of it. The Contractor shall secure and maintain protective liability insurance in the name of the Owner and the Contractor covering from contingent liability under this contract.

1) General Aggregate: Not less than $2,000,000

2) Each Occurrence of Personal Injury or Property Damage: Not less than $1,000,000 Combined Single Limit.

G. BUILDER'S RISK INSURANCE

The Contractor shall procure and maintain during the life of this contract Builder's Risk Insurance fire, lightening, extended coverage, vandalism, and property theft on the insurable portion of the Project on a 100 percent completed value basis against damage to the equipment, structures, or material. The Owner and the Contractor, as their interests may appear shall be names as the Insured.

H. INSTALLATION FLOATER INSURANCE POLICY

The Contractor shall procure and maintain during the life of this contract an Installation Floater for fire, lightening, extended coverage, vandalism, and property theft on the insurance portion of the Project. The Owner and the Contractor, as their interests may appear, shall be named as the Insured. Coverage shall be based on 100 percent of the total value of the competed Project. The Installation Floater Insurance Policy shall protect against damage to all equipment and materials.

Note: Builder's Risk Insurance must be procured and maintained during the life of the project if there is an actual structure being erected or which exists on the premises. If no structure exists, or is being erected an **Installation Floater Insurance Policy** must be procured and maintained during the life of the project.

Note: Builder's Risk Insurance and Installation Floaters do not provide coverage for Contractor's equipment if stolen or damaged at a job site. Contractors are responsible for insuring their own equipment.

I. INSURANCE COVERAGE FOR SPECIAL CONDITIONS

When the construction is to be accomplished within a public or private right-of-way requiring special insurance coverage, the Contractor shall conform to the particular requirements and provide the required insurance. The Contractor shall include in his liability policy all endorsements, or purchase additional liability insurance that the said authority may require for the protection of the authority, its officers, agents, and employees. Insurance coverage for special conditions, when required, shall be provided as set forth in the Supplementary Conditions.

J. NO PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the provisions hereof in exercising any authority granted by the Contract, there will be no personal liability upon any public official.

37. PERFORMANCE AND PAYMENT BONDS

The successful Bidder shall furnish a Performance and Payment Bond in the amount equal to one hundred percent (100%) of the contract price on the forms provided in the Contract Documents as security for faithful performance of the Contract and payment of all obligations arising thereunder within ten days after receipt of the Notice of Award. The bond shall be written by a surety company qualified and authorized to do business in the State of Arkansas and shall be listed on the current U.S. Department of Treasury, Circular Number 570, or amendments thereto, in the Federal Register of acceptable Sureties for Federal projects. The bond shall be executed by a resident agent licensed by the State Insurance Commissioner to represent the surety company in Arkansas. The bond shall be written in favor of the Owner. Bond company rating by "AM Best Rating Company" to be "A-" or above and have a Positive or Stable Rating Outlooks.

The Attorney-in-Fact who executes this Performance Bond and Payment Bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond. All Contracts, Performance and Payment Bonds, and respective powers-of-attorney will have the same date.

If the Surety on any Bond furnished by Contractor is declared bankrupt, or becomes insolvent, or its right to do business is terminated in any location where any part of the project is located, or ceases to meet the requirements of the preceding paragraph, the Contractor shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to Owner.

Before execution of the Contract Documents, the Contractor shall submit the Bonds (in triplicate) to the Owner. The Bonds shall be submitted **WITHOUT DATES**, as they will be dated by the Owner at the same time as the Contracts are executed.

38. INDEMNITY

The Contractor shall indemnify and hold harmless the Owner, the Engineer, and their agents and employees from and against damages, losses, and expenses including attorney's fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease, or death, or to injury or to destruction of tangible property (other than the Work itself), including the loss of use resulting there from, and (2) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Owner, the Engineer, or any of their agents or employees by any employee of the Contractor, any subcontractor, anyone directly indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Article shall not be limited in any way by any limitation on the amount or type of

damages, compensation, or benefits payable by or for the Contractor or any subcontractor under Worker's Compensation Acts, Disability Benefit Acts, or other Employee Benefit Acts.

39. TAXES AND CHARGES

The Contractor shall withhold and pay any and all sales and use taxes, including any and all charge of taxes thereof, and all withholding taxes, whether state or federal, and pay all Social Security charges and also all State Unemployment Compensation charges, and pay or cause to be withheld, as the case may be, any and all taxes, charges, or fees or sums whatsoever, which are now or may hereafter be required to be paid or withheld under any laws.

40. ORDINANCES, PERMITS, AND LICENSES

The Contractor shall keep himself fully informed of all local ordinances, as well as state and federal laws, which in any manner affect the Work herein specified. The Contractor shall at all times comply with said ordinances, laws, and regulations, and protect and indemnify the Owner, the Engineer and their respective employees, and its officers and agents against any claim or liability arising from or based on the violation of any such laws, ordinances, or regulations up to the amount of the Contract Price. All permits, licenses, and inspection fees necessary for prosecution and completion of the Work shall be secured and paid for by the Contractor, unless otherwise specified.

The Contractor shall observe and comply with all applicable local, state, and federal occupational safety and health regulations during the prosecution of Work under this Contract. In addition, full compliance by the Contractor with the U. S. Department of Labor's Occupational Safety and Health Standards, as established in Public Law 91-596, will be required under the terms of this Contract.

41. SUPERINTENDENCE

The Contractor shall keep on the Work, during its progress, competent supervisory personnel. The Contractor shall designate, in writing, before starting Work, one authorized representative who shall have complete authority to represent and to act for the Contractor. The Contractor shall give sufficient supervision to the Work, using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, and procedures, and for providing adequate safety precautions and coordinating all portions of the Work under the Contract. It is specifically understood and agreed that the Engineer, its employees and agents, shall not have control or charge of and shall not be responsible for the construction means, methods, techniques, procedures, or for providing adequate safety precautions in connection with the Work under the Contract.

42. RECEPTION OF ENGINEER'S DIRECTIONS

The superintendent, or other duly authorized representative of the Contractor, shall represent the Contractor in all directions given to him by the Engineer. Such directions of major importance will be confirmed in writing. Any direction will be so confirmed, in each case, on written request from the Contractor.

43. SANITATION

Sanitary conveniences conforming to state and local codes shall be erected and maintained by the Contractor at all times while workers are employed on the Work. The sanitary convenience facilities shall be as approved by the Engineer.

44. EMPLOYEES

The Contractor shall employ only men or women who are competent and skillful in their respective line of work. Whenever the Engineer or Owner shall notify the Contractor that any person on the Work is, in their opinion, incompetent, unfaithful, or disorderly or refuses to carry out the provisions of this Contract or uses threatening or abusive language to any person representing the Owner on the Work, or is otherwise unsatisfactory, such person shall be immediately discharged from the Project and shall not be re-employed thereon except with the consent of the Engineer by the Owner.

45. PROJECT MEETINGS

The Engineer may conduct Project meetings, as he deems necessary, for the purposes of discussing and resolving matters concerning the various elements of the Work. Time and place for these meetings and the names of persons required to be present shall be as directed by the Engineer. Contractor shall comply with these attendance requirements and shall also require his subcontractors to comply.

46. SAFETY

The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U. S. Department of Labor (OSHA); the State Labor Department Laws; all other applicable federal, state, county, and local laws, ordinances, and codes; the requirements set forth below; and any regulations that may be detailed in other parts of these Documents. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth herein.

The Contractor shall develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.

The duty of the Engineer to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

The Contractor, as a part of his safety program, shall maintain at his office or other well-known place at the job site, safety equipment applicable to the Work as prescribed by the aforementioned authorities, all articles necessary for giving first aid to the injured, and shall

establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the job site.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the site, giving full details and statements of witnesses.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

47. CONTRACTOR'S TOOLS AND EQUIPMENT

The Contractor's tools and equipment used on the Work shall be furnished in sufficient quantity and of a capacity and type that will safely perform the Work specified, and shall be maintained and used in a manner that will not create a hazard to persons or property, or cause a delay in the progress of the Work.

48. PROTECTION OF WORK AND PROPERTY

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Contract. The Contractor shall at all times safely guard and protect from damage his own Work, and that of adjacent property (as provided by law and the Contract Documents). All passageways, guard fences, lights, and other facilities required for protection by federal, state, or municipal laws and regulations and local conditions, must be provided and maintained.

The Contractor shall protect his Work and materials from damage due to the nature of the Work, the elements, carelessness of other Contractors, or from any cause whatever until the completion and acceptance of the Work. All loss or damages arising out of the nature of the Work to be done under these Contract Documents, or from any unforeseen obstruction or defects which may be encountered in the prosecution of the Work, or from the action of the elements, shall be sustained by the Contractor.
In addition, the Contractor shall take special precautions to prevent the "flotation" of all tanks and structures prior to their final acceptance and filling for beneficial use. The Contract price shall include all costs associated with such special precautions.

Also, the Contractor shall not load or permit any part of any structure to be loaded with a weight that will endanger its safety or its structural integrity.

49. RESPONSIBILITY OF CONTRACTOR TO ACT IN EMERGENCY

In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor shall act, without previous instructions from the Owner or Engineer, as the situation may warrant. The Contractor shall notify the Engineer thereof immediately thereafter. Any claim for compensation by the Contractor, together with substantiating documents in regard to

expense, shall be submitted to the Owner through the Engineer and the amount of compensation shall be determined by agreement.

50. MATERIALS AND APPLIANCES

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the Work.

Unless otherwise specified, all materials shall be new, and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

In selecting and/or approving equipment for installation in the Project, the Owner and Engineer assume no responsibility for injury or claims resulting from failure of the equipment to comply with applicable national, state, and local safety codes or requirements, or the safety requirements of a recognized agency, or failure due to faulty design concepts, or defective workmanship and materials.

51. BUY AMERICAN

Unless otherwise stipulated, only steel and manufactured products produced in the United States will be used by the Contractor, subcontractors, materialmen, and suppliers in performance of the Work.

52. CONTRACTORS' AND MANUFACTURERS' COMPLIANCE WITH STATE SAFETY, OSHA, AND OTHER CODE REQUIREMENTS

The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items required by the state and federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work (including Owner-selected equipment) subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. Contractors shall notify all equipment suppliers and subcontractors of the provisions of this Article.

53. SUBSTITUTION OF MATERIALS

Except for Owner-selected equipment items and items where no substitution is clearly specified, whenever any material, article, device, product, fixture, form, type of construction, or process is indicated or specified by patent or proprietary name, by name of manufacturer, or by catalog number, such specifications shall be deemed to be used for the purpose of establishing a standard of quality and facilitating the description of the material or process desired. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design, and shall be deemed to be followed by the words "or equal". The Bidder may, in such cases, submit complete data to the Engineer 10 days prior to bid date for consideration of another material, type, or process which shall be substantially equal in every respect to that so indicated or specified. Substitute

materials shall not be used unless approved in writing. The Owner or his authorized agent will be the sole judge of the substituted article or material.

54. TESTS, SAMPLES, AND INSPECTIONS

The Contractor shall furnish, without extra charge, the necessary test pieces and samples, including facilities and labor for obtaining the same, as requested by the Engineer. When required, the Contractor shall furnish certificates of tests of materials and equipment made at the point of manufacture by a recognized testing laboratory.

The Owner, Engineer, authorized government agents, and their representatives shall at all times be provided safe access to the Work wherever it is in preparation or progress, and the Contractor shall provide facilities for such access and for inspection, including maintenance of temporary and permanent access.

If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require any Work to be specially tested or approved, the Contractor shall give timely notice of its readiness for inspection. Inspections to be conducted by the Engineer will be promptly made, and where practicable, at the source of supply. If any Work should be covered up without approval or consent of the Engineer. it shall be uncovered for examination at the Contractor's expense.

55. ROYALTIES AND PATENTS

The Contractor shall pay all royalty and license fees, unless otherwise specified. The Contractor shall defend all suits or claims for infringement of any patent rights and shall save the Owner and the Engineer harmless from any and all loss, including reasonable attorneys' fees, on account thereof, up to the amount of the Contract Price.

56. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the Work should be stopped under an order of any court or other public authority for a period of more than 3 months, through no act or fault of the Contractor, its Subcontractors, or respective employees or agents, then the Contractor may, upon 15 days' written notice to the Owner and the Engineer, if said default has not been cured, stop Work or terminate this Contract and recover from the Owner payment for the reasonable value of Work performed.

57. CORRECTION OF DEFECTIVE WORK

The Contractor hereby agrees to make, at his own expense, all repairs or replacements necessitated by defects in materials or workmanship supplied under terms of this Contract, and pay for any damage to other works resulting from such defects, which are found during construction or become evident within 1 year after the date of final acceptance of the Work or within 1 year after the date of substantial completion established by the Engineer for specified items of equipment, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents. The Contractor further assumes responsibility for a similar guarantee for all Work and materials provided by subcontractors or manufacturers of packaged equipment components.

The effective date for the start of the guarantee or warranty period for equipment qualifying as substantially complete is defined in Article 16, SUBSTANTIAL COMPLETION, and Article 69, SUBSTANTIAL COMPLETION DATE, in these General Conditions. The Contractor also agrees to hold the Owner and the Engineer harmless from liability of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written order for same from the Owner.

If the Contractor fails to make the repairs and replacements promptly, the Owner may do the Work, and the Contractor and his Surety shall be liable for the cost thereof. Any additional requirements for the Project relative to correction of defective Work after final acceptance are set forth in the Supplementary Conditions.

PROGRESS OF THE WORK

58. BEGINNING OF THE WORK

Before Work shall be started and materials ordered, the Contractor shall meet and consult with the Owner and/or Engineer relative to materials, equipment, and all arrangements for prosecuting the Work.

59. SCHEDULES AND PROGRESS REPORTS

The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, records, and other data as the Owner may request concerning Work performed or to be performed under this Contract.

Construction Schedule Requirements: The Contractor shall comply with the following requirements concerning construction scheduling and payments:

The Contractor shall submit a construction schedule of the bar graph type (or other approved type) prior to the preconstruction conference showing the following information as a minimum:

a. Date of Notice to Proceed with Contract Work.

b. Actual date construction is scheduled to start if different from the date of Notice to Proceed.

c. Contract completion date.

d. Beginning and completion dates for each phase of Work.

e. The dates at which special detail drawings are required.

f. Respective dates for submission of shop drawings and the beginning of manufacture, the testing of, and the installation of materials, supplies, and equipment.

g. All construction milestone dates.

h. A separate graph showing Work placement in dollars versus Contract time.

The schedule shall incorporate approved Contract changes. The schedule shall be maintained in an up-to-date condition monthly and shall be available for inspection at the construction site at all times.

The construction schedule shall be submitted in conjunction with and/or in addition to any other requirements concerning schedules within these Specifications.

The construction schedule shall be updated and submitted with each monthly request for payment. Should the Contractor fall behind said schedule, he shall present in writing to the owner a revised plan of action to complete the project on time. Methods may include, but are not limited to additional manpower, equipment, working overtime, etc. as may be required. Also, the construction schedule shall be revised accordingly. Failure to submit such revised construction schedule and written explanation shall be reason to withhold payment entirely or reduce payment substantially.

60. PROSECUTION OF THE WORK

It is expressly understood and agreed that the time of beginning, rate of progress, and time of completion of the Work are the essence of this Contract. The Work shall be prosecuted at such time, and in or on such part or parts of the Project as may be required, to complete the Project as contemplated in the Contract Documents and the approved construction schedule.

Regular Work hours shall be from 7:00 a.m. to 6:00 p.m. Monday through Friday. No Work requiring the presence of the Engineer's representative will be performed outside of regular Work hours. If, however, the Contractor works additional hours (other than specified herein), the Contractor shall pay the Owner for additional engineering services as outlined below.

The cost of additional engineering services shall be borne by the Contractor and will be based upon actual hours worked (labor cost x 3 x 1.5) plus out-of-pocket expenses such as lodging, mileage, materials, etc. Otherwise, the Contractor may perform clean-up work only outside of regular hours (including Saturdays and Sundays). No Work will be accomplished on holidays. McClelland Consulting Engineers, Inc. observes the following holidays during the year: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day and Friday following, Christmas Eve, and Christmas Day. When a holiday occurs on a Saturday, the Company will observe it on the Friday preceding, and when a holiday occurs on a Sunday, the Company will observe it on the following Monday.

61. ASSIGNMENT

Neither party to the Contract shall assign the Contract or sublet it as a whole, without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder without the prior written consent of the Owner.

62. OWNER'S RIGHT TO DO WORK

If the Contractor should, in the opinion of the Engineer, neglect to prosecute the Work properly or should neglect or refuse at his own cost to take up and replace Work as shall have been rejected by the Engineer, then the Owner shall notify the Surety of the condition, and after 10 days' written notice to the Contractor and the Surety, or without notice if an emergency or

danger to the Work or public exists, and without prejudice to any other right which the Owner may have under the Contract, take over that portion of the work which has been improperly executed or uncompleted, and make good the deficiencies and deduct the cost thereof from the payments then or thereafter due the Contractor, and if such payments are not sufficient thereof, charge the cost to the Contractor and its surety.

63. OWNER'S RIGHT TO TRANSFER EMPLOYMENT

If the Contractor should abandon the Work or should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if he should fail to make prompt payment to subcontractors for material or labor, or persistently disregard laws, ordinances, or the instructions of the Engineer, or otherwise be guilty of a substantial violation of any provision of the Contract or any laws or ordinance, the Owner may, without prejudice to any other right or remedy, and after giving the Contractor and Surety 7 days' written notice, transfer the employment for said Work from the Contractor to the Surety. Upon receipt of such notice, such Surety shall enter upon the premises and take possession of all materials, tools, and appliances thereon for the purpose of completing the Work included under this Contract and employ, by Contract or otherwise, any qualified person or persons to finish the Work and provide the materials therefore, in accordance with the Contract Documents, without termination of the continuing full force and effect of this Contract.

In case of such transfer of employment to such Surety, the Surety shall be paid in its own name on estimates according to the terms hereof without any right of the Contractor to make any claim for the same or any part thereof.

If after the furnishing of said written notice to the Surety, the Contractor and the Surety still fail to make reasonable progress on the performance of the Work, the Owner may terminate the employment of the Contractor and take possession of the premises and of all materials, tools, and appliances thereon and finish the Work by whatever method he may deem expedient and charge the cost thereof to the Contractor and Surety. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. If the expense of completing the Contract, including compensation for additional managerial and administrative services, shall exceed such unpaid balance, the Contractor and the Surety shall pay the difference to the Owner.

64. OWNER'S RIGHT TO SUSPEND OR TERMINATE WORK

Owner may suspend work under the following conditions:

At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contract makes an approved claim therefor as provided in per the General Conditions.

Owner may terminate:

Upon the occurrence of any one or more of the following events:

1. If Contractor persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established in the Contract Documents.
2. If Contractor disregards Laws or Regulations of any public body having jurisdiction.
3. If Contractor disregards the authority of the Engineers.
4. If Contractor otherwise violates in any substantial way any provisions of the Contract Documents.

Owner may, after giving Contractor (and the surety, if any) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the site and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient.

In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from completing the Work such excess will be paid to Contractor. If such claims, costs, losses and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and when so approved by Engineer incorporated in a Change Order, provided that when exercising any rights or remedies under the paragraph Owner shall not be required to obtain the lowest price for the Work performed.

Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

Upon seven days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Contract. In such case, Contractor shall be paid (without duplication of any items):

1. For completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work.
2. For expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses.
3. For all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others.
4. For reasonable expenses directly attributable to termination.

Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

65. DELAYS AND EXTENSION OF TIME

If the Contractor is delayed in the progress of the Work by any separate Contractor employed by the Owner, or by strikes, lockouts, fire, excessive adverse weather conditions not reasonably anticipated (on the basis of official weather records from the past ten years, minimum, from the locality involved), or acts of God, the Contractor shall, within 48 hours of the start of the occurrence, give written notice to the Owner of the cause of the potential delay and estimate the possible time extension involved, and within 7 days after the cause of delay has been remedied, the Contractor shall given written notice to the Owner of any actual time extension requested as a result of the aforementioned occurrence; then the Contract time may be extended by Change Order for such reasonable time as the Engineer determines.

It is agreed that no claim shall be made or allowed for any damages which may arise out of any delay caused by the above referenced acts or occurrences, other than claims for the appropriate extension of time.

No extension of time will be granted to the Contractor for delays occurring to parts of the Work that have no measurable impact on the completion of the total Work under this Contract; nor will extension of time be granted for delays to parts of Work that are not located on the critical path if the Critical Path Method (CPM) is used for scheduling the Work.

No extension of time will be considered for weather conditions normal to the area in which the Work is being performed. Unusual weather conditions, if determined by the Engineer to be of a severity that would stop all progress of the Work, may be considered as cause for an extension of Contract completion time. The Contractor shall provide official documentation of weather conditions experienced versus those anticipated as described above.

Delays in delivery of equipment or material purchased by the Contractor or his subcontractors (including Owner-selected equipment) shall not be considered as a just cause for delay. The Contractor shall be fully responsible for the timely ordering, scheduling, expediting, delivery, and installation of all equipment and materials.
Within a reasonable period after the Contractor submits to the Owner a written request for an extension of time, the Engineer will present his written opinion to the Owner as to whether an extension of time is justified, and, if so, his recommendation as to the number of days for time extension. The Owner will make the final decision on all requests for extension of time. In no event shall the Contractor be entitled under this Contract to collect or recover any damages, loss, or expense incurred by any delay other than as caused by the Owner, as stipulated in the Article titled, NOTICE OF CLAIM FOR DELAY.

66. LIQUIDATED DAMAGES

The Work shall begin at the time stated in the Notice to Proceed issued by the Owner to the Contractor and shall be completed within the number of consecutive calendar days, or by the calendar date, stated in the accepted Bid and Contract. The time shall be computed from and

including the date stated in the Notice to Proceed. It is agreed that time is of the essence of this Contract.

The Contractor agrees that said Work shall be prosecuted regularly, diligently, and uninterruptedly at such rate or progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the Work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual construction conditions prevailing in this locality.

If the Contractor shall neglect, fail, or refuse to complete the Work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, a penalty put as liquidated damages for such breach of Contract, as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the Work.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages which the Owner would in such event sustain, and said amount shall be retained from time to time by the Owner from current periodic pay estimates.

67. OTHER CONTRACTS

The Owner reserves the right to award other Contracts in connection with the Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work and shall properly connect and coordinate his Work with theirs.

If any part of the Work under this Contract depends on the prior acceptable completion of Work by others under separate Contract(s), the Contractor shall inspect and promptly report to the Engineer any defects in such Work that would adversely affect the satisfactory completion of the Work under this Contract. The Contractor's failure to so inspect and report shall constitute acceptance of the Work by others as being suitable for the proper reception and completion of the Work under this Contract, excluding, however, those defects in the Work by others that occur after the satisfactory completion of the Work specified hereunder.

68. USE OF PREMISES

The Contractor shall confine his equipment, the storage of materials, and the operation of his workers to limits shown on the Drawings or indicated by law, ordinances, permits, or directions of the Engineer, and shall not unreasonably encumber the premises with his materials. The Contractor shall provide, at his own expense, the necessary rights-of-way and access to the Work which may be required outside the limits of the Owner's property.

69. SUBSTANTIAL COMPLETION DATE

The Engineer may, at his sole discretion, issue a written notice of substantial completion for the purpose of establishing the starting date for specific equipment guarantees, and to establish the date that the Owner will assume the responsibility for the cost of operating such equipment. Said notice shall not be considered as final acceptance of any portion of the Work or relieve the Contractor from completing the remaining Work within the specified time and in full compliance with the Contract Documents.

Such substantial completion shall not relieve Contractor from liquidated damages should the Owner have added costs after the completion date, i.e., if additional construction observation, interest paid, loss of revenue, or other expenses continue to be charged to the Owner.

Substantial completion of an operating facility shall be that degree of completion that will provide a minimum of 7 continuous work days of successful operation in which all performance and acceptance testing has been successfully demonstrated to the Engineer. All equipment contained in the Work, plus all other components necessary to enable the Owner to operate the facility in the manner that was intended, shall be complete on the substantial completion date. See "SUBSTANTIAL COMPLETION" under Article DEFINITIONS, of these General Conditions.

70. PERFORMANCE TESTING

Operating equipment and systems shall be performance tested in the presence of the Engineer to demonstrate compliance with the specified requirements. Performance testing shall be conducted under the specified design operating conditions or under such simulated operating conditions as recommended or approved by the Engineer. Schedule such testing with the Engineer at least 1 week in advance of the planned date for testing.

71. OWNER'S USE OF PORTIONS OF THE WORK

The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work. Such use shall not be considered as final acceptance of any portion of the Work, nor shall such use be considered as cause for an extension of the Contract completion time, unless authorized by a Change Order issued by the Owner.

72. CUTTING AND PATCHING

The Contractor shall do all cutting, fitting, or patching of his Work that may be required to make its several parts come together properly and fit it to receive or be received by Work of other Contractors shown upon or reasonably implied by the Drawings. Any defective Work or material, performed or furnished by the Contractor, that may be discovered by the Engineer before the final acceptance of the Work or before final payment has been made, shall be removed and replaced or patched, in a manner as approved by the Engineer at the expense of the Contractor.

73. CLEANING UP

The Contractor shall, at all times, at his own expense, keep property on which Work is in progress and the adjacent property free from accumulations of waste material or rubbish caused by employees or by the Work. Upon completion of the construction, the Contractor shall, at his own expense, remove all temporary structures, rubbish, and waste materials resulting from his operations.

PAYMENT

74. PAYMENT FOR CHANGE ORDERS

Payment or credit for any alterations covered by a Change Order shall be determined by one or a combination of the methods set forth in A, B, or C below as applicable:

A. UNIT PRICES. If applicable, those unit prices stipulated in the Bid, shall be utilized. If such Unit Prices are not applicable, the Contractor and Owner may utilize Unit Prices as mutually agreed upon.

B. LUMP SUM. A total lump sum for the Work may be negotiated as mutually agreed upon by the Contractor and Owner.

In "A" and "B" above, Contractor's quotations for Change Orders shall be in writing and firm for a period of 90 days. Any compensation paid in conjunction with the terms of a Change Order shall comprise total compensation due the Contractor for the Work or alteration defined in the Change Order.

By signing the Change Order, the Contractor acknowledges that the stipulated compensation includes payment for the Work or alteration plus all payment for the interruption of schedules, extended overhead, delay or any other impact claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation in respect to the subject of the Change Order.

The Owner's request for quotations on alterations to the Work shall not be considered authorization to proceed with the Work prior to the issuance of a formal Change Order, nor shall such request justify any delay in existing Work. Lump sum quotations for alterations to the Work shall include substantiating documentation with an itemized breakdown of Contractor and subcontractor costs, including labor, material, rentals, approved services, overhead, and profit calculated as specified under "C" below.

C. FORCE ACCOUNT WORK. If the method of payment cannot be agreed upon prior to the beginning of the Work, and the Owner or the Engineer directs that the Work be done by written Change Order or on a force account basis, then the Contractor shall furnish labor, equipment, and materials necessary to complete the Work in a satisfactory manner and within a reasonable period of time. For the Work performed, payment will be made for the documented actual cost of the following:

1) Labor, including foremen, who are directly assigned to the force account Work: (actual payroll cost, including wages, fringe benefits as established by

negotiated labor agreements, labor insurance, and labor taxes as established by law). No other fixed labor burdens will be considered, unless approved in writing by the Owner.

2) Material delivered and used on the designated Work, including sales tax, if paid for by the Contractor or his subcontractor.

3) Rental, or equivalent rental cost of equipment, including necessary transportation for items having a value in excess of $100.

4) Additional bond, as required and approved by the Owner.

5) Additional insurance (other than labor insurance) as required and approved by the Owner.

To costs under 74C, FORCE ACCOUNT WORK, there shall be added the following fixed fees for the Contractor or subcontractor actually performing the Work:
A fixed fee not to exceed 15 percent of the cost of all items above.

The added fixed fees shall be considered to be full compensation, covering the cost of general supervision, overhead, profit, and any other general expense.

The Owner reserves the right to furnish such materials and equipment as he deems expedient, and the Contractor shall have no claim for profit or added fees on the cost of such materials and equipment.

For equipment under Item 3 above, rental or equivalent rental cost will be allowed for only those days or hours during which the equipment is in actual use. Rental and transportation allowances shall not exceed the current rental rates prevailing in the locality. The rentals allowed for equipment will, in all cases, be understood to cover all fuel, supplies, repairs, and renewals, and no further allowances will be made for those items, unless specific agreement to that effect is made.

The Contractor shall maintain his records in such a manner as to provide a clear distinction between the direct costs of Work paid for on a force account basis and the costs of other operations. The Contractor shall furnish the Engineer report sheets in duplicate of each day's force account Work no later than the working day following the performance of said Work. The daily report sheets shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces.

The daily report sheets shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type, and identification number of equipment and hours operated.

Material charges shall be substantiated by valid copies of vendors' invoices. Such invoices shall be submitted with the daily report sheets, or, if not available, they shall be submitted with subsequent daily report sheets. Said daily report sheets shall be signed by the Contractor or his authorized agent.

To receive partial payments and final payment for force account Work, the Contractor shall submit in a manner approved by the Engineer, detailed and complete documented verification of the Contractor's and any of his subcontractors' actual current costs involved in the force account Work pursuant to the issuance of an approved Change Order. Such costs shall be submitted within 30 days after said Work has been performed.
No payment will be made for Work billed and submitted to the Engineer after the 30-day period has expired. No extra or additional Work shall be performed by the Contractor, except in an emergency endangering life or property, unless in pursuance of a written Change Order, as provided in ALTERATIONS - CHANGES IN WORK.

75. PARTIAL PAYMENTS

A. GENERAL

Nothing contained in this Article shall be construed to affect the right, hereby reserved, to reject the whole or any part of the aforesaid Work, should such Work be later found not to comply with the provisions of the Contract Documents. All estimated quantities of Work for which partial payments have been made are subject to review and correction on the final estimate. Payment by the Owner and acceptance by the Contractor of partial payments based on periodic estimates of quantities of Work performed shall not, in any way, constitute acceptance of the estimated quantities used as the basis for computing the amounts of the partial payments. For public works projects, each partial payment request and final payment request shall contain an affidavit by the Contractor that all provisions of the applicable federal and state requirements regarding apprentices and payment of prevailing wages have been complied with by him and by his Subcontractors.

B. ESTIMATE AND PAYMENT

Before the first working day of each calendar month, the Contractor shall submit to the Engineer a detailed estimate of the amount earned for the separate portions of the Work, and request payment. As used in this Article, the words "amount earned" means the value, on the date of the estimate for partial payment, of the Work completed in accordance with the Contract Documents, and the value of approved materials delivered to the Project site suitably stored and protected prior to incorporation into the Work. If the Contractor's estimate of amount earned conforms with the Engineer's evaluation, the Engineer will calculate the amount due the Contractor and make recommendation to the Owner for payment.

An estimate of monthly progress payments shall be provided for the entire job prior to the first payment request. An update of the estimate of progress payments shall be updated if the actual progress differs by more than 20 percent in any given month. Each monthly payment request shall include the required updated Schedule.

If the updated Schedule is not submitted, the Owner may withhold payment until this item is completed. The Contractor shall be paid within 30 days of approval of the payment request.

C. DEDUCTION FROM ESTIMATE

Unless modified in the Supplementary Conditions, deductions from the estimate will be as described below. The Owner will deduct from the estimate, and retain as part security, 5 percent of the amount earned for Work satisfactorily completed. However, no deduction or retainage will be made on the approved items of material delivered to and properly stored at the job site but not incorporated into the Work.

NOTE: Exception--If the Work includes water or sewer pipelines, the Contractor shall maintain the Work for a period of ninety (90) days following its acceptance by the OWNER. Up to five percent (5%) of the Contract amount shall be retained during this maintenance period. All prior payments shall be subject to correction in the final payment.

This 90-day period does not relieve the Contractor of the Performance and Payment Bond requirements regarding warranty of the Project. In such cases, the semi-final payment estimate shall indicate the initial acceptance of the Work, and the warranty shall begin on such date.

D. QUALIFICATION FOR PARTIAL PAYMENT FOR MATERIALS DELIVERED

Unless modified in the Supplementary Conditions, qualification for partial payment for materials delivered but not yet incorporated in to the Work shall be as described below. Materials, as used herein, shall be considered to be those items which are fabricated or manufactured material and equipment. To receive partial payment for materials delivered to the site, but not incorporated in the Work, it shall be necessary for the Contractor to include invoices of such materials and documentation warranting that the materials and equipment are covered by appropriate property insurance and other arrangements to protect Owner's interest therein; all of which must be satisfactory to Owner.

At the time of the next partial payment request, the Contractor must submit the following documentation relative to materials paid on the previous partial payment: paid invoices of such materials or other documentation warranting that the Owner has received the materials and equipment free and clear of all liens, charges, security interests, and encumbrances (i.e., all materials have been paid for by Contractor). Failure to submit this documentation will result in an appropriate reduction on the current partial payment estimate for such materials.

At his sole discretion, the Engineer may approve items for which partial payment is to be made. Proper storage and protection shall be provided by the Contractor, and as approved by the Engineer. Final payment shall be made only for materials actually incorporated in the Work and, upon acceptance of the Work, all materials remaining for which advance payments had been made shall revert to the Contractor, unless otherwise agreed, and partial payments made for these items shall be deducted from the final payment for the Work.

E. PAYMENT

After deducting the retainages and the amount of all previous partial payments made to the Contractor, the amount earned as of the current month will be made payable to the

Contractor within 30 days of the Owner's receipt of an approved request, except where the Owner is a municipality or other agency whose laws require the approval of each payment by a council or similar body, in which case, the payment shall become due and payable 10 days after the first regularly-scheduled meeting in the month following the submittal of such payment request.

76. CLAIMS

In any case where the Contractor deems additional compensation is due him for Work or materials not clearly covered in the Contract or not ordered by the Engineer according to provisions of Article 20 ALTERATIONS - CHANGES IN WORK, the Contractor shall notify the Engineer, in writing, of his intention to make claim for such compensation before he begins the Work on which he bases the claim, in order that such matters may be settled, if possible, or other appropriate action promptly taken. If such notification is not given or the Engineer is not afforded proper facilities by the Contractor for keeping strict account of actual cost, then the Contractor hereby agrees to waive the claim for such additional compensation. Such notice by the Contractor, and the fact that the Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim. Claims for additional compensation shall be made in itemized detail and submitted, in writing, to the Owner and Engineer within 10 days following completion of that portion of the Work for which the Contractor bases his claim. In case the claim is found to be just, it shall be allowed and paid for as provided in the Article titled, PAYMENT FOR CHANGE ORDERS.

77. NOTICE OF CLAIM FOR DELAY

If the Contractor intends to file a claim for additional compensation for delay caused by the Owner at a particular time, he shall file a notice of claim with the Owner within 7 days of the beginning of the occurrence. The notice of claim shall be in duplicate, in writing, and need not state the amount. No claim for additional compensation will be considered unless the provisions of Article 65, DELAYS AND EXTENSION OF TIME, are complied with, and a notice of claim has been filed with the Owner in writing, as stated above.

Should the Owner be prevented or enjoined from proceeding with Work, either before or after its prosecution, or from authorizing its prosecution by reason of any litigation, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay; but time for completion of the Work will be extended to such reasonable time as the Owner may determine will compensate for time lost by such delay, with such determination to be set forth in writing.

78. RELEASE OF LIENS OR CLAIMS

The Contractor shall indemnify and save harmless the Owner from all claims for labor and materials furnished under this Contract. Prior to the final payment, the Contractor shall furnish to the Owner, as part of his final payment request, an affidavit that all of the Contractor's obligations on the Project have been satisfied and that there are no unpaid taxes, liens, vendors' liens, rights to lien or any other type of claim against the Project, and that the hourly wages paid to all persons on the Project were in accordance with the applicable wage scale determinations.

79. FINAL PAYMENT

Upon completion of all of the Work under this Contract, the Contractor shall notify the Engineer, in writing, that he has completed his part of the Contract and shall request final inspection. Upon receipt of the Contractor's written notice that the Work is ready for final inspection, the Engineer shall make such inspection and shall submit to the Owner his recommendation as to acceptance of the completed Work and as to the final estimate of the amount due the Contractor under this Contract.

Upon approval of this final estimate by the Owner and compliance with provisions in Article titled, RELEASE OF LIENS OR CLAIMS, and other provisions as may be applicable, the Owner shall pay to the Contractor all monies due him under the provisions of these Contract Documents. On contracts for public works, final payment of the retained percentage will not be made until the Contractor has also furnished the applicable apprenticeship wage certification.

80. NO WAIVER OF RIGHTS

Neither the inspection of the Owner, through the Engineer or any of his employees, nor any order by the Owner for payment of money, nor any payment for, or acceptance of, the whole or any part of the Work by the Owner or Engineer, nor any extension of time, nor any possession taken by the Owner or its employees shall operate as a waiver of any provision of this Contract, or any power herein reserved to the Owner, or any right to damages herein provided nor shall any waiver of any breach in this Contract be held to be a waiver of any other or subsequent breach.

81. ACCEPTANCE OF FINAL PAYMENT CONSTITUTES RELEASE

The acceptance by the Contractor of the final payment shall release the Owner and the Engineer, as agent of the Owner, from all claims and all liability to the Contractor for all things done or furnished in connection with the Work, and every act of the Owner and others relating to or arising out of the Work. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from obligations under this Contract and the Performance and Payment Bonds, and other bonds and warranties, as herein provided.

END OF GENERAL CONDITIONS

DOCUMENT 00800

SUPPLEMENTAL CONDITIONS

GENERAL

The Contractor's attention is directed to Division 1, GENERAL REQUIREMENTS, which contains other directions pertinent to the project.

REVISIONS AND ADDITIONS TO THE GENERAL CONDITIONS

The **GENERAL CONDITIONS** are hereby revised as follows:

ARTICLE 50. "MATERIALS AND APPLIANCES"

After this Article, add the following:

EQUIPMENT NAMEPLATES

All manufacturer's nameplates on equipment items are to be kept visible and are not to be obscured by other equipment or piping nor are they to be covered by any paint or insulating material.

INSTALLATION OF EQUIPMENT

Where building openings are too small to permit the passage of an assembled unit of equipment, it shall be assembled at its permanent location unless otherwise specifically shown or specified.

ARTICLE 52. "TESTS, SAMPLES, AND INSPECTIONS"

Add the following:

COMPACTION TESTS

Density tests will be performed on all areas as required by the Engineer. Contractor shall inform Engineer as to when an area is ready for testing. Contractor shall give 24 hours notice to Engineer prior to requiring a test. Engineer will not be responsible for delay to Contractor due to testing agency. Any stand-by time charged by the testing agency due to Contractor delay shall be paid for by Contractor. Engineer will determine the number and location of tests to be performed.

All tests will be performed by a materials testing agency acceptable to the Owner. The Contractor shall pay for all testing. All materials and tests shall conform to the requirements of these Specifications and as required by the Engineer.

Add the following:

CONCRETE TESTING

The Contractor will retain an independent testing laboratory, acceptable to the Owner, to determine compliance with the Specifications. Four concrete test cylinders will be made by the Contractor from each day's pour and as specified in Section 03003 - Site Cast-In-Place Concrete. One slump test and one air test (if required) will be performed for each set of cylinders. The Contractor shall be responsible for storage of the cylinders and for delivering test cylinders to the laboratory for testing. The Contractor will pay for all testing.

END OF SUPPLEMENTARY CONDITIONS

SECTION 01001

BASIC REQUIREMENTS

PART 1. GENERAL

1.1 SUMMARY OF WORK

A. Section Includes:

1.2 Description of Project
1.3 Site Investigation
1.4 Existing Utilities
1.5 Payment Schedule
1.6 Application for Payment
1.7 Change Order Procedures
1.8 Cutting and Patching
1.9 Conferences
1.10 Progress Meetings
1.11 Submittal Procedures
1.12 Construction Progress Schedule
1.13 Prosecution of the Work
1.14 Shop Drawings
1.15 Product Data
1.16 Manufacturers' Instructions and Certifications
1.17 Quality Assurance
1.18 References
1.19 Manufacturer's Field Services
1.20 Testing Laboratory Services
1.21 Temporary Electric Power and Lighting
1.22 Temporary Water
1.23 Sanitary Facilities
1.24 Water for Testing
1.25 Temporary Telephone Service
1.26 Temporary Water Control
1.27 Temporary Access Roads and Parking
1.28 Temporary Heating and Ventilating
1.29 Protection of Finished Work
1.30 Progress Cleaning
1.31 Field Offices
1.32 Removal of Utilities, Facilities, and Controls
1.33 Products
1.34 Transportation, Handling, Storage, and Protection
1.35 Substitutions
1.36 System Demonstration
1.37 Contract Closeout Procedures
1.38 Final Cleaning and Inspection
1.39 Final Submittals
1.40 Project Record Documents (“As-Builts”)
1.41 Operation and Maintenance Data
1.42 Guarantees, Bonds, Affidavits, and Warranties
1.43 Spare Parts and Maintenance Materials

1.2 DESCRIPTION OF PROJECT

A. Wherever in these Documents the word "Engineer" appears, it shall be understood to mean McClelland Consulting Engineers, Inc., acting either directly or indirectly as authorized agents of the Owner. In these Documents where the word "Owner" appears, it shall be understood to mean the City of Bryant, Arkansas.

B. A General Contract to install a new culvert crossing on Timbercreek Drive and improve the drainage for the area.

1.3 SITE INVESTIGATION

A. Information obtained by the Owner regarding site conditions; topography; existing construction of site facilities; and subsurface investigations, including test boring logs are available for examination at the office of the Engineer.

1.4 EXISTING UTILITIES

A. Approximate locations of major utilities and structures are shown on the Drawings, there may be some discrepancies and omissions in the locations and size of utilities and structures shown.

B. Notify all utilities affected by the construction operation at least 48 hours in advance of beginning work, and contact Arkansas One-Call at 1-800-482-8998.

1.5 PAYMENT SCHEDULE

A. Payment shall be made based on the payment schedule submitted by the Contractor in accordance with the Bid Form and the Engineers observation of work completed to date.

B. Payment for pipe shall be made at 85 percent of the unit bid price upon pipe installation, backfilling and rough grading. Payment shall be increased 5 percent upon completion of testing and disinfection. Payment will be increased 10 percent of the unit price bid upon completion and acceptance of final clean-up by the Owner and Engineer and in accordance with the General Conditions.

1.6 APPLICATION FOR PAYMENT

A. Submit three copies of each application on EJCDC Form C-620 or other format approved by Engineer.

B. For payment of stored materials, the Contractor shall submit a copy of supplier/vendor's invoice for the materials with job name, delivery date, invoice number, and invoice amount on invoice attached with the Application for Payment. Stored materials shall be on site and stored in accordance with Contract Documents prior to making Application for Payment.

C. Contractor shall submit copies of paid invoices and proof of payment in the form of a lien release from the supplier/vendor for stored materials that the Owner has paid for

previously with Application for Payment. Contractor's subsequent Applications for Payment will not be approved without copies of paid invoices and lien releases.

D. Contractor shall submit lien release for all previous progress payments for materials, labor, and equipment that has been billed to the Owner in the present pay request. Lien release shall be submitted to the Engineer with next Application for Payment. Application for Payment submitted without lien release from previous Application for Payment will not be approved for payment until Engineer has received lien release. Submit lien release on the form found at the end of this Section.

E. Utilize Payment Schedule or Unit Prices for listing items in Application for Payment.

F. Pay Periods: Calendar Month.

1.7 CHANGE ORDER PROCEDURES

A. Submit on EJCDC Form 1910-8B.

1.8 CUTTING AND PATCHING

A. Employ a skilled and experienced installer to perform cutting and patching new Work; restore Work with new products.

B. Submit written request in advance of cutting or altering existing structures or utilities.

C. Fit work tight to adjacent elements and maintain integrity of existing work.

1.9 CONFERENCES

A. Engineer will schedule a preconstruction conference after Notice of Award for all affected parties.

B. Where required in individual specification Section, convene a pre-installation conference at project site prior to commencing Work of the Section.

1.10 PROGRESS MEETINGS

A. Schedule and administer meetings at the site throughout progress of the Work at minimum monthly intervals.

B. Preside at meetings, record minutes, and distribute typed copies within two days to those affected by decisions made.

1.11 SUBMITTAL PROCEDURES

A. The Contractor shall submit a sufficient number of copies to allow the Engineer to retain four copies (2 for himself; 2 for the Owner) for review. Submittals shall include shop drawings, electrical diagrams, and catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for construction.

B. Submittal form to identify Project, Contractor, subcontractor or supplier, and pertinent Contract Document reference.

C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

D. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

E. Revise and resubmit as required; identify all changes made since previous submittal.

1.12 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial Construction Progress Schedule in duplicate within 10 days after date of Contract. Engineer shall review Construction Progress Schedule and approve. Once approved by Engineer this Construction Progress Schedule shall become the "Approved Construction Progress Schedule" by which the Contractor shall plan, organize, direct, coordinate, and execute the Work, and the basis of evaluating progress of the Work.

B. "Approved Construction Progress Schedule" shall be a horizontal bar chart with separate lines for each major section of Work or operation, identifying first work day of each week.

C. Submit updated Construction Progress Schedule with each Application for Payment, identifying changes since previous updated Construction Progress Schedule. Indicate estimate percentage of completion for each item of Work at each submission.

D. Should updated Construction Progress Schedule show the Contractor to be 10 percent or more behind schedule, Contractor shall immediately devise a plan for recovery of lost time and submit to the Engineer for approval within 1 week. Once approved by the Engineer, the Contractor shall immediately put "Recovery Construction Progress Schedule" into action.

E. During period covered by "Recovery Construction Progress Schedule" plan, Contractor's progress will be monitored against the "Approved Construction Progress Schedule." If Contractor does not recover from delay as detailed in his "Recovery Construction Progress Schedule," the Engineer shall advise the Owner to exercise its options as described in the General Conditions.

F. Contractor shall bear all cost and expenses related to recovery from the Contractor's delays, including costs, expenses, and lost revenue by the Owner.

1.13 PROSECUTION OF THE WORK

A. It is expressly understood and agreed that the time of beginning, rate of progress, and time of completion of the Work are the essence of this Contract. The Work shall be prosecuted at such time, and in or on such part or parts of the Project as may be required, to complete the Project as contemplated in the Contract Documents and the approved construction schedule.

B. Regular Work hours shall be from 7:00 a.m. to 6:00 p.m. Monday through Friday. No Work requiring the presence of the Engineer's representative will be performed outside of regular Work hours. If, however, the Contractor works additional hours (other than specified herein), the Contractor shall pay the Owner for additional engineering services as outlined below.

C. The cost of additional engineering services shall be borne by the Contractor and will be based upon actual hours worked (labor cost x 3 x 1.5) plus out-of-pocket expenses such as lodging, mileage, materials, etc. Otherwise, the Contractor may perform clean-up work only outside of regular hours (including Saturdays and Sundays). No Work will be accomplished on holidays.

1.14 SHOP DRAWINGS

A. Submit number of copies which the Contractor requires, plus four copies which will be retained by the Engineer.

B. Include as a minimum dimensions, size, location of connections to other work, weight of equipment, and supporting calculations.

1.15 PRODUCT DATA

A. Submit number of copies which the Contractor requires, plus four copies which will be retained by the Engineer.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

1.16 MANUFACTURERS' INSTRUCTIONS AND CERTIFICATIONS

A. Submit as noted in individual specification Sections.

1.17 QUALITY ASSURANCE

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

B. Comply fully with manufacturer's instructions.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.18 REFERENCES

A. Conform to reference standard by date of issue current as of date of Contract.

B. Should specified reference standard conflict with Contract Documents, request clarification from Engineer before proceeding.

1.19 MANUFACTURERS' FIELD SERVICES

A. Representative shall submit written report to Engineer listing observations and recommendations.

1.20 TESTING LABORATORY SERVICES

A. Owner will approve the Contractor's selection of a testing laboratory to perform inspections, tests, and other services required by individual Specification Sections.

B. All costs for laboratory testing of earthwork and concrete shall be paid for by the Contractor.

C. Services will be performed in accordance with requirements of governing authorities and with specified standards.

D. Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
   1. Notify Engineer/Testing Laboratory 48 hours prior to expected time for operations requiring testing services.
   2. Furnish and deliver samples/cylinders to lab for testing.
   3. Pay for testing.

1.21 TEMPORARY ELECTRIC POWER AND LIGHTING

A. Provide and pay for power services required from source.

B. Provide power outlets for construction operations, branch wiring, distribution boxes, and flexible power cords as required.

1.22 TEMPORARY WATER

A. Provide water, as needed, for own use.

B. Provide an adequate supply of potable drinking water for use by employees and Engineer's employees.

1.23 SANITARY FACILITIES

A. Provide and maintain required sanitary facilities and enclosures.

B. Maintain clean and sanitary condition.

1.24 WATER FOR TESTING

A. The Owner shall provide the water for first time testing up to a maximum amount of two and half times the water capacity volume in the total length of the waterlines in the distribution system in this Project. Owner shall determine the location(s) on where the Contractor can obtain the water. If test fails, the Contractor shall be responsible to

paying Owner the cost of additional water for testing until the system being tested passes.

1.25 TEMPORARY TELEPHONE SERVICE

A. Provide on-site telephone service for Contractor's and Engineer's use during the period of construction of the Contract.

1.26 TEMPORARY WATER CONTROL

A. Maintain excavations and trenches free of water. Provide and operate pumping equipment of a capacity to control water flow.

B. Provide dewatering system and pumping to maintain excavations dry and free of water inflow on a 24 hours basis.

C. Provide piping to handle pumping outflow to discharge in a manner to avoid erosion or deposit of silt.

1.27 TEMPORARY ACCESS ROADS AND PARKING

A. Construct and maintain temporary construction access roads, parking areas, and detours as are required to execute the Work.

1.28 TEMPORARY HEATING AND VENTILATING

A. Provide adequate heat and ventilation to all parts of the Work.

B. See requirements of Specifications for minimum temperature to be maintained for various trades.

C. Ventilate enclosed areas.

D. Do not use permanent systems to provide temporary heating or ventilation.

1.29 PROTECTION OF FINISHED WORK

A. Protect installed work and provide special protection where specified in individual specification Sections.

1.30 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

1.31 FIELD OFFICES

A. Contractor shall provide a field office for himself and the Owner's use, as follows:
Office shall be weather tight, secure, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing display table, telephone, and space for project meetings with table and chairs.

1.32 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary erosion control construction, above grade or buried utilities, equipment, facilities, and materials, prior to Substantial Completion inspection.

B. Remove and repair damage caused by installation or use of temporary work.

1.33 PRODUCTS

A. Products: New material, machinery, components, equipment, and systems forming Work, but does not include machinery or equipment used for preparation, fabrication, or erection of Work.

B. Use interchangeable components of the same manufacture for similar components.

1.34 TRANSPORTATION, HANDLING, STORAGE, AND PROTECTION

A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

1.35 SUBSTITUTIONS

A. Possible substitutions ("or approved equal"/ "or equal") shall be submitted no later than 10 days prior to bid date for Engineer to review and consider requests from Contractor or Bidder for substitutions as equal . The Bidder may include substitutions not specified only if written approval is received from the Engineer prior to bidding. Otherwise, substitutions will be not be allowed.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

1.36 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Engineer and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

1.37 CONTRACT CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and Work is complete in accordance with Contract Documents and ready for Engineers inspection.

B. Submit final Application for Payment identifying total adjusted Contract Price, previous payments, and amount remaining due after Engineer has given written approval of Project Record Documents.

1.38 FINAL CLEANING AND INSPECTION

A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior surfaces exposed to view.

C. Clean debris, waste and surplus supplies, rubbish, and construction facilities from site.

D. After final cleaning and upon written notice from the Contractor that the Work is completed, the Engineer will make a preliminary inspection with the Owner and Contractor present. Upon completion of this preliminary inspection, the Engineer will notify the Contractor, in writing, of any particulars in which this inspection reveals that the Work is defective or incomplete.

E. Upon receiving written notice from the Engineer, the Contractor shall immediately undertake the work required to remedy defects and complete the Work to the satisfaction of the Owner.

F. When the Contractor has corrected or completed the items as listed in the Engineer's written notice, he shall inform the Engineer, in writing, that the required Work has been completed. Upon receipt of this notice, the Engineer, in the presence of the Owner and Contractor, shall make his final inspection of the Project.

G. Should the Engineer find all Work satisfactory at the time of his inspection, the Contractor will be allowed to make application for final payment in accordance with the provisions of the General Conditions. Should the Engineer still find deficiencies in the Work, the Engineer will inform the Contractor of the deficiencies and will deny the Contractor's request for final payment until the Contractor has satisfactorily completed the required Work.

H. Water courses, gutters, and ditches shall be opened and left in a condition satisfactory to the Engineer.

1.39 FINAL SUBMITTALS

A. No contract will be finalized until all of the following have been submitted:
   1. Final Shop Drawings.
   2. Record Drawings.
   3. Operations and Maintenance Manuals.

4. Manufacturers' Certificates of Proper Installation.

1.40 PROJECT RECORD DOCUMENTS ("AS-BUILTS")

A. Maintain on Project site, one set of Contract Documents, Shop Drawings, and Product Submittals to be utilized for Record Documents.

B. Keep Record Documents and samples available for inspection by Engineer.

C. Maintain Record Documents in a clean, dry, and legible condition. **Do not use Record Documents for construction purposes**. If Contractor submits Record Documents that are in poor condition and is unacceptable by the Engineer, Contractor shall re-purchase a new set of Project Drawings and Project Manual and re-recording information on new purchased set and resubmit to Engineer.

D. Specification, Record Documents, and Shop Drawings: Legibly mark each item to record actual construction or product installed.

E. Record information in red ink on a set of blue line opaque Drawings, and in a copy of a Project Manual.

F. Record information concurrently with construction progress.

G. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:
   1. Measured depths of elements of structures in relation to datum.
   2. Measured horizontal and vertical locations of underground utilities, valves, fittings, and other appurtenances incorporated in the Project, referenced to permanent surface improvements (3 each).
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
   4. Field changes of dimension and detail.
   5. Changes made by Modifications by either Field Orders or Change Orders.
   6. Details not on original Contract Drawings or referenced in Project Manual, but are part of the Project.

H. Specifications: Legibly mark each item to record actual construction, including:
   1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
   2. Changes made by Addenda, Field Orders, Change Orders, or other Modifications.

I. Other Documents: Maintain manufacturer's certifications, inspection certifications, field test records, and other required documentation required by individual Specifications Sections.

J. Transmit with cover letter in duplicate, listing:
   1. Date.
   2. Project title and number.

3. Contractor's name, address, and telephone number.
4. Number and title of each Record Document.
5. Signature of Contractor or authorized representative.

K. Final Application for Payment shall not be approved until Project Record Documents ("As-Builts") are reviewed and approved by Engineer.

1.41 OPERATION AND MAINTENANCE DATA

A. Submit 2 sets prior to final inspection, bound in 8-1/2 x 11 inch text pages with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE MANUAL" and title of project.

C. Internally subdivide the binder contents with permanent page dividers, logically organized, with tabs clearly printed under reinforced laminated plastic tabs.

D. Contents:
1. Directory listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system.
3. Certificates.
4. Shop drawings.
5. Product data.
6. Warranties.

1.42 GUARANTEES, BONDS, AFFIDAVITS, AND WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

C. No contract will be finalized until all guarantees, performance tests, bonds, certificates, licenses, affidavits, and warranties required for Work or equipment as specified are satisfactorily filed with the Engineer.

D. Submit prior to final Application for Payment.

1.43 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver to project site and place in locations as directed; obtain receipt prior to final payment.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

END OF SECTION

Contractor's Application for Payment No. ____

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project: **TIMBERCREEK DRIVE CULVERT REPLACEMENT**	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.: **19-5766**

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE	**$** ____
2. Net change by Change Orders	**$** ____
3. Current Contract Price (Line 1 ± 2)	**$** ____
4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)	**$** ____
5. RETAINAGE:	
a. X ____ Work Completed	**$** ____
b. X ____ Stored Material	**$** ____
c. Total Retainage (Line 5a + Line 5b)	**$** ____
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)	**$** ____
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	**$** ____
8. AMOUNT DUE THIS APPLICATION	**$** ____
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)	**$** ____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $ ____
(Line 8 or other - attach explanation of the other amount)

is recommended by: ____ ____
(Engineer) (Date)

Payment of: $ ____
(Line 8 or other - attach explanation of the other amount)

is approved by: ____ ____
(Owner) (Date)

Approved by: ____ ____
Funding Agency (if applicable) (Date)

Endorsed by the Construction Specifications Institute.

EJCDC C-620 Contractor's Application for Payment
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Progress Estimate

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A		B	Work Completed		E	F		G
Item		Scheduled Value	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F) B	Balance to Finish (B - F)
Specification Section No.	Description		From Previous Application (C+D)	This Period				
	Totals							

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Progress Estimate

Contractor's Application

For (contract):							Application Number:			
Application Period:							Application Date:			
A				B	C	D	E	F		
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
	Totals									

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Stored Material Summary

Contractor's Application

For (contract):							Application Number:		
Application Period:							Application Date:		
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
			Date (Month/Year)	Amount ($)	Amount ($)	Subtotal	Date (Month/Year)	Amount ($)	
		Totals							

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Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project: TIMBERCREEK DRIVE CULVERT REPLACEMENT	Owner: CITY OF BRYANT, ARKANSAS	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 19-5766

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $_____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: $_____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable):

_____ Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

LIEN RELEASE

NAME OF GENERAL CONTRACTOR:

_____

PROJECT: TIMBERCREEK DRIVE CULVERT REPLACEMENT

ENGINEER'S PROJECT NUMBER: 19-5766

PAY REQUEST NUMBER: _____

The undersigned Contractor certifies that: (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment numbered 1 through _____ inclusive; (2) title to all Work, materials, labor, and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all (i.e., all stored materials, subcontracted work, labor, materials, equipment, and other items incorporated into Work have been paid to date by the Contractor) liens, claims, security interest, and encumbrances; and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not *defective* as that term is defined in Contract Documents.

If it is found that material or work has not been paid as sworn on this document, the full amount of the unpaid payment shall be withheld from the next pay estimate, and a check will be prepared by the Owner, made out jointly to the Contractor and the payee for materials or work. The check will be mailed to the payee.

Signed this _____ day of _____, 20____.

Subscribed and Sworn to before me _____

Contractor

this _____ day of _____, 20___.

By_____

Notary Public Title_____

My commission expires the _____ day of _____, 20____.

Certificate of Substantial Completion

Project: TIMBERCREEK DRIVE CULVERT REPLACEMENT	
Owner: CITY OF BRYANT, ARKANSAS	Owner's Contract No.:
Contractor:	Engineer's Project No.: 19-5766

This [tentative] [definitive] Certificate of Substantial Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

State of Arkansas
Arkansas Department of Labor
Arkansas Occupational Safety and Health

10421 WEST MARKHAM • LITTLE ROCK, AR 72205-2190
Phone: 501-682-9091 Fax: 501-682-4532 TRS: 800-285-1131

CONTRACT FOR EXCAVATION REPORTING FORM

This form must be completed by any public body (state agency, county, municipality, school district, or other local tax unit or improvement district) awarding a contract for a public construction project which will involve any trench or excavation of five feet (5') or more. *Arkansas Code § 22-9-212.*

Name of Public Agency:_____

Address of Public Agency:_____

Contact Person:_____Phone number:_____

Person Filing Report:_____

Name of General Contractor:_____

Address:_____Phone number:_____

Name of any subcontractor doing trenching or excavation;_____

Subcontractor address:_____Phone number:_____

Estimated start date:_____

Estimated completion date:_____

Site location/address/street/road:_____

Arkansas Code § 22-9-212 also requires that the current federal OSHA standard for excavation and trenching be incorporated into the project's specifications and that the contract bid form include a separate pay item for trench or excavation safety systems.

The Arkansas Department of Labor provides free training on trenching and excavation safety.

SEND NOTICE TO:

Arkansas Department of Labor
Safety Division
10421 West Markham Street
Little Rock, AR 72205-2190
(501) 682-9091
fax: (501) 682-4532
e-mail: mike.watson@arkansas.gov

STATE OF ARKANSAS
DEPARTMENT OF LABOR
ARKANSAS OCCUPATIONAL SAFETY & HEALTH

10421 WEST MARKHAM • LITTLE ROCK, AR 72205-2190
Phone: 501-682-9091 Fax: 501-682-4532 TRS: 800-285-1131

REPORTING FORM FOR WORK NEAR OVERHEAD HIGH VOLTAGE POWER LINES AND CONDUCTORS

This form must be completed by any person, firm, or corporation that desires to carry on any work or activity within ten feet (10') of overhead energized electrical lines or conductors. *Arkansas Code § 11-5-307*. The ten feet clearance applies to any part of any machinery, equipment or materials, as well as any employee or person.

Name of company or individual:_____

Address:_____Phone Number:_____

Name & title of person filing report:_____

Date work to be performed:_____

Expected date of completion:_____

Has the operator of the electrical lines been notified?_____

IMPORTANT

*Arkansas Code § 11-5-307 also requires written notice to the owner or operator of the electrical lines. You must also make appropriate arrangements with the operator of the electrical lines **before** proceeding with any work which would violate the ten feet clearance requirement.*

The Arkansas Department of Labor provides free training on working safely near high voltage lines.

SEND NOTICE TO:

Arkansas Department of Labor
Safety Division
10421 West Markham Street
Little Rock, AR 72205
(501) 682-9091
fax: (501) 682-4532
e-mail: mike.watson@arkansas.gov

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1. GENERAL

1.1 RELATED SECTIONS

A. Document 00300 - Bid.

B. Section 00700 - General Conditions.

C. Section 01001 - Basic Requirements.

1.2 MEASUREMENT OF QUANTITIES

A. All work completed under the contract will be measured by the Engineer, or his/her authorized representatives, using United States Customary Units of Measure or the International System of Units.

B. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

1.3 SCOPE OF PAYMENT

A. The Amount for Work listed in the Bid, whether lump sum or unit price, shall include all costs specified on the Bid Form, including all miscellaneous amounts (mobilization, demobilization, bonds, insurance, as built record drawings, traffic control, erosion control, plans and any items not covered elsewhere) to complete the project in accordance with the Contract Documents.

B. The quantities listed in these documents are approximate, for information only, and should be verified by each bidder prior to bidding

C. Payments for lump sum items shall be made in proportion to the amount of Work accomplished, as determined by the Engineer, as of the period ending date of each Application for Payment.

D. Payment for unit price items shall be made as the work progresses. Said payments will be based upon the work performed and materials complete in place in accordance with the contract, plans, and specifications, approved by the Engineer, as of the period ending date of each Application for Payment.

E. It is understood and agreed that the Contractor shall not be entitled to partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

F. No partial payments shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment.

G. The Contractor has sole responsibility for providing materials, equipment and work which meet the specifications. In the event inspection or testing reveals that materials/equipment furnished or work performed by the Contractor does not meet the specifications, payment for said materials/equipment/work will be withheld until compliance with the specifications is demonstrated by the Contractor.

1.4 UNIT PRICE ITEMS

A. Item No. 1 – Erosion Control
   1. Unit of measure: Lump Sum
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for erosion control per the Drawings and Specifications.

B. Item No. 2 – Removal and Disposal of Culverts
   1. Unit of measure: Lump Sum
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for the removal and disposal of culverts per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

C. Item No. 3 – Removal and Disposal of Drop Inlets
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for removal and disposal of drop inlets per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

D. Item No. 4 – Removal and Disposal of Curb and Gutter
   1. Unit of measure: Linear Foot
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for the removal and disposal of curb and gutter per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

E. Item No. 5 – Removal and Disposal of Concrete Pavement
   1. Unit of measure: Square Yard
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for removal and disposal of concrete pavement per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

F. Item No. 6 – Removal and Disposal of Concrete Slab
   1. Unit of measure: Square Yard
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for removal and disposal of concrete pavement per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

G. Item No. 7 – Removal and Disposal of Headwall
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for removal and disposal of headwall per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

H. Item No. 8 – Removal and Disposal of Wingwalls
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for removal and disposal of wingwalls per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

I. Item No. 9 – Embankment (Plan Quantity)
   1. Unit of measure: Cubic Yard
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for construction of embankment and subgrade to the grades shown on the Drawings and Specifications.
   3. This item shall be paid per plan quantities only. Volumes are shown in the cross section sheets for reference.
   4. If the subgrade soils are determined to be unsuitable, the Engineer shall determine how they should be replaced. If the soils have excessive moisture, but are deemed suitable by the Engineer, they shall be excavated, dried, and reinstalled with proper compaction. This work will be considered as a part of the compacted embankment and no extra payment shall be awarded for it.

5. If the subgrade soils are deemed unsuitable, they shall be removed and replaced as directed by the Engineer. If select fill material is used to replace these materials, the Contractor shall be paid for additional compacted embankment, for the measured in-place quantity (Cubic Yard). The removal and disposal of the poor soils shall be paid for as unclassified excavation.

J. Item No. 10 – Aggregate Base Course (Class 7)
   1. Unit of measure: Ton
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for aggregate base course (class 7) per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

K. Item No. 11 – Cold Milling
   1. Unit of measure: Square Yard
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for cold milling per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

L. Item No. 12 – ACHM Surface
   1. Unit of measure: Ton
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for ACHM surface per the Drawings and Specifications.

M. Item No. 13 – Maintenance of Traffic
   1. Unit of measure: Lump Sum
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for maintenance of traffic per the Drawings and Specifications.

N. Item No. 14 – 5′ S x 3′ R Reinforced Concrete Box Culvert (Prefabricated or Cast-in-Place)
   1. Unit of measure: Linear Foot
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for 5′ S x 3′ R reinforced concrete box culvert (prefabricated or cast-in-place) per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

O. Item No. 15 – Concrete Headwalls (Cast-in-Place)
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for materials, labor, tools, and equipment for concrete headwalls (cast-in-place) per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

P. Item No. 16 – Concrete Wingwalls (Cast-in-Place)
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for concrete wingwalls (cast-in-place) per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

Q. Item No. 17 – 18″ HDPE Pipe Culverts
   1. Unit of measure: Linear Foot
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for installation of 18″ HDPE pipe culverts per the Drawings and Specifications.

R. Item No. 18 – Drop Inlet
   1. Unit of measure: Each
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for drop inlet per the Drawings and Specifications.
   3. The work shall be done per AHTD Standard Specifications for Roadway Construction – Section 303 (2014 Edition).

S. Item No. 19 – Selected Pipe Bedding for Culvert (B-Stone)
   1. Unit of measure: Cubic Yard
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for installation of selected pipe bedding (B-Stone) per the Drawings and Specifications.

T. Item No. 20 – Combination Concrete Curb and Gutter
   1. Unit of measure: Linear Foot
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for installation of combination concrete curb and gutter per the Drawings and Specifications.

U. Item No. 21 – Solid Sodding
   1. Unit of measure: Square Yard
   2. This item shall compensate the Contractor for all materials, tools, labor, and equipment required for solid sodding per the Drawings and Specifications.

V. Item No. 22 – Arkansas Code Ann. §22-9-212, Trench and Excavation Safety System.
   1. Unit of Measure: Lump Sum.
   2. This item shall compensate the Contractor the cost associated with trench and excavation safety systems required for any trench and excavation which equals or exceeds five (5) feet in depth.
   3. This item shall be paid to Contractor in final application for payment.

W. Item No. 23 – Miscellaneous (Mobilization, Demobilization, Bonds, Insurance, As-Built Record Drawings, Seeding of Construction Area, and Any Items not Covered Elsewhere to Complete the Project per the Drawings and Specifications):

1. Unit of Measure: Lump Sum.
2. This item shall compensate the Contractor for mobilization, demobilization, bonds, insurance, as-built record drawings, seeding of construction area, and any items not covered elsewhere to complete the Project per the Drawings and Specifications.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

END OF SECTION

SECTION 02200

SITE PREPARATION

PART 1. GENERAL

1.1 SUMMARY

A. Remove interfering or objectionable material from designated areas of Work.

B. Preserve vegetation and existing objects designated to remain from injury or defacement.

C. Cut trees only at direction of Engineer.

D. Contractor shall be responsible for implementing and following a Storm Water Pollution Prevention Plan as required by the Arkansas Department of Environmental Quality and in accordance with NPDES ARR150000. The successful Bidder (Contractor) shall develop a Storm Water Pollution Prevention Plan to meet all State and Federal regulations and submit to the Engineer for review and approval prior to commencing work.

1.2 DEFINITIONS

A. Clearing:
   1. Cutting, removing, and disposing of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth.
   2. Removing evidence of their presence from the surface, inclusive of sticks and branches greater than 2 inches in diameter or thickness.
   3. Removing and disposing of trash piles, rubbish, and fencing.

B. Grubbing:
   1. Removing and disposing of wood or root matter below the ground surface remaining after clearing.
   2. Includes stumps, trunks, roots, or root systems greater than 2 inches in diameter or thickness to a depth of 18 inches below the ground surface.

C. Stripping: Removing and disposing of organic sod, topsoil, grass and grass roots, and other objectionable material from the areas designated to be stripped that remain after clearing and grubbing.

1.3 RELATED SECTIONS

A. Section 02300 - Earthwork.

PART 2. MATERIALS

2.1 GENERAL

A. Provide materials, suitable and in adequate quantity, required to accomplish Work of this Section.

PART 3. EXECUTION

3.1 PREPARATION

A. Review with Engineer's representative the location, limits, and methods to be used prior to commencing Work under this Section.

3.2 CUTTING TIMBER

A. Exercise care when clearing near the clearing limits to avoid damage to existing trees, vegetation, structures, or utilities which are outside of the clearing limits.

B. Trees shall be leveled into the area to be cleared.

C. Flush cut stumps not designated for grubbing by cutting to within 2 inches of the ground surface.

D. Timber is the property of the Contractor.

E. Dispose of stumps, limbs, brush, snags, non-marketable timber, and other vegetative growth off-site.

3.3 PRESERVATION OF TREES, SHRUBS, AND OTHER VEGETATION

A. Trees, shrubbery, and other vegetation not designated for removal shall be protected from damage.

B. Cut and remove tree branches only where, in the opinion of the Engineer, cutting is necessary to effect construction operation.

C. Remove branches other than those required to effect the Work to provide a balanced appearance of any tree, as approved prior to removal.

D. Treat scars resulting from the removal of branches with an approved tree sealant.

3.4 CLEARING AND GRUBBING LIMITS

A. Clear and grub areas within the limits of construction.

B. Clear and grub in stages as the construction area is increased to avoid unnecessary clearing and grubbing.

3.5 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

A. Haul the material from the Work site and dispose of in accordance with state, federal, and local laws. Off-site disposal shall be at the Contractor's sole expense.

3.6 AREAS TO BE STRIPPED

A. The exact depth of stripping shall be determined by the Engineer.

B. Topsoil requirements are specified in Section 02300.

C. Strip areas that are cleared and grubbed.

D. Strip areas in stages to avoid unnecessary stripping.

3.7 DISPOSAL OF STRIPPINGS

A. Do not mix strippings with borrow excavation.

B. Stockpile topsoil from the strippings for use in landscape grading.

C. Dispose of excess topsoil.

D. Strippings not suitable for use as topsoil shall become the property of the Contractor and shall be removed from the site.

END OF SECTION

SECTION 02220

DEMOLITION AND REMOVAL OF FACILITIES

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Labor and material that is necessary for the work associated with the removal of the existing facilities as shown on the Drawings.

1.2 RELATED SECTION

A. Section 02200 - Site Preparation.

B. Section 02300 - Earthwork.

1.3 SAFETY REQUIREMENTS

A. Work shall be done in conformance with federal, state, and local rules and regulations pertaining to safety and as specified elsewhere in these Specifications.

1.4 SALVAGE

A. Salvageable piping, valves, and materials removed during demolition are the property of the Owner. Place on the site in an area designated by the Owner.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

3.1 PREPARATION

A. Make provisions to prevent the entrance of surface runoff from entering the area of excavation.

B. Coordinate any disconnect and capping of services with Owner before starting demolition.

C. Protect existing structures and underground utilities within the Work area from being damaged during demolition.

3.2 DEMOLITION AND REMOVAL

A. Excavate to the minimum extent necessary.

B. Dispose of demolition debris at a site approved by the Owner. Otherwise, to the nearest state approved landfill permitted to receive waste.

3.3 BACKFILLING

A. Begin backfilling excavated areas after receiving approval from Engineer.

B. Backfill in accordance with Section 02315.

C. Material excavated during demolition may be used as backfill.

D. Import backfill as required.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1. GENERAL

1.1 SUMMARY

A. Perform earthwork.

B. Meet requirements for excavation safety, or to facilitate construction due to wet conditions.

C. Perform excavation regardless of type, nature, or condition of materials encountered.

D. Contractor shall make his own estimate of the type and extent of the various materials to be excavated in order to accomplish the work.

E. There will be no extra compensation for dewatering.

1.2 RELATED SECTIONS

A. Section 01001 - Basic Requirements.

B. Section 02200 - Site Preparation.

C. Section 02315 - Trench Excavation, Backfill, and Compacting.

1.3 REFERENCES

A. Arkansas Department of Transportation, Standard Specifications for Highway Construction, latest edition.
   1. ARDOT Section 303 - Aggregate Base Course.

B. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA Phone: (610) 832-9585 Fax: (610) 832-9555.
   1. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12-in. Drop.
   2. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
   3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb Rammer and 18-in. Drop.
   4. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
   5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place of Nuclear Methods (Shallow Depth).

C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P: Excavations.

D. Arkansas Statute 291 of 1993.

1.4 DEFINITIONS

A. Relative Compaction:
1. The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by the Standard Proctor Test, ASTM D698, or as determined by the Modified Proctor Test, ASTM D1557, as applicable.
2. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.

B. Optimum Moisture Content:
1. Moisture content of the material for which the maximum dry density is obtained as determined by ASTM D698 or D1557.
2. Field moisture contents shall be determined on the basis of the fraction passing the 3/4-inch sieve.

C. Completed Course: A course or layer that is ready for the next layer or the next phase of construction.

1.5 SUBMITTALS

A. Submit in accordance with Section 01001.

B. Provide the following:
1. Samples of imported material.
2. Samples of onsite material to be used as fill.
3. Certification that imported materials conform to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory.
4. Proctor curves on fill material as prepared by approved laboratory.

1.6 PROJECT CONDITIONS

A. Beginning work of this Section means acceptance of existing conditions.

PART 2. PRODUCTS

2.1 FILL

A. Free from roots, organic matter, trash, and debris with maximum particle size of 1-1/2 inches.

B. It is intended that structural backfill material be obtained from on site to the maximum extent possible.

2.2 IMPORTED GRANULAR FILL

A. Provide granular fill beneath structures as noted on Drawings.

B. Imported granular fill to consist of a natural or artificial mixture of gravel and soil mortar, uniformly well graded from coarse to fine.

C. Conform to the ARDOT Section 303 classifications for Class 7 as designated on the Drawings.

2.3 TOPSOIL

A. Selected topsoil at the site, properly stored and protected, free from roots, sticks, hard clay, and stones which will not pass through a 2-inch square opening.

B. Provide imported topsoil of equal quality if required to accomplish the work.

2.4 COMPACTION EQUIPMENT

A. Provide compaction equipment of suitable type and adequate to obtain the densities specified.

B. Operate compaction equipment in strict accordance with the manufacturer's instructions and recommendations.

C. Hand-operated equipment shall be capable of achieving the specified densities.

2.5 MOISTURE CONTROL EQUIPMENT

A. Provide equipment for applying water of a type and quality adequate for the work; it shall not leak; and be equipped with a distributor bar or other approved device to assure uniform application.

B. Provide equipment for mixing and drying out material consisting of blades, discs, or other approved equipment.

2.6 WATER REMOVAL EQUIPMENT

A. Provide and operate equipment adequate to keep excavation and trenches free of water.

2.7 IMPORTED MATERIAL ACCEPTANCE

A. Import only if insufficient material is available on-site.

B. Locate and arrange use of a site near the construction area for obtaining borrow material.

C. Additional tests required at the borrow area:
   1. Standard Proctor.
   2. Remolded permeability.
   3. Atterberg limits.

D. Upon completion of removal of borrow material, grade the site to drain, place topsoil on disturbed areas, and establish grass.

E. Cost for testing and imported material shall be the responsibility of the Contractor.

2.8 SELECTED MATERIAL ACCEPTANCE

A. Provide samples for testing representative of the actual material to be installed in the work. Take samples from each 2,000 cubic yards of material stockpiled. Depending on the uniformity of the material, Engineer may request more frequent samples.

B. Forward test results to the Engineer at least 10 days before the material is required for use. If tests indicate that the material does not meet Specification requirements, the material shall not be installed in the work.

C. Material which is placed in the work but does not conform to the Specification requirements shall be removed and replaced at the Contractor's sole expense.

PART 3. EXECUTION

3.1 CLEARING AND GRUBBING

A. Complete clearing and grubbing work as specified in Section 02231 prior to beginning work in this Section.

3.2 STRIPPING TOPSOIL

A. Remove existing grass and overburden before excavating topsoil.

B. Prior to beginning excavation or fill, strip the topsoil to a depth of at least 6 inches or to a depth sufficient to remove organic material and stockpile for future use.

C. In general, remove topsoil where structures are to be built, trenches dug, and roads, parking lots, walks, and similar improvements constructed within the areas presently covered with topsoil.

D. Store topsoil clear of the construction area.

E. Take reasonable care to prevent the topsoil from becoming mixed with subsoil or eroding.

3.3 STRUCTURAL EXCAVATION

A. Contractor shall be solely responsible for trench and excavation safety systems in accordance with ACT 291 of 1993 and OSHA requirements.

B. Identify required lines, levels, and grades.

C. Identify known underground utilities. Contractor will be responsible for locating utilities.

D. The method of excavation is optional, however, no equipment shall be operated in a manner that will endanger existing structures and their integrity.

E. Use excavation support system such as sheet piling where ever necessary.

F. Allow for forms, working space, granular base, and finish topsoil where shown on Drawings or required.

G. Do not carry excavation for footings and slabs deeper than the elevation shown on Drawings after allowing for base material. Excavation of material to depths below the grades indicated, unless so directed by the Engineer or Owner's representative, will be deemed unauthorized excavation.

H. If undercutting occurs below the planned dirt grade, the same fill material as specified for backfill shall be placed and compacted to 100 Percent Standard Proctor Density as defined in this Section up to the planned dirt grade in 8 inch lifts, at no additional cost to the Owner. Do not attempt to over compact excessively wet soil. Allow to dry first by scarifying and aerating before remolding.

3.4 DEWATERING EXCAVATION

A. Remove water during periods when concrete is being deposited, pipe is being laid, and placing of backfill unless water settling is required, and at other times as required for efficient and safe execution of the work.

B. Accomplish removal of groundwater in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes, and will not result in damage to existing structures.

C. Where necessary to these purposes, lower the water level in advance of excavation, utilizing wells, well points, or similar methods.

D. Maintain the water level in the gravel stratum as measured in piezometers, a minimum of 3 feet below the prevailing excavation level or as needed to prevent bottom heave of the excavation.

E. Open pumping, sumps, and ditches: If these result in boils, loss of fines, softening of the ground or instability of slopes, areas shall not be accepted.

F. Install wells and well points with suitable screens and filters so that continuous pumping of fines does not occur.

G. Operate well points continuously to prevent boils and loss of consolidation.

H. Arrange discharge to facilitate collection of samples by Engineer.

I. Avoid settlement or damage to adjacent property.

J. Dispose of water in a manner that will not damage adjacent property, as approved.

3.5 GRANULAR FILL MATERIAL UNDER FACILITIES

A. Place fill granular material as specified in this Section within the influence area beneath slabs, walks, structures, roads, and parking areas, and as shown on the Drawings.

B. Do not exceed loose lifts of 6 inches.

C. Compact each lift to not less than 95 Percent Modified Proctor Density.

D. Place and compact a 6-inch layer of granular fill to at least 95 Percent Modified Proctor density immediately beneath spread footings, slabs on grade, or other concrete structures.

E. Moisten material as required to aid compaction (± 2 percent optimum moisture).

F. Place material in horizontal lifts and in a manner to avoid segregation.

G. Correct and repair subsequent damage to slabs, piping, concrete structures, facilities, or other structures caused by settlement of fill material.

3.6 BACKFILL AND STRUCTURES

A. Remove form materials and trash from excavation before placing backfill.

B. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material.

C. Compact backfill adjacent to concrete walls with hand-operated tampers or similar equipment that will not damage the structure.

D. Backfill water-holding basins only after satisfactory leakage tests have been conducted.

E. Place earth fill in areas not designated to be structural fill or granular fill.

F. Deposit material in maximum 6-inch loose lifts, and compact each lift to not less than 95 Percent Standard Proctor.

3.7 FILL NOT BENEATH STRUCTURES OR FACILITIES

A. Place earth fill to the lines and grades shown.

B. Place fill material in maximum 6-inch loose lifts and compact each lift to not less than 95 Percent Standard Proctor.

C. Make proper allowance for topsoil where required.

3.8 MOISTURE CONTROL

A. During compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of fill.

B. Maintain moisture content uniform throughout the lift.

C. Add water to the material at the site of excavation. Supplement, if required, by sprinkling the fill.

D. At the time of compaction, maintain the water content of the material at optimum moisture content, plus or minus 2 percentage points, except as otherwise specified for embankments.

E. Do not attempt to compact fill material that contains excessive moisture.

F. Aerate material by blading, discing, harrowing, or other methods, to hasten the drying process.

3.9 FIELD DENSITY TESTS

A. Test Methods: ASTM D2922, D1556, D2216, and D3017.

B. Cooperate with testing work by leveling small test areas designated by the Engineer.

C. Backfill test areas.

D. Field density test shall be performed for every 3,000 cubic yards of fill material placed.

E. Engineer may order testing of lift of fill at any time, location, or elevation.

3.10 SITE GRADING

A. Perform earthwork to lines and grades as shown on Drawings with proper allowance for topsoil where specified or shown on Drawings.

B. Shape, trim, and finish slopes to conform with the lines, grades, and cross sections shown.

C. Slopes shall be free of loose exposed roots and stones exceeding 3-inch diameter.

D. Round tops of banks to circular curbs, in general, not less than a 6-foot radius.

E. Neatly and smoothly trim rounded surfaces; over-excavating and backfilling to the proper grade are not acceptable.

F. Finished site grading shall be reviewed by the Engineer.

3.11 DISPOSAL OF EXCESS EXCAVATION

A. Dispose of excess excavated materials, not required or suitable for use as backfill or fill, outside of the area of work.

B. Compact excess material as specified for fill, dress the completed disposal area to slopes no greater than 4:1 (horizontal:vertical), and slope to drain.

3.12 SETTLEMENT

A. Settlement in backfill, fill, or in structures built over the backfill or fill, that may occur within the 1-year guarantee period in the General Conditions shall be considered to be caused by improper compaction methods.

B. Restore structures damaged by settlement to original condition.

END OF SECTION

SECTION 02315

TRENCH EXCAVATION, BACKFILL, AND COMPACTING

PART 1. GENERAL

1.1 SUMMARY

A. Work of this Section also includes:
   1. Replacing topsoil that contains regenerative material.
   2. Disposal of trees, stumps, brush, roots, limbs, and other waste materials from clearing operations.
   3. Imported topsoil.
   4. Crush rock backfill required by over-excavation.
   5. Imported pipe zone material.
   6. Trench settlement repair, including replacing roadway surfacing, sidewalk, or other structures.
   7. Replacing damaged culverts.

B. Trench excavation is classified as common excavation and includes removal of material of whatever types encountered including rock to depths shown or as directed by Engineer.

C. Pipe zone includes full width of excavated trench from bottom of pipe to a point 6 inches above top outside surface of pipe barrel.

D. Conform to federal, state, and local codes governing safe loading of trenches with excavated material.

E. The right is reserved to modify the use, location, and quantities of the various types of backfill during construction as Engineer considers to be in the best interest of Owner.

F. There shall be no extra compensation for dewatering and rock excavation.

G. Pipe shall be installed according to the latest version of AWWA C605.

1.2 REFERENCES

A. Arkansas Department of Transportation, P.O. Box 2261, Little Rock, Arkansas 72203, latest edition.
   1. ARDOT 303 - Aggregate Base Course.

B. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.

1. ASTM D448 - Classifications for Standard Sizes of Aggregate and Bridge Construction.
2. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg.) Rammer and 12-inch (304.8-mm) Drop.
3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-lb. (4.54-kg.) Rammer and 18-inch (457-mm) Drop.
4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes.
5. ASTM D2922 - Test Methods for Density of Soils and Soil-Aggregates in Place by Nuclear Method.

C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P: Excavations.

D. The Contractor shall be solely responsible for trench and excavation safety systems in accordance with Act 291 of 1993.

PART 2. PRODUCTS

2.1 FOUNDATION STABILIZATION

A. Crushed gravel or crushed rock, free from dirt, clay balls, or organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and meeting ASTM D448 Size No. 67 (Concrete Aggregate).

2.2 PIPE ZONE MATERIAL

A. Select material shall consist of fine loose earth or sand free from clods or rocks larger than 3/4 inches in dimension and of proper moisture content for maximum consolidation.

B. Crushed granular material conforming to ASTM D448, Size No. 67.

C. Washed stone bedding size 1/4-inch to 3/4-inch.

2.3 COMMON FILL MATERIALS

A. Material shall not contain pieces larger than 3 inches, and shall be free of roots, debris, or organic matter.

2.4 SELECT FILL MATERIALS

A. Class 7, Class 3, and Class 4 as established by Section 303 of Arkansas Department of Transportation Standard Specifications for Highway Construction.

B. ASTM Soil Classification GC as set forth in ASTM Designation D2487-92. On site material may be used, provided it is in accordance with ASTM D2487-92.

2.5 BEDDING MATERIAL

A. Pea gravel, sand, or other locally available bedding material, as approved.

2.6 TRENCH BACKFILL

A. Granular Backfill:
   1. Natural or artificial mixture of gravel and soil mortar uniformly well graded from coarse to fine.
   2. ARDOT Section 303 Class 3, Class 4, or Class 7 as specified in this Section.

2.7 PVC WATER AND SEWER PIPE TRENCH

A. See Drawings for trench details.

2.8 COMPACTION EQUIPMENT

A. Suitable type and adequate to obtain the amount of compaction specified.

B. Operate in strict accordance with manufacturer's instructions and recommendations and maintain in such condition so that it will deliver manufacturer's rated compactive effort.

2.9 IMPORTED TOPSOIL

A. Suitable sandy loam from an approved source.

B. Must possess friability and a high degree of fertility.

C. Free of clods, roots, gravel, and other inert material.

D. Free of quackgrass, horsetail, and other noxious vegetation and seed.

PART 3. EXECUTION

3.1 PREPARATION

A. Where clearing or partial clearing of right-of-way is necessary, complete prior to start of trenching.

B. Cut trees and brush as near to surface of ground as practicable, remove stumps, and pile for disposal.

C. Do not permit excavated materials to cover brush or trees prior to disposal.

3.2 PREVENT TRENCH WATER AND ANIMALS FROM ENTERING PIPE

A. When pipe laying is not in progress, including noon hours, open ends of pipe shall be closed; and no trench water, animals, or foreign material shall be permitted to enter the pipe.

3.3 DISPOSAL OF CLEARED MATERIAL

A. Dispose of material in such a manner to meet requirements of state, county, and local regulations regarding health, safety, and public welfare.

B. Dispose of nonflammable and flammable material off the construction site in an approved location.

C. Do not leave material on the Project site, shove onto abutting private properties, or bury in embankments or trenches.

3.4 REMOVAL OF OBSTRUCTIONS

A. Remove obstructions within trench area or adjacent thereto such as tree roots, stumps, abandoned piling, logs, and debris.

B. Engineer may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the easement or right-of-way without adversely affecting the intended function of the facility.

C. Dispose of obstructions in accordance with this Section.

3.5 REMOVAL AND REPLACEMENT OF TOPSOIL

A. Where trenches cross lawns, garden areas, pasturelands, cultivated fields, or other areas on which reasonable topsoil conditions exist, remove topsoil for a depth of 6 inches for full width of trench to be excavated.

B. Use equipment capable of removing a uniform depth of material.

C. Stockpile removed topsoil at regular intervals, and do not mix with other excavated material.

D. Locate stockpiles so that material of one ownership is not transported and stockpiled on property of another ownership.

E. Minimum finished depth of topsoil over trenches: 5 inches.

F. Imported topsoil may be substituted for stockpiling and replacing topsoil.

G. Maintain finished grade of topsoil level with area adjacent to trench until final acceptance by Engineer.

H. Repair damage to adjacent topsoil caused by work operations.
   1. Remove rock, gravel, clay, and other foreign materials from the surface.
   2. Regrade.
   3. Add topsoil as required.

3.6 TRENCH WIDTH

A. Minimum width of unsheeted trenches where pipe is to be laid shall be 18 inches greater than the outside diameter of the pipe, or as approved.

B. Maximum width at top of trench will not be limited, except where excess width of excavation would cause damage to adjacent structures or property or cause undue stresses on the pipe.

C. Confine trench widths to dedicated rights-of-way or construction easements, unless special written agreements have been made with affected property owner.

3.7 EXCAVATION

A. Excavate trench to lines and grades shown or as established by Engineer with proper allowance for pipe thickness and for pipe base or special bedding when required.

B. If trench is excavated below required grade, correct with foundation stabilization material.

C. Place material over full width of trench in compacted layers not exceeding 6 inches deep to established grade with allowance for pipe base or special bedding.

3.8 PREPARATION OF TRENCH - LINE AND GRADE

A. Do not deviate more than ½ inch from line or ½ inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.

B. Grade the bottom of the trench by hand to the line and grade where the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.

C. Remove hard spots that would prevent a uniform thickness of bedding.

D. Check the grade with a straightedge and correct irregularities found.

E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

3.9 SHORING, SHEETING, AND BRACING OF TRENCHES

A. Sheet and brace trench when necessary to prevent caving during excavation in unstable material or to protect adjacent structures, property, workers, and the public.

B. Increase trench widths accordingly by the thickness of the sheeting.

C. Maintain sheeting in place until pipe has been placed and backfilled at pipe zone.

D. Remove shoring and sheeting as backfilling is done in a manner that will not damage pipe or permit voids in backfill.

E. Conform to safety requirements of federal, state, or local public agency having jurisdiction for sheeting, shoring, and bracing of trenches; the most stringent of these requirements shall apply.

3.10 LOCATION OF EXCAVATED MATERIALS

A. Place excavated material only within construction easement, right-of-way, or approved working area.

B. Do not obstruct private or public traveled roadways or streets.

3.11 REMOVAL OF WATER

A. Provide and maintain ample means and devices to promptly remove and dispose of water entering trench during time trench is being prepared for pipe laying, during laying of pipe, and until backfill at pipe zone is completed.
   1. These provisions apply during the noon hour as well as overnight.
   2. Provide necessary means and devices, as approved, to positively prevent under water from entering the construction area of another contractor.

B. Dispose of water in a manner to prevent damage to adjacent property.

C. Drainage of trench water through the pipeline under construction is prohibited.

3.12 FOUNDATION STABILIZATION

A. When existing material in bottom of trench is unsuitable for supporting pipe, excavate unsuitable material.

B. Backfill trench to subgrade of pipe base with foundation stabilization material specified.

C. Place foundation stabilization material over the full width of trench and compact in layers not exceeding 6 inches deep to required grade by making passes with a vibratory compactor (or equivalent).

D. Material shall be considered unsuitable when it contains more than 5 percent organic material by volumetric sampling or when it will not support a reading of 1.5 on a hand penetrometer.

3.13 ROCK IN PIPE TRENCH

A. Where rock is encountered in bottom of trench, support pipe on bedding material.

B. Minimum Bedding Thickness: Minimum of 4 inches or one eighth of the outside diameter of pipe, whichever is greater.

C. Extend bedding up pipe sides one sixth of outside diameter of the pipe, minimum.

D. Backfill over pipe according to pipe zone type.

3.14 PIPE ZONE BACKFILL

A. Depth of the pipe zone above pipe barrel varies with pipe material.

B. Particular attention must be given to area of pipe zone from flow line to centerline of pipe to ensure firm support is obtained to prevent lateral movement of pipe during final backfilling of pipe zone.

C. Backfill area of pipe zone from bottom of pipe to horizontal centerline of pipe by hand-placing material around pipe in 4-inch layers.

D. Achieve continuous support beneath pipe haunches by "walking in" and slicing with shovel.

E. Backfill area of pipe zone from horizontal centerline to top of pipe zone with pipe zone material as determined by class of backfill.

F. In lieu of selected material for pipe zone in upper portion of pipe zone, imported pipe zone material approved by Engineer for trench backfill may be substituted.

G. If the Engineer determines that the existing material is insufficient or unsuitable at trench side for selected material for pipe zone in upper portion of pipe zone, provide suitable material from other trench excavation along pipeline or imported pipe zone material.

3.15 TRENCH BACKFILL ABOVE PIPE ZONE

A. When backfill is placed mechanically, push backfill material onto slope of backfill previously placed and allow to slide down into trench.

B. Do not push backfill into trench in such a way as to permit free fall of material until at least 2 feet of cover is provided over top of pipe.

C. Under no circumstances allow sharp, heavy pieces of material to drop directly onto pipe or tamped material around pipe.

D. Do not use backfill material of consolidated masses larger than ½ cubic foot.

3.16 EXCESS EXCAVATED MATERIAL

A. Dispose of excess excavated material off project site in an approved area.

3.17 DRAINAGE CULVERTS

A. Replace drainage culverts which are removed on near right angles to pipe centerline.

B. If pipe cannot be reused or is damaged during removal, dispose of it and provide new pipe.

C. Protect culverts from damage or restore to equivalent condition.

D. Replace culverts to existing lines and grades.

E. Do not replace culverts until proposed pipeline is installed and backfill of trench has been completed to subgrade of culvert.

3.18 PIPE COVER

A. Place select material from excavation over pipe to provide minimum coverage, as shown on Drawings or as directed by Engineer.

3.19 DRAINAGE DITCH RESTORATION

A. Undercrossings of minor drainage ditches not covered in another Specification Section shall be backfilled so that upper 1 foot of material in ditch between ditch banks is clay.

B. Compact material for full ditch width by 6 passes of vibratory compactor (or equivalent).

C. Where indicated on Drawings, provide concrete arch, and/or riprap on ditch banks.

3.20 SETTLEMENT

A. Correct settlement noted in backfill, fill, or in structures built over backfill or fill within warranty period.

3.21 IMPORTED TOPSOIL

A. Should regenerative material be present in soil, remove both surface and root which appears in within 1 year following acceptance of Project in a manner satisfactory to Owner.

END OF SECTION

SECTION 02370

EROSION PREVENTION

PART 1. GENERAL

1.1 SUMMARY

A. Install slope protection and erosion control.

B. Complete Work to present a continuous appearance.

1.2 RELATED SECTIONS

A. Section 02200 - Site Preparation.

B. Section 02300 - Earthwork.

C. Section 02315 - Trench Excavation, Backfill, and Compacting.

1.3 SAFETY REQUIREMENTS

A. Conform with OSHA requirements, federal, state, and local rules and regulations pertaining to safety and as specified elsewhere in these Specifications.

PART 2. PRODUCTS

2.1 FILTER FABRIC FOR SILT FENCING

A. Nonwoven polypropylene or polyester fabric.

B. Manufacturer: Typar 3401, Trevira S1115, or equal.

2.2 ACCESSORIES

A. Wood or steel stakes. If using steel stakes (rebar), stakes shall have safety caps meet OSHA requirements.

B. Rectangular hay bales secured with twine or nylon rope.

C. Filter fabric shall be supported by steel or wooden post and backed with a woven wire fabric for support.

PART 3. EXECUTION

3.1 INSTALLATION

A. Stake hay bales with wooden or steel stakes to prevent movement and to provide erosion control.

B. Install silt fencing to control dust movement and to prevent erosion.

C. Hay bales and silt fencing support shall be set in shallow trench and anchored a minimum of a 1-1/2 inch in ground surface.

END OF SECTION

SECTION 02630

STORM DRAINAGE

(NOTE: THIS SECTION INCLUDES JUNCTION BOXES AND INLETS WITH GRATES)

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Pipe and Culverts.

B. Pipe Joint Material.

C. Inlets and Junction Boxes.

D. Foundation Drain Pipe.

1.2 RELATED SECTIONS

A. Section 02315 - Trench Excavation and Backfill.

B. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 249, Washington, DC 20001.
   1. AASHTO M36 - Corrugated Steel Pipe, Metallic Coated, for Sewers and Drains.
   2. AASHTO M176 - Porous Concrete Pipe.
   3. AASHTO M218 - Sheet Steel, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
   4. AASHTO M245 - Polymer Precoated Corrugated Steel Pipe.
   5. AASHTO M246 - Steel Sheet, Polymer Precoated for Corrugated Steel Pipe.

B. American Concrete Institute, P. O. Box 9094, Farmington Hills, MI 48333-9094
   38800 Country Club Drive, Farmington Hills, MI 48331 Phone 248/484-3700
   Fax 248/848-3701
   1. ACI 301 - Specification for Structural Concrete for Buildings.

C. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA Phone: (610) 832-9585 Fax: (610) 832-9555.
   1. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
   2. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   3. ASTM C412 - Specification for Concrete Drain Tile.

4. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
5. ASTM C444 - Specification for Preformed Concrete Pipe.
6. ASTM C478 - Specification for Precast Reinforced and Nonreinforced Masonry.
7. ASTM C700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
8. ASTM D1785 - PVC Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

PART 2. PRODUCTS

2.1 PIPE AND CULVERTS

A. Corrugated Steel Pipe and Culverts: Provide as specified in Section 02641.
   1. Flared end sections for corrugated steel pipe:
      a. In compliance with latest AASHTO specifications.
      b. Galvanized to AASHTO standards.
      c. Install as per AASHTO and manufacturer's recommendation.

B. Flared End Sections for Corrugated Steel Pipe:
   1. In compliance with latest AASHTO specifications.
   2. Polymer coated to AASHTO Standards.
   3. Install per AASHTO and manufacturer's recommendations.

C. Reinforced Concrete Pipe:
   1. Class III or as shown on Drawings.
   2. Conform to ASTM C76.
   3. Joints shall conform to ASTM C990.

2.2 PIPE JOINT MATERIAL

A. Band Couplers:
   1. Manufacturers:
      a. LUV band, with 2 annular corrugations, by Caldwell Culvert; or equal.
      b. Smooth Cor band, with 2 annular corrugations by Caldwell Culvert; or equal.
   2. Minimum gage in accordance with AASHTO M36.
   3. Gaskets: Ramneck.

B. Reinforcing End Collars:
   1. 12-gage.
   2. 6 inches wide.
   3. Annular corrugations same as pipe.

2.3 COATINGS FOR PIPE AND CULVERTS

A. Polymer:
   1. AASHTO M218, M245, and M246.
   2. Thickness: 10 mils, both sides.
   3. Equal to Dow Chemical Trenchcoat protective film as furnished by Caldwell Culvert Company, North Little Rock, Arkansas.

2.4 MATERIALS FOR CAST-IN-PLACE CONCRETE

A. Conform to Section 03300.

B. Design mix to attain minimum 4,000 psi compressive strength at 28 days.

2.5 PRE-CAST CONCRETE STRUCTURES

A. Conform to local standards.

B. Conform to ASTM C478.

2.6 FOUNDATION DRAIN PIPE

A. Open-joint Pipe: Extra-quality or heavy-duty extra quality concrete drain tile conforming to ASTM C412, or extra-strength vitrified clay pipe conforming to ASTM C700.

B. Perforated Pipe: Type 1 or Type 2 perforated concrete pipe conforming to ASTM C444 and applicable requirements of ASTM C14, Class 2 or Class 3, or extras-strength, perforated, vitrified clay pipe conforming to ASTM D1785, or perforated SDR Standard PVC pipe conforming to ASTM D3034. Do not use bituminized fiber pipe or PE plastic pipe for perforated drain piping.

C. Porous Wall Pipe: Standard-strength "Poroswall" concrete pipe by the Walker Poroswall Pipe Co., or equal. Straight, free from cracks and defects, meeting AASHTO Designation M176-631, Class II, and having infiltration rate of not less than 1 gallon per minute per inch of internal diameter per foot of pipe. Provide wye, tee, and related fittings required.

2.7 METAL GRATES, COVERS, AND FRAMES (CAST IRON GRATES, COVERS, AND FRAMES SUBJECT TO VEHICLE TRAFFIC)

A. All frame, covers, grates, and other castings shall be heavy-duty cast iron and shall be non-rocking, machine surfaces bearing surfaces.

B. Furnish frames with anchors for attachment to concrete work.

C. Furnish covers with pry holes or flush type drop handles and non-slip surfaces.

D. Cast iron castings to be size and type shown on Drawings.

PART 3. EXECUTION

3.1 INSTALLATION OF PIPE AND CULVERTS

A. Lay sections on properly compacted granular bedding (4-inch minimum) to lines and grades shown on Drawings.

B. Backfill with approved imported granular materials as specified in Section 02315.

C. Band Couplers:
   1. Install band couplers in accordance with manufacturer's recommendations and AASHTO guidelines.
   2. Use Ram Neck gasket material in end corrugation of each pipe end.

D. Reinforcing End Collars:
   1. Install reinforcing end collar where pipe terminates without protective end treatment, such as headwall, inlet box, or grouted rip rap.

E. Storm drains shall have a minimum cover of 24 inches.

F. Pipes (storm, sanitary, water) that cross each other with less than 1-1/2-foot clearance must have a concrete encased intersection.

3.2 INSTALLATION OF INLETS AND JUNCTION BOXES

A. Conform to city standard construction details.

B. Construction methods to conform to Section 03300.

C. Construct concrete drainage structures with exposed concrete surfaces rubbed to smooth finish and with metal frames for grates and covers securely anchored in place.

D. Structures may be cast-in-place or pre-cast.

E. Frame castings to be securely held in place to proper line and grade to make an integral part of the complete structure.

F. Construct catch basin, weirs, headwalls and similar structures of reinforced concrete unless otherwise indicated; pre-cast concrete units as approved.
   1. Provide concrete foundations for manholes and other structures.
   2. Concrete structures shall be reinforced.
   3. All concrete construction shall receive a smooth finish in accordance with ACI 301 on all surfaces exposed to exterior or interior of structure; rough formed for all unexposed construction.
   4. Moist cure concrete for a minimum of seven days after placing.

G. Where manholes occur in pavement, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3 inches above finish surface, unless otherwise indicated.

H. Backfill at structures and compact in accordance with Section 02315.

3.3 INSTALLATION OF FOUNDATION DRAINS

A. Open-joint:
   1. Lay with joints opened 1/10-inch and with top half of joints covered with strips of roofing felt.
   2. Grade pipe lines to drain.
   3. Place drainage fill in accordance with Section 02300.

B. Laying Pipe:
   1. Carefully prepare bedding so pipe after installation will be true to line and grade.
   2. Surface grade drainage fill material beneath pipe to provide uniform and continuous support beneath pipe at all points. Densify fill material beneath pipe.
   3. After each pipe has been brought to grade, aligned, and placed in final position, deposit and densify sufficient bedding material under pipe haunches and on each side of pipe to hold pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations. Deposit bedding material uniformly and simultaneously on each side of pipe to prevent lateral displacement.

END OF SECTION

SECTION 02633

POLYETHYLENE STORM SEWER PIPE AND FITTINGS

PART 1. GENERAL

1.1 SUMMARY

A. Provide high density polyethylene corrugated storm sewer pipe and fittings with integrally formed smooth interior.

1.2 RELATED SECTIONS

A. Section 02315 - Trench Excavation, Backfill, and Compaction.

B. Section 02630 - Storm Drainage.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 225, Washington, DC 20001.
   1. AASHTO M252 - Standard Specification for Polyethylene Corrugated Drainage Pipe.
   2. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 12-inch to 24-inch diameter.

B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM D1248 - Specification for Polyethylene Plastics Molding and Extrusion Materials.
   2. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
   3. ASTM D2412 - Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   4. ASTM D3350 - Standard Specification for Polyethylene Pipe and Fittings Materials.
   5. ASTM F405 - Standard Specification for Corrugated Polyethylene Pipe and Fittings.
   6. ASTM F667 - Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.

1.4 SUBMITTALS

A. Submit in accordance with Section 01001.

B. Submit manufacturer's certificate of compliance.

PART 2. PRODUCTS

2.1 PIPE

A. Provide pipe and fittings manufactured of polyethylene compounds which meet or exceed the requirements of Type II, Category 4 or 5, Grade P33 or P34, Class C per ASTM D1248. Clean reworked material may be used.

B. Pipe and fittings shall be free of foreign inclusions and visible defects.

C. Cut pipe ends squarely and cleanly so as not to adversely affect jointing.

D. Minimum parallel plate pipe stiffness values at 5 percent deflection (per ASTM D2412) shall be as follows:
   1. 12-inch: 45 psi.
   2. 15-inch: 42 psi.
   3. 18-inch: 40 psi.
   4. 24-inch: 34 psi.
   5. 30-inch: 28 psi.
   6. 36-inch: 22 psi.

E. Manufactured in accordance with ASTM F405, ASTM F667, AASHTO M252, and AASHTO M294.

2.2 FITTINGS

A. Provide molded or fabricated fittings manufactured by pipe supplier. Fittings produced by manufacturer other than pipe supplier shall not be allowed.

B. Provide Split Couplings:
   1. Corrugated to match pipe corrugations.
   2. Engage a minimum of 6 corrugations for 12-inch through 24-inch diameter and 4 corrugations for 30-inch and 36-inch diameter pipe.

C. Gaskets: Neoprene, where required by Engineer.

D. Manufactured in accordance with ASTM F405, ASTM F667, AASHTO M252, and AASHTO M294.

PART 3. EXECUTION

3.1 INSTALLATION

A. Install in accordance with ASTM D2321 and manufacturer's instructions.

END OF SECTION

SECTION 02640

PRECAST REINFORCED CONCRETE BOX CULVERTS

PART 1. GENERAL

1.1 SUMMARY

A. This item shall provide for the use and installation of precast reinforced concrete box culverts.

1.2 RELATED SECTIONS

A. Section 01001 - Basic Requirements.

B. Section 02315 - Trench Excavation, Backfill and Compacting.

C. Section 03251 - Expansion, Construction and Contraction Joints.

1.3 REFERENCE STANDARDS

A. Arkansas Department of Transportation (ARDOT) Standard Specifications for Highway Construction, latest edition.

1.4 SUBMITTALS

A. Submit in accordance with Section 01001.

PART 2. PRODUCTS

2.1 MATERIALS

A. The manufacture and furnishing of precast reinforced concrete box culverts shall be in accordance with AASHTO M 259 or M 273, as applicable.

B. The manufacturer shall furnish a certification that the units comply with AASHTO M 259 or M 273, as appropriate, and that all steel materials incorporated in the units comply with the requirements of Section 106.01 of the Arkansas Department of Transportation (ARDOT) Standard Specifications for Highway Construction, latest edition.

C. Units shall bear evidence that the component materials have been tested and approved and that the construction methods have been inspected by an inspector approved by the Engineer.

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Excavation and backfill shall be in accordance with Section 02315.

B. Precast reinforced concrete box culverts shall be bedded on a foundation of firm and stable material, accurately shaped to conform to their base. When required by the plans, special bedding material shall be provided.

C. Joints and joint materials shall comply with Section 03251.

D. Lifting holes shall be filled with mortar or concrete and cured as directed by the Architect.

E. When precast boxes are used to form multiple barrel structures, they shall be placed in conformance with the details shown on the plans. Material required between barrels shall be as shown on the plans.

F. Connections of precast boxes to cast-in-place boxes or to any required headwalls, wingwalls, riprap, or other structure shall comply with the details shown on the plans.

G. Headwalls, wingwalls, and footings shall be according to the details of the plans, except that overall widths of the headwalls and footings shall be modified to fit the finished width of the various structures.

END OF SECTION

SECTION 02642

CORRUGATED HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1. GENERAL

1.1 SUMMARY

A. Provide smooth interior Corrugated High Density Polyethylene (HDPE) Pipe with silt tight and leak resistant joint.

1.2 RELATED SECTIONS

A. Section 02315 - Trench Excavation, Backfill, and Compaction.

B. Section 02630 - Storm Drainage.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 225, Washington, DC 20001.
   1. AASHTO M252 - Standard Specification for Corrugated Polyethylene Pipe, 4-inch to 10" diameter.
   2. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 12-inch to 48-inch diameter.
   3. AASHTO MP7-97 - Standard Specification for Corrugated Polyethylene Pipe, 54-inch to 60-inch diameter.

B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM D2321 - Recommended Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   2. ASTM D3350 - Standard Specification for Polyethylene Pipe and Fittings Materials.
   3. ASTM F477 - Standard Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

A. Submit in accordance with Section 01001.

B. Submit manufacturers certificate of compliance.

PART 2. PRODUCTS

2.1 PIPE MATERIAL

A. Pipe and fitting material shall be high-density polyethylene meeting ASTM D3350 minimum cell classification 324420C for 4-inch to 10-inch diameters, or 335420C for 12-inch through 60-inch diameters.

2.2 PIPE REQUIREMENTS

A. Pipe manufactured for this specification shall comply with the requirements for test methods, dimension, and markings found in AASHTO M252, AASHTO M294 and/or AASHTO MP7-97. The prescribed sizes of pipe are nominal inside diameters. Pipe sizes shall be no less than 99% of nominal inside diameter and have a nominal length of 20.0 feet.

B. For 4-inch to 10-inch diameters, the pipe supplied shall be smooth Interior and Annular Exterior Corrugated High Density Polyethylene (HDPE) Pipe meeting the requirements of AASHTO M252, Type S.

C. For 12-inch to 42-inch diameters, the pipe supplied shall be smooth Interior and Corrugated High Density Polyethylene (HDPE) Pipe meeting the requirements of AASHTO M294, Type S or D.

D. For 48-inch to 60-inch diameters, the pipe supplied shall be smooth Interior and Corrugated High Density Polyethylene (HDPE) Pipe meeting the requirements of AASHTO MP7-97, Type S or D.

E. Manning's "n" value for use in design shall not be less than 0.012.

2.3 FITTINGS

A. Fittings shall conform to AASHTO M252, M294 or MP7-97. Fabricated fittings shall be welded on the interior and exterior at all junctions.

2.4 JOINT PERFORMANCE

A. Pipe shall be joined with bell-and-spigot joints meeting ASHTO M252, M294 or MP7-97. Joints shall provide a silt-tight and leak resistant joint.

B. Pipe joints shall incorporate a gasket meeting the requirements of ASTM F477 to form a silt tight and leak resistant connection. Joints shall exceed the soil tight joint performance criterial of AASHTO Standard Specifications for Highway Bridges, Division II, Section 26.

C. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris.

D. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

2.5 ACCEPTABLE MANUFACTURERS

A. Smooth Interior and Corrugated HDPE Pipe shall be as manufactured by:
   1. Hancor, Inc.
   2. Advanced Drainage Systems, Inc.
   3. Engineer approved equal.

PART 3. EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with ASTM D2321 with the exception that minimum cover in trafficked areas shall be one foot for 4-inch to 48-inch pipe and 24-inches for 54-inch and 60-inch pipe.

B. Backfill the pipe with material meeting the requirements of ASTM D2321 Class I, II or III subject to approval of the Engineer. Backfill shall be placed in six to 12 inch lifts compacted to a minimum 90% standard proctor or as designated by the Engineer.

C. Trench width should be wide enough to place and compact backfill around the entire pipe. The trench width shall be outside diameter +24-inches for pipe sizes 12-inch to 30-inch, and outside diameter +36-inches for pipe sizes 36-inches to 60-inches.

END OF SECTION

SECTION 02722

AGGREGATE BASE COURSE

PART 1. GENERAL

1.1 SUMMARY

A. This item shall consist of a foundation course for surface course, for other base courses, or for pavements.

B. It shall be constructed on the prepared subgrade, subbase, or other completed base course according to these specifications and in substantial conformity with the lines, grades, compacted thickness, and typical cross section shown on the plans.

PART 2. PRODUCTS

2.1 MATERIALS

A. Aggregate Base Course shall be either gravel and/or crushed stone so proportioned as to meet the requirements for a class of aggregate specified in the following table:

Sieve,mm	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
				PERCENT PASSING				
75 (3")	100	100	100					
50 (2")	95-100	95-100	95-100					
37.5 (1-1/2")				85-100	100	100	100	
25.0 (1")								100
19.0 (3/4")	60-100	60-100	60-100	60-100	60-100	50-90	50-90	65-100
9.5 (3/8")	40-8-	40-80	40-80	40-80	40-80			
4.75 (#4)	30-60	30-60	20-60	30-60	30-60	25-55	25-55	25-55
2.0 (#10)	20-50	20-50	20-45	20-45	20-45			
0.425 (#40)	10-35	10-35	10-35	10-35	10-35	10-30	10-30	10-30
0.075 (#200)	3-15	3-15	3-12	3-12	3-12	3-10	3-10	3-10
MAX. PLASTICITY INDEX (MINUS								
0.425 MATL.)	13	10	6	6	6	6	6	6
(#40) MINIMUM PERCENT CRUSHED (RETAINED ON 4.75 mm [#4] SIEVE					15			
MINIMUM PERCENT CRUSHER-RUN MATERIAL						90	90	90

B. Class 7 and 8 shall be any mechanically crushed natural rock or stone of igneous, sedimentary, and/or metamorphic origin produced from a solid geological formation by quarrying method.

C. The Contractor shall have the option of using any higher numbered class Aggregate Base Course than that specified, provided that payment will be for the class specified.

D. Material furnished for Aggregate Base Course, Class 3 through Class 8, shall have a percent of wear by the Los Angeles Test not greater than 45 as determined by AASHTO T 96.

E. When it is necessary to blend two or more materials, each material shall be proportioned separately through mechanical feeders to ensure uniform production. Premixing or blending to avoid separate feedings will not be permitted. Production of material by blending materials on the roadway to obtain a mixture that will comply with the requirements specified herein will not be permitted.

F. For the purpose of this specification, shale and slate are not considered to be gravel or stone. The material furnished shall not obtain more than 5percent by weight of shale, slate, and other objectionable, deleterious, or injurious matter.

G. For Class 1 and 2 materials, the fraction passing the 0.075 mm (#200) sieve shall not be greater than three-fourths of the fraction passing the 0.425 (#40) sieve. For Classes 3 through 8, the fraction passing the 0.075 mm (#200) sieve shall not be greater than two-thirds of the fraction passing the 0.425 mm (#40) sieve. For Classes 3 through 8 the fraction passing the 0.425 mm (#40) sieve shall have a liquid limit not greater than 25.

H. To ensure that gravel is uniformly graded, the difference between the percent passing the various sieves shall be as follows for Classes 3, 4 and 5:

Sieve		Percent
19.0 mm - 9.5 mm	(3/4" - 3/8")	5 min.
9.5 mm - 4.75 mm	(3/8" - #4)	5 min.
4.75 mm - 2.00 mm	(#4 - #10)	5 min.
2.0 mm - 0.425 mm	(#10 - #40)	4 min.

I. When the material contains aggregate larger than that specified above for the class called for in the Contract, the oversize aggregate shall be removed by screening or by screening and crushing. The removal of large size aggregate by hand methods will not be permitted.

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The base course material shall be placed on a completed and approved subgrade or existing base that has been bladed to substantially conform to the grade and cross section shown on the plans.

B. The subgrade shall be prepared as specified in Section 02300 - Earthwork, and shall be free from an excess or deficiency of moisture at the time of placing base course material.

1. The subgrade shall also comply, where applicable, with the requirements of other items that may be contained in the Contract that provide for the construction, reconstruction, or shaping of the subgrade or the reconstruction of the existing base course.

C. Base course material shall not be placed on a frozen subgrade or subbase.

D. The aggregate shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width, and cross section shown on the Drawings.

E. If the required compacted depth of the base course exceeds 150 mm (6 inches), the base shall be constructed in two or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 150 mm (6 inches) except when vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of base course may be increased to 200 mm (8 inches) upon approval of the Engineer.

F. The material shall be spread the same day that it is hauled. Spreading shall be performed in such a manner that no segregation of course and fine particles nor nests or hard areas caused by dumping the aggregate on the subgrade will exist. Care shall be taken to prevent mixing of subgrade or unspecified material with the base course material during the blading and spreading operation.

G. Aggregate shall not be dumped or mixed on an existing or newly constructed ACHM course or PCC Pavement that will not be overlaid under the same Contract nor on any open graded base course. Mechanical spreading equipment shall be used, if necessary, to place the base course on the subgrade.

H. If sufficient working space is not available to allow proper aeration or addition of water to the base, the base material shall be mixed by any satisfactory method before placement.

I. Each course shall be thoroughly mixed for the full depth of the course and shall be compacted by any satisfactory method that will produce the density thereinafter specified.
   1. The aggregate shall be maintained substantially at optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be necessary.
   2. The specified grade and cross section shall be maintained by blading throughout the compaction operation.
   3. The material in each course shall be compacted to a density, as determined by AASHTO T 238, Method B, of not less than 98 percent of the maximum laboratory density determined in the laboratory by AASHTO T 180, Method D.
   4. The aggregate shall be compacted across the full width of application.

J. The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and recompacting to the specified density, as directed.

K. Where neither prime coat nor surfacing is provided in the same Contract with the base course, the material in the base course shall be uniformly compacted, stable, and free of segregated areas.

L. The Contractor shall maintain the base course in a satisfactory condition until accepted.

3.2 QUALITY CONTROL

A. To assure that the material used meets the requirements of the specifications, certain tests for quality control and acceptance will be performed as specified herein. The properties for which quality control and acceptance testing will be performed are gradation, density, moisture content, plasticity index, and thickness as specified in each Section.

B. The maximum laboratory density shall be determined as follows:

% Retained - 4.75 mm (#4) Sieve	Test Method
10 Max.	AASHTO T 99, Method A
11 - 30	AASHTO T 99, Method C
31 Min.	AASHTO T 180, Method D

Note: In lieu of AASHTO T224, correction for coarse particles retained on the 3/4" (19.0 mm) sieve shall be determined by replacing with an equal mass of material passing the 3/4" (19.0 mm) sieve and retained on the #4 (4.75 mm) sieve.

C. The in-place density shall be determined by using AASHTO T 310, Direct Transmission. The moisture content shall be determined by AASHTO T 310 or ARDOT Test Method 347 or 348. A new maximum laboratory density and optimum moisture will be determined whenever the Engineer deems necessary or upon evidence provided by the Contractor.

D. Tests for gradation, liquid limit, and plasticity index shall be performed by AASHTO T 11, T 27, T 89, and T 90.

E. The Contractor shall furnish all personnel, equipment, and facilities necessary to perform the required sampling and testing.

F. The Contractor shall provide the Engineer with the opportunity to observe all quality control sampling and testing.

G. All quality control sampling and testing shall be performed by or under the direct supervision of a technician acceptable to the Owner and in accordance with ARDOT's Manual of Field Sampling and Testing Procedures. Test reports shall be signed and copies made available to the Engineer if requested.

H. If the results of any test shows that the required minimum density has not been obtained, corrective action shall be taken, followed by a re-test at the same location. The original and re-test reports shall be cross referenced. All corrective actions shall be performed by the Contractor at no cost to the Owner.

3.3 ACCEPTANCE

A. Acceptance testing for thickness (when specified on the Drawings), gradation, plasticity index, density, and moisture content will be based on lots. The size of standard lots will be 100 cubic yards. Partial lots, of any size, may be established by the Engineer at any time.

B. Test methods for acceptance shall be the same as specified for quality control testing.

C. The item of work being tested shall not be considered complete or accepted until passing test reports are submitted to the Engineer.

D. The Contractor shall take one test for all properties in each lot or partial lot at a location randomly selected by the Engineer.

E. In addition to the required acceptance tests, the Engineer may require the Contractor to test any location that, by visual observation, appears to be defective.

F. The Contractor's acceptance sampling and testing procedures and results will be subject to independent assurance sampling and testing conducted by the Owner. The Contractor shall be required to make changes to the equipment and/or procedures if the such tests are unable to verify the Contractor's test results.

G. All acceptance testing performed by the Contractor is subject to observation by the Engineer. All test reports shall be signed and submitted to the Engineer the next business day after the tests are performed.

H. If a lot or a partial lot fails to meet the specifications, the Contractor shall remove and replace that lot or partial lot with acceptable material at no cost to the Owner. Tests will be performed on the replacement material as required for the original material. Acceptance of the replacement material will be the same as for the original material.

I. Payment for the quantity in the original lot will be withheld or recovered, and released after the removal and replacement has been acceptably performed.

END OF SECTION

SECTION 02746

ASPHALTIC CONCRETE PAVING

PART 1. GENERAL

1.1 SUMMARY

A. Prepare asphaltic concrete pavement in accordance with this Section and where indicated on the Drawings.

B. Contractor will pay cost of testing.

C. Construct Work of this Section that is adjacent to or connected to city streets in accordance with requirements of the City for city streets.

D. Secure permits and inspections, post necessary bonds, and pay necessary fees.

1.2 RELATED SECTIONS

A. Section 01001 - Basic Requirements.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, North West, Suite 225, Washington, DC 20001.
   1. AASHTO M14 - Anionic Emulsified Asphalt.
   2. AASHTO M81 - Cut-Back Asphalt Concrete (Rapid-Curing Type).
   3. AASHTO M82 - Cut-Back Asphalt Concrete (Medium-Curing Type).
   4. AASHTO M208 - Cationic Emulsified Asphalt.

B. American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM C207 - Specification for Hydrated Lime for Masonry Purposes.
   2. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
   3. ASTM D946 - Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
   4. ASTM D977 - Specification for Emulsified Asphalt.

C. Arkansas Department of Transportation, P.O. Box 2262, Little Rock, Arkansas 72203.
   1. ARDOT - Standard Specifications, Division 400, Latest Edition.

PART 2. PRODUCTS

2.1 ASPHALTIC PAVING MATERIALS

A. Prime Coat: Medium curing cut-back asphalt; MC-30 or MC070; AASHTO M82; heated and applied within the temperature range 80 degrees F. - 150 degrees F.

B. Tack Coat:
   1. Rapid curing cut-back asphalt:
      a. AASHTO M81
      b. SS-1
      c. Application temperature 70 degrees F. - 160 degrees F.
      d. Rapid curing emulsified asphalt to match aggregate type.
      e. Cationic: CRS-1; AASHTO M208
      f. Application temperature 125 degrees F. - 185 degrees F.

C. Hot-mix surfacing material shall meet the following requirements:
   1. Asphaltic Cement: Mix Design in accordance with Arkansas Department of Transportation, latest edition.
   2. Testing: Tests of asphalt mixtures and materials will be made by commercial testing laboratory approved by Owner. Submit test reports to Engineer.
   3. Owner shall pay for all passing tests. Contractor shall be responsible for the cost of testing all material which fails to meet the requirements.

PART 3. EXECUTION

3.1 SUBGRADE PREPARATION

A. Subgrade for asphalt paving improvements shall have organic silty and clayey topsoils and other unsuitable material removed and replaced with approved material.

B. Fill and tamp traces of utility trenches.

C. Scarify and re-compact subgrade; proof roll with dump truck.

D. Replace soft spots as needed.

3.2 BASE COURSE FOR ASPHALTIC PAVING

A. Place material on prepared subgrade for a total compacted thickness, as required on plans.
   1. Spread course the same day the material is hauled. It shall be thoroughly mixed, either by repeated handling with a blade grader or by harrowing sufficiently to secure a uniform mixture or course and fine particles.

2. Compact base course by systematically rolling and watering as required to obtain a firm, uniform, smooth surface as specified in Part 300 of ARDOT Standard Specifications for Highway Construction.
3. Set blue tops prior to final finishing of base course.

B. Minimum density shall be 100 Percent Modified Proctor (ASTM D-1557).

C. Prime coat shall not be put down until base course is compacted.

3.3 PRIME COAT

A. After acceptance of completed base course, a prime coat shall be uniformly distributed over the prepared base at the rate of 0.3 gallon per square yard.

B. Remove surplus asphalt material.

C. Construct and maintain barricades to keep traffic off the primed surface until it is thoroughly cured and ready for asphalt pavement (3 days minimum).

3.4 TACK COAT

A. Apply tack coat when an asphalt course is to be laid on an asphalt or concrete surface.

B. Clean surface to be treated with prime or tack.
1. Sweep with mechanical broom immediately preceding the application of prime or tack.
2. Remove patches of asphalt, dirt or other material which does not form an integral part of the surface.
3. When directed, sprinkle the surface with water and give an additional sweeping.

3.5 HOT-MIX SURFACING FOR ASPHALTIC PAVING

A. Plant Mixing and Transporting: Mixing, transportation, and temperature limitations for hot-mix surface course materials shall be in accordance with the requirements of Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction, latest Edition.

B. Placing, compacting, and acceptance shall be in accordance with Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction, latest Edition.

END OF SECTION

SECTION 02770

CONCRETE CURBS AND SIDEWALKS

PART 1. GENERAL

1.1 SUMMARY

A. Construction of concrete curbs and sidewalks.

1.2 RELATED SECTIONS

A. Section 02315 - Trench Excavation, Backfill, and Compacting.

1.3 REFERENCES

A. American Concrete Institute, 22400 W. Seven Mile Road, Detroit, Michigan 48219.
   1. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM C94 - Specification for Ready-Mixed Concrete.
   2. ASTM C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
   3. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
   4. ASTM D994 - Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

1.4 SUBMITTALS

A. Submit complete information regarding concrete mix to Engineer for review in accordance with the requirements of ASTM C94, Alternate 2.

PART 2. PRODUCTS

2.1 CURB FORMS

A. 2-inch dressed dimension lumber or metal of equal strength, free from defects that would impair appearance or structural quality of completed curb.
   1. Metal forms: Subject to approval of Engineer.

B. Short-Radius Forms: 1-inch dressed lumber, plywood, or metal.

C. Curb Face: No horizontal joints in form material closer than 7 inches from top of curb.

D. Stakes and Bracing Materials: Provide as required to hold forms securely in place.

2.2 SIDEWALK FORMS

A. 2-inch dressed lumber, straight and free from defects, or standard metal forms.

B. Short-Radius Forms: 1-inch dressed lumber or plywood.

C. Stakes and Bracing Materials: Provide as required to hold forms securely in place.

2.3 CRUSHED ROCK BASE

A. Clean gravel or crushed rock conforming to requirements for granular fill as specified in Section 02315.

2.4 EXPANSION JOINT FILLER

A. 1/2-inch thick preformed asphalt-impregnated expansion joint material conforming to ASTM D994.

2.5 CONCRETE

A. Ready mixed conforming to ASTM C94, Alternate 2.

B. Compressive Strength: 3,000 psi at 28 days.

C. Maximum Size of Aggregate: 1-1/2-inch.

D. Slump: 2 to 4 inches.

2.6 CURING COMPOUND

A. Liquid membrane-forming, clear or translucent, suitable for spray application.

B. Conform to ASTM C309, Type 1.

2.7 ACCEPTANCE OF MATERIALS

A. All materials shall be subject to inspection for suitability, as the Engineer may elect, prior to or during incorporation into the work.

PART 3. EXECUTION

3.1 EXCAVATION AND BACKFILL

A. Excavate and backfill in accordance with Section 02315.

3.2 PREPARATION OF SUBGRADE

A. Bring the areas on which curbs and sidewalks are to be constructed to required grade on undisturbed ground and compact by sprinkling and rolling or mechanical tamping.

B. As depressions occur, refill with suitable material and recompact until the surface is at the proper grade.

C. Compact subgrade on fill to 95 percent of maximum density at optimum moisture content as determined by ASTM D698.

3.3 SETTING FORMS

A. Construct forms to the shape, lines, grades, and dimensions called for on the Drawings.

B. Stake wood or metal forms securely in place, true to line and grade.

C. Brace forms to prevent change of shape or movement in any direction resulting from the weight of the concrete during placement.

D. Construct short-radius curved forms to exact radius.

E. Tops of forms shall not depart from grade line more than 1/8 inch when checked with a 10-foot straightedge.

F. Alignment of straight sections shall not vary more than 1/8 inch in 10 feet.

3.4 CURB CONSTRUCTION

A. Construct curbs to line and grade shown or established by the Engineer, and conform to the details shown.

B. Place, process, finish, and cure concrete in conformance with this Section and the applicable requirements of ACI 614. Wherever requirements differ, the more stringent shall govern.

C. Placement of Preformed Asphalt-Impregnated Expansion Joints (1/2 inch thick):
   1. Beginning and end of curved portions of the curb.
   2. Connections to existing curbs.
   3. At drainage structures.

D. Contraction Joints: All contraction joints shall be formed by sawing unless otherwise specified, and filled with a commercially available silicone product approved by the Engineer.
   1. Contraction joints shall be constructed at 15 foot intervals.
   2. Contraction joints shall be 1/8 inch to 3/8 inch in width and 1-1/2 inch in depth.
   3. Contraction joints shall be constructed at right angles to the centerline and perpendicular to the surface of the curb and gutter.
   4. When curb and gutter is constructed adjacent to, or on rigid pavement, the same joint layout for pavement shall be used, where practicable.

E. As soon as concrete has set sufficiently to support its own weight, remove the front form and finish all exposed surfaces.
   1. Finish top of curb with a steel trowel.
   2. Finish edges with a steel edging tool.
   3. Rub formed faces with burlap sack or similar device to produce a uniformly textured surface, free from form marks, honeycomb, and other defects.

F. Fill contraction joints with a commercially available silicone product approved by the Engineer.

G. Curing:
   1. Upon completion of finishing, apply approved curing compound to exposed surfaces of curb.
   2. Curing shall continue for a minimum of 5 days.

H. Backfilling Curb: Upon completion of curing period, but not before 7 days has elapsed since pouring the concrete, backfill the curb as specified in Section 02315.

I. Adjusting:
   1. Finished curb shall present a uniform appearance for both grade and alignment.
   2. Remove curb sections showing abrupt changes in alignment or grade or which are more than 1/4 inch away from location as staked or which are defective for any reason.
   3. Construct new curb at Contractor's expense.

3.5 SIDEWALK CONSTRUCTION

A. Thickness of sidewalks shall be as shown on the Drawings.

B. Place, process, finish, and cure concrete in conformance with this Section and the applicable requirements of ACI 614. Where the requirements differ, the more stringent shall govern.

C. Placement of Preformed Asphalt Expansion Joints (1/2 inch thick):
   1. Where sidewalk ends.
   2. Around posts, poles, or other objects protruding through the sidewalk.
   3. Drainage structures.
   4. Adjacent to curb and gutter

D. Transverse Joints:
   1. Joints shall be cut with a 1/4 inch joint at intervals not greater than the width of the walk being constructed, or as directed.

E. Finish:
   1. Broom surface with fine hair broom at right angles to length of walk and tool at all edges, joints, and markings.
   2. Edges shall be rounded in a 1/4 inch radius, including edges at joints.

F. Curing:
   1. Upon completion of finishing, apply an approved curing compound to exposed surfaces.
   2. Protection sidewalk from damage for period of 7 days.

END OF SECTION

SECTION 02924

SODDING

PART 1. GENERAL

1.1 SUMMARY

A. Provide slab sod, fertilizer, and water to establish and maintain grass. Owner shall provide access to water at no cost.

B. Planting Period: As recommended by sod producer for time of year, subject to Landscape Architect's approval.

1.2 REFERENCES

A. Federal Specifications.
   1. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.3 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perrenial Sorrel, and Brome Grass.

1.4 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for herbicide composition.

1.5 QUALITY CONTROL

A. Grass that has been cut more than 48 hours before placing shall not be used.

B. Sod shall not be loaded in bulk on vehicles and dumped in bulk on planting site.

C. Soil Analysis: For each un-amended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory approved by the Landscape Architect prior to setting Sod. Cooperative Extension Service is an acceptable soil testing lab.
   1. The soil-testing laboratory shall oversee soil sampling.
   2. Report suitability of tested soil for turf growth.
      a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver to site, store, and protect products at site.

B. Sod:
1. Cut sod with approved sod cutters to minimum depth of 2-1/2 inches in satisfactory and uniform widths and convenient lengths for handling.
2. Place cut sod flat, grass side up, on boards and haul to site with soil intact.
3. Sod shall not hang over the edges of the boards.

C. Fertilizer: Deliver in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2. MATERIALS

2.1 TOPSOIL

A. Existing topsoil shall be reused where practical.

B. Imported Topsoil:
1. Furnished at sole expense of Contractor.
2. Friable loam free from subsoil, roots, grass, excessive amounts of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; and containing a minimum of 4 percent and a maximum of 50 percent organic matter.

2.2 SLAB SODDING

A. Type: Common Bermuda or as indicated on Landscape plans.

B. Certified nursery grade cultivated grass sod, 95 percent weed free.

C. Sod shall be live, fresh, and uninjured at time of placing.

2.3 FERTILIZER

A. FS O-F-241, Type and Grade as recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the proportions of nitrogen, phosphoric acid, and soluble potash as recommended by County Extension Agent and/or seed manufacturer, subject to Engineer's approval.

2.4 WATER

A. Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

2.5 HERBICIDES

A. As recommended by sod producer and as approved by Landscape Architect.

PART 3. EXECUTION

3.1 PREPARATION

A. Fine grade to eliminate uneven areas and low spots. Allow for thickness of topsoil and sod.

B. Spread topsoil to minimum 4-inch depth and rake smooth.

3.2 FERTILIZING

A. Apply approximately 90 percent over entire area to receive slab sodding.

B. Apply remaining 10 percent over sod after placing and rolling.

3.3 SODDING

A. Upon delivery to site transfer sod from boards to soil surface.

B. Place slabs closely, leaving a minimum amount of space between slabs.

C. Use appropriate tools to pull together slabs that do not fit closely.

D. Do not handle sod by hand except when filling small cracks or at locations where it would be impractical to use boards.

3.4 ROLLING

A. Roll slab sod as soon after planting as practicable with plain rollers or cultipackers.

B. Tamp sod with approved hand methods where rolling is impractical.

3.5 MAINTENANCE

A. Water to prevent grass and soil from drying out.

B. Control growth of weeds.

C. Apply herbicides in accordance with manufacturer's instructions.

D. Remedy damage resulting from improper use of herbicides.

E. Immediately re-sod areas which show bare spots.

F. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

SECTION 02961

COLD MILLING ASPHALT PAVEMENT

PART 1. GENERAL

1.1 SUMMARY

A. This item shall consist of cold milling the asphalt pavement at the location(s) designated on the plans or by the Engineer and removing the resulting material from the highway right-of-way.

B. Unless otherwise provided, the reclaimed pavement shall become the property of the Contractor.

C. The pavement remaining after milling shall provide a surface suitable for maintaining traffic.

1.2 EQUIPMENT

A. The contractor shall provide self-propelled equipment with sufficient power, traction, and stability to maintain an accurate depth of cut and slope.

B. The equipment shall be capable of accurately and automatically establishing profile grades along each edge of the machine by referencing from the existing pavement by means of a ski or matching shoe or from an independent grade control and shall have an automatic system for controlling cross slope at a given rate. The milling machine shall have an effective means of preventing dust resulting from the operation from escaping into the air.

C. Provision shall be made, either integrally with the milling machine or by use of additional equipment, to remove the material being cut from the surface of the roadway.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The existing pavement shall be cold milled to the typical section shown on the plans. The number of passes and the depth of each pass required to obtain the total depth to be removed will be determined by the Contractor, unless specified in the plans.

B. The traverse joint left at the end of each day's run shall be tapered to provide a smooth ride.

C. The equipment shall be operated at a rate of travel that will provide a surface meeting the applicable surface requirements.

3.2 METHOD OF MEASUREMENT

A. Cold Milling Asphalt Pavement will be measured by the square yard of pavement milled to the typical section as shown.

3.3 BASIS OF PAYMENT

A. Work completed and accepted and measured as provided above will be paid for at the contract unit price bid per square yard for Cold Milling Asphalt Pavement, which price shall be full compensation for all work as prescribed herein, and for all labor, equipment, tools and incidentals necessary to complete the work.

B. Payment will be made under:

Pay Item	Pay Unit
Cold Milling Asphalt Pavement	Square Meter (Square Yard)

END OF SECTION

SECTION 03210

REINFORCING STEEL

PART 1. GENERAL

1.1 SUMMARY

A. Provide reinforcing steel and welded wire fabric.

B. Conform to "Placing Reinforcing Bars", Recommended Practices, Joint Effort of CRSI-WCRSI, prepared under the direction of the CRSI Committee on Engineering Practice.

C. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for this inspection prior to casting concrete.

1.2 RELATED SECTIONS

A. Section 01001 - Basic Requirements.

B. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

A. American Concrete Institute, 22400 West Seven Mile Road, Detroit, Michigan 48219.
   1. ACI-318-83 - Building Code Requirements for Reinforcing Concrete.

B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM A185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
   2. ASTM A497 - Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
   3. ASTM A615 - Specification for Deformed and Plain Billet-Steel for Concrete Reinforcement.

C. American Welding Society, 550 North West LeJeune Road, Miami, Florida 33126.
   1. AWS D1.4-79 - Structural Welding Code; Reinforcing Steel.

D. Concrete Reinforcing Steel Institute, 933 North Plum Grove Road, Schamburg, Illinois 60195.
   1. CRSI-MSP-1-86 - Manual of Standard Practice.

1.4 SUBMITTALS

A. Submit the following in accordance with Section 01001:
   1. Bending lists.
   2. Placing drawings.
   3. Shop drawings.

B. Shop Drawings:
   1. Bars for footings, including dowels, shall not be fabricated and shipped without prior review of Shop Drawings by the Engineer.
   2. Otherwise, Shop and Placing Drawings shall include reinforcing placing plans and details indicating size, location, arrangement, placing sequence, etc., and shall conform to ACI 315.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Steel:
   1. Deliver with suitable hauling and handling equipment.
   2. Tag for easy identification.
   3. Store to prevent contact with the ground.

B. Unloading, storing, and handling of bars shall conform to CRSI publication "Placing Reinforcing Bars".

PART 2. PRODUCTS

2.1 DEFORMED REINFORCING BARS

A. Deformed billet-steel bars conforming to ASTM A615, Grade 60.

2.2 WELDED WIRE FABRIC

A. Conform to ASTM A185 or A497.

2.3 ACCESSORIES:

A. Tie wire: 16-gage, black, soft-annealed wire.

B. Bar supports: proper type for intended use.

C. Bar supports in beams, columns, walls, and slabs exposed to view after stripping: Small rectangular concrete blocks of same color and strength of concrete that is being placed around them.

D. Concrete supports: for reinforcing concrete placed on grade.

E. Conform to requirements of "Placing Reinforcing Bars" published by CRSI.

PART 3. EXECUTION

3.1 REINFORCING STEEL

A. Clean metal reinforcement of loose mill scale, oil, earth and other contaminants.

B. Straightening and rebending reinforcing steel:
   1. Do not straighten or rebend metal reinforcement.
   2. Where construction access through reinforcing is a problem, use bundle or space bars instead of bending.
   3. Submit details and obtain Engineer's review prior to placing.

C. Protection, spacing, and positioning of reinforcing steel: Conform to the current edition of the ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318), reviewed placing drawings and design drawings.

D. Location Tolerance: Conform to the current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to the Details and Notes on the Drawings.

E. Splicing:
   1. Conform to Drawings and current edition of ACI Code 318.
   2. Stagger splices in adjacent bars.

F. Tying deformed reinforcing bars: Conform to current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to details and notes on Drawings.

G. Field Bending:
   1. Field bending of reinforcing steel bars is not permitted when rebending will later be required to straighten bars.
   2. Consult with Engineer prior to pouring if there is a need to work out a solution to prevent field bending.

3.2 REINFORCEMENT AROUND OPENINGS

A. Place an equivalent area of steel around pipe or opening and extend on each side sufficiently to develop bond in each bar.

B. See Drawings for bar extension length each side of opening.

C. Where welded wire fabric is used, provide extra reinforcement using fabric or deformed bars.

3.3 WELDING REINFORCEMENT

A. Welding shall not be permitted unless Contractor submits detailed Shop Drawings, qualifications, and radiographic nondestructive testing procedures for review by Engineer.
   1. Obtain results of this review prior to proceeding.
   2. Basis for submittals: Structural Welding Code, Reinforcing Steel, AWS D1.4-79, published by American Welding Society, and applicable portions of ACI 318, current edition.
   3. Test 10 percent of welds using radiographic, nondestructive testing procedures in accordance to the above referenced codes.

3.4 PLACING WELDED WIRE FABRIC

A. Conform to ACI 318-77 and to current Manual of Standard Practice, Welded Wire Fabric, by Wire Reinforcement Institute regarding placement, bends, laps, and other requirements.

B. Placing:
   1. Extend fabric to within 2 inches of edges of slab.
   2. Lap splices at least 1-1/2 courses of fabric and a minimum of 6 inches.
   3. Tie laps and splices securely at ends and at least every 24 inches with 16-gage black annealed steel wire.
   4. Place welded wire fabric at the proper distance above bottom of slab.

END OF SECTION

SECTION 03251

EXPANSION, CONSTRUCTION, AND CONTRACTION JOINTS

PART 1. GENERAL

1.1 SUMMARY

A. Provide expansion, construction, and contraction joints as specified.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

A. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM A36 - Specification for Structural Steel.
   2. ASTM D226 - Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing.
   3. ASTM D994 - Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
   4. ASTM D1190 - Specification for Concrete joint Sealer, Hot-Poured Elastic Type.
   5. ASTM D1751 - Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

B. Corp of Engineers, (U.S. Department of the Army) Pulaski Building, 20 Massachusetts Avenue, North West, Washington, D.C. 20314.
   1. CRD-C-572 - Polyvinylchloride Waterstops.

C. Federal Specifications: SS-S-210A; Sealing Compound for Expansion Joints.

PART 2. PRODUCTS

2.1 WATERSTOPS

A. Center bulb type extruded from an elastomeric plastic compound, the basic resin of virgin polyvinyl chloride (PVC).

B. Size as recommended by manufacturer for each application or as shown on Drawing. Generally 6 inches for walls with a 12 inches thickness and 9 inches for walls thicker than 12 inches.

C. Size as recommended by manufacturer for each application or as shown on Drawing. Generally 6 inches for walls with a 12 inches thickness and 9 inches for walls thicker than 12 inches.

D. Specific gravity approximately 1.37 and the shore durometer Type A hardness, approximately 80.

E. Meet the performance requirements of the Corps of Engineers' Specification CRD-C-572.

F. Constant thickness from the edge of the bulb to the outside edge.

G. Have a number of parallel ribs or protrusions on each side of the center of the strip.

H. Corrugated type or tapered waterstops are not acceptable.

I. The minimum weight per foot for waterstop shall be 0.75 pound for 3/16-inch by 6-inch, 1.35 pounds for 3/8-inch by 6-inch, and 2.05 pounds for 3/8-inch by 9-inch.

J. Manufacturers:
   1. Southern Metal and Plastic Products, Inc.
      a. Type 11RCB for 4-inch by 3/16-inch.
      b. Type 17RCB for 6-inch by 3/8-inch.
      c. Type 18RCB for 9-inch by 3/8-inch.
   2. Vinylex Corporation.
      a. Catalog No. RB6-38H for the 6-inch by 3/8-inch.
      b. Catalog No. RB9-38H for the 9-inch by 3/8-inch.
   3. Greenstreak Plastic Products.
      a. Style 732 for the 6-inch by 3/8-inch.
      b. Style 735 for the 9-inch by 3/8-inch.
   4. Or approved equal.

2.2 BOND BREAKER TAPE FOR EXPANSION JOINTS

A. Where indicated, adhesive-backed glazed butyl or polyethylene tape that will satisfactorily adhere to the premolded joint material or concrete surface.

B. Same width as joint.

2.3 PREMOLDED JOINT FILLER - BITUMINOUS TYPE

A. Bituminous type conforming to ASTM D994 or D1751, unless otherwise shown or specified.

B. Use around pipe penetrations through existing walls.

C. Manufacturers:
   1. Synko Flex Products Inc.; Synko Flex Preformed Plastic Adhesive Waterstop.
   2. American Colloid Co.; Waterstop RX.

2.4 BOND BREAKER

A. Bond breaker, except where a tape is specifically called for, shall be either bond breaker tape as specified or a bond prevention material, nonstaining type, as specified in Section 03300.

2.5 CORK EXPANSION JOINT FILLER

A. Manufacturer: W.R. Meadows Sealtight, or equal.

B. Seal joints with a pourable two-component cold-applied compound to depth as indicated on Drawings.

2.6 POURABLE JOINT FILLERS - RUBBER ASPHALT FILLER

A. Hot-pour type, conforming to ASTM D1190. Use primer recommended by the manufacturer.

2.7 COAL-TAR TAPE

A. Manufacturer's:
   1. Protecto Wrap 200, by Protecto Wrap Co., Denver, CO.
   2. Tapecoat CT, by Tapecoat Company, Inc., Evanston, IL.
   3. Or equal.

2.8 STEEL EXPANSION JOINT DOWELS

A. Smooth steel conforming to ASTM A36. Coating on bars with an approved, FUSION BONDED COATING.

PART 3. EXECUTION

3.1 INSTALLATION OF WATERSTOPS - GENERAL

A. Join waterstops at intersections so continuous seal is provided.

B. Center waterstop on joint.

C. Hold waterstop positively in correct position.

D. If waterstop is damaged, repair in acceptable manner.

E. Vibrate concrete to obtain impervious concrete in the vicinity of joints.

F. In horizontal joints, fill areas below waterstop completely with concrete; make visual inspection of entire waterstop area during concrete placement.

3.2 WATERSTOPS IN CONSTRUCTION JOINTS

A. Horizontal Waterstops:
   1. Place immediately after the pour is completed and before concrete has begun to set.
   2. Puddle each side to level concrete and assure that waterstop is properly embedded.
   3. Where stops are spliced, lap at least 12 inches and secure together.
   4. After concrete has set to the point where the surface can be cut with a broom or a stream of water, cut off the surface to a rough finish with laitance removed and the concrete left clean.

B. Vertical Waterstop: Place and secure in forms prior to placing concrete.

3.3 PLASTIC WATERSTOP

A. Install in accordance with details shown and manufacturer's instructions.

B. Allow at least 10 minutes before pulling or straining the new splice.

C. Finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent of unspliced materials.

3.4 SPLICES AND JOINTS

A. Prior to use of the waterstop material in the field, submit a sample of a fabricated cross constructed of each size or shape of material to be used for approval.

B. Fabricate samples so that the material and workmanship represent the fittings provided under this Section.

C. Make field splices and joints in accordance with waterstop manufacturer's instructions using a thermostatically controlled heating iron.

3.5 JOINT PREPARATION - GENERAL

A. Accurately locate and construct joints to produce straight joints.

B. Vertical or horizontal, except where walls intersect sloping floors.

C. Do not commence concrete pour until after joint preparation has been inspected and approved by Engineer.

3.6 CONSTRUCTION JOINTS

A. Prior to placing abutting concrete, clean contact surface by sandblasting or other approved means to remove laitance and expose the aggregate.

B. Remove concrete from exposed portion of reinforcing steel.

C. Do not damage the waterstop, if one is present, during the cleaning process.

D. Grout for horizontal construction joints shall be as specified in Section 03300.

E. Roughen surface of hardened concrete by one of the following methods:
   1. Sandblast foundation and reinforcing dowels after concrete has fully cured to remove laitance and spillage and to expose sound aggregate.
   2. Water blast the foundation and reinforcing dowels after concrete has partially cured to remove laitance and spillage and to expose sound aggregate.
   3. Green cut fresh concrete with high pressure water and hand tools to remove laitance and spillage from the foundation and reinforcing dowels, and to expose sound aggregate.

3.7 LOCATION

A. Joints as shown on the Drawings or approved by Engineer.

3.8 TIME BETWEEN POURS

A. At least 2 hours shall elapse after depositing concrete in long or high columns or heavy walls before depositing in beams, girders, or slabs supported thereon.

B. For short columns and low height walls, 10 feet or less, wait at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.

C. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor or roof system and shall be placed monolithically therewith.

D. Where cold joints will result and this joint will be below the finished water surface, provide and install a waterstop in the joint.

3.9 EXPANSION JOINTS - GENERAL

A. Provide premolded joint filler of sufficient width to completely fill the joint space.

B. If a waterstop is in the joint, accurately cut premolded joint filler to butt tightly against the waterstop and the side forms.

C. At locations where joint sealant is to be applied, precut premolded joint filler the required depth.

D. Form cavities for joint sealant with either precut, premolded joint filler or smooth, accurately-shaped material that can be removed.

E. Thoroughly vibrated concrete along the joint form to produce a dense, smooth surface.

F. Repair surface irregularities along the joint sealant cavity due to improper concrete consolidation or faulty form removal with an approved compound compatible with the joint sealant in a manner that is satisfactory to the sealant manufacturer.

3.10 INSTALLATION OF BITUMINOUS TYPE OR CLOSED CELL FOAM TYPE PREMOLDED JOINT FILLER

A. Drive nails at about 1 foot on centers through the filler to provide anchors into the concrete when it is placed.

B. Place premolded joint filler in the forms in the proper position before concrete is poured.

C. Install premolded joint filler in walks (to provide expansion and contraction joints at not more than 20-foot intervals), at changes in direction at intersections, and at each side of driveway entrances.

3.11 POURABLE JOINT FILLER - GENERAL

A. Install pourable joint fillers in accordance with the manufacturer's instructions.

B. Thoroughly clean joints by sandblasting concrete surfaces of each side of joint from plastic waterstop to top of joint, dry the joint, and remove dust and foreign material; prime before pouring the filler.

C. Avoid damaging waterstop by sandblasting operations.

D. Primer compatible with filler material.

3.12 RUBBER ASPHALT JOINT FILLER

A. Heat rubber asphalt filler material in a double-walled boiler and place in the joint by means of a nozzle.

B. Prevent spillage outside of the joint.

C. Begin pouring joint filler at the bottom of the horizontal joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.

D. Use masking tape at each side of joint to assist in cleaning all spillage.

3.13 CONTROL JOINTS IN FLOOR SLABS

A. Form tongue-and-groove construction joints with keyway in bulkhead forms.

B. Key horizontal joints the full length of the member.

C. Key width shall occupy the interior one-third section, and depth of the key shall be 2 inches.

3.14 STEEL EXPANSION JOINT DOWELS

A. Install parallel to wall or slab face and in true horizontal position by securing tightly in forms with rigid ties.

B. Orient dowels to permit joint movement.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1. GENERAL

1.1 WORK INCLUDED

A. Cast-in-place concrete, including formwork.

1.2 RELATED WORK

A. Section 01001 - Basic Requirements.

B. Section 03210 - Reinforcing Steel.

1.3 REFERENCES

A. American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48219 (latest revision).
   1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   2. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
   3. ACI 211.3: Standard Practice for Selecting Proportions for No-Slump Concrete.
   4. ACI 304R: Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   5. ACI 304.2R: Placing Concrete by Pumping Method.
   6. ACI 304.3R: High Density Concrete: Measuring, Mixing, Transporting and Placing.
   7. ACI 304.4R: Placing Concrete with Belt Conveyors.
   8. ACI 305R: Hot Weather Concreting.
   9. ACI 306R: Cold Weather Concreting.
   10. ACI 309: Standard Practice for Consolidating of Concrete.
   11. ACI 309.1R: Behavior of Fresh Concrete During Vibration.
   12. ACI 309.2R: Identification and Control of Consolidation-Related Surface Defects in Formed Concrete.
   13. ACI 347: Recommended Practice for Concrete Formwork.

B. American Society of Testing FOR Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103 (latest revision).
   1. ASTM C33: Specification for Concrete Aggregates.
   2. ASTM C150: Specifications for Portland Cement.
   3. ASTM C260: Specification for Air-Entraining Admixtures for Concrete.
   4. ASTM C309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

5. ASTM C494: Specification for Chemical Admixtures for Concrete.
6. ASTM E329: Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.4 SUBMITTALS

A. Provide the following in accordance with Section 01001.
1. Admixture certification; chloride ion content must be included.
2. Concrete mix design.
3. Certification for aggregate quality.
4. Mill tests for cement.
5. Method of adding admixtures.
6. Materials and methods for curing.
7. Testing agency to perform services required in ACI 301, Section 167.
8. Laboratory test on concrete.

1.5 QUALITY ASSURANCE

A. Inspection: Engineer shall have access and rights to inspect batch plants, cement mills, and facilities of suppliers, manufacturers, and subcontractors providing products specified.

B. Batch Plant:
1. Certification: Current certification that weighing scales have been tested and are within tolerances as set forth in National Bureau of Standards Handbook No. 44.
2. Equipment: Semi-automatic or fully automatic.

C. Obtain materials from same source throughout the Work.

PART 2. PRODUCTS

2.1 CEMENT

A. Portland cement Type I.

2.2 WATER

A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances.

B. Potable.

2.3 CONCRETE AGGREGATES

A. General:
   1. Natural aggregates, well graded, free from deleterious coatings and organic materials conforming to ASTM C33 (latest revision).
   2. Import non-reactive aggregates if local aggregates are reactive. (Appendix XI-ASTM C33).
   3. Wash aggregates uniformly before use.
   4. Other aggregate gradations can be approved by Engineer.

B. Fine Aggregates:
   1. Clean, sharp, natural sand conforming to ASTM C33.
   2. Less than 2 percent passing the No. 200 sieve.

C. Course Aggregates:
   1. Natural gravel, crushed gravel, crushed stone, or combination of these materials.
   2. Less than 15 percent float or elongated particles (long dimension >5 times short dimension).
   3. Less than 0.5 percent passing the No. 200 sieve.

D. Grading Requirements for Course Aggregates:

Sieve Size or Size in Inches	1-1/2" Aggregate	1" Aggregate	3/4" Aggregate
1-1/2"	95 - 100	---	---
1"	---	90 - 100	---
3/4"	35 - 70	40 - 85	90 - 100
1/2"	---	10 - 40	20 - 55
3/8"	10 - 30	0 - 15	0 - 15
No. 4	0 - 5	0 -5	0 -5

E. Grading Requirements for Fine Aggregates:

Sieve Size	Minimum	Maximum
3/8″	100	---
No. 4	95	100
No. 8	80	100
No. 16	50	85
No. 30	25	60
No. 50	10	30
No. 100	2	10

2.4 CONCRETE AIR-ENTRAINING ADMIXTURES

A. Manufacturer:
   1. Air-Mix or Perma-Air by the Euclid Chemical Co.
   2. Sealtight Air Entraining Admixture by W.R. Meadows of Texas.

B. ASTM C260; nontoxic after 30 days.

C. Use only the specified non-corrosive non-chloride accelerator. Calcium chloride is not permitted.

D. Provide for concrete exposed to freezing and thawing or required to be watertight. Air Content: 5 to 6 percent.

2.5 ADMIXTURES

A. Water-Reducing Admixture: Conforming to ASTM C494, Type A:
   1. Eucom WR-75 by the Euclid Chemical Company.
   2. Pozzolith 200N by Master Builder.
   3. Plastocrete 160 by Sika Chemical Corporation.

B. Water-Reducing Retarding Admixture: Conforming to ASTM C494, Type D:
   1. Eucom Retarder-75 by the Euclid Chemical Company.
   2. Pozzolith 100XR by Master Builder.
   3. Plastiment by Sika Chemical Company.

C. High-Range Water-Reducing Admixture (Superplasticizer): Conforming to ASTM C494, Type F or G:
   1. Eucom 37 by Euclid Chemical Company.
   2. Rheobuild 1000 by Master Builders.
   3. Sikament by Sika Chemical Company.

D. Non-Corrosive Non-Chloride Accelerator Admixture: Conforming to ASTM C494 Type C or E:
   1. Accelguard 80 by Euclid Chemical Company.
   2. Or approved equal.
   3. Manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least 1 year's duration) using an acceptable accelerated corrosion test method using electrical potential measures.

E. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions.

F. Certification: Submit written conformance to the requirements and chloride ion content of the admixture to Engineer prior to mix design review.

2.6 FORMS

A. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel.

B. Surfaces: New and undamaged condition.

C. Joints: Use tape, gaskets, plugs, or approved calking to keep joints water tight and to allow them to withstand placing pressures without bulging outward or creating surface patterns.

2.7 FORM TIES

A. Factory-made and constructed so that tie remains embedded in wall, except for removable portion at each end.

B. Inserts:
   1. Conical or spherical.
   2. Fixed to remain in contact with forming material.
   3. Constructed so no metal is within 1 inch of concrete surface when forms, inserts, and tie ends are removed.

C. Flat bar ties for panel forms: Plastic or rubber inserts with a minimum depth of 1 inch and sufficient dimensions to permit proper patching of tie hole.

2.8 BONDING AGENT

A. Manufacturer: Sonnebond by Sonneborn; or approved equal.

B. Submit product specifications and manufacturer's specific instructions for application on this Project for Engineer's approval.

C. Product must meet Project requirements with regard to surface, pot life, set time, vertical or horizontal application, forming restrictions, or other stated requirements.

2.9 BOND BREAKER

A. Manufacturers:
   1. Williams Tilt-Up Compound, Williams Distributors Inc., Seattle, Washington.
   2. Silcoseal 77, Superior concrete Accessories, Franklin Park, Illinois.
   3. Or Equal.

B. Nonstaining type.

C. Provide positive bond prevention.

D. Submit for review copies of manufacturer's data, recommendations, and instructions for specific use on this Project.

2.10 CURING COMPOUND

A. Curing and Sealing Compound:
   1. Clear styrene acrylate type, minimum 30 percent solids content.
   2. Test data from an independent testing laboratory indication a maximum moisture loss of 0.030 grams per sq. cm when applied at a coverage rate of 300 sq. ft. per gallon.
   3. Submit manufacturer's certification.
   4. Sodium silicate compounds are not permitted.
   5. Manufacturer:
      a. Super Rez Seal or Super Pliocure by the Euclid Chemical Co.
      b. Masterkure 30 by Master Builders.

B. Exposed Concrete Surfaces:
   1. Manufacturer:
      a. Kurez DR by Euclid Chemical Company.
      b. Or approved equal.
   2. Dissipating resin type compound.
   3. ASTM C309.
   4. Film must chemically break down in 6- to 8-week period.

2.11 BONDING AND REPAIR MATERIALS

A. Rewettable Bonding Compounds:
   1. Polyvinyl acetate type.
   2. Manufacturer:
      a. Euco Weld by the Euclid Chemical Co.
      b. Weldcrete by the Larsen Co.
   3. Use only in areas not subject to moisture.

B. Non-Rewettable Bonding Compounds:
   1. Polymer modified type.
   2. Manufacturer:
      a. Euco-Bond by the Euclid Chemical Co.
      b. Or approved equal.

C. Bonding Admixture:
   1. Latex, non-rewettable type.
   2. Manufacturer:
      a. SBR Latex or Flex-Con by the Euclid Chemical Co.
      b. Daraweld C by W. R. Grace.

D. Epoxy Adhesives:
   1. Two component, 100 percent solids, 100 percent reactive compound.
   2. Suitable for use on dry or damp surfaces.
   3. Manufacturer:
      a. Euco Epoxy No. 452MV or No. 620 by the Euclid Chemical Co.
      b. Sikadure Hi-Mod by the Sika Chemical Corp.

E. Patching Mortar:
   1. Free flowing or gel consistency.
   2. Polymer modified cementitious mortar.
   3. Manufacturer:
      a. Euco Thin Coat or Concrete Coat by the Euclid Chemical Co. for horizontal repairs.
      b. Verticoat by the Euclid Chemical Co. for vertical or overhead repairs.
      c. Sikatop 121 or 122 by the Sika Chemical Co. for horizontal repairs.
      d. Sikatop 123 by the Sika Chemical Co. for vertical or overhead repairs.

F. Underlayment Compound:
   1. Free-flowing, self-leveling, pumpable cementitious base compound.
   2. Manufacturer:
      a. Flo-Top by the Euclid Chemical Co.
      b. Or approved equal.

G. Repair Topping:
   1. Self-leveling, polymer modified high strength topping.
   2. Manufacturer: Thin Top SL by the Euclid Chemical Co.

PART 3. EXECUTION

3.1 DESIGN OF CONCRETE MIX

A. Submit mix design on each class of concrete for review; include standard deviation analysis or trial mixture test data.

B. Proportion mix design in accordance with ACI 318-89, Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures".

C. If trial batches are used:
   1. Prepare mix design by independent testing laboratory.
   2. Achieve an average compressive strength 1200 psi higher than the specified strength, or 1400 psi for specified concrete strengths over 5000 psi.
   3. Certified copies of laboratory trial mix reports and cylinder tests shall be submitted to Engineer by the testing laboratory for approval.

D. Do not place concrete prior to receipt of Engineer's written approval of mixes and cylinder test results.

E. Design mix and perform tests to meet the requirements as specified.

	Minimum 28-Day Compressive	Maximum Water	Air	Slump Range
Location	Strength (psi)	Cement Ration	Content	(in.)
Manholes	3000	.45	5-6 Percent	2-4
Sidewalks	3000	.45	5-6 Percent	2-4
Junction Boxes	4000	.45	5-6 Percent	2-4
Pump Station	4000	.45	5-6 Percent	2-4
Pavements	4000	.45	Optional	2-4

F. Minimum Cement Content (based on aggregate size):

Minimum Cement Content	Maximum Aggregate Size
517 lb/cy	1-1/2-inch
540 lb/cy	1-inch
564 lb/cy	3/4-inch

G. Combined Aggregate Gradings:
   1. Aggregates for concrete shall be combined in proportions that will provide a mixture within the grading limits in accordance with this Section, unless otherwise approved in writing by Engineer.
   2. Maximum aggregate size depends on rebar clearances.
   3. Recommended Admixture Usage:

Location or Condition	Recommended Admixture	Additional Requirements
Air-entrained concrete	Air-entraining admixture	Non-toxic; non-corrosive
Pumped concrete admixture	High-range, water reducing (Superplasticizer)	Initial slump: 2-3 in. Slump with Superplasticizer: 8 inch maximum
Concrete with a water-cement ratio below 0.50	High-range, water-reducing admixture (Superplasticizer).	Initial slump: 2-3 in. slump with Superplasticizer: 8 inch maximum

4. Admixtures:
    a. Concrete shall contain the specified water-reducing admixture or the specified high-range water-reducing admixture (superplasticizer).
    b. Concrete required to be air entrained shall contain an approved air entraining admixture.
    c. Pumped concrete, concrete for industrial slabs, architectural concrete, concrete required to be watertight, or concrete with a water/cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer).

3.2 MEASUREMENT OF MATERIALS AND MIXING

A. Conform to ACI 304 current edition; specified requirements for mix deign, testing, and quality control; and to other requirements of these Specifications.

3.3 RETEMPERING

A. Retempering of concrete or mortar in which the cement has partially hydrated will not be permitted. Redosage with the specified high-range water-reducing admixture (superplasticizer) may be done with the prior approval of the Engineer regarding dosage and time periods.

3.4 FORMS - MAXIMUM SIZE OF CONCRETE PLACEMENTS

A. Coordinate with other trades whose work may be located within or below concrete.

B. Notify Engineer 1 full working day prior to erection of forms for inspection.

C. Thoroughly clean forms and adjacent surfaces to receive concrete; remove chips, wood, sawdust, dirt or other debris before concrete is placed.

D. Design:
    1. Design, erect, support, brace, and maintain formwork in accordance with:
        a. Building Codes Requirements for Reinforced Concrete (ACI 318).
        b. Recommended Practice for Concrete Formwork (ACI 347).
        c. Construction Industry Standards (OSHA 2207).
    2. Design formwork to be readily removable without impact, shock, or damage to concrete surfaces and adjacent materials.

E. Reuse of Forms: Do not reuse forms unless they are in new and undamaged condition.

F. Beveled Edges (Chamfer):
    1. Form 3/4-inch bevels at concrete edges.

2. Where beveled edges on existing adjacent structures are diverse more than 3/4 inch, obtain Engineer's approval of size prior to placement of bevel form strip.

G. Form Tolerances: Construct forms to sizes, shapes, lines, and dimensions shown, work in finished structures.

H. Removal of Forms:
1. Do not disturb forms until concrete is sufficiently strong to withstand possible injury.
2. Do not remove shoring until member has acquired sufficient strength to support its weight and the load upon it.

3.5 FORM TIES

A. Place in uniform patterns on exposed surfaces.

B. Number and placement sufficient to withstand pressures and limit deflection of forms to acceptable limits.

3.6 PLACING CONCRETE - GENERAL

A. Do not place concrete without Engineer being present.

B. Allow other trades reasonable time to complete portions of work which must be completed before concrete is placed.

C. Notify Engineer at least 1 full working day in advance before starting to place concrete to permit inspection of forms, reinforcing, sleeves, conduits, boxes, inserts, or other work required to be installed in concrete.

D. Review curing methods with Engineer and verify curing materials and equipment are at Project site.

E. Placement shall conform to requirements and recommendations of ACI 304 and ACI 318, except as modified in these Specifications.

F. Place concrete as soon as possible after leaving mixer in layers not over 1.5 feet deep:
1. Without segregation or loss of ingredients.
2. Without splashing forms or steel above.

G. Vertical Free Fall Drop to Final Placement:
1. Concrete shall not be dropped freely where reinforcing will cause segregation.
2. Not to exceed 10 feet for concrete containing high-range water-reducing admixture (superplasticizer).

3. Not to exceed 5 feet for other concrete.

H. Do not use concrete truck chutes, pipes, finishing tools, etc., constructed of aluminum.

I. Before depositing concrete:
   1. Remove debris from space to be occupied by concrete.
   2. Dampen:
      a. Gravel fill beneath slabs on ground.
      b. Sand where vapor barrier is specified.
      c. Wood forms.
   3. Verify reinforcement is secured in position.

3.7 ADDITION OF WATER AT PROJECT SITE

A. Do not add water to concrete at Project site if slump is within specified range.

B. With the Engineer's approval, add water to concrete arriving at Project site with a slump less than the specified range, provided it can be demonstrated that the specified water-cement ratio will not be exceeded.

C. All concrete shall be 4000 psi at 28 days with a maximum cement water ratio of .45 unless noted otherwise.

3.8 CONVEYING

A. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.

B. Conveying equipment shall be capable of providing a supply of concrete at the site of placement without interruptions sufficient to permit loss of plasticity between successive increments.

3.9 CONSOLIDATION AND VISUAL OBSERVATION

A. Concrete shall be consolidated with internal vibrators having a frequency of at least 800 vpm, with amplitude required to consolidate concrete in the section being placed.

B. At least one standby vibrator in operable condition shall be at the placement site prior to and during placing concrete.

C. Consolidation equipment and methods shall conform to ACI 309 "Recommended Practice for Consolidation of Concrete".

D. Vibrator operator is required to see the concrete being consolidated to ensure good quality workmanship; or Contractor shall have a person actually observe the vibration of the concrete and will advise the vibrator operator of changes needed to assure complete consolidation.

E. Do not use vibrators to transport concrete in forms.

3.10 PLACING CONCRETE IN HOT WEATHER

A. Follow the recommendations in Hot Weather Concreting, ACI 305.

B. Do not place concrete at times when temperature is forecast to exceed 100 degrees F. within 12 hours after the concrete is placed.

C. Verify preparations are complete before ordering concrete so that concrete may be placed upon arrival.

D. Fog spray forms, reinforcing steel, and subgrade just before placing concrete.

E. Minimize size of concrete placements and thickness of layers of concrete.

F. Make every effort to maintain concrete temperature:
   1. Below 90 degrees F. at time of placement, cool the ingredients before mixing by use of chilled water.
   2. Uniform:
      a. Minimize the time of placement.
      b. Begin each operation in concrete finishing promptly when the concrete is ready for it.

G. Place concrete promptly upon arrival at Project and vibrate immediately after placement.

H. Do not add water to retemper.

I. Consider placing concrete in late afternoon as opposed to early morning.

J. Provide windbreaks, shading, and fog spraying on days when temperature is forecast to exceed 90 degrees F.

K. Saw-Cut Joints:
   1. Maximum Joint Spacing: 36 times slab thickness, unless otherwise noted on Drawings.
   2. Soft-Cut Saw: Cut to a depth of 1-1/4-inch immediately after final finishing.
   3. Conventional saw shall be used as soon as possible without dislodging aggregate to a depth of 1/4 slab thickness.

L. Protect and cure exposed surfaces by one of the following:
   1. Continuous water curing.
   2. Moisture-cover curing.

3.11 PLACING CONCRETE IN COLD WEATHER (ACI 306R-78)

A. Preparation:
   1. Follow recommendations in Cold Weather Concreting, ACI 306.
   2. Additives for the sole purpose of providing freeze protection shall not be used.
   3. Arrangements for covering, insulating, housing, or steam heating newly-placed concrete shall be made in advance of placement and shall be adequate to maintain temperature and moisture conditions recommended.
   4. Temperatures of concrete mix shall be as shown as follows for various stages of mixing and placing of concrete mix:

Section Size, Minimum Dimension				
Air Temperature	**12 Inches**	**36 Inches**	**72 Inches**	**72 Inches**
Minimum concrete temperature as mixed for indicated weather:				
Above 30° F	60° F	55° F	50° F	45° F
0° F to 30° F	65° F	60° F	55° F	50° F
Below 0° F	70° F	65° F	60° F	55° F
Maximum allowable gradual temperature drop in first 24 hours after end of protection:				
	50° F	40° F	30° F	20° F

B. Placement:
   1. Surfaces to be in contact with concrete shall be free of snow, ice, and frost and shall be above 40 degrees F.
   2. Do not place concrete on frozen subgrade.
   3. Placement of insulating material, tarpaulins, or other movable coverings shall follow closely the placing of concrete so that only a few feet of concrete are exposed to outside air at anytime.

C. Curing and Protection:
   1. Keep concrete continuously moist and maintain concrete temperature at a minimum of 50 degrees F. for 7 days; temperature shall be uniform throughout concrete. If high early strength concrete is used, this temperature requirement may be reduced to 3 days.
   2. It is recommended to leave forms in place for the entire period of protection; use insulated blankets or other approved method on slab surfaces.

3. Limit rapid temperature changes at end of protection period to avoid thermal cracking.

3.12 BONDING TO CONCRETE SURFACES

A. New Concrete Surfaces:
   1. New concrete is defined as less than 60 days old.
   2. Roughen surface to hardened concrete.
   3. Thoroughly clean and saturate with water.
   4. Immediately place concrete.
   5. Horizontal surfaces:
      a. Cover surface with 2-inches of grout.
      b. Limit first lift on top of grout to 12-inches.
      c. Thoroughly vibrate to mix and consolidate grout and concrete.

B. Old Concrete Surfaces:
   1. Use bonding agent.
   2. Prepare surface in strict accordance with manufacturers printed instructions and recommendations for specific and application for this Project.
   3. Follow manufacturers recommendations.

3.13 EVALUATION AND ACCEPTANCE OF CONCRETE

A. Conform to ACI Standard Building Code requirements for reinforced concrete (ACI 318-83), Section 4.7, "Evaluation and Acceptance of Concrete", and to the following specifications:

B. Testing Responsibilities:
   1. Contractor:
      a. Collect, label, and handle test specimens at Project site.
      b. Provide adequate facilities for safe storage, curing, and protection for first 24 hours and for additional time as may be required before transporting to test lab.
      c. Deliver test specimens to laboratory.
      d. Pay for testing.

C. Number of Test Cylinders:
   1. Set of Cylinders: Three (3).
   2. Sample Frequency:
      a. 1 set/class of concrete/50 cubic yards.
      b. 1 set/class of concrete/3000 square feet of wall or slab surface.
      c. 1 set/class of concrete/day.
      d. Whichever is greater.

D. Laboratory shall test 3 cylinders for the 28-day strength test. The test results should be the average strength of the 3 cylinders, except that if 1 cylinder shows obvious evidence of improper sampling, molding or testing, it should be discarded and the strengths of the other 2 cylinders averaged. If more than 1 cylinder shows defects, the test should be abandoned.

3.14 PATCHING – GENERAL

A. Prior to starting patching work, except as specified, obtain Engineer's approval of proposed patching techniques and mixes.

3.15 REPAIR OF DEFECTIVE AREAS

A. Definition: Concrete in place that does not conform to specified design strength, shapes, alignments, and elevations as shown on Drawings and contains surface defects.

B. Evaluation and acceptance of concrete shall conform to ACI 318.

C. With prior approval of Engineer, as to method and procedure, repair defective areas in conformance with ACI 301, Chapter 9, except that the specified bonding compound shall be used.

D. The specified patching mortar may be used in lieu of the above-mentioned method when color match of adjacent concrete is not required. Prior approval of Engineer is required.

E. Surface Repairs:
   1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Owner.
   2. Honey-combed areas and rock pockets:
      a. Repair immediately after removal of forms.
      b. Prepare no-slump concrete mortar and test so that, when dry, patching mortar will match surrounding color and strength.
      c. Cut out to solid concrete or minimum of 1-inch depth.
      d. Make edges for cuts perpendicular to the concrete surface.
      e. Thoroughly clean and dampen with water.
      f. Apply bonding compound.
      g. Compact no-slump concrete into patch, and finish to blend with adjacent finished concrete.
      h. Cure in same manner as adjacent concrete.
   3. High Areas: Grind after concrete has cured at least 14 days.
   4. Low Areas:
      a. Repair during or immediately after completion of surface finishing operations.

b. Cut out low areas and replace with fresh concrete of same type and class as original concrete.
c. Finish repaired areas to blend into adjacent concrete.

5. Defective Areas:
   a. Cut out and replace with fresh concrete of same type and class as original concrete.
   b. Finish repaired areas to blend into adjacent concrete.
6. Make structural repairs with prior approval of Engineer, as to method and procedure, using the specified epoxy adhesive or epoxy mortar. Where epoxy injection procedures must be used, use an approved low viscosity epoxy made by the manufacturers previously specified.
7. Level floors for subsequent finishes by use of specified underlayment material.
8. Where required, level exposed floors by use of the specified self-leveling repair topping.
9. Repair methods not specified above may be used, subject to approval of Engineer.

3.16 BLOCKOUTS AT PIPES OR OTHER PENETRATIONS

A. Submit proposed blockouts for review in accordance with Section 01001.

3.17 CURING OF CONCRETE

A. Follow recommendations in Standard Practice for Curing Concrete (ACI 308).

B. Begin curing as soon as free water has disappeared from concrete surface after placing and finishing.

C. Continue curing for at least 7 days without interruption.

D. Curing Methods:
   1. Water Curing:
      a. Cover surface with burlap or sand (1-inch deep) as soon as possible without marring surface.
      b. Keep continuously wet for 7 days; do not allow surface to become alternately wet and dry.
      c. Use water not more than 2 degrees F. cooler than concrete.
      d. Allow surface to dry slowly before removing burlap or sand.
   2. Moisture-Cover Curing:
      a. Cover surface with plastic film (4 mil minimum) as soon as possible without marring the surface. Cover entire surface without wrinkles or holes.
      b. Cover plastic film with 1-inch of sand and weight edges.
      c. Keep covered for a minimum of 7 days.

3. Curing Compounds:
    a. Verify compatibility with required finishes such as hardeners, paint, stain, tile, or other specified work.
    b. Exposed concrete receiving mastic applied adhesive, or metallic or mineral aggregate hardeners shall be cured with the specified curing and sealing compounds.

E. Cold-Weather Curing:
1. Use moisture-cover curing or liquid membrane-forming compound as approved.
2. Protect concrete from temperature changes in accordance with ACI 306.

F. Hot-Weather Curing: Use water curing or moisture-cover curing as approved.

END OF SECTION

SECTION 03411

PRE-CAST REINFORCED CONCRETE BOX CULVERTS

PART 1. GENERAL

1.1 SUMMARY

A. This item shall provide for the use and installation of precast reinforced concrete box culverts.

1.2 RELATED SECTIONS

A. Section 01001 - Basic Requirements.

B. Section 02315 - Trench Excavation, Backfill and Compacting.

C. Section 03251 - Expansion, Construction and Contraction Joints.

1.3 REFERENCE STANDARDS

A. Arkansas Department of Transportation (ARDOT) Standard Specifications for Highway Construction, latest edition.

1.4 SUBMITTALS

A. Submit in accordance with Section 01001.

PART 2. PRODUCTS

2.1 MATERIALS

A. The manufacture and furnishing of precast reinforced concrete box culverts shall be in accordance with AASHTO M 259 or M 273, as applicable.

B. The manufacturer shall furnish a certification that the units comply with AASHTO M 259 or M 273, as appropriate, and that all steel materials incorporated in the units comply with the requirements of Section 106.01 of the Arkansas Department of Transportation (ARDOT) Standard Specifications for Highway Construction, latest edition.

C. Units shall bear evidence that the component materials have been tested and approved and that the construction methods have been inspected by an inspector approved by the Engineer.

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Excavation and backfill shall be in accordance with Section 02315.

B. Precast reinforced concrete box culverts shall be bedded on a foundation of firm and stable material, accurately shaped to conform to their base. When required by the plans, special bedding material shall be provided.

C. Joints and joint materials shall comply with Section 03251.

D. Lifting holes shall be filled with mortar or concrete and cured as directed by the Engineer.

E. When precast boxes are used to form multiple barrel structures, they shall be placed in conformance with the details shown on the plans. Material required between barrels shall be as shown on the plans.

F. Connections of precast boxes to cast-in-place boxes or to any required headwalls, wingwalls, riprap, or other structure shall comply with the details shown on the plans.

G. Headwalls, wingwalls, and footings shall be according to the details of the plans, except that overall widths of the headwalls and footings shall be modified to fit the finished width of the various structures.

END OF SECTION

APPENDIX

Contractor is responsible for adherence to all applicable Federal and State Laws and Regulations including, but not limited to, the following and any applicable amendments:

Ark Act 291 of 1993
Trench and Excavation Safety Systems

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Code of Federal Regulations Title 29
website: http://ecfr.gpoaccess.gov/

****

Arkansas State Licensing Law for Commercial Contractors
website: www.arkansas.gov/clb