JOB 090376
HWY. 62/102 INTCHNG. IMPVTS. & 8TH STREET WIDENING (BENTONVILLE) (S)
NOVEMBER 2, 2016

Question:

Please clarify the following discrepancies:

1). Plan Sheet 136, Summary of Traffic Signal Quantities shows quantity 2 Each for 714 Traffic Signal Mast Arm and Pole With Foundation (40'). Only 1 Each can be found on Plan Sheet 141 (Pole "C").

2). Plan Sheet 136, Summary of Traffic Signal Quantities shows quantity 3 Each for 714 Traffic Signal Mast Arm and Pole With Foundation (45'). Only 2 Each can be found, 1 Each on Plan Sheet 138 (Pole "D"), and 1 Each on Plan Sheet 147 (Pole "A").

3). There is no Pay Item for Traffic Signal Pole "A" shown on Plan Sheet 150. This pole is a Traffic Signal Mast Arm and Pole With Foundation (46' – 40').

Answer:

Revisions will be required to address these discrepancies. An addendum will be issued.

Question:

In regards to the Special Provision for Retaining Walls, in the paragraph concerning Undercutting, it states "All undercut areas shall be backfilled with granular material meeting the requirements specified in the plans." Note 4 concerning undercutting on MSE Typical Wall Sections – plan sheet no. 130 – states "The backfill material shall be approved stiff native clays available on the site or an approved granular material." Please clarify what material is acceptable for backfill of undercut volumes.

Answer:

An addendum has been issued to clarify this.

Question:

In regards to the Special Provision for Retaining Walls, in the section "Method of Measurement", it states "All backfill within the limits of any undercut areas will be measured as shown in the plans". In the section "Basis of Payment" it states that "All backfill within the limits of any undercut areas… will be paid for as shown in the plans." The only mention of undercutting and backfill is found in Note 4 referenced above and states "The undercutting, backfill and placement of the backfill shall be in accordance with the Special Provision "Retaining Walls". Please clarify how measurement and payment for backfill in undercut volumes will be made.

Answer:
An addendum has been issued to clarify this.

Question:
The MSE Typical Wall Sections on Plan Sheet 130 show that SM-1 material shall be placed behind reinforced zone. Note 1 states that his material "shall be included in the price bid for Compacted Embankment." Do you have an informational quantity for the SM-1 material that is to be placed behind the MSE wall reinforced zone?

Answer:
All embankment constructed adjacent to the Backfill Reinforcement Zone shall consist of material meeting the Special Provision "Compacted Embankment Special". This material shall extend from the back of the Reinforcing Zone to the adjacent side slope.

Question:
Addendum 2 included a revised Special Provision for "Compacted Embankment Special" as well as a revised Sheet No. 130 "MSE Typical Wall Sections". The answer to the question regarding the SM-1 material behind the reinforced zone states that "This material shall extend from the back of Reinforcing Zone to the adjacent side slope." Can the Contractor conclude that 100% of the compacted embankment in the roadway section that include an MSE wall be built out of material that meets the requirements of Compacted Embankment Special?

Answer:
Yes.

Question:
Plan Sheet 210 shows a layout of the Bridge Abutments and includes several details that are in conflict with the revised Sheet No. 130, including the SM-1 (Special) Embankment Limits behind the reinforced zone as well as Unclassified Excavation Pay Limits. Please confirm which detail sheet is correct.

Answer:
The correct detail sheet was included with Addendum #2. It is the "Compacted Embankment Special" area shown as SM-1 on Plan Sheet 130.

Question:
The Soil Logs in the plans and the Geotechnical Report included online indicate that the vast majority of onsite excavated material does not meet the material requirements in the

Special Provision for “Compacted Embankment Special” (i.e. PI 15 or less, or gravel content 55% or greater). Is it the intent of the Special Provision that any onsite material that does not meet the requirements of the Special Provision be hauled off the site and all embankments be constructed by materials obtained off site?

Answer:
The material shall meet the requirements of the Special Provision.

Question:
Please confirm that the Special Provision for “Compacted Embankment Special” considers any costs associated with providing Compacted Embankment Special (including any off site borrow material) to be included in the bid price for “Compacted Embankment”.

Answer:
Per the Special Provision, Compacted Embankment Special will be paid for under the item “Compacted Embankment”.

Question:
If is the intent of the Special Provision that all onsite excavation unsuitable for use as Compacted Embankment Special be hauled off site, does the Department have a location on or near the ROW of this project to haul this excess material?

Answer:
The disposal of the excess excavation is the responsibility of the Contractor.

Question:
Please confirm the quantities associated with the Sediment Basin items are correct.

Answer:
The quantities are correct.

Question:
Please confirm that the payment for the earthwork items (with the exception of undercut/backfill) will be plan quantity.

Answer:
The plans have been revised to remove the note, “Earthwork quantities shown above shall be paid as plan quantity.” An addendum has been issued.

Question:
Will the payment for the select granular backfill item be actual measured quantity?

Answer:
Yes

Question:
Addendum #2 contains a "Compacted Embankment Special" Special Provision and a revised typical section for the MSE walls that shows the Compacted Embankment Special material behind the reinforcing zone of the MSE wall. That detail, however, does not show any limits for that material. Can you confirm what the limits of the Compacted Embankment Special material will be?

Answer:
All compacted embankment in the roadway sections that include an MSE wall shall be constructed from material that meets the requirements of Compacted Embankment Special.

Question:
There are multiple areas on the project where the cross sections and MSE Wall plans indicate the MSE Wall leveling pad to be placed on Compacted Embankment constructed as a part of this project. Is the material obtained from the onsite cuts acceptable for use as Compacted Embankment below the footing and backfill of the MSE walls? What are the material requirements for acceptable foundation material under the MSE wall footing and backfill? If onsite cut material placed in Compacted Embankment is not an acceptable foundation, what would be the procedure for constructing acceptable ground improvements under the MSE wall footing and backfill?

Answer:
The MSE wall details are being revised to clarify the materials to be used in the compacted embankment below the MSE wall. An addendum will be issued.

Question:
Will the Department provide the box culvert standards for this job?

Answer:
Please see the pdfs below.

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

"a" bars – STRAIGHT – In Top and Bottom Slab of Barrel. 2 Add'l in Apron and Headwall - Each.

D	S	H	Size	Spacing	Number Req'd 3:1	Number Req'd 4:1	Length
0'-0" TO 5'-0" MAXIMUM.	2 @ 4'	2'	#5	12"	128	128	9'-5"
		3'			128	128	9'-5"
		4'			128	128	9'-5"
		5'			128	128	9'-5"
		6'			128	128	9'-8"
	2 @ 5'	3'	#6	12"	128	128	11'-5"
		4'			128	128	11'-5"
		5'			128	128	11'-5"
		6'			128	128	11'-8"
		7'			128	128	11'-10"
	2 @ 6'	3'	#6	11"	140	140	13'-5"
		4'			140	140	13'-5"
		5'			140	140	13'-5"
		6'			140	140	13'-8"
		7'			140	140	13'-10"
		8'			140	140	13'-11"
	2 @ 7'	4'	#6	12"	128	128	15'-5"
		5'			128	128	15'-5"
		6'			128	128	15'-8"
		7'			128	128	15'-10"
		8'			128	128	15'-11"
		9'			128	128	16'-2"
	2 @ 8'	4'	#6	11"	140	140	17'-5"
		5'			140	140	17'-8"
		6'			140	140	17'-8"
		7'			140	140	17'-10"
		8'			140	140	17'-11"
		9'			140	140	18'-2"
		10'			140	140	18'-5"
	2 @ 9'	5'	#6	11"	140	140	19'-8"
		6'			140	140	19'-10"
		7'			140	140	19'-10"
		8'			140	140	19'-11"
		9'			140	140	20'-2"
		10'			140	140	20'-5"
		11'			140	140	20'-7"
	2 @ 10'	5'	#7	12"	128	128	21'-8"
		6'			128	128	21'-10"
		7'			128	128	21'-10"
		8'			128	128	21'-11"
		9'			128	128	22'-2"
		10'			128	128	22'-5"
		11'			128	128	22'-7"
		12'			128	128	22'-9"
	2 @ 11'	6'	#7	12"	128	128	23'-11"
		7'			128	128	23'-11"
		8'			128	128	23'-11"
		9'			128	128	24'-2"
		10'			128	128	24'-5"
		11'			128	128	24'-7"
		12'			128	128	24'-9"
	2 @ 12'	6'	#7	11"	140	140	25'-11"
		7'			140	140	25'-11"
		8'			140	140	25'-11"
		9'			140	140	26'-2"
		10'			140	140	26'-5"
		11'			140	140	26'-7"
		12			140	140	26'-9"

"b" bars – BENT - See Diagram below. – In Bottom of Top Slab bent up over Division Wall - hooked. Alternate with "a" and "c" bars.

S	H	Size	Spacing	Number Req'd 3:1	Number Req'd 4:1	Length	X	Y	Z
2 @ 4'	2'	#5	12"	59	59	10'-6"	0'-3"	2'-2¼"	3'-4"
	3'			59	59	10'-6"	0'-3"	2'-2¼"	3'-4"
	4'			59	59	10'-6"	0'-3"	2'-2¼"	3'-4"
	5'			59	59	10'-6"	0'-3"	2'-2¼"	3'-4"
	6'			59	59	10'-9"	0'-3"	2'-3¼"	3'-5"
2 @ 5'	3'	#5	12"	59	59	12'-7"	0'-3½"	2'-7½"	4'-1"
	4'			59	59	12'-7"	0'-3½"	2'-7½"	4'-1"
	5'			59	59	12'-7"	0'-3½"	2'-7½"	4'-1"
	6'			59	59	12'-10"	0'-3½"	2'-8½"	4'-2"
	7'			59	59	13'-0"	0'-3½"	2'-9½"	4'-2½"
2 @ 6'	3'	#5	11"	65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	4'			65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	5'			65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	6'			65	65	14'-10"	0'-4"	3'-1½"	4'-11"
	7'			65	65	15'-0"	0'-4"	3'-2½"	4'-11½"
	8'			65	65	15'-1"	0'-4"	3'-2½"	5'-0"
2 @ 7'	4'	#6	12"	59	59	16'-9"	0'-4½"	3'-5"	5'-7"
	5'			59	59	16'-9"	0'-4½"	3'-5"	5'-7"
	6'			59	59	17'-0"	0'-4½"	3'-6"	5'-8"
	7'			59	59	17'-2"	0'-4½"	3'-7"	5'-8½"
	8'			59	59	17'-3"	0'-4½"	3'-7"	5'-9"
	9'			59	59	17'-6"	0'-4½"	3'-8"	5'-10"
2 @ 8'	4'	#6	11"	65	65	18'-10"	0'-5"	3'-10"	6'-4"
	5'			65	65	19'-1"	0'-5"	3'-11"	6'-5"
	6'			65	65	19'-1"	0'-5"	3'-11"	6'-5"
	7'			65	65	19'-3"	0'-5"	4'-0"	6'-5½"
	8'			65	65	19'-4"	0'-5"	4'-0"	6'-6"
	9'			65	65	19'-7"	0'-5"	4'-1"	6'-7"
	10'			65	65	19'-10"	0'-5"	4'-2"	6'-8"
2 @ 9'	5'	#6	11"	65	65	21'-1"	0'-5½"	4'-4"	7'-2"
	6'			65	65	21'-3"	0'-5½"	4'-5"	7'-2½"
	7'			65	65	21'-3"	0'-5½"	4'-5"	7'-2½"
	8'			65	65	21'-4"	0'-5½"	4'-5"	7'-3"
	9'			65	65	21'-7"	0'-5½"	4'-6"	7'-4"
	10'			65	65	21'-10"	0'-5½"	4'-7"	7'-5"
	11'			65	65	22'-0"	0'-5½"	4'-7"	7'-6"
2 @ 10'	5'	#6	12"	59	59	23'-2"	0'-6"	4'-9"	7'-11"
	6'			59	59	23'-4"	0'-6"	4'-10"	7'-11½"
	7'			59	59	23'-4"	0'-6"	4'-10"	7'-11½"
	8'			59	59	23'-5"	0'-6"	4'-10"	8'-0"
	9'			59	59	23'-8"	0'-6"	4'-11"	8'-1"
	10'			59	59	23'-11"	0'-6"	5'-0"	8'-2"
	11'			59	59	24'-1"	0'-6"	5'-0"	8'-3"
	12'			59	59	24'-3"	0'-6"	5'-0"	8'-4"
2 @ 11'	6'	#6	12"	59	59	25'-5"	0'-6½"	5'-3"	8'-9"
	7'			59	59	25'-5"	0'-6½"	5'-3"	8'-9"
	8'			59	59	25'-5"	0'-6½"	5'-3"	8'-9"
	9'			59	59	25'-8"	0'-6½"	5'-4"	8'-10"
	10'			59	59	25'-11"	0'-6½"	5'-5"	8'-11"
	11'			59	59	26'-1"	0'-6½"	5'-5"	9'-0"
	12'			59	59	26'-3"	0'-6½"	5'-5"	9'-1"
2 @ 12'	6'	#6	11"	65	65	27'-5"	0'-7"	5'-8"	9'-6"
	7'			65	65	27'-5"	0'-7"	5'-8"	9'-6"
	8'			65	65	27'-5"	0'-7"	5'-8"	9'-6"
	9'			65	65	27'-8"	0'-7"	5'-9"	9'-7"
	10'			65	65	27'-11"	0'-7"	5'-10"	9'-8"
	11'			65	65	28'-1"	0'-7"	5'-10"	9'-9"
	12			65	65	28'-3"	0'-7"	5'-10"	9'-10"

"b2" bars – BENT - See Diagram below. – In Top of Bottom Slab bent down under Division Wall - hooked. Alternate with "a" and "c" bars.

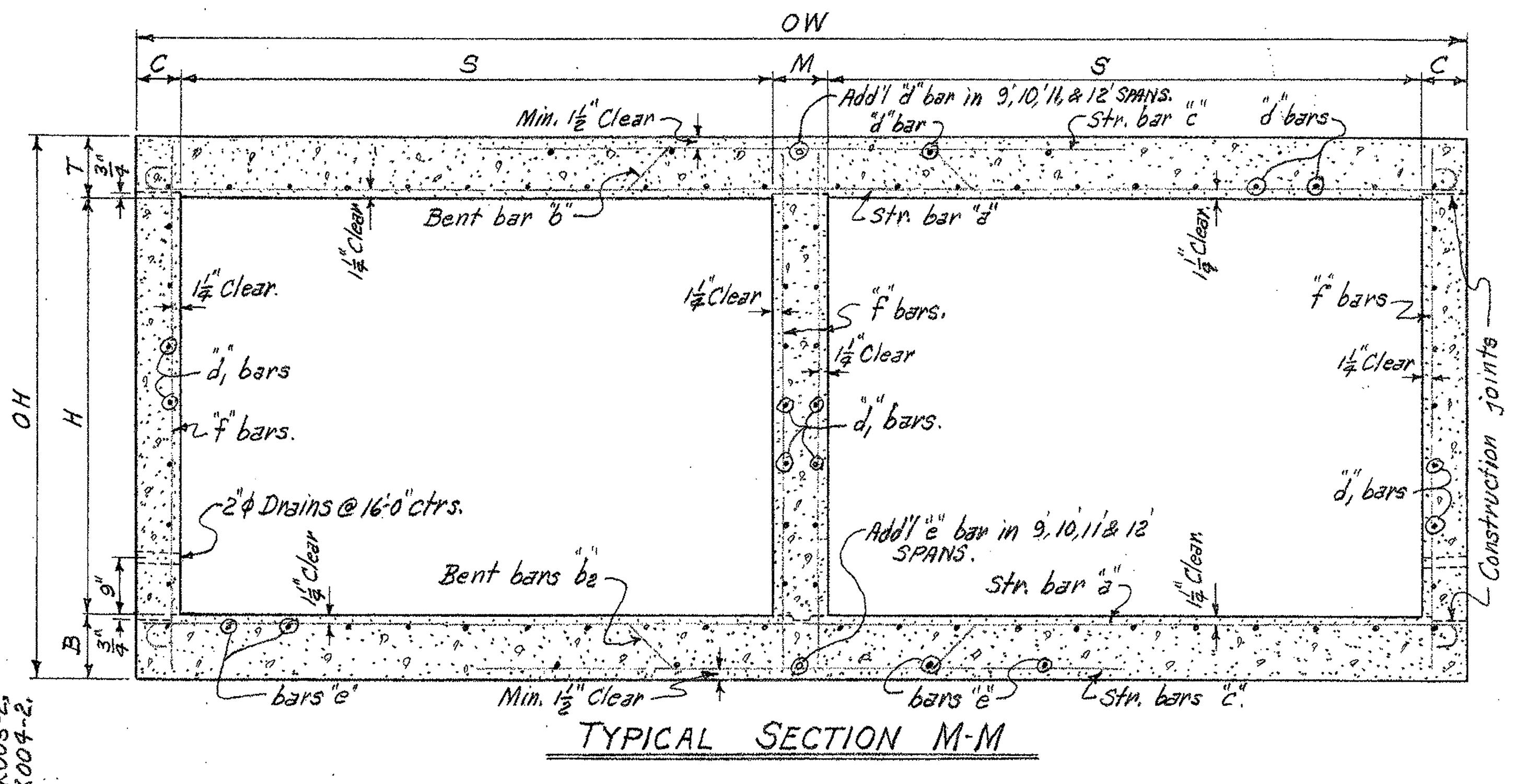
S	H	Size	Spacing	Number Req'd 3:1	Number Req'd 4:1	Length	X	Y	Z
2 @ 4'	2'	#5	12"	59	59	10'-6"	0'-2½"	2'-3½"	3'-4"
	3'			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"
	4'			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"
	5'			59	59	10'-6"	0'-2½"	2'-3½"	3'-4"
	6'			59	59	10'-9"	0'-2½"	2'-4½"	3'-5"
2 @ 5'	3'	#5	12"	59	59	12'-6"	0'-3"	2'-8½"	4'-1"
	4'			59	59	12'-6"	0'-3"	2'-8½"	4'-1"
	5'			59	59	12'-6"	0'-3"	2'-8½"	4'-1"
	6'			59	59	12'-9"	0'-3"	2'-9½"	4'-2"
	7'			59	59	12'-11"	0'-3"	2'-10½"	4'-2½"
2 @ 6'	3'	#5	11"	65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	4'			65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	5'			65	65	14'-7"	0'-4"	3'-0½"	4'-10"
	6'			65	65	14'-10"	0'-4"	3'-1½"	4'-11"
	7'			65	65	15'-0"	0'-4"	3'-2½"	4'-11½"
	8'			65	65	15'-1"	0'-4"	3'-2½"	5'-0"
2 @ 7'	4'	#6	12"	59	59	16'-9"	0'-4½"	3'-5"	5'-7"
	5'			59	59	16'-9"	0'-4½"	3'-5"	5'-7"
	6'			59	59	17'-0"	0'-4½"	3'-6"	5'-8"
	7'			59	59	17'-2"	0'-4½"	3'-7"	5'-8½"
	8'			59	59	17'-3"	0'-4½"	3'-7"	5'-9"
	9'			59	59	17'-6"	0'-4½"	3'-8"	5'-10"
2 @ 8'	4'	#6	11"	65	65	18'-10"	0'-5"	3'-10"	6'-4"
	5'			65	65	19'-1"	0'-5"	3'-11"	6'-5"
	6'			65	65	19'-1"	0'-5"	3'-11"	6'-5"
	7'			65	65	19'-3"	0'-5"	4'-0"	6'-5½"
	8'			65	65	19'-4"	0'-5"	4'-0"	6'-6"
	9'			65	65	19'-7"	0'-5"	4'-1"	6'-7"
	10'			65	65	19'-10"	0'-5"	4'-2"	6'-8"
2 @ 9'	5'	#6	11"	65	65	21'-1"	0'-5¾"	4'-3½"	7'-2"
	6'			65	65	21'-3"	0'-5¾"	4'-4½"	7'-2½"
	7'			65	65	21'-3"	0'-5¾"	4'-4½"	7'-2½"
	8'			65	65	21'-4"	0'-5¾"	4'-4½"	7'-3"
	9'			65	65	21'-7"	0'-5¾"	4'-5½"	7'-4"
	10'			65	65	21'-10"	0'-5¾"	4'-6½"	7'-5"
	11'			65	65	22'-0"	0'-5¾"	4'-6½"	7'-6"
2 @ 10'	5'	#6	12"	59	59	23'-2"	0'-6½"	4'-8"	7'-11"
	6'			59	59	23'-4"	0'-6½"	4'-9"	7'-11½"
	7'			59	59	23'-4"	0'-6½"	4'-9"	7'-11½"
	8'			59	59	23'-5"	0'-6½"	4'-9"	8'-0"
	9'			59	59	23'-8"	0'-6½"	4'-10"	8'-1"
	10'			59	59	23'-11"	0'-6½"	4'-11"	8'-2"
	11'			59	59	24'-1"	0'-6½"	4'-11"	8'-3"
	12'			59	59	24'-3"	0'-6½"	4'-11"	8'-4"
2 @ 11'	6'	#6	12"	59	59	25'-6"	0'-7½"	5'-1"	8'-9"
	7'			59	59	25'-6"	0'-7½"	5'-1"	8'-9"
	8'			59	59	25'-6"	0'-7½"	5'-1"	8'-9"
	9'			59	59	25'-9"	0'-7½"	5'-2"	8'-10"
	10'			59	59	26'-0"	0'-7½"	5'-3"	8'-11"
	11'			59	59	26'-2"	0'-7½"	5'-3"	9'-0"
	12'			59	59	26'-4"	0'-7½"	5'-3"	9'-1"
2 @ 12'	6'	#6	11"	65	65	27'-7"	0'-8½"	5'-5"	9'-6"
	7'			65	65	27'-7"	0'-8½"	5'-5"	9'-6"
	8'			65	65	27'-7"	0'-8½"	5'-5"	9'-6"
	9'			65	65	27'-10"	0'-8½"	5'-6"	9'-7"
	10'			65	65	28'-1"	0'-8½"	5'-7"	9'-8"
	11'			65	65	28'-3"	0'-8½"	5'-7"	9'-9"
	12			65	65	28'-5"	0'-8½"	5'-7"	9'-10"

"c" bars – STRAIGHT – In Top and Bottom Slab of Barrel. Alternate with "b" and "b2" bars.
"d" bars – STRAIGHT – Longitudinal in Top Slab of Barrel. Length: 2 @ 30'-8" for 60'-0" Length Barrel (1'-8" Lap)
"d1" bars – STRAIGHT – Longitudinal in Sidewalls and Division Walls. Length: 2 @ 30'-6" for 60'-0" Length Barrel (1'-3" Lap)
"e" bars – STRAIGHT – Longitudinal in Bottom Slab of Barrel. Length: 2 @ 31'-6" for 60'-0" Length Barrel (1'-3" Lap)
"f" bars – STRAIGHT – Vertical in Sidewalls and Division Walls.

S	H	"c" Size	"c" Spacing	"c" No. 3:1	"c" No. 4:1	"c" Length	"d" Size	"d" Spacing	"d" No. Req'd	"d1" Size	"d1" Spacing	"d1" No. Req'd	"e" Size	"e" Spacing	"e" No. Req'd	"f" Size	"f" Spacing	"f" No. 3:1	"f" No. 4:1	"f" Length
2 @ 4'	2'	#5	12"	120	120	4'-8"	#5	12"	14	#4	12"	8	#4	12"	14	#4	12"	240	240	2'-10"
	3'			120	120	4'-8"			14			12			14			240	240	3'-10"
	4'			120	120	4'-8"			14			16			14			240	240	4'-10"
	5'			120	120	4'-8"			14			20			14			240	240	5'-10"
	6'			120	120	4'-9"			14			24			14			240	240	6'-10"
2 @ 5'	3'	#6	12"	120	120	5'-8"	#5	11½"	16	#4	12"	12	#4	12"	16	#4	12"	240	240	3'-11"
	4'			120	120	5'-8"			16			16			16			240	240	4'-11"
	5'			120	120	5'-8"			16			20			16			240	240	5'-11"
	6'			120	120	5'-9"			16			24			16			240	240	6'-11"
	7'			120	120	5'-10"			16			28			16			240	240	7'-11"
2 @ 6'	3'	#6	11"	132	132	6'-8"	#5	11½"	18	#4	12"	12	#4	12"	18	#4	12"	240	240	4'-0"
	4'			132	132	6'-8"			18			16			18			240	240	5'-0"
	5'			132	132	6'-8"			18			20			18			240	240	6'-0"
	6'			132	132	6'-9"			18			24			18			240	240	7'-0"
	7'			132	132	6'-10"			18			28			18			240	240	8'-0"
	8'			132	132	6'-10"			18			32			18		10"	288	288	9'-0"
2 @ 7'	4'	#6	12"	120	120	7'-8"	#5	11½"	20	#4	12"	16	#4	12"	20	#4	12"	240	240	5'-1"
	5'			120	120	7'-8"			20			20			20			240	240	6'-1"
	6'			120	120	7'-9"			20			24			20			240	240	7'-1"
	7'			120	120	7'-10"			20			28			20			240	240	8'-1"
	8'			120	120	7'-10"			20			32			20		10"	288	288	9'-1"
	9'			120	120	7'-11"			20			36			20	#5	12"	240	240	10'-1"
2 @ 8'	4'	#6	11"	132	132	8'-8"	#5	11½"	23	#4	12"	16	#4	12"	22	#4	12"	240	240	5'-2"
	5'			132	132	8'-9"			23			20			22			240	240	6'-2"
	6'			132	132	8'-9"			23			24			22			240	240	7'-2"
	7'			132	132	8'-10"			23			28			22			240	240	8'-2"
	8'			132	132	8'-10"			23			32			22		10"	288	288	9'-2"
	9'			132	132	8'-11"			23			36			22	#5	12"	240	240	10'-2"
	10'			132	132	9'-0"			23			40			22		11"	264	264	11'-2"
2 @ 9'	5'	#6	11"	132	132	9'-9"	#5	11½"	26	#4	12"	20	#4	12"	25	#4	12"	240	240	6'-3"
	6'			132	132	9'-10"			26			24			25			240	240	7'-3"
	7'			132	132	9'-10"			26			28			25			240	240	8'-3"
	8'			132	132	9'-10"			26			32			25		10"	288	288	9'-3"
	9'			132	132	9'-11"			26			36			25	#5	12"	240	240	10'-3"
	10'			132	132	10'-0"			26			40			25		11"	264	264	11'-3"
	11'			132	132	10'-0"			26			44			25		10"	288	288	12'-3"
2 @ 10'	5'	#7	12"	120	120	10'-9"	#5	11½"	28	#4	12"	20	#4	12"	27	#4	12"	240	240	6'-4"
	6'			120	120	10'-10"			28			24			27			240	240	7'-4"
	7'			120	120	10'-10"			28			28			27			240	240	8'-4"
	8'			120	120	10'-10"			28			32			27		10"	288	288	9'-4"
	9'			120	120	10'-11"			28			36			27	#5	12"	240	240	10'-4"
	10'			120	120	11'-0"			28			40			27		11"	264	264	11'-4"
	11'			120	120	11'-0"			28			44			27		10"	288	288	12'-4"
	12'			120	120	11'-0"			28			48			27	#6	12"	240	240	13'-4"
2 @ 11'	6'	#7	12"	120	120	11'-10"	#5	11½"	30	#4	12"	24	#4	12"	29	#4	12"	240	240	7'-6"
	7'			120	120	11'-10"			30			28			29			240	240	8'-6"
	8'			120	120	11'-10"			30			32			29		10"	288	288	9'-6"
	9'			120	120	11'-11"			30			36			29	#5	12"	240	240	10'-6"
	10'			120	120	12'-0"			30			40			29		11"	264	264	11'-6"
	11'			120	120	12'-0"			30			44			29		10"	288	288	12'-6"
	12'			120	120	12'-0"			30			48			29	#6	12"	240	240	13'-6"
2 @ 12'	6'	#7	11"	132	132	12'-10"	#5	11½"	32	#4	12"	24	#4	12"	31	#4	12"	240	240	7'-7"
	7'			132	132	12'-10"			32			28			31			240	240	8'-7"
	8'			132	132	12'-10"			32			32			31		10"	288	288	9'-7"
	9'			132	132	12'-11"			32			36			31	#5	12"	240	240	10'-7"
	10'			132	132	13'-0"			32			40			31		11"	264	264	11'-7"
	11'			132	132	13'-0"			32			44			31		10"	288	288	12'-7"
	12			132	132	13'-0"			32			48			31	#6	12"	240	240	13'-7"

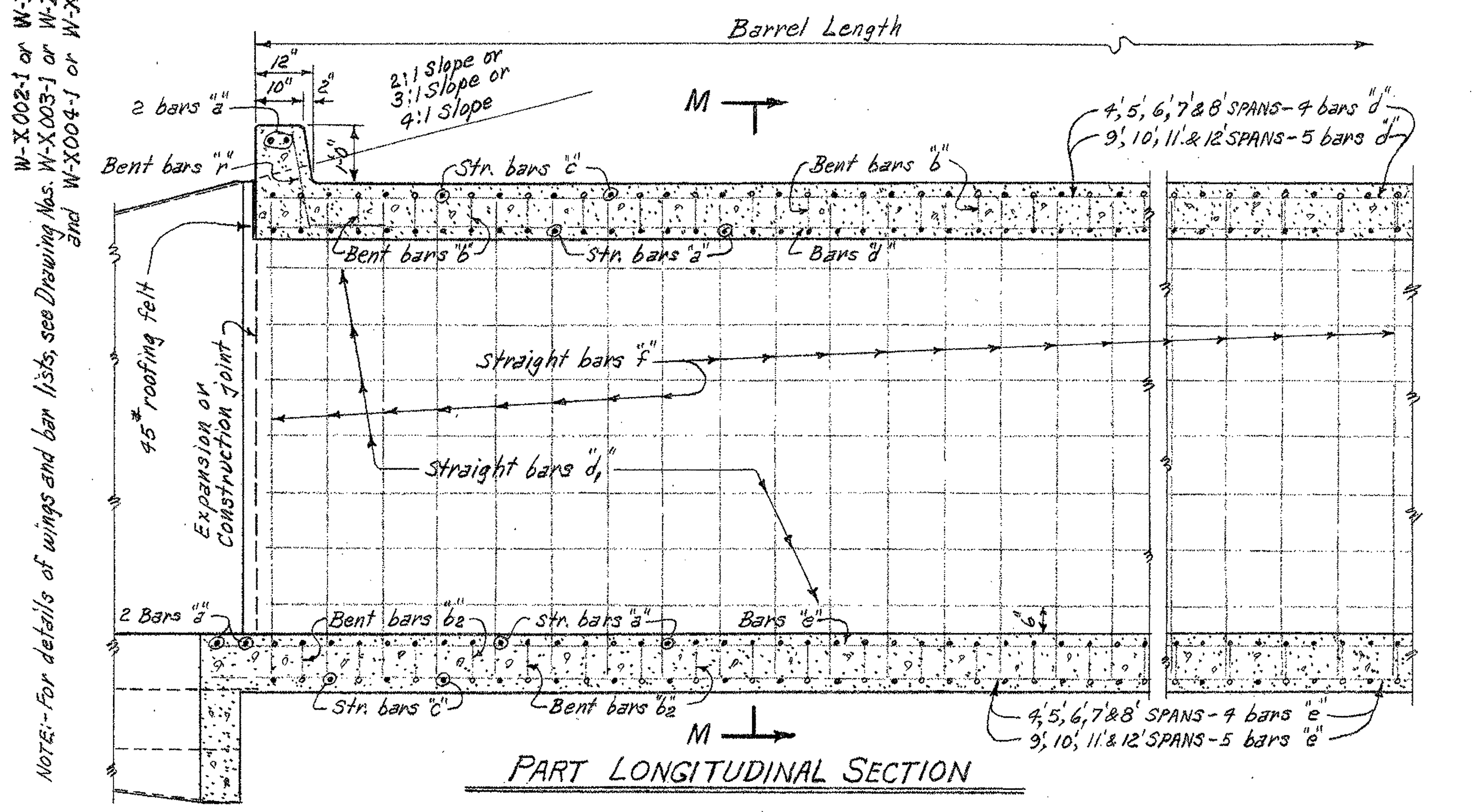
DIMENSIONS QUANTITIES

Max. Design Depth of Cover D	Clear Spans S	Clear Height H	Sq.Ft. Opening A	Overall Width OW	Thickness of Top Slab T	Thickness of Sidewalls C	Thickness of Division Wall M	Thickness of Bottom Slab B	Overall Height OH	Class S Conc. per Lin. Ft. of Barrel CU.YD.	Reinforcing Steel per Lin. Ft. of Barrel LB.	Additional per Lap LB.	Additional Two Headwalls & Aprons LB.
5'-0"	2 @ 4'	2'	16	9'-8"	6½"	6"	8"	6"	3'-0½"	0.496	88.15	42.71	129.56
		3'	24	9'-8"		6"	8"		4'-0½"	0.558	93.49	46.05	129.56
		4'	32	9'-8"		6"	8"		5'-0½"	0.620	98.84	49.39	129.56
		5'	40	9'-8"		6"	8"		6'-0½"	0.682	104.18	52.73	129.56
		6'	48	9'-11"		7"	9"		7'-0½"	0.809	110.74	56.07	131.65
	2 @ 5'	3'	30	11'-8"	7"	6"	8"	6½"	4'-1½"	0.671	123.34	51.19	198.64
		4'	40	11'-8"		6"	8"		5'-1½"	0.733	128.68	54.53	198.64
		5'	50	11'-8"		6"	8"		6'-1½"	0.795	134.03	57.87	198.64
		6'	60	11'-11"		7"	9"		7'-1½"	0.922	140.89	61.21	201.64
		7'	70	12'-1"		7½"	10"		8'-1½"	1.044	147.34	64.55	203.65
	2 @ 6'	3'	36	13'-8"	7½"	6"	8"	7½"	4'-3"	0.818	148.50	56.34	233.58
		4'	48	13'-8"		6"	8"		5'-3"	0.880	153.85	59.68	233.58
		5'	60	13'-8"		6"	8"		6'-3"	0.941	159.19	63.02	233.58
		6'	72	13'-11"		7"	9"		7'-3"	1.070	166.20	66.36	236.59
		7'	84	14'-1"		7½"	10"		8'-3"	1.192	172.74	69.70	238.59
		8'	96	14'-2"		8"	10"		9'-3"	1.298	183.36	73.04	239.59
	2 @ 7'	4'	56	15'-8"	8"	6"	8"	8"	5'-4"	1.021	178.15	64.83	268.97
		5'	70	15'-8"		6"	8"		6'-4"	1.082	183.49	68.17	268.97
		6'	84	15'-11"		7"	9"		7'-4"	1.212	190.59	71.51	271.97
		7'	98	16'-1"		7½"	10"		8'-4"	1.334	197.19	74.85	273.98
		8'	112	16'-2"		8"	10"		9'-4"	1.440	207.89	78.19	274.98
		9'	126	16'-5"		9"	11"		10'-4"	1.616	225.25	81.53	277.98
	2 @ 8'	4'	64	17'-8"	8½"	6"	8"	8½"	5'-5"	1.174	210.37	71.71	304.80
		5'	80	17'-11"		7"	9"		6'-5"	1.295	217.63	75.05	307.81
		6'	96	17'-11"		7"	9"		7'-5"	1.366	222.97	78.39	307.81
		7'	112	18'-1"		7½"	10"		8'-5"	1.489	229.68	81.73	309.81
		8'	128	18'-2"		8"	10"		9'-5"	1.595	240.47	85.07	310.81
		9'	144	18'-5"		9"	11"		10'-5"	1.772	258.08	88.41	313.82
		10'	160	18'-8"		10"	12"		11'-5"	1.967	271.07	91.75	316.82
	2 @ 9'	5'	90	19'-11"	9"	7"	9"	9¼"	6'-6¼"	1.477	239.37	82.77	345.42
		6'	108	20'-1"		7½"	10"		7'-6¼"	1.594	246.08	86.11	347.43
		7'	126	20'-1"		7½"	10"		8'-6¼"	1.671	251.43	89.45	347.43
		8'	144	20'-2"		8"	10"		9'-6¼"	1.778	262.26	92.79	348.43
		9'	162	20'-5"		9"	11"		10'-6¼"	1.956	279.95	96.13	351.43
		10'	180	20'-8"		10"	12"		11'-6¼"	2.152	292.97	99.47	354.43
		11'	198	20'-10"		11"	12"		12'-6¼"	2.328	306.86	102.81	356.44
	2 @ 10'	5'	100	21'-11"	9½"	7"	9"	10"	6'-7½"	1.674	279.64	87.92	479.99
		6'	120	22'-1"		7½"	10"		7'-7½"	1.792	286.50	91.26	482.71
		7'	140	22'-1"		7½"	10"		8'-7½"	1.869	291.85	94.60	482.71
		8'	160	22'-2"		8"	10"		9'-7½"	1.976	302.77	97.94	484.08
		9'	180	22'-5"		9"	11"		10'-7½"	2.155	320.74	101.28	488.16
		10'	200	22'-8"		10"	12"		11'-7½"	2.352	333.99	104.62	492.25
		11'	220	22'-10"		11"	12"		12'-7½"	2.529	348.01	107.96	494.98
		12'	240	23'-0"		12"	12"		13'-7½"	2.718	370.23	111.30	497.70
	2 @ 11'	6'	132	24'-2"	10"	8"	10"	11"	7'-9"	2.048	309.36	96.41	530.03
		7'	154	24'-2"		8"	10"		8'-9"	2.128	314.70	99.75	530.03
		8'	176	24'-2"		8"	10"		9'-9"	2.208	325.12	103.09	530.03
		9'	198	24'-5"		9"	11"		10'-9"	2.388	343.25	106.43	534.12
		10'	220	24'-8"		10"	12"		11'-9"	2.586	356.57	109.77	538.21
		11'	242	24'-10"		11"	12"		12'-9"	2.764	370.67	113.11	540.93
		12'	264	25'-0"		12"	12"		13'-9"	2.954	393.05	116.45	543.66
	2 @ 12'	6'	144	26'-2"	10½"	8"	10"	12"	7'-10½"	2.299	353.31	101.55	576.43
		7'	168	26'-2"		8"	10"		8'-10½"	2.379	358.65	104.89	576.43
		8'	192	26'-2"		8"	10"		9'-10½"	2.459	369.12	108.23	576.43
		9'	216	26'-5"		9"	11"		10'-10½"	2.640	387.52	111.57	580.52
		10'	240	26'-8"		10"	12"		11'-10½"	2.840	401.07	114.91	584.60
		11'	264	26'-10"		11"	12"		12'-10½"	3.018	415.31	118.25	587.33
		12'	288	27'-0"		12"	12"		13'-10½"	3.208	437.88	121.59	590.05

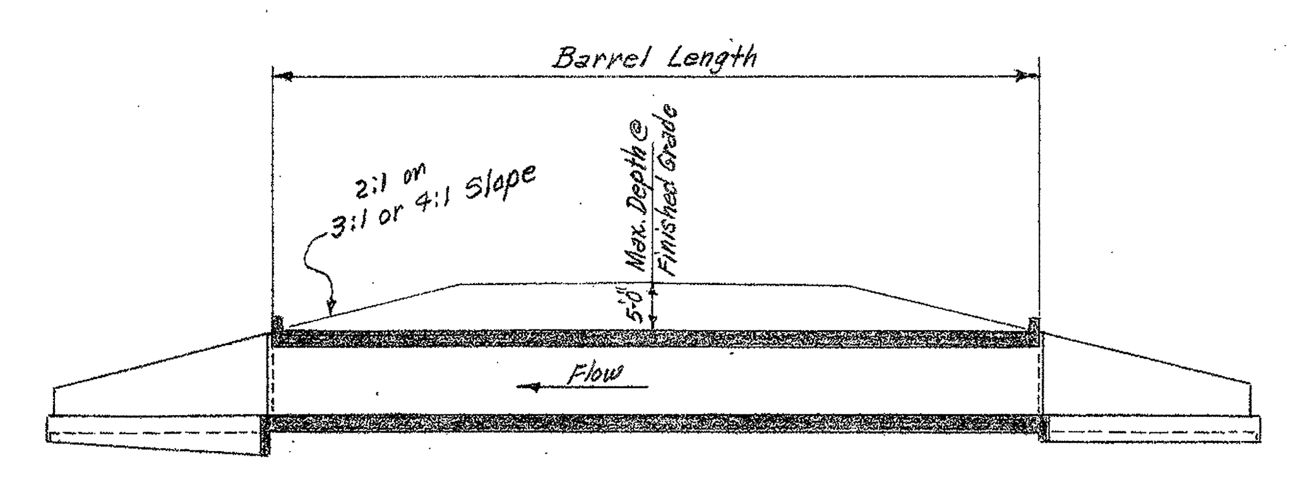


TYPICAL SECTION M-M

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

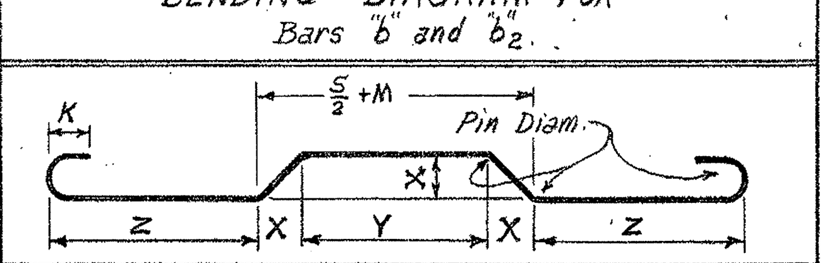


PART LONGITUDINAL SECTION



LONGITUDINAL SECTION

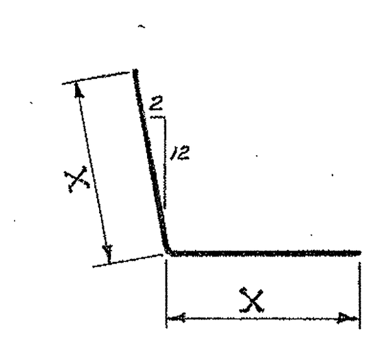
BAR SIZE	PIN DIAM.	K	ADD FOR 2 HOOKS	BENDING DIAGRAM FOR Bars "b" and "b2".
#5	2½"	4¼"	0'-11½"	
#6	3"	5"	1'-2"	



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

DOWEL BARS FOR TWO HEADWALLS

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



Designed by:- W.C.H. 1-17-63. Checked by:- RHS. 5-14-63
Drawn by:- W.C.H. 2-15-63. Checked by:- RHS. 5-24-63
Quantities by:- W.C.H. 2-19-63. Checked by:- RHS. 5-24-63

GENERAL NOTES:-
CONCRETE:- All concrete to be Class S, and shall be poured in the dry. All exposed corners to have ¾" chamfers.
REINFORCING STEEL:- Reinforcing to be deformed bars of intermediate or hard grade.
BAR LAP:- In computing the quantities of steel from the tables add one lap for each additional 33'-0" length of barrel over 32'-0". Lap longitudinal bars 30 diameters.
CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls, division walls and slabs shall be only where shown on plans.
SPECIFICATIONS:- Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.

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

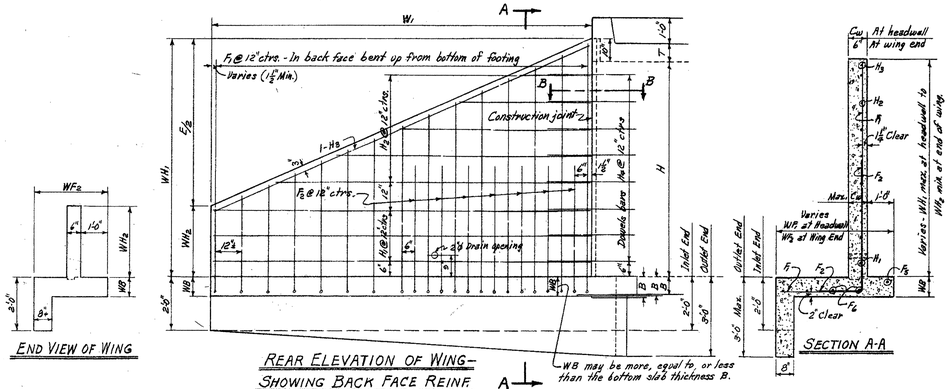
UNIT STRESSES:-
Class S Concrete (n=10) 1200#/□"
Reinforcing Steel 20,000#/□"

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

CLASS S CONCRETE

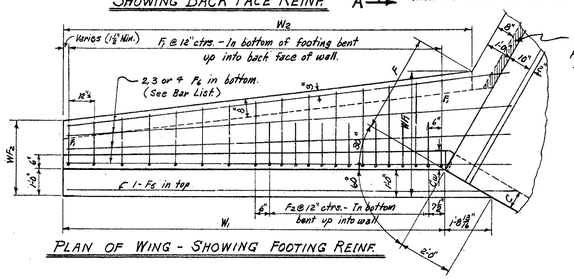
ARKANSAS STATE HIGHWAY COMMISSION
DETAILS OF STANDARD BARREL SECTIONS
FOR
REINFORCED CONCRETE BOX CULVERTS
4',5',6',7',8',9',10',11'&12' SPANS 3:1 OR 4:1 SLOPES
DOUBLES UNDER 5'-0" COVER
STANDARD DRAWING NO. R-200X-0.

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



REAR ELEVATION OF WING - SHOWING BACK FACE REINF.

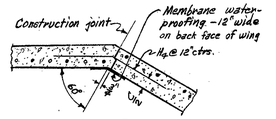
END VIEW OF WING



PLAN OF WING - SHOWING FOOTING REINF.

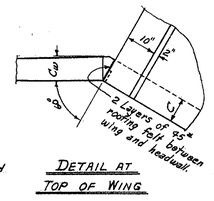
SECTION A-A

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



SECTION B-B THRU CONSTRUCTION JOINT.

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



DETAIL AT TOP OF WING

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 Headwall 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'-11⅞"	4'-1⅝"	5'-0"	4'-7½"	0.606	0.670
3'	7"	6"	3'-10"	1'-0"	2'-8"	2'-1½"	1'-4⅜"	5'-0"	6'-6⅝"	6'-1¾"	0.908	0.996
4'	7"	6"	4'-10"	1'-9"	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'-9⅜"	1.679	1.810
		7"	5'-10"	1'-8"	3'-4"	2'-4½"	2'-1⅝"	8'-4"	9'-7½"	9'-9⅜"	1.750	1.881
6'	8"	7"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.330	2.483
		7½"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.379	2.531
		8"	6'-10"	2'-0"	3'-8"	2'-6"	2'-6⅜"	9'-8"	11'-2"	11'-6½"	2.427	2.580
7'	8½"	7½"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1⅛"	11'-0"	12'-8½"	13'-1½"	3.054	3.230
		8"	7'-10"	2'-4"	4'-2"	2'-7½"	3'-1⅛"	11'-0"	12'-8½"	13'-1½"	3.117	3.293
8'	9"	8"	8'-10"	2'-8"	4'-8"	2'-9"	3'-8"	12'-9"	14'-3"	15'-2½"	3.905	4.109

* 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	Footing Dimension	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'-0⅝"	9'-8"	7'-8⅛"	14'-4"	12'-4⅛"	19'-0"	17'-0⅛"	23'-8"	21'-8⅛"
	3'	2'-8⅜"	5'-0"	2'-3¼"	9'-8"	6'-11⅛"	14'-4"	11'-7⅛"	19'-0"	16'-3⅛"	23'-8"	20'-11⅛"
	4'	3'-6"	5'-0"	1'-6"	9'-8"	6'-2"	14'-4"	10'-10"	19'-0"	15'-6"	23'-8"	20'-2"
	5'	4'-3⅜"	5'-0"	0'-8¾"	9'-8"	5'-4¾"	14'-4"	10'-0⅜"	19'-0"	14'-8⅜"	23'-8"	19'-4⅜"
	6'	5'-0⅝"	5'-2"	0'-1⅜"	9'-11"	4'-10⅜"	14'-8"	9'-7⅜"	19'-5"	14'-1⅜"	24'-2"	19'-1⅜"
5'	3'	2'-8⅜"	6'-0"	3'-3⅛"	11'-8"	8'-11⅛"	17'-4"	14'-7⅛"	23'-0"	20'-3⅛"	28'-8"	25'-11⅛"
	4'	3'-6"	6'-0"	2'-6"	11'-8"	8'-2"	17'-4"	13'-10"	23'-0"	19'-6"	28'-8"	25'-2"
	5'	4'-3⅜"	6'-0"	1'-8¾"	11'-8"	7'-4¾"	17'-4"	13'-0⅜"	23'-0"	18'-8⅜"	28'-8"	24'-4⅜"
	6'	5'-0⅝"	6'-2"	1'-1⅜"	11'-11"	6'-10⅜"	17'-8"	12'-7⅜"	23'-5"	18'-1⅜"	29'-2"	24'-1⅜"
	7'	6'-3"	6'-3"	0'-0⅝"	12'-1"	5'-10⅝"	17'-11"	11'-8⅝"	23'-9"	17'-6⅝"	29'-7"	23'-6⅝"
6'	3'	2'-8⅜"	7'-0"	4'-3⅛"	13'-8"	10'-11⅛"	20'-4"	17'-7⅛"	27'-0"	24'-3⅛"	33'-8"	30'-11⅛"
	4'	3'-6"	7'-0"	3'-6"	13'-8"	10'-2"	20'-4"	16'-10"	27'-0"	23'-6"	33'-8"	30'-2"
	5'	4'-3⅜"	7'-0"	2'-8¾"	13'-8"	9'-4¾"	20'-4"	16'-0⅜"	27'-0"	22'-8⅜"	33'-8"	29'-4⅜"
	6'	5'-0⅝"	7'-2"	2'-1⅜"	13'-11"	8'-10⅜"	20'-8"	15'-7⅜"	27'-5"	22'-1⅜"	34'-2"	29'-1⅜"
	7'	6'-2½"	7'-3"	1'-0⅝"	14'-1"	7'-10⅝"	20'-11"	14'-8⅝"	27'-9"	21'-6⅝"	34'-7"	28'-6⅝"
	8'	7'-0"	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'-3⅜"	8'-0"	3'-8¾"	15'-8"	11'-4¾"	23'-4"	19'-0⅜"	31'-0"	26'-8⅜"	38'-8"	34'-4⅜"
	6'	5'-0⅝"	8'-2"	3'-1⅜"	15'-11"	10'-10⅜"	23'-8"	18'-7⅜"	31'-5"	26'-1⅜"	39'-2"	34'-1⅜"
	7'	6'-2½"	8'-3"	2'-0⅝"	16'-1"	9'-10⅝"	23'-11"	17'-8⅝"	31'-9"	25'-6⅝"	39'-7"	33'-6⅝"
	8'	7'-0"	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'-3⅜"	9'-2"	4'-10⅜"	17'-11"	13'-4⅜"	26'-8"	22'-4⅜"	35'-5"	31'-1⅜"	44'-2"	39'-10⅜"
	6'	5'-0⅝"	9'-2"	4'-1⅜"	17'-11"	12'-10⅜"	26'-8"	21'-7⅜"	35'-5"	30'-4⅜"	44'-2"	39'-1⅜"
	7'	6'-2½"	9'-3"	3'-0⅝"	18'-1"	11'-10⅝"	26'-11"	20'-8⅝"	35'-9"	29'-6⅝"	44'-7"	38'-6⅝"
	8'	7'-0"	9'-4"	2'-0"	18'-2"	10'-10"	27'-0"	19'-8"	35'-10"	28'-6"	44'-8"	37'-4"
9'	5'	4'-3⅜"	10'-2"	5'-10⅜"	19'-11"	15'-7⅜"	29'-5"	25'-4⅜"	39'-5"	35'-1⅜"	49'-2"	44'-10⅜"
	6'	5'-0⅝"	10'-3"	5'-2⅜"	20'-1"	15'-0⅜"	29'-11"	24'-10⅜"	39'-9"	34'-5⅜"	49'-7"	44'-1⅜"
	7'	6'-2½"	10'-3"	4'-0⅝"	20'-1"	13'-10⅝"	29'-11"	23'-8⅝"	39'-9"	33'-6⅝"	49'-7"	43'-1⅝"
	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'-3⅜"	11'-2"	6'-10⅜"	21'-11"	17'-7⅜"	32'-8"	28'-4⅜"	43'-5"	39'-1⅜"	54'-2"	49'-10⅜"
	6'	5'-0⅝"	11'-3"	6'-2⅜"	22'-1"	17'-0⅜"	32'-11"	27'-10⅜"	43'-9"	38'-5⅜"	54'-7"	49'-1⅜"
	7'	6'-2½"	11'-3"	5'-0⅝"	22'-1"	15'-10⅝"	32'-11"	26'-8⅝"	43'-9"	37'-6⅝"	54'-7"	48'-1⅝"
	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'-0⅝"	12'-4"	7'-3⅜"	24'-2"	19'-1⅜"	36'-0"	30'-11⅜"	47'-10"	42'-9⅜"		
	7'	6'-2½"	12'-4"	6'-1⅜"	24'-2"	17'-11⅜"	36'-0"	29'-9⅜"	47'-10"	41'-7⅜"		
	8'	7'-4"	12'-4"	5'-0"	24'-2"	16'-10"	36'-0"	28'-8"	47'-10"	40'-6"		
12'	6'	5'-0⅝"	13'-4"	8'-3⅜"	26'-2"	21'-1⅜"	39'-0"	33'-11⅜"	51'-10"	46'-9⅜"		
	7'	6'-2½"	13'-4"	7'-1⅜"	26'-2"	19'-11⅜"	39'-0"	32'-9⅜"	51'-10"	45'-7⅜"		
	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	4.95	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"	258.2	7.91	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	11.18	12.28	
	6'	7"	8"	415.4	10.19	11.38	12.57	13.77	14.96	
	7'	7⅛	8⅛	797.6	12.39	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'	7⅛	8⅛	797.6	13.19	14.63	16.04	17.47	18.90	
	8'	8"	9"	1024.9	16.50	17.93	19.36	20.79	22.23	
7'	4'	6"	7"	183.3	6.47	8.07	9.66	11.25	12.85	
	5'	6"	7"	253.2	8.05	9.66	11.29	12.84	14.44	
	6'	7"	8"	415.4	10.62	12.25	13.84	15.46	17.08	
	7'	7⅛	8⅛	797.6	13.92	15.06	16.68	18.32	19.96	
	8'	8"	9"	1024.9	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	12.24	14.11	15.92	
	6'	7"	8"	415.4	10.86	12.69	14.51	16.36	18.17	
	7'	7⅛	8⅛	797.6	13.68	15.50	17.34	19.21	21.08	
	8'	8"	9"	1024.9	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'	7⅛	8"	415.4	11.27	13.38	15.42	17.52	19.56	
	7'	7⅛	8⅛	797.6	13.85	15.96	18.00	20.10	22.14	
	8'	8"	9"	1024.9	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'	7⅛	8"	415.4	11.50	13.83	16.10	18.38	20.61	
	7'	7⅛	8⅛	797.6	14.08	16.41	18.68	20.91	23.20	
	8'	8"	9"	1024.9	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"	8⅛	797.6	14.56	17.15	19.64	22.11		
	8'	8"	9"	1024.9	17.53	20.18	22.67	25.14		
12'	6'	8"	8"	415.4	12.16	14.99	17.70	20.42		
	7'	8"	8⅛	797.6	14.79	17.62	20.33	23.06		
	8'	8"	9"	1024.9	17.82	20.65	23.36	26.09		

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

GENERAL NOTES:-

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

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

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

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

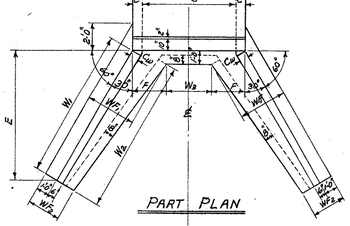
UNIT STRESSES:-

Class S Concrete (n=10) 1200 #/□"
Reinforcing Steel 24,000 #/□"

Note:- This drawing to be used in conjunction with Standard Barrel Sections, Drawing Nos. as listed below.

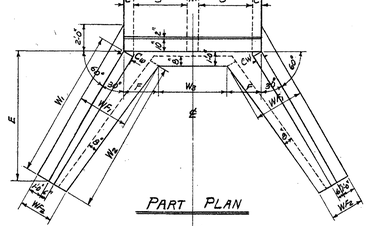
Singles	Doubles	Triples	Quadruples	Quintuples
R-100X-0	R-200X-0	R-300X-0	R-400X-0	R-500X-0
R-100X-X1	R-200X-X1	R-300X-X1	R-400X-X1	R-500X-X1
R-100X-X2	R-200X-X2	R-300X-X2	R-400X-X2	
	R-200X-X3	R-300X-X3		

CLASS S CONCRETE



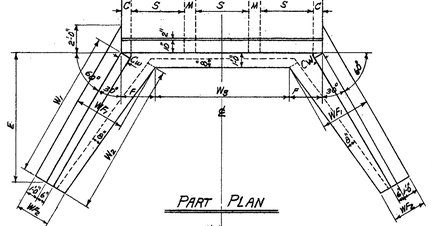
PART PLAN

END ELEVATION
SINGLE BARREL CULVERT



PART PLAN

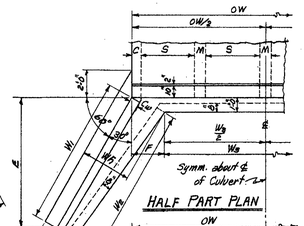
END ELEVATION
DOUBLE BARREL CULVERT



PART PLAN

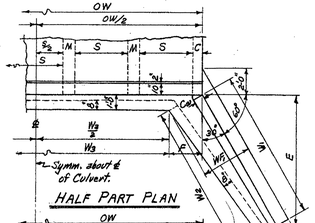
END ELEVATION
TRIPLE BARREL CULVERT

Note:- Plans and Elevations are not to scale.



HALF PART PLAN

HALF END ELEVATION
QUADRUPLE BARREL CULVERT



HALF PART PLAN

HALF END ELEVATION
QUINTUPLE BARREL CULVERT

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

BAR LIST FOR ONE WING - 4 REQUIRED

Clear Height	F1 Bent: In bottom of footing, bent up into back face of wing. One bar of each length.							F2 Bent: In bottom of footing, bent up into back face of wing. Alt. with F1 bars.						F3 Straight: Longitudinal in top of wing footing keel.			F4 Straight: Longitudinal in bottom of wing footing toe.			H1 Straight: Horizontal in back face of wing.			H2 Straight: Horizontal in back face of wing. One bar of each length.						H3 Straight: In back face of wing at top-on slope.			H4 Bent: Dowels thru construction joint at headwall.				Quantity - Reinforcing Steel per Wing	Bar Bending Diagrams
	Size	Spacing	No. Reqd	Lengths Vary		X		Y		Size	Spacing	No. Reqd	Length	X	Y	Size	No. Reqd	Length	Size	No. Reqd	Length	Size	Spacing	No. Reqd	Length	Size	Spacing	No. Reqd	Lengths Vary		Size	No. Reqd	Length	Size	Spacing	No. Reqd	Length	X		
H				Min.	Max.	Min.	Max.	Min.	Max.																				Max.	Min.										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'-9"	20.2	
3'	#3	12"	7	2'-2"	5'-3"	0'-10"	1'-4"	1'-5"	4'-0"	—	—	—	—	—	—	#3	1	9'-0"	#3	2	8'-0"	#3	12"	1	6'-3"	#3	12"	2	5'-0"	2'-8"	#3	1	6'-9"	#3	12"	3	2'-8"	1'-9"	29.9	
4'	#3	12"	9	2'-8"	6'-7"	0'-11"	1'-8"	1'-8"	5'-0"	—	—	—	—	—	—	#3	1	10'-7"	#3	3	9'-9"	#3	12"	1	7'-10"	#3	12"	3	7'-6"	2'-8"	#3	1	8'-5"	#3	12"	4	2'-8"	1'-9"	95.8	
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"	1	9'-8"	#3	12"	3	7'-6"	2'-8"	#3	1	10'-1"	#3	12"	5	2'-8"	1'-9"	68.3	
6'	#4	12"	12	3'-5"	9'-3"	1'-2"	2'-3"	2'-9"	7'-1"	#3	12"	3	4'-6"	1'-9"	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'-9"	103.8	
7'	#4	12"	13	4'-1"	10'-9"	1'-4"	2'-9"	3'-1"	8'-1"	#4	12"	5	5'-6"	1'-7"	4'-0"	#4	1	15'-2"	#4	4	15'-0"	#4	12"	3	12'-5"	#4	12"	5	12'-0"	2'-8"	#4	1	13'-5"	#4	12"	7	3'-6"	1'-9"	139.4	
8'	#4	12"	15	4'-5"	12'-3"	1'-5"	3'-2"	3'-1"	9'-2"	#4	12"	7	6'-6"	1'-10"	4'-9"	#4	1	16'-9"	#4	4	16'-9"	#4	12"	3	14'-0"	#4	12"	5	12'-0"	2'-8"	#4	1	15'-2"	#4	12"	8	3'-6"	1'-9"	251.2	

Note:- Dimensions are to bar centers.

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

Drawn by - W.C.H. 7-18-62
Quantities by - W.C.H.
Checked by - J.E.M. - 8-5-63

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

(1)