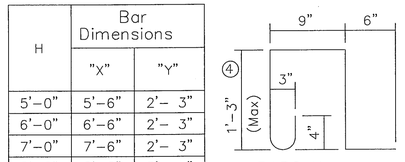
BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

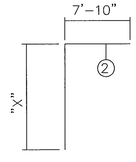
NO.	DATE	REVISION	APPROV.
1			
2		QUANTITIES	
3			

NUMBER OF SPANS	SECTION DIMENSIONS				④ Bars B					Bars C & D								Bars E					Bars F ~#4				Bars F ~#4 at 1'-6" Max			Bars M ~#4 at 1'-6" Max			Bars Y & Z ~#4 at 8" Max					⑥ Bars H 4~#4		Bars K		Per foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bar C Length	Bar C Wt	Bar D Length	Bar D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Length	Wt	No.	Spa	Length	Wt	No.	Bar Y Length	Bar Y Wt	Bar Z Length	Bar Z Wt	Length	Weight	No.	Weight	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
2	10'-0"	5'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	194	#4	5"	13'- 4"	1,728	10'- 1"	1,307	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	72	39'-9"	1,912	56	5'- 0"	187	61	4'- 8"	190	11'- 2"	455	21'- 6"	57	46	131	1.398	362.1	1.6	188	57.5	14,672
3	10'-0"	5'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	194	#4	5"	13'- 4"	1,728	10'- 1"	1,307	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	103	39'-9"	2,735	56	5'- 0"	187	122	4'- 8"	380	11'- 2"	910	32'- 1"	86	66	187	2.029	537.5	2.4	273	83.6	21,774
4	10'-0"	5'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	194	#4	5"	13'- 4"	1,728	10'- 1"	1,307	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	134	39'-9"	3,558	56	5'- 0"	187	183	4'- 8"	570	11'- 2"	1,365	42'- 8"	114	88	250	2.659	712.9	3.2	364	109.6	28,881
5	10'-0"	5'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	194	#4	5"	13'- 4"	1,728	10'- 1"	1,307	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	165	39'-9"	4,381	56	5'- 0"	187	244	4'- 8"	761	11'- 2"	1,820	53'- 3"	142	110	312	3.290	888.4	4.0	454	135.6	35,988
6	10'-0"	5'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	194	#4	5"	13'- 4"	1,728	10'- 1"	1,307	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	196	39'-9"	5,204	56	5'- 0"	187	305	4'- 8"	951	11'- 2"	2,275	65'- 7"	175	130	369	3.921	1,079.5	4.7	544	161.5	43,724
2	10'-0"	6'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	194	#4	5"	14'- 4"	1,857	10'- 1"	1,307	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	78	39'-9"	2,071	56	6'- 0"	224	61	4'- 8"	190	13'- 2"	537	21'- 6"	57	46	131	1.463	372.3	1.6	188	60.1	15,079
3	10'-0"	6'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	194	#4	5"	14'- 4"	1,857	10'- 1"	1,307	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	111	39'-9"	2,947	56	6'- 0"	224	122	4'- 8"	380	13'- 2"	1,073	32'- 1"	86	66	187	2.115	551.1	2.4	273	87.0	22,315
4	10'-0"	6'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	194	#4	5"	14'- 4"	1,857	10'- 1"	1,307	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	144	39'-9"	3,824	56	6'- 0"	224	183	4'- 8"	570	13'- 2"	1,610	42'- 8"	114	88	250	2.767	729.9	3.2	364	113.9	29,558
5	10'-0"	6'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	194	#4	5"	14'- 4"	1,857	10'- 1"	1,307	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	177	39'-9"	4,700	56	6'- 0"	224	244	4'- 8"	761	13'- 2"	2,146	53'- 3"	142	110	312	3.420	908.6	4.0	454	140.8	36,799
6	10'-0"	6'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	194	#4	5"	14'- 4"	1,857	10'- 1"	1,307	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	210	39'-9"	5,576	56	6'- 0"	224	305	4'- 8"	951	13'- 2"	2,683	65'- 7"	175	130	369	4.072	1,103.2	4.7	544	167.6	44,670
2	10'-0"	7'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	194	#4	5"	15'- 4"	1,987	10'- 1"	1,307	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	78	39'-9"	2,071	56	7'- 0"	262	61	4'- 8"	190	15'- 2"	618	21'- 6"	57	46	131	1.528	378.5	1.6	188	62.7	15,328
3	10'-0"	7'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	194	#4	5"	15'- 4"	1,987	10'- 1"	1,307	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	111	39'-9"	2,947	56	7'- 0"	262	122	4'- 8"	380	15'- 2"	1,236	32'- 1"	86	66	187	2.202	559.3	2.4	273	90.5	22,646
4	10'-0"	7'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	194	#4	5"	15'- 4"	1,987	10'- 1"	1,307	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	144	39'-9"	3,824	56	7'- 0"	262	183	4'- 8"	570	15'- 2"	1,854	42'- 8"	114	88	250	2.876	740.2	3.2	364	118.2	29,970
5	10'-0"	7'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	194	#4	5"	15'- 4"	1,987	10'- 1"	1,307	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	177	39'-9"	4,700	56	7'- 0"	262	244	4'- 8"	761	15'- 2"	2,472	53'- 3"	142	110	312	3.549	921.0	4.0	454	146.0	37,293
6	10'-0"	7'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	194	#4	5"	15'- 4"	1,987	10'- 1"	1,307	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	210	39'-9"	5,576	56	7'- 0"	262	305	4'- 8"	951	15'- 2"	3,090	65'- 7"	175	130	369	4.223	1,117.5	4.7	544	173.6	45,245
2	10'-0"	8'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	194	#4	5"	16'- 4"	2,117	10'- 1"	1,307	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	84	39'-9"	2,230	56	8'- 0"	299	61	4'- 8"	190	17'- 2"	700	21'- 6"	57	46	131	1.593	388.7	1.6	188	65.3	15,736
3	10'-0"	8'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	194	#4	5"	16'- 4"	2,117	10'- 1"	1,307	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	119	39'-9"	3,160	56	8'- 0"	299	122	4'- 8"	380	17'- 2"	1,399	32'- 1"	86	66	187	2.288	572.9	2.4	273	93.9	23,189
4	10'-0"	8'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	194	#4	5"	16'- 4"	2,117	10'- 1"	1,307	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	154	39'-9"	4,089	56	8'- 0"	299	183	4'- 8"	570	17'- 2"	2,099	42'- 8"	114	88	250	2.984	757.1	3.2	364	122.6	30,647
5	10'-0"	8'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	194	#4	5"	16'- 4"	2,117	10'- 1"	1,307	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	189	39'-9"	5,019	56	8'- 0"	299	244	4'- 8"	761	17'- 2"	2,798	53'- 3"	142	110	312	3.679	941.3	4.0	454	151.2	38,105
6	10'-0"	8'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	194	#4	5"	16'- 4"	2,117	10'- 1"	1,307	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	224	39'-9"	5,948	56	8'- 0"	299	305	4'- 8"	951	17'- 2"	3,498	65'- 7"	175	130	369	4.374	1,141.2	4.7	544	179.7	46,192
2	10'-0"	9'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	194	#4	5"	17'- 4"	2,246	10'- 1"	1,307	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	90	39'-9"	2,390	56	9'- 0"	337	61	4'- 8"	190	19'- 2"	781	21'- 6"	57	46	131	1.657	398.9	1.6	188	67.9	16,144
3	10'-0"	9'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	194	#4	5"	17'- 4"	2,246	10'- 1"	1,307	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	127	39'-9"	3,372	56	9'- 0"	337	122	4'- 8"	380	19'- 2"	1,562	32'- 1"	86	66	187	2.374	586.5	2.4	273	97.4	23,731
4	10'-0"	9'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	194	#4	5"	17'- 4"	2,246	10'- 1"	1,307	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	164	39'-9"	4,355	56	9'- 0"	337	183	4'- 8"	570	19'- 2"	2,343	42'- 8"	114	88	250	3.092	774.0	3.2	364	126.9	31,324
5	10'-0"	9'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	194	#4	5"	17'- 4"	2,246	10'- 1"	1,307	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	201	39'-9"	5,337	56	9'- 0"	337	244	4'- 8"	761	19'- 2"	3,124	53'- 3"	142	110	312	3.809	961.6	4.0	454	156.4	38,916
6	10'-0"	9'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	162	#5	6"	17'- 4"	2,929	10'- 6"	1,774	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	238	39'-9"	6,320	56	9'- 0"	337	305	4'- 8"	951	19'- 2"	3,905	65'- 7"	175	130	369	4.526	1,193.6	4.7	544	185.7	48,288
2	10'-0"	10'-0"	8"	7"	162	#6	6"	21'- 6"	5,231	162	#5	6"	18'- 4"	3,098	10'- 6"	1,774	162	#6	6"	11'- 0"	2,677	30	8"	39'-9"	797	90	39'-9"	2,390	56	10'- 0"	374	61	4'- 8"	190	21'- 2"	862	21'- 6"	57	46	131	1.722	434.8	1.6	188	70.5	17,581
3	10'-0"	10'-0"	8"	7"	162	#6	6"	32'- 1"	7,807	162	#5	6"	18'- 4"	3,098	10'- 6"	1,774	162	#6	6"	21'- 7"	5,252	45	8"	39'-9"	1,195	127	39'-9"	3,372	56	10'- 0"	374	122	4'- 8"	380	21'- 2"	1,725	32'- 1"	86	66	187	2.461	624.4	2.4	273	100.8	25,250
4	10'-0"	10'-0"	8"	7"	162	#6	6"	42'- 8"	10,382	162	#5	6"	18'- 4"	3,098	10'- 6"	1,774	162	#6	6"	32'- 2"	7,827	60	8"	39'-9"	1,593	164	39'-9"	4,355	56	10'- 0"	374	183	4'- 8"	570	21'- 2"	2,587	42'- 8"	114	88	250	3.200	814.0	3.2	364	131.2	32,924
5	10'-0"	10'-0"	8"	7"	162	#6	6"	53'- 3"	12,957	162	#5	6"	18'- 4"	3,098	10'- 6"	1,774	162	#6	6"	42'- 9"	10,402	75	8"	39'-9"	1,991	201	39'-9"	5,337	56	10'- 0"	374	244	4'- 8"	761	21'- 2"	3,450	53'- 3"	142	110	312	3.938	1,003.6	4.0	454	161.5	40,598
6	10'-0"	10'-0"	8"	7"	162	#6	6"	66'- 5"	16,161	162	#5	6"	18'- 4"	3,098	10'- 6"	1,774	162	#6	6"	53'- 4"	12,977	90	8"	39'-9"	2,390	238	39'-9"	6,320	56	10'- 0"	374	305	4'- 8"	951	21'- 2"	4,312	65'- 7"	175	130	369	4.677	1,208.9	4.7	544	191.8	48,901

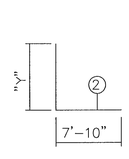
H	Bar Dimensions "X"	"Y"
5'-0"	5'-6"	2'- 3"
6'-0"	6'-6"	2'- 3"
7'-0"	7'-6"	2'- 3"
8'-0"	8'-6"	2'- 3"
9'-0"	9'-6"	2'- 3"
10'-0"	10'-6"	2'- 8"



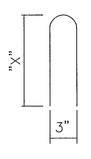
BARS K ~ #4
(Spa = 1'-0" Max)
(Length = 4'-3")



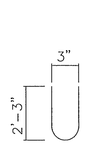
BARS C



BARS D

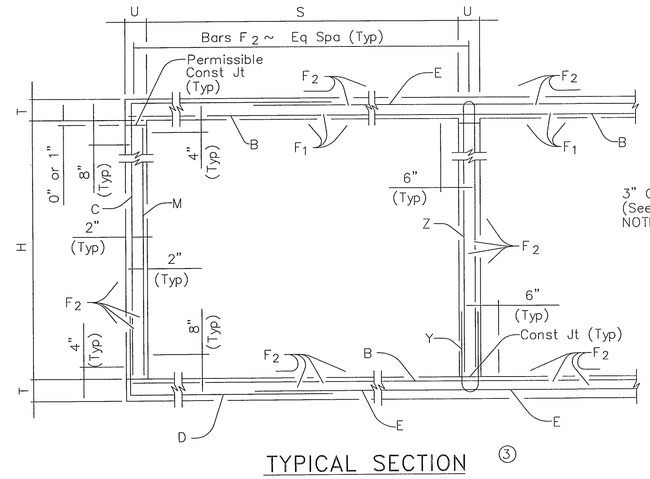


BARS Z

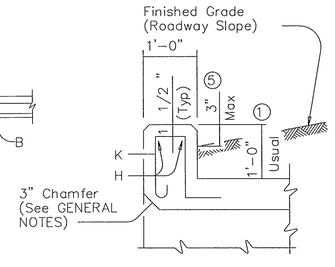


BARS Y

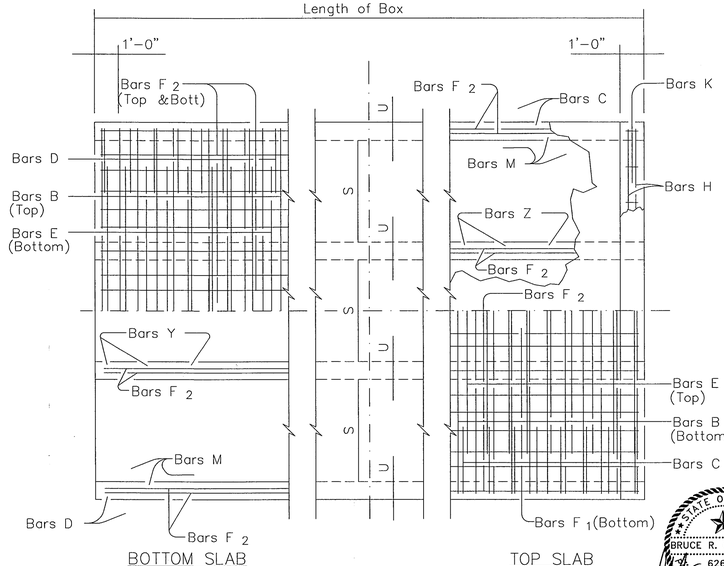
② Extend into slab.



TYPICAL SECTION ③



SECTION THRU CURB



BOTTOM SLAB

TOP SLAB

PART PLANS ③

① 0" min to 5'-0" max. For T6 or C6 Rail, see T6-CM standard for additional details. For curbs without rail and greater than 1'-0" high, see ECD standard for additional details.

④ For curbs less than 1'-0" high, tilt bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, bars K may be omitted.

⑤ For vehicle safety, curb heights shall be reduced, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

⑥ Bar lengths over 60' include one bar lap as follows:
#4 = 1'-9", #5 = 2'-2", & #6 = 2'-7"
For Epoxy coated reinforcing, bar laps shall be as follows:
#4 = 2'-7", #5 = 3'-3", & #6 = 3'-10"

③ Reinforcing shown for orientation purposes only. See table for number and spacing of bars.

GENERAL NOTES:

Designed according to current AASHTO Standard and Interim Specifications.

Designed for HS20 Loading and to the maximum fill height shown.

All reinforcing steel shall be Grade 60.

All concrete shall be Class "C" concrete with a minimum 28 day compressive strength of 3600 psi; except for the top slab of direct traffic culverts, which shall be Class "S" concrete with a minimum 28 day compressive strength of 4000 psi.

The bottom edge of the top slab shall be chamfered 3" at the entrance.

Reinforcing bars shall be adjusted to provide a minimum of 1 1/4 " clear cover.

Construction joints shown at the flow line may be raised a maximum of 6" at the Contractor's option. If this option is used, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

See standard MC-MD for skewed ends, angle sections and lengthening details.

For Direct Traffic, construct top slab to conform to crown of roadway while maintaining constant thickness of slab.

Bar Dimensions "X" and "Y" shall be adjusted as necessary. The maximum permissible variation in dimension H is 6 inches.

STATE OF TEXAS
BRUCE R. GRANTHAM
62659
REGISTERED PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY:
BRUCE R. GRANTHAM
ON 02/14/02
ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

THIS DETAIL SHEET WAS OBTAINED FROM TXDOT

61

DATE: DECEMBER, 2001	SCALE: NOT TO SCALE	JOB NO.: 00-249
DRAWN: GBW	DESIGN: BRG	REVIEWED: JFW	DWG: 249DETAILS

ARAPAHO ROAD PHASE II

BOX CULVERT DETAIL

TOWN OF ADDISON

Grantham, Burge & Waldbauer Engineers, Inc.
1919 S. SHILOH ROAD, SUITE 530, L.B. 27
GARLAND, TEXAS 75042
(972) 840-1916 (TEL)
(972) 840-2156 (FAX)

SHT. SW-7 OF SW-8