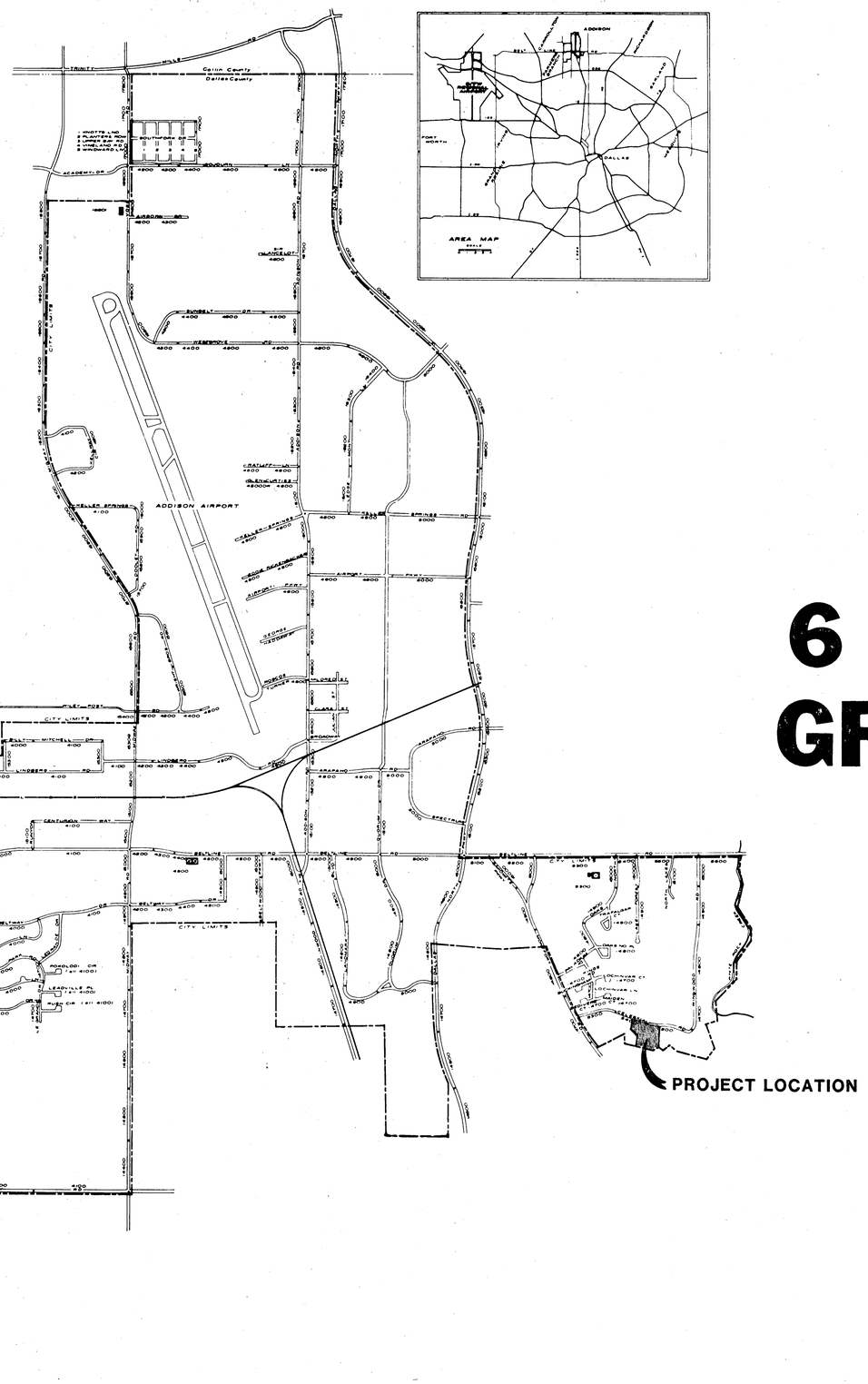


TOWN OF
ADDISON
DALLAS COUNTY, TEXAS

CONSTRUCTION PLANS FOR

6 MG CELESTIAL ROAD GROUND STORAGE TANK

SHEET INDEX

SHEET NO.	TITLE
1	SITE PLAN
2	PLAN AND SECTIONS
3	MISCELLANEOUS TANK DETAILS
4	MISCELLANEOUS TANK DETAILS
5	MISCELLANEOUS TANK DETAILS
6	BOX CULVERT PROFILE
7	TYPE "A" HEADWALL DETAILS
8	TYPE "B" HEADWALL DETAILS

MAYOR:
JERRY REDDING

CITY MANAGER:
RON WHITEHEAD

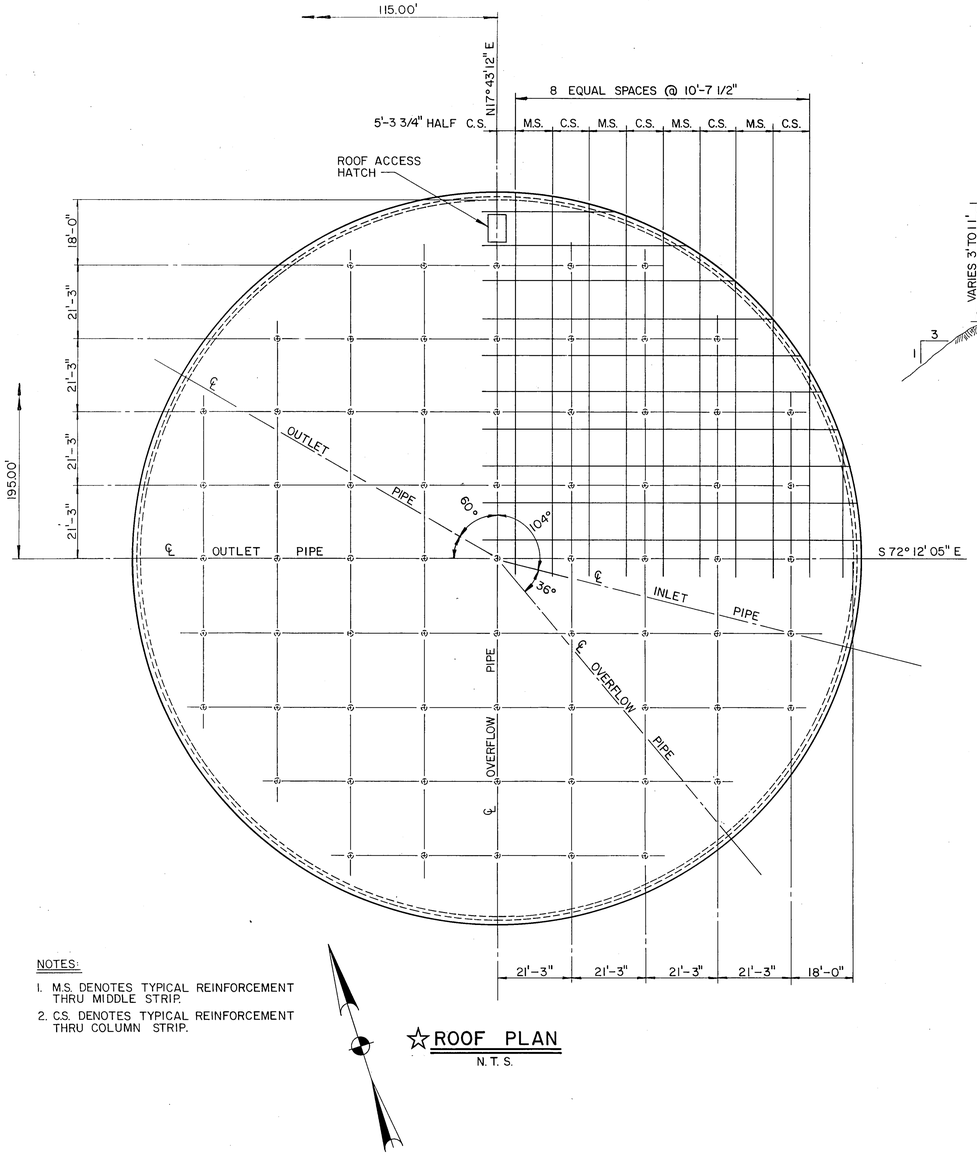
COUNCIL MEMBERS:
STEWART BEATTY
GREG COLE
BARRY FINKELSTEIN
RICHARD RODER
LYNN SPRUILL

RECORD COPY

Appr ved by: _____ Date: 5-8-86
Jerry Redding, Mayor of Addison

STATE OF TEXAS
H. WAYNE GINN
31142
REGISTERED PROFESSIONAL ENGINEER

GINN, INC.
Consulting Engineers Dallas, Texas

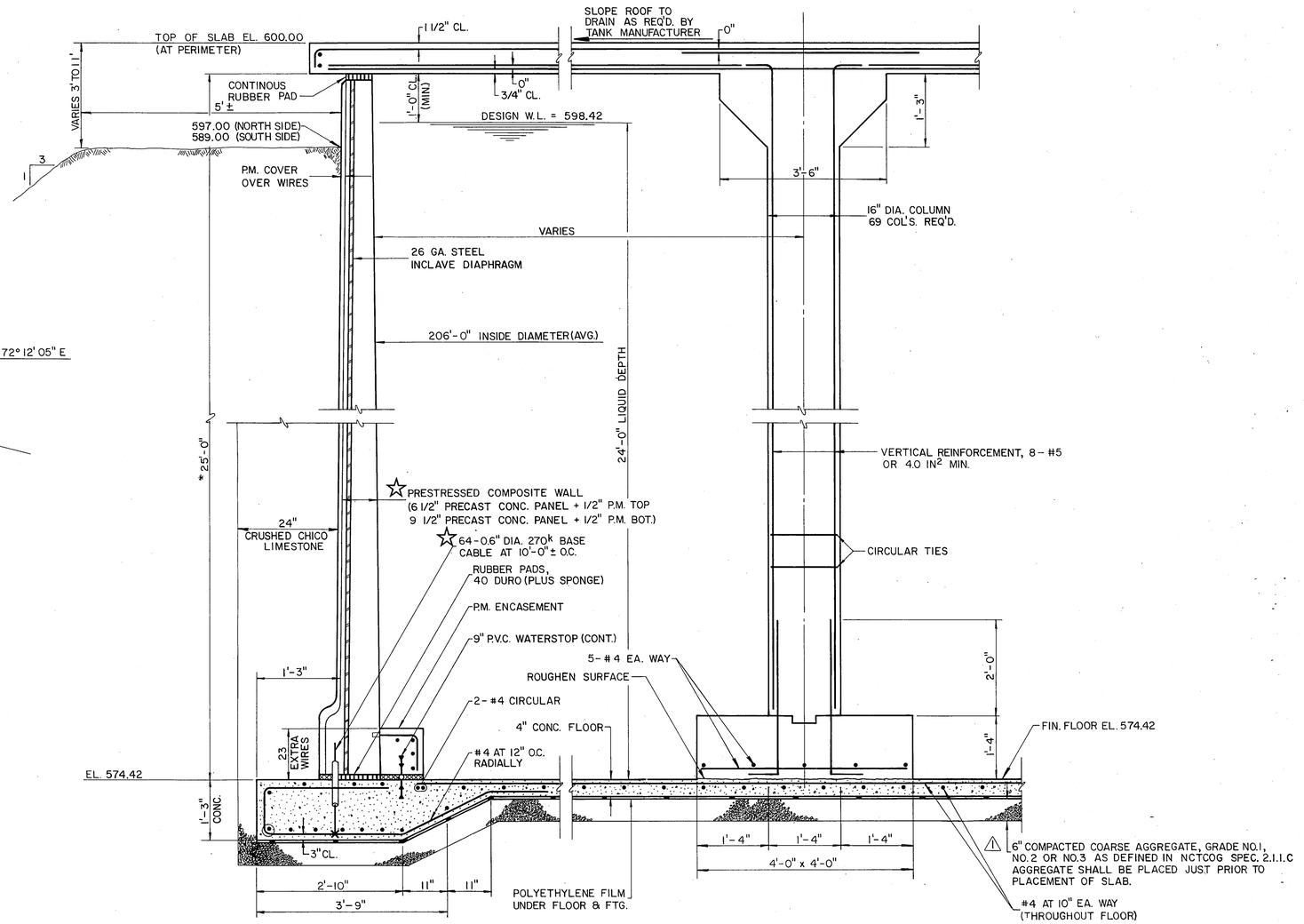


NOTES:

1. M.S. DENOTES TYPICAL REINFORCEMENT THRU MIDDLE STRIP.
2. C.S. DENOTES TYPICAL REINFORCEMENT THRU COLUMN STRIP.

☆ROOF PLAN

N. T. S.



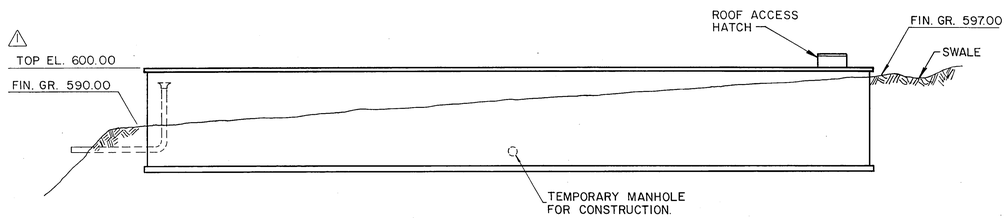
☆SECTION THRU COLUMN STRIP

N.T.S.

* HORIZONTAL PRESTRESSING WIRES AT 150,000 P.S.I. INITIAL AND 120,000 P.S.I. DESIGN STRESS WITH 61 WIRES/FT. AT BOTTOM TO 14 WIRES/FT. AT 6'-0" FROM TOP OF WALL AND 14 WIRES/FT. TO TOP OF WALL.

WIRE DIAMETER BEFORE PRESTRESSING = 0.192"
DIE DIAMETER = 0.164"

NOTE: MAXIMUM SOIL PRESSURE = 10,000 P.S.F.



ELEVATION (LOOKING WEST)

N.T.S.

NOTES:

1. P.M. = PNEUMATIC MORTAR
2. MINIMUM 28 DAY CONCRETE CYLINDER STRENGTHS:

FLOOR, FOOTING & COLUMN FOOTING	3000 P.S.I.
ROOF SLAB	4000 P.S.I.
COLUMN CONCRETE	4000 P.S.I.
☆WALL CONCRETE	4500 P.S.I.
PNEUMATIC MORTAR	4500 P.S.I.

3. ROOF LIVE LOAD = 100 P.S.F.
4. REINFORCING STEEL SHALL CONFORM TO ASTM A-615 GR-60.

STATE OF TEXAS
H. WAYNE GINN
31142
REGISTERED PROFESSIONAL ENGINEER

RECORD COPY

No	Revision	By	Date
⚠	REVISE TOP OF TANK ELEVATIONS	RCH	5-7-86

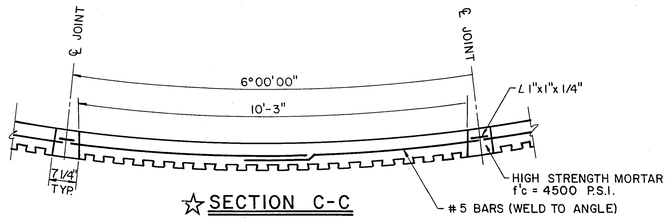
TOWN OF ADDISON
DALLAS COUNTY, TEXAS

6 MG CELESTIAL ROAD STORAGE TANK

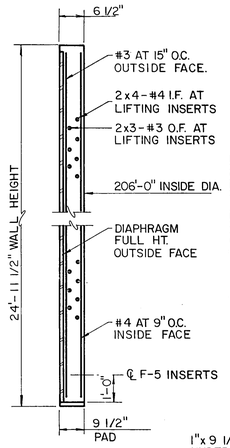
PLAN AND SECTIONS

GINN, INC.
Consulting Engineers Dallas, Texas

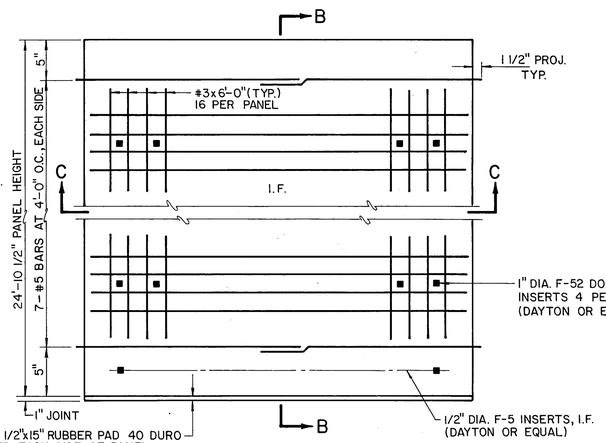
Designed - RCH	Drawn - ALA	Date - FEB. ,1986	Job No. - 215
Approved - HWG	Checked - GF	Scale - AS SHOWN	Sheet 2 Of 8



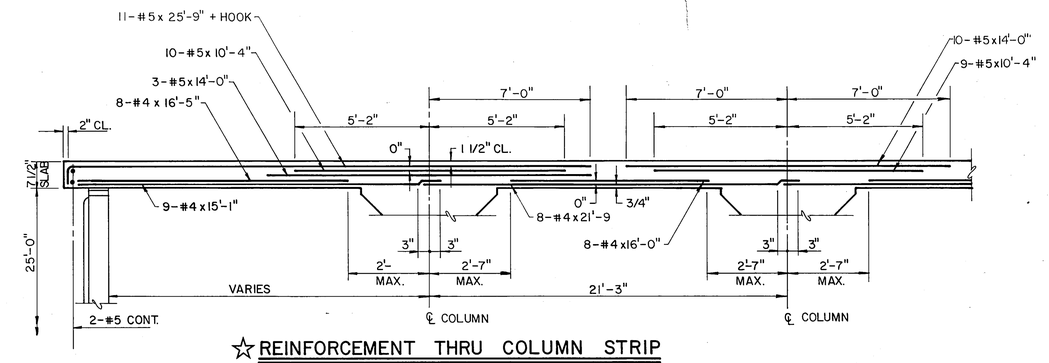
☆SECTION C-C



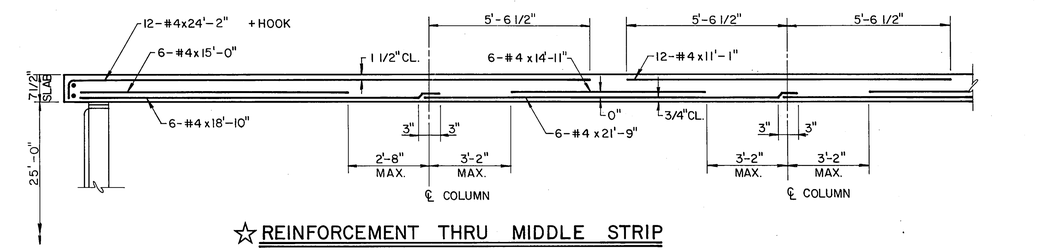
☆SECTION B-B



☆PANEL ELEVATION
☆(60 REQ'D.)

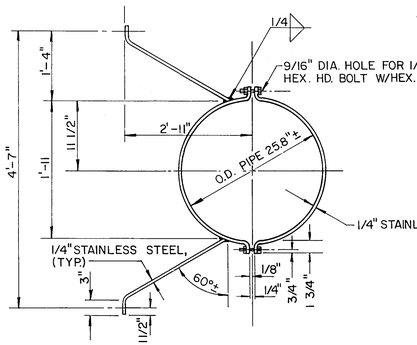


☆REINFORCEMENT THRU COLUMN STRIP

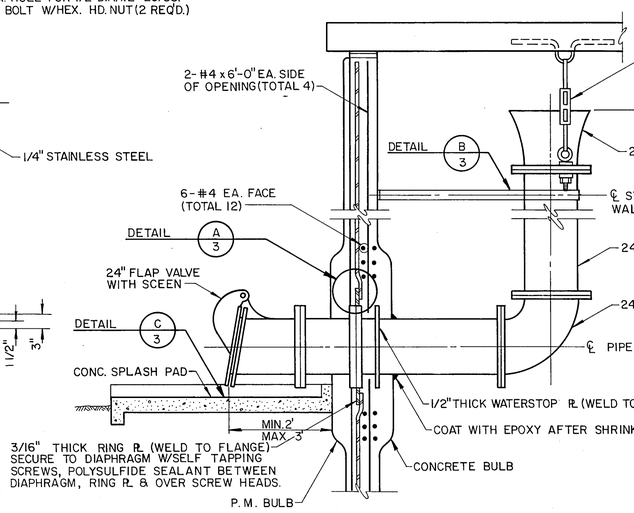


☆REINFORCEMENT THRU MIDDLE STRIP

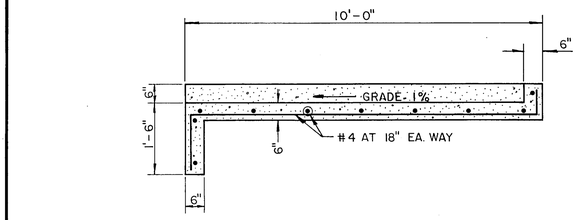
REINFORCEMENT SHOWN IN ONE DIRECTION ONLY FOR CLARITY



DETAIL B 3

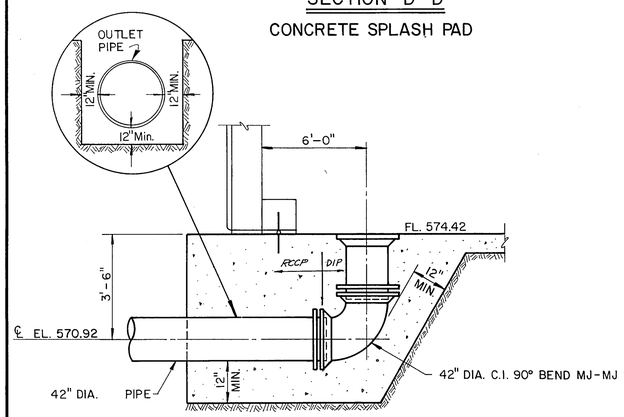


OVERFLOW DETAIL

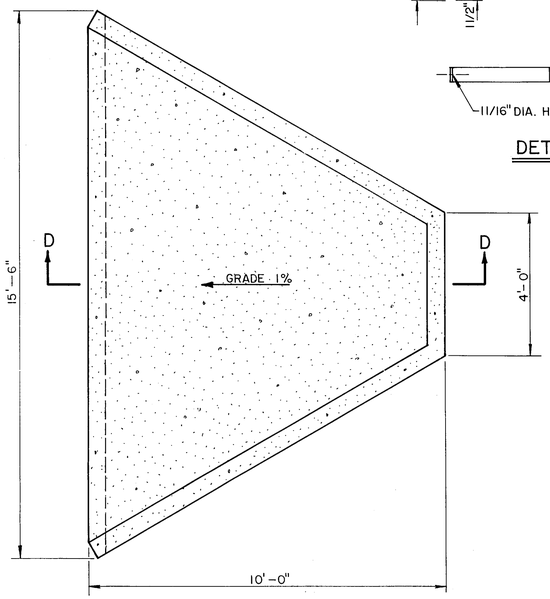


SECTION D-D

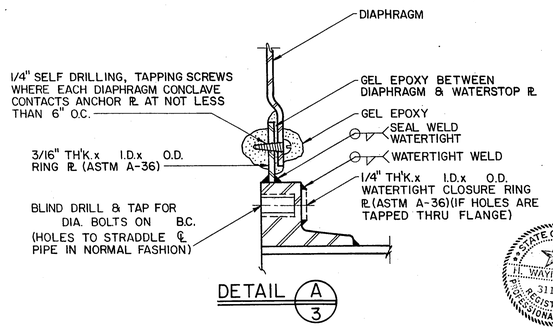
CONCRETE SPLASH PAD



OUTLET PIPE DETAIL



DETAIL C 3



DETAIL A 3

STATE OF TEXAS
WAYNE GINN
31142
REGISTERED PROFESSIONAL ENGINEER

RECORD COPY

No.	Revision	By	Date
1	CLARIFY OUTLET PIPE DETAIL	RCH	5-7-86

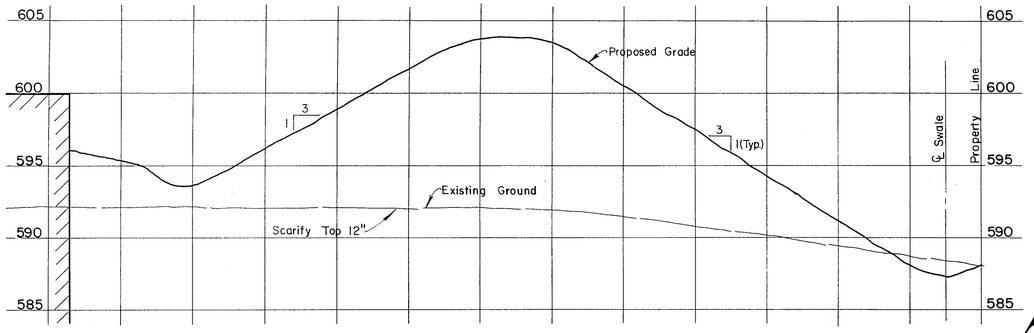
TOWN OF ADDISON
DALLAS COUNTY, TEXAS

6 MG CELESTIAL ROAD STORAGE TANK

MISCELLANEOUS TANK DETAILS

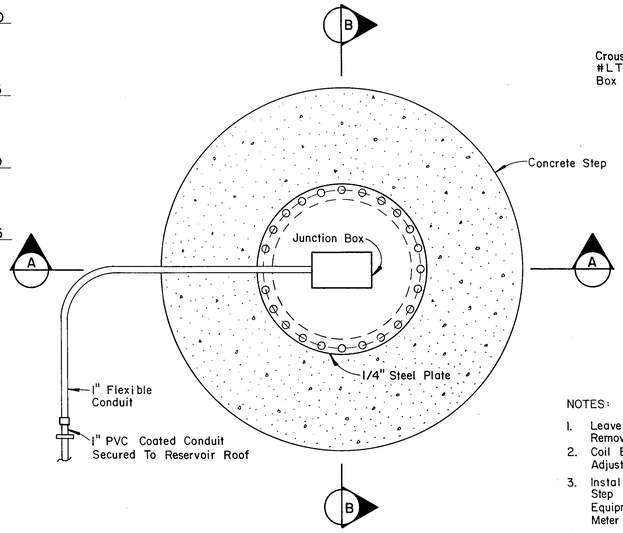
GINN, INC.
Consulting Engineers Dallas, Texas

Designed - RCH	Drawn - ALA	Date - FEB. 1986	Job No. - 215
Approved - HWG	Checked - GF	Scale - NOT TO SCALE	Sheet 3 Of 8



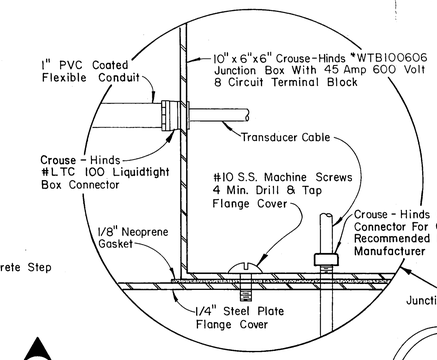
BERM SECTION

Scale: H: 1" = 10'
V: 1" = 5'



PLAN
SONIC LEVEL TRANSMITTER

Scale: 1" = 1'-0"

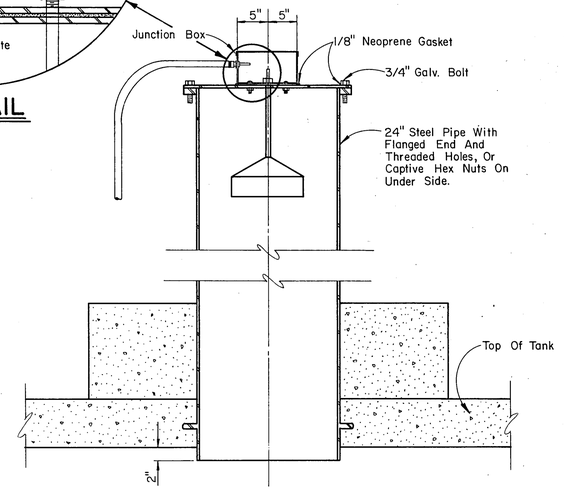


DETAIL

N.T.S.

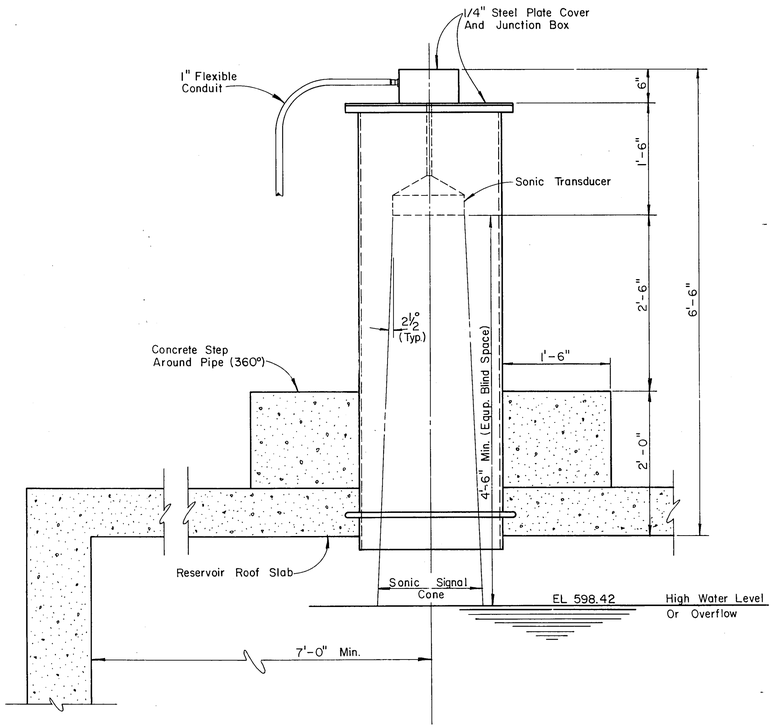
NOTES:

1. Leave Slack In Flexible Conduit For Removal Of Coyer Plate.
2. Coil Excess Cable In Box For Future Adjustments.
3. Installation Of 24" Steel Pipe And Step Will Be By Reservoir Contractor. Equipment Will Be Installed By Meter Vault Contractor.
4. Install Transducer On A Radius Line A Mininium Of 90° From The Inlet And Overflow.



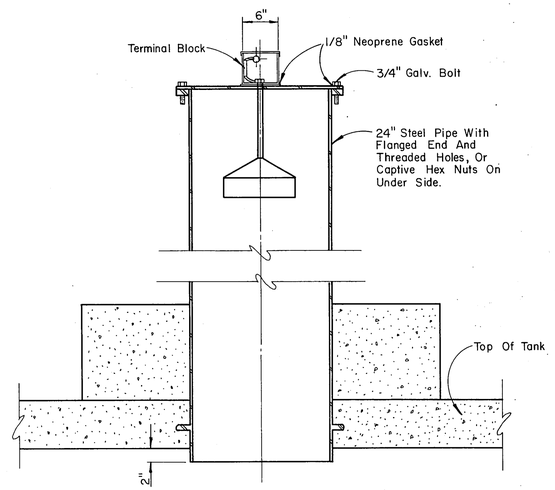
SECTION A-A

Scale: 1" = 1'-0"



ELEVATION

Scale: 1" = 1'-0"



SECTION B-B

Scale: 1" = 1'-0"

RECORD COPY

No	Revision	By	Date
1	SONIC LEVEL TRANSMITTER ADDENDUM #1	RCH	5-7-86

TOWN OF ADDISON
DALLAS COUNTY, TEXAS

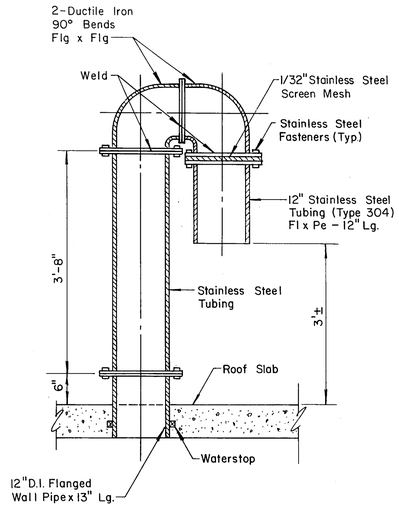
6 MG CELESTIAL ROAD STORAGE TANK

MISCELLANEOUS TANK DETAILS

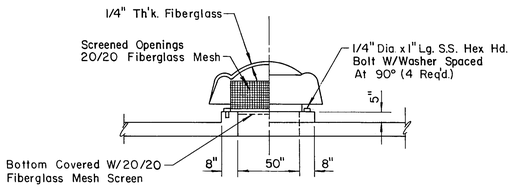
GINN, INC.
Consulting Engineers Dallas, Texas

Designed - RCH	Drawn - ALA	Date - FEB. 1986	Job No. - 215
Approved - HWG	Checked - GF	Scale - AS SHOWN	Sheet 4 Of 8

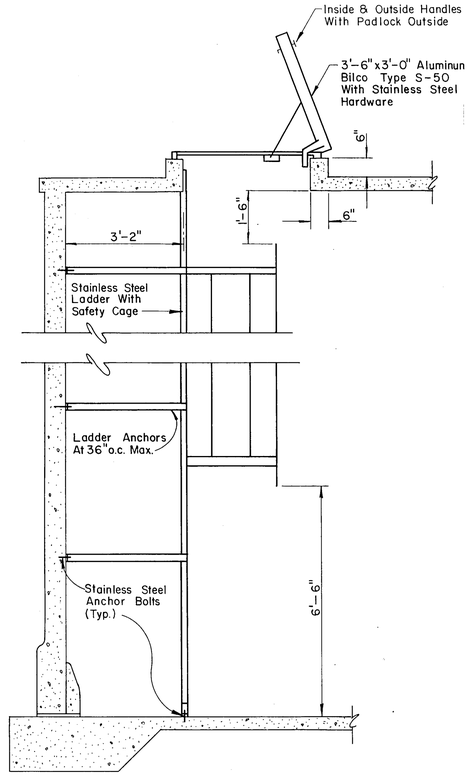
STATE OF TEXAS
H. WAYNE GINN
3114
REGISTERED PROFESSIONAL ENGINEER



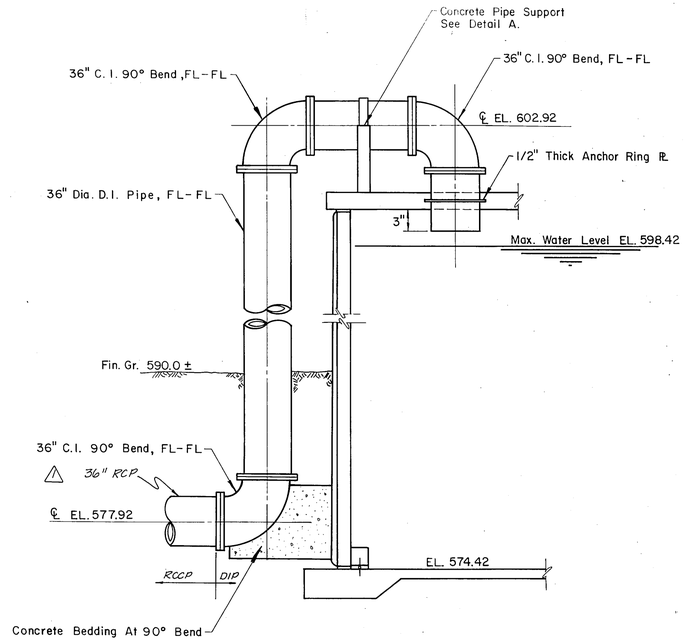
ROOF VENT ALTERNATIVE I



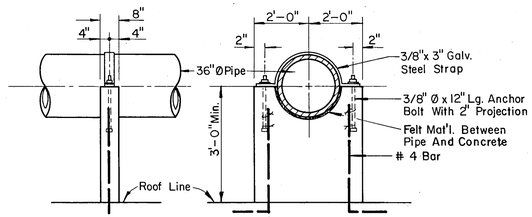
ROOF VENT ALTERNATIVE II



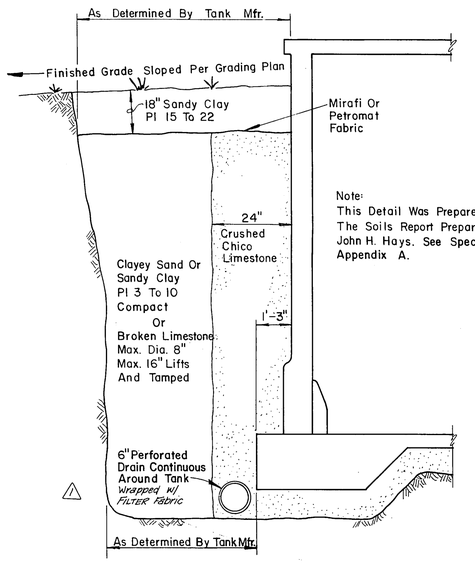
ACCESS LADDER AND HATCH DETAIL



INLET PIPE

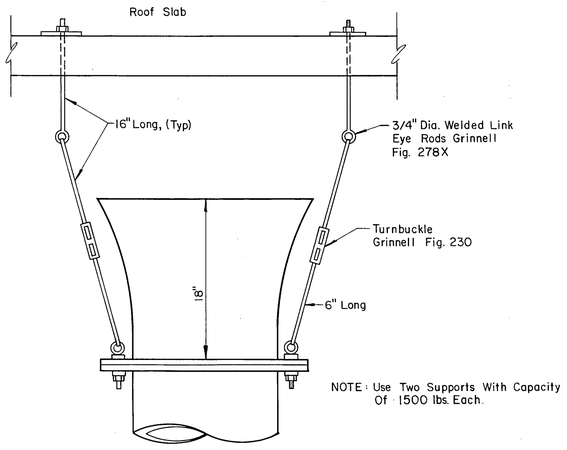


DETAIL A



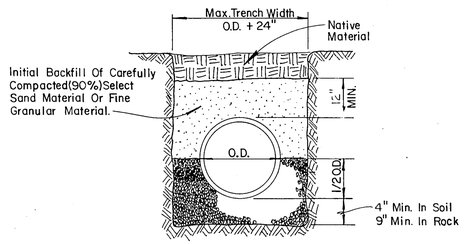
Note:
This Detail Was Prepared From The Soils Report Prepared By John H. Hays. See Specifications Appendix A.

TANK BACKFILL DETAIL



NOTE: Use Two Supports With Capacity Of 1500 lbs. Each.

PIPE SUPPORT



EMBEDMENT DETAIL FOR WATERLINES

RECORD COPY

No.	Revision	By	Date
1	ADDENDUM # 1	RCH	5-7-86

TOWN OF ADDISON
DALLAS COUNTY, TEXAS

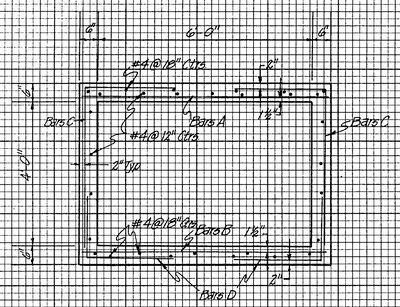
6 MG CELESTIAL ROAD STORAGE TANK

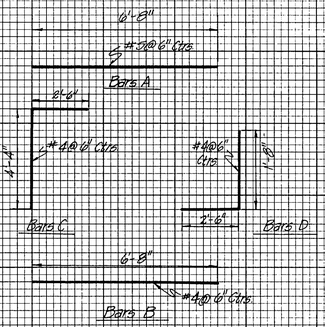
MISCELLANEOUS TANK DETAILS

GINN, INC.
Consulting Engineers Dallas, Texas

Designed - RCH	Drawn - ALA	Date - FEB. 1986	Job No. - 215
Approved - HWG	Checked - GF	Scale - NOT TO SCALE	Sheet 5 Of 8

STATE OF TEXAS
H. WAYNE GINN
81142
REGISTERED PROFESSIONAL ENGINEER





Notes:

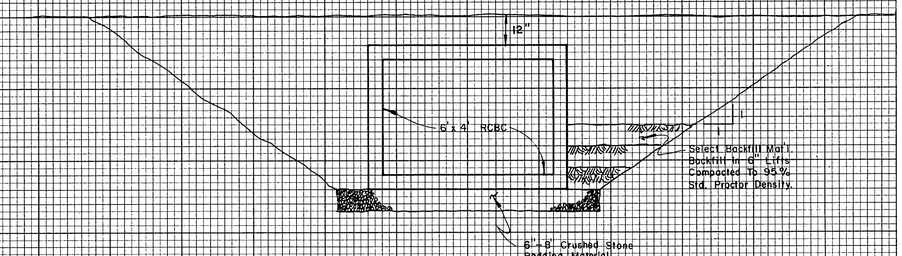
1. Concrete Box Culvert Construction shall Conform to Section 03100 of the Contract Documents.
2. Dimension Relating to Reinforcing Steel are to Centers of Bars.
3. Splices for Longitudinal Steel shall be 21" for #4 Bars.

6' x 4' CAST-IN-PLACE CULVERT

N.T.S.

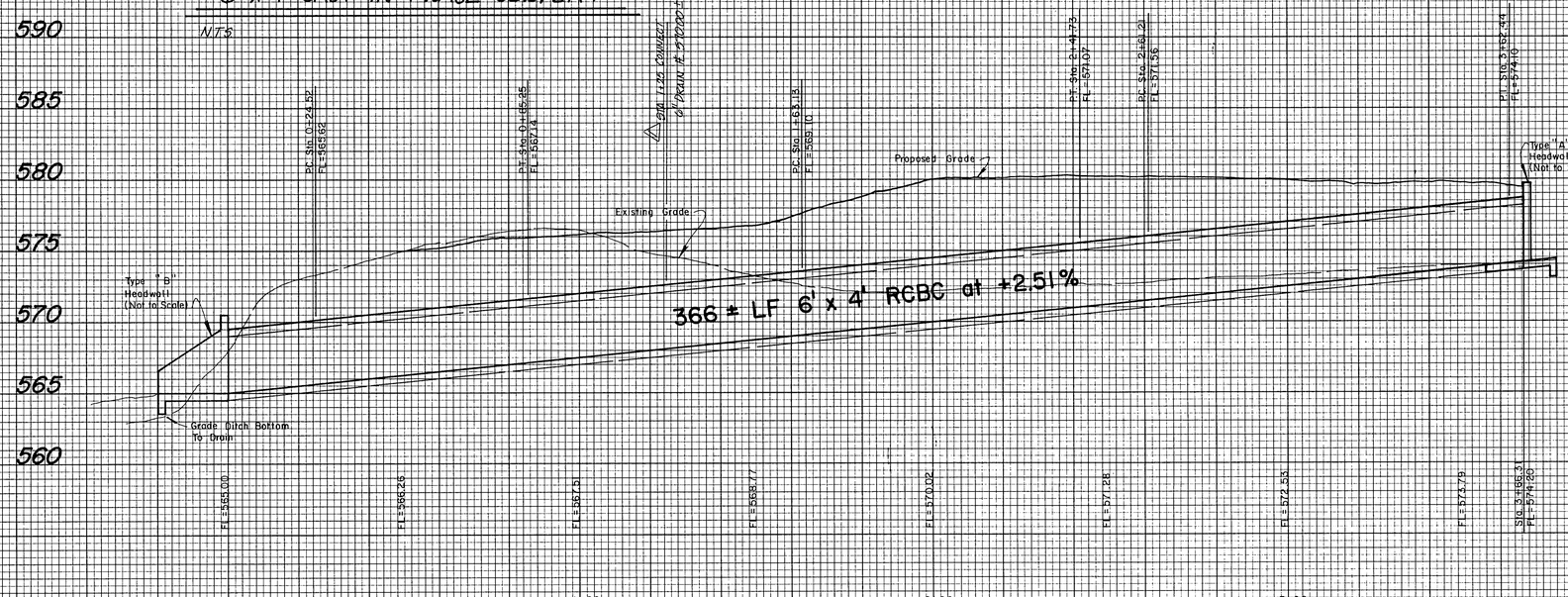
BAR DETAILS

N.T.S.



BACKFILL DETAIL

N. T. S.



RECORD COPY

No.	Revision	By	Date
1	ADD 6" PVC CONNECTION	RCH	6-7-80

TOWN OF ADDISON
DALLAS COUNTY, TEXAS

6 MG CELESTIAL ROAD STORAGE TANK

BOX CULVERT PROFILE

GINN, INC.
Consulting Engineers Dallas, Texas

Designed - RCH	Drawn - ALA	Date -	Job No. - 215
Approved HWG	Checked RCH	Scale - V: 1"=5' H: 1"=20'	Sheet 6 Of 8

FINAL SURVEY — SURVEYED, PLOTTED, NOTE BOOK, NO., TEMPLATE, AREAS, AREAS CHECKED, BY, DATE

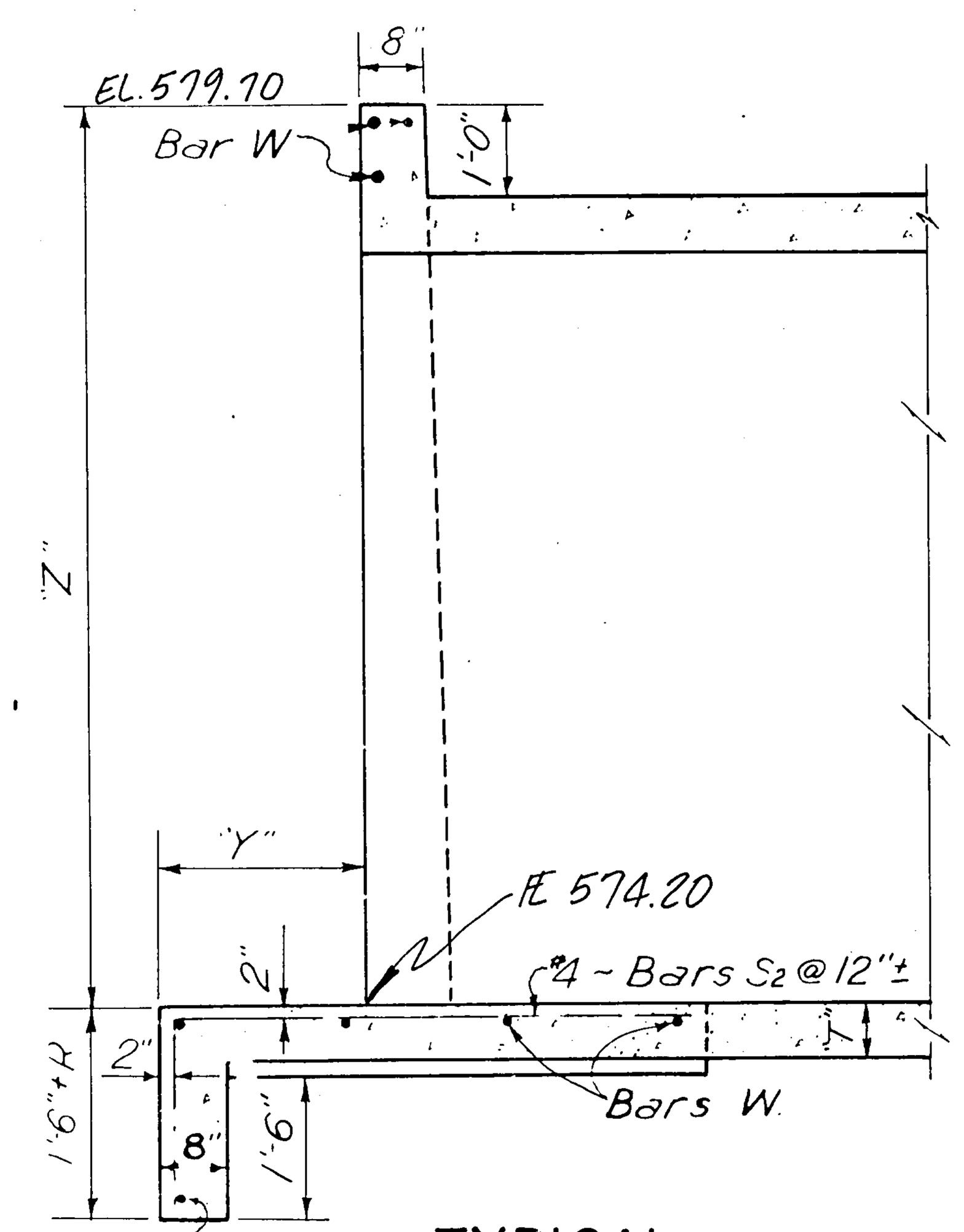
ORIGINAL SURVEY — SURVEYED, PLOTTED, NOTE BOOK, NO., TEMPLATE, AREAS, AREAS CHECKED, BY, DATE

HIGHWAY FEDERAL AID SHEET
PLATE 3-FULL CROSS SECTION-FULL LINE
*TELEDYNE
PRINTED IN U.S.A.

CULVERT SIZE S × H	SLAB DEPTH "T"	MAX FILL FT	WING HEIGHT "Z"	WING LENGTH "L"	TOTAL QUANT. 4 WINGWALLS CONC CY	TOTAL QUANT. 4 WINGWALLS REINF LB	TABLE OF DIMENSIONS "R"	"W"	"V"	"D"	"Y"
3 × 2	6"	14'	3'-6"	5'-3"	4.10	558	6½"	2'-6"	8"	10"	1'-0"
3 × 3	6"	14'	4'-6"	6'-9"	6.11	818	7"	2'-10"	8"	1'-2"	1'-0"
4 × 2	6"	12'	3'-6"	5'-3"	4.21	564	6½"	2'-6"	8"	10"	1'-0"
4 × 3	6"	12'	4'-6"	6'-9"	6.23	824	7"	2'-10"	8"	1'-2"	1'-0"
4 × 4	6"	12'	5'-6"	8'-3"	8.75	1322	7"	3'-5"	8"	1'-7"	1'-2"
5 × 2	6"	8'	3'-6"	5'-3"	4.33	569	7"	2'-6"	8"	10"	1'-0"
5 × 3	6"	8'	4'-6"	6'-9"	6.34	829	7"	2'-10"	8"	1'-2"	1'-0"
5 × 4	6"	8'	5'-6"	8'-3"	8.87	1328	7"	3'-5"	8"	1'-7"	1'-2"
5 × 5	6"	8'	6'-6"	9'-9"	11.86	1876	7"	4'-0"	8"	2'-0"	1'-4"
6 × 3	6"	8'	4'-6"	6'-9"	6.46	835	7"	2'-10"	8"	1'-2"	1'-0"
6 × 4	6"	8'	5'-6"	8'-3"	8.90	1334	7"	3'-5"	8"	1'-7"	1'-2"
6 × 5	6"	8'	6'-6"	9'-9"	11.99	1883	7"	4'-0"	8"	2'-0"	1'-4"
6 × 6	6"	8'	7'-6"	11'-3"	15.56	2616	7"	4'-8"	8"	2'-3"	1'-9"
7 × 3	6½"	8'	4'-6½"	6'-10"	6.68	841	7"	2'-10"	8"	1'-2"	1'-0"
7 × 4	6½"	8'	5'-6½"	8'-4"	9.24	1341	7"	3'-5"	8"	1'-7"	1'-2"
7 × 5	6½"	8'	6'-6½"	9'-10"	12.27	1890	7"	4'-0"	8"	2'-0"	1'-4"
7 × 6	6½"	8'	7'-6½"	11'-4"	15.89	2624	7"	4'-8"	8"	2'-3"	1'-9"
7 × 7	6½"	8'	8'-6½"	12'-10"	21.55	3650	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 4	6½"	4'	5'-6½"	8'-4"	9.36	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	6½"	4'	6'-6½"	9'-10"	12.40	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	6½"	4'	7'-6½"	11'-4"	16.03	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	6½"	4'	8'-6½"	12'-10"	21.70	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	6½"	4'	9'-6½"	14'-4"	28.49	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
8 × 4	7"	6'	5'-7"	8'-4"	9.41	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	7"	6'	6'-7"	9'-10"	12.46	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	7"	6'	7'-7"	11'-4"	16.11	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	7"	6'	8'-7"	12'-10"	21.79	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	7"	6'	9'-7"	14'-4"	28.60	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
8 × 4	7½"	8'	5'-7½"	8'-5"	9.54	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	7½"	8'	6'-7½"	9'-11"	12.61	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	7½"	8'	7'-7½"	11'-5"	16.30	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	7½"	8'	8'-7½"	12'-11"	22.02	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	7½"	8'	9'-7½"	14'-5"	28.88	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
9 × 5	7"	6'	6'-7"	9'-10"	12.59	1904	7"	4'-0"	8"	2'-0"	1'-4"
9 × 6	7"	6'	7'-7"	11'-4"	16.26	2640	7"	4'-8"	8"	2'-3"	1'-9"
9 × 7	7"	6'	8'-7"	12'-10"	21.95	3668	8"	5'-2"	9½"	2'-6½"	1'-10"
9 × 8	7"	6'	9'-7"	14'-4"	28.78	5232	9"	5'-9"	10½"	2'-8½"	2'-2"
9 × 9	7"	6'	10'-7"	15'-10"	37.26	6874	9½"	6'-4"	12½"	2'-10½"	2'-5"
9 × 5	8"	8'	6'-8"	10'-0"	12.90	1904	7"	4'-0"	8"	2'-0"	1'-4"
9 × 6	8"	8'	7'-8"	11'-6"	17.35	2640	7½"	4'-9"	8½"	2'-3½"	1'-9"
9 × 7	8"	8'	8'-8"	13'-0"	23.11	3668	8½"	5'-4"	9½"	2'-7½"	1'-11"
9 × 8	8"	8'	9'-8"	14'-6"	30.73	5232	9½"	6'-0"	11"	2'-11"	2'-2"
9 × 9	8"	8'	10'-8"	16'-0"	38.93	6874	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 5	7"	4'	6'-7"	9'-10"	12.72	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	7"	4'	7'-7"	11'-4"	16.41	2648	7"	4'-8"	8"	2'-3"	1'-9"
10 × 7	7"	4'	8'-7"	12'-10"	22.11	3677	8"	5'-2"	9½"	2'-6½"	1'-10"
10 × 8	7"	4'	9'-7"	14'-4"	28.96	5241	9"	5'-9"	10½"	2'-8½"	2'-2"
10 × 9	7"	4'	10'-7"	15'-10"	37.45	6885	9½"	6'-4"	12½"	2'-10½"	2'-5"
10 × 10	7"	4'	11'-7"	17'-4"	48.02	8740	11"	7'-0"	13½"	3'-2½"	2'-8"
10 × 5	8"	6'	6'-8"	10'-0"	13.04	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	8"	6'	7'-8"	11'-6"	17.51	2648	7½"	4'-9"	8½"	2'-3½"	1'-9"
10 × 7	8"	6'	8'-8"	13'-0"	23.26	3677	8½"	5'-4"	9½"	2'-7½"	1'-11"
10 × 8	8"	6'	9'-8"	14'-6"	30.91	5241	9½"	6'-0"	11"	2'-11"	2'-2"
10 × 9	8"	6'	10'-8"	16'-0"	39.14	6885	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 10	8"	6'	11'-8"	17'-6"	48.80	8740	11"	7'-0"	13½"	3'-2½"	2'-8"
10 × 5	8½"	8'	6'-8½"	10'-1"	13.20	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	8½"	8'	7'-8½"	11'-7"	17.71	2648	7½"	4'-9"	8½"	2'-3½"	1'-9"
10 × 7	8½"	8'	8'-8½"	13'-1"	23.52	3677	8½"	5'-4"	9½"	2'-7½"	1'-11"
10 × 8	8½"	8'	9'-8½"	14'-7"	31.20	5241	9½"	6'-0"	11"	2'-11"	2'-2"
10 × 9	8½"	8'	10'-8½"	16'-1"	39.50	6885	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 10	8½"	8'	11'-8½"	17'-7"	49.18	8740	11"	7'-0"	13½"	3'-2½"	2'-8"

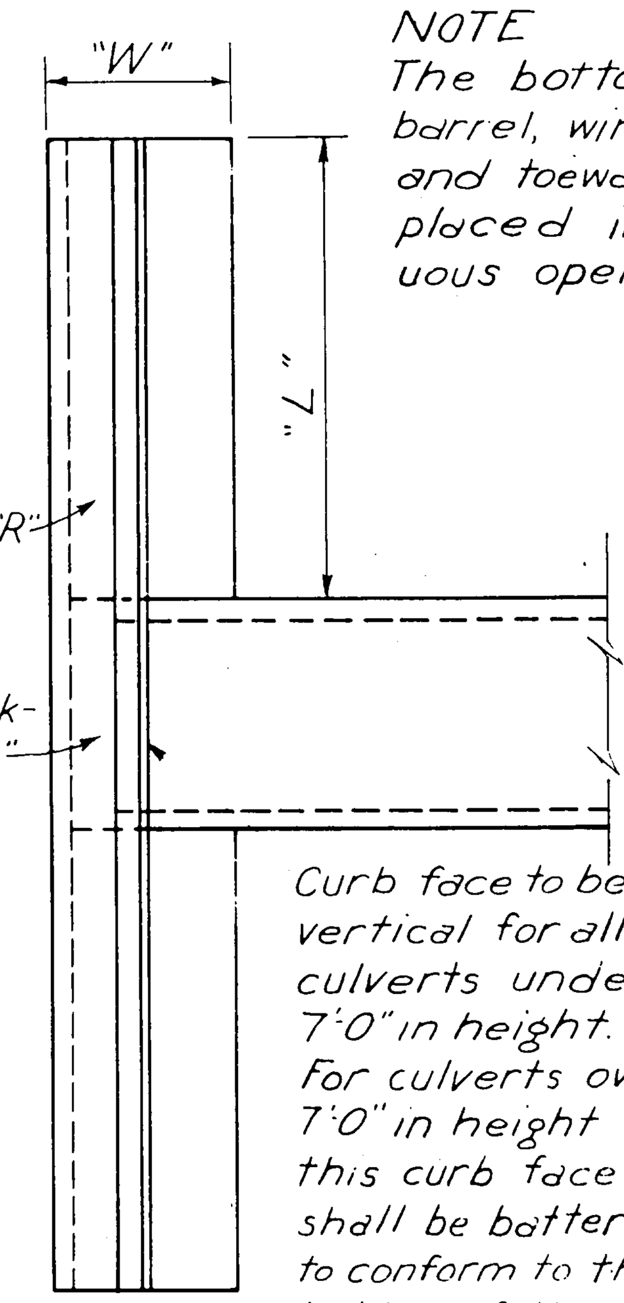
TABLE OF REINFORCING STEEL FOR 4 WING WALLS

WING SIZE "Z"	WING SIZE "L"	BARS R NO	SIZE	SPAC	LENGTH	WEIGHT	BARS S1 NO	SIZE	SPAC	LENGTH	WEIGHT	#4 BARS T1 @18"± NO	LENGTH	WEIGHT	#4 BARS T2 @12"± NO	LENGTH	WEIGHT	BARS U NO	SIZE	SPAC	LENGTH	WEIGHT	#4 Bars P @18" c.c. SPAC	LENGTH	WEIGHT	#4 BARS W @12"± NO	LENGTH	WEIGHT	TOTAL WEIGHT
3'-6"	5'-3"	24	#4	12"	5'-1"	81	24	#4	12"	3'-11"	63	16	5'-0"	53	8	5'-0"	27	16	#5	18"	6'-0"	100	20	3'-9"	50	28	8'-9"	164	538
4'-6"	6'-9"	32	#4	11"	6'-1"	130	32	#4	11"	4'-3"	91	24	6'-6"	104	8	6'-6"	35	24	#5	18"	6'-0"	150	24	4'-9"	76	28	11'-3"	210	796
5'-6"	8'-3"	60	#4	7"	7'-3"	291	60	#4	7"	4'-10"	194	32	8'-0"	171	8	8'-0"	43	32	#5	18"	6'-0"	200	28	5'-9"	108	32	13'-3"	283	1290
6'-6"	9'-9"	56	#5	8½"	8'-5"	492	60	#5	8"	5'-5"	339	32	9'-6"	203	12	9'-6"	76	32	#5	18"	6'-0"	200	32	6'-9"	144	36	15'-9"	379	1833
7'-6"	11'-3"	80	#5	7"	9'-10"	820	80	#5	7"	6'-1"	507	40	11'-0"	294	12	11'-0"	88	40	#5	18"	6'-0"	250	36	7'-9"	186	36	17'-3"	415	2560
8'-6½"	12'-10"	112	#5	5½"	11'-4"	1,324	104	#5	6"	6'-7"	714	48	12'-7"	403	12	12'-7"	101	48	5	18"	6'-0"	300	40"	8'-9"	234	40	18'-11"	505	3581
9'-6½"	14'-4"	108	#6	6½"	12'-9"	2068	116	#6	6"	7'-4"	1277	48	14'-1"	452	16	14'-1"	150	48	5	18"	6'-0"	300	44	9'-9"	287	44	20'-6"	603	5137
10'-7"	15'-10"	140	#6	5½"	14'-4"	3013	140	#8	5½"	7'-11"	1665	56	15'-7"	583	16	15'-7"	167	56	5	18"	6'-0"	350	48	10'-10"	347	44	22'-0"	647	6772
11'-7"	17'-4"	168	#8	5"	15'-9"	3974	168	#6	5"	8'-7"	2165	64	17'-1"	730	16	17'-1"	183	64	5	18"	6'-0"	401	52	11'-10"	411	48	23'-6"	754	8618



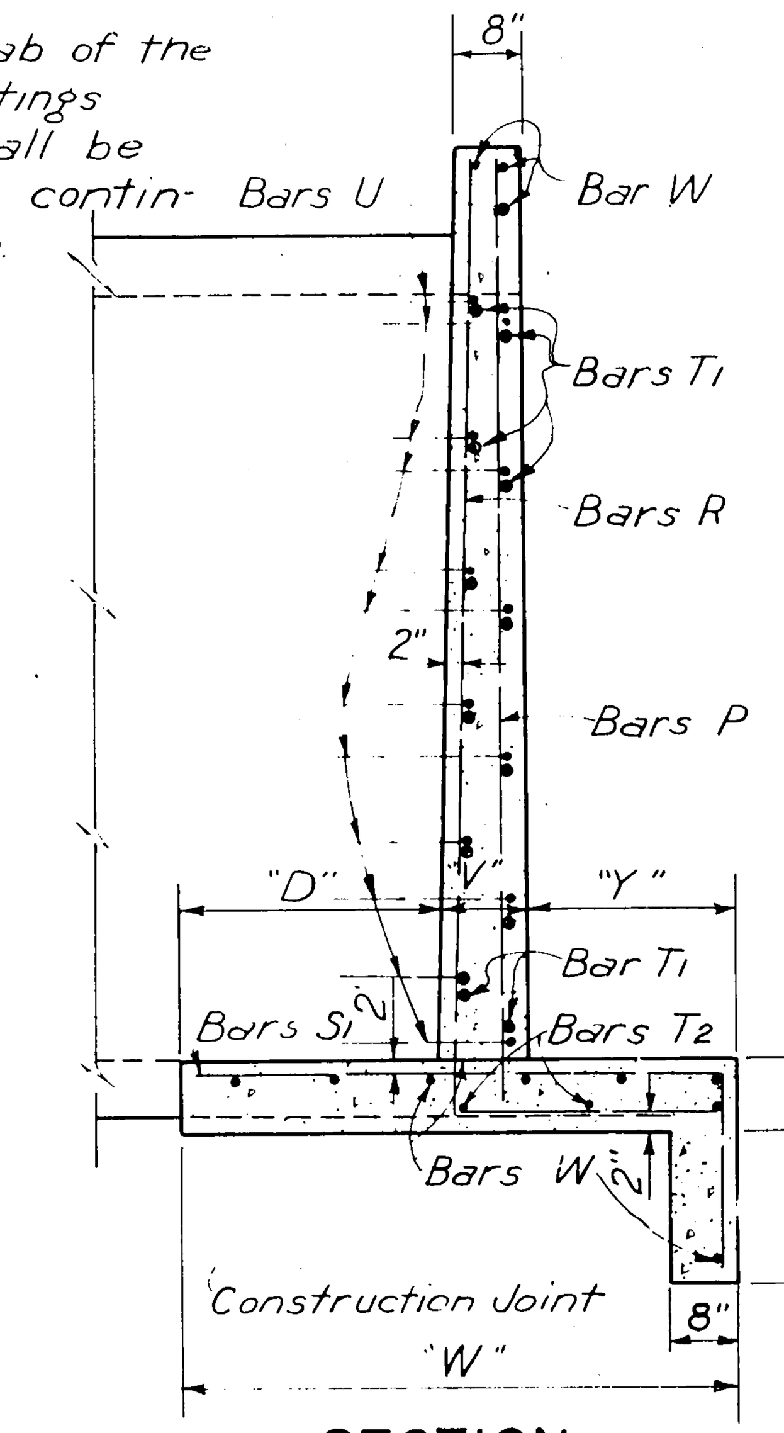
TYPICAL LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON

NOTE The bottom slab of the barrel, wing footings and toewalls shall be placed in one continuous operation.

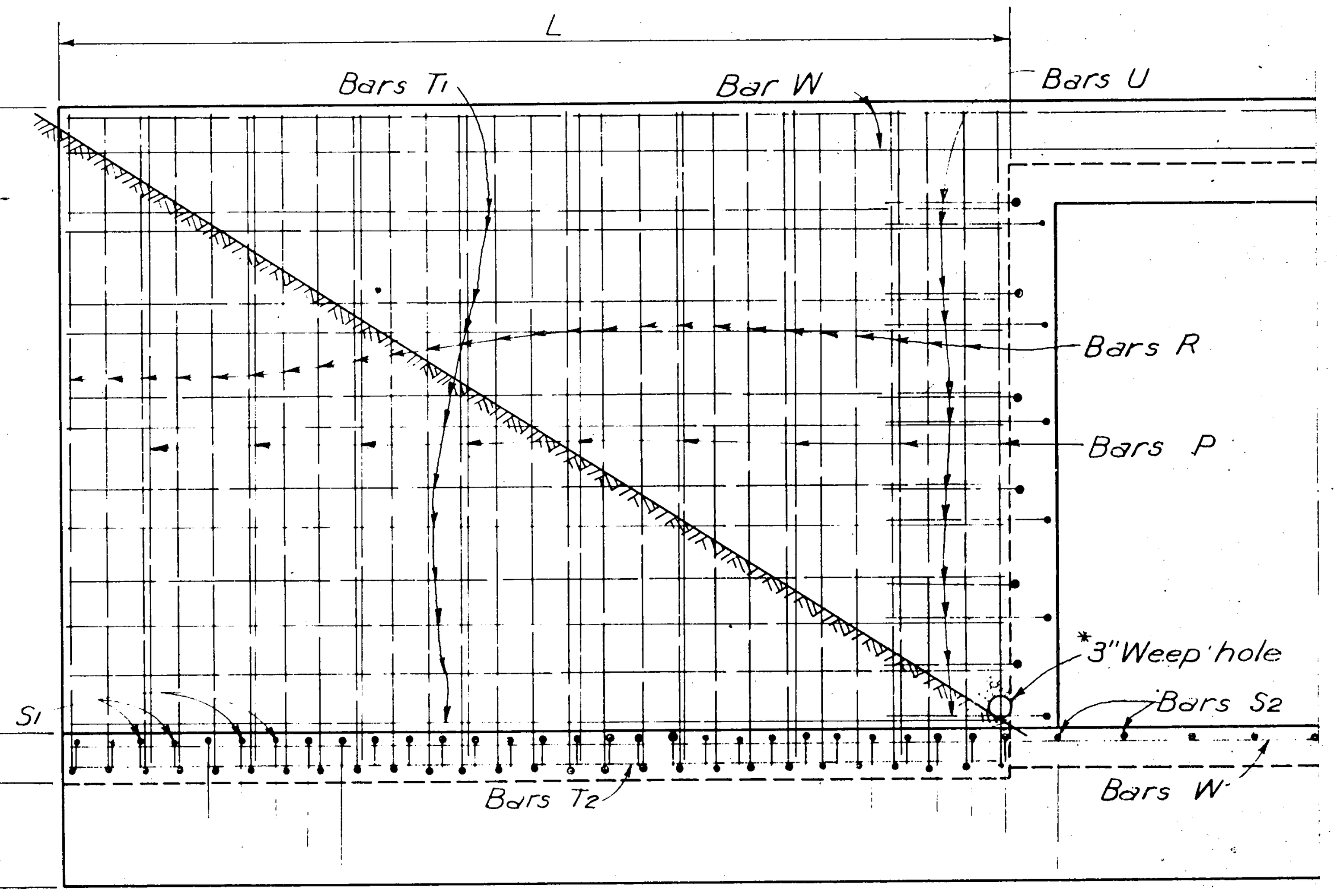


Curb face to be vertical for all culverts under 7'0" in height. For culverts over 7'0" in height this curb face shall be battered to conform to the batter of the wingwall.

PLAN VIEW OF WING WALL



SECTION

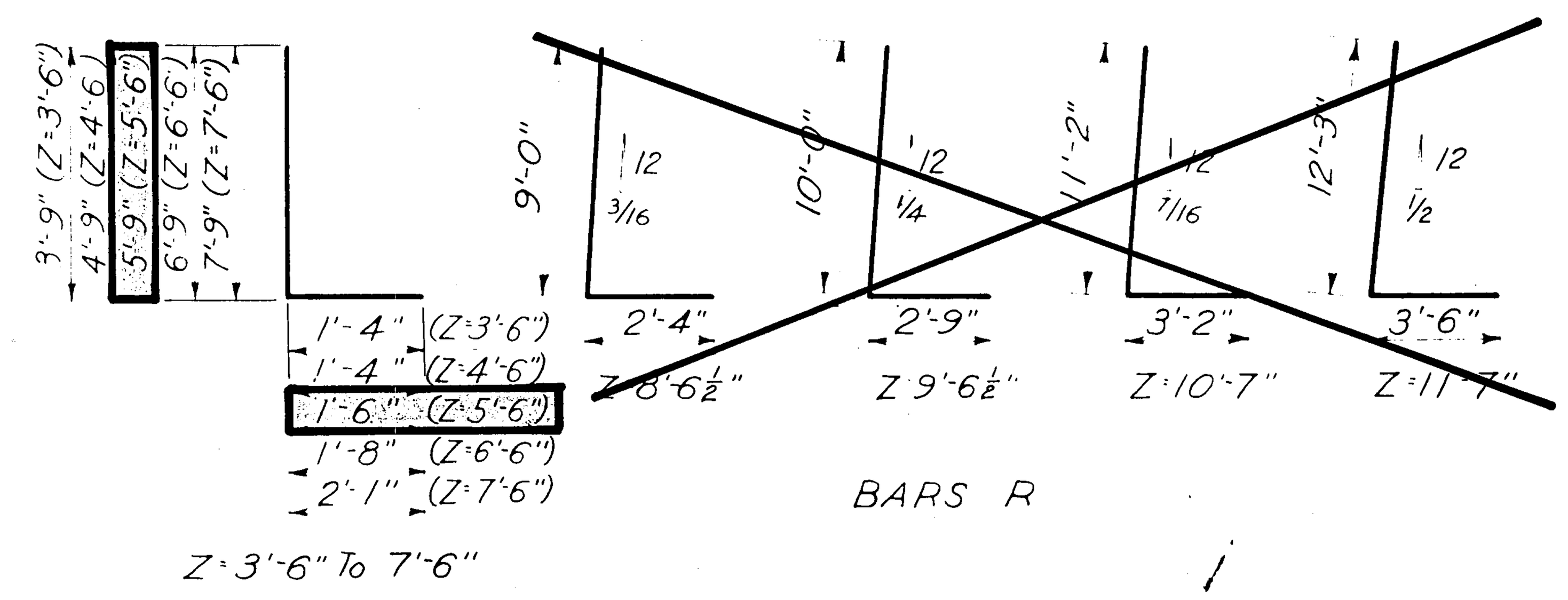


HALF ELEVATION

DETAIL OF WING WALL

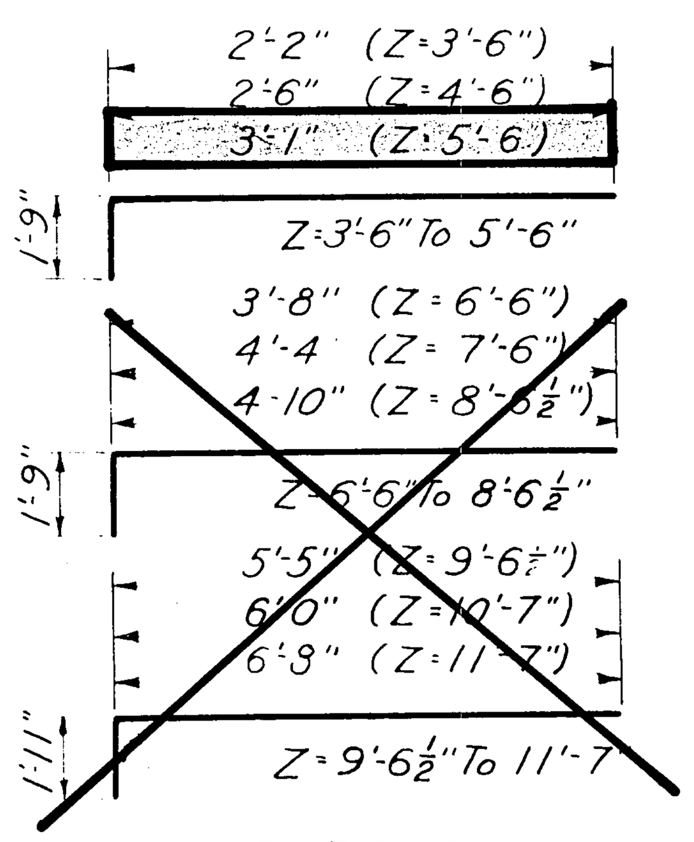
*Place one weep hole per wing at approximate earth line as shown. Fill around inlet of drains with broken stone or coarse gravel to permit free passage of water. Weep holes required for Z=6'-6" and greater.

GENERAL NOTES:
All concrete shall be Class C. Chamfer all exposed corners ¾" unless specified otherwise.
All dimensions relating to reinforcing steel are to centers of bars.

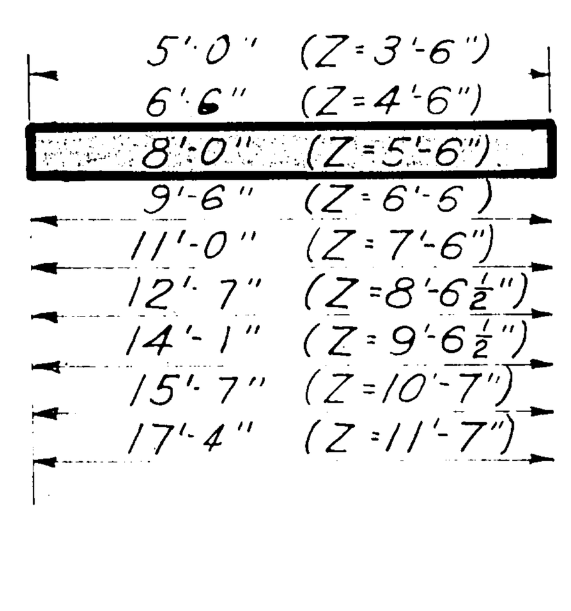


NOTE
Quanties Are For TWO Headwalls
Divide In Half For ONE.

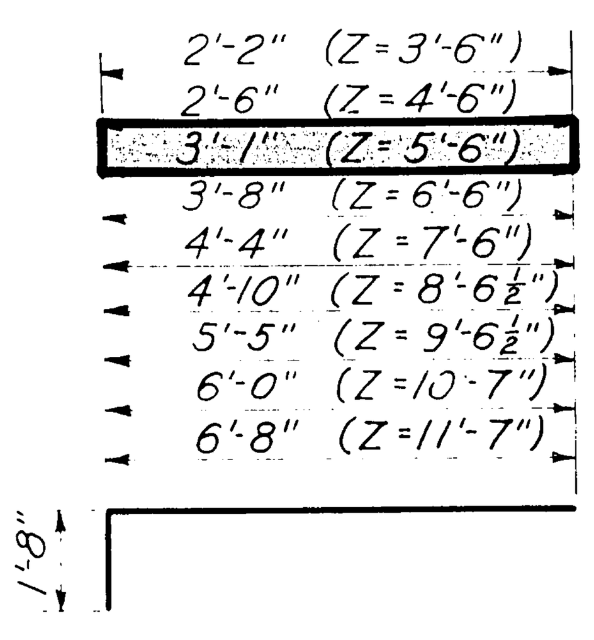
BARS R



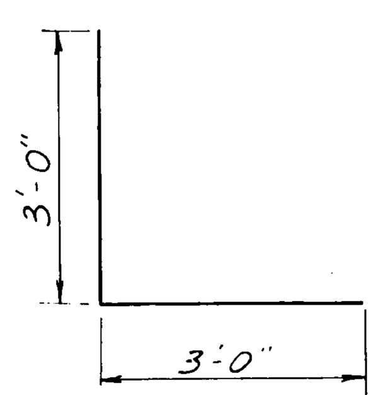
BARS S1



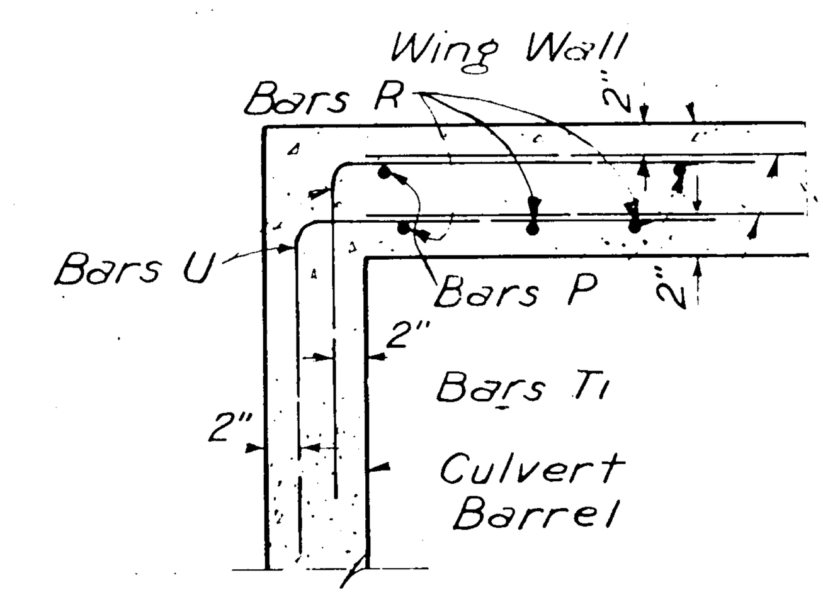
BARS T1



BARS S2 (Culvert Apron)



BARS U



ARRANGEMENT OF WING WALL REINF. AT CULVERT WALL

BILL OF #4 BARS S2 @12"± FOR 2 CULVERT APRONS "Z"	SPAN	NO	LGTH	WEIGHT	"Z"	SPAN	NO	LGTH	WEIGHT
3'-6"	3'-0"	8	3'-10"	20	6'-6"	9'-0"	20	5'-4"	71
	4'-0"	10	3'-10"	26		10'-0"	22	5'-4"	78
	5'-0"	12	3'-10"	31	7'-6"	6'-0"	14	6'-0"	56
4'-6"	3'-0"	8	4'-2"	22		7'-0"	16	6'-0"	64
	4'-0"	10	4'-2"	28		8'-0"	18	6'-0"	72
	5'-0"	12	4'-2"	33		9'-0"	20	6'-0"	80
	6'-0"	14	4'-2"	39		10'-0"	22	6'-0"	88
	7'-0"	16	4'-2"	45	8'-6½"	7'-0"	16	6'-6"	69
5'-6"	4'-0"	10	4'-9"	32		8'-0"	18	6'-6"	78
	5'-0"	12	4'-9"	38		9'-0"	20	6'-6"	87
	6'-0"	14	4'-9"	44		10'-0"	22	6'-6"	96
	7'-0"	16	4'-9"	51	9'-6½"	8'-0"	18	7'-1"	85
	8'-0"	18	4'-9"	57		9'-0"	20	7'-1"	95
6'-6"	5'-0"	12	5'-4"	43		10'-0"	22	7'-1"	104
	6'-0"	14	5'-4"	50	10'-7"	9'-0"	20	7'-8"	102
	7'-0"	16	5'-4"	57		10'-0"	22	7'-8"	113
	8'-0"	18	5'-4"	64	11'-7"	10'-0"	22	8'-4"	122

STATE OF TEXAS
H. WAYNE GINN
31142
REGISTERED PROFESSIONAL ENGINEER

RECORD COPY

TEXAS HIGHWAY DEPARTMENT

TYPE "A" HEADWALL DETAILS

P.W-N

	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
DN C.I.S.E.W.H.	Original	June 1948	6	TEXAS				7 of 8
CK DN W.H.	Rev. Oct 1958		DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
DW ABL	Rev. Jan. 1959			DALLAS			215	
CK DW W.H.	Rev. 1964							
TR ACB								
CK TR WH								

TABLE OF DIMENSIONS

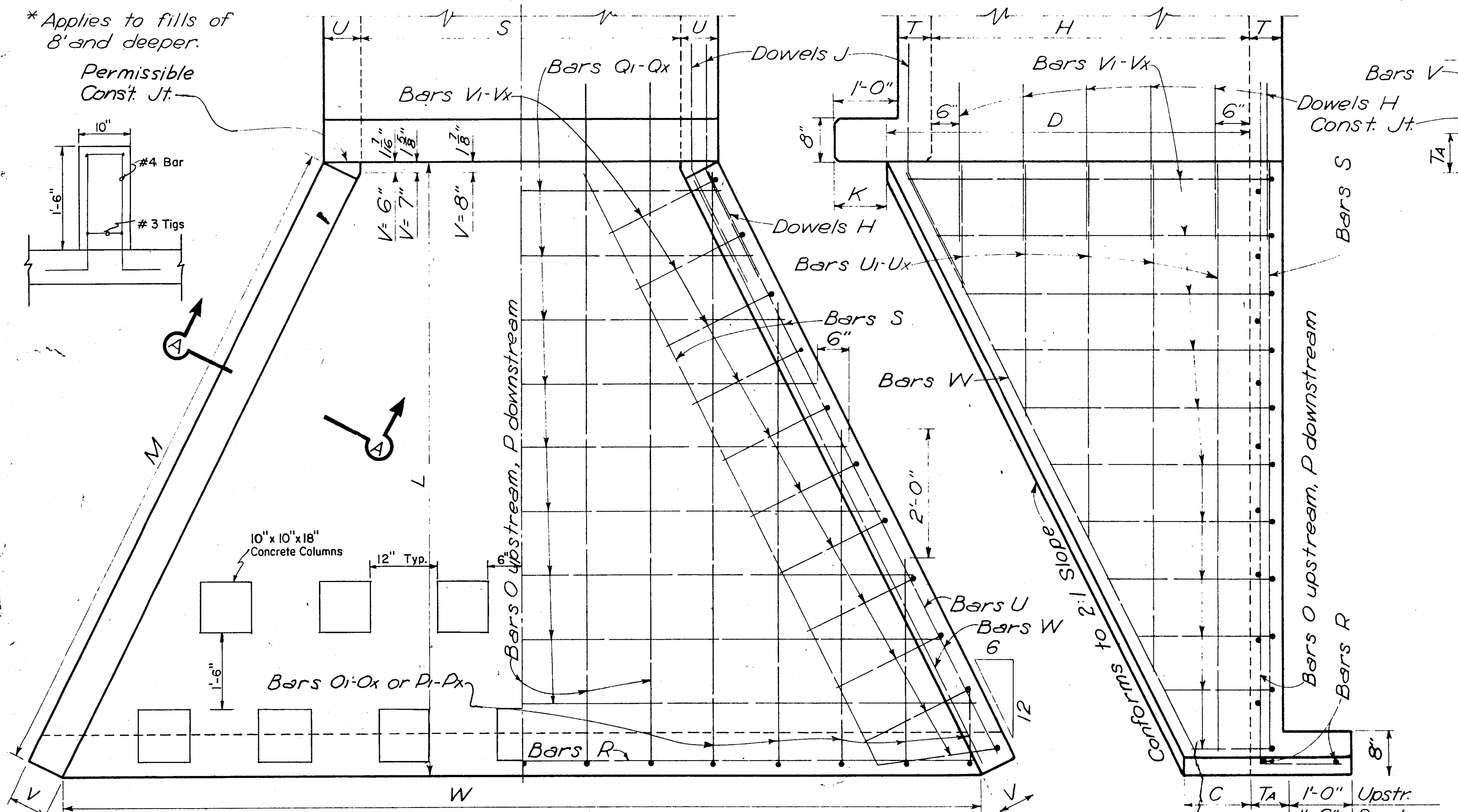
Culvert Size S × H	L	M	V	W	C	D	T_A	Max Fill 4' K	Max Fill 6' K	Max Fill 8'* K	Total Quantities Conc Cu. Yds.	Total Quantities Steel Lbs.
3 × 2	3'-6¾"	3'-8¾"	6"	6'-5¼"	1'-0"	2'-8"	6"	-	-	10"	1.73	241
3 × 3	5'-6¾"	5'-11½"	6"	8'-5¼"	1'-0"	3'-8"	6"	-	-	10"	3.03	371
4 × 2	3'-6¾"	3'-8¾"	6"	7'-5¼"	1'-0"	2'-8"	6"	-	-	10"	1.93	256
4 × 3	5'-6¾"	5'-11½"	6"	9'-5¼"	1'-0"	3'-8"	6"	-	-	10"	3.29	390
4 × 4	7'-6¾"	8'-2⅜"	6"	11'-5¼"	1'-0"	4'-8"	6"	-	-	10"	4.98	558
5 × 2	3'-6¾"	3'-8¾"	6"	8'-5¼"	1'-0"	2'-8"	6"	-	-	10"	2.12	271
5 × 3	5'-6¾"	5'-11½"	6"	10'-5¼"	1'-0"	3'-8"	6"	-	-	10"	3.56	410
5 × 4	7'-6¾"	8'-2⅜"	6"	12'-5¼"	1'-0"	4'-8"	6"	-	-	10"	5.32	583
5 × 5	8'-7⅛"	9'-3¾"	7"	13'-5½"	1'-6"	5'-8"	6"	-	-	10"	7.17	728
6 × 3	5'-6¾"	5'-11½"	6"	11'-5¼"	1'-0"	3'-8"	6"	-	10"	10"	3.83	432
6 × 4	7'-6¾"	8'-2⅜"	6"	13'-5¼"	1'-0"	4'-8	6"	-	10"	10"	5.66	610
6 × 5	8'-7⅛"	9'-3¾"	7	14'-5½"	1'-6"	5'-8"	6"	-	10"	10"	7.55	757
6 × 6	10'-7⅛"	11'-6⅝"	7"	16'-5½"	1'-6"	6'-8"	6"	-	10"	10"	10.13	972
7 × 3	5'-7¾"	6'-0⅝"	6"	12'-6¼"	1'-0"	3'-8½	6½"	10"	10"	10"	4.36	465
7 × 4	7'-7¾"	8'-3½"	6"	14'-6¼"	1'-0"	4'-8½"	6½"	10"	10"	10"	6.37	642
7 × 5	8'-8⅛"	9'-4⅞"	7"	15'-6½"	1'-6"	5'-8½"	6½"	10"	10"	10"	8.37	792
7 × 6	10'-8⅛"	11'-7¾"	7"	17'-6½"	1'-6"	6'-8½"	6½"	10"	10"	10"	11.15	1014
7 × 7	12'-8⅛"	13'-10⅝"	7"	19'-6½"	1'-6"	7'-8½"	6½"	10"	10"	10"	14.28	1372
8 × 4	7'-8¾"	8'-4⅝"	6"	15'-7¼"	1'-0"	4'-9"	7"	9½"	10"	10½"	7.14	671
8 × 5	8'-9⅛"	9'-6"	7"	16'-7½"	1'-6"	5'-9"	7"	9½"	10"	10½"	9.26	828
8 × 6	10'-9⅛"	11'-8⅞"	7"	18'-7½"	1'-6"	6'-9"	7"	9½"	10"	10½"	12.25	1053
8 × 7	12'-9⅛"	13'-11¾"	7"	20'-7½"	1'-6"	7'-9"	7"	9½"	10"	10½"	15.60	1385
8 × 8	13'-9⅝"	15'-1⅛"	8"	21'-7¾"	2'-0"	8'-9"	7"	9½"	10"	10½"	19.25	1818
9 × 5	8'-10⅛"	9'-7⅛"	7"	17'-8½"	1'-6"	5'-9½"	7"	9½"	9½"	10"	9.82	858
9 × 6	10'-10⅛"	11'-10"	7"	19'-8½"	1'-6"	6'-9½"	7"	9½"	9½"	10"	12.91	1106
9 × 7	12'-10⅛"	14'-0⅞"	7"	21'-8½"	1'-6"	7'-9½"	7"	9½"	9½"	10"	16.36	1428
9 × 8	13'-10⅝"	15'-2¼"	8"	22'-8¾"	2'-0"	8'-9½"	7"	9½"	9½"	10"	20.09	1894
9 × 9	15'-10⅝"	17'-5⅛"	8"	24'-8¾"	2'-0"	9'-9½"	7"	9½"	9½"	10"	24.47	2563
10 × 5	8'-11⅛"	9'-8¼"	7"	18'-9½"	1'-6"	5'-10"	7½"	9"	10"	10½"	10.82	894
10 × 6	10'-11⅛"	11'-11⅛"	7"	20'-9½"	1'-6"	6'-10"	7½"	9"	10"	10½"	14.14	1149
10 × 7	12'-11⅛"	14'-1⅞"	7"	22'-9½"	1'-6"	7'-10"	7½"	9"	10"	10½"	17.84	1479
10 × 8	13'-11⅝"	15'-3⅜"	8"	23'-9¾"	2'-0"	8'-10"	7½"	9"	10"	10½"	21.72	1849
10 × 9	15'-11⅝"	17'-6⅛"	8"	25'-9¾"	2'-0"	9'-10"	7½"	9"	10"	10½"	26.36	2626
10 × 10	17'-11⅝"	19'-9"	8"	27'-9¾"	2'-0"	10'-10"	7½"	9"	10"	10½"	31.41	3744

TABLE OF REINFORCING STEEL FOR 2 WINGS

Culvert Size S × H	Bars H-#4 2'-6" Long @12" No.	Wt.	Bars J-#6 4'-0" Long No.	Wt.	Bars O #4 @ 12" No.	Lgth.	Wt.	Bars O_1-Ox #4 @ 12" No.	Av. Lgth.	Wt.	Bars P #4 @ 12" No.	Lgth.	Wt.	Bars P_1-Px #4 @ 12" No.	Av. Lgth.	Wt.
3 × 2	12	20	8	48	3	5'-11"	12	4	3'-6"	9	3	6'-5"	13	4	4'-0"	11
3 × 3	16	27	8	48	3	7'-11"	16	6	4'-6"	18	3	8'-5"	17	6	5'-0"	20
4 × 2	12	20	8	48	4	5'-11"	16	4	3'-6"	9	4	6'-5"	17	4	4'-0"	11
4 × 3	16	27	8	48	4	7'-11"	21	6	4'-6"	18	4	8'-5"	22	6	5'-0"	20
4 × 4	20	33	8	48	4	9'-11"	26	8	5'-6"	29	4	10'-5"	28	8	6'-0"	32
5 × 2	12	20	8	48	5	5'-11"	20	4	3'-6"	9	5	6'-5"	21	4	4'-0"	11
5 × 3	16	27	8	48	5	7'-11"	26	6	4'-6"	18	5	8'-5"	28	6	5'-0"	20
5 × 4	20	33	8	48	5	9'-11"	33	8	5'-6"	29	5	10'-5"	35	8	6'-0"	32
5 × 5	24	40	8	48	5	10'-11"	36	8	6'-6"	35	5	11'-5"	38	8	7'-0"	37
6 × 3	16	27	8	48	6	7'-11"	32	6	4'-6"	18	6	8'-5"	34	6	5'-0"	20
6 × 4	20	33	8	48	6	9'-11"	40	8	5'-6"	29	6	10'-5"	42	8	6'-0"	32
6 × 5	24	40	8	48	6	10'-11"	44	8	6'-6"	35	6	11'-5"	46	8	7'-0"	37
6 × 6	28	47	8	48	6	12'-11"	52	10	7'-6"	50	6	13'-5"	54	10	8'-0"	53
7 × 3	16	27	8	48	7	8'-0"	37	6	4'-7"	18	7	8'-6"	40	6	5'-1"	20
7 × 4	20	33	8	48	7	10'-0"	47	8	5'-7"	30	7	10'-6"	49	8	6'-1"	33
7 × 5	24	40	8	48	7	11'-0"	51	8	6'-7"	35	7	11'-6"	54	8	7'-1"	38
7 × 6	28	47	8	48	7	13'-0"	61	10	7'-7"	51	7	13'-6"	63	10	8'-1"	54
7 × 7	32	53	8	48	7	15'-0"	70	12	8'-7"	69	7	15'-6"	72	12	9'-1"	73
8 × 4	20	33	8	48	8	10'-1"	54	8	5'-8"	30	8	10'-7"	57	8	6'-2"	33
8 × 5	24	40	8	48	8	11'-1"	59	8	6'-8"	36	8	11'-7"	62	8	7'-2"	38
8 × 6	28	47	8	48	8	13'-1"	70	10	7'-8"	51	8	13'-7"	73	10	8'-2"	55
8 × 7	32	53	8	48	8	15'-1"	81	12	8'-8"	69	8	15'-7"	83	12	9'-2"	73
8 × 8	36	60	8	48	8	16'-2"	86	12	9'-9"	78	8	16'-8"	89	12	10'-3"	82
9 × 5	24	40	8	48	9	11'-2"	67	8	6'-9"	36	9	11'-8"	70	8	7'-3"	39
9 × 6	28	47	8	48	9	13'-2"	79	10	7'-9"	52	9	13'-8"	82	10	8'-3"	55
9 × 7	32	53	8	48	9	15'-2"	91	12	8'-9"	70	9	15'-8"	94	12	9'-3"	74
9 × 8	36	60	8	48	9	16'-3"	98	14	8'-10"	83	9	16'-9"	101	14	9'-4"	87
9 × 9	40	67	8	48	9	18'-3"	110	16	9'-10"	105	9	18'-9"	113	16	10'-4"	110
10 × 5	24	40	8	48	10	11'-3"	75	8	6'-10"	37	10	11'-9"	78	8	7'-4"	39
10 × 6	28	47	8	48	10	13'-3"	89	10	7'-10"	52	10	13'-9"	92	10	8'-4"	56
10 × 7	32	53	8	48	10	15'-3"	102	12	8'-10"	71	10	15'-9"	105	12	9'-4"	75
10 × 8	36	60	8	48	10	16'-4"	109	14	8'-11"	83	10	16'-10"	112	14	9'-5"	88
10 × 9	40	67	8	48	10	18'-4"	122	16	9'-11"	106	10	18'-10"	126	16	10'-5"	111
10 × 10	44	73	8	48	10	20'-4"	136	18	10'-11"	131	10	20'-10"	139	18	11'-5"	137

Culvert Size S × H	Bars Q_1-Qx #4 @ 12" No.	Av. Lgth.	Wt.	Bars R 4-#4 Lgth.	Wt.	Bars S 8-#4 Lgth.	Wt.	Bars U #4 No.	Av. Lgth.	Wt.	Bars V_1-Vx No.	Size	Spac.	Av. Lgth.	Wt.	8 Bars W Size	Lgth.	Wt.
3 × 2	6	5'-0"	20	6'-6"	17	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20
3 × 3	10	6'-0"	40	8'-6"	23	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33
4 × 2	6	6'-0"	24	7'-6"	20	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20
4 × 3	10	7'-0"	47	9'-6"	25	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33
4 × 4	14	8'-0"	75	11'-6"	31	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46
5 × 2	6	7'-0"	28	8'-6"	23	3'-5"	18	8	3'-1"	16	16	#4	12"	3'-6"	37	#4	3'-9"	20
5 × 3	10	8'-0"	53	10'-6"	28	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33
5 × 4	14	9'-0"	84	12'-6"	33	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46
5 × 5	16	9'-6"	102	13'-6"	36	9'-0"	48	20	6'-6"	87	40	#4	12"	5'-3"	140	#5	9'-8"	81
6 × 3	10	9'-0"	60	11'-6"	31	5'-8"	30	12	4'-4"	35	24	#4	12"	4'-0"	64	#4	6'-3"	33
6 × 4	14	10'-0"	94	13'-6"	36	7'-10"	42	16	5'-7"	60	36	#4	12"	4'-6"	108	#4	8'-7"	46
6 × 5	16	10'-6"	112	14'-6"	39	9'-0"	48	20	6'-6"	87	40	#4	12"	5'-3"	140	#5	9'-8"	81
6 × 6	20	11'-6"	154	16'-6"	44	11'-3"	60	24	7'-8"	123	48	#4	12"	5'-9"	184	#5	12'-4"	103
7 × 3	10	10'-0"	67	12'-7"	34	5'-8"	30	12	4'-4"	35	28	#4	12"	4'-1"	76	#4	6'-3"	33
7 × 4	14	11'-0"	103	14'-7"	39	8'-0"	43	16	5'-7"	60	36	#4	12"	4'-7"	110	#4	8'-9"	47
7 × 5	16	11'-6"	123	15'-7"	42	9'-1"	49	20	6'-6"	87	40	#4	12"	5'-4"	142	#5	9'-11"	83
7 × 6	20	12'-6"	167	17'-7"	47	11'-4"	61	24	7'-9"	124	48	#4	12"	5'-10"	187	#5	12'-5"	104
7 × 7	24	13'-6"	216	19'-7"	52	13'-7"	73	28	8'-11"	167	84	#4	8"	6'-4"	355	#5	14'-11"	124
8 × 4	14	12'-0"	112	15'-8"	42	8'-1"	43	16	5'-7"	60	36	#4	12"	4'-8"	112	#4	8'-10"	47
8 × 5	16	12'-6"	134	16'-8"	45	9'-2"	49	20	6'-7"	88	40	#4	12"	5'-5"	145	#5	10'-1"	84
8 × 6	20	13'-6"	180	18'-8"	50	11'-5"	61	24	7'-9"	124	48	#4	12"	5'-11"	190	#5	12'-6"	104
8 × 7	24	14'-6"	232	20'-8"	55	13'-8"	73	28	8'-11"	167	76	#4	9"	6'-5"	326	#5	15'-0"	125
8 × 8	26	15'-0"	261	21'-8"	58	14'-9"	79	32	9'-9"	208	120	#4	6"	7'-2"	575	#6	16'-2"	194
9 × 5	16	13'-6"	144	17'-9"	47	9'-3"	49	20	6'-7"	88	40	#4	12"	5'-5"	145	#5	10'-2"	85
9 × 6	20	14'-6"	194	19'-9"	53	11'-6"	61	24	7'-9"	124	52	#4	12"	5'-11"	206	#5	12'-7"	105
9 × 7	24	15'-6"	248	21'-9"	58	13'-9"	73	28	8'-11"	167	76	#4	9"	6'-5"	326	#5	15'-1"	126
9 × 8	26	16'-0"	278	22'-9"	61	14'-10"	79	32	9'-10"	210	124	#4	6"	7'-2"	594	#6	16'-3"	195
9 × 9	30	17'-0"	341	24'-9"	66	17'-1"	91	36	11'-0"	265	120	#5	7"	8'-2"	1022	#6	18'-9"	225
10 × 5	16	14'-6"	155	18'-10"	50	9'-4"	50	20	6'-8"	89	40	#4	12"	5'-6"	147	#5	10'-3"	86
10 × 6	20	15'-6"	207	20'-10"	56	11'-7"	62	24	7'-10"	126	52	#4	12"	6'-0"	208	#5	12'-8"	106
10 × 7	24	16'-6"	265	22'-10"	61	13'-10"	74	28	9'-0"	168	76	#4	9"	6'-6"	330	#5	15'-2"	127
10 × 8	26	17'-0"	295	23'-10"	64	14'-11"	80	32	9'-10"	210	104	#4	7"	7'-3"	504	#6	16'-4"	196
10 × 9	30	18'-0"	361	25'-10"	69	17'-2"	92	36	11'-0"	265	120	#5	7"	8'-3"	1033	#6	18'-10"	226
10 × 10	34	19'-0"	432	27'-10"	74	19'-5"	104	40	12'-2"	325	136	#6	7"	9'-3"	1890	#6	21'-3"	255

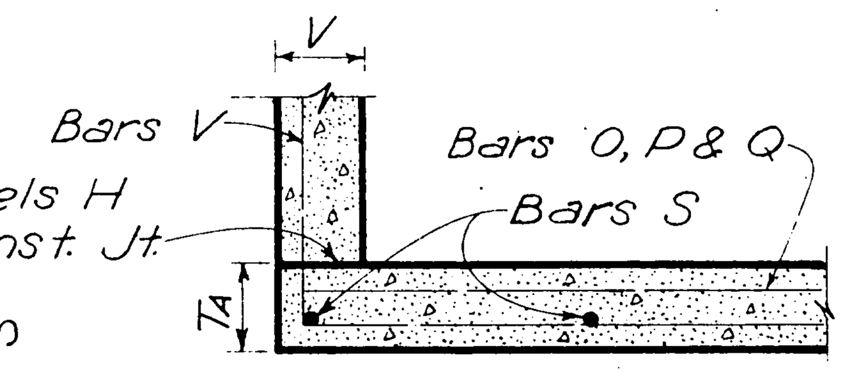
* Applies to fills of 8' and deeper.



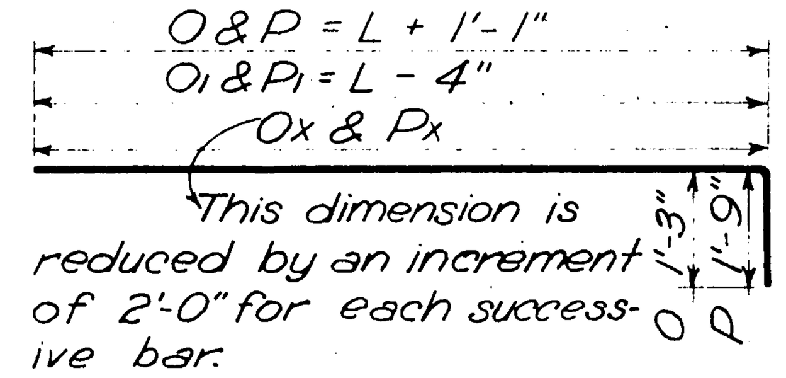
HALF PLAN SHOWING DIMENSIONS

HALF PLAN SHOWING REINFORCING BARS

ELEVATION PARALLEL TO BARREL



SECTION A-A

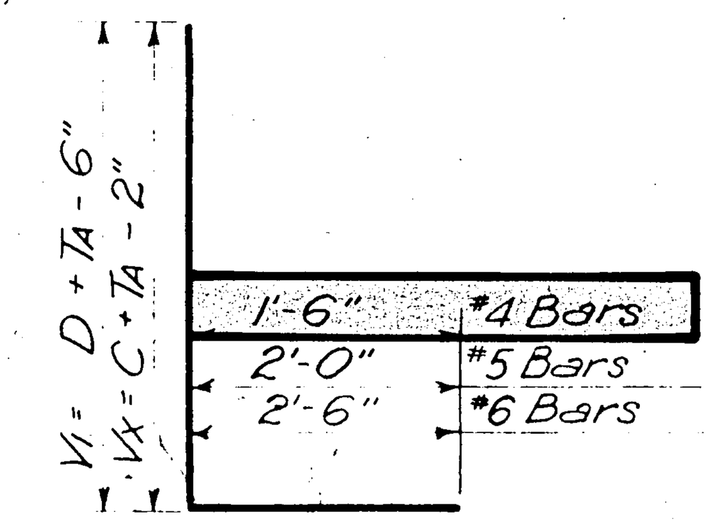


BARS O & P

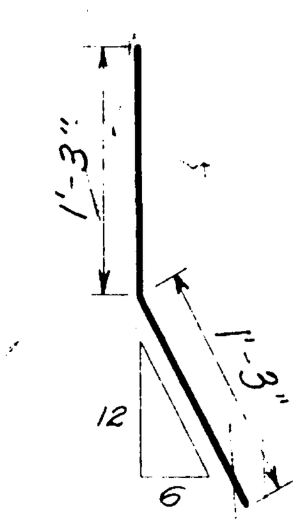
Q1 = S + 1'-0"
Qx
This dimension is increased by an increment of 1'-0" for each successive bar.

BARS Q

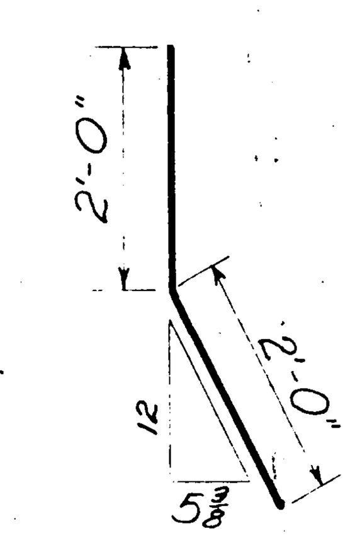
U1 = 2'-6"
U2 thru U(x-1) or (x-2)
Ux = M - 2"
This dimension is increased by an increment of 2'-2¾" for each successive bar.



BARS V



DOWELS H



DOWELS J

GENERAL NOTES:
All concrete shall be Class A.
Dimensions relating to reinforcing steel are to centers of bars.
Steel cover to be 2" from center of outside layer of steel to face of concrete.
Chamfer exposed corners ¾" except as otherwise noted.

STATE OF TEXAS — H. WAYNE GINN — 31142 — REGISTERED PROFESSIONAL ENGINEER

RECORD COPY

TEXAS HIGHWAY DEPARTMENT

TYPE "B" HEADWALL DETAILS

FW-N

	Drawing	Date
Dn.: RMM	Original	April, 1948
Ck. Dn.: W.H.		
Dw.: RMM	Rev. Oct. 1959	
Ck. Dw.: A.B.L.	Rev. Jan 1959	
Tr.: ABP	Rev. Nov. 1961	
Ck. Tr.: RMM	Rev. Nov. 1967	

Fed. Road Div. No. 6 — State: Texas — Federal Aid Project No. — Sheet No. 8 of 8 — State Dist. No. — County — Control Section No. — Job No. — Highway No. — 215

6 MG CELESTIAL ROAD STORAGE TANK