FED. ROAD DIST. NO	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	1	

4003 W

COLORADO
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED
A.W. PROJECT NO. 4003
STATE HIGHWAY NO. 6
PROWERS COUNTY

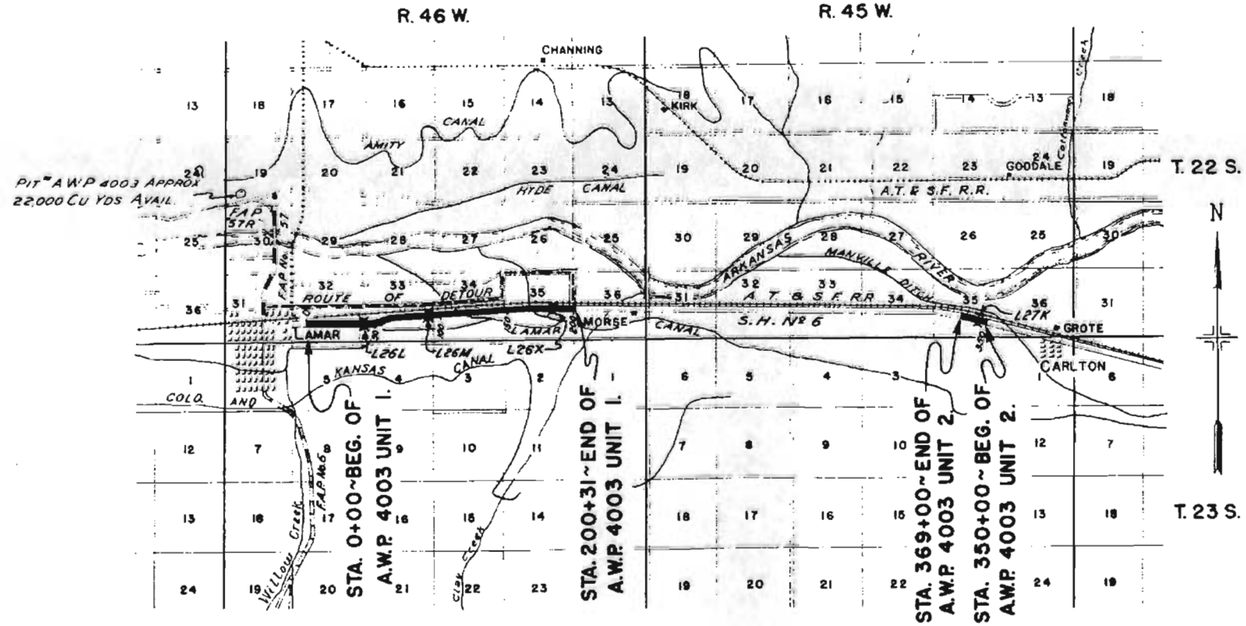
SCALES OF ORIGINAL TRACINGS
ON PLAN, 1 IN. = 100 FT.
ON PROFILE 1 IN. = 100 FT. HORIZONTAL
1 IN. = 10 FT. VERTICAL
GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD

UNIT 1	GROSS LENGTH OF PROJECT, NET LENGTH OF PROJECT	20,031.0 FEET = 3.793 MILES
UNIT 2	GROSS LENGTH OF PROJECT, NET LENGTH OF PROJECT	1900.0 FEET = 0.359 MILES

INDEX OF SHEETS

CONVENTIONAL SIGNS

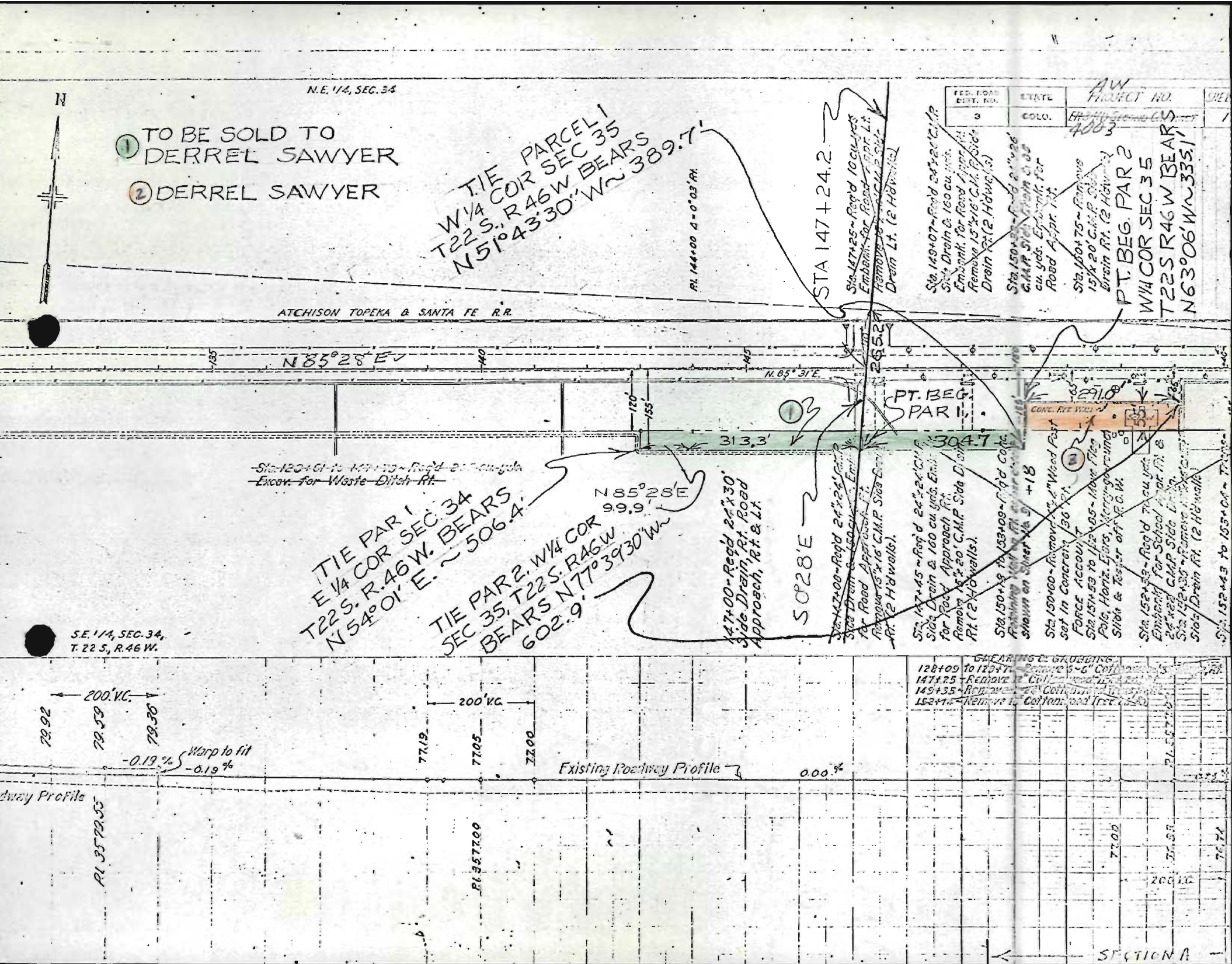
CENTER LINE OF SURVEY 200
RIGHT OF WAY LINES
TOWNSHIP OR RANGE LINES
SECTION LINES
ONE QUARTER SECTION LINES
BARBED WIRE FENCE
TELEPHONE LINES
POWER LINES

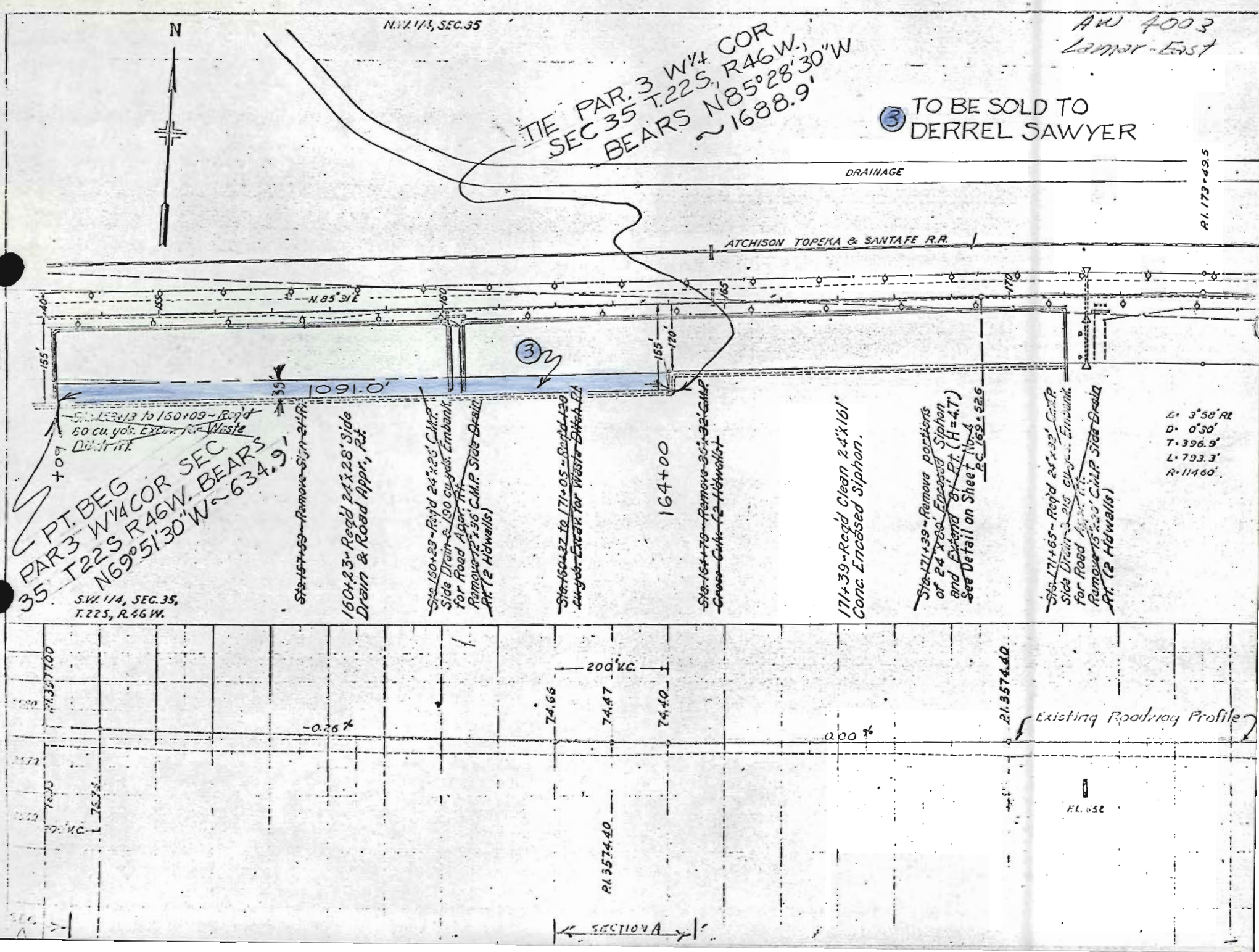


NOTE
It is recommended that bidders on this Project go over the plan details with one of the following field representatives of this department:

J.D. Bell	Division Engineer	Pueblo
L.A. Rose	Resident Engineer	Lamar

RECOMMENDED FOR APPROVAL 10/15/56
ASSISTANT ENGINEER
APPROVED
STATE HIGHWAY ENGINEER

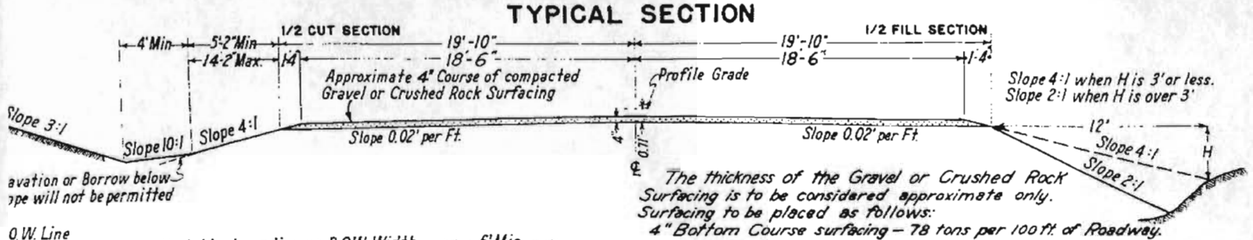

N.E. 1/4, SEC. 34
N
① TO BE SOLD TO DERREL SAWYER
② DERREL SAWYER
TIE PARCEL 1 W1/4 COR SEC 35 T22S. R46W BEARS N51°43'30"W~389.7'
ATCHISON TOPEKA & SANTA FE R.R.
N85°28'E
N.85°31'E.
PT. BEG. PAR 1
PT. BEG. PAR 2 W1/4 COR SEC 35 T22S R46W BEARS N63°06'W~335.1'
313.3'
304.7'
291.0'
265.2'
STA 147+24.2
TIE PAR 1 E1/4 COR SEC. 34 T22S. R.46W. BEARS N54°01'E.~506.4'
TIE PAR 2. W1/4 COR SEC. 35, T22S. R46W BEARS N77°39'30"W~602.9'
N85°28'E 99.9'
S0°28'E
Excav. for Waste Ditch Rt.
S.E. 1/4, SEC. 34, T. 22 S., R.46 W.
200' V.C.
200' V.C.
-0.19 %
Warp to fit
-0.19 %
0.00 %
Existing Roadway Profile
Roadway Profile
SECTION A


AW 4003
Lamar-East
N
N.W. 1/4, SEC. 35
TIE PAR. 3 W¼ COR SEC 35 T.22S., R46W. BEARS N85°28'30"W ~1688.9'
3 TO BE SOLD TO DERREL SAWYER
DRAINAGE
Pl. 173+49.5
ATCHISON TOPEKA & SANTAFE R.R.
N.85°31'E
PT. BEG PAR 3 W¼ COR SEC 35 T22S R46W. BEARS N69°51'30"W ~634.9'
S.W. 1/4, SEC. 35, T. 22S., R. 46W.
1091.0'
Sta. 153+13 to 160+09 ~ Rq'd 80 cu. yds. Excav. for Waste Ditch Fill
Sta. 157+53 ~ Remove Sign 24' Rt.
160+23 ~ Regd 24"x28' Side Drain & Road Appr., Rt.
Sta. 160+29 ~ Rq'd 24"x35' C.M.P. Side Drain ~ 190 cu. yds. Embank. for Road Appr. Rt. Remove 24"x36' C.M.P. Side Drain Rt. 12 Howells)
Sta. 160+32 to 171+05 ~ Rq'd 420 cu. yds. Excav. for Waste Ditch Fill
164+00
Sta. 164+79 ~ Remove 36" x 32' C.M.P. Cross Culv. (2 Howells)
171+39 ~ Regd Clean 24"x161' Conc. Encased Siphon.
Sta. 171+39 ~ Remove portions of 24"x83' Encased Siphon and Extend 8" Pt. (H=4.7') See Detail on Sheet No. 4
P.C. 169+52.6
Sta. 171+65 ~ Regd 24"x32' C.M.P. Side Drain ~ 315 cu. yds. Embank. for Road Appr. Rt. Remove 18"x26' C.M.P. Side Drain Rt. 12 Howells)
Δ = 3°58' Rt
D = 0°30'
T = 396.9'
L = 793.3'
R = 11460'
Pl. 357+40.0
200' V.C.
74.65
74.47
74.40
-0.26%
4.00%
Existing Roadway Profile
EL. 852
SECTION A

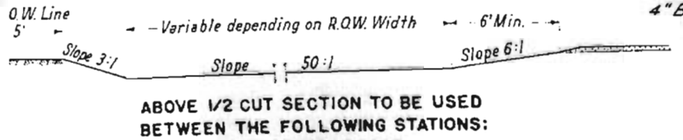
FED. ROAD DIST. NO	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	2	

TYPICAL CROSS SECTION OF IMPROVEMENT AND SUMMARY OF QUANTITIES

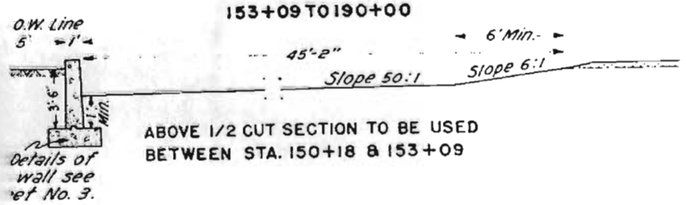
TYPICAL SECTION



The thickness of the Gravel or Crushed Rock Surfacing is to be considered approximate only. Surfacing to be placed as follows:
4" Bottom Course surfacing — 78 tons per 100 ft. of Roadway.



ABOVE 1/2 CUT SECTION TO BE USED BETWEEN THE FOLLOWING STATIONS:
42+65 TO 150+18
153+09 TO 190+00



ABOVE 1/2 CUT SECTION TO BE USED BETWEEN STA. 150+18 & 153+09

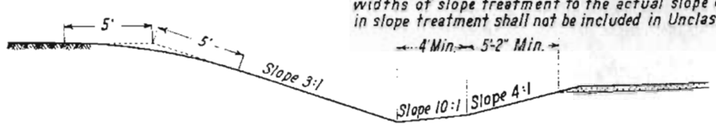
ABOVE SECTION TO BE USED BETWEEN THE FOLLOWING STATIONS:
0+00 TO 42+65
190+00 TO 200+18
350+00 TO 369+00

NOTE

The connection between the present road and the new construction shall be a gradual transition from the 28 ft. section to the 35 ft. 8 in. section for a distance of 200 ft. from Stations 0+00, 200+31 and 369+00. Quantities involved are shown in "List of Structures."

CUT SLOPE TREATMENT IN EARTH CUTS

The intersection of cut slopes with the existing ground shall be rounded in earth cuts beginning 5' outside the slope stake and extending 5' down the cut slope. Where the cut slope is less than 5' reduce each of the above widths of slope treatment to the actual slope distance. Quantities involved in slope treatment shall not be included in Unclassified Excavation.



GENERAL NOTES

his Project is to be constructed in conformity with the Standard Specifications of the rado State Highway Department, adopted August 1, 1935.

ll quantities on preliminary plans are to be considered approximate only.

ll roadway excavation required to construct the Project is to be obtained as indicated he plans. Quantities involved beyond the limits of the ditch as shown on typical Section e noted on Profile as "Borrow" or on List of Structures as Embankment, are to be sified as "Unclassified Excavation."

hese Quantities are to be staked as part of the original excavation at locations indicated he plans. Slope stakes beyond the limits of the Typical Section as shown, are subject to nge by the Engineer to fit Embankment requirements actually met in construction.

ll curves are to be superelevated as provided for on the Standard Superelevation Sheet.

ll side approach roads to the Project shall be gravel surfaced with a 4" thickness of vel or Crushed Rock Surfacing" extending approximately 30 ft. from the edge of the way. Estimated tonnage of surfacing material required in this operation is shown ist of Structures.

ll poles encroaching on construction are to be moved by owners.

xcept where noted on plans, payment for overhaul will be based on measurement along erline of Project.

ll corrugated metal pipe cross culverts are to be provided with one headwall on the inlet end, ss otherwise noted on the plans.

he entire Project is to be cleared for the full width of the Right of Way and the cost thereof uded in the lump sum price bid for "Clearing and Grubbing the Entire Project."

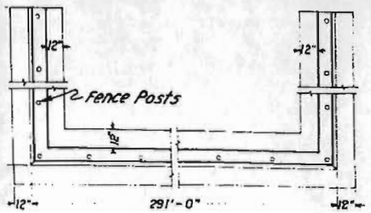
he Detour from Sta. 0+00 to 200+31 is to be constructed by State Forces along the route cated on the Title Sheet.

he Detour from Sta. 350+00 to 369+00 lies along the present travelled road. At all places he Project where the new work lies along the present travelled road, the Contractor shall is own expense, prosecute construction in such a manner that traffic may safely and tily pass over the road. Also the Contractor shall maintain in safe condition and at own expense, all temporary approaches to, and crossings of, intersecting roads.

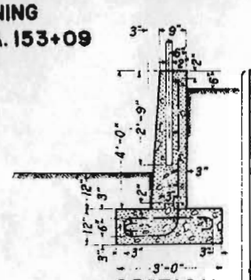
SUMMARY OF APPROXIMATE QUANTITIES

NO.	ITEM	UNIT	UNIT #1 ROADWAY	BRIDGES STA. 41+	BRIDGES STA. 92+	BRIDGES STA. 187+	TOTAL		
10a	Clearing & Grubbing Entire Project	Lump Sum	•				•		
11a	Removing & Salvaging Part of Bridge, Sta. 41+	" "		•			•		
11b	Removal of Disused Culvert Sta. 188+	" "				•	•		
11c	Removing & Salvaging Part of Bridge, Sta. 92+	" "			•		•		
11d	Removal of 58 Structures	" "	•				•		
11e	Removing & Resetting Mail Boxes	" "	•				•		
11f	" Headwall & Cutting Keyway	Each	2				2		
11g	" Portions of Siphon Sta. 171+	Lump Sum	•				•		
11h	Transplanting Trees	Each	60				60		
11i	" Shrubs	"	19				19		
11j	Removing & Resetting Flume Sta. 41+	Lump Sum	•				•		
12a	Removing Fence	Lin. Ft.	18400				18400		
12b	" & Rebuilding Fence	"	3500				3500		
12c	" " " Gates	Each	4				4		
13c	Unclassified Excavation	Cu. Yds.	102600			400	103000		
13d	Cut Slope Treatment	Mile	3.6				3.6		
14a	Dry Rock Excavation (Structural)	Cu. Yds.	60				60		
14b	" Common " "	"	490			45	535		
14c	Wet Rock " "	"	20				20		
14d	" Common " "	"	170				170		
18a	Station Yard Overhaul	Sta. Yd.	213000				213000		
18b	Yard Mile "	Yd. Mi.	1300				1300		
26a	Gravel or Crushed Rock Surfacing	Ton	16600				16600		
42a	Untreated Bridge Timber	Mft. bm.		1.0	1.3	1.9	4.2		
42b	Treated " "	" "		3.0	4.8	44.6	52.4		
43	Asphalt Plank Wearing Surface	Sq. Ft.				2700	2700		
46a	Class "A" Concrete	Cu. Yd.	203	21.0	40.0		264		
46b	" "B" "	" "	7				7		
47	Reinforcing Steel	Lb.	14,500	700	1300		16500		
53c	24" Corrugated Metal Culvert Pipe	Lin. Ft.	540				540		
55b	18" " " Siphon "	"	97				97		
55c	24" " " " "	"	85				85		
59	Relaying Pipe	"	598				598		
60a	Treated Timber Piling	Lin. Ft.		336	480	1336	2152		
60c	Piling Cut-off Treated	" "		10	10	10	30		
61a	Treated Sheet Piling	Lin. Ft.		840	1008		1848		
74	Wire Cable Guard Fence	Lin. Ft.	756				756		
76c	Barbed Wire Fence With Metal Posts	" "	16000				16000		
76g	Barbed Wire Gates	Each	13				13		
76h	Driveway "	"	2				2		
76i	Walk "	"	1				1		
78a	Chain Link Wire Mesh Fence	Lin. Ft.	390				390		
78b	Double Driveway Gates	Each	2				2		
81a	Project Markers	"	2				2		
81b	Right of Way Markers	"	34				34		
89b	Drain Pipe (Timber Floor)	"				8	8		
42x	Placing Salvaged Timber	Mft. bm.		8.7	4.4		13.1		
	FORCE ACCOUNT								
	Detour (Work to be done by State Forces)	Lump Sum	•				•		
	Moving Buildings off R.O.W. Sta. 114+ & 197+	"	•				•		
	" Playground Equip. off R.O.W. Sta. 151+	"	•				•		
	ALTERNATE BIDS TO BE RECEIVED FOR REINF. CONC. CULVERT PIPE								
	As an alternate for item 53c, shown in the foregoing, the following item, involving Reinf. Conc. Pipe shall be bid upon:								
51c	24" Reinf. Conc. Culvert Pipe	Lin. Ft.	502				502		

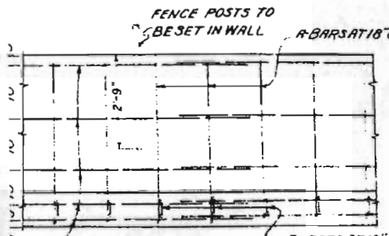
DETAILS OF CONCRETE RETAINING WALL RT. OF STA. 150+18 TO STA. 153+09



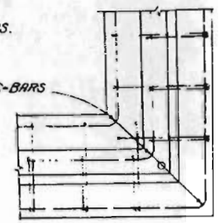
PLAN



SECTION



FRONT ELEVATION



CORNER DETAIL

REINFORCEMENT BAR LIST

MARK	SIZE	NUMBER REQD.	LENGTH	TOTAL LENGTH	BENDING DIAGRAM Dimensions to ℄ of Bars
A	½"ϕ	273	6'-4"	1729	10" 2" 2"R 6"R 4'-0"
B	½"ϕ	273	3'-6"	956	2'-2" 2"R 2"R 2" 2"
C	½"ϕ	14	30'-0"	420	14'-9½" 3"R 14'-9½"
D1	½"ϕ	77	30'-0"	2310	D1 = 30'-0"
D2	"	4	19'-6"	78	D2 = 19'-6"
D3	"	8	18'-3"	146	D3 = 18'-3"
D4	"	2	17'-4"	35	D4 = 17'-4"
D5	"	2	15'-1"	30	D5 = 15'-1"
D6	"	4	12'-6"	50	D6 = 12'-5"
D7	"	1	10'-9"	11	D7 = 10'-9"

Total = 5,765 Lin. Ft. @ 0.668 # per Ft. + 1½ % for Overrun = 3909 Lbs.

Class "A" Concrete = 98.5 Cu. Yds.

UNIT 1

FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.
3	COLO.	4003	3

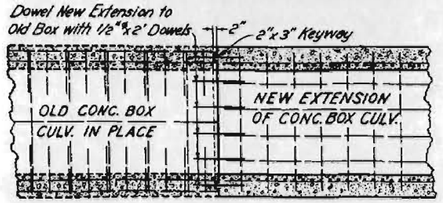
LIST OF STRUCTURES

STATION	DESCRIPTION	REMOVE STRUCTURE NO.	UNCLASSIFIED EXCAV. CU. YDS.	UNCLASSIFIED EMBANK CU. YDS.	STRUCTURAL EXCAVATION CU. YDS. *	GRAVEL OR CR. ROCK SURFACING TONS	CONCRETE CU. YDS. CLASS "A"	CONCRETE CU. YDS. CLASS "B"	REINF. STEEL LBS.	CORRUGATED METAL CULVERT PIPE LIN. FT. 24"	CORR. METAL SIPHON PIPE LIN. FT. 18"	CORR. METAL SIPHON PIPE LIN. FT. 24"	RELAY PIPE LIN. FT.	‡CONNECTING BANDS EACH 24"	MISCELLANEOUS
0+00	Project Marker & Approach to Project			•18		50									1 Project Marker
0+38 to 1+53	Transplant 47 Small Trees Rt														Transplant 47 Trees Rt.
0+29	Remove Sign 19' Lt.	1													
0+38	" " 29' Rt.	1													
1+61	Road Approach Rt.			•40		10									
	Remove & Relay 24"x16' C.M.P. Side Drain Rt. (2 Headwalls)				2								16		
	Relay 24"x16' C.M.P. on Rt. Removed at Sta. 2+93												16	1	
2+93	C.M.P. Side Drain & Road Approach Rt.			•60	5	10				22					
	Remove 24"x16' C.M.P. Side Drain Rt (2 Hdwalls) & Relay Rt of Sta. 1+61														
6+77	Remove Sign 29' Rt	1													
7+00	Road Approach Rt.			•60		10									
	Remove & Relay 24"x16' C.M.P. Side Drain Rt (2 Headwalls)				2								16		
	Relay 24"x16' C.M.P. on Rt. Removed at Sta. 12+66												16	1	
7+10	Remove Sign 25' Rt.	1													
10+31	" " 31' Rt.	1													
10+42	Remove 24"x24' C.M.P. Side Drain Rt. & Relay Lt of Sta. 24+78														
10+50	C.M.P. Side Drain & Road Approach Rt			•120	3	20				40					
12+10	" " " " " "			•120	3	20				40					
12+28	Remove 18"x22' C.M.P. 6' Rt.	1													
12+76	Road Approach & C.M.P. Side Drain Rt			30	1	10				26					
12+88	Remove 24"x16' C.M.P. Side Drain Rt (2 Hdwalls) & Relay Rt of Sta. 7+00														
13+10 to 15+75	Waste Ditch Rt.		30												
15+75	Remove Sign 16' Rt.	1													
15+79	" " 22' Rt.	1													
15+85 to 17+00	Waste Ditch Rt		15												
24+78	Road Approaches Rt & Lt.			60		20									
	Relay 24"x24' C.M.P. on Rt. Removed at Sta. 10+42				1								24		
	Remove & Relay 18"x20' C.M.P. Side Drain Lt. (2 Headwalls)				1								20		
27+42	Road Approach Rt.			30		10									
	Remove & Relay 24"x16' C.M.P. Rt. (2 Headwalls) & Extend				3					10			16	1	
	Road Approach Lt.			20		10									
	Remove & Relay 15"x16' C.M.P. Side Drain Lt. (2 Hdwalls)				1								16		
	Relay 24"x32' C.M.P. Lt. Removed at Sta. 69+35				5								32		
29+70	Remove Sign 24' Rt.	1													
30+33	" " 20' "	1													
30+55	Road Approach Rt.			20		10									
	Remove & Relay 24"x28' C.M.P. Rt. (2 Hdwalls)				2								28		
	Road Approach Lt.			20		10									
	Relay 24"x36' C.M.P. on Lt Removed at Sta. 39+55				3								38		
	Remove 15"x26' C.M.P. Lt. (2 Headwalls)	1													
30+63	18"x92' Siphon H = 2.5'				70		16.8		1892		97				
	Remove 15"x60' C.M.P. Cross Culvert (2 Headwalls)	1													
31+29	Remove Sign 27' Rt.	1													
31+54	" " 28' Rt.	1													
32+42	" " 28' "	1													
32+97	" " 38' "	1													
33+50	" " 46' "	1													
34+16	Remove 18"x36' C.M.P. Cross Culvert (2 Headwalls)	1													
39+55	Remove 24"x36' C.M.P. Cross Culv. (2 Hdwls) & Relay Lt of Sta. 30+55														
39+80	C.M.P. Side Drain & Road Approach Rt.			25	20	20				38					
	Road Approach Lt.			10		20									
	Relay 24"x36' C.M.P. on Lt. Removed at Sta. 40+08				15								38		
40+08	2'x2'x56' Conc. Box Culv. (Skew 60°)				65		23.3		2402						
	Remove 24"x36' C.M.P. Cross Culv. (2 Hdwls) & Relay Lt of Sta. 39+80														
40+25 to 41+72	Irrigation Ditch Rt		75												
41+74	Remove Concrete Diversion Box Rt.	1													
41+74 to 42+41	Remove & Reset 24"x70' C.M.P. Flume Rt				3										Remove & Reset 24"x 70' Flume on Rt.
41+84	" " Relay 90°x24" " " " & 1 Hdwll.				20			2.25					24		
41+94.3 to 42+16.3	Tr. Timb. Bridge 1 Sp. @ 23'- Remove & Salvage Parts of Old Bridge		(Quantities in Summary)												
42+43	C.M.P. Cross Culv. with Hdwll. Lt & Comb. 4 Way Divrn. Box Rt.				10			3.25		42					
	Remove 24"x30' C.M.P. (2 Hdwlls.) & Relay Lt. of Sta. 46+49														
42+43 to 42+69	Ditch Rt.		10												
42+46	Remove Steel Rail 6' Rt.	1													
42+48	" " " 8' "	1													
42+57	" 2" Iron Pipe 21' Rt.	1													
42+63	2'x2' Concrete Diversion Box Rt				2			1.20							
	Remove " " " "	1													
42+69 to 44+40	Dike Ditch Rt.			75											

Continued on Sheet No. 4

FED. ROAD DIST. NO.	STATE	A. W. PROJ. NO.	SHEET NO.
3	COLO.	4003	4

DETAIL OF JOINT FOR CONCRETE BOX CULVERT EXTENSION, STA. 128+64



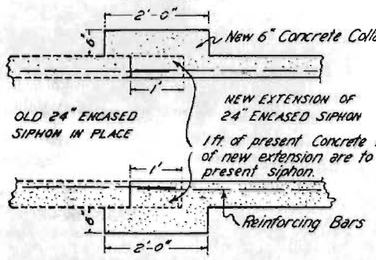
Place one Dowel to each U-Bar shown on Standard Concrete Box Culvert Sheet M-104-D.

Dowel Bars are to be Grouted in place with a cement grout composed of one part cement and two parts clean, well graded sand. The cost of drilling holes, grouting and placing dowels is to be included in payment for Reinforcement Steel.

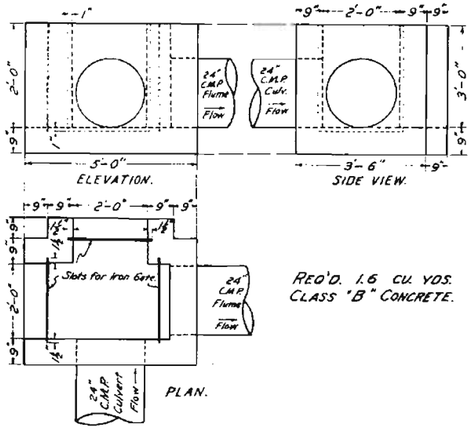
NOTE

The cost of "Removing Headwall and Cutting Keyway" is to be paid for at the contract unit price each.

DETAIL OF JOINT FOR 24" ENCASED SIPHON EXTENSION STA. 171+39



DETAIL OF CONCRETE DIVERSION BOX STA. 42+43



REQ'D. 1.6 CU. YDS. CLASS "B" CONCRETE.

LIST OF STRUCTURES

Continued from Sheet No. 3

UNIT 1

STATION	DESCRIPTION	REMOVE STRUCTURE NO.	UNCLASSIFIED CU. YDS. EXCAV.	UNCLASSIFIED CU. YDS. EMBANK	STRUCTURAL EXCAVATION CU. YDS. *	GRAVEL OR CR. ROCK SURFACING TONS	CONCRETE CU. YDS. CLASS "A"	CONCRETE CU. YDS. CLASS "B"	REINF. STEEL LBS.	CORRUGATED METAL CULVERT PIPE LIN. FT. 24"	CORR. METAL SIPHON PIPE LIN. FT. 18"	CORR. METAL SIPHON PIPE LIN. FT. 24"	RELAY PIPE LIN. FT.	CONNECTING BANDS 24"	MISCELLANEOUS
46+49	Road Approach Rt.			160		35									
	Relay 24"x32' C.M.P. on Rt. Removed at Sta. 67+66				1								32		
	Road Approach Lt.			80		10									
	Relay 24"x30' C.M.P. on Lt. Removed at Sta. 42+43				3								30		
	Remove 15"x16' C.M.P. Side Drain (2 Hdwls) Rt.	1													
	" 15"x16' " " " " Lt.	1													
49+66 to 51+46	Approach to Filling Station			20		140									
	Remove & Relay 18"x180' C.M.P. Side Drain Lt				5								180		
51+39	Remove Sign 19' Rt.	1													
54+38	" 36"x32' C.M.P Cross Culv. (2 Hdwlls)	1													
67+54	" Sign 48' Rt	1													
67+56	" 24"x32' C.M.P. Rt. (2 Hdwlls) & Relay Rt. of Sta. 46+49														
	Road Approach Rt.			90		60									
67+59	Remove Sign 54' Rt.	1													
67+75	Road Approach Lt.			30		10									
	Remove 15"x16' C.M.P Side Drain Lt. (2 Hdwlls)	1													
69+35	" 24"x32' C.M.P Cross Culv. (2 Hdwlls) & Relay Lt of Sta. 27+42														
80+64	" Sign 20' Rt.	1													
85+93	Road Approach Rt.			60		45									
	Remove & Relay 24"x16' C.M.P. Side Drain Rt (2 Hdwlls) & Extend				5					14			16	1	
	Road Approach Lt.			20		10									
	Remove 15"x16' C.M.P. Side Drain Lt. (2 Hdwls)	1													
86+09	Remove Sign 25 Rt.	1													
92+10.5 to 92+58.5	Treated Timb. Bridge 2@ 23' Remove & Salvage Parts of Old Bridge				(Quantities in Summary)										
95+35	C.M.P. Side Drain & Road Approach Rt.			50	10	40				30					
	Remove 15"x 20' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
	Road Approach Lt.			25		10									
	Remove & Relay 15"x 20' C.M.P. Side Drain Lt. (2 Hdwlls)				1								20		
109+85 to 114+82	Irrigation Ditch Rt.		60												
114+35 to 114+83	Move Buildings off R.O.W.		(Force Account)												
114+35	Fill Cellar Rt.			15											
114+58	Fill 29' Well Rt.			10											
114+63	Remove Rubble Masonry Foundation Rt	1													
114+63	Fill Cellar Rt.			45											
114+96	Road Approach Rt.			260		40									
	Remove & Relay 24"x 20' C.M.P. Rt. (2 Hdwlls) & Extend				1					14			20	1	
118+03	" Sign 32' Rt.	1													
119+35	" 36"x 32' C.M.P. Cross Culv. (2 Hdwlls)	1													
122+45	" Sign 27' Rt.	1													
123+20	" " & 4" Iron Pipe 30' Rt.	1													
125+29	" 4"x 4" Wood Post 24' Rt.	1													
128+61 to 147+73	Waste Ditch Rt.		205												
128+64	Extend 7'x 3.5"x 26' Conc. Box Culv. 25' Rt & 4' Lt.				95		45.2	43.57							Remove 2 Hdwlls & Cut Keyways.
129+43	Remove Sign 25' Rt.	1													
129+60	Remove 15"x 20' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
129+62	Road Approach Rt.			250		40									
147+08	C.M.P. Side Drain & Road Approach Rt.			150	1	40				24					
	Remove 15"x 16' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
147+25	Road Approach Lt.			10		20									
	Remove 15"x 60' C.M.P. Side Drain Lt. (2 Hdwlls.)	1													
147+45	C.M.P. Side Drain & Road Approach Rt.			160	1	40				24					
	Remove 15"x 20' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
149+07	C.M.P. Side Drain & Road Approach Rt.			160	1	40				26					
	Remove 15"x 16' C.M.P. Side Drain Rt. (2 Hdwlls.)	1													
150+33	C.M.P Side Drain & Road Approach Rt.			85	1	25				26					
150+18 to 153+09	Concrete Retaining Wall Rt.				270		98.5	39.09							
150+60	Remove 4"x 4" Wood Post set in Conc. 36' Rt.	1													
150+75	" 15"x 20' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
151+53 to 152+85	Move Playground Equipment off R.O.W.		(Force Account)												
152+39	School Approach Rt. & C.M.P. Side Drain			70	3	20				22					
152+35	Remove 15"x 16' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
152+43 to 153+04	Transplant 6 Small Trees Rt.														Transplant 6 Trees Rt.
153+13 to 160+09	Waste Ditch Rt.		80												
157+53	Remove Sign 21' Rt.	1													
160+23	C.M.P. Side Drain & Road Approach Rt.			190	1	40				26					
	Remove 12"x 36' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
160+37 to 171+05	1068' Waste Ditch Rt.		120												

Continued on Sheet No. 5

FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.
3	COLO.	4003	5

FENCING REQUIREMENTS

	STATION		SIDE	REMOVE FENCE	REMOVE & REBUILD FENCE	BUILD BARBED WIRE FENCE	BUILD CHAIN LINK WIRE MESH FENCE	REMOVE & REBUILD GATES	BUILD GATES: BARBED WIRE	DRIVEWAY	WALK	DOUBLE DRIVEWAY
				LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	NO.	NO.	NO.	NO.	NO.
	0+39	- 2+82	R	270								
	30+41	- 34+10	R	405								
	79+60	- 85+84	R	5150								
	46+02	- 147+00	R	6960								
	47+16	- 149+00	R	285								
	49+16	- 171+09	R	2391								
	171+75	- 195+50	R	2420								
	0+39	- 2+82	R			227						
	2+98	- 6+92	R		394							
	7+06	- 10+31	R	55	325							
	13+11	- 21+84	R	65	873							
	21+84	- 30+41	R	30	857							
	30+55	- 34+10	R			355						
	39+60	- 41+94	R			258						
	42+19	- 46+42	R			447						
	46+56	- 67+42	R			2101						
	67+70	- 85+85	R			1835						
	96+01	- 92+11	R			648						
	92+58	- 95+28	R			308						
	95+42	- 114+13	R			1871						
	114+13	- 114+88	R		75							
	115+02	- 129+55	R			1447						
	129+69	- 147+00	R			1766						
	147+16	- 147+38	R			22						
	147+52	- 148+99	R			147						
	149+15	- 150+18	R			103						
	150+18.5	- 153+085	R				390					
	153+09	- 160+16	R			707						
	160+30	- 171+58	R			1163						
	171+79	- 187+60	R			1608						
	188+52	- 195+52	R			720						
	195+52	- 199+92	R	135	445							
	0+35	- 3+66	L		331							
	10+42	- 41+94	L			150						
	42+19	- 42+68	L			44						
	91+86	- 92+11	L	25	25							
	92+58	- 92+83	L	25	25							
	187+40	- 187+60	L	45	30							
	188+52	- 188+92	L	45	30							
	1+61		R						1			
	2+93		R							1		
	3+34		R								1	
	7+00		R						1			
	13+11		R					1				
	24+78		R						1			
	30+50		R						1			
	46+49		R						1			
	67+49		R						1			
	67+63		R						1			
	85+93		R					1				
	95+35		R						1			
	114+61		R					1				
	114+95		R							1		
	129+52		R						1			
	147+45		R						1			
	149+07		R					1				
	150+33		R									1
	152+33		R									1
	160+23		R						1			
	171+65		R						1			
	195+43		R						1			
	350+00	- 355+45	L	600		640						
	356+59	- 363+00	L	1300		1315						
	355+00	- 355+45	R	90		30						
	356+59	- 356+80	R	90		30						
UNIT 1	TOTALS UNIT 1			18,306	3410	15,927	390	4	13	2	1	2
UNIT 2	TOTALS UNIT 2			2080		2015						

• Posts to be set in concrete retaining wall.

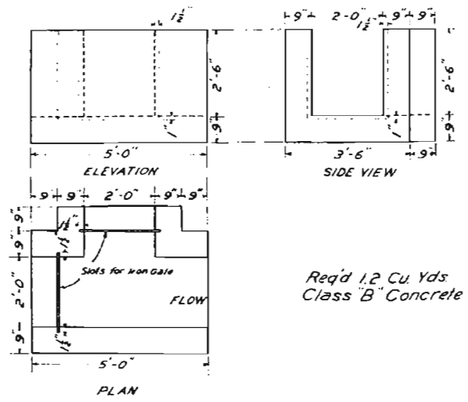
LIST OF STRUCTURES

Continued from Sheet No. 4

	STATION	DESCRIPTION	REMOVE STRUCTURE NO.	UNCLASSIFIED EXCAV. CU. YDS.	UNCLASSIFIED EMBANK. CU. YDS.	STRUCTURAL EXCAVATION CU. YDS. *	GRAVEL OR CR. ROCK SURFACING TONS	CONCRETE CU. YDS. CLASS "A"	CONCRETE CU. YDS. CLASS "B"	REINF. STEEL LBS.	CORRUGATED METAL CULVERT PIPE LIN. FT. 24"	CORR. METAL SIPHON PIPE LIN. FT. 18"	CORR. METAL SIPHON PIPE LIN. FT. 24"	RELAY PIPE LIN. FT.	CONNECTING BANDS EACH 24"	MISCELLANEOUS
UNIT 1	164+78	Remove 36"x32' C.M.P. Cross Culv. (2 Hdwlls.)	1													
	171+39	" Inlet & Extend 24"x80' Siphon 81' Rt. H=4.7'				60			18.9	1918			84.5		1	Remove Portions of Siphon
	171+65	C.M.P. Side Drain & Road Approach Rt.			215	1	40				32					
		Remove 15"x20' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
	175+18 to 192+04	1746' Waste Ditch Rt.			195											
	187+60 to 188+52.12	Treated Timber Bridge - 4 Spans @ 22'-6" (Skew 45°)		(QUANTITIES IN SUMMARY)												
		Channel Improvement		* 400												
		Remove 36"x32' C.M.P. Cross Culv. (2 Hdwlls.)														
	191+67	" Sign 19' Rt.	1													
	194+26	" " 18' "	1													
	195+43	C.M.P. Side Drain & Road Approach Rt.			40	2	10				30					
	196+07	Remove Sign 23' Rt.	1													
	197+13 to 199+92	Transplant Vine Rt														Transplant 249' Vine on Rt.
	197+20	Move 14'x16' Frame Shed off R.O.W		(FORCE ACCOUNT)												
	197+52	C.M.P. Side Drain & Road Approach Rt.			40		10				30					
		Remove 15"x16' C.M.P. Side Drain Rt. (2 Hdwlls)	1													
	198+96	C.M.P. Side Drain & Road Approach Rt.			15	1	10				24					
		Remove 15"x20' C.M.P. Side Drain Rt. (2 Hdwlls.)	1													
	199+06 to 199+92	Transplant 7 Peach Trees & 18 Rose Bushes Rt.														Transplant 7 Peach Trees & 18 Rose Bushes on Rt.
	200+31	Road Approaches Rt. & Lt.			75		30									
		Approach to Project & Project Marker			75		80									1 Project Marker
UNIT 2	350+00	Project Marker & Approach to Project			75		100									1 - Project Marker.
	355+45 to 356+59	Treated Timber Bridge - 5 Spans @ 22'-6" (Skew 60)		(QUANTITIES IN SUMMARY)												
		Channel Improvement - Remove 15"x20' C.M.P.		• 320												
	369+00	Approach to Project & Project Marker		• 1000	50		100									1 Project Marker
UNIT 1	TOTALS UNIT 1		58	790	2690	720	1075	202.1	6.7	14,478	540	97	84.5	598	6	
UNIT 2	TOTALS UNIT 2		0	0	125	0	200	0	0	0	0	0	0	0	0	

* Structural Excavation is estimated to be 90% Common and 10% Rock each of which is estimated to be 75% Dry and 25% Wet.
• Included in Profile Quantities for Payment. (Material for road approaches between Sta. 0+ and 12+ available from excess excavation, Sta. 0+ to 5+)
* Included in Bridge " " "
÷ Connecting Bands are to be included in the price bid for "Corrugated Metal Culvert Pipe."

DETAIL OF CONCRETE DIVERSION BOX STA. 42+63



Req'd 1.2 Cu. Yds Class "B" Concrete

R.O.W. MARKERS

	STATION	SIDE	NO.	STATION	SIDE	NO.
UNIT 1	0+35	L	1			
	0+39	R	1			
	7+00	R	2			
	14+00	R&L	2			
	33+10	R	1			
	39+60	R	1			
	39+70	L	1			
	54+00	R	2			
	67+00	R&L	2			
	69+00	R	2	350+00	R	1
	93+82	R	1	350+00	L	2
	93+84	R	1	363+00	L	2
	93+96	L	1	369+00	L	2
	120+00	R&L	2	369+00	R	1
	143+00	R	2			
	146+84	L	1			
	147+00	R	1			
	164+00	R	2			
	173+50	R&L	2			
	189+00	R	2	TOTALS UNIT 1		34
UNIT 2	198+00	R	2			
	199+92	R&L	2	TOTALS UNIT 2		8

WIRE CABLE GUARD FENCE

	STATION		LIN FT LEFT SIDE	LIN FT RIGHT SIDE
UNIT 1	41+29	to 41+92	63	63
	42+21	to 42+84	63	63
	91+45	to 92+08	63	63
	92+61	to 93+24	63	63
	186+79	to 187+42		63
	187+09	to 187+72	63	
	188+37	to 189+00		63
	188+70	to 189+33	63	
UNIT 2	354+71	to 355+34		63
	354+88	to 355+51	63	
	356+53	to 357+16		63
	356+70	to 357+33	63	
	TOTALS UNIT 1		756	
	TOTALS UNIT 2		252	

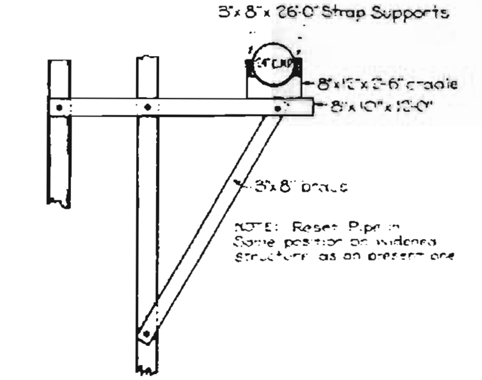
REVISIONS

FED. ROAD DIST. NO.	STATE	A. W. P.		
3	COLO.	4003	6	

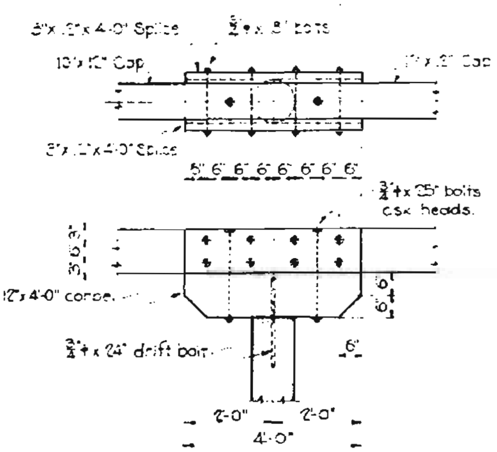
TABLE OF REINFORCEMENT ALTERNATES *

TYPE OF REINFORCEMENT	WEIGHT
A. S. & W. CO. WELDED WIRE FABRIC Nº 612-00 OR EQUIVALENT	81 LB. PER 100 SQ. FT.
A. S. & W. CO. TRIANGLE MESH REINFORCEMENT Nº 208 OR EQUIVALENT	89 LB. PER 100 SQ. FT.

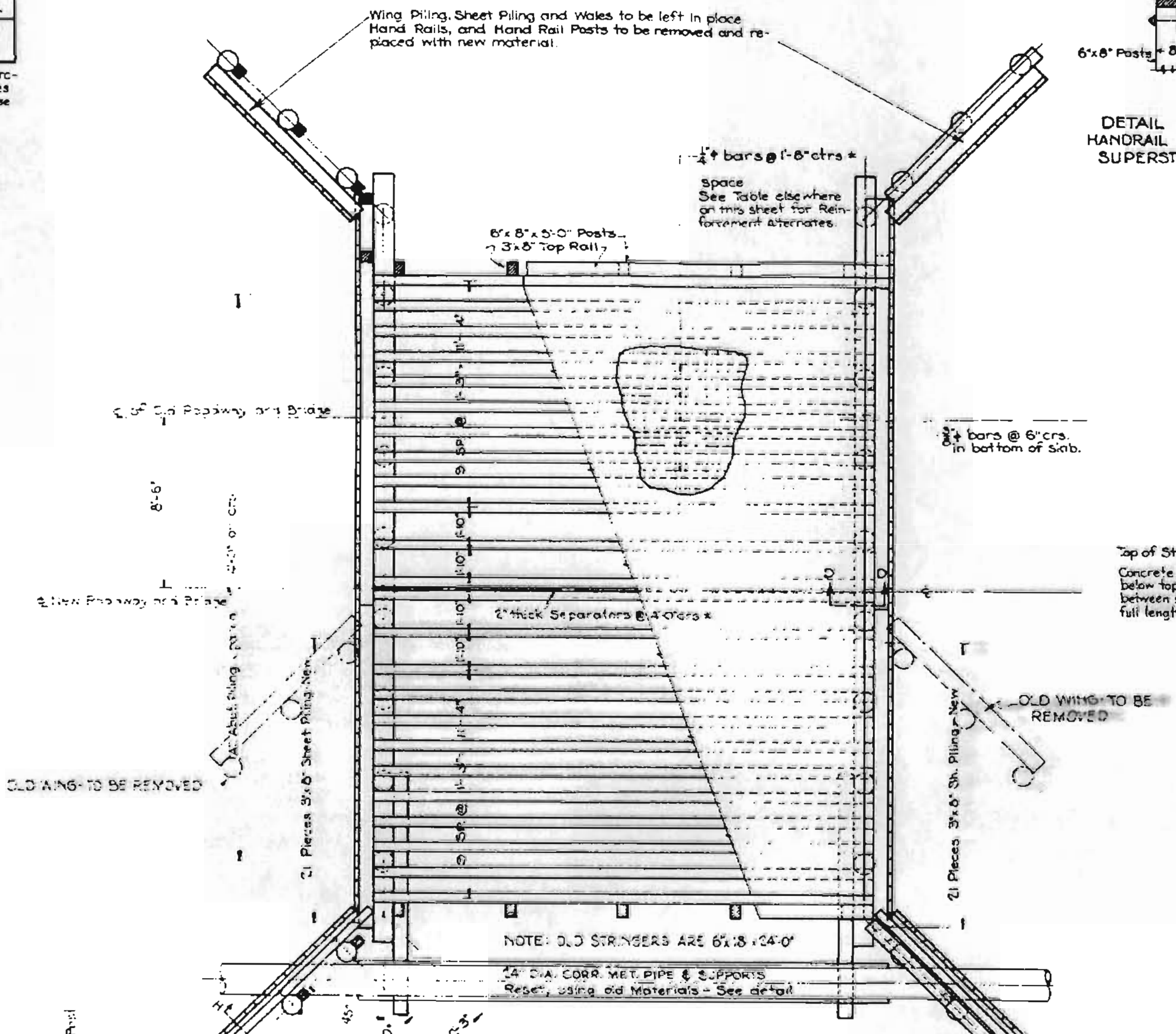
*Weights shown in Summary of Quantities are based on Plain Reinforcing bars shown on Plan @ 86 lb per 100 sq. ft. For allowable substitutes weighing less payment will be made on actual weight used and for those weighing more payment will be made on weights shown in Summary of Quantities.



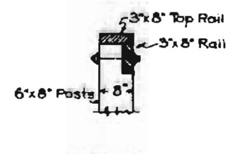
DETAIL OF PIPE SUPPORT



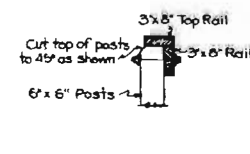
DETAIL OF CAP SPLICE



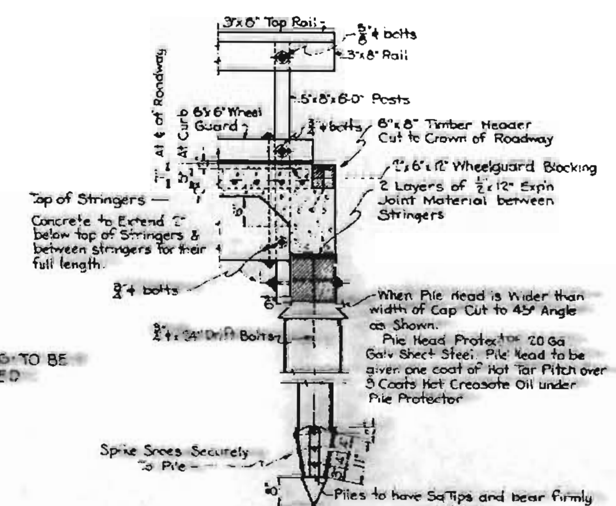
PLAN



DETAIL OF HANDRAIL POSTS SUPERSTRUCT.

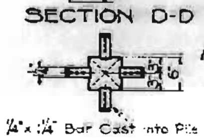


DETAIL OF HANDRAIL POSTS WINGS

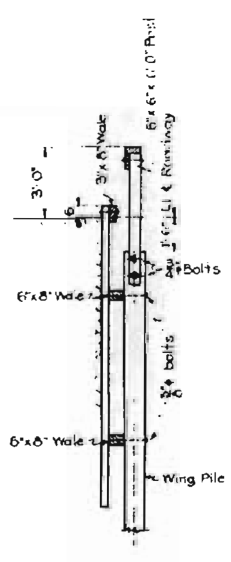


SECTION D-D

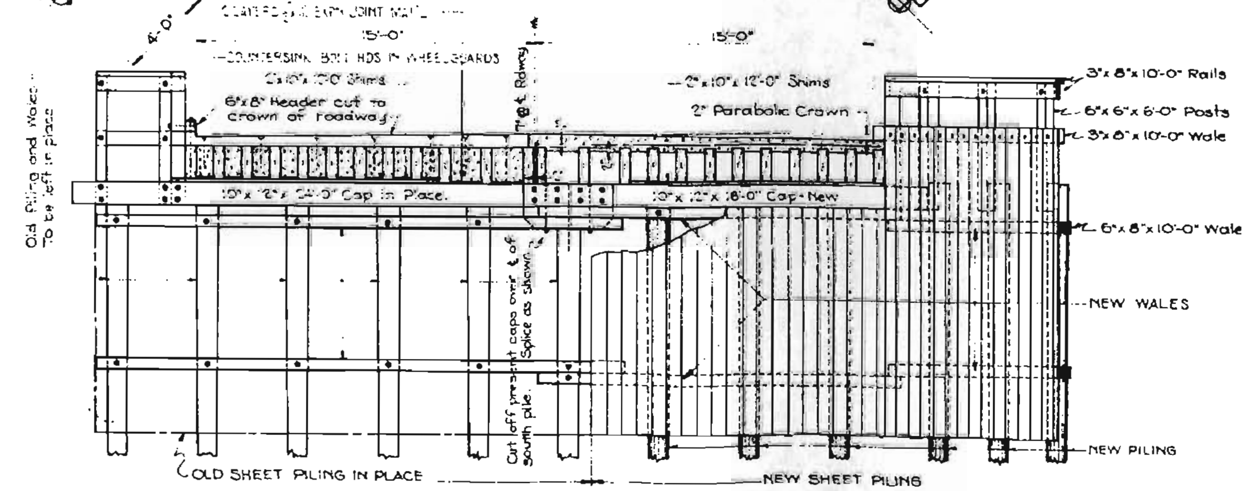
NOTE: PILE SHOES NOT USED



PLAN OF PILE SHOE
CAST IRON



SECTION H-H



PART SECTION & END ELEVATION.

BILL OF MATERIAL

ITEM 42 a UNTREATED BRIDGE TIMBER

Rails S.4 S.	4 Pcs.	3"x 8"x 4'-0"	32 Bd. Ft.
Rails S.4 S.	8 "	3"x 8"x 10'-0"	160 " "
Rails S.4 S.	4 "	3"x 8"x 24'-0"	192 " "
Handrail Posts S.4 S.	6 "	6"x 8"x 5'-0"	120 " "
Handrail Posts S.4 S.	8 "	6"x 8"x 6'-0"	192 " "
Handrail Posts S.4 S.	12 "	6"x 6"x 6'-0"	216 " "
TOTAL UNTREATED BRIDGE TIMBER			912 Bd. Ft.

ITEM 42 b TREATED BRIDGE TIMBER

Wheelguards	2 Pcs.	6"x 6"x 24'-0"	144 Bd. Ft.
Wheelguard Blocks	10 "	2"x 6"x 1'-0"	10 " "
Header	2 "	6"x 8"x 36'-0"	288 " "
Stringers	6 "	6"x 20"x 24'-0"	1440 " "
Shims under 18" Stringers	4 "	2"x 10"x 12'-0"	80 " "
Caps	2 "	10"x 12"x 16'-0"	320 " "
Cap Splices	4 "	3"x 12"x 4'-0"	48 " "
Corbels	2 "	10"x 12"x 4'-0"	80 " "
Wales	4 "	6"x 8"x 16'-0"	256 " "
Wales	4 "	6"x 8"x 10'-0"	160 " "
Wales	4 "	3"x 8"x 10'-0"	80
TOTAL TREATED BRIDGE TIMBER			2906 Bd. Ft.

ITEM 46 a CLASS "A" CONCRETE

TOTAL CL."A" CONCRETE 20.5 Cu. Yd.

ITEM 47 REINFORCING STEEL

TOTAL REINFORCING STEEL 615 POUNDS

ITEM 60 a TREATED TIMBER PILING

TOTAL TREATED TIMBER PILING 12 Pcs 28'-0" EACH 336 Lin. Ft.

ITEM 60 c TREATED PILING CUT-OFF

10 Lin. Ft.

ITEM 61 a TREATED SHEET PILING

Treated Sheet Piling	42 Pcs.	3"x 8"x 10'-0"	420 Lin. Ft.
Treated Sheet Piling	30 Pcs.	3"x 8"x 14'-0"	420 Lin. Ft.
TOTAL TREATED SHEET PILING			840 Lin. Ft.

ITEM 11a REMOVING & SALVAGING PORTIONS OF BRIDGE

LUMP SUM

ITEM 42x PLACING SALVAGED TIMBER (STRINGERS & CAPS)

8.7 M. FT. B. M.

½" x 12" Expansion Joint Material 80 Lin. Ft.
(INCLUDED IN UNIT PRICE BID FOR CL. A CONCRETE)

NOTE:- CONTRACTOR TO CAREFULLY REMOVE PRESENT CONCRETE FLOOR, ALL HANDRAILS AND POSTS, WHEELGUARDS, BULKHEAD PLANKS, STRINGERS, AND WINGS AS SHOWN.

ALL OLD AND NEW PILING TO HAVE 20 GA. GALV. PILE HEAD PROTECTORS AS SHOWN IN SECTION D-D

DRIVE ADDITIONAL NEW PILING AND SHEET PILING. SPLICE CAPS AND RELOCATE OLD STRINGERS WITH NEW. PLACE NEW CONCRETE FLOOR AND WHEELGUARDS, HANDRAILS & WINGS.

SEE SH. Nº 7 FOR NAILING DIRECTIONS & GEN. NOTES.

LOADING DATA
LIVE LOAD
DEAD LOAD

DESIGNING DATA

BOLTS AND WASHERS

LOCATION	SIZE	NO.	LENGTH	LBS.
POSTS TO RAILS	⅝"	30	10"	32.4
POSTS TO WHEELGRDS	¾"	10	14"	21.2
POSTS TO STRINGERS	¾"	20	16"	47.2
POSTS TO CAPS	⅝"	8	18"	13.9
POSTS TO HEADERS	⅝"	4	14"	5.7
POSTS TO PILES	¾"	24	20"	68.2
WHEEL GUARD TO STRGR	¾"	10	33"	44.0
HEADER BOLTS	⅝"	28	18"	48.7
SPLICE TO CAP TO SPLICE	¾"	16	18"	41.6
CAPS TO CORBELS	¾"	4	25"	13.8
CAPS TO PILES	¾"	16	24" *	48.0
CORBELS TO PILES	¾"	2	24" *	6.0
WALES TO CORBELS	⅝"	4	22"	8.3
" TO WALES	⅝"	4	14"	5.6
" TO PILES	⅝"	24	22"	49.7
3"x 8" WALES TO SHEET PILING	⅝"	60	8"	54.7
WASHERS - STD C.I.O.G.	⅝"	324	.75 LB. EA.	243
WASHERS - " "	¾"	168	1.25 " "	210
TOTAL WEIGHT				962.0

* DRIFT BOLTS

NAILS

LOCATION	ITEM	LBS.
SUPERSTRUCTURE		
	40 D COMMON	9 LBS.
ONE ABUTMENT (Shims to Caps)	20 D COMMON	2 LBS.
ONE WING		
TOTAL WEIGHT		11 LBS.

COLORADO
STATE HIGHWAY DEPARTMENT

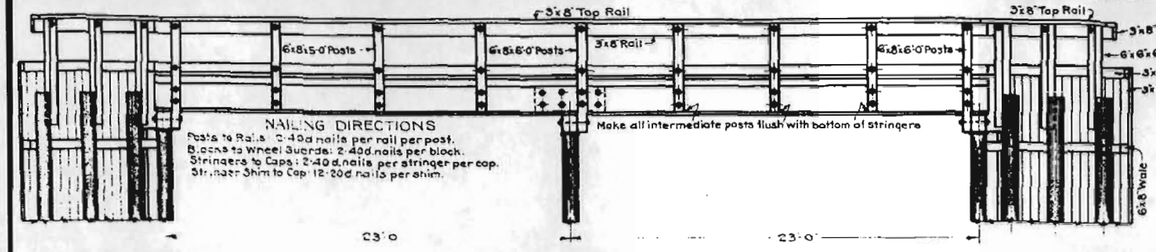
WIDENING PRESENT 23 FT. SPAN TIMBER TRESTLE FROM 20 FT. ROADWAY TO A 30 FT. ROADWAY.

Across LAMAR CANAL.
Sta. 41+94.3 To 42+18.3
Near LAMAR, COLO. S. 33 T. 22 S. R. 46 W.

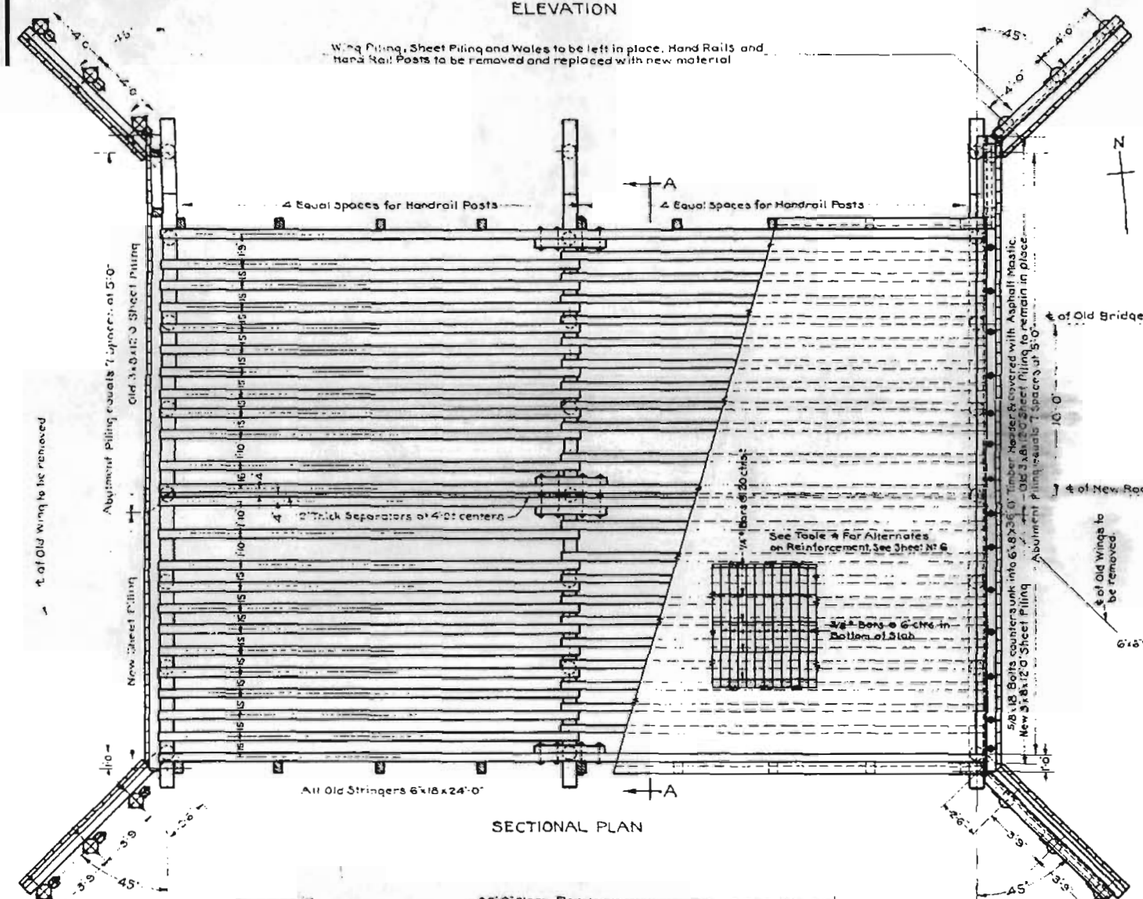
Designed by T.G.C.	Approved by C. J. Bailey
Made by F.W.D.	State Engineer
Checked by	Date: Oct. 13th 1936.

REVISIONS

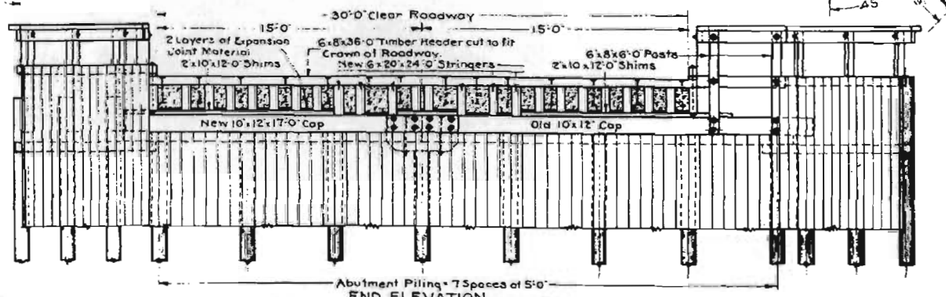
FED. ROAD DIST. NO.	STATE	AWP	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	7	



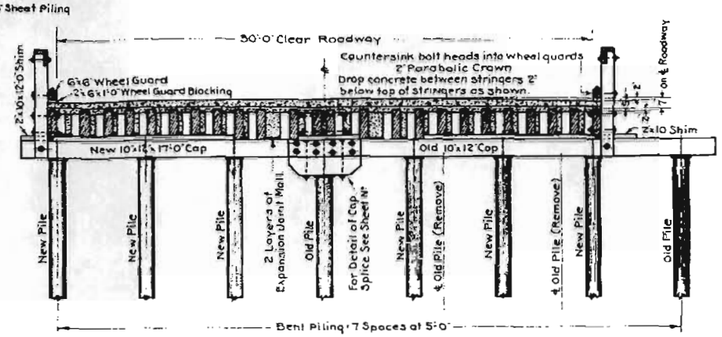
ELEVATION



SECTIONAL PLAN



END ELEVATION



SECTION A-A.

BOLTS AND WASHERS

LOCATION	ITEM	SIZE	№	LENGTH	WT EACH	TOTAL WEIGHT
Posts to Rails	Bolts	5/8	22	10"	1.08	23.8 Lbs.
Posts to Rails	do	5/8	12	11"	1.16	13.9 Lbs.
Posts to Wheel Guards	do	3/4	18	14"	2.60	36.5 Lbs.
Posts to Stringers	do	3/4	32	16"	2.36	75.5 Lbs.
Posts to Stringer Splices	do	3/4	4	22"	3.08	12.4 Lbs.
Posts to Timber Header	do	3/4	4	16"	2.36	9.5 Lbs.
Posts to Caps	do	3/4	6	18"	2.60	15.7 Lbs.
Posts to Caps	do	3/4	4	20"	3.32	11.5 Lbs.
Posts to Piles	do	3/4	24	20"	2.84	68.3 Lbs.
Wheel Guards to Stringers	do	3/4	18	33"	4.40	79.2 Lbs.
Stringers to Splices	do	5/8	12	14"	1.41	16.9 Lbs.
Wales to Sheet Piling	do	5/8	30	8"	0.91	27.3 Lbs.
Wales to Piles	do	5/8	28	22"	2.07	58.0 Lbs.
Wales to Wales	do	5/8	4	14"	1.41	5.6 Lbs.
Timber Header	do	5/8	28	16"	1.74	48.7 Lbs.
Caps to Corbels	do	3/4	6	25"	3.44	20.6 Lbs.
Splice to Cap to Splice	do	3/4	24	18"	2.60	62.8 Lbs.
Cap to Piles	Drift Bolts	3/4	24	24"	3.00	72.0 Lbs.
Washers Std C.I.O.G.	Washers	5/8	268		0.75	201.0 Lbs.
Washers Std C.I.O.G.	do	3/4	328		1.25	350.0 Lbs.
TOTAL WEIGHT						1211.0 LBS.

PLAN VIEW
WHEEL GUARD SPLICE

NAILS

40d Common	20 Lbs.
20d Common	3 Lbs.

SUMMARY OF QUANTITIES AND BILL OF MATERIAL

ITEM № 42a UNTREATED BRIDGE TIMBER		
Handrails S.4.S.	4 Pcs. 3"x 8"x 5'-0" =	40 Bd Ft.
Handrails S.4.S.	8 Pcs. 3"x 8"x 10'-0" =	160 Bd Ft.
Handrails S.4.S.	8 Pcs. 3"x 8"x 24'-0" =	384 Bd Ft.
Handrail Posts S.4.S.	12 Pcs. 6"x 8"x 5'-0" =	240 Bd Ft.
Handrail Posts S.4.S.	10 Pcs. 6"x 8"x 6'-0" =	240 Bd Ft.
Handrail Posts S.4.S.	12 Pcs. 6"x 6"x 6'-0" =	216 Bd Ft.
TOTAL UNTREATED TIMBER		1280 BD.FT.
ITEM № 42b TREATED BRIDGE TIMBER		
Wheel Guards	4 Pcs. 6"x 6"x 24'-0" =	288 Bd Ft.
Wheel Guard Blocks	18 Pcs. 2"x 6"x 1'-0" =	18 Bd Ft.
Timber Header	2 Pcs. 6"x 36"-0" =	288 Bd Ft.
Stringers	12 Pcs. 6"x20"x24'-0" =	2880 Bd Ft.
Stringer Shims	6 Pcs. 2"x10"x12'-0" =	120 Bd Ft.
Caps	3 Pcs. 10"x12"x 17'-0" =	510 Bd.Ft.
Cap Splices	6 Pcs. 3"x12"x 4'-0" =	72 Bd.Ft.
Corbels	3 Pcs. 10"x12"x 4'-0" =	120 Bd.Ft.
Wales	2 Pcs. 3"x 8"x10'-0" =	40 Bd Ft.
Wales	4 Pcs. 6"x 8"x10'-0" =	160 Bd.Ft.
Wales	4 Pcs. 6"x 8"x16'-0" =	256 Bd.Ft.
TOTAL TREATED TIMBER		4752 BD.FT.
ITEM 60a PILING-TREATED		
Abutments and Bent Piles	12 Pcs. at 26 Lineal Ft. each =	312 Lin Ft.
Wing Piles	6 Pcs. at 28 Lineal Ft. each =	168 Lin.Ft.
TOTAL PILING-TREATED		480 LIN FT.
ITEM 61a TREATED SHEET PILING		
Abutment Sheet Piling	44 Pcs. 3"x8" at 12 Lin.Ft. each =	528 Lin.Ft.
Wing Sheet Piling	30 Pcs. 3"x8" at 16 Lin.Ft. each =	480 Lin.Ft.
TOTAL TREATED SHEET PILING		1008 LIN.FT.
ITEM 46a. CONCRETE Class 'A'		
TOTAL CONCRETE		39.5 Cu.Yds.
ITEM 47 REINFORCING STEEL		
TOTAL REINFORCING STEEL		1230 Lbs.
ITEM 60c. PILING CUT-OFF, TREATED		10 LIN.FT.
EXPANSION JOINT MATERIAL 1/2"x12"		90 LIN.FT.
ITEM 11c REMOVING & SALVAGING PORTIONS OF BRIDGE		LUMP SUM
ITEM 42. PLACING SALVAGED TIMBER (STRINGERS & CAPS)		4.328 M.BD.FT.

GENERAL NOTES

All work shall be done according to the Standard Specifications of The Colorado State Highway Department, Adopted August 1-1935.
In concrete floor make a longitudinal construction joint on centerline of roadway.
Make transverse construction joints at about 6'-0" centers and one over the bent.
Reinforcement may be continuous across construction joints.
Place one layer of tar paper between timber and concrete.
All timber and piling to be treated or untreated as shown in bills of material.
All timber and piling shall be Dense Southern Yellow Pine or West Coast Douglas Fir.
All caps shall be edged to an even depth before treatment. The ends of all stringers shall be dapped on one edge before treatment, to obtain an even depth over caps.
All cut surfaces or bored holes in treated timber or piles shall be thoroly saturated with hot creosote oil.
All piling supporting caps shall be covered with galvanized pile protectors as specified, all other piling tops shall be saturated with hot creosote oil and covered with a thick layer of heavy asphalt or tar.
Joints in top handrail must be staggered with joints in side rail.
All handrailing and posts above the wheel guards shall be painted white and all handrail posts below the top of wheel guards shall be painted black as specified.
All bolts more than 12" long must be threaded not less than 4 inches.
Bolts in the finished structure shall not project more than one half inch beyond the nut.
All bolts must have Std.C.I.O.G. or Malleable Cast Washers under each head and nut.
Bolt lengths are calculated assuming C.I.O.G. washers will be used.
The contractor is cautioned to check bolt lengths before ordering because of variations in thickness in lumber and piling.
The entire exposed surface of all untreated timber shall be painted one coat as specified immediately after the material is delivered to the project.
Before placing handrailing the contact surfacing shall receive the second coat of paint.
When contractor is permitted to drill holes to facilitate pile driving, these holes must be drilled so piling will stand in vertical position after final driving.
All hardware to be galvanized. Weights of hardware as shown are for ungalvanized material.
All necessary blocking for swaybracing shall be treated timber.

Note!
Contractor to carefully remove present concrete floor, all handrailing and posts, wheel guards, bulkhead planks, stringers and wings as shown.
All old and new piling to have 20 gage galvanized pile head protectors as shown in Section D-D.
Drive additional new piles and sheet piling, Splice caps and relocate old stringers with new as shown. Place new concrete floor, wheel guards handrailing and wings

LOADING DATA
LIVE LOAD A. A. S. H. O. 1935 CLASS A. H-15
DEAD LOAD ASSUMES 15 LBS PER SQ. FT. ADDITIONAL WEARING SURFACE WHICH INCLUDES THE ½ INCH CONCRETE MONOLITHIC WEARING SURFACE SHOWN.

DESIGNING DATA.
A.A.S.H.O. 1935 EXCEPT CONCRETE UNIT STRESSES PER A.A.S.H.O. AUG. 1929

For details of cap splice, handrail posts, Section D-D, and H-H see Sheet № 6.

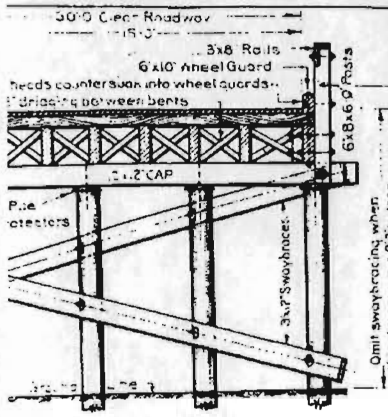
COLORADO
STATE HIGHWAY DEPARTMENT
WIDENING OF PRESENT 2-23 FT. SPAN TIMBER TRESTLE FROM 20 FT. ROADWAY TO 30 FT. ROADWAY
Across Willow Creek Overflow Ditch
Sta. 92+10.5 To 92+58.5
Near Lamar Sec 33 T 22 S R 46 W

Designed by A.G.K.	Approved by Pat Bailey
Made by A.G.K.	Bridge Engineer
Checked by F.W.O.	Date: Oct. 13th, 1936

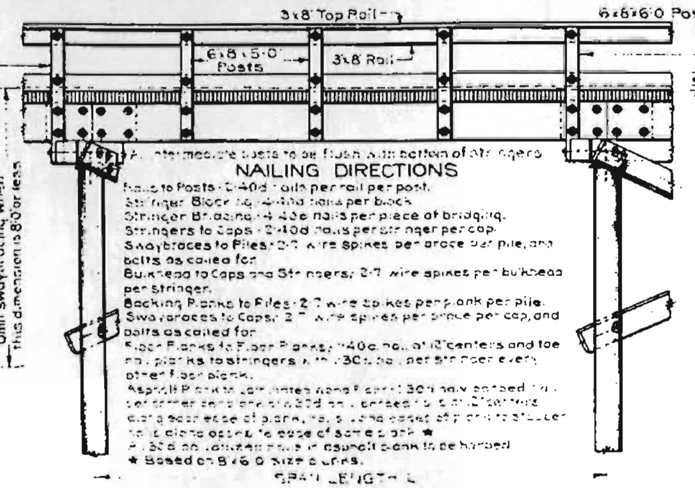
STRUCTURE NO. L-26-M

STANDARD P-117-B-H 45

FED. ROAD DIST. NO.	STATE	A.W.P.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	8	



HALF SECTION A-A
TYPICAL BENT AND SPAN SECTION.

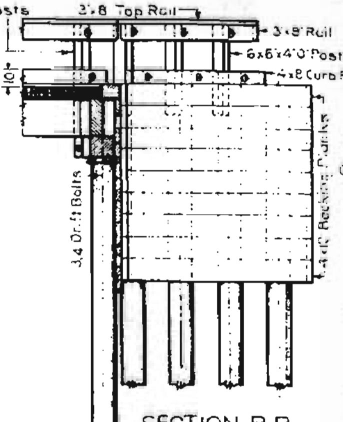


All intermediate posts to be flush with bottom of stringers.

NAILING DIRECTIONS

Rails to Posts - 2-40d nails per rail per post.
Stringer Block to - 4-40d nails per block.
Stringer Bridging - 4-40d nails per piece of bridging.
Stringers to Caps - 2-40d nails per stringer per cap.
Swaybraces to Piles - 2-7" wire spikes per brace per pile, and bolts as called for.
Bulkhead to Caps and Stringers - 2-7" wire spikes per bulkhead per stringer.
Backing Planks to Piles - 2-7" wire spikes per plank per pile.
Swaybraces to Caps - 2-7" wire spikes per brace per cap, and bolts as called for.
Floor Planks to Floor Planks - 40d nails at 12" centers and toe nail planks to stringers with 30d nails per stringer every other floor plank.
Asphalt Plank to laminated wood floor - 30d nails spaced ... per corner ... along each edge of plank, nails along edges of plank to stagger ... along edge ... to edge of same plank ★
All 30d ... galvanized nails in asphalt plank to be barbed.
★ Based on 8'x6'0 size planks.

TYPICAL ELEVATION OF SPAN.

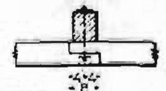


SECTION B-B

See bill of material for number of backing planks required.

DETAIL OF HANDRAIL POSTS SUPERSTRUCTURE.

DETAIL OF HANDRAIL POSTS WINGS.



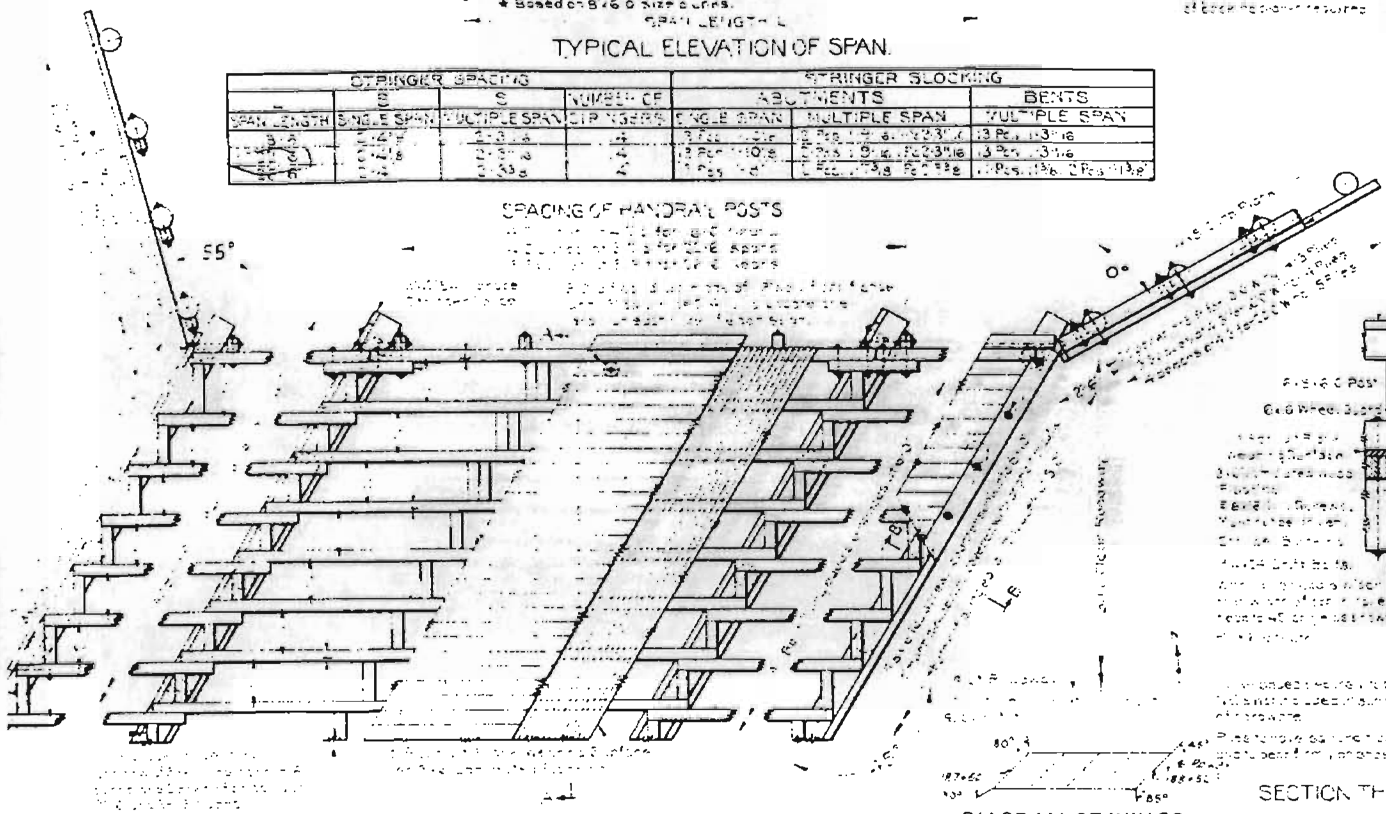
Countersink bolt heads into wheel guards

PLAN VIEW
DETAILS OF WHEEL GUARD SPLICE.

STRINGER SPACING				STRINGER BLOCKING		
	S	S	NUMBER OF	ABUTMENTS		BENTS
SPAN LENGTH	SINGLE SPAN	MULTIPLE SPAN	STRINGERS	SINGLE SPAN	MULTIPLE SPAN	MULTIPLE SPAN
18'6"	2'4"	2'3 1/4"	4	[illegible]	[illegible]	3 Pcs. 3'1/16
22'6"	2'2 1/8	2'3 1/4"	4	[illegible]	[illegible]	3 Pcs. 3'1/16
26'6"	[illegible]	2'3 3/8	4	[illegible]	[illegible]	[illegible]

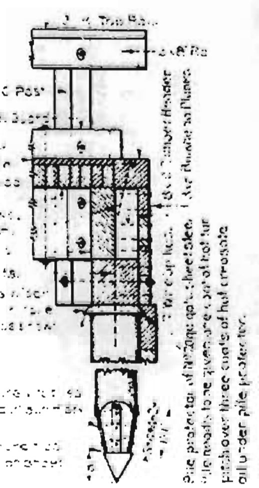
SPACING OF HANDRAIL POSTS

[illegible] for 18'6" Spans
[illegible] for 22'6" Spans
[illegible] for 26'6" Spans

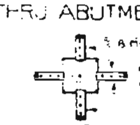


TYPICAL SECTIONAL HALF PLAN OF SPANS AND ABUTMENTS.

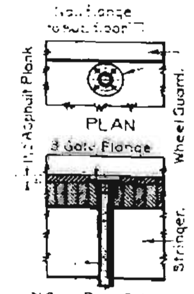
DIAGRAM OF WINGS



SECTION THRU ABUTMENT



PLAN OF PILE SHOE
CAST IRON.

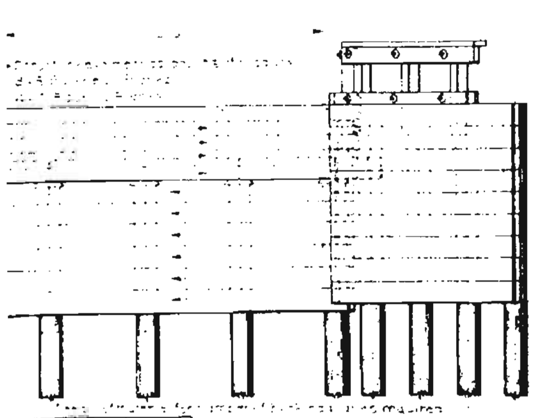


ELEVATION

DETAIL OF FLOOR DRAIN.

GENERAL NOTES.

All work shall be done in accordance with the standard specifications of the Colorado State Highway Department, [illegible] 1932.
[illegible] untreated timber as shown in bill of material.
[illegible] yellow pine or west coast douglas fir.
[illegible] before treatment. The ends of all stringers [illegible] even bearing over caps.
[illegible] treated timber [illegible] saturated [illegible].
All [illegible] shall be covered with galvanized pile protectors as specified, [illegible] with hot creosote oil and covered with a thick [illegible] of heavy asphalt or tar.
Joints in top handrail must be staggered with joints in side rail.
All handrails and posts above the wheel guards shall be painted white and all handrail posts below the top of wheel guards shall be painted black as specified.
All bolts [illegible] 12 inches long must be threaded not less than 4 inches.
Bolts [illegible] shall not project more than one half inch beyond the nut.
All bolts must have std. C.I.O.G. or malleable cast washers under each head and nut.
Bolt lengths are calculated assuming C.I.O.G. washers will be used.
The contractor is cautioned to check bolt lengths before ordering because of variations in thickness of lumber and piling.
The entire exposed surface of all untreated timber shall be painted one coat as specified immediately after the material is delivered to the project.
Before placing handrailing the contact surfacing shall receive the second coat of paint.
When contractor is permitted to drill holes to facilitate pile driving, these holes must be drilled so piling will stand in vertical position after final driving.
Bid price for asphalt plank shall include galvanized barbed nails.
All hardware to be galvanized. Weights of hardware as shown are for ungalvanized material.
All necessary blocking for swaybracing shall be treated timber.



HALF END ELEVATION.

	INITIAL	DATE
[illegible] BY	F.S.T.	10-3-36
[illegible] BY		36
[illegible] BY		[illegible]
[illegible] BY		36

STANDARD P-117-BH-60

BOLTS AND WASHERS FOR ONE SPAN OF SUPERSTRUCTURE

LOCATION	SIZE	18'6 SPAN NO.	LENGTH	LBS.	22'6 SPAN NO.	LENGTH	LBS.	26'6 SPAN NO.	LENGTH	LBS.
POSTS TO RAILS	5/8	6	10	[illegible]	6	10	7.0	8	10	9.0
POSTS TO WHEEL GUARDS	3/4	6	14	[illegible]	6	14	12.0	8	14	17.0
POSTS TO STRINGERS	3/4	12	16	28.3	12	16	28.3	16	18	40.0
WHEEL GUARD TO STRINGERS	3/4	6	36	29.0	6	38	30.0	5	38	40.0
WASHERS STD. C.I.O.G.	5/8 & 3/4	12	48	69.0	12	48	69.0	2	64	92.0
TOTAL WEIGHT				142.0			147.0			200.0

BOLTS AND WASHERS FOR ONE ABUTMENT

LOCATION	ITEM	SIZE	NO.	LENGTH	WT. EACH	TOTAL WT.
POSTS TO RAILS	BOLTS	5/8	2	10	1.68 LBS.	3.2 LBS.
POST TO BULKHEAD TO CAP	BOLTS	5/8	2	27	2.48 LBS.	5.0 LBS.
POSTS TO STRINGERS	BOLTS	3/4	4	8	2.60 LBS.	10.4 LBS.
POSTS TO WHEEL GUARDS	BOLTS	3/4	6	14	2.12 LBS.	13.0 LBS.
WHEEL GUARDS TO STRINGERS	BOLTS	3/4	2	38	5.00 LBS.	10.0 LBS.
TIMBER HEADER TO STRINGERS	LAG SCREWS	5/8	14	16	1.36 LBS.	19.1 LBS.
CAPS TO CORBELS	BOLTS	3/4	2	26	3.56 LBS.	7.3 LBS.
WASHERS STD. C.I.O.G.	WASHERS	5/8 3/4	22/28		1.25 LBS.	52.0 LBS.
CAPS TO PILES	DRIFT BOLTS	3/4	8	24	3.00 LBS.	24.0 LBS.
TOTAL WEIGHT						143.0 LBS.

BOLTS AND WASHERS FOR ONE WING

LOCATION	ITEM	SIZE	NO.	LENGTH	WT. EACH	TOTAL WT.
POSTS TO RAILS	BOLTS	5/8	3	11	1.18 LBS.	3.4 LBS.
POSTS TO PILES	BOLTS	3/4	6	20	2.84 LBS.	17.0 LBS.
PILES TO CURB PLANK	BOLTS	3/4	3	8	1.74 LBS.	5.2 LBS.
WASHERS STD. C.I.O.G.	WASHERS 5/8 3/4		12/7		1.25 LBS.	24.4 LBS.
TOTAL WEIGHT						50.0 LBS.

BOLTS AND WASHERS FOR ONE BENT

LOCATION	ITEM	SIZE	NO.	LENGTH	WT. EACH	TOTAL WT.
POSTS TO RAILS	BOLTS	5/8	3	10	1.08 LBS.	3.2 LBS.
POSTS TO WHEEL GUARDS	BOLTS	3/4	2	14	2.12 LBS.	4.3 LBS.
POSTS TO CAPS WITHOUT SWAYS	BOLTS	5/8	2	24	2.33 LBS.	4.7 LBS.
WHEEL GUARDS TO STRINGERS	BOLTS	3/4	2	38	5.00 LBS.	10.0 LBS.
POSTS TO STRINGERS TO SPLICES	BOLTS	3/4	4	24	3.31 LBS.	13.3 LBS.
SPLICES TO STRINGERS	BOLTS	5/8	12	16	.81 LBS.	9.8 LBS.
CAP SPLICE	BOLTS	3/4	4	14	2.12 LBS.	8.6 LBS.
CAPS TO CORBELS	BOLTS	3/4	2	26	3.56 LBS.	7.2 LBS.
SWAYBRACES TO PILES	BOLTS	5/8	[illegible]	[illegible]	1.66 LBS.	[illegible]
SWAY TO PILE TO SWAY	BOLTS	5/8	[illegible]	20	1.90 LBS.	[illegible]
WASHERS STD. C.I.O.G. NO SWAYS	WASHERS 5/8 3/4		75		1.25 LBS.	59.0 LBS.
WASHERS STD. C.I.O.G. WITH SWAYS	WASHERS 5/8 3/4		[illegible]		1.25 LBS.	[illegible]
CAPS TO PILES	DRIFT BOLTS	3/4	[illegible]	24	3.00 LBS.	[illegible]
TOTAL WEIGHT WITHOUT SWAYBRACES						149.0 LBS.
TOTAL WEIGHT WITH SWAYBRACES						— LBS.

NAILS

LOCATION	ITEM	18'6 SPAN	22'6 SPAN	26'6 SPAN
ONE SPAN OF SUPERSTRUCTURE	30D COMMON	[illegible] LBS.	30 LBS.	35 LBS.
	30D GALV. BARBED	[illegible] LBS.	150 LBS.	180 LBS.
	40D COMMON	[illegible] LBS.	[illegible] LBS.	[illegible] LBS.
ONE ABUTMENT	40D COMMON	5 LBS.	[illegible] LBS.	[illegible] LBS.
	7" WIRE SPIKES	[illegible] LBS.	26 LBS.	[illegible] LBS.
ONE WING	40D COMMON	[illegible] LBS.	1 LBS.	[illegible] LBS.
	7" WIRE SPIKES	[illegible] LBS.	8 LBS.	[illegible] LBS.
ONE BENT	40D COMMON	[illegible] LBS.	[illegible] LBS.	[illegible] LBS.
	7" WIRE SPIKES	LBS.	— LBS.	LBS.

SUMMARY FOR HARDWARE

BOLTS AND WASHERS	4 SPANS	AT	147 LBS. PER SPAN	588 LBS.
	2 ABUTMENTS	AT	143 LBS. PER ABUTMENT	286 LBS.
	4 WINGS	AT	50 LBS. PER WING	200 LBS.
	3 BENTS WITHOUT SWAYS	AT	149 LBS. PER BENT	447 LBS.
	BENTS WITH SWAYS	AT	— LBS. PER BENT	— LBS.
	TOTAL WEIGHT			1521 LBS.

	LOCATION	UNIT	30D COMMON EACH	30D COMMON TOTAL	30D GALV. EACH	30D GALV. TOTAL	40D COMMON EACH	40D COMMON TOTAL	7" WIRE SPIKES EACH	7" WIRE SPIKES TOTAL
NAILS	4 SPANS	LBS.	30	120	150	600	195	780	—	—
	2 ABUTMENTS	LBS.	—	—	—	—	5	10	26	52
	4 WINGS	LBS.	—	—	—	—	1	4	8	32
	3 BENTS	LBS.	—	—	—	—	7	21	—	—
	TOTAL WEIGHT	LBS.		120		600		815		84

SUMMARY OF QUANTITIES

STRUCTURAL EXCAVATION					
ITEM 14a	DRY ROCK				— CU. YDS.
ITEM 14b	DRY COMMON				45 CU. YDS.
ITEM 14c	WET ROCK				— CU. YDS.
ITEM 14d	WET COMMON				— CU. YDS.
ITEM 42a UNTREATED BRIDGE TIMBER					
4 SPANS		AT	312 BD. FT. EACH	=	1248 BD. FT.
2 ABUTMENTS		AT	48 BD. FT. EACH	=	96 BD. FT.
4 WINGS		AT	84 BD. FT. EACH	=	336 BD. FT.
3 BENTS		AT	48 BD. FT. EACH	=	144 BD. FT.
			TOTAL	=	1824 BD. FT.
ITEM 42b TREATED BRIDGE TIMBER					
2 SPANS		AT	8880 BD. FT. EACH	=	17760 BD. FT.
2 SPANS		AT	8871 BD. FT. EACH	=	17742 BD. FT.
2 ABUTMENTS		AT	2256 BD. FT. EACH	=	4512 BD. FT.
4 WINGS		AT	480 BD. FT. EACH	=	1920 BD. FT.
3 BENTS		AT	858 BD. FT. EACH	=	2574 BD. FT.
			TOTAL	=	44508 BD. FT.
ITEM 43 ASPHALT PLANK WEARING SURFACE					
4 SPANS		AT	675 SQ. FT. EACH	=	2700 SQ. FT.
ITEM 60c TREATED PILING CUT-OFF					
					10 LIN. FT.
ITEM 60a PILING-TREATED					
2 ABUTMENTS		AT	192 LIN. FT. EACH	=	384 LIN. FT.
4 WINGS		AT	112 LIN. FT. EACH	=	448 LIN. FT.
3 BENTS		AT	168 LIN. FT. EACH	=	504 LIN. FT.
			TOTAL	=	1336 LIN. FT.
ITEM 60e METAL PILE SHOES					
— SHOES		AT	38 LBS. EACH	=	— SHOES
ITEM 89b DRAIN PIPE					
2 PIECES 3" DIA. GALV. PIPE 2'4" LONG WITH ONE 3" GALV. FLANGE ON EACH PIPE					
4 SPANS		AT	2 COMPLETE PER SPAN	=	8 PIECES

ONE SPAN OF SUPERSTRUCTURE

DESCRIPTION	SIZE	18'6 SPAN NO.	LENGTH	TOTAL	22'6 SPAN NO.	LENGTH	TOTAL	26'6 SPAN NO.	LENGTH	TOTAL
UNTREATED TIMBER										
HANDRAILS S4S	3x8	4	20'0	160 BD. FT.	[illegible]	24'0"	[illegible]	[illegible]	[illegible]	[illegible]
HANDRAIL POSTS S4S	6x8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL UNTREATED TIMBER				280 BD. FT.			312 BD. FT.			[illegible]
TREATED TIMBER										
BRIDGING	3x8	7	10'0	105 BD. FT.	[illegible]	10'0	125 BD. FT.	[illegible]	[illegible]	[illegible]
WHEEL GUARDS	6x10	2	20'0	200 BD. FT.	2	24'0	240 BD. FT.	[illegible]	[illegible]	[illegible]
STRINGERS OUTSIDE INTERMEDIATE SPANS	6x18 / 6x20 / 8x20	[illegible]	18'6	333 BD. FT.	[illegible]	22'6	[illegible]	[illegible]	[illegible]	[illegible]
STRINGERS OUTSIDE END SPANS	6x18 / 6x20 / 8x20	[illegible]	[illegible]	341 BD. FT.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
STRINGERS INSIDE INTERMEDIATE AND END SPANS	6x18 / 6x20 / 8x20	[illegible]	[illegible]	2780 BD. FT.	[illegible]	24'0	[illegible]	[illegible]	[illegible]	[illegible]
FLOORING S4S	3x6 / 3x6				[illegible]	[illegible]	[illegible]			
TOTAL TR. TIMBER - SINGLE SPAN				[illegible] BD. FT.			[illegible] BD. FT.			11266 BD. FT.
TOTAL TR. TIMBER - END SPANS				[illegible] BD. FT.			8880 BD. FT.			[illegible] BD. FT.
TOTAL TR. TIMBER - INTER. SPANS				6843 BD. FT.			8871 BD. FT.			[illegible] BD. FT.
ASPHALT PLANK WEARING SURF.				555 SQ. FT.			675 SQ. FT.			[illegible] SQ. FT.

ONE ABUTMENT

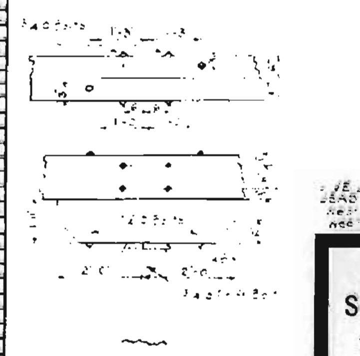
UNTREATED TIMBER				
HANDRAIL POSTS S4S	[illegible]	[illegible]		[illegible] BD. FT.
TOTAL UNTREATED TIMBER				[illegible] BD. FT.
TREATED TIMBER				
TIMBER HEADER	2 PCS.	8"x10"x22'0" FINISH TO 7'x9"		294 BD. FT.
CAP	1 PC. EA.	12"x12"x27'0", 21'0" 4'0"		624 BD. FT.
BULKHEAD PLANKS	4 PCS. EA.	3"x8"x26'0", 20'0"		368 BD. FT.
BACKING PLANKS	4 PCS. EA.	4"x12"x26'0", 20'0"		736 BD. FT.
STRINGER BLOCKING (to be placed before treatment)	22'6 SPANS 1 PC.	6"x18"x26'[illegible]		234 BD. FT.
TOTAL TREATED TIMBER				2256 BD. FT.
PILING-TREATED	8 PIECES AT 24 LIN. FT. EACH =			192 LIN. FT.

ONE WING

DESCRIPTION	SIZE	[illegible] LENGTH NO.	LENGTH	BD. FT.	12'0 LENGTH NO.	LENGTH	BD. FT.	20'0 LENGTH NO.	LENGTH	BD. FT.
UNTREATED TIMBER										
HANDRAILS S4S	3x8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
HANDRAIL POSTS S4S	6x8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL UNTREATED TIMBER BD. FT.				[illegible]			84			[illegible]
TREATED TIMBER										
CURB PLANKS	4x8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32	[illegible]	[illegible]	32
BACKING PLANKS	4x12	[illegible]	[illegible]	[illegible]	7	[illegible]	448	[illegible]	[illegible]	[illegible]
TOTAL TREATED TIMBER BD. FT.							480			
PILING-TREATED		4 PIECES AT 28 LIN. FT. EACH =								112 LIN. FT.

ONE BENT

UNTREATED TIMBER				
HANDRAIL POSTS S4S	[illegible]	[illegible]		[illegible] BD. FT.
TOTAL UNTREATED TIMBER				[illegible] BD. FT.
TREATED TIMBER				
STRINGER SPLICES	2 PCS.	6"x[illegible]x4'0"		[illegible] BD. FT.
CAP	1 PC. EA.	12"x12"x24'0", 24'0" 4'0"		624 BD. FT.
SWAYBRACES				— BD. FT.
STRINGER BLOCKING (to be placed before treatment) — 18'6 & 22'6 SPANS	1 PC.	6"x18"x18'0"		162 BD. FT.
26'6 SPANS				— BD. FT.
TOTAL TREATED TIMBER				858 BD. FT.
PILING-TREATED	7 PIECES AT 24 LIN. FT. EACH =			168 LIN. FT.



DETAIL OF CORBEL FOR CAPS

Corbel and Caps to be cut and drilled before treatment

STRUCTURES REQUIRED
4 SPANS AT 22'-6"
SPANS AT

DESIGN DATA
LIVE LOAD: A.A.S.H.O. AUG. 1931 CLASS H [illegible]
DEAD LOAD: [illegible] Asphalt Plank Wearing Surface

COLORADO
STATE HIGHWAY DEPARTMENT
TREATED TIMBER PILE TRESTLE WITH 3" LAMINATED FLOOR AND 2" ASPHALT PLANK WEARING SURFACE
30 FT. CLEAR ROADWAY
Across WILLOW CREEK
Sta. 87+60.5 To 188+52.2
Near Lamar Sec. 35 T 22 S R 46 W

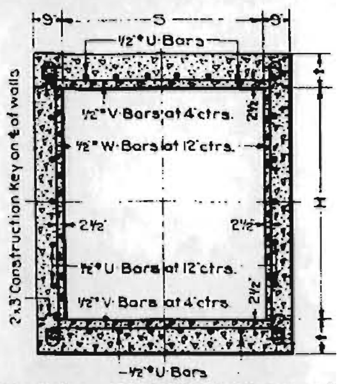
Designed by A.G.K. | Approved by P. S. Bailey, Bridge Engineer
Made by A.G.K.
Check Design [illegible]
Check Detail [illegible] | Date: Feb. 9, 1935

STRUCTURE NO. L-26 X

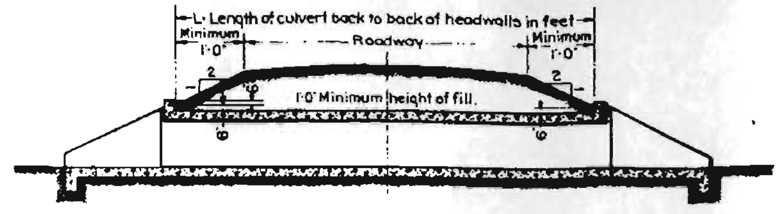
STANDARD M-103-D

[redacted]

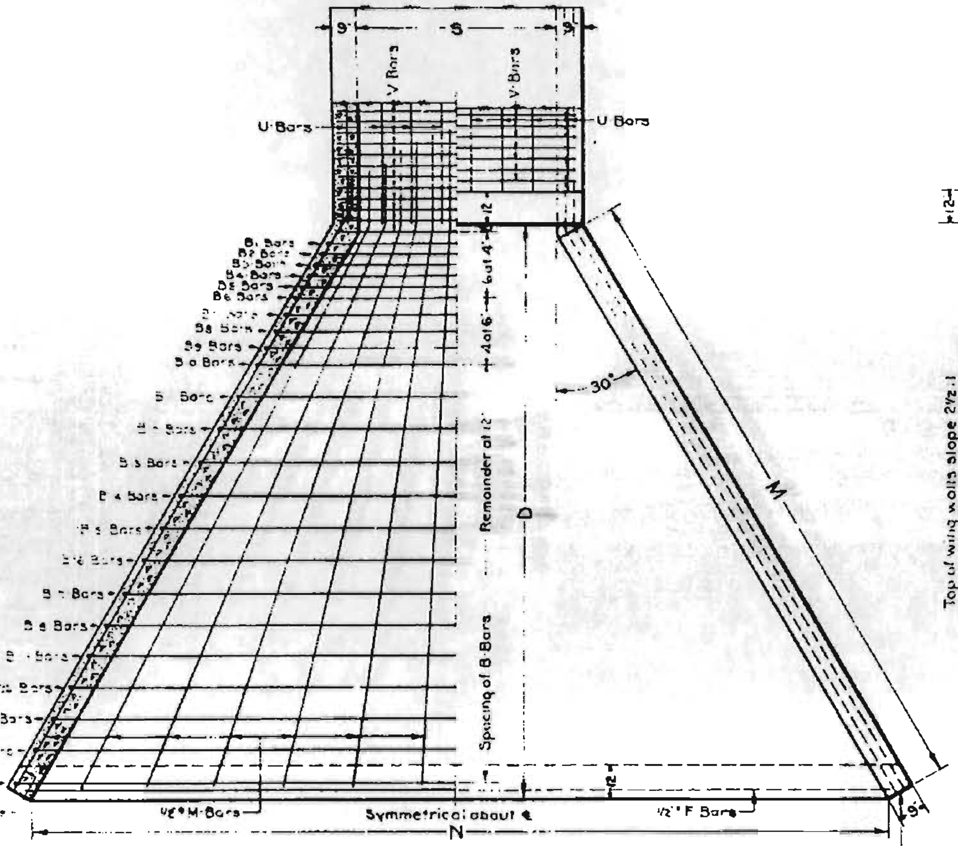
FED. ROAD DIST. NO.	STATE		SHEET NO.	TOTAL SHEETS
3	COLO.	A.W.H. 4003	9	



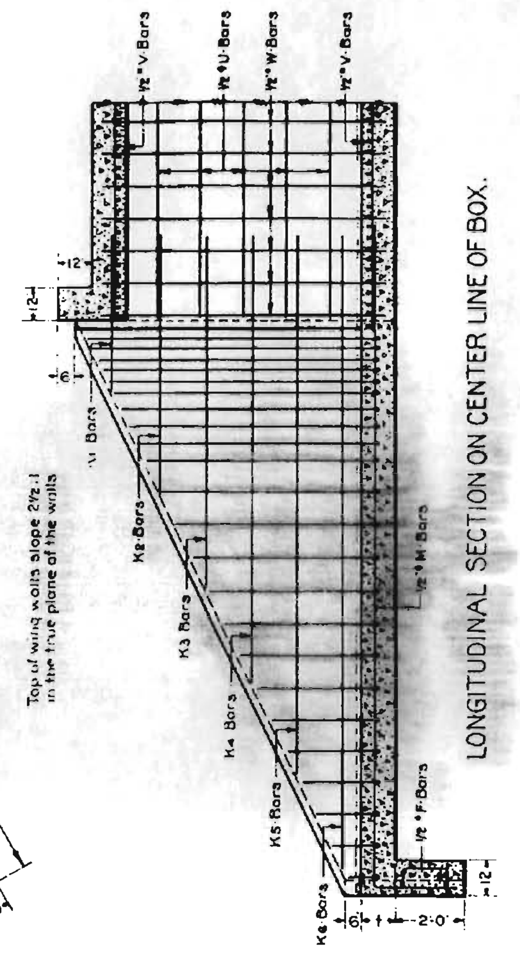
TYPICAL SECTION THRU BOX.



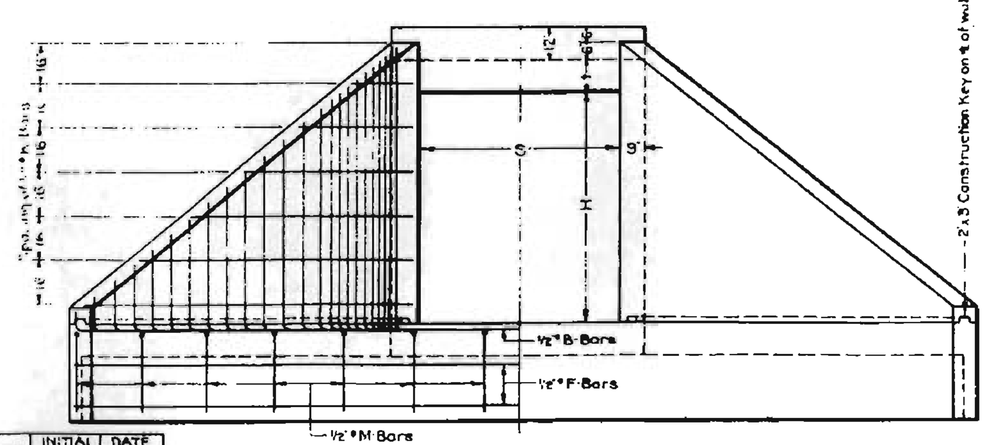
TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY.



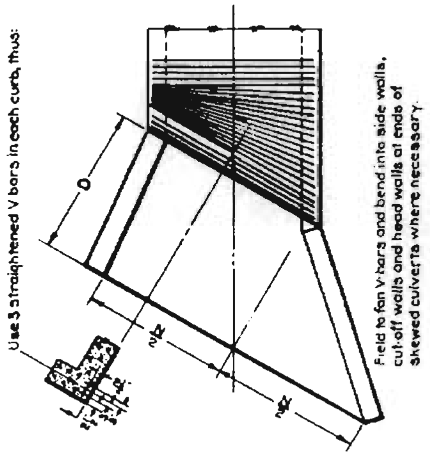
PART PLAN.



LONGITUDINAL SECTION ON CENTER LINE OF BOX.



END VIEW.



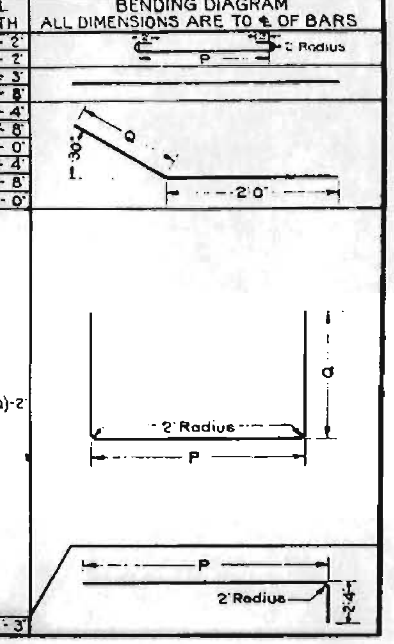
PART PLAN FOR SKEWED HEADWALLS.

REINFORCEMENT BAR LIST

W.W.D.

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P	DIMENSION Q	TOTAL LENGTH
All Sizes	V	1/2"ф	(6×L)+14	S + 10"		S + 2'-2"
" "	W	1/2"ф	(2×L)+6	H + 10"		H + 2'-2"
" "	F	1/2"ф	4			N + 0'-3"
" "	U	1/2"ф	★			L + 1'-8"
" "	K 1	1/2"ф	4		3'-4"	5'-4"
H=2'-0" or more	K 2	1/2"ф	4		6'-8"	8'-8"
H=3'-0" " "	K 3	1/2"ф	4		10'-0"	12'-0"
H=5'-0" " "	K 4	1/2"ф	4		13'-4"	15'-4"
H=6'-0" " "	K 5	1/2"ф	4		16'-8"	18'-8"
H=7'-0" " "	K 6	1/2"ф	4		20'-0"	22'-0"
All Sizes	B 1	1/2"ф	2	S + 1'-6"	H + 1'-3"	
" "	B 2	1/2"ф	2	S + 1'-11"	H + 1'-1"	
" "	B 3	1/2"ф	2	S + 2'-3"	H + 0'-11"	
" "	B 4	1/2"ф	2	S + 2'-8"	H + 0'-9"	
" "	B 5	1/2"ф	2	S + 3'-0"	H + 0'-8"	
" "	B 6	1/2"ф	2	S + 3'-5"	H + 0'-6"	
" "	B 7	1/2"ф	2	S + 4'-0"	H + 0'-3"	
" "	B 8	1/2"ф	2	S + 4'-7"	H + 0'-0"	
" "	B 9	1/2"ф	2	S + 5'-2"	H - 0'-3"	
H=1'-6" or more	B 10	1/2"ф	2	S + 5'-9"	H - 0'-5"	
H=2'-0" " "	B 11	1/2"ф	2	S + 6'-11"	H - 0'-11"	P+(2×Q)-2"
H=3'-0" " "	B 12	1/2"ф	2	S + 8'-1"	H - 1'-4"	
H=3'-0" " "	B 13	1/2"ф	2	S + 9'-3"	H - 1'-10"	
H=3'-0" " "	B 14	1/2"ф	2	S + 10'-5"	H - 2'-3"	
H=4'-0" " "	B 15	1/2"ф	2	S + 11'-7"	H - 2'-3"	
H=4'-0" " "	B 16	1/2"ф	2	S + 12'-9"	H - 3'-3"	
H=5'-0" " "	B 17	1/2"ф	2	S + 13'-11"	H - 3'-8"	
H=5'-0" " "	B 18	1/2"ф	2	S + 15'-1"	H - 4'-2"	
H=6'-0" " "	B 19	1/2"ф	2	S + 16'-3"	H - 4'-7"	
H=6'-0" " "	B 20	1/2"ф	2	S + 17'-5"	H - 5'-1"	
H=6'-0" " "	B 21	1/2"ф	2	S + 18'-7"	H - 5'-6"	
H=7'-0" " "	B 22	1/2"ф	2	S + 19'-9"	H - 6'-0"	
H=7'-0" " "	B 23	1/2"ф	2	S + 20'-11"	H - 6'-5"	
All Sizes	M	1/2"ф	(S+1)×4	D + 3'-0"		D + 5'-3"

BENDING DIAGRAM — ALL DIMENSIONS ARE TO ℄ OF BARS



★ See table of Dimensions and Quantities.

TABLE OF DIMENSIONS AND QUANTITIES

W.W.D.

STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE FOR OVERRUN OF 1%.

TOTAL QUANTITIES FOR ONE BOX EQUALS THE QUANTITY FOR TWO HEADWALLS PLUS (L × QUANTITY FOR ONE LINEAL FT. OF BOX)

SPAN S	HEIGHT H	HEIGHT OF FILL ALLOWED	DIMENSION M	DIMENSION N	DIMENSION D	THICKNESS OF SLAB t	NUMBER OF U-BARS PER BOX	QUANTITIES FOR ONE LINEAL FT. OF BOX: CONCRETE CU. YDS.	QUANTITIES FOR ONE LINEAL FT. OF BOX: STEEL LBS.	QUANTITIES FOR TWO HEADWALLS: CONCRETE CU. YDS.	QUANTITIES FOR TWO HEADWALLS: STEEL LBS.	STRUCTURAL EXCAVATION: TWO HEADWALLS SQ. FT.	STRUCTURAL EXCAVATION: TWO CUT-OFF WALLS CU. YDS.
1'-6"	1'-6"	29'-6"	5'-6 1/4"	7'-2 3/8"	5'-1 7/8"	8 1/2"	6	0.241	30.6	4.5	320	116.91	4.40
2'-0"	2'-0"	22'-6"	6'-9 1/4"	8'-11 5/8"	6'-2 7/8"	8 1/2"	8	0.293	34.0	6.1	430	153.44	5.18
3'-0"	1'-0"	19'-0"	4'-7"	7'-9 3/8"	4'-4 1/8"	10"	8	0.332	37.5	5.0	360	116.50	4.65
3'-0"	2'-0"	19'-0"	7'-1"	10'-3 3/8"	6'-6 1/8"	10"	10	0.388	40.5	7.7	495	178.11	5.76
3'-0"	3'-0"	19'-0"	9'-7"	12'-9 3/8"	8'-8 1/8"	10"	12	0.444	43.6	11.0	680	250.88	6.87
4'-0"	2'-0"	15'-0"	7'-1"	11'-3 3/8"	6'-6 1/8"	10"	12	0.450	47.0	8.5	565	195.13	6.19
4'-0"	3'-0"	15'-0"	9'-7"	13'-9 3/8"	8'-8 1/8"	10"	14	0.506	50.0	12.0	755	272.24	7.31
4'-0"	4'-0"	15'-0"	12'-1"	16'-3 3/8"	10'-10 1/8"	10"	16	0.562	53.1	16.0	910	359.71	8.42
5'-0"	3'-0"	11'-6"	9'-7"	14'-9 3/8"	8'-8 1/8"	10"	18	0.567	56.6	12.8	835	293.60	7.76
5'-0"	4'-0"	11'-6"	12'-1"	17'-3 3/8"	10'-10 1/8"	10"	18	0.623	59.6	17.1	995	385.43	8.87
5'-0"	5'-0"	11'-6"	14'-7"	19'-9 3/8"	13'-0"	10"	20	0.679	62.7	21.9	1220	488.07	9.98
6'-0"	2'-0"	10'-0"	7'-4 3/4"	13'-7 1/8"	6'-9 3/8"	11 1/2"	16	0.645	60.0	11.3	705	239.30	7.23
6'-0"	3'-0"	10'-0"	9'-10 3/4"	16'-1 1/8"	8'-11 1/4"	11 1/2"	18	0.699	63.0	15.3	920	325.95	8.34
6'-0"	4'-0"	10'-0"	12'-4 3/4"	18'-7 1/8"	11'-1 1/4"	11 1/2"	20	0.755	66.2	20.1	1090	423.57	9.45
6'-0"	5'-0"	10'-0"	14'-10 3/4"	21'-1 1/8"	13'-3 1/4"	11 1/2"	22	0.810	69.2	25.6	1320	532.02	10.56
6'-0"	6'-0"	10'-0"	17'-4 3/4"	23'-7 1/8"	15'-5 1/4"	11 1/2"	24	0.866	72.3	31.7	1620	651.48	11.67
6'-0"	7'-0"	10'-0"	19'-10 3/4"	26'-1 1/8"	17'-7 1/4"	11 1/2"	26	0.923	75.3	38.5	1900	781.58	12.79

[redacted]

GENERAL NOTES.

All work shall be done according to the Standard Specifications of the Colorado State Highway Department. Adopted August 1-1935.

All concrete shall be class 'A'.

All exposed surfaces shall be rubbed free of form marks.

All walls shall have forms on both sides.

Minimum distance between center line of bar and edge of concrete to be 2 1/2".

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

Footings in rock shall be poured out to the rock and not formed.

For culverts required and governing dimensions see sheet Nº 2.

All reinforcing bars shall be deformed.

All reinforcing bars shall be tagged with the station number and letter designation.

Secondary bars when spliced shall be given a lap of 50 diameters.

Main bars shall not be spliced.

Soundings and depth of footings shown are according to the best available data, if essentially different conditions are encountered, the engineer will inspect and determine if redesign is necessary.

Pour wing footings monolithically with floor of box.

The use of additional construction joints undesirable, should field conditions require, construction joints may be made on a vertical plane perpendicular to center line of culvert and shall have a 2"×3" key.

This design not to be used when height of fill exceeds the allowable tabulated.

Supporting soils for all culverts must be composed of firm and uniform material throughout.

All backfilling in approaches, to and over culverts, shall be laid in layers not exceeding 6 inches in depth and each layer shall be rolled or hand tamped where inaccessible to roller, also moistened when necessary.

LOADING DATA
LL = A.A.S.H.O. Aug. 1928 Class 'A' (H-15)

COLORADO
STATE HIGHWAY DEPARTMENT
CONCRETE BOX CULVERTS

1 1/2'×1 1/2'	4'×2'	5'×4'	6'×4'
2'×2'	4'×3'	5'×5'	6'×5'
3'×1'	4'×4'	6'×2'	6'×6'
3'×2'	5'×3'	6'×3'	6'×7'
3'×3'	[redacted]	[redacted]	[redacted]

Designed by A.G.K.
Made by A.G.K.
Check Design
Check Detail H.E.S.

Approved by Ed Bailey
Bridge Engineer
Date: April 25th 1936

	INITIAL	DATE
ORIGINAL BY	[redacted]	
CHECKED BY		
VANDYKE BY		
CHECKED BY		

STANDARD M-103-D.

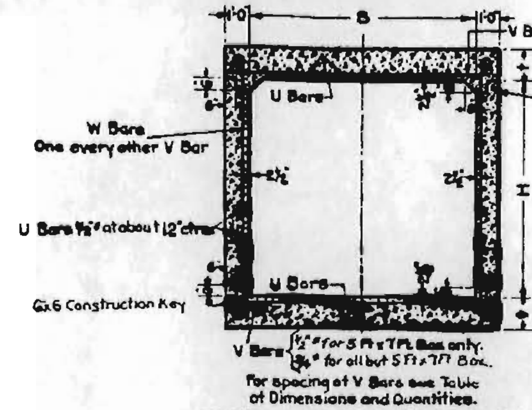
STRUCTURE NO.

STANDARD M-104-D

REVISED FOR 7'x3'-6" BOX

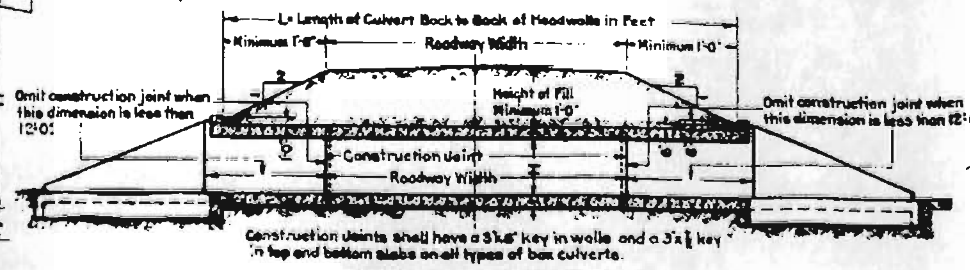
FED. ROAD DIST. No.	STATE	A.W. PROJ. No.	SHEET No.	TOTAL SHEETS
3	COLO	4003	10	

Revised 7-14-33 A.G.K. Changed Length of B and E Bars.



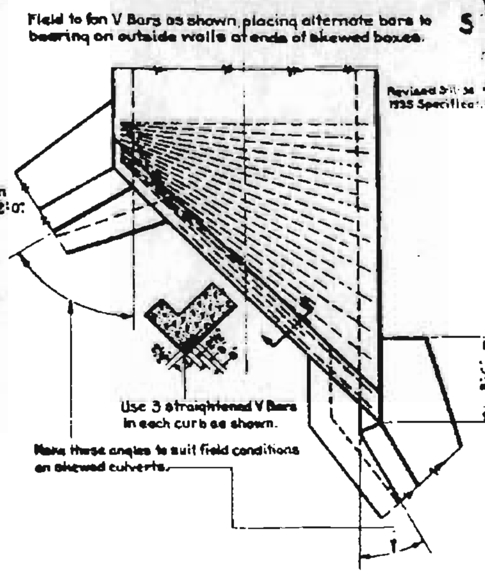
V Bars ½" for 5 Ft. x 7 Ft. Box only. ¾" for all but 5 Ft. x 7 Ft. Box.
6"x6" Construction Key.
U Bars
W Bars One every other V Bar
U Bars ½" at about 12" ctrs.
6x6 Construction Key
V Bars ½" for 5 Ft x 7 Ft. Box only. ¾" for all but 5 Ft x 7 Ft. Box.
For spacing of V Bars see Table of Dimensions and Quantities.

TYPICAL SECTION THRU BOX

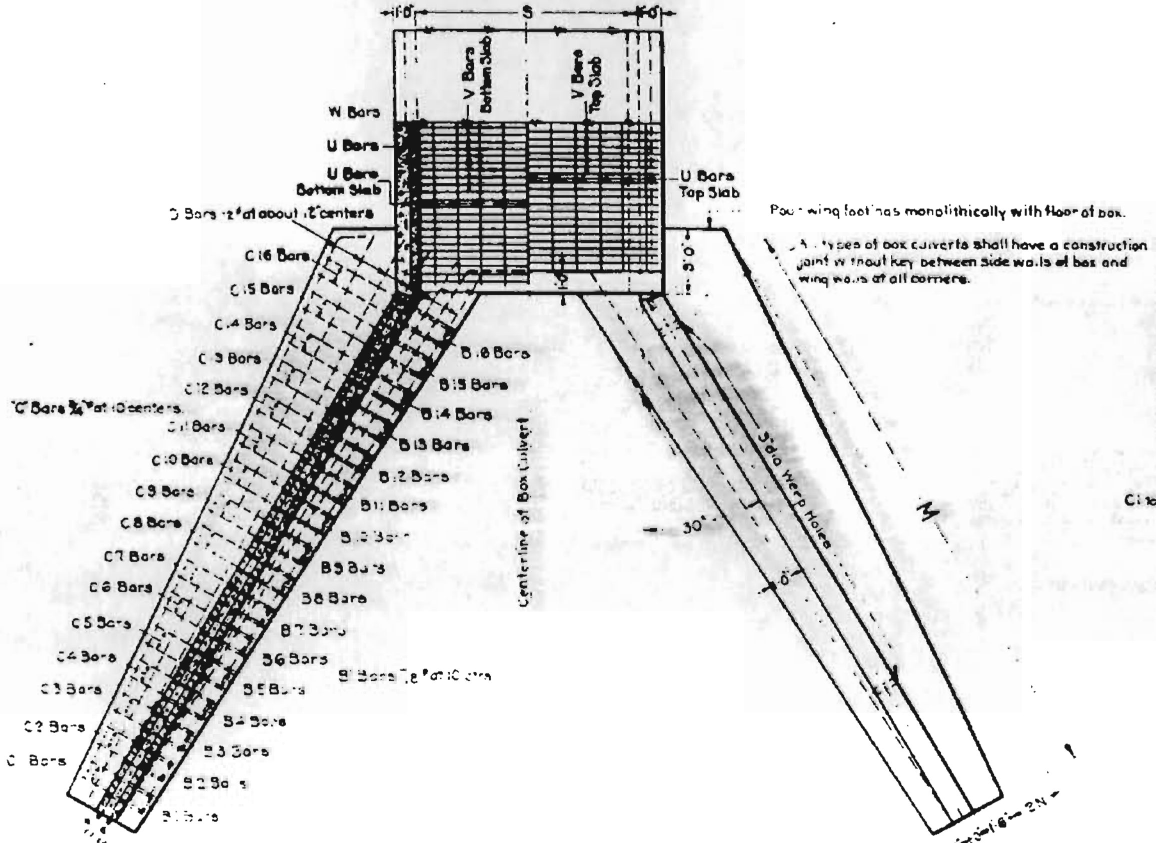


L = Length of Culvert Back to Back of Headwalls in Feet
Minimum 1'-0"
Roadway Width
Minimum 1'-0"
Height of Fill Minimum 1'-0"
Omit construction joint when this dimension is less than 12'-0".
Omit construction joint when this dimension is less than 12'-0".
Construction Joint
Roadway Width
Construction Joints shall have a 3"x6" key in walls and a 3"x1½" key in top and bottom slabs on all types of box culverts.

SECTION SHOWING RELATION OF CULVERT TO ROADWAY

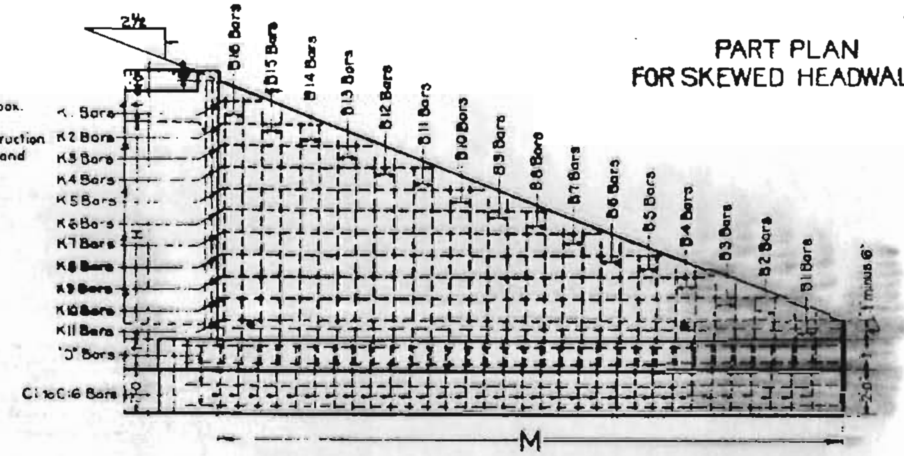


PART PLAN FOR SKEWED HEADWALLS

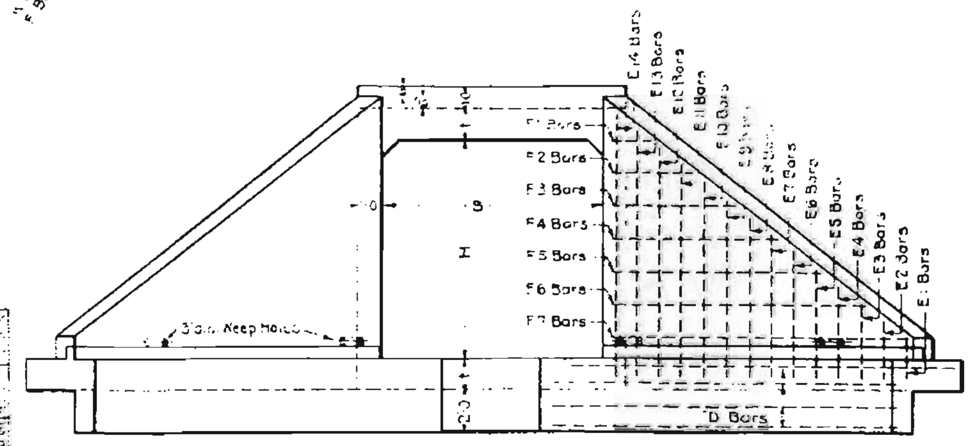


V Bars Bottom Slab
V Bars Top Slab
W Bars
U Bars
U Bars Bottom Slab
U Bars Top Slab
D Bars ½" at about 12" centers
C16 Bars
C15 Bars
C14 Bars
C13 Bars
C12 Bars
"C" Bars ¾" at 10" centers
C11 Bars
C10 Bars
C9 Bars
C8 Bars
C7 Bars
C6 Bars
C5 Bars
C4 Bars
C3 Bars
C2 Bars
C1 Bars
B16 Bars
B15 Bars
B14 Bars
B13 Bars
B12 Bars
B11 Bars
B10 Bars
B9 Bars
B8 Bars
B7 Bars
B6 Bars
B5 Bars
B4 Bars
B3 Bars
B2 Bars
B1 Bars
B Bars ½" at 10" ctrs
Centerline of Box Culvert
3" dia. Weep Holes
30°
M
Pour wing foot monolithically with floor of box.
All types of box culverts shall have a construction joint without key between side walls of box and wing walls at all corners.

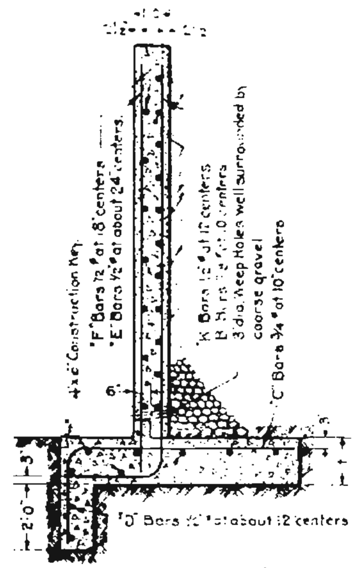
PART PLAN



TRUE SIDE ELEVATION OF WINGWALL



END VIEW



TYPICAL SECTION THRU WINGWALL

REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P	TOTAL LENGTH
All Boxes but 5'x7'	V	¾"	24(L+2) divided by Spacing	S+14"	P+2'-0"
5'x7' Box Only	V	½"		S+14"	P+2'-0"
All Sizes	W	[illegible]	½ No. of V Bars	H+10"	P+2'-0"
All Sizes	U	½"	[illegible]		[illegible]
All Sizes	D	½"	36		[illegible]
All Sizes	[illegible]	½"	4		[illegible]
All Sizes	[illegible]	½"	4		[illegible]
All Sizes	[illegible]	½"	4		[illegible]
All Sizes	[illegible]	½"	4		[illegible]
All Sizes	[illegible]	½"	4		[illegible]
All Sizes	[illegible]	½"	4		[illegible]

BENDING DIAGRAM ALL DIMENSIONS ARE TO ℄ OF BARS

NOTE FOR "E" BARS ONLY.

NOTE: THE ABOVE BAR LIST IS FOR A 7x3'-6" BOX ONLY.

★ SEE TABLE OF DIMENSIONS AND QUANTITIES.

TABLE OF DIMENSIONS AND QUANTITIES

STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE OF [illegible] RUN

(TOTAL QUANTITIES FOR ONE BOX EQUALS THE QUANTITY FOR TWO HEADWALLS PL[illegible]TY FOR ONE LIN. FT. BOX)

HEIGHT OF FILL ALLOWED	TYPE	SPAN S	HEIGHT H	THICKNESS OF SLAB t	SPACING OF BARS V	SIZE OF BARS W	NUMBER OF U BARS PER BOX	LENGTH OF WINGWALL M	DIMENSION N	QUANTITIES FOR [illegible] FT. OF BOX: CONCRETE	STEEL LBS.	QUANTITIES FOR TWO HEADWALLS: CONCRETE CU. YDS.	STEEL LBS.
11'-6"		5'-0"	7'-0"	10"	4"	½"	24	20'-0"	10"	[illegible]	79	35.5	3260
7'-0"	8 I	8'-0"	4'-0"	11½	5½	½"	24	12'-6"	7"	[illegible]	100	22.5	1615
			5'-0"	11½	5½	½"	26	15'-0"	8"	1.090	103	27.0	2300
			6'-0"	11½	5½	½"	28	17'-6"	9"	1.164	106	33.0	2840
			8'-0"	11½	5½	½"	32	22'-6"	1'-0"	1.318	116	45.0	4135
8'-6"	8 II	8'-0"	4'-0"	12½	5"	½"	24	12'-6"	7"	1.078	109	23.5	1850
			5'-0"	12½	5"	½"	26	15'-0"	8"	1.152	112	27.5	2340
			6'-0"	12½	5"	½"	28	17'-6"	9"	1.226	115	34.0	2880
			8'-0"	12½	5"	½"	32	22'-6"	1'-0"	1.374	126	47.0	4150
10'-6"	8 III	8'-0"	4'-0"	13½	4½	½"	24	12'-6"	7"	1.140	120	24.0	1910
			5'-0"	13½	4½	½"	26	15'-0"	8"	1.214	122	29.5	2415
			6'-0"	13½	4½	½"	28	17'-6"	9"	1.288	126	35.5	2965
			8'-0"	13½	4½	½"	32	22'-6"	1'-0"	1.436	137	48.5	4290
4'-0"	10 I	10'-0"	4'-0"	13"	5"	½"	28	12'-6"	7"	1.269	126	24.0	1850
			6'-0"	13"	5"	½"	32	17'-6"	9"	1.417	131	35.5	2935
			8'-0"	13"	5"	½"	36	22'-6"	1'-0"	1.566	138	48.5	4250
			10'-0"	13"	5"	⅝"	40	27'-6"	1'-2"	1.714	156	64.0	5530
6'-0"	10 II	10'-0"	4'-0"	14"	4½	½"	28	12'-6"	7"	1.343	138	25.0	1965
			6'-0"	14"	4½	½"	32	17'-6"	9"	1.491	144	37.5	3025
			8'-0"	14"	4½	½"	36	22'-6"	1'-0"	1.640	151	51.0	4350
			10'-0"	14"	4½	⅝"	40	27'-6"	1'-2"	1.788	170	66.0	5650
9'-0"	10 III	10'-0"	4'-0"	15½	4"	½"	28	12'-6"	7"	1.454	153	27.0	2055
			6'-0"	15½	4"	½"	32	17'-6"	9"	1.603	160	39.5	3125
			8'-0"	15½	4"	½"	36	22'-6"	1'-0"	1.751	166	54.0	4475
			10'-0"	15½	4"	⅝"	40	27'-6"	1'-2"	1.899	188	69.5	5795
12'-0"	10 IV	10'-0"	4'-0"	17"	3½	½"	28	12'-6"	7"	1.566	172	29.0	2145
			6'-0"	17"	3½	½"	32	17'-6"	9"	1.714	179	42.0	3240
			8'-0"	17"	3½	½"	36	22'-6"	1'-0"	1.862	194	57.0	4610
			10'-0"	17"	3½	¾"	40	27'-6"	1'-2"	2.010	232	73.5	5955
7'-0"	7 I	7'-0"	3'-6"	11½"	5½"	½"	22	11'-3"	0'-6"	0.901	92	190	1630

GENERAL NOTES

All work shall be done in accordance with the standard specifications of the Colorado State Highway Department, adopted August 1, 1932 [illegible]

All concrete shall be Class A.

All walls shall have forms on both sides.

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

All bars shall be deformed.

Minimum distance from centerline of bars to edge of concrete to be 2½".

[illegible] bars when spliced shall be lapped two feet.

For culverts required and governing dimensions see sheet No. 2.

All reinforcing bars shall be tagged with the station number and letter designation.

This design not to be used when height of fill over box exceeds that tabulated as allowable.

Pour wing footings monolithically with floor of box.

Pour wings independent of sides of box.

The use of additional construction joints undesirable. Should field conditions require, construction joints may be made on a vertical plane perpendicular to centerline of culvert, and shall have keys as shown.

Supporting [illegible] for all culverts must be composed of firm and uniform material throughout.

All backfill [illegible] over culverts shall be laid in layers not exceeding six inches in depth and each layer shall be rolled or hand tamped where inaccessible to roller, also moistened when necessary.

LOADING DATA

[illegible] A.A.S.H.O. AUG 1928 CLASS "A" (H-15)

COLORADO

STATE HIGHWAY DEPARTMENT

STANDARD

CONCRETE BOX CULVERT

8 FT. x 4 FT. 5 FT. x 7 FT. 10 FT. x 6 FT.

8 FT. x 5 FT. 8 FT. x 8 FT. 10 FT. x 8 FT.

8 FT. x 6 FT. 10 FT. x 4 FT. 10 FT. x 10 FT.

7 FT. x 3'-6" [redacted]

Designed by A.G.K. Approved by [signature]

Made by A.G.K. Bridge Engineer

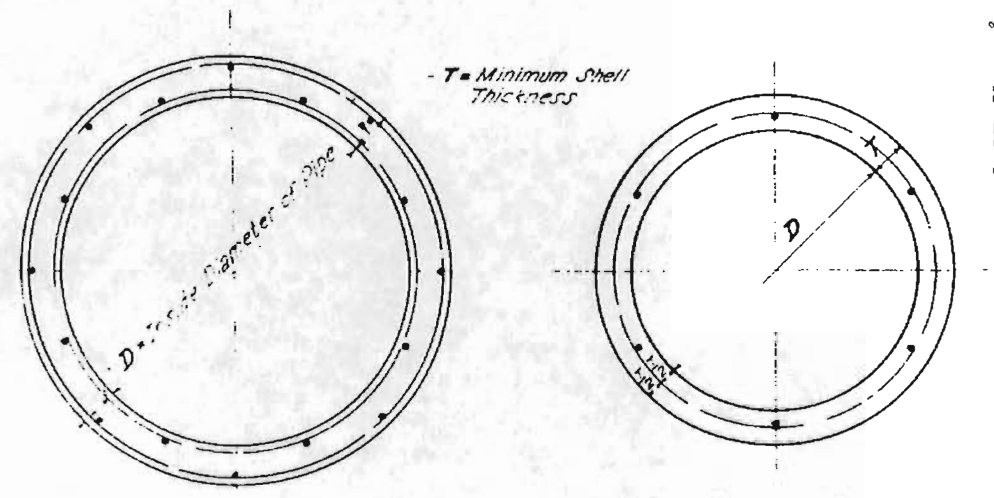
Checked by A.L.C. Date 7-20, 1932

STRUCTURE NO. _

M-104 D

FED. ROAD DIST. NO	STATE	A.W.P.	SHEET NO	TOTAL SHEETS
3	COLO.	4003	11	

STANDARD M-112-C

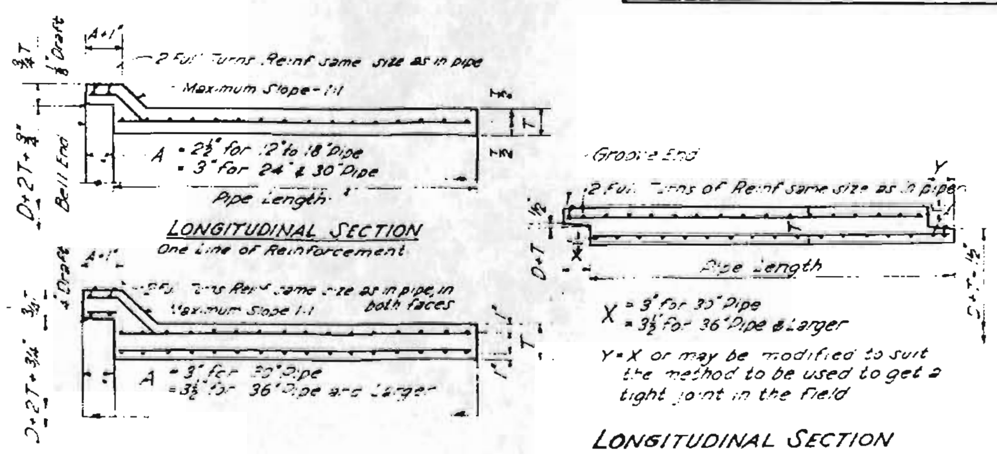


PIPE CROSS SECTION

With Two Lines of Circular Reinforcement

PIPE CROSS SECTION

With One Line of Circular Reinforcement



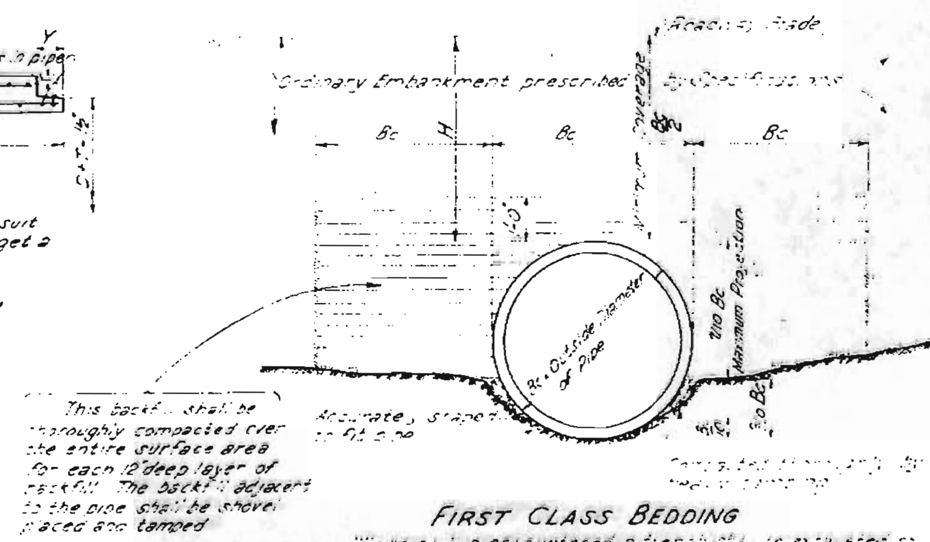
LONGITUDINAL SECTION

One Line of Reinforcement

LONGITUDINAL SECTION

LONGITUDINAL SECTION

Two Lines of Reinforcement

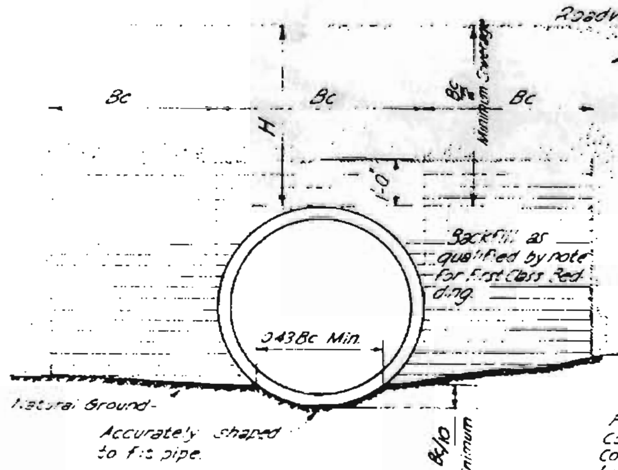


FIRST CLASS BEDDING

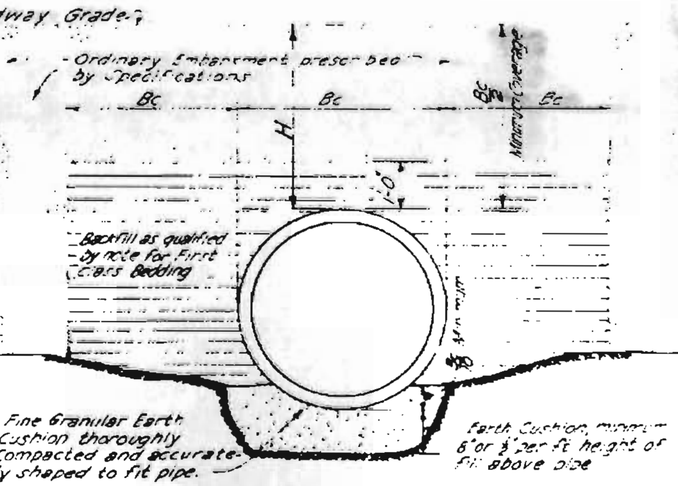
STANDARD REINFORCED CONCRETE CULVERT PIPE					
[illegible] AUG 1935					
[illegible]	D INCHES	T INCHES	CIRCULAR REINFORCEMENT SQ INCHES PER LINEAL FT		LONGITUDINAL REINFORCEMENT MINIMUM TOTAL AREA REQ'D
	12	2	1 Line	0.07	0.12 Sq In.
	15	2¼	1 Line	0.09	0.18 " "
[illegible] H = 3 [illegible] H = 5	18	2½	1 Line	0.12	0.24 " "
	24	3	1 Line	0.17	0.38 " "
	30	3½	1 Line or 2 Lines each	[illegible]	0.55 " "
	36	4	2 Lines each	0.20	0.75 " "
	42	4½	2 Lines each	[illegible]	0.98 " "
	48	5	2 Lines each	[illegible]	1.25 "
	54	5½	2 Lines each	0.30	1.57 "

[illegible] longitudinal [illegible] is required

EXTRA STRENGTH REINFORCED CONCRETE CULVERT PIPE					
[illegible] ULTIMATE COMPRESSIVE STRENGTH = 4750 #/in² AND THE THREE-EDGE BEARING TESTS PRESCRIBED IN COLORADO SPECS AUG. 1935					
MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE FOR EXTRA STRENGTH PIPE	D INCHES	T INCHES	CIRCULAR REINFORCEMENT SQ INCHES PER LINEAL FT		LONGITUDINAL REINFORCEMENT MINIMUM TOTAL AREA REQ'D
	12	2	1-Line	[illegible]	0.12 Sq In.
	15	2¼	[illegible]	0.19	0.18 " "
	18	2½	[illegible]	0.24	0.24 " "
[illegible]	24	3	[illegible]	0.35	0.38 " "
[illegible] H = 24	30	3½	[illegible]	0.47	0.55 " "
[illegible] H = 30	30	3½	2 " each	0.34	0.55 "
ORDINARY, SPECIAL: H = 37	36	4	2 " "	0.41	0.75 " "
	42	4½	2 " "	0.48	0.98 " "
FIRST CLASS, SPECIAL: H = 45	48	5	2 " "	0.55	1.25 " "
	54	5½	2 " "	0.52	1.57 " "

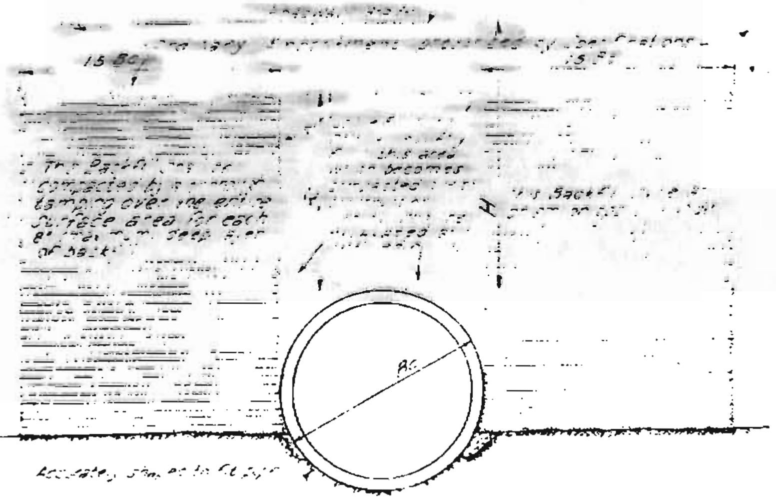


ORDINARY BEDDING



ORDINARY BEDDING

Where rock is encountered in the bedding



SPECIAL BEDDING

A construction which consists of Ordinary Bedding or First Class Bedding with Special Backfill Construction. To be used when called for on plans under high fills.

NOTE: When Special Bedding is called for the placement of the pipe and the backfill shall not be done except in the presence of the Engineer

-GENERAL NOTES-

All work shall be done according to the Standard Specifications of The Colorado State Highway Department adopted Aug 1, 1935.

Pipe constructed to the requirements of A.S.T.M. Specifications C 76-35T. Table I may be used as Standard Pipe for the fill heights as noted hereon, while if Table II is used for Extra Strength Pipe the permissable fill heights shall be reduced to 75% of those indicated hereon for that Class of Pipe.

Circular Reinforcement when spliced shall be lapped 40 diameters unless welded. Circular reinforcement shall be Cold Drawn Steel Wire; if Billet Steel of Hard or Intermediate Grade is used the steel area shall be increased by 37.5 percent.

Longitudinal Reinforcement shall be Billet Steel of Structural or Intermediate Grade.

The type of joint used and the field construction thereof to make the joint reasonably watertight shall be submitted to the Department for Approval.

Unless otherwise noted the bedding shall be Ordinary Bedding except when the maximum fill height for this type of bedding is exceeded. In this case that type of bedding shall be used as indicated by the allowable fill height.

All culverts must have concrete headwalls on up stream end as per Std. M-102-E and down stream end if required on plans.

Supporting soils shall be composed of firm and uniform material throout the entire length of Culvert. The soil shall be accurately shaped to fit the pipe.

Rock and shale shall be removed and the pipe bedded as noted. Increase the earth cushion at the bell end.

The pipe shall be laid with the Bell or Groove placed upstream.

Minimum dimension of center of bar to edge of concrete shall be 1-inch.

All excavation and backfill required for bedding and shaping shall be included in Contract Unit Price for Reinforced Concrete Pipe.

COLORADO
STATE HIGHWAY DEPARTMENT

REINFORCED CONCRETE CULVERT PIPE

STANDARD & EXTRA STRENGTH

SIZES - 12" 15" 18" 24" 30" 36" 42" 48" 54"

Made by R.L.C. Bridge Engineer Date Sept 5th 1936

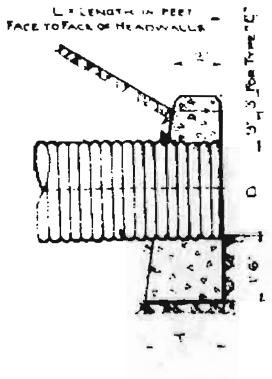
STRUCTURE NO

STANDARD M-102-E

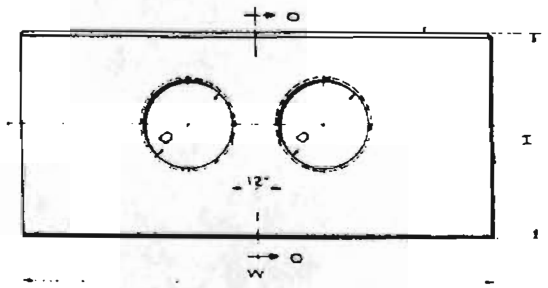
[redacted]

FED. ROAD DIST. No	STATE	A.W. PROJ. No	SHEET No	TOTAL SHEETS
3	COLO	4003	12	

Revised 10-24-33 A.S.K. Corrected Gauge for 24" & 36" Type "C" Culverts.
REVISED 3-5-35 W.W.D. DEFORMED BARS.
Revised 3-1-36 A.S.K. Changed to 1935 Specifications.
Revised 6-?-36 A.S.K. Extended table for intercepting headwalls and added Standard Cement Rubble Apron for CMP Culverts.



SECTIONAL ELEVATION "D-D"

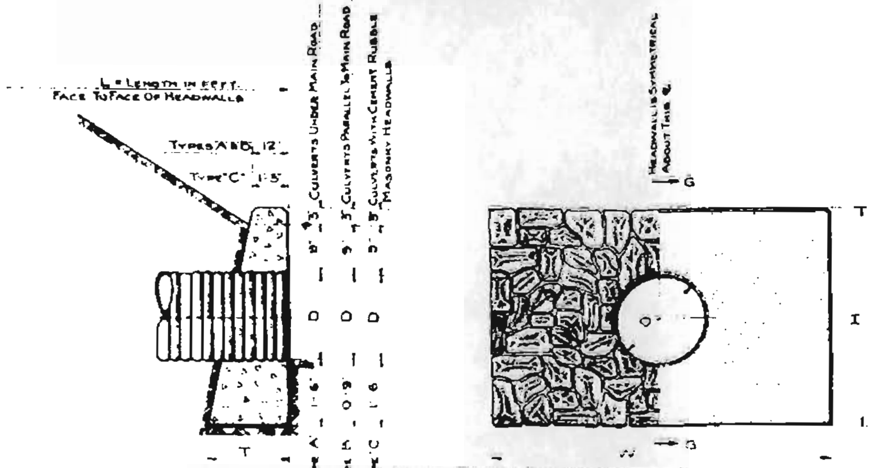


FRONT ELEVATION

TABLE OF DIMENSIONS & QUANTITIES FOR DOUBLE CORRUG. METAL PIPE CULVERT & HEADWALLS

	D	W	H	T	Cu. Yds. Concrete for 2 Headwalls	Corrugated Metal Pipe		Cement Rubble Masonry
Type "A"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] Yds.	[illegible] Gage	2 × L = [illegible] Lin. Ft.	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] do	[illegible] do	2 × L =	do	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] do	[illegible] do	2 × L =	do	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] do	4 do	2 × L =	do	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] do	[illegible] do	2 × L =	do	

STD. HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS.



SECTIONAL ELEVATION "G-G"

HALF FRONT ELEVATION TYPE "C"

HALF FRONT ELEVATION TYPES "A" & "B"

TABLE OF DIMENSIONS & QUANTITIES FOR CORRUGATED METAL PIPE CULVERTS & HEADWALLS

Type	D	W	H	T	Cu. "B" Concrete for 2 Headwalls	Corrugated Metal Pipe		Cement Rubble Masonry
Type "A"	12"	[illegible]-8"	3-[illegible]	1-5"	1.4 Cu. Yds.	16 Gage	L = Lin. Ft.	
	15"	3-3	3-9"	1-6"	1.8 do	16 do	L = do	
	18"	[illegible]	4-0"	1-7"	2.2 do	16 do	L = do	
	24"	[illegible]	4-5"	1-9"	3.3 do	14 do	L = do	
	30"	3-3"	5-0"	2-0"	4.5 do	14 do	L = do	
	36"	[illegible]	5-6"	2-2"	6.0 do	12 do	L = do	
	42"	12-0	6-[illegible]	2-5"	8.0 do	10 do	L = do	
	48"	13-6	6-[illegible]	2-7"	10.0 do	10 do	L = do	
Type "B"	12"	4-3"	2-9"	1-0"	0.8 Cu. Yds.	16 Gage	L = Lin. Ft.	
	15"	4-3	2-9"	1-2"	0.9 do	16 do	L = do	
	18"	4-0"	3-3	1-3"	1.1 do	16 do	L = do	
	24"	5-0"	3-9"	1-5"	1.2 do	14 do	L = do	
	30"	5-6"	4-3"	1-7"	1.8 do	14 do	L = do	
Type "C"	12"	4-6"	3-6"	2-0"		16 Gage	L = Lin. Ft.	1.6 Cu. Yds.
	15"	[illegible]-2"	3-9"	2-0"		16 do	L = do	2.2 do
	18"	6-0"	4-0"	2-1"		16 do	L = do	2.5 do
	24"	7-6"	4-6"	2-4"		14 do	L = do	4.1 do
	30"	9-0"	5-0"	2-6"		14 do	L = do	5.6 do
	36"	10-6"	5-6"	2-5"		12 do	L = do	7.4 do

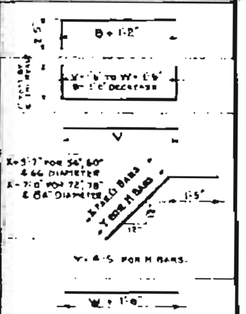
Type	D	W	H	V	B	C	Unit	Concrete Class "A"	Corrugated Metal Pipe		Unit	Reinforcing Steel
Type "G"	54"	[illegible]-6"	5-6"	15'-6"	4'-0"	3'-6"	Cu. Yds.	12.6 ✱	8 Gage	L = Lin. Ft.	Lbs.	446 ▲
	60"	8'-0"	6-0"	16'-0"	4'-0"	4'-0"	do	13.5 ✱	8 do	L = do	do	482 ▲
	66"	8'-[illegible]	6'-6"	16'-6"	4'-0"	4'-6"	do	14.4 ✱	8 do	L = do	do	498 ▲
	72"	9'-0"	7'-0"	19'-0"	5'-0"	4'-6"	do	17.9 ✱	8 do	L = do	do	610 ▲
	78"	[illegible]'-6"	7'-5"	19'-6"	5'-0"	5'-0"	do	18.9 ✱	8 do	L = do	do	630 ▲
	84"	10'-0"	8'-0"	20'-[illegible]	5'-0"	5'-6"	do	20.0 ✱	8 do	L = do	do	684 ▲

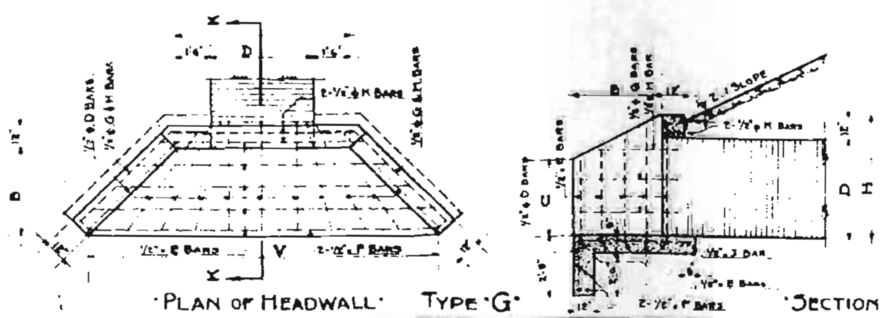
▲ Reinforcing steel quantities are for two headwalls.
✱ Concrete quantities are for two headwalls.

· BAR LIST FOR TYPE "G" · W.McM.

Size of Pipe		54"	60"	66"	72"	78"	84"
D Bars ½" ⌀	Spacing	18"	18"	18"	18"	18"	18"
	Number	11	11	11	12	12	13
	Length	7'-7"	7'-7"	7'-7"	8'-7"	8'-7"	8'-7"
E Bars ½" ⌀	Spacing	12"	12"	12"	12"	12"	12"
	Number	1 Each	1 Each	1 Each	1 Each	1 Each	1 Each
	Length	24'-6" to 20'-0"	25'-6" to 21'-6"	27'-0" to 23'-0"	29'-6" to 24'-6"	31'-0" to 26'-0"	32'-6" to 27'-6"
	Decrease	By 12"	By 12"	By 12"	By 12"	By 12"	By 12"
F Bars ½" ⌀	Spacing	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"
	Number	2	2	2	2	2	2
	Length	15'-6"	16'-0"	16'-6"	19'-0"	19'-6"	20'-0"
G Bars ½" ⌀	Spacing	18"	18"	18"	18"	18"	18"
	Number	4	6	6	6	6	8
	Length	7'-0"	7'-0"	7'-0"	8'-5"	8'-5"	8'-5"
H Bars ½" ⌀	Spacing	18"	18"	18"	18"	18"	18"
	Number	2	2	2	2	2	2
	Length	5'-11"	5'-11"	5'-11"	5'-11"	5'-11"	5'-11"
J Bars ½" ⌀	Spacing	12"	12"	12"	12"	12"	12"
	Number	1	1	1	1	1	1
	Length	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"
K Bars ½" ⌀	Spacing	8	8"	8"	8"	8"	8"
	Number	2	2	2	2	2	2
	Length	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"

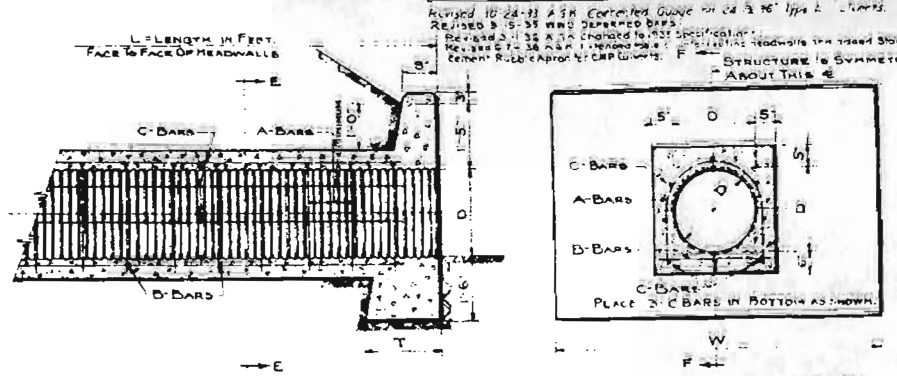
BENDING DIAGRAM.





·PLAN OF HEADWALL· TYPE "G" ·SECTION K-K·

·STANDARD HEADWALLS FOR CORRUGATED METAL PIPE CULVERTS·



LONGITUDINAL SECTION "F-F"

SECTIONAL ELEVATION "E-E"

TABLE OF DIMENSIONS & QUANTITIES FOR INCASED PIPE CULVERT

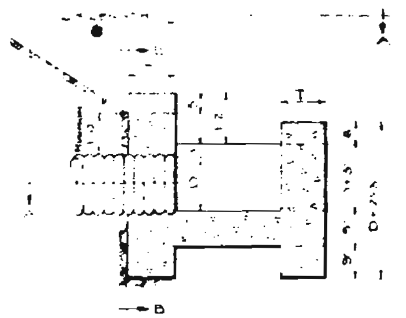
		12"	15"	18"	24"	30"		Bending Diagram
Diameter of Pipe	D	12"	15"	18"	24"	30"		
Width of Headwall	W	4'-6"	5'-3"	6'-0"	7'-6"	9'-0"		
Height of Headwall	H	4'-2"	4'-5"	4'-8"	5'-2"	5'-8"		
Width of Headwall Base	T	1'-7"	1'-8"	1'-9"	2'-0"	2'-3"		
A-Bars	Spacing	12"	12"	12"	12"	12"		D+4" / D+2"
	Number	L-1	L-1	L-1	L-1	L-1		
	Length	3'-9"	4'-5"	5'-0"	6'-4"	7'-7"		
B-Bars	Spacing	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"		D+7"
	Number	.5L	.5L	.5L	.5L	.5L		
	Length	1'-7"	1'-10"	2'-[illegible]	2'-7"	3'-1"		
C-Bars	Spacing							L-(2'-0")
	Number	6	6	6	6	6		
	Length	L-(2'-0")	L-(2'-0")	L-(2'-0")	L-(2'-0")	L-(2'-0")		

Item No.	Description	Unit	12"	15"	18"	24"	30"
46 ✱	Concrete Class "A" ✱	Cu. Yds.	1.4+0.01L	1.6+0.12L	2.2+0.143L	3.2+0.19L	4.5+0.259L
47	Reinforcing Steel	Lbs.	[illegible]	[illegible]	11.863L-17.8 ▼	[illegible]	14.909L-[illegible] ▼
53	Galv. Corr. Metal Pipe	Lin. Ft.	L	L	L	L	L

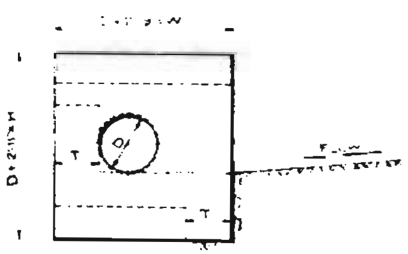
✱ Concrete quantities shown above are for two headwalls.
[illegible] When L = 40 Ft. or more add [illegible] lbs for lap in C-Bars.
▼ When L = 40 Ft. or more add [illegible] lbs for splicing C-Bars.

SPECIAL NOTES
All reinforcing bars shall be ¾" [illegible]
[illegible]
Pipe shall be thoroughly cleaned before incasing in concrete.

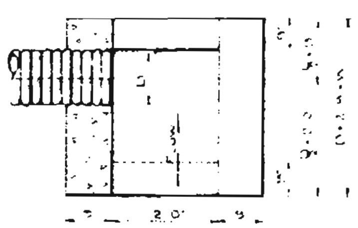
INCASED PIPE CULVERTS.



SECTIONAL ELEVATION "C-C"



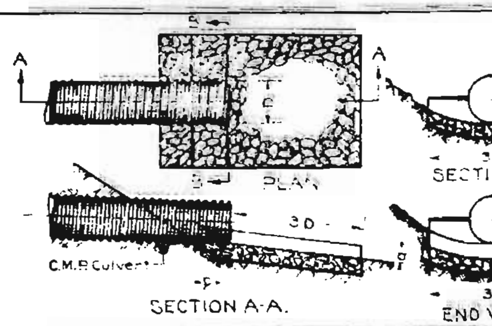
SECTIONAL ELEVATION "B-B"



SECTIONAL PLAN "A-A"

SIZE OF PIPE	WIDTH OF WALL	HEIGHT OF WALL	THICKNESS OF WALL	CU. "B" CONC. IN ONE HEADWALL
D	W	H	T	CU. YDS.
12	3-9"	3-11"	9	1.1
15"	4-0"	4-2"	9"	1.2
18"	4-3"	4-5"	9"	1.3
24"	4-9	4-11"	9"	1.6
30	5-3	5-5	9"	1.9
36"	5-9	5-11	9"	2.2

INTERCEPTING HEADWALLS.



STANDARD CEMENT RUBBLE APRON FOR C.M.P. CULVERTS

SQUARE YARDS CEMENT RUBBLE PAVING "1 FOOT THICK"

Fill Slope	D	15"	18	24	30	36	42	48	54	60	66	72	78	84
	P \ 9	7½"	9	12	12	12	12	12	12	12	12	12	12	12
1½:1	2'-0"	3	4	6	9	12	17	21	27	33	39	46	54	62
2:1	2'-0"	3	4	7	10	13	18	22	28	34	41	49	57	66
3:1	3'-0"	3	4	7	11	15	20	25	31	38	45	54	63	73
4:1	4'-0"	3	5	8	12	16	22	28	34	42	50	59	69	79

GENERAL NOTES FOR ALL STRUCTURES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT, ADOPTED AUGUST 1, 1935.
ALL CONCRETE SHALL BE CLASS "A" EXCEPT TYPES A & B WHICH SHALL BE CLASS "B".
ALL EXPOSED SURFACES SHALL BE RUBBED FREE OF FORM MARKS.
ALL EXPOSED CORNERS SHALL BE BEVELED TO A 2" FACE.
ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
ALL WALLS SHALL HAVE FORMS ON BOTH SIDES.
ALL REINFORCING BARS SHALL BE DEFORMED.
ALL REINFORCING BARS SHALL BE TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION.
SECONDARY BARS WHEN SPLICED SHALL BE GIVEN A LAP OF 50 DIAMETERS.
MAIN BARS SHALL NOT BE SPLICED.
MINIMUM FILL OVER TOP OF CULVERTS SHALL BE 1'-0".
WHEN CULVERT IS SKEWED, HEADWALLS SHALL BE PLACED PARALLEL TO ℄ OF ROADWAY.
MINIMUM GRADE OF PIPE SHALL BE 1%.
FOR SIZE AND LOCATION OF CULVERTS SEE SHEET Nº 2.
FOOTINGS IN ROCK SHALL BE POURED OUT TO THE ROCK AND NOT FORMED.

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD HEADWALLS
INTERCEPTING HEADWALLS
INCASED METAL PIPE CULVERT WITH HEADWALLS
FOR
CORRUGATED METAL PIPE CULVERTS

Designed by F.B.&K.S.	Approved by R.J. Bauer
Made by G.H.D.-W.W.D.	Bridge Engineer
Checked G.H.D.-W.McM.	Date April 30th 1932

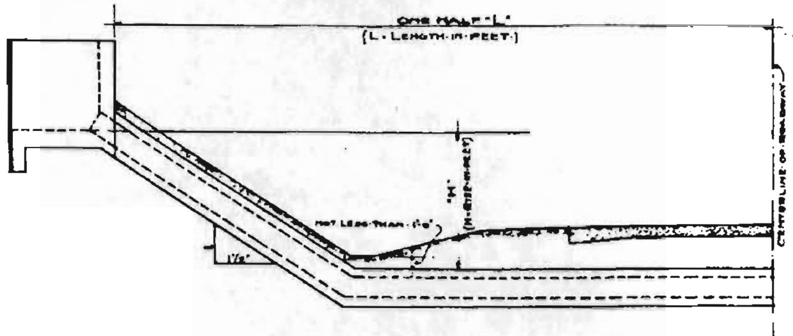
STRUCTURE NO.

M-102-E

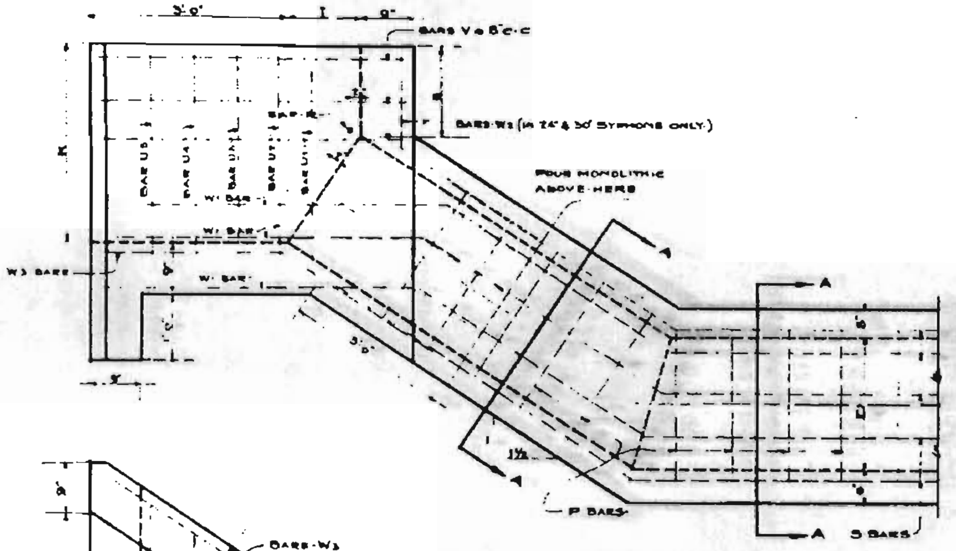
FED. ROAD DIST No.	STATE	A.W.P. PROJ. No.	SHEET No.	TOTAL SHEETS
J	COLO.	4005	13	

STANDARD M-121-A

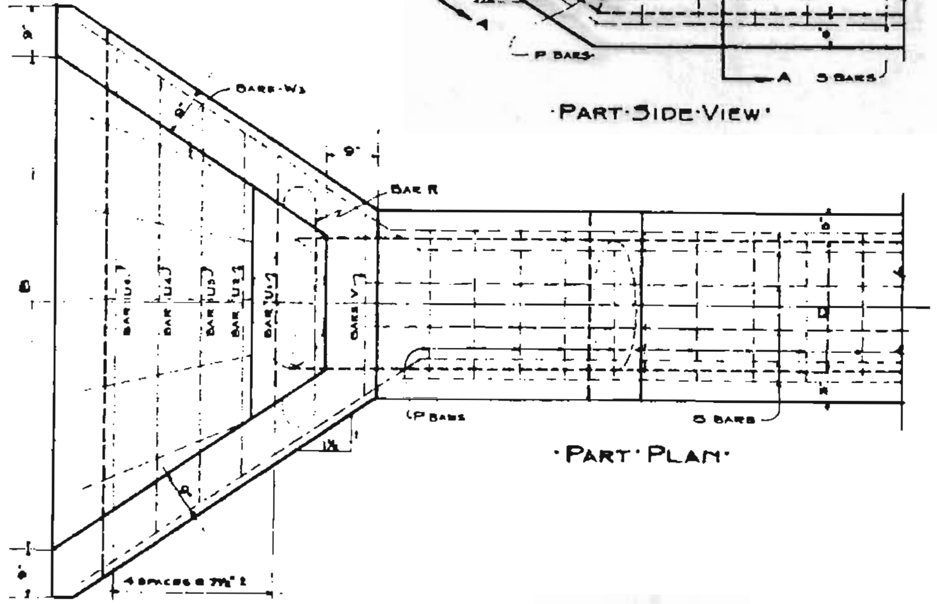
REVISED 3-15-36 W.H.D. DEFORMED BARS.
REVISED 3-16-36 W.H.L. (1935 SPECIFICATIONS.)



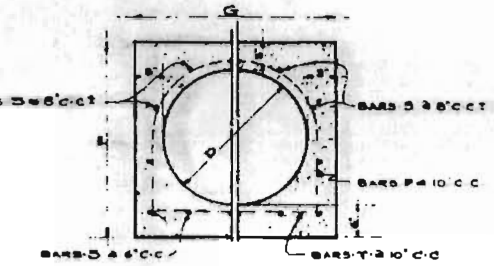
·TYPICAL·HALF·ELEVATION·



·PART·SIDE·VIEW·

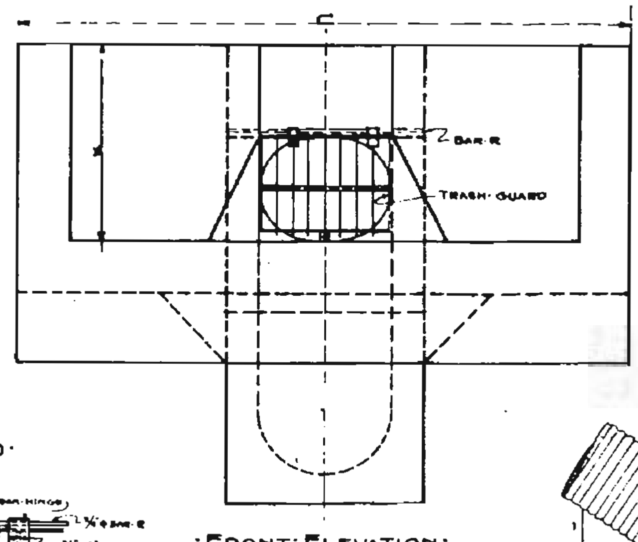


·PART·PLAN·



·SECTION·A-A·

HALF SECTION 15" & 18" — HALF SECTION 24" & 30"



·FRONT·ELEVATION·

DIAMETER 15" AND 18"			·BAR·LIST·FOR·ONE·SYPHON· BENDING·DIAGRAM. ALL BARS ⅜" ø	DIAMETER 24" AND 30"		
MARK	NUMBER	LENGTH		LENGTH	NUMBER	MARK
U1 TO U5	2 EACH	7'-9" TO 9'-1" INCREASING BY 10"		10'-7" TO 14'-1" INCREASING BY 10"	2 EACH	U1 TO U5
V	6	11'-6"		13'-3"	6	V
W1	12	7'-0"		7'-9"	12	W1
				4'-0"	4	W2
W3	10	6'-3"		6'-3"	10	W3
T	2L+4H	4'-6" FOR 15" DIAMETER 5'-0" FOR 18" DIAMETER	15" DIAMETER; 18" DIAMETER; 24" DIAMETER; 30" DIAMETER	5'-6" FOR 24" DIAMETER 3'-0" FOR 30" DIAMETER	2L+4H	T
P	2L+4H	4'-6" FOR 15" DIAMETER 4'-6" FOR 18" DIAMETER		6'-0" FOR 24" DIAMETER 7'-0" FOR 30" DIAMETER	2L+4H	P
S	11	L+0.6H	BEND IN THE FIELD	L+0.6H	13	S
R	2	4'-4"	SPECIAL·ANCHOR·BAR·FOR·TRASH GUARD ¼" ø	5'-1"	2	R

·TABLES·OF·QUANTITIES·

PIPE: LENGTH·IN·FEET MEASURED ON ℄ OF SYPHON·
CONCRETE: VOLUME·IN·CUBIC YARDS
REINFORCING·STEEL: WEIGHT·IN·LBS·INCLUDES·ALLOWANCE·FOR·OVERRUN

15" DIAMETER

H \ L		22	25	28	31	34	37	40	43	46	49	52	55	58	61	64	67	70
	PIPE	25	28	31	34	37	40	43	46	49	52	55	58	61	64	67	70	73
0	CONC	5.5	5.9	6.3	6.6	7.0	7.4	7.7	8.1	8.4	8.8	9.2	9.5	9.9	10.3	10.6	11.0	11.4
	STEEL	627	676	724	773	821	870	919	967	1016	1064	1113	1162	1210	1259	1307	1356	1405
	PIPE		28.6	31.6	34.6	37.6	40.6	43.6	46.6	49.6	52.6	55.6	58.6	61.6	64.6	67.6	70.6	73.6
1	CONC		6.0	6.3	6.7	7.1	7.4	7.8	8.2	8.5	8.9	9.2	9.6	10.0	10.3	10.7	11.1	11.4
	STEEL		704	752	801	849	898	947	995	1044	1092	1141	1190	1238	1287	1336	1384	1433
	PIPE			32.2	35.2	38.2	41.2	44.2	47.2	50.2	53.2	56.2	59.2	62.2	65.2	68.2	71.2	74.2
2	CONC			6.4	6.8	7.2	7.5	7.9	8.2	8.6	9.0	9.3	9.7	10.1	10.4	10.8	11.2	11.5
	STEEL			779	828	876	925	974	1022	1071	1119	1168	1217	1265	1314	1362	1411	1460
	PIPE				35.8	38.8	41.8	44.8	47.8	50.8	53.8	56.8	59.8	62.8	65.8	68.8	71.8	74.8
3	CONC				6.8	7.2	7.6	7.9	8.3	8.7	9.0	9.4	9.8	10.1	10.5	10.9	11.2	11.6
	STEEL				856	904	953	1002	1050	1099	1147	1196	1245	1293	1342	1390	1439	1488
	PIPE					39.4	42.4	45.4	48.4	51.4	54.4	57.4	60.4	63.4	66.4	69.4	72.4	75.4
4	CONC					7.3	7.6	8.0	8.4	8.7	9.1	9.5	9.8	10.2	10.6	10.9	11.3	11.6
	STEEL					932	981	1030	1078	1127	1175	1224	1273	1321	1370	1418	1467	1516
	PIPE						43.0	46.0	49.0	52.0	55.0	58.0	61.0	64.0	67.0	70.0	73.0	76.0
5	CONC						7.7	8.1	8.4	8.8	9.2	9.5	9.9	10.3	10.6	11.0	11.4	11.7
	STEEL						1009	1058	1106	1155	1203	1252	1300	1349	1398	1446	1495	1544
	PIPE							46.6	49.6	52.6	55.6	58.6	61.6	64.6	67.6	70.6	73.6	76.6
6	CONC							8.2	8.5	8.9	9.3	9.6	10.0	10.4	10.7	11.1	11.4	11.8
	STEEL							1085	1133	1182	1230	1279	1328	1376	1425	1473	1522	1571
	PIPE								50.2	53.2	56.2	59.2	62.2	65.2	68.2	71.2	74.2	77.2
7	CONC								8.6	9.0	9.3	9.7	10.0	10.4	10.8	11.1	11.5	11.9
	STEEL								1161	1210	1258	1307	1356	1404	1453	1501	1550	1599
	PIPE									53.8	56.8	59.8	62.8	65.8	68.8	71.8	74.8	77.8
8	CONC									9.0	9.4	9.8	10.1	10.5	10.8	11.2	11.6	11.9
	STEEL									1238	1286	1335	1384	1432	1481	1529	1578	1627
	PIPE										57.4	60.4	63.4	66.4	69.4	72.4	75.4	78.4
9	CONC										9.5	9.8	10.2	10.6	10.9	11.3	11.7	12.0
	STEEL										1313	1362	1411	1459	1508	1556	1605	1654
	PIPE											61.0	64.0	67.0	70.0	73.0	76.0	79.0
10	CONC											9.9	10.3	10.6	11.0	11.4	11.7	12.1
	STEEL											1390	1439	1487	1536	1584	1633	1682

·INCREMENTS·

	FOR·H·1 FOOT	FOR·L·3 FEET
PIPE	0.6 LIN·FEET	3.0 LIN·FEET
CONCRETE	0.073 CU·YDS	0.364 CU·YDS
STEEL	27.65 LBS	48.56 LBS

18" DIAMETER

H \ L		22	25	28	31	34	37	40	43	46	49	52	55	58	61	64	67	70
	PIPE	25.5	28.5	31.5	34.5	37.5	40.5	43.5	46.5	49.5	52.5	55.5	58.5	61.5	64.5	67.5	70.5	73.5
0	CONC	6.6	7.0	7.4	7.9	8.3	8.7	9.1	9.6	10.0	10.4	10.8	11.3	11.7	12.1	12.6	13.0	13.4
	STEEL	640	690	741	792	842	892	943	994	1044	1094	1145	1196	1246	1296	1347	1398	1448
	PIPE		29.1	32.1	35.1	38.1	41.1	44.1	47.1	50.1	53.1	56.1	59.1	62.1	65.1	68.1	71.1	74.1
1	CONC		7.1	7.5	8.0	8.4	8.8	9.2	9.7	10.1	10.5	10.9	11.4	11.8	12.2	12.6	13.1	13.5
	STEEL		720	770	821	871	922	972	1022	1073	1123	1174	1224	1274	1325	1375	1426	1476
	PIPE			32.7	35.7	38.7	41.7	44.7	47.7	50.7	53.7	56.7	59.7	62.7	65.7	68.7	71.7	74.7
2	CONC			7.6	8.0	8.5	8.9	9.3	9.7	10.2	10.6	11.0	11.4	11.9	12.3	12.7	13.2	13.6
	STEEL			800	851	901	951	1002	1053	1103	1153	1204	1255	1305	1355	1406	1457	1507
	PIPE				36.3	39.3	42.3	45.3	48.3	51.3	54.3	57.3	60.3	63.3	66.3	69.3	72.3	75.3
3	CONC				8.1	8.6	9.0	9.4	9.8	10.3	10.7	11.1	11.5	12.0	12.4	12.8	13.2	13.7
	STEEL				881	931	981	1032	1083	1133	1183	1234	1285	1335	1385	1436	1487	1537
	PIPE					39.9	42.9	45.9	48.9	51.9	54.9	57.9	60.9	63.9	66.9	69.9	72.9	75.9
4	CONC					8.6	9.1	9.5	9.9	10.3	10.8	11.2	11.6	12.0	12.5	12.9	13.3	13.8
	STEEL					961	1011	1062	1113	1163	1213	1264	1315	1365	1415	1466	1517	1567
	PIPE						43.5	46.5	49.5	52.5	55.5	58.5	61.5	64.5	67.5	70.5	73.5	76.5
5	CONC						9.1	9.6	10.0	10.4	10.8	11.3	11.7	12.1	12.6	13.0	13.4	13.8
	STEEL						1042	1092	1142	1192	1242	1294	1344	1394	1444	1494	1544	1594
	PIPE							47.1	50.1	53.1	56.1	59.1	62.1	65.1	68.1	71.1	74.1	77.1
6	CONC							9.7	10.1	10.5	10.9	11.4	11.8	12.2	12.6	13.1	13.5	13.9
	STEEL							1122	1172	1222	1272	1323	1374	1424	1474	1525	1576	1626
	PIPE								50.7	53.7	56.7	59.7	62.7	65.7	68.7	71.7	74.7	77.7
7	CONC								10.2	10.6	11.0	11.4	11.9	12.3	12.7	13.2	13.6	14.0
	STEEL								1202	1252	1302	1353	1404	1454	1504	1555	1606	1656
	PIPE									54.3	57.3	60.3	63.3	66.3	69.3	72.3	75.3	78.3
8	CONC									10.7	11.1	11.5	12.0	12.4	12.8	13.2	13.7	14.1
	STEEL									1282	1332	1384	1434	1484	1534	1585	1635	1685
	PIPE										57.9	60.9	63.9	66.9	69.9	72.9	75.9	78.9
9	CONC										11.2	11.6	12.0	12.5	12.9	13.3	13.8	14.2
	STEEL										1361	1412	1463	1513	1563	1614	1665	1716
	PIPE											61.5	64.5	67.5	70.5	73.5	76.5	79.5
10	CONC											11.7	12.1	12.6	13.0	13.4	13.8	14.3
	STEEL											1442	1493	1543	1593	1644	1695	1745

·INCREMENTS·

	FOR·H·1 FT.	FOR·L·3 FT.
PIPE	0.6 LIN·FEET	3.0 LIN·FEET
CONCRETE	0.0853 CU·YDS	0.427 CU YDS
STEEL	29.66 LBS	50.4 LBS

24" DIAMETER

H \ L		22	25	28	31	34	37	40	43	46	49	52	55	58	61	64	67	70
	PIPE	26	29	32	35	38	41	44	47	50	53	56	59	62	65	68	71	74
0	CONC	8.4	9.0	9.6	10.1	10.7	11.3	11.8	12.4	13.0	13.5	14.1	14.7	15.2	15.8	16.4	16.9	17.5
	STEEL	779	840	902	964	1025	1086	1148	1210	1271	1332	1394	1456	1517	1578	1640	1702	1763
	PIPE		29.6	32.6	35.6	38.6	41.6	44.6	47.6	50.6	53.6	56.6	59.6	62.6	65.6	68.6	71.6	74.6
1	CONC		9.1	9.7	10.2	10.8	11.4	11.9	12.5	13.1	13.6	14.2	14.8	15.4	15.9	16.5	17.1	17.6
	STEEL		877	939	1001	1062	1123	1185	1247	1308	1369	1431	1493	1554	1615	1677	1739	1800
	PIPE			33.2	36.2	39.2	42.2	45.2	48.2	51.2	54.2	57.2	60.2	63.2	66.2	69.2	72.2	75.2
2	CONC			9.8	10.4	10.9	11.5	12.1	12.6	13.2	13.8	14.4	14.9	15.5	16.0	16.6	17.2	17.8
	STEEL			976	1038	1099	1160	1223	1284	1345	1406	[illegible]	[illegible]	1591	1652	1714	1776	1837
	PIPE				36.8	39.8	42.8	45.8	48.8	51.8	54.8	57.8	60.8	63.8	66.8	69.8	72.8	75.8
3	CONC				10.5	11.0	11.6	12.2	12.8	13.3	13.9	14.5	15.0	15.6	16.2	16.7	17.3	17.9
	STEEL				1078	[illegible]	[illegible]	1260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	PIPE					40.4	43.4	46.4	49.4	52.4	55.4	58.4	61.4	64.4	67.4	70.4	73.4	76.4
4	CONC					11.2	11.7	12.3	12.9	13.4	14.0	14.6	15.2	15.7	16.3	16.9	17.4	18.0
	STEEL					1174	1235	1297	1359	1420	1481	1543	1605	1666	1727	1789	1851	1912
	PIPE						44.0	47.0	50.0	53.0	56.0	59.0	62.0	65.0	68.0	71.0	74.0	77.0
5	CONC						11.8	12.4	13.0	13.6	14.1	14.7	15.3	15.8	16.4	17.0	17.5	18.1
	STEEL						1272	1334	1396	1457	1518	1580	1642	1703	1764	1826	1888	1949
	PIPE							47.6	50.6	53.6	56.6	59.6	62.6	65.6	68.6	71.6	74.6	77.6
6	CONC							12.5	13.1	13.7	14.2	14.8	15.4	15.9	16.5	17.1	17.6	18.2
	STEEL							1371	1433	1494	1555	1617	1679	1740	1801	1863	1925	1986
	PIPE								51.2	54.2	57.2	60.2	63.2	66.2	69.2	72.2	75.2	78.2
7	CONC								13.2	13.8	14.3	14.9	15.5	16.0	16.6	17.2	17.7	18.3
	STEEL								1470	1531	1592	1654	1716	1777	1838	1900	1962	[illegible]
	PIPE									54.8	57.8	60.8	63.8	66.8	69.8	72.8	75.8	78.8
8	CONC									13.9	14.4	15.0	15.6	16.2	16.7	17.3	17.9	18.4
	STEEL									1569	1630	1692	1754	1815	1876	1938	2000	2061
	PIPE										58.4	61.4	64.4	67.4	70.4	73.4	76.4	79.4
9	CONC										14.5	15.1	15.7	16.3	16.8	17.4	18.0	18.6
	STEEL										1667	1729	1791	1852	1913	1975	2037	2098
	PIPE											62.0	65.0	68.0	71.0	74.0	77.0	80.0
10	CONC											15.2	15.8	16.4	17.0	17.5	18.1	18.7
	STEEL											1766	1828	1889	1950	2012	2074	2135

·INCREMENTS·

	FOR·H·1 FOOT	FOR·L·3 FEET
PIPE	0.6 LIN·FEET	3.0 LIN·FEET
CONCRETE	0.114 CU·YDS	0.568 CU·YDS
STEEL	37.2 LBS	61.5 LBS

30" DIAMETER

H \ L		22	25	28	31	34	37	40	43	46	49	52	55	58	61	64	67	70
	PIPE	26.5	29.5	32.5	35.5	38.5	41.5	44.5	47.5	50.5	53.5	56.5	59.5	62.5	65.5	68.5	71.5	74.5
0	CONC	10.5	11.2	11.9	12.7	13.4	14.1	14.8	15.5	16.3	17.0	17.7	18.4	19.1	19.9	20.6	21.3	22.0
	STEEL	821	888	955	1023	1090	1157	1224	1291	1359	1426	1493	1560	1627	1695	1762	1829	1896
	PIPE		30.1	33.1	36.1	39.1	42.1	45.1	48.1	51.1	54.1	57.1	60.1	63.1	66.1	69.1	72.1	75.1
1	CONC		11.4	12.1	12.8	13.5	14.2	15.0	15.7	16.4	17.1	17.8	18.6	19.3	20.0	20.7	21.4	22.2
	STEEL		932	999	1067	1134	1201	1268	1335	1403	1470	1537	1604	1671	1739	1806	1873	1940
	PIPE			33.7	36.7	39.7	42.7	45.7	48.7	51.7	54.7	57.7	60.7	63.7	66.7	69.7	72.7	75.7
2	CONC			12.3	13.0	13.7	14.4	15.1	15.8	16.6	17.3	18.0	18.7	19.4	20.2	20.9	21.6	22.3
	STEEL			1043	1110	1177	1244	1311	1378	1446	1513	1580	1647	1714	1782	1849	1916	1983
	PIPE				37.3	40.3	43.3	46.3	49.3	52.3	55.3	58.3	61.3	64.3	67.3	70.3	73.3	76.3
3	CONC				13.1	13.8	14.5	15.2	16.0	16.7	17.4	18.1	18.8	19.6	20.3	21.0	21.7	22.4
	STEEL				1154	1221	1288	1355	1422	1490	1557	1624	1691	1758	1826	1893	1960	2027
	PIPE					40.9	43.9	46.9	49.9	52.9	55.9	58.9	61.9	64.9	67.9	70.9	73.9	76.9
4	CONC					14.0	14.7	15.4	16.1	16.8	17.6	18.3	19.0	19.7	20.4	21.2	21.9	22.6
	STEEL					1265	1331	1398	1465	1533	1600	1667	1734	1801	1869	1936	2003	2070
	PIPE						44.5	47.5	50.5	53.5	56.5	59.5	62.5	65.5	68.5	71.5	74.5	77.5
5	CONC						14.8	15.5	16.3	17.0	17.7	18.4	19.1	19.9	20.6	21.3	22.0	22.7
	STEEL						1375	1442	1509	1577	1644	1711	1778	1845	1913	1980	2047	2114
	PIPE							48.1	51.1	54.1	57.1	60.1	63.1	66.1	69.1	72.1	75.1	78.1
6	CONC							15.7	16.4	17.1	17.8	18.6	19.3	20.0	20.7	21.4	22.2	22.9
	STEEL							1486	1553	1621	1688	1755	1822	1889	1957	2024	2091	2158
	PIPE								51.7	54.7	57.7	60.7	63.7	66.7	69.7	72.7	75.7	78.7
7	CONC								16.6	17.3	18.0	18.7	19.4	20.2	20.9	21.6	22.3	23.0
	STEEL								1596	1664	1731	1798	1865	1932	2000	2067	2134	2201
	PIPE									55.3	58.3	61.3	64.3	67.3	70.3	73.3	76.3	79.3
8	CONC									17.4	18.1	18.8	19.6	20.3	21.0	21.7	22.4	23.2
	STEEL									1708	1775	1843	1909	1976	2044	2111	2178	2245
	PIPE										58.9	61.9	64.9	67.9	70.9	73.9	76.9	79.9
9	CONC										18.3	19.0	19.7	20.4	21.2	21.9	22.6	23.3
	STEEL										1819	1885	1952	2019	2087	2154	2221	2288
	PIPE											62.5	65.5	68.5	71.5	74.5	77.5	80.5
10	CONC											19.1	19.9	20.6	21.3	22.0	22.7	23.5
	STEEL											1929	1996	2063	2131	2198	2265	2332

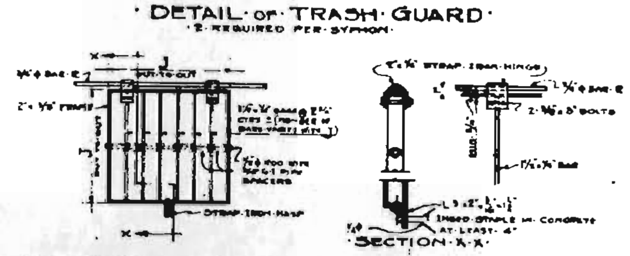
·INCREMENTS·

	FOR·H·1 FT.	FOR·L·3 FT.
PIPE	0.6 LIN·FT.	3.0 LIN·FT.
CONC.	0.144 CU·YDS	0.72 CU·YDS
STEEL	43.6 LBS	67.2 LBS

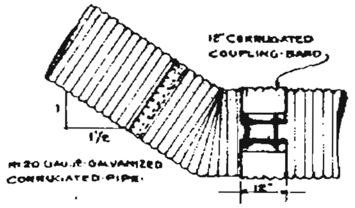
·TABLE·OF·DIMENSIONS·

DIAM. OF SYPHON \ DIMENSION	B	C	K	E	F	G	I	J
15"	6'-2½"	7'-8½"	2'-3"	1'-2½"	2'-2"	2'-1"	0'-6½"	1'-2"
18"	6'-7½"	8'-1½"	2'-6"	1'-3"	2'-5"	2'-4"	0'-10"	1'-5"
24"	7'-6"	9'-0"	3'-0"	1'-4"	2'-11"	2'-10"	1'-1½"	1'-11"
30"	8'-4½"	9'-10½"	3'-6"	1'-5"	3'-5"	3'-4"	1'-4½"	2'-5"

·DETAIL·OF·TRASH·GUARD·
·2 REQUIRED PER SYPHON·



·SECTION·X-X·



·DETAIL·AT·ELBOW·

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT.
ALL CONCRETE SHALL BE CLASS "A."
ALL EXPOSED SURFACES SHALL BE RUBBED FREE OF FORM MARKS.
ALL EXPOSED CORNERS, EXCEPT ON HANDRAILS, SHALL BE BEVELED TO A ¾" FACE.
GIRDERS, FLOOR SLAB AND CURB SHALL BE POURED MONOLITHICALLY.
ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.

ALL REINFORCING BARS SHALL BE DEFORMED.

ALL REINFORCING BARS SHALL BE TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION.
SECONDARY BARS WHEN SPLICED SHALL BE GIVEN A LAP OF 40 DIAMETERS.
MAIN BARS SHALL NOT BE SPLICED.
SOUNDINGS AND DEPTH OF FOOTINGS SHOWN ARE ACCORDING TO THE BEST AVAILABLE DATA. IF ESSENTIALLY DIFFERENT CONDITIONS ARE ENCOUNTERED THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.
FOR SYPHONS AND TRASH RACKS REQUIRED AND GOVERNING DIMENSIONS SEE STRUCTURE LIST SHEET Nº 2.
SUPPORTING SOILS FOR ALL SYPHONS MUST BE COMPOSED OF FIRM AND UNIFORM MATERIAL THROUOUT.

LOADING DATA
LIVE LOAD - A.A.S.H.O. AUG. 1928 CLASS "A"(H-15)

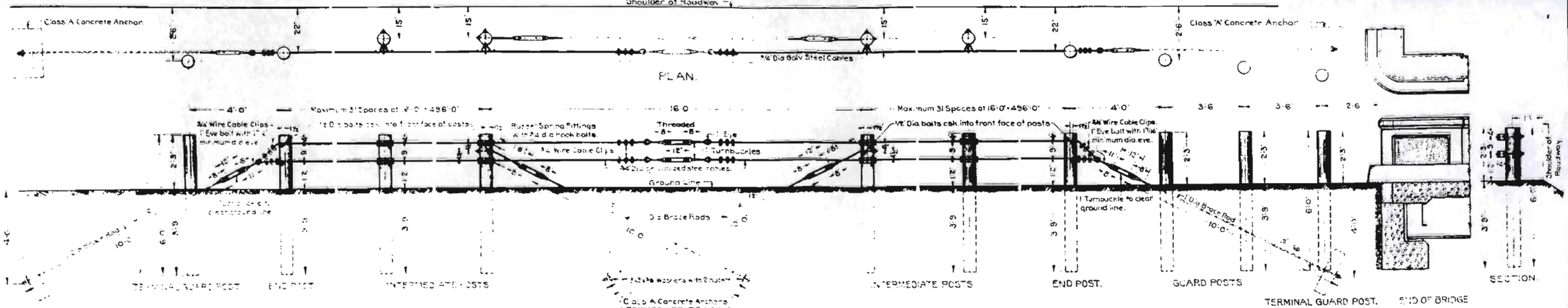
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD·SYPHONS
·WITH·INCLINED·RISERS·
15" 18" 24" 30"

Designed by F.S.B.	Approved by P. Bailey, Bridge Engineer
Made by O.H.D.	
Checked by A.L.P.	Date: Nov. 3rd 1930.

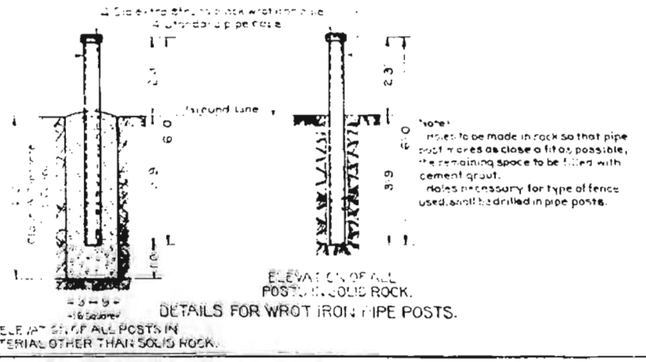
STRUCTURE NO. ________

STANDARD M-20-A

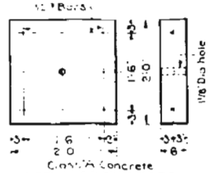
FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
3	COLO.	A.W.P. 4003	14



STANDARD WIRE CABLE GUARD FENCE WITH TIMBER POSTS.



DETAILS FOR WROT IRON PIPE POSTS.



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of The Colorado State Highway Department adopted August 1, 1935.

The length of fence to be paid for and designated as such shall be measured from terminal guard post to terminal guard post.

Each continuous wire cable fence, 3 more than 500 Ft. in length, shall have intermediate bracing complete with turnbuckles.

All wood posts shall be made from seasoned, straight, sound Lodge Pole Pine, Southern Yellow Pine or West Coast Douglas Fir.

No section of wood posts shall be less than 6" diameter.

All wood posts shall be entirely peeled and shaved, thoroly seasoned and dry, with square tops and all holes to be drilled 1/32" larger than diameter of bolt or rod before treatment is applied.

All wood posts shall be pressure treated with creosote for the full length of posts, as provided for in the Specifications.

All wood posts shall be set and tamped in plumb and firm, to the lines and grades directed by the engineer.

All fittings, cables and hard ware shall be hot dip galvanized steel with sizes as noted and located as shown.

Eye bolts shall be welded or drop forged.

Standard galvanized cast iron 0.6 or galvanized malleable cast washers shall be used under all bolt heads and nuts coming in contact with wood posts.

Any loop fittings or other fittings equivalent to those shown on plans and approved by the engineer may be used in lieu of offset fittings, turnbuckles, eye bolts and clips as shown.

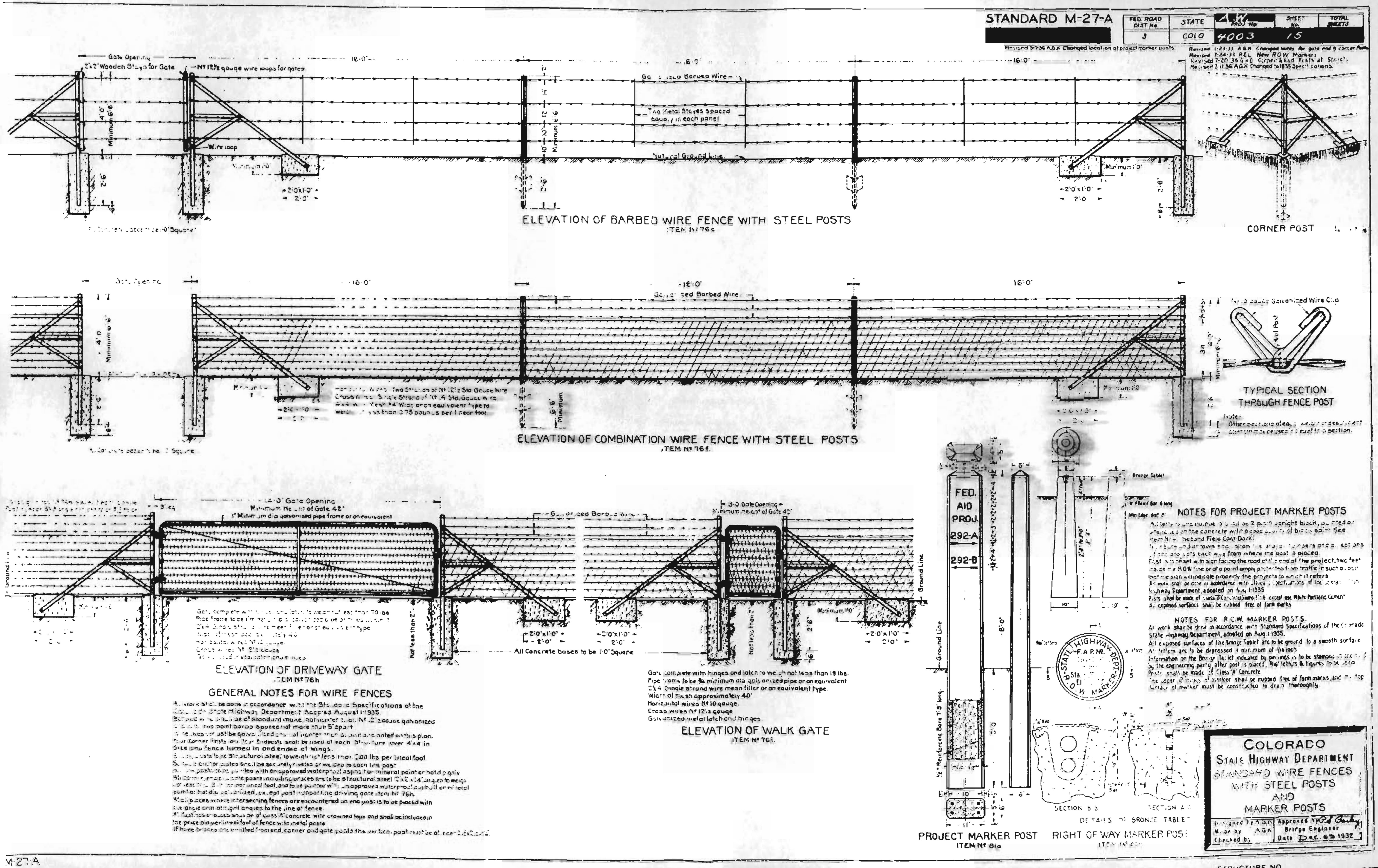
Only one style of offset fittings, turnbuckles, eye bolts and clips may be used on a project.

COLORADO
STATE HIGHWAY DEPARTMENT

STANDARD
WIRE CABLE GUARD FENCE

Designed by A.G.M.	Approved by P. L. Bush
Made by A.G.A.	Bridge Engineer
Check Design	Date: March 20th 1936
Check Detail	

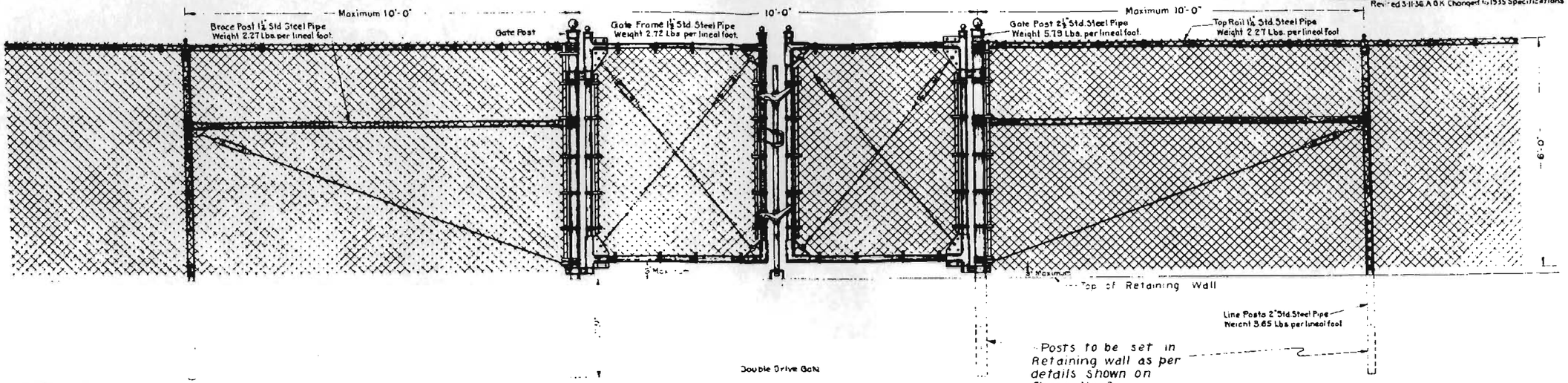
STANDARD M-20-A


STANDARD M-27-A
FED. ROAD DIST No. 3
STATE COLO
PROJ. No. 4003
SHEET No. 15
TOTAL SHEETS
Revised 1-23-33 A.G.K. Changed notes for gate and & corner Posts
Revised 7-24-33 R.E.L. New ROW Markers
Revised 7-20-35 G.H.D. Corner & End Posts at Struct.
Revised 3-11-36 A.G.K. Changed to 1935 Specifications
Gate Opening
2"x2" Wooden Stays for Gate
Nº 12½ gauge wire loops for gates
16'-0"
Galvanized Barbed Wire
Two Metal Stays spaced equally in each panel
Wire loop
Natural Ground Line
Minimum 6'-6"
2'-0"x1'-0"
2'-0"
ELEVATION OF BARBED WIRE FENCE WITH STEEL POSTS
ITEM Nº 76e
CORNER POST
Galvanized Barbed Wire
Nº 9 Gauge Galvanized Wire Clip
TYPICAL SECTION THROUGH FENCE POST
ELEVATION OF COMBINATION WIRE FENCE WITH STEEL POSTS
ITEM Nº 76f
14'-0" Gate Opening
Minimum Height of Gate 42"
1" Minimum dia galvanized pipe frame or an equivalent
Galvanized Barbed Wire
3'-0" Gate Opening
Minimum Height of Gate 42"
Ground Line
Minimum 1'-0"
2'-0"x1'-0"
All Concrete bases to be 1'-0" Square
ELEVATION OF DRIVEWAY GATE
ITEM Nº 76h
GENERAL NOTES FOR WIRE FENCES
All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department Adopted August 1-1935.
Size and fence turned in and ended at Wings.
Line posts to be Structural steel to weigh not less than 2.00 lbs per lineal foot.
the price bid per lineal foot of fence with metal posts
Gate complete with hinges and latch to weigh not less than 19 lbs.
Pipe frame to be ¾ minimum dia galvanized pipe or an equivalent
2"x4" Single strand wire mesh filler or an equivalent type.
Width of mesh approximately 40"
Horizontal wires Nº 10 gauge.
Cross wires Nº 12½ gauge
Galvanized metal latch and hinges.
ELEVATION OF WALK GATE
ITEM Nº 76i
FED. AID PROJ.
292-A
292-B
Ground Line
Bronze Tablet
NOTES FOR PROJECT MARKER POSTS
Highway Department, adopted on Aug. 1-1935
All exposed surfaces shall be rubbed free of form marks
NOTES FOR R.O.W. MARKER POSTS.
State Highway Department, adopted on Aug. 1-1935.
All exposed surfaces of the Bronze Tablet are to be ground to a smooth surface
All letters are to be depressed a minimum of 1/16 inch
Posts shall be made of Class "A" Concrete
surface of marker must be constructed to drain thoroughly.
SECTION B-B
SECTION A-A
DETAILS OF BRONZE TABLET
PROJECT MARKER POST
ITEM Nº 81a
RIGHT OF WAY MARKER POST
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD WIRE FENCES WITH STEEL POSTS AND MARKER POSTS
Designed by A.G.K.
Made by A.G.K.
Checked by
Approved by
Bridge Engineer
Date Dec. 6th 1932
STRUCTURE NO.
M-27-A

STANDARD M-26-A

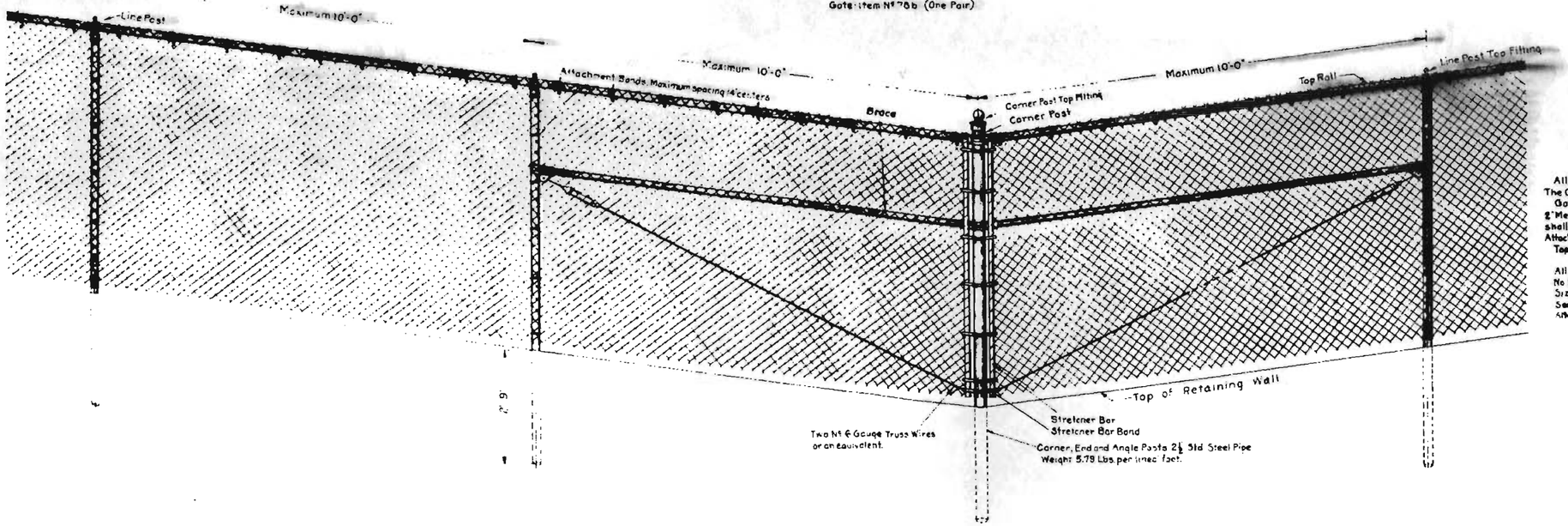
FED ROAD DIST No	STATE	A.W PROJ. No	SHEET No	TOTAL SHEETS
3	COLO.	4003	16	

Revised 3-11-36 A.G.K. Changed to 1935 Specifications



ELEVATION OF SWING GATE AND CHAIN LINK FENCE

Fence-Item No 78a
Gate-Item No 78b (One Pair)



ELEVATION OF CORNER POST AND CHAIN LINK FENCE

GENERAL NOTES

All Work shall be done in accordance with the Standard Specifications of The Colorado State Highway Department, Adopted August 1, 1935.

Gate and Fence Fabric to be Chain Link Copper Bearing No 9 Gauge, 2" Mesh, 6'-0" High, to be Galvanized by Hot Dip Process after weaving and shall be Securely Fastened to all Posts and Top Rail with suitable Attachment Bands.

Top and Bottom Selvage to be barbed finish.

All Fence and Gate Material shall be Hot Dip Galvanized.
No Splicing of Fabric shall occur except at regular line posts
Sizes and weights of Pipe as shown are the minimum allowed
See Sheet No 5 for location, number of gates and length of fence
Alternate Standard Fittings acceptable subject to Engineers Approval

	INITIA	DATE
ORIGINAL BY		
CHECKED BY		
VANDYKE BY		
CHECKED BY		

COLORADO
STATE HIGHWAY DEPARTMENT

CHAIN LINK WIRE MESH (SCHOOL) FENCE

Designed by A.G.K.	Approved by Chas Bailey
Made by A.G.K.	Bridge Engineer
Checked by	Date Nov 20th 1936

SCALE OF LETTERING

STANDARD M-10-A

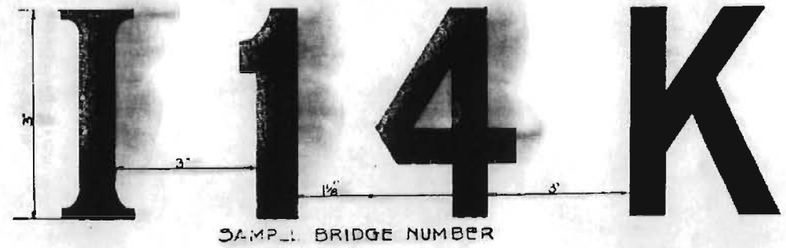
FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	400 B	17	

Revised July 1938 A.G.C. Changed to 1935 Specifications

A B C D E F G H I J

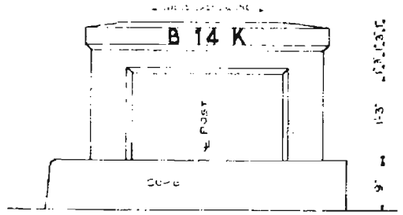
K L M N O P Q R S T

U V W X Y Z

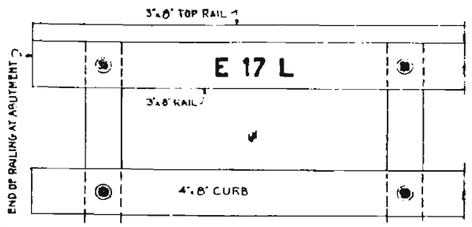


SAMPLE BRIDGE NUMBER

1 2 3 4 5 6 7 8 9 0 .



TYPICAL CONCRETE ENDPOST.



TYPICAL TIMBER WING

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT ADOPTED AUGUST 1 1935.

THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED.

THE CORRECT NUMBER FOR EACH BRIDGE IS SHOWN IN THE LOWER RIGHT HAND CORNER OF THE DETAIL SHEETS FOR THAT PARTICULAR BRIDGE.

THE SIZE, SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IDENTICAL WITH THE FULL SIZE SHOWN ON THIS SHEET. ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.

BEFORE STENCILING THE NUMBER ON THE BRIDGE, THE SURFACE MUST BE THOROLY CLEANED. A PROPER WHITE BACKGROUND SHALL BE PAINTED ON CONCRETE SURFACES. ON TIMBER HANDRAILS THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY. ON CONCRETE ENDPOSTS THE DRY CONCRETE SURFACE SHALL BE PROPERLY SIZED BEFORE PLACING THE WHITE RECTANGLE, UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED.

TWO COATS OF ACCEPTABLE WHITE PAINT SHALL BE APPLIED TO THE CONCRETE IN A NEAT RECTANGULAR SHAPE AND EXTEND THREE INCHES BEYOND THE LIMITS OF THE STRUCTURE NUMBER.

AFTER THIS WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON IT WITH TWO COATS OF STANDARD "C" SECOND FIELD COAT DARK" AS SPECIFIED UNDER ITEM 41 "STEEL BRIDGES. THE BRACES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES. SUFFICIENT TIME BETWEEN SUCCESSIVE COATS SHALL BE ALLOWED TO PERMIT THE PRECEDING COAT TO DRY.

THIS WORK WILL NOT BE PAID FOR AS A SEPERATE ITEM. COMPENSATION SHALL BE INCLUDED IN THE ORIGINAL CONTRACT ITEMS.

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD STRUCTURE NUMBER LETTERING.

Across Sta.
Near Sec. T R

Designed by O.M.C.	Approved by P. L. Bailey
Made by J.M.P.	Bridge Engineer
Check Design	Date: Feb. 6th 1935.
Check Detail	

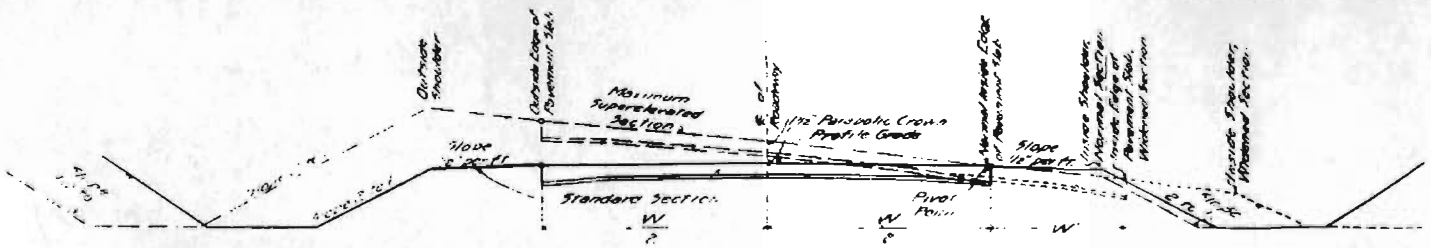
IDARD M-10-A.

STRUCTURE NO

STANDARD M-I-A

FED. ROAD DIST. No.	STATE	PROJ. No.	SHEET No.	TOTAL SHEETS
3	COLO	[redacted]	18	[redacted]

Revised [illegible] S.B.L. (200' Length)
Revised [illegible] S.B.L.
Revised [illegible] S.B.L.
Revised [illegible] S.B.L. (Special Cases)
Revised [illegible] AGR. (1938 Specifications)
Revised 6-9-36 S.B.L. (Notes on Special Cases)



PAVEMENT SECTION

SUPERELEVATION AND WIDENING NOTES FOR PAVEMENT SECTION

Curves on projects using the pavement section are to be superelevated and widened as indicated in the accompanying drawings and table.

The normal inside edge of the pavement slab is to remain at the standard elevation of 0.125 Ft. below the profile grade, and the outside edge of the slab is to be superelevated at the rate per foot width of roadway given in the table or graph. The section is to be rotated about the normal inside edge of the [illegible].

When the degree of curvature exceeds 10° the inside portion of the pavement slab is to be widened from the normal inside edge as [illegible] Curves of 10° or less are not to be widened. The 1½" parabolic crown [illegible] used for curves of [illegible] and under. The widened section [illegible]

The slope of the shoulders shall conform to the rate per foot width of roadway required except that the inside shoulder shall maintain the standard slope of 0.0417 Ft. per foot width until the superelevation rate exceeds this standard slope.

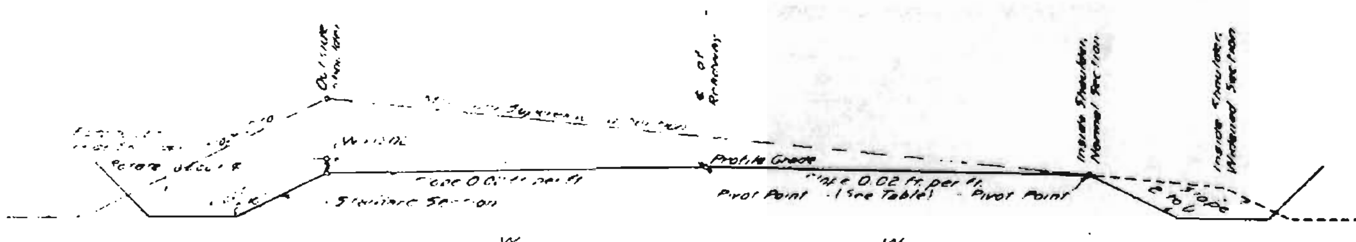
The outside ditch along a superelevated section is to be modified from the standard where a deeper ditch is required to provide drainage.

Details of plans for superelevating and widening are shown on the General Plan for Widening and the Graph of Superelevation Factors.

The subgrade for future pavement is to be constructed to conform to the superelevation and widening requirements for the pavement section.

SUPERELEVATION FACTORS AND OFFSETS FOR WIDENING FOR PAVEMENT SECTION

[illegible]	20 Ft.	40 Ft.	60 Ft.	80 Ft.	100 Ft.+P.C.	120 Ft.	140 Ft.	160 Ft.	180 Ft.	200 Ft.+E.T.	On Curve
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.50	[illegible]	0.82	0.92	0.98	1.00	1.00
[illegible]	Rate of Superelevation (in Feet) per Foot Width of Roadway										
2° and Under	[illegible]	[illegible]	0.0038	[illegible]	[illegible]	[illegible]	0.0172	[illegible]	0.0206	0.0210	0.0210
3°	[illegible]	[illegible]	0.0057	[illegible]	0.0158	[illegible]	0.0258	[illegible]	0.0309	0.0315	0.0315
4°	0.0008	0.0034	0.0076	0.0134	[illegible]	[illegible]	0.0344	[illegible]	0.0412	0.0420	0.0420
5°	0.0010	[illegible]	0.0094	0.0168	[illegible]	[illegible]	0.0430	[illegible]	0.0514	0.0525	0.0525
6°	[illegible]	0.0050	[illegible]	0.0202	[illegible]	[illegible]	0.0517	0.0580	[illegible]	0.0630	0.0630
7°	[illegible]	0.0059	[illegible]	[illegible]	0.0368	0.0500	0.0603	[illegible]	0.0720	0.0735	0.0735
8°	0.0017	0.0067	0.0151	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0823	0.0840	0.0840
9°	[illegible]	0.0076	[illegible]	[illegible]	0.0472	0.0643	[illegible]	0.0869	0.0921	0.0945	0.0945
10° and Over	0.0020	0.0080	[illegible]	0.0320	0.0500	0.0680	0.0820	[illegible]	0.0980	0.1000	0.1000
	Offsets for Widening W (in Feet)										
Over 10° Under 12°	0.06	[illegible]	0.54	0.96	1.50	2.04	2.46	2.76	2.94	3.00	3.00
12° 15°	0.08	[illegible]	[illegible]	[illegible]	[illegible]	2.72	3.28	3.68	3.92	4.00	4.00
15° 20°	0.10	[illegible]	[illegible]	1.60	2.50	3.40	4.10	4.60	4.90	5.00	5.00
Over 20°	0.12	[illegible]	1.08	1.92	3.00	4.08	4.92	[illegible]	5.88	6.00	6.00



GRADED OR SURFACING SECTION

SUPERELEVATION AND WIDENING NOTES FOR GRADED OR SURFACING SECTIONS

Curves on projects using the graded or surfacing sections are to be superelevated and widened as indicated in the accompanying [illegible] table.

The normal inside shoulder [illegible] to remain [illegible] the [illegible] The outside shoulder is to be [illegible] the section.

The outside ditch along a superelevated section is to be modified from the standard where a deeper ditch is required to provide drainage.

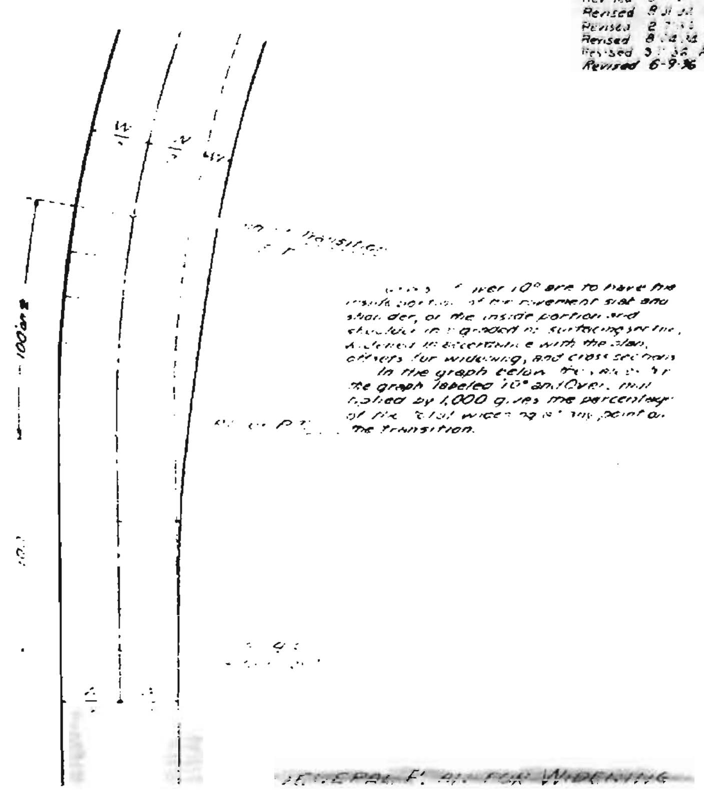
The center line pivot point is to be used as long as the superelevation does not exceed 0.02 feet per foot width of roadway. The normal inside shoulder pivot point is to be used for a superelevation rate in excess of 0.02 Ft. per foot width of roadway.

When the degree of curvature exceeds 10° the inside shoulder is to be widened from the normal inside shoulder line as shown by the table and cross section. Curves of 10° and less are not to be widened.

Details of plans for superelevation and widening are shown on the General Plan for Widening and the Graph of Superelevation Factors.

SUPERELEVATION FACTORS AND OFFSETS FOR WIDENING FOR GRADED OR SURFACING SECTIONS

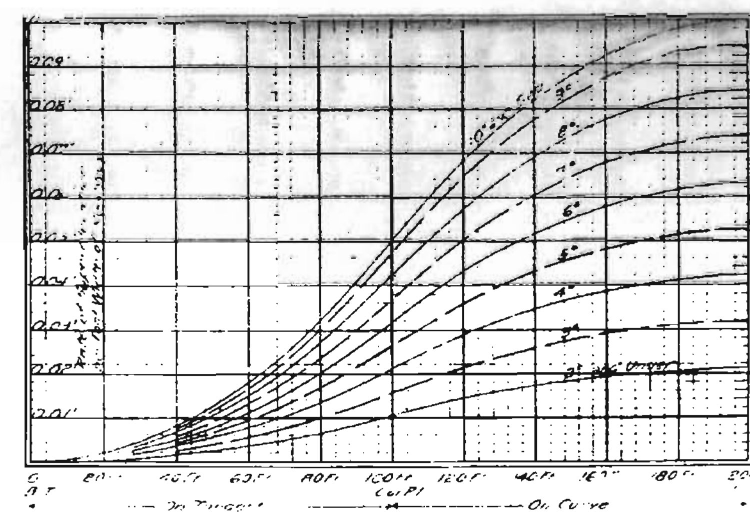
Distance from B.T.	20 Ft.	40 Ft.	60 Ft.	80 Ft.	100 Ft.+P.C.	120 Ft.	140 Ft.	160 Ft.	180 Ft.	200 Ft.+E.T.	On Curve	Length of Transition Rotated about Center Line	Length of Transition Rotated about Inside Shoulder
Factor	0.02	0.08	0.18	0.32	0.50	0.68	0.82	0.92	0.98	1.00	1.00		
Degree of Curve	Rate of Superelevation (in Feet) per Foot Width of Roadway												
2° and Under	0.0004	0.0017	0.0038	0.0067	0.0105	0.0143	0.0172	0.0193	0.0206	0.0210	0.0210	169 Ft.	31 Ft.
3°	0.0006	0.0025	0.0057	0.0101	0.0158	0.0214	0.0258	0.0290	0.0309	0.0315	0.0315	115 "	85 "
4°	0.0008	0.0034	0.0076	0.0134	0.0210	0.0286	0.0344	0.0386	0.0412	0.0420	0.0420	98 "	102 "
5°	0.0010	0.0042	0.0094	0.0168	0.0262	0.0357	0.0430	0.0483	0.0514	0.0525	0.0525	87 "	119 "
6°	0.0013	0.0050	0.0113	0.0202	0.0315	0.0428	0.0517	0.0580	0.0617	0.0630	0.0630	80 Ft.	120 Ft.
7°	0.0015	0.0059	0.0132	0.0235	0.0368	0.0500	0.0603	0.0676	0.0720	0.0735	0.0735	74 "	126 "
8°	0.0017	0.0067	0.0151	0.0269	0.0420	0.0571	0.0689	0.0773	0.0823	0.0840	0.0840	69	131 "
9°	0.0019	0.0076	0.0170	0.0302	0.0472	0.0643	0.0775	0.0869	0.0926	0.0945	0.0945	65 "	135 "
10° and Over	0.0020	0.0080	0.0180	0.0320	0.0500	0.0680	0.0820	0.0920	0.0980	0.1000	0.1000	63 "	137 "
	Offsets for Widening W (in Feet)												
Over 10° Under 12°	0.06	0.24	0.54	0.96	1.50	2.04	2.46	2.76	2.94	3.00	3.00		
12° 15°	0.08	0.32	0.72	1.28	2.00	2.72	3.28	3.68	3.92	4.00	4.00		
15° 20°	0.10	0.40	0.90	1.60	2.50	3.40	4.10	4.60	4.90	5.00	5.00		
Over 20°	0.12	0.48	1.08	1.92	3.00	4.08	4.92	5.52	5.88	6.00	6.00		



[illegible] over 10° are to have the inside portion of the pavement slab and shoulder, or the inside portion and shoulder in graded or surfacing sections, widened in accordance with the plan, offsets for widening, and cross sections.

In the graph below the [illegible] the graph labeled 10° and Over, multiplied by 1,000 gives the percentage of the total widening at any point on the transition.

GENERAL PLAN FOR WIDENING



GRAPH OF SUPERELEVATION TRANSITION FACTORS

The rate of superelevation per foot width of roadway to be applied at the outside edge of the pavement slab, and at the outside shoulder of the roadway is computed as follows:

The full superelevation per foot width of roadway rate for a given degree of curvature is

0.0105 Ft. × Degree of Curvature

The maximum superelevation of 0.10 Ft. per foot width, applying to curves of 10° and over, is not to be exceeded.

The above graph has been prepared from the rates of superelevation shown in [illegible]

SPECIAL CASES. When the roadway alignment does not [illegible] the regular transition lengths, the segment length [illegible] minimum distance of 200 Ft. plus [illegible] of the curves shall be used between the points of full superelevation.

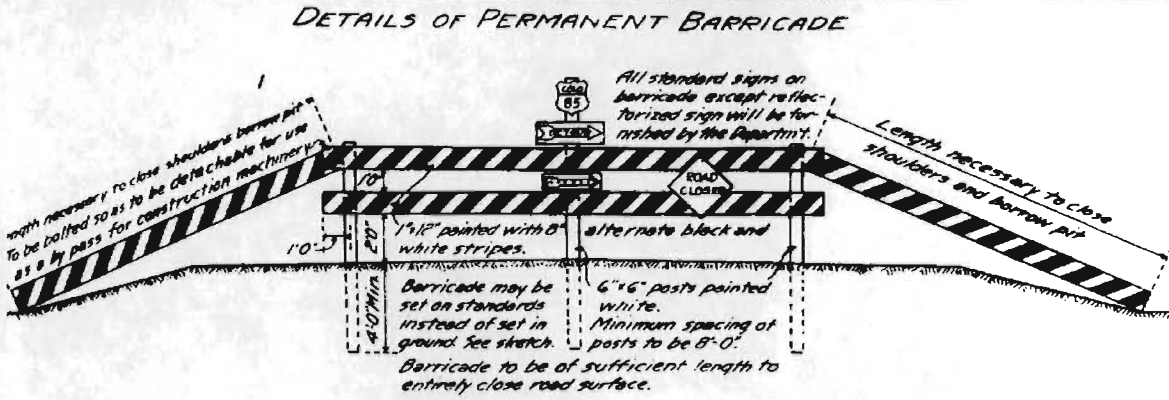
Where the length of the curve is less than 200 Ft., the rate of superelevation and the widening required for a distance of one half the length of the curve plus 100 Ft. ([illegible] +100 Ft.) as shown for the regular 200 Ft. transition for that degree of curve shall be used. This maximum of superelevation and widening [illegible] at the center of the curve.

When the tangent distance between two curves in the same direction is less than 400 Ft., the superelevation and widening required by the curve of [illegible] degree is to be carried across the connecting tangent in such a way that good appearance and riding qualities will be maintained.

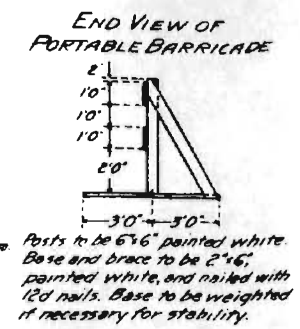
COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD METHODS FOR SUPERELEVATION AND WIDENING OF CURVES

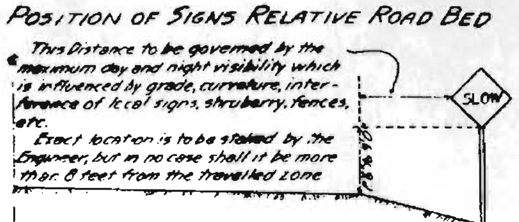
FED. ROAD DIST. NO.	STATE	[illegible] PROJ. NO.	SHEET NO.	TOTAL SHEETS
3.	COLO.	4003	19	

STANDARD M-2-B



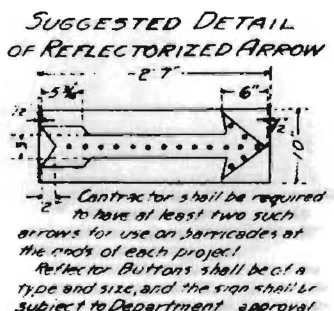
DETAILS OF PERMANENT BARRICADE
All standard signs on barricade except reflectorized sign will be furnished by the Department.
Length necessary to close shoulders and borrow pit
Length necessary to close shoulders borrow pit To be bolted so as to be detachable for use as a by pass for construction machinery
1"x 12" painted with 8" alternate black and white stripes.
Barricade may be set on standards instead of set in ground. See sketch.
6"x6" posts painted white. Minimum spacing of posts to be 8'-0".
Barricade to be of sufficient length to entirely close road surface.
4'-0" Min.



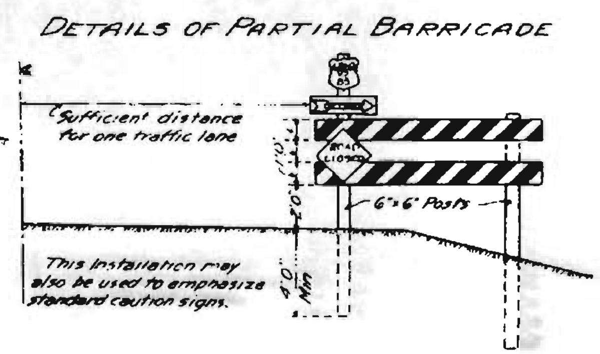


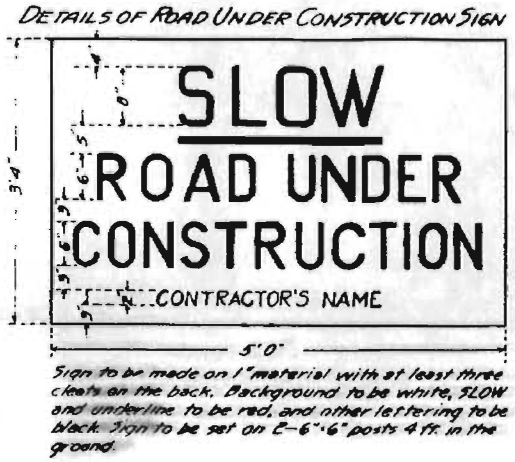
POSITION OF SIGNS RELATIVE ROAD BED
This Distance to be governed by the maximum day and night visibility which is influenced by grade, curvature, interference of local signs, shrubbery, fences, etc.
Exact location is to be staked by the Engineer, but in no case shall it be more than 8 feet from the travelled zone
SLOW

Barricades to be placed as construction conditions require.

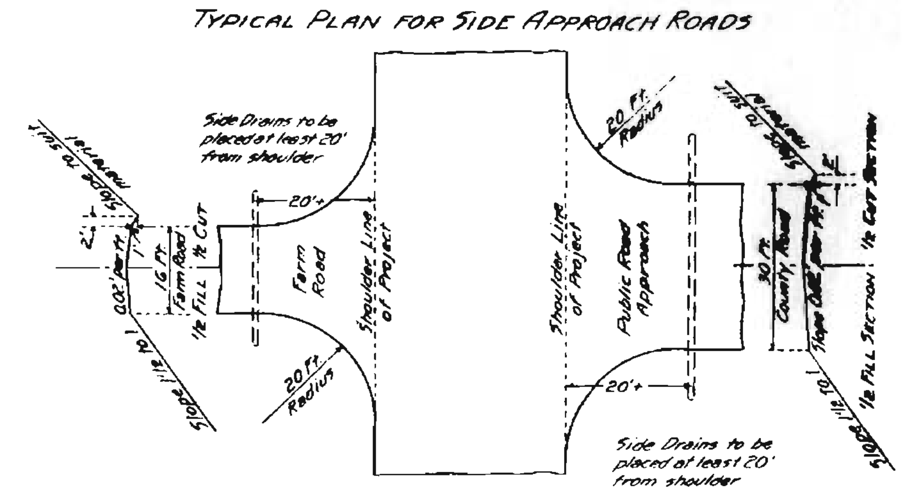


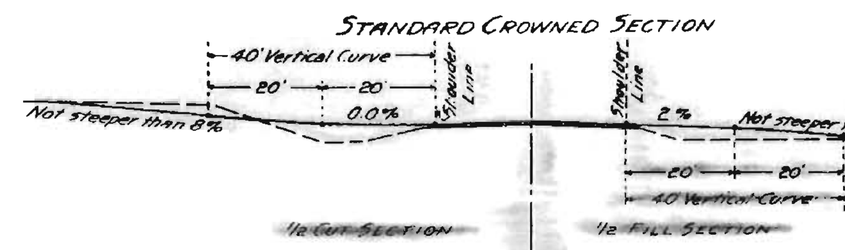
SUGGESTED DETAIL OF REFLECTORIZED ARROW
2'-7"
Contractor shall be required to have at least two such arrows for use on barricades at the ends of each project.
Reflector Buttons shall be of a type and size, and the sign shall be subject to Department approval.

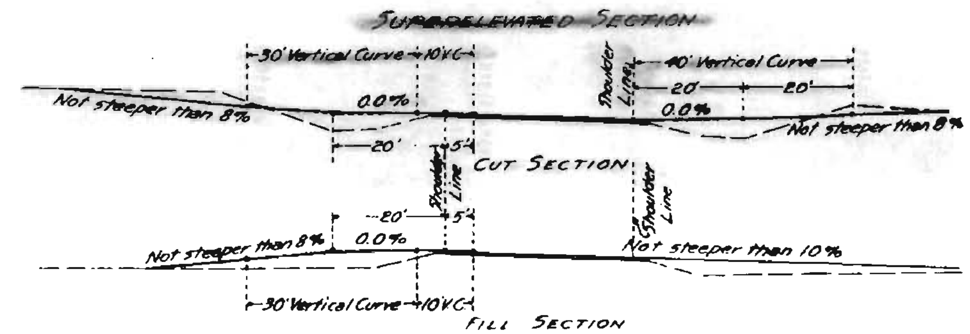


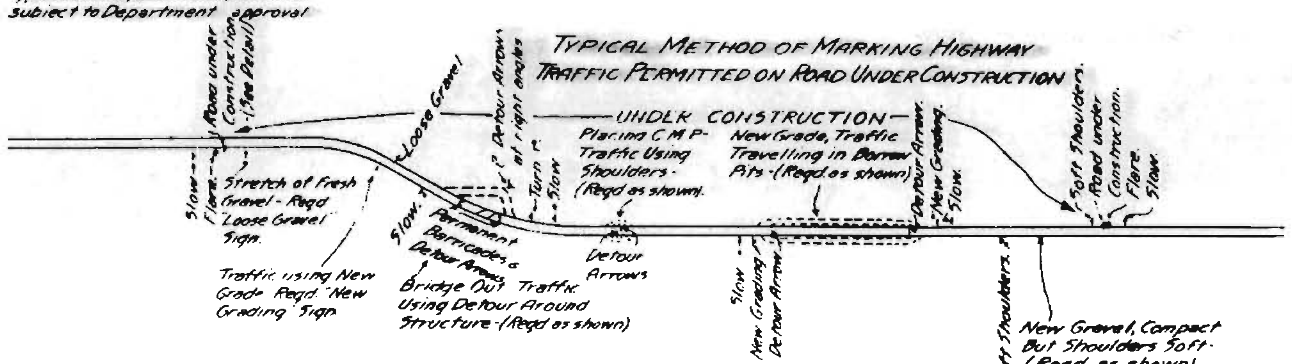


DETAILS OF ROAD UNDER CONSTRUCTION SIGN
SLOW
ROAD UNDER
CONSTRUCTION
CONTRACTOR'S NAME
5'-0"
Sign to be made on 1" material with at least three cleats on the back. Background to be white, SLOW and underline to be red, and other lettering to be black. Sign to be set on 2-6"x6" posts 4 ft. in the ground.

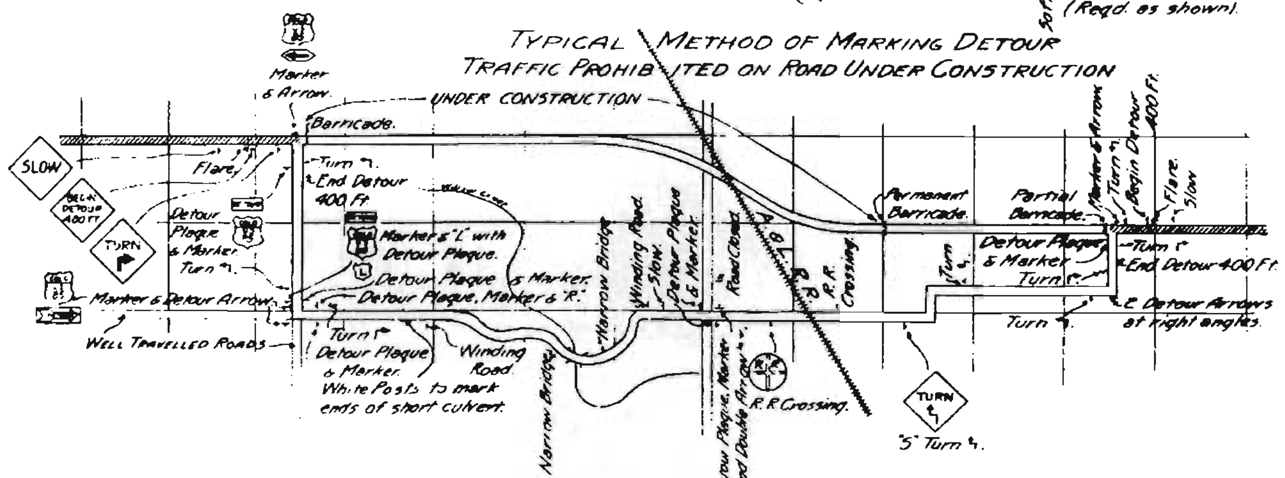








TYPICAL METHOD OF MARKING HIGHWAY TRAFFIC PERMITTED ON ROAD UNDER CONSTRUCTION
UNDER CONSTRUCTION
Placing C.M.P. Traffic Using Shoulders (Reqd as shown)
New Grade, Traffic Travelling in Borrow Pits (Reqd as shown)
Stretch of Fresh Gravel - Reqd 'Loose Gravel' Sign
Traffic using New Grade Reqd 'New Grading' Sign
Bridge Out Traffic Using Detour Around Structure (Reqd as shown)
Detour Arrows
New Gravel, Compact But Shoulders Soft (Reqd as shown)



TYPICAL METHOD OF MARKING DETOUR TRAFFIC PROHIBITED ON ROAD UNDER CONSTRUCTION
UNDER CONSTRUCTION
Barricade
SLOW
TURN
Well Travelled Roads
Permanent Barricade
Partial Barricade
End Detour 400 Ft.
Winding Road
Narrow Bridge
R.R. Crossing
"S" Turn

GENERAL NOTES ON APPROACHES

The maximum grades shown are to be the limiting grades for all except extreme cases.

When the length of the approach as determined by the intersection of these grades with the natural ground is such as to damage the Property so served, or cause unreasonable conditions, the grades may be modified.

In such cases, methods used, and maximum grades, shall be as indicated on the plans, or provided by work order.

GENERAL NOTES FOR ROADWAY CONSTRUCTION TRAFFIC SIGNS

All Work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department adopted August 1, 1935.

Whenever traffic is permitted on a road while under construction, the Contractor shall at all times adequately and appropriately mark any and all hazards on the Project with well painted, well maintained barricades, and standard caution and warning signs. The Contractor shall also mark with standard directional signs any places where the direction of the flow of traffic is not plain.

Whenever traffic is prohibited from a Project under construction, the Detour will be marked by the Department and the barricades at either end of the Project shall be erected and maintained by the Contractor.

All signs and barricades shall be immediately moved, added to, removed, or changed to appropriately mark hazards, or conditions altered, corrected, or changed by construction progress.

The Contractor shall furnish:

(1) All barricade material. It shall always be well painted, as per sketch, and well maintained.
(2) A reflectorized arrow of an approved type for each barricade at the ends of the Project, and at other barricades required where traffic is permitted on road under construction.
(3) "SLOW-ROAD UNDER CONSTRUCTION" signs as required.
(4) Any special signs the Department may deem necessary for the protection of traffic over the Project.
(5) At least three (3) flares or torches for each barricade, and other flares to illuminate such signs as are called for on these plans, or as the Department may direct.

Flares or torches shall be placed between 3 and 5 feet ahead of the sign or object to be illuminated, and shall be kept burning from sunset to sunrise.

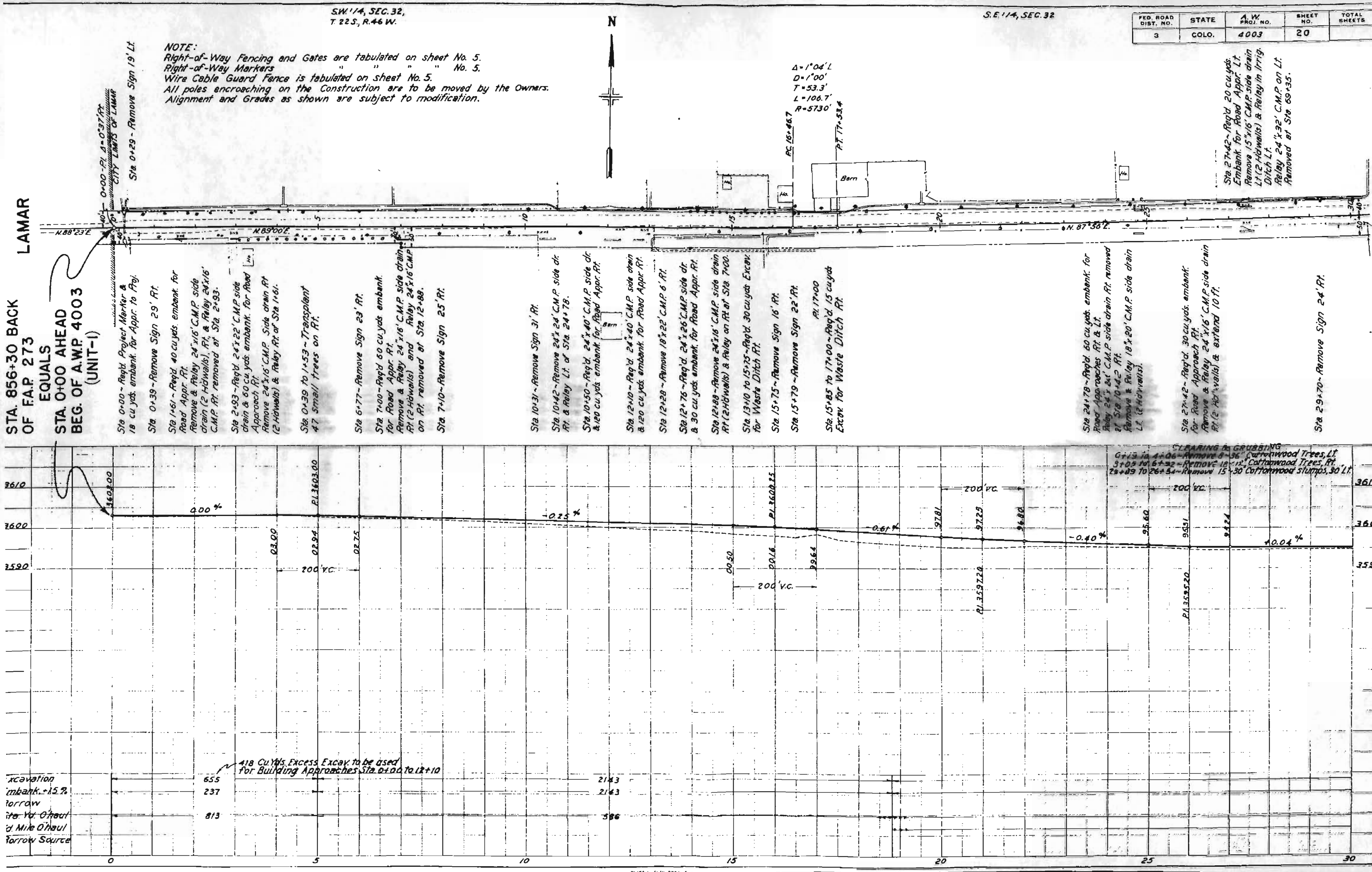
Costs of all of the foregoing materials and work by the Contractor shall be included in the original contract prices for the Project.

The Highway Department will furnish all standard signs not required to be furnished by the Contractor.

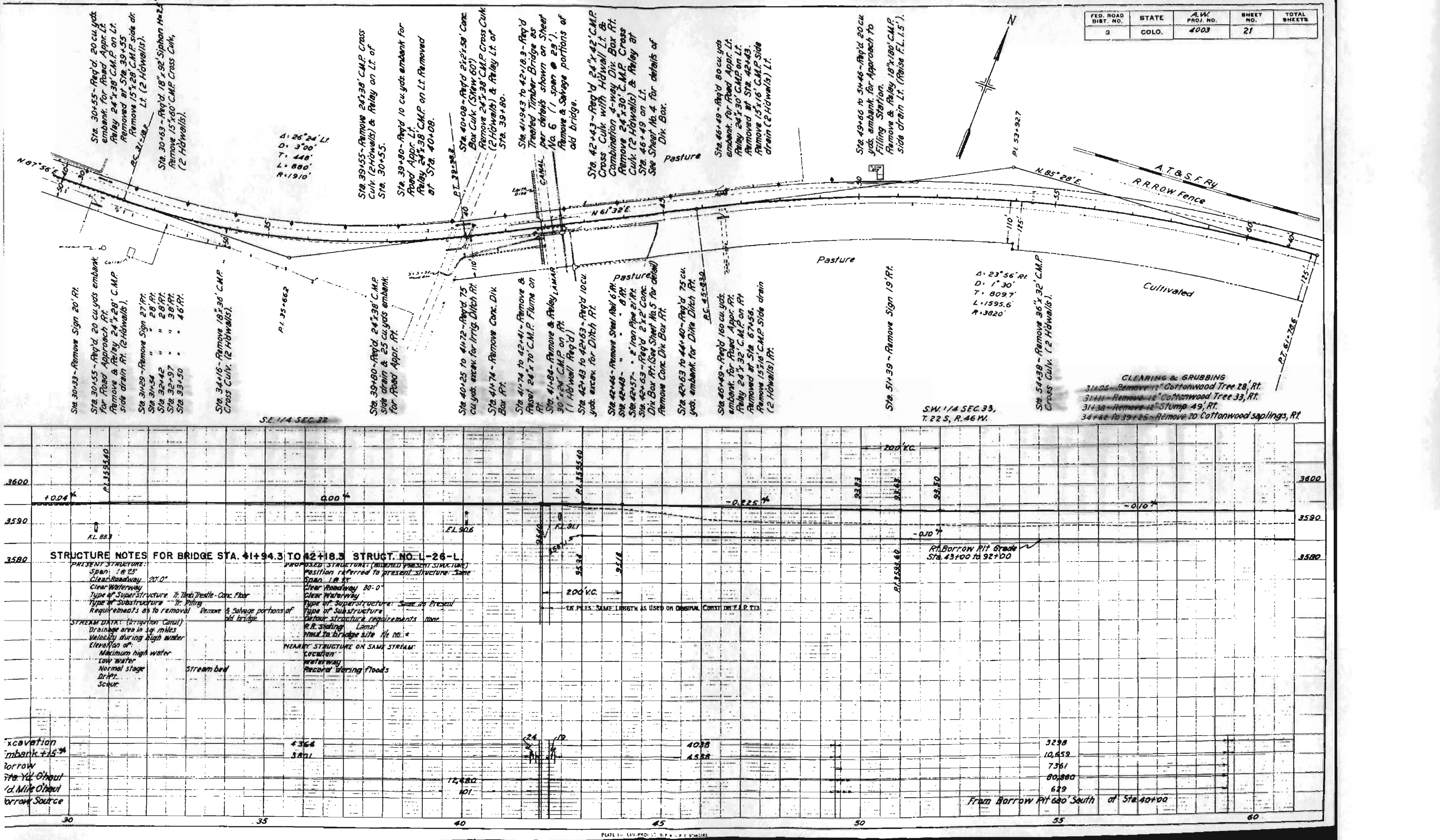
COLORADO
STATE HIGHWAY DEPARTMENT
TYPICAL
SIDE APPROACH ROADS
ROADWAY CONSTRUCTION TRAFFIC SIGNS

Designed by [illegible] Made by [illegible] Check J.S.M. Check F.A.K.
Approved by [signature] Date: Aug. 20, 1935

FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	20	



FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	21	



FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	22	

N

Sta. 67+75 - Reqv'd. 30 cu. yds embank. for Road Appr. Lt. Remove 15"x16' C.M.P. Side drain Lt. (2 Hdwalls).

Sta. 69+35 - Remove 24"x32' C.M.P. Cross Culv. (2 Hdwalls) & Relay at Sta. 27+42 on Lt.

Sta. 85+93 - Reqv'd 20 cu. yds. embank. for Road Appr. Lt. Remove 15"x16' C.M.P. Side drain Lt. (2 Hdwalls).

ATCHISON TOPEKA & SANTA FE R.R.

60 65 70 75 80 85 90

125' 145' N. 85° 28' E. 125' 145'

Pt. 61+78.6

Sta 67+54 - Remove Sign 48' Rt.

Sta 67+56 - Reqv'd 90 cu. yds. embank. for Road Appr. Rt. Remove 24"x32' C.M.P. side drain Rt. (2 Hdwalls) & Relay on Rt. at Sta. 46+49.

Sta. 67+59 - Remove Sign 54' Rt.

Sta. 80+64 - Remove Sign 20' Rt.

Sta 85+93 - Reqv'd 60 cu. yds. embank. for Road Appr. Rt. Remove & Relay 24"x16' C.M.P. Side drain Rt. (2 Hdwalls) & extend 14 Ft.

Sta 85+09 - Remove Sign 25' Rt.

S.W. 1/4, SEC. 33, T. 22 S, R. 46 W.

S.E. 1/4, SEC. 33

3600 3590 3580

-0.10% -0.44% 0.00% -0.10% -0.12%

200' V.C. 200' V.C. 200' V.C. 200' V.C.

Pt. 3592.40 Pt. 3588.00 Pt. 3588.20 Pt. 3587.40

88.44 88.11 88.00 88.20 87.97 87.88 87.52 87.43 87.40

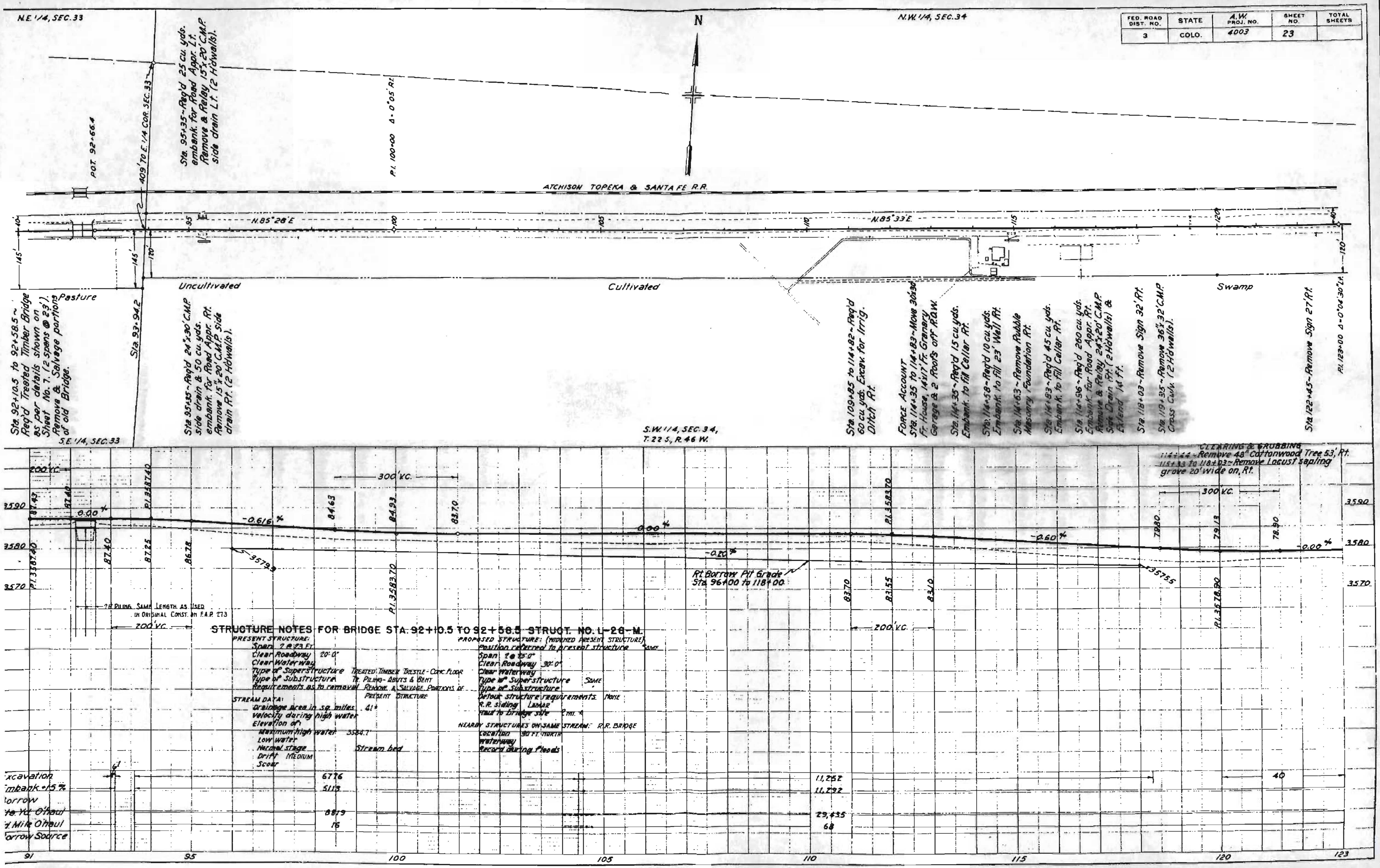
92.50 92.31 91.96

Rt Borrow Pit Grade Sta 43+00 to 92+00.

Excavation	3498		2348	106	4670		3705	2152	
Embank. @ 15%	3498		2348		4776		3705	3816	
Borrow									
Reqd. Yd. O'haul					4033		924		
Reqd. Mile O'haul									
Borrow Source									

60 65 70 75 80 85 90

FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	23	



FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	24	

N.E. 1/4, SEC. 34

N

Sta. 128+64 ~ Extend 7'x3.5'x26' Conc. Box Culv. 25' Rt. & 4' Lt. See Sheet No. 4 for details.

P.I. 144+00 Δ = 0°03' Rt.

Sta. 147+25 ~ Req'd 10 cu. yds Embank. for Road Appr. Lt. Remove 15"x60' C.M.P. Side Drain Lt. (2 Hdwalls)

Sta. 149+07 ~ Req'd 24"x26' C.M.P. Side Drain & 160 cu. yds. Embank. for Road Appr. Rt. Remove 15"x16' C.M.P. Side Drain Rt. (2 Hdwalls)

Sta. 150+33 ~ Req'd 24"x26' C.M.P. Side Drain & 85 cu. yds. Embank. for Road Appr. Rt.

Sta. 150+75 ~ Remove 15"x 20' C.M.P. Side Drain Rt. (2 Hdwalls)

ATCHISON TOPEKA & SANTA FE R.R.

N. 85° 28' E.

N. 85° 31' E.

P.I. 123+00 Δ = 0°04'30" Lt.

Sta. 123+20 ~ Remove Sign & 4" Iron Pipe 30' Rt.

Sta. 125+29 ~ Remove 4"x4" Wood Post 24' Rt.

Sta. 129+43 ~ Remove Sign 25' Rt.

Sta. 129+60 ~ Remove 15"x20' C.M.P. Side Drain Rt. (2 Hdwalls)

Sta. 129+62 ~ Req'd 250 cu. yds. Embank. for Road Appr. Rt.

Sta. 128+61 to 147+73 ~ Req'd 205 cu. yds. Excav. for Waste Ditch Rt.

Sta. 147+08 ~ Req'd 24"x24' C.M.P. Side Drain & 150 cu. yds. Embank. for Road Approach Rt. Remove 15"x16' C.M.P. Side Drain Rt. (2 Hdwalls).

Sta. 147+45 ~ Req'd 24"x24' C.M.P. Side Drain & 160 cu. yds. Embank. for Road Approach Rt. Remove 15"x20' C.M.P. Side Drain Rt. (2 Hdwalls).

Sta. 150+18 to 153+09 ~ Req'd Conc. Retaining Wall on Rt. as per details shown on Sheet No. 3

Sta. 150+60 ~ Remove 4"x4" Wood Post set in Concrete 36' Rt.

FORCE ACCOUNT
Sta. 151+33 to 152+85 ~ Move Flag Pole, Horiz. Bars, Merry-go-round, Slide & Teeter off R.O.W.

Sta. 152+33 ~ Req'd 70 cu. yds. Embank. for School Appr. Rt. & 24"x22' C.M.P. Side Drain.

Sta. 152+35 ~ Remove 15"x16' C.M.P. Side Drain Rt. (2 Hdwalls)

Sta. 152+43 to 153+04 ~ Transplant 6 small trees on Rt.

Conc. Ret. Wall

School

S.E. 1/4, SEC. 34, T. 22 S., R. 46 W.

Sta. 128+09 to 128+70 ~ Remove 6 ~ 6" Cottonwood saplings, Rt.
Sta. 147+25 ~ Remove 2 ~ Cottonwood Trees 28' Rt.
Sta. 149+35 ~ Remove 1 ~ 24" Cottonwood Tree 87' Rt.
Sta. 152+14 ~ Remove 1 ~ 18" Cottonwood Tree 26' Rt.

P.I. 3578.90

P.I. 3577.00

200' V.C.

0.00 %

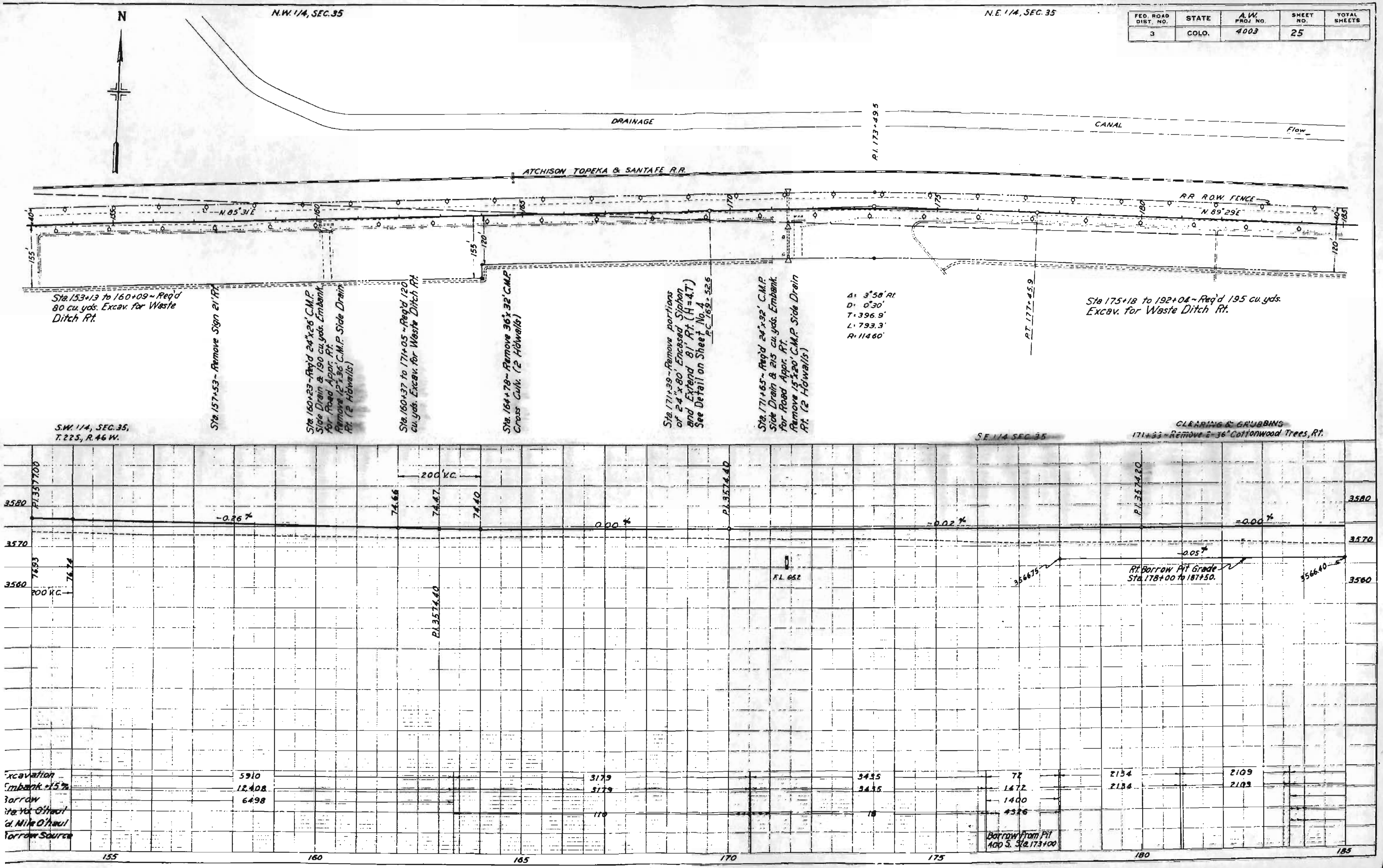
-0.19 %

-0.26 %

78.90 78.85 78.71 77.19 77.05 77.00 77.00 76.93 76.74

Excavation		5197	2562
Embankment 15%	259	5197	2562
Borrow	259		
Sta Yd O'haul		496	24
Rd Mile O'haul			
Borrow Source	Borrow from widened Cuts on R.O.W.		Borrow from widened and deepened Pit on Rt.

122 125 130 135 140 145 150 154


FED. ROAD DIST. NO. 3
STATE COLO.
A.W. PROJ NO. 4003
SHEET NO. 25
TOTAL SHEETS
N
N.W. 1/4, SEC.35
N.E. 1/4, SEC.35
DRAINAGE
CANAL
Flow
P.I. 173+49.5
ATCHISON TOPEKA & SANTAFE R.R.
R.R. R.O.W. FENCE
N.85°31'E
N.89°29'E
Sta.153+13 to 160+09 ~ Req'd 80 cu.yds. Excav. for Waste Ditch Rt.
Sta.157+53 ~ Remove Sign 21' Rt.
Sta.160+23 ~ Req'd 24"x26' C.M.P. Side Drain & 190 cu.yds. Embank. for Road Appr. Rt. Remove 12"x36' C.M.P. Side Drain Rt. (2 Hdwalls)
Sta.160+37 to 171+05 ~ Req'd 120 cu.yds. Excav. for Waste Ditch Rt.
Sta.164+78 ~ Remove 36"x32' C.M.P. Cross Culv. (2 Hdwalls)
Sta.171+39 ~ Remove portions of 24"x80' Encased Siphon and Extend 8' Rt. (H=4.7') See Detail on Sheet No.4
P.C. 169+52.6
Sta.171+65 ~ Req'd 24"x32' C.M.P. Side Drain & 215 cu.yds. Embank. for Road Appr. Rt. Remove 15"x20' C.M.P. Side Drain Rt. (2 Hdwalls)
Δ= 3°58' Rt.
D= 0°30'
T= 396.9'
L= 793.3'
R= 11460'
P.T. 177+45.9
Sta.175+18 to 192+04 ~ Req'd 195 cu.yds. Excav. for Waste Ditch Rt.
S.W. 1/4, SEC.35, T.22S., R.46W.
S.E. 1/4 SEC.35
CLEARING & GRUBBING
171+83 ~ Remove 2-36" Cottonwood Trees, Rt.
P.I. 3577.00
200' V.C.
74.66
74.47
74.40
P.I. 3574.40
P.I. 3574.40
P.I. 3574.20
-0.26%
0.00%
-0.02%
-0.00%
-0.05%
3580
3570
3560
76.93
76.74
F.L. 65.2
3566.75
3566.40
Rt. Borrow Pit Grade Sta.178+00 to 187+50.
Excavation
Embank.+15%
Borrow
Sta.Yd. O'haul
Yd. Mile O'haul
Borrow Source
5910
12,408
6498
3179
3179
110
3435
3435
18
72
1472
1400
4326
Borrow from Pit 400 S. Sta.173+00
2134
2134
2109
2109
155
160
165
170
175
180
185

FED. ROAD DIST. NO.	STATE	A.W. PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	4003	26