INACTIVE NOV 19 1969

R.O.W. OBTAINED ON PROJECT FAP 278-D

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO	SHEET NO.
9	COLORADO	F 017-3(13)	1

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

AS CONSTRUCTED
REVISED DATE DEC 1 1969

PLAN AND PROFILE OF PROPOSED
FEDERAL AID PROJECT NO. F 017-3(13)
STATE HIGHWAY NO. 8
CHEYENNE COUNTY

SCALES OF ORIGINAL DRAWINGS
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
GROSS LENGTH OF PROJECT } 19,000.0 FT. = 3.599 MILES
NET LENGTH OF PROJECT

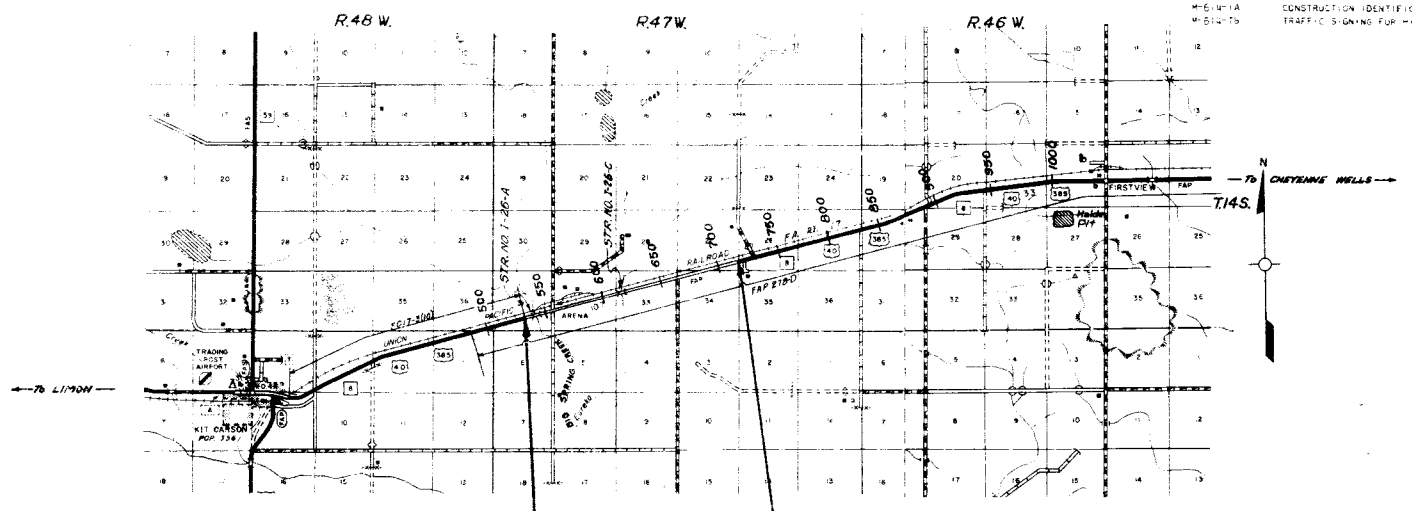
CONTRACTOR: ASPHALT PAVING CO.
PROJECT ENGR.: ROBERT W. DOLLARD
DATE COMPLETED: DECEMBER 1, 1968

CONVENTIONAL SIGNS

CENTER LINE
COUNTY LINE
TOWNSHIP OR RANGE LINE
LAND LINES — SECTION LINE — ¼ SECTION LINE — ¼ SECTION LINE
CITY LIMITS
RAILROAD — PLAN SHEET — TITLE SHEET
BARBED WIRE FENCE
WOVEN WIRE - COMBINATION FENCE
TELE. & TELEG. LINE
POWER LINE
PRESENT ROAD (PLAN SHEETS)
RIGHT OF WAY LINE — R.O.W. MARKER
ACCESS POINTS (FREEWAYS) — 24' OP. — OPENING — 24' OP.
C OF A LINE (CONTROL OF ACCESS)
ACCESS DENIED BY DEED
TOP OF CUTS
TOE OF FILLS
DETOUR

INDEX OF SHEETS

H. G. JOHNSTON
W. E. MITCHELL



STA. 535+00 AH. BEGIN F 017-3(13)=
STA. 1535+00 BK. END F 017-3(10)

STA. 725+00-END F 017-3(13)=
STA. 1725+00 ON FAP 278-D

SCALE OF MILES
0 ½ 1 2 3

SEE SPECIAL PROVISIONS FOR NOTICE TO BIDDERS

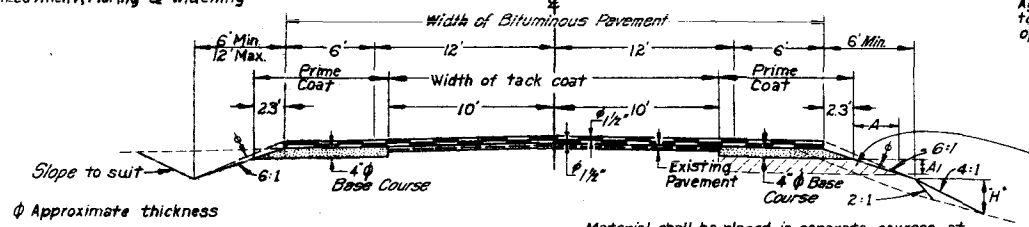
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
APPROVED: Lehan E. Shumate 10-27-67
CHIEF ENGINEER DATE
By: L. L. Brown Deputy Chief Engr.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
BUREAU OF PUBLIC ROADS
APPROVED: _____ DATE
DIVISION ENGINEER

W.E.M.

NOTE:
See Standards for Details of Cut Slope Treatment, Flaring & Widening

TYPICAL SECTION A { Sta. 535+00 to Sta. 536+50; Sta. 554+50 to Sta. 604+50; Sta. 613+50 to End of project



φ Approximate thickness

Excavation below 4:1 Slope and/or 10:1 slope will not be permitted.
The depth and width of the side ditch shall be varied where necessary in order to provide proper drainage.

Material shall be placed in separate courses at the following rates per 100 linear feet of roadway.
Bituminous Pavement
Top layer 1½" _____ 31 Tons
Bottom layer 1½" _____ 31 Tons
Base Course _____ 39 Tons

Contractor will be required to place Aggregate Base Course (class 7)(Special) to this line after completion of paving operation.

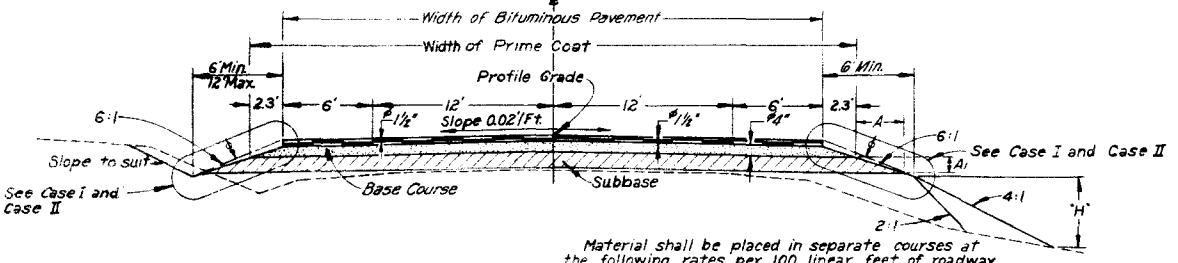
FILL SLOPES

"H"	Slope
3' or less	4:1
Over 3'	2:1

SIDE SLOPE DIMENSIONS FOR SUBBASE MATERIAL

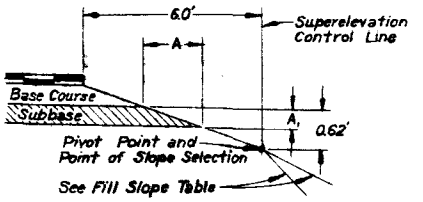
Subbase Thickness	Slope 6:1 A	Slope 6:1 A1
8"	4.5'	0.8'

TYPICAL SECTION B { Sta. 536+50 to Sta. 554+50; Sta. 604+50 to Sta. 613+50

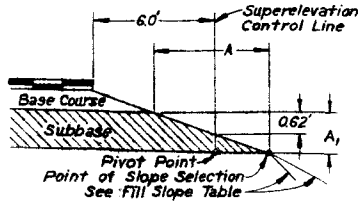


Material shall be placed in separate courses at the following rates per 100 linear feet of roadway.
Bituminous Pavement
Top layer 1½" _____ 31 Tons
Bottom layer 1½" _____ 31 Tons
Base Course _____ 82 Tons

CASE I (Bottom of Subbase ABOVE Superelevation Control Line Intersection)



CASE II (Bottom of Subbase BELOW Superelevation Control Line Intersection)



FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 017-3 (13)	2	

AS CONSTRUCTED
REVISED DATE DEC 1 1969

GENERAL NOTES

For preliminary plan quantities of Bituminous Materials the following rates were used:

See Final Tabulations	~~Prime Coat MC~~	~~@~~	~~0.40 Gals. per sq. yd.~~
	~~Tack Coat~~	~~@~~	~~0.10 Lbs. per sq. yd.~~

Any layer of bituminous pavement that is to have a succeeding layer placed thereon shall be completed full width before succeeding layer is placed.

Road approaches which require bituminous pavement shall be primed and a thickness of pavement equivalent to that of the bottom layer of the mainline placed as follows:
Public approaches and entrances to buildings or residences shall be paved 50 ft. out from edge of shoulder or to the Right of Way line whichever is less. Field entrances shall be paved 4 ft. out from edge of shoulder.

Shoulder areas, excavation area sta. 604+ to sta. 613+ and approaches to bridges shall be constructed with moisture and density control to a depth of 1 foot below the subgrade. Excavation required for compaction of this area will be considered subsidiary to that operation and will not be paid for separately.

Standard compaction will be required on this project.

It is ~~estimated~~ that ~~1500~~ Final 1078 Hours of Flagging for controlling traffic will be required for this project.

WORK BY MAINTENANCE FORCES

Removing Guard Posts, cleaning culverts and regrading of drainage ditches will be accomplished by State Maintenance Forces at no cost to project.

TABULATION OF LENGTH AND DESIGN DATA

STATION	ROADWAY LIN. FT.	BRIDGE LIN. FT.
535+00 Ah. - BEGIN F017-3(13) = 1535+00 BK. - END F017-3(10)		
	978.3	
544+78.3 Big Spring Creek 545+59.8 } STR. NO. I-26-A		81.5
	7,370.2	
619+30.0 Eureka Creek 620+11.5 } STR. NO. I-26-C		81.5
	10,488.5	
725+00 - END F017-3(13) = 1726+00 ON FAP 278D		
TOTALS	18,837.0	163.0

SUMMARY	LIN. FT.	MILES
ROADWAY	18,837.0	3.568
~~BRIDGES~~	163.0	0.031
~~ROADWAY~~ (NET & GROSS)	19,000.0	3.599

DESIGN DATA

MAXIMUM DEGREE OF CURVE	TANGENT
MAXIMUM GRADE	2.10%
MINIMUM SSD - HORIZONTAL	TANGENT
MINIMUM SSD - VERTICAL	615'
MAXIMUM DESIGN SPEED	70 M.P.H.

SUMMARY OF APPROXIMATE QUANTITIES

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLORADO	F017-3(13)	3	

ITEM NO.	ITEM	UNIT	ROADWAY	BRIDGE STA. 545± STR. NO. I-26-A	BRIDGE STA. 620± STR. NO. I-26-C	PROJECT TOTALS
202	Removal of Structure	Each	1			1
202	Removal of Asphalt Mat	Sq. Yd.	80			80
202	Removal of Bridge	Each		1	1	2
202	Plug Culvert	Each	3			3
203	Unclassified Excavation	Cu. Yd.	14,950		50	15,000
203	Borrow	Cu. Yd.	4,000			4,000
203	Embankment (Standard)	Cu. Yd.	39,000			39,000
204	Haul	Yd. Mi.	45,100			45,100
204	Haul	Ton Mi.	226,700			226,700
206	Structure Excavation (Haul)	Cu. Yd.	80	120	160	360
206	Structure Backfill (Class 3)(Haul)	Cu. Yd.	40	60	50	150
209	Wetting	M. Gal.	1,630			1,630
304	Aggregate Base Course (Class 2)	Ton	5,800			5,800
304	Aggregate Base Course (Class 7)(Special)	Ton	11,500			11,500
403	Hot Bituminous Pavement (Grading F)(Hydrated Lime)	Ton	12,400			12,400
411	Asphalt Cement (85-100 pen)	Ton	900			900
411	Emulsified Asphalt (SS-K)	Gal.	80,200			80,200
411	Liquid Asphaltic Material (MC-70)	Gal.	19,900			19,900
412	Concrete Pavement (10 Inch)	Sq. Yd.	320			320
502	Steel Piling (10 BP 42)	Lin. Ft.		780	675	1,455
506	Riprap	Cu. Yd.		270	100	370
509	Structural Steel	Lump Sum		●	●	●
509	Structural Steel (Galvanized)	Lump Sum		●	●	●
516	Dampproofing (Linseed Oil)	Sq. Yd.		550	550	1,100
518	Bridge Compression Joint Sealer (Type A)	Lin. Ft.	160			160
601	Concrete Class A	Cu. Yd.		68	59	127
601	Concrete Class D	Cu. Yd.		124	124	248
602	Reinforcing Steel	Lb.	15,200	44,400	44,000	103,600
603	18 Inch Corrugated Steel Pipe	Lin. Ft.	82			82
603	24 Inch Corrugated Steel Pipe	Lin. Ft.	82			82
603	24 Inch Steel End Section	Each	2			2
606	Guard Rail Type 3	Lin. Ft.	1,400			1,400
609	Curb Type 2 (Section-Variable)	Lin. Ft.	160			160
612	Delineator (Type III)	Each	4			4
614	Flagging	Hour	1,500			1,500
620	Field Laboratory	Each	1			1
620	Sanitary Facility	Each	1			1
621	Maintenance of Detours	Lump Sum	●			●
626	Mobilization	Lump Sum	●			●
	STATE FORCES					
	Furnishing and Installing Identification Sign	Each	2			2
	NON FEDERAL AID (STATE FORCES)					
	Signing and Striping Entire (Entire) Project	Lump Sum				●

DEPARTMENT OF HIGHWAYS-STATE OF COLORADO
FORM D.O.H. 125
REV. NOVEMBER 1964

LIST OF STRUCTURES

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	F 017-3(13)	4

LOCATION	REMOVAL OF STRUCTURES	UNCLASSIFIED EXCAVATION CUBIC YARDS			STRUCTURE EXCAVATION	STRUCTURE BACKFILL	AGGREGATE BASE COURSE CLASS-7	HOT BITUMINOUS PAVE.	PLUG CULVERTS	CORR. STEEL PIPE LINEAR FEET		"H" OVER CULV.	STEEL END SECTIONS FOR C.S.P. CULVERTS	MISCELLANEOUS
	NO.	UNCL.	EMB.	DITCH	CUBIC YARDS	CUBIC YARDS CL. 3	TONS	TONS	EACH	18"	24"	FT.	NO. 24"	
535±														1-Identification Sign. (State Forces)
545±														
541+50 - 549+00							(QUANTITIES IN SUMMARY)							Maintenance of Detours.
546+60			40				11	2						
555+75			80				110	42						
568+15			20		27	10	22	4		28		2		
580+60			40		20	9	22	4		28		1		
										26		1		
585+00	1			2	3	4					14	5	1	
											6	5		
601+75			10				11	2						
602+00									1					
610+25							11	2						
615+50 - 623+50							(QUANTITIES IN SUMMARY)							Maintenance of Detours.
620±														
620+75							11	2						
635+09									1				1	
663+80							11	2						
664+97.4			40				55	14						
667+72									1					
680± - 682±		80		2	30	16	△	△						75 Sq. Yds. Removal of Asphalt Mat.
681+06											62	2	1	
687+00							11	2						
719+71.8							11	2						
725+50							22	4						
725±														1-Identification Sign. (State Forces)
725+00 - 726+00							△	△						
TOTALS	1	80	230	4	80	39	308	82	3	82	82		2	

△- Quantities Incl. in Subbase and/or Surfacing Plan.

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 017-3(13)	5	

AS CONSTRUCTED
REVISED DATE DEC 1 1968

APPROACH SLABS

STATION ABUTMENT	SKEW	WIDTH	CONCRETE PAVEMENT (10 INCH) SQ. YD.	REINFORCING STEEL LB.	CURB TYPE 2 (SECTION VARIABLE) LIN. FT.	BRIDGE COMPRESSION JOINT SEALER TYPE A LIN. FT.
544 +	90° 00'	36'	80	3796	40	38
545 +	90° 00'	36'	80	3796	40	38
619 +	90° 00'	36'	80	3796	40	38
620 +	90° 00'	36'	80	3796	40	38
Totals			320'	15184'	160'	152'

GUARD RAIL TYPE 3

STATION	SIDE	LIN. FT.
542 + 29 to 544 + 79	Rt.	250
543 + 79 to 544 + 79	Lt.	100
545 + 59 to 546 + 59	Rt.	100
545 + 59 to 548 + 09	Lt.	250
616 + 81 to 619 + 31	Rt.	250
618 + 31 to 619 + 31	Lt.	100
620 + 11 to 621 + 11	Rt.	100
620 + 11 to 622 + 61	Lt.	250
Totals		1400'

DELINEATOR (TYPE III)

STATION	SIDE	EACH
544 + 78	Rt.	1
545 + 60	Lt.	1
619 + 30	Rt.	1
620 + 12	Lt.	1
Totals		4

SUBBASE PLAN

See Sheet 5xa

STATION TO STATION	SOURCE	ø THICKNESS	AGGREGATE BASE COURSE CLASS 2 TONS	HAUL CLASS 2 TON MILE
535+00 to 538+00		8"	336	3,100
538+00 to 544+78.3		8"	1,364	12,459
545+59.8 to 552+00		8"	1,287	11,575
552+00 to 554+00		8"	224	1,997
604+50 to 613+50		8"	1,809	14,207
Estimated for:				
Correcting Irregularities			502	4,334
Stabilizing present roadway Sta. 680+ to Sta. 682+.		8"	200	1,300
TOTALS			5,722'	48,972

ø Based on Design Curve "D"

SURFACING PLAN

See Sheet 5x

STATION TO STATION	SOURCE	QUANTITY - TONS: AGGREGATE BASE COURSE (CLASS 7) (SPECIAL)	QUANTITY - TONS: HOT BITUMINOUS PAVEMENT (GRADING F) BOTTOM LAYER	QUANTITY - TONS: HOT BITUMINOUS PAVEMENT (GRADING F) TOP LAYER	HAUL - TON MILE: AGGREGATE BASE COURSE (CLASS 7) (SPECIAL)	HAUL - TON MILE: HOT BITUMINOUS PAVEMENT (GRADING F) BOTTOM LAYER	HAUL - TON MILE: HOT BITUMINOUS PAVEMENT (GRADING F) TOP LAYER
535+00 to 536+50		59	47	47	545	434	434
536+50 to 544+78.3		680	257	257	6221	2351	2351
545+59.8 to 554+50		730	276	276	6548	2476	2476
554+50 to 604+50		1950	1550	1550	16404	13039	13039
604+50 to 613+50		738	279	279	5796	2191	2191
613+50 to 619+30.0		226	180	180	1743	1388	1388
620+11.5 to 725+00		4091	3252	3252	27205	21626	21626
From List of Structures		308'		82'	2296		611
Appr. to Proj., Sta. 725+		20		30	113		169
Estimated For:							
Correcting Irregularities		633	503		4590	3649	
Stabilizing present roadway Sta. 680+ to Sta 682+		80	30		519		195
Shoulder Slope Finishing		1884			14032		
Totals		11,399'	6374'	5953'	86012'	47154'	44480'

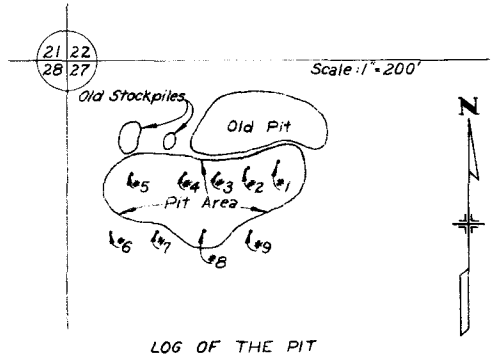
STMENT OF HIGHWAYS—STATE OF COLORADO
Sht. C. O. H. 126
ARCH 1964

PIT LOCATION

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 017-3(13)	6	

HALDE PIT

LOCATION ---------- A portion of the N.W. 1/4, Sec. 27, T.14S., R.46W.
OWNERS ---------- John P. Halde
QUANTITY AVAILABLE ------ 40,000+ Cu. Yds.
HAUL DISTANCE ------- 0.6 Mile to Sta. 992+
PROPOSED USE -------- Surfacing
ESTIMATED FOR STRIPPING — 1000 Cu. Yds.
SAMPLE NO. ---------- 4725



LOG OF THE PIT

Test No	From	To	Description
1	0'	10'	Silt - tan
1A	10'	13'	Sand - very fine grained to gravel
1B	13'	17'	Gravel - brown clean coarse
2	0'	8.5'	Silt - tan
2A	8.5'	9.5'	Sand - very fine grained
2B	9.5'	15'	Sand & Gravel - clean coarse
3	0'	5'	Silt (similar to #2)
3A	5'	7'	Sand - fine grained with trace of gravel
3B	7'	15'	Gravel with med. grained sand
4	0'	3.5'	Silt (similar to #2)
4A	3.5'	12'	Sand & Gravel
5	0'	5.5'	Silt (similar to #2)
5A	5.5'	13'	Gravel (similar to #4A)
6	0'	11'	Silt (similar to #2)
6A	11'	15'	Sand - med. to coarse grained
7	0'	5'	Silt (similar to #2)
7A	5'	15'	Gravelly Sand - clean
8	0'	9'	Silt - tan
8A	9'	16'	Sand & Gravel - clean - coarse
9	0'	9'	Silt (similar to #8)
9A	9'	15'	Sand - fine

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	F 017-3(13)	7	

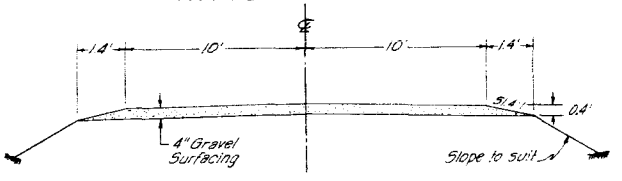
AS CONSTRUCTED
REVISED DATE DEC. 1, 1968

[4] MAINTENANCE OF DETOURS

STATION	EARTHWORK EXCAV. CU.YDS.	EARTHWORK EMB. CU.YDS.	GRAVEL SURFACING TONS		REMOVE FENCE LIN. FT.	B.W. FENCE WITH METAL POSTS LIN. FT.	RESET B.W. FENCE WITH METAL POSTS LIN. FT.
541+50 to 549+00, Rt.	450	1800	300		600	700	600
615+50 to 623+50, Rt.	1200	2400	330		600	700	600

[4] Note: Estimated quantities are for information only.

TYPICAL SECTION OF DETOUR



The contractor shall build fence before beginning construction of detour.
Adequate drainage structures shall be supplied by the contractor.

SUMMARY OF EARTHWORK QUANTITIES

UNCLASSIFIED EXCAVATION

Roadway (From Cross Sections)	17,350 ~~12,263~~	Cu. Yds.
~~Est for Subsidence~~	~~1,225~~	
~~Structure Quantities as Emb.~~	~~230~~	
~~Structure Quantities as Excav.~~	~~80~~	
~~Structure Quantities as Ditch Excav.~~	~~4~~	
Stripping (Removing Overburden)	4,795 ~~1,000~~	
TOTAL	22,145 ~~14,003~~	Cu. Yds.

BORROW

~~From Halde Pit~~	~~3,336~~	Cu. Yds.
~~Est. for Subsidence~~	~~334~~	
TOTAL	~~3,670~~	Cu. Yds.

EMBANKMENT (STANDARD)
(Moisture and Density Control)

Embankment (Net)	10,870 ~~10,395~~	Cu. Yds.
Base of Cuts and Fills	23,303 ~~28,070~~	
TOTAL	34,173 ~~38,465~~	Cu. Yds.

HAUL

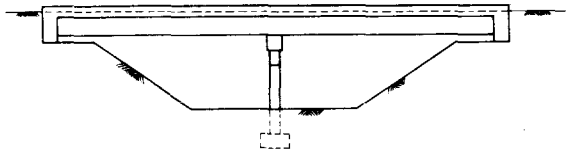
From Mass Diagram	15,637 ~~40,914~~	Yd. Mi.
~~Est. for Subsidence~~	~~4,091~~	
TOTAL	15,637 ~~45,005~~	Yd. Mi.

ROADWAY QUANTITIES BALANCE
(For Information Only)

EXCAVATION		
Unclassified	12,263	Cu Yds.
Borrow	3,336	
TOTAL	15,599	Cu. Yds.
~~EMBANKMENT x FACTOR~~		
TOTAL	15,599	~~Cu. Yds.~~

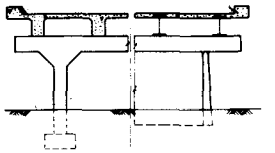
REVISIONS

FED. ROAD DIV. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	8	

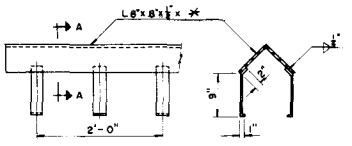


RURAL STREAM CROSSING

DETAILS SHOWING PORTIONS OF STRUCTURE TO RECEIVE CLASS 2 SURFACE FINISH.



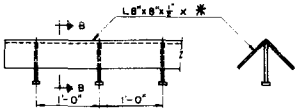
PIER AND SUPERSTRUCTURE



Anchors 2½"x⅜"x1'-0" welded @ 12" ctrs. to alternate legs.

* I-26-A : 13'-0"
I-26-C : 11'-0"

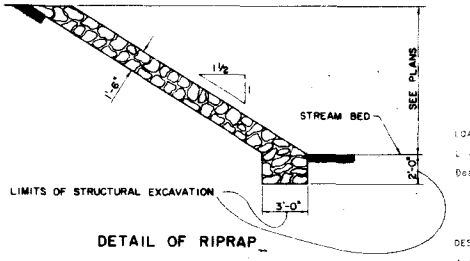
REGULAR NOSE ANGLE



¾"ϕx5" Min. standard anchor stud automatically end welded to angle.

ALTERNATE NOSE ANGLE

PIER NOSE ANGLE DETAILS



DETAIL OF RIPRAP

GENERAL NOTES

ALL WORK SHALL BE DONE ACCORDING TO THE STANDARD SPECIFICATIONS OF THE DEPARTMENT OF HIGHWAYS, STATE OF COLORADO, APPLICABLE TO THE PROJECT.

ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE STEEL OF A DEFORMED TYPE. EACH BAR SHALL BE TAGGED WITH THE BAR DESIGNATION, STRUCTURE NUMBER, AND STATION OF THE PROJECT.

IF BY PERMISSION OF THE ENGINEER PRIMARY BARS ARE SPLICED, THEY SHALL LAP A MINIMUM OF 40 DIAMETERS FOR BARS NEAR TOPS OF BEAMS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS, AND 24 DIAMETERS FOR BARS NEAR THE BOTTOM OF MEMBERS. SECONDARY BARS WHEN SPLICED SHALL LAP 24 DIAMETERS.

DIMENSIONS FOR REINFORCING STEEL NOT SHOWN AS CLEAR SHALL BE TO THE CENTERLINE OF THE BAR.

ALL CONCRETE SURFACES MARKED WITH THE SYMBOL ℉ AS SHOWN ON SHEET NO. 82 SHALL RECEIVE CLASS 2 SURFACE FINISH.

ALL CONCRETE CHAMFERS TO BE 3/4" UNLESS OTHERWISE NOTED.

EXPANSION JOINT MATERIAL SHALL MEET AASHO SPEC. M-153-54 UNLESS OTHERWISE NOTED.

SOUNDINGS AND DEPTH OF FOOTINGS ARE IN ACCORDANCE WITH THE BEST AVAILABLE DATA. WHEN DIFFERENT CONDITIONS ARE ENCOUNTERED, THE BRIDGE ENGINEER WILL INSPECT AND DETERMINE IF REDESIGN IS NECESSARY.

WHEN TREATED TIMBER PILING IS SHOWN ON THE PLANS, THE PRESERVATIVE FOR TREATMENT SHALL BE CREOSOTE OIL.

WHEN EXCAVATING FOR FOOTINGS, THE FINAL ONE FOOT IN DEPTH SHALL BE DONE BY HAND-LABOR METHODS.

FOR DETAILS OF STRUCTURAL EXCAVATION AND STRUCTURE BACKFILL, SEE STANDARD M-206-A.

ALL STRUCTURAL STEEL NOT OTHERWISE NOTED SHALL BE AASHO M-183.

WELDING SHALL CONFORM TO THE LATEST EDITION OF THE A.W.S. STANDARD SPECIFICATIONS FOR WELDING HIGHWAY BRIDGES AS AMENDED.

ALL STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH SECTION 509 FOR "ALUMINUM" PAINT.

BOLTS SHALL BE FURNISHED IN THE AMOUNT OF TWO PERCENT IN EXCESS OF THE NOMINAL NUMBER REQUIRED FOR EACH SIZE AND LENGTH.

LOADING DATA

Live Load : A.A.S.H.O. H S 20 ---

Design assumes 15 Lbs. per Sq. Ft. Additional Wearing Surface which includes the 1/2-inch Concrete Monolithic Wearing Surface shown.

DESIGNING DATA

A.A.S.H.O. Unit Stresses except as noted.

Reinforcing Steel	f_s =	20000	Lbs. per Sq. Inch
A7 Structural Steel	f_s =	18000	Lbs. per Sq. Inch
A 36 Structural Steel	f_s =	20000	Lbs. per Sq. Inch
Concrete	f_c =	1200	Lbs. per Sq. Inch
	n =	10	

	Initial	Date
DESIGNED BY		
DETAILED BY		
CHECKED BY	S.J.C.	9-67
APPROVED BY		
REVISED BY		
CORRECTED BY		

* { I-26-A Sta 544+78.250 To 545+59.750
I-26-C Sta. 619+30.000 To 620+11.500

STRUCTURE NO. *

SHEET No. B-2 OF 12

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
GENERAL NOTES
SURFACE FINISH DETAILS
PIER NOSE DETAILS
RIPRAP DETAIL

Across Sta. *
Near Kit Carson Sec. T. 19 S. R 47 W

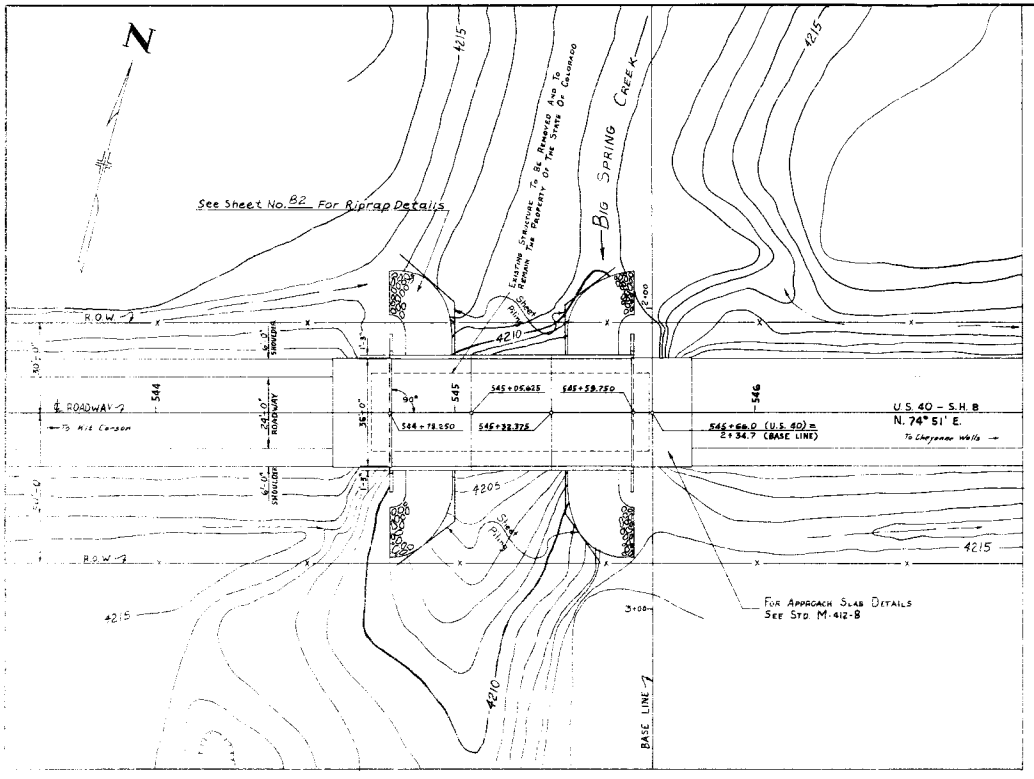
Designed by F. L.	Approved by R. L. Stevens
Made by A. R. A.	Bridge Engineer
Checked by	Date: Oct. 13 1967

REVISIONS

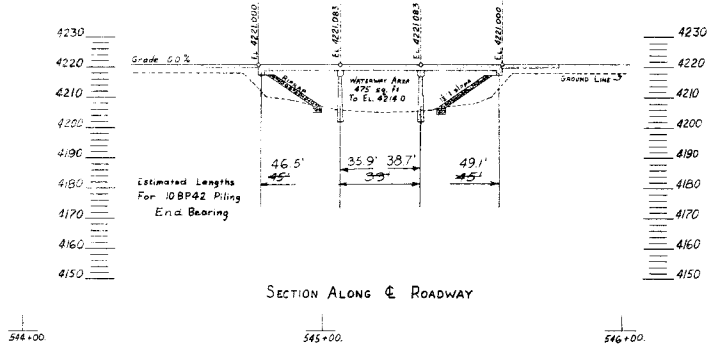
REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F 017-3(13)	9	

AS CONSTRUCTED
REVISED DATE DEC 1 1988



SITUATION PLAN



SECTION ALONG ℄ ROADWAY

GENERAL LAYOUT

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	SUPER-STRUCT.	ABUT. NO. 1	PIER NO. 2	PIER NO. 3	ABUT NO. 4	TOTALS
202	Removal of Bridge	Ea.						1
206	Structure Excavation	Cu. Yd.		28	30	30	27	115
206	Structure Backfill (Class 3)	Cu. Yd.		12	18	18	12	60
				247'-7"	179'-4"	193'-7"	245'-4"	865'-10" *
(1) 502	Steel Piling (10 BP 42)	Lin. Ft.		~~225~~	~~165~~	~~165~~	~~225~~	~~780~~
506	Riprap	Cu. Yd.		~~130~~			~~140~~	~~270~~ 277
(2) 509	Structural Steel	L. S.		65.8			81.9	Lump Sum
(3) 509	Structural Steel (Galvanized)	L. S.						Lump Sum
(4) 516	Dampproofing (Linseed Oil)	Sq. Yd.	~~540~~ 32					~~540~~ 32 Curb & Ftg.
601	Concrete, Class A	Cu. Yd.			34+6	34		~~68~~ 74 **
601	Concrete, Class D	Cu. Yd	102.8	10.6			10.6	124
602	Reinforcing Steel	Lb.	38,147	841	2,240	2,240	841	44,309

NOTES
(1) 10 WF 45 may be used in lieu of 10 BP 42.
(2) Design weight = 760 lb.
(3) Design Weight = 6,315 lb.
(4) Includes 160 sq yds. for 2 Approach Slabs.

** Note 6 Cu Yd. Poured as a foundation for Pier No. 2

* Note	Abut. No. 1	Pier No. 2	Pier No. 3	Abut No. 4
Length Driven	252'-7"	179'-4"	178'-7"	230'-4"
Welds (5) 15'-0"		(0) 0'-0"	(5) 15'-0"	(5) 15'-0"
	247'-7"	179'-4"	193'-7"	245'-4"
Cutoff Less Than 6'	0	23'-0"	21'-9"	19'-8"

64'-5" of Cutoff Less Than 6'

Sheet Piling Covered by Work Order # 10880 (3000 Lin Ft.)

FOR GENERAL NOTES SHEET NO. B2

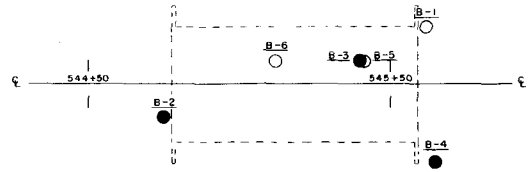
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
GENERAL LAYOUT AND SUMMARY OF QUANTITIES

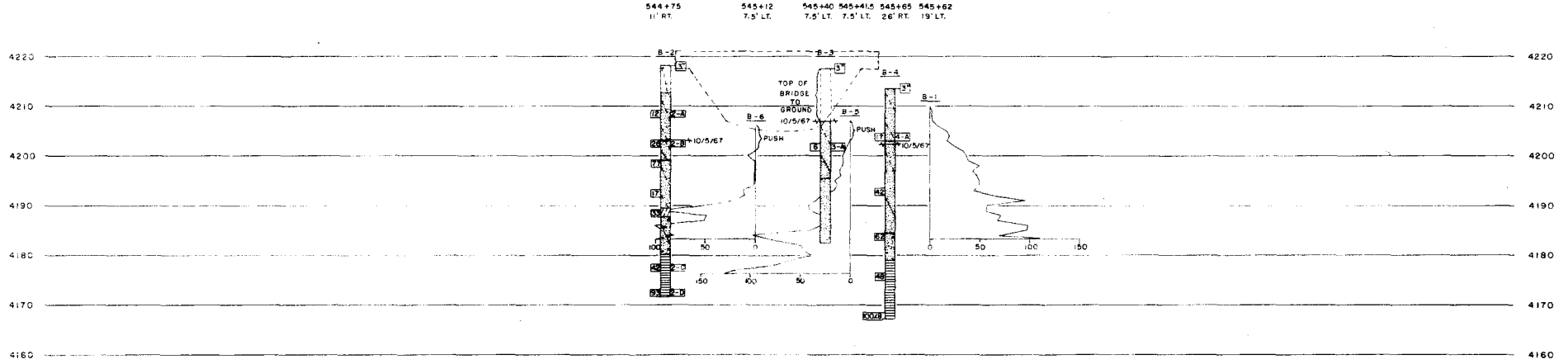
3 SPANS (26' EACH) CONT. SLAB & GIRDER BRIDGE
36' Roadway ~ 1-3° Curve ~ 90° Skew
Across BIG SPRING CREEK
Sta. 544+78.250 to 545+59.750
Near KIT CARSON Sec. 31 T. 13 S. R. 47 W.

Designed by F.L.	Approved by [illegible]
Made by R.R.A.	Bridge Engineer
Checked by	Date Oct. 13 19[illegible]

STRUCTURE NO. I-26-A
SHEET NO. B1 of 12

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	10	





SUMMARY OF TEST RESULTS

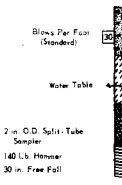
Sample No.	Depth	Classification: Centre of Rngs. in Y'sum	Classification: AASHO	Grading Analysis: Percent Passing: Gravel	Coarse Sand	Fine Sand	Silt and Clay	Atterberg Limits: Liquid Limit %	Plastic Limit %	Plasticity Index %	Water Cont. %	Wet Unit Weight γ P.C.F.	Unconfined Strength Q_u T.S.F.	Triaxial Shear Strength: Unconsolidated: ϕ°	C T.S.F.	Consolidated: ϕ°	C T.S.F.	Time hrs.	Press. P.S.I.	Dia. of Sample (inches)
2-A	9.0-10.5	Silty Sand	A-2-4(0)	0	18	62	20	NV	NP	NP	10.6									
2-B	15.0-16.5	Silty Sandy Clay	A-6(2)	0	11	44	45	25	14	11	12.7									
2-C	40.0-41.5	Shale	A-7-6(20)	0	0	1	99	70	25	45	22.6	126.3	4.3							1.4
2-D	45.0-46.5	Shale	A-7-6(17)	3	3	1	93	53	28	25	27.2									
3-A	15.0-16.5	Sandy Clay	A-7-6(11)	0	8	37	55	45	18	27	19.1									
4-A	9.0-10.5	Silty Sand	A-2-4(0)	0	12	69	19	NV	NP	NP	17.2									

TYPE OF MATERIAL

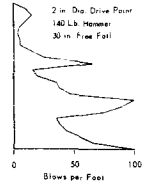
- SAND, SILTY, TAN
- SAND, SILTY, CLAYEY, TAN
- SAND, TAN
- SAND, CLAYEY, GRAVELLY, TAN
- SAND W/SOME PEA GRAVEL, TAN
- CLAY, SILTY, TAN
- SHALE, GRAY

LEGEND

TEST BORING



CONTINUOUS PENETRATION TEST



- Location of Test Boring
- Location of Continuous Penetration Test
- Rotary Boring
- Auger Boring
- Core Boring

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

ENGINEERING GEOLOGY

Across BIG SPRINGS CREEK Sta. 544+78.28 to 545+59.50

Near KIT CARSON Sec. 31 T. 14S R. 47W

Geologist E.C. Made by G.C.P. Checked by J.B.G.

Approved by [signature] Bridge Engineer

Date Oct 13 1967

STRUCTURE NO. I-26-A

SHT. NO. B-3 OF 12

MASTER COPY FEB. 16, 1966

REVISIONS

REVISIONS

FED. ROAD SEC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	11	

BAR LIST ~ SUPERSTRUCTURE

MARK	SIZE	No. Req'd	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
401	½"ø	192	2'-7"	II	0'-10"	0'-11"
402	½"ø	112	3'-5"	IV	1'-1½"	0'-6"
403	½"ø	700	4'-11"	III	1'-8"	0'-11"
404	⅝"ø	48	4'-8"	I	1'-3"	0'-10"
501	⅞"ø	164	38'-3"	Str		
502	⅝"ø	81	39'-0"	XV		
503	⅝"ø	208	26'-5"	Str		
801	1"ø	8	32'-10"	Str		
802	1"ø	8	38'-2"	Str		
1101	1⅜"ø	40	27'-0"	Str		
1102	1⅜"ø	60	23'-0"	Str		
1103	1⅜"ø	20	24'-5"	Str		
1104	1⅜"ø	20	7'-6"	Str		

BAR SUMMARY

4,467 lin ft ½"ø @ 0.668 #/ft = 2,984 lb
16,274 lin ft ⅝"ø @ 1.043 #/ft = 16,979 lb
568 lin ft 1"ø @ 2.670 #/ft = 1,517 lb
3,138 lin ft 1⅜"ø @ 5.313 #/ft = 16,672 lb
Total 38,147 lb

BAR LIST ~ ABUT No 1 (ABUT No 4 SIMILAR)

MARK	SIZE	No. Req'd	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
405	½"ø	38	8'-3"	V		
406	½"ø	12	8'-6"	Str		
407	½"ø	2	3'-1"	Str		
408	½"ø	2	3'-8"	Str		
409	½"ø	4	6'-3"	Str		
410	½"ø		4'-4"		1'-10"	
To	½"ø	2 Ea	By 4" To	II	By 2" To	0'-8"
416	½"ø		6'-4"		2'-10"	
504	⅝"ø	2	38'-2"	Str		
803	1"ø	4	38'-2"	Str		

BAR SUMMARY

529 lin ft ½"ø @ 0.668 #/ft = 353 lb
76 lin ft ⅝"ø @ 1.043 #/ft = 79 lb
153 lin ft 1"ø @ 2.670 #/ft = 409 lb
Total 841 lb

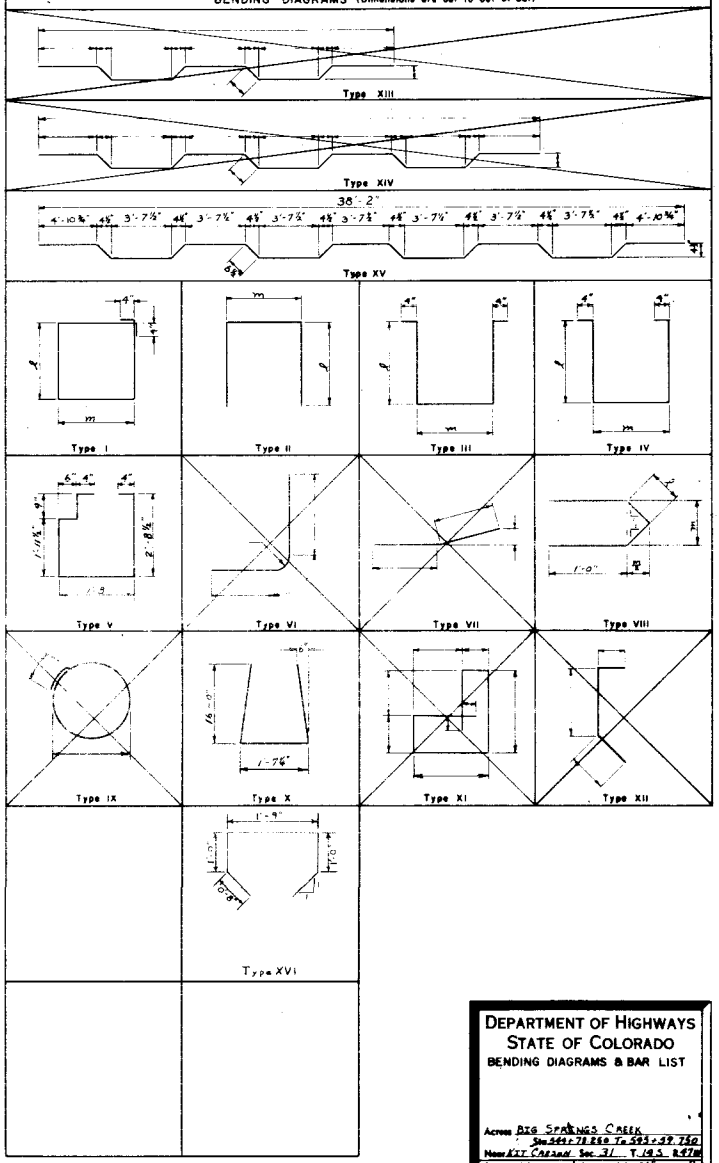
BAR LIST ~ PIER No 2 (PIER No 3 SIMILAR)

MARK	SIZE	No. Req'd	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
418	½"ø	24	33'-6"	Str		
419	½"ø	34	5'-1"	XVI		
420	½"ø	4	4'-4"	VIII	1'-2"	1'-8"
421	½"ø		4'-0⅛"		1'-0⅛"	1'-5"
To	½"ø	2 Ea	By 1½" To	VIII	By ¾" To	By 1" To
430	½"ø		2'-10¾"		0'-5⅞"	0'-8"
505	⅝"ø	34	33'-7¼"	X		
506	⅝"ø	2	16'-9"	Str		
804	1"ø	2	33'-6"	Str		
805	1"ø	20	2'-4"	Str		

BAR SUMMARY

1,063 lin ft ½"ø @ 0.668 #/ft = 710 lb
1,175 lin ft ⅝"ø @ 1.043 #/ft = 1,226 lb
114 lin ft 1"ø @ 2.670 #/ft = 304 lb
Total 2,240 lb

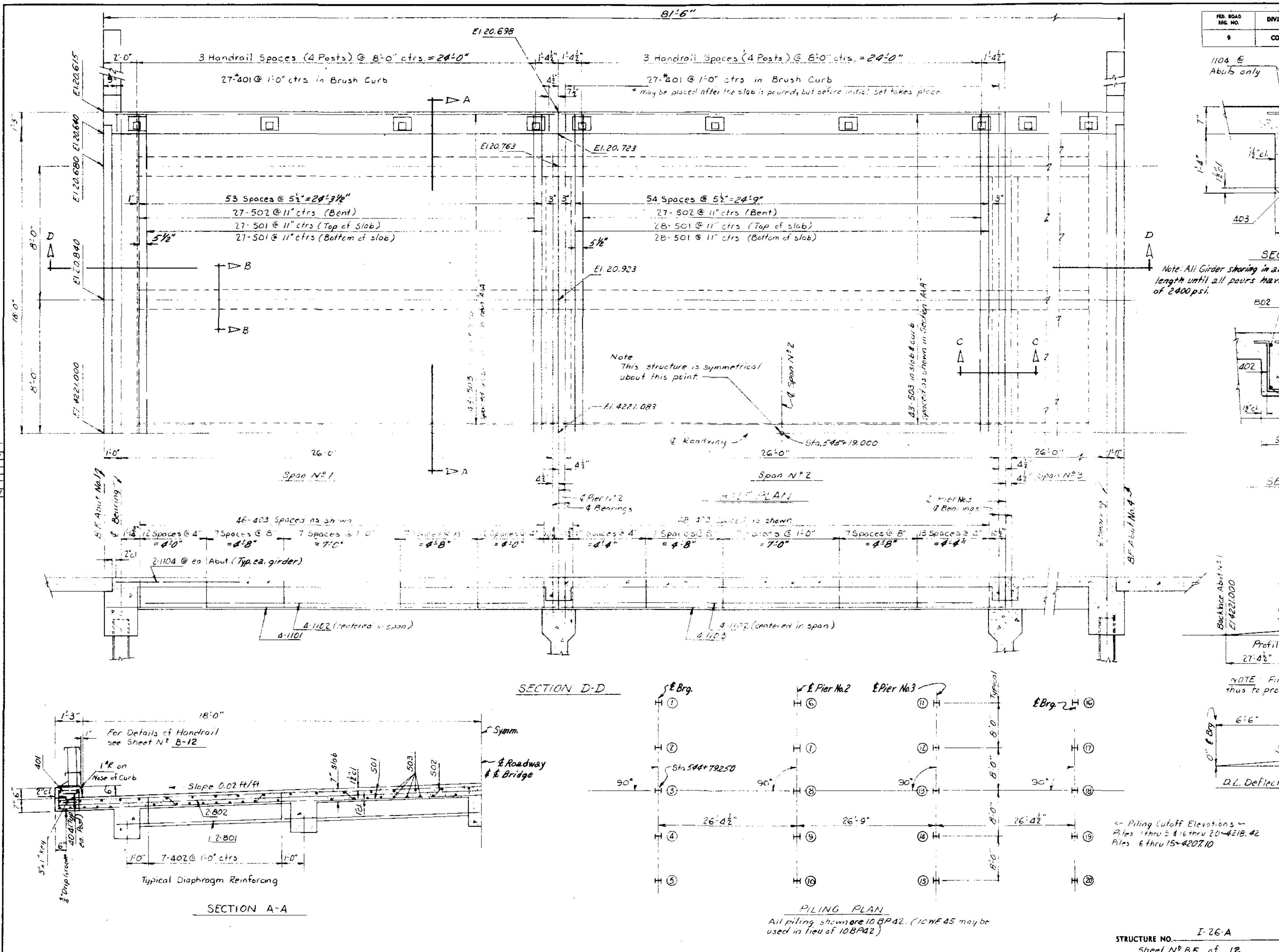
BENDING DIAGRAMS (Dimensions are out to out of bar)



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
BENDING DIAGRAMS & BAR LIST

Across BIG SPRINGS CREEK
Sta 541+78.250 To 543+39.750
Near KIT CARSON Sec. 31 T. 14 S. R 47 W
Designed by F.L.C. Approved by [signature] Bridge Engineer
Made by C.T.C.
Checked by
Date: Oct 13, 1967

STRUCTURE NO. I-26-A
SHEET No. B4 of 12


81'-6"
3 Handrail Spaces (4 Posts) @ 8'-0" ctrs = 24'-0"
27-*401 @ 1'-0" ctrs in Brush Curb
* may be placed after the slab is poured, but before initial set takes place.
53 Spaces @ 5½" = 24'-3½"
27-502 @ 11" ctrs (Bent)
27-501 @ 11" ctrs (Top of Slab)
27-501 @ 11" ctrs (Bottom of slab)
54 Spaces @ 5½" = 24'-9"
28-501 @ 11" ctrs (Top of slab)
28-501 @ 11" ctrs (Bottom of slab)
Note: This structure is symmetrical about this point.
Sta. 545+19.000
Span No 1
Span No 2
Span No 3
HALF PLAN
SECTION D-D
46-403 Spaced as shown
2-1104 @ ea Abut (Typ. ea. girder)
4-1102 (centered in span)
4-1101
SECTION B-B
Note: All Girder shoring in any Span shall remain in place full length until all pours have reached a minimum strength of 2400 psi.
SECTION C-C
Profile Grade 0.0%
NOTE: Finish Grade Elevations calculated thus to provide for drainage.
D.L. Deflection - Gird. Blocking
For Details of Handrail see Sheet No B-12
Slope 0.02 ft/ft
Typical Diaphragm Reinforcing
SECTION A-A
PILING PLAN
All piling shown are 10BP42. (10WF45 may be used in lieu of 10BP42)
Piling Cutoff Elevations
Piles 1 thru 5 & 16 thru 20 = 4218.42
Piles 6 thru 15 = 4207.10

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	12	

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

SUPERSTRUCTURE DETAILS
PILING PLAN

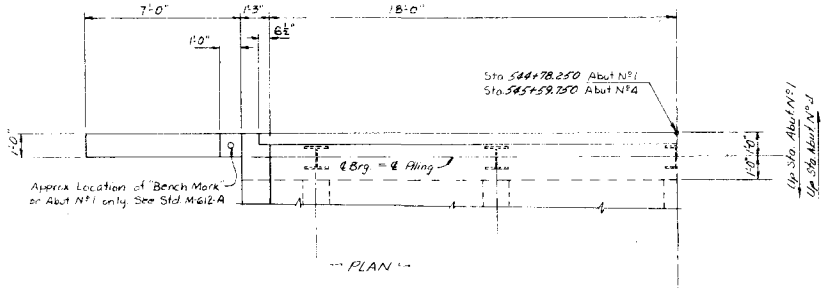
Across Big Springs Creek
Sta. 544+78.250 to 545+59.750
Near Kit Carson Sec. 31 T.14S R.47W

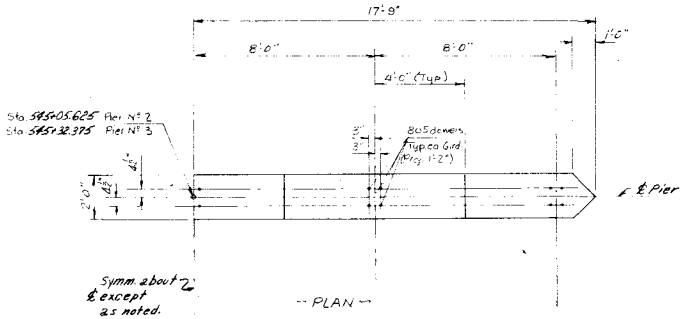
Designed by F.L.
Made by R.R.A.
Checked by
Approved by ... Bridge Engineer
Date: Oct 13, 1967

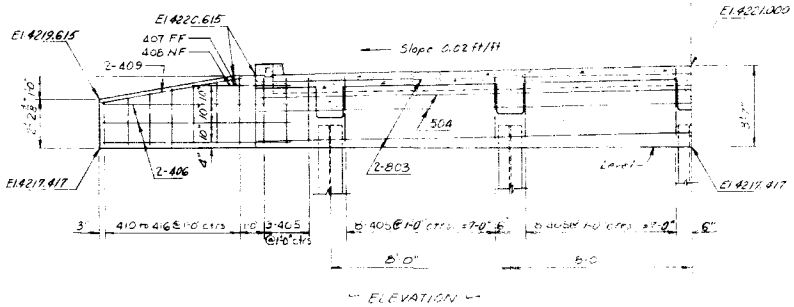
STRUCTURE NO. I-26-A
Sheet No B5 of 12

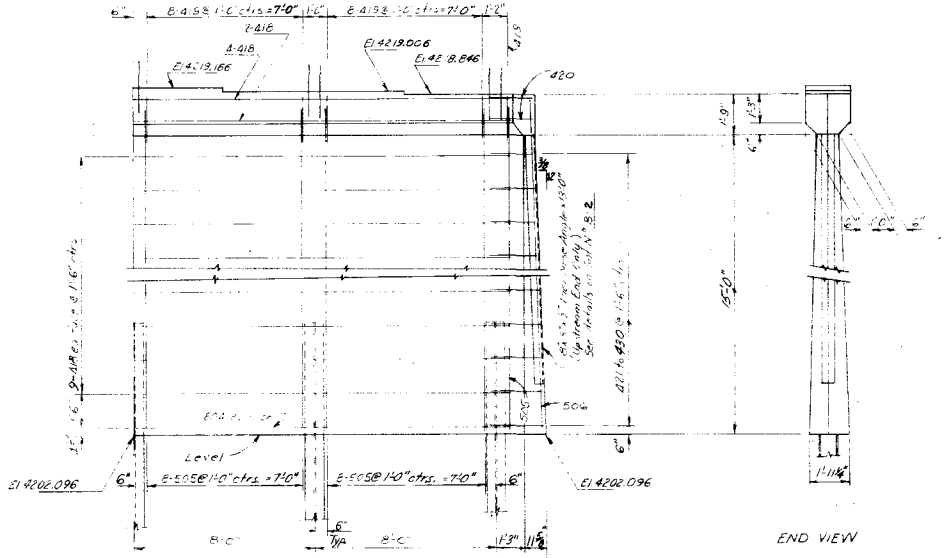
REVISIONS

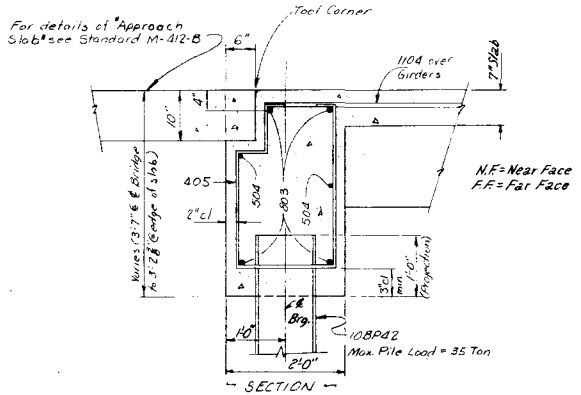
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(113)	13	

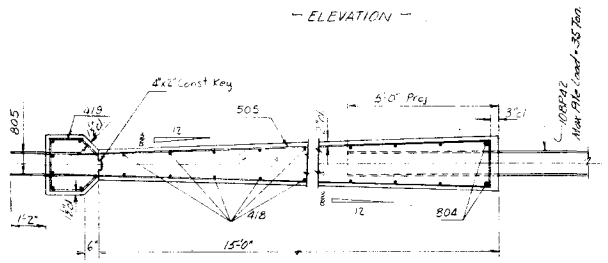












DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
— DETAILS —
ABUTMENTS & PIERS

Across Big Springs Creek
Sta 544+78.250 to 545+59.750
Near Kit Carson Sec. 31 T. 14 S. R. 47 W.

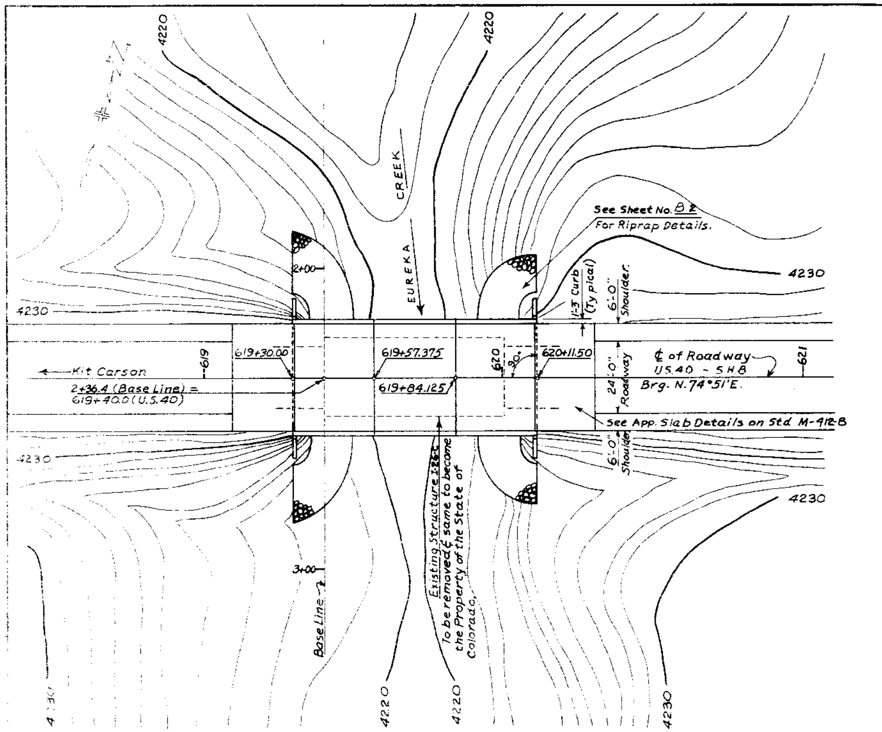
Designed by F.L.
Made by R.R.A.
Checked by

Approved by R. H. Swanson
Bridge Engineer
Date: Oct. 13, 1967

STRUCTURE NO. I-26-A
Sheet N° B-6 of 12

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	14	

AS CONSTRUCTED
REVISED DATE DEC 1 1968



4220
CREEK
EUREKA
See Sheet No. B2
For Riprap Details.
1-3 Curb (Typical)
6'-0" Shoulder
4230
2+00
Kit Carson
619
619+30.00
619+57.375
620
620+11.50
621
2+36.4 (Base Line) = 619+40.0 (U.S.40)
619+84.125
℄ of Roadway
U.S.40 ~ SH8
Brg. N.74°51'E.
24'-0" Roadway
See App. Slab Details on Std. M-412-B
Existing Structure 5-62 To be removed & same to become the Property of the State of Colorado.
3+00
Base Line-2

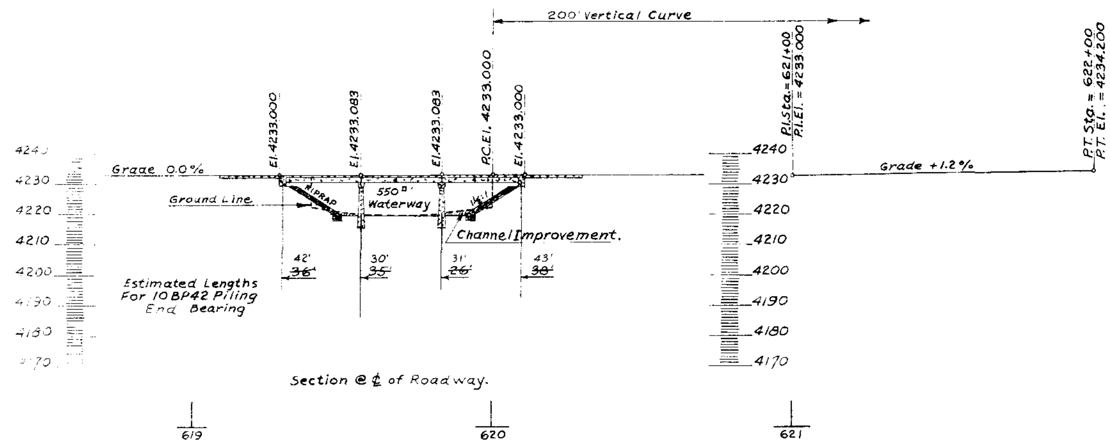
SUMMARY OF QUANTITIES

ITEM No.	DESCRIPTION	UNIT	SUPER-STRUCT.	ABUT. No.1	PIER No.2	PIER No.3	ABUT. No.4	TOTAL	
202	Removal of bridge	Each	—	—	—	—	—	1	
203	Unclassified Excavation	Cu. Yd.	—	—	—	—	—	~~45~~ 0	Included in Roadway Mass
206	Structure Excavation	Cu. Yd.		50	30	30	50	160	
206	Structure Backfill (Class 3)	Cu. Yd.		5	20	20	5	50	
① 502	Steel Piling (10BP42)	Lin. Ft.	—	225'-1" ~~180~~	154'-10" ~~175~~	170'-10" ~~130~~	230'-10" ~~190~~	781'-7" ~~675~~	*
506	Riprap	Cu. Yd.	—	~~50~~	—	—	~~50~~	~~100~~ 221.1	**
② 509	Structural Steel	Lump Sum		88.1			133.0	L.S.	
③ 509	Structural Steel (Galv.)	Lump Sum						L.S.	
④ 516	Dampproofing (Linseed Oil)	Sq. Yds	~~540~~ 32	—	—	—	—	~~540~~ 32	Curb Only
601	Concrete, Class A	Cu. Yd.	—	—	29.5	29.5	—	59	
601	Concrete, Class D	Cu. Yd.	102.8	10.6	—	—	10.6	124	
602	Reinforcing Steel	Lb.	38,147	841	2044	2044	841	43,917	

① 10WF45 May be used in lieu of 10BP42.
② Design Weight = 640 Lbs.
③ Design Weight = 6315 Lbs.
④ Includes 160 Sq. Yds. for 2 Approach Slabs.

* Note.	Abut No 1	Pier No. 2	Pier No. 3	Abut. No. 4
Length Driven	210'-1"	151'-10"	155'-10"	215'-10"
Welds	(5) 15'-0"	(1) 3'-0"	(5) 15'-0"	(5) 15'-0"
	225'-1"	154'-10"	170'-10"	230'-10"
Cutoff Less Than 6'	10'-1"	3'-11"	3'-0"	3'-4"

20'-4" of Cutoff Less Than 6'



200' Vertical Curve
El.4233.000
El.4233.083
El.4233.083
P.C.El. 4233.000
El.4233.000
P.I.Sta.= 621+00
P.I.El. = 4233.000
P.T.Sta.= 622+00
P.T.El. = 4234.200
Grade 0.0%
Grade +1.2%
Ground Line
Riprap
550□' Waterway
Channel Improvement.
42'
~~36'~~
30'
~~35'~~
31'
~~26'~~
43'
~~38'~~
Estimated Lengths For 10BP42 Piling End Bearing
4240
4230
4220
4210
4200
4190
4180
4170
619
620
621

Section @ ℄ of Roadway.

GENERAL LAYOUT

FOR GENERAL NOTES SHEET No. B2

COLORADO
DEPARTMENT OF HIGHWAYS

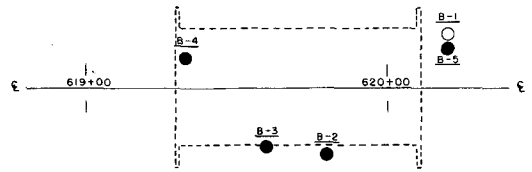
GENERAL LAYOUT AND SUMMARY OF QUANTITIES
3 SPAN (26' EACH) CONC. SLAB AND GIRDER BRIDGE
36' ROADWAY - 90° SKEW - 1'-3" CURBS

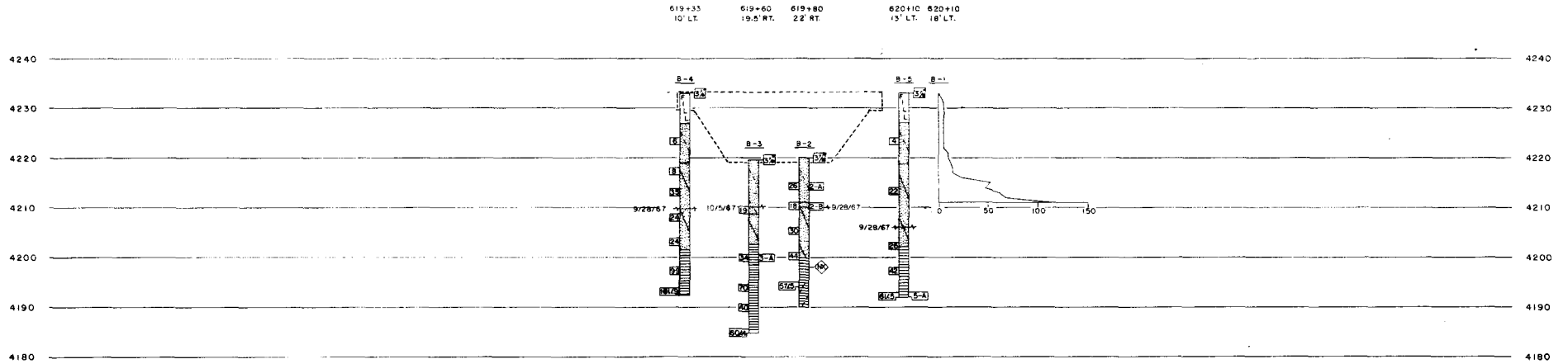
Across Eureka Creek Sta. 619+30.000 to 620+11.500
Near Kit Carson Sec. 33 T.14S R47W

Designed by F.L. | Approved by [signature] Bridge Engineer
Made by R.R.A.
Checked by DSM/CF Date Oct. 13 1967

STRUCTURE NO. I-26-C
Sheet No. B 7 of 12

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	15	





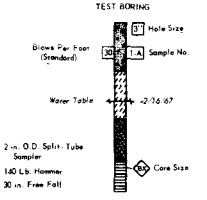
SUMMARY OF TEST RESULTS

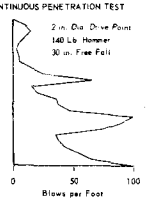
Sample No.	Depth	Classification: Corps of Engrs. or Bureau	Classification: AASHO	Grading Analysis: Percent Passing: Gravel	Coarse Sand	Fine Sand	Silt and Clay	Atterberg Limits: Liquid Limit	Plastic Limit	Plastic Index	Natural Conditions: Moisture Content %	Dry Unit Weight γd P.C.F.	Unconfined Strength Qu T.S.F.	Triaxial Shear Strength: Unconsolidated: φ	c T.S.F.	Consolidated: β	c T.S.F.	Time hrs	Press P.S.I.	Dia. Of Sample (Inches)
2-A	5.0-6.5	Silty Sand	A-2-4(0)	0	20	53	27	23	17	6	11.0									
2-B	9.0-10.5	Sandy Clay	A-6(6)	0	15	31	54	32	16	16	17.8									
3-A	19.0-20.5	Shale	A-7-6(20)	0	2	0	98	68	25	43	25.0	25.4	2.4							1.4
5-A	40.0-41.0	Shale	A-7-6(20)	0	1	0	99	68	23	45	21.5									

TYPE OF MATERIAL

- SAND, SILTY, TAN
- SAND, CLAYEY, TAN
- SHALE, LT. BROWN TO GRAY
- SHALE, SILTY, GRAY

LEGEND





- Location of Test Boring
- Location of Continuous Penetration Test
- Rotary Boring
- Auger Boring
- Core Boring

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

ENGINEERING GEOLOGY

Across EUREKA CREEK Sta 619+30.00 To 620+11.00

Near KIT CARSON Sec 33 T 14S R 47W

Geologist E.C. Made by B.C.P. Checked by J.B.G.

Approved by R. Schmeckpeper Bridge Engineer

Date Oct 13 1967

STRUCTURE NO. I-28-C

SHT. No. 8 8 OF 12 SHEETS

MASTER COPY FEB. 16, 1966

REVISIONS

REVISIONS

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	16	

BAR LIST ~ SUPERSTRUCTURE

MARK	SIZE	No. REQ'D	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
401	½"ø	162	2'-7"	II	0'-10"	0'-11"
402	½"ø	112	3'-5"	IV	1'-1½"	0'-6"
403	½"ø	700	4'-11"	III	1'-8"	0'-11"
404	½"ø	48	4'-8"	I	1-2"	0'-10"
501	⅝"ø	164	38'-1"	Str		
502	⅝"ø	81	39'-6"	XV		
503	⅝"ø	258	26'-5"	Str		
801	1"ø	8	32'-10"	Str.		
802	1"ø	8	38'-2"	Str.		
1101	1⅜"ø	40	27'-0"	Str.		
1102	1⅜"ø	60	23'-0"	Str		
1103	1⅜"ø	20	26'-5"	Str.		
1104	1⅜"ø	20	7'-6"	Str		

BAR SUMMARY

4,467 lin ft ½ø @ 0.668 #/ft = 2,984 lb
16,274 lin ft ⅝ø @ 1.043 #/ft = 16,979 lb
568 lin ft 1"ø @ 2.670 #/ft = 1,517 lb
3,138 lin ft 1⅜"ø @ 5.313 #/ft = 16,672 lb
Total 38,147 lb

BAR LIST ~ ABUT. No. 1 (ABUT No. 4 SIMILAR)

MARK	SIZE	No REQ'D	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
405	½"ø	38	8'-3"	V		
406	½"ø	12	8'-6"	Str.		
407	½"ø	2	3'-1"	Str.		
408	½"ø	2	3'-8"	Str.		
409	½"ø	4	6'-3"	Str.		
410	½"ø		4'-4"		1'-10"	
To	½"ø	2 Ea.	By 4" To	II	By 2" To	0'-8"
416	½"ø		6'-4"		2'-10"	
504	⅝"ø	2	38'-2"	Str.		
803	1"ø	4	38'-2"	Str		

BAR SUMMARY

529 lin ft ½"ø @ 0.668 #/ft = 353 lb.
76 lin ft ⅝"ø @ 1.043 #/ft = 79 lb.
153 lin ft 1"ø @ 2.670 #/ft = 409 lb.
Total 841 lb.

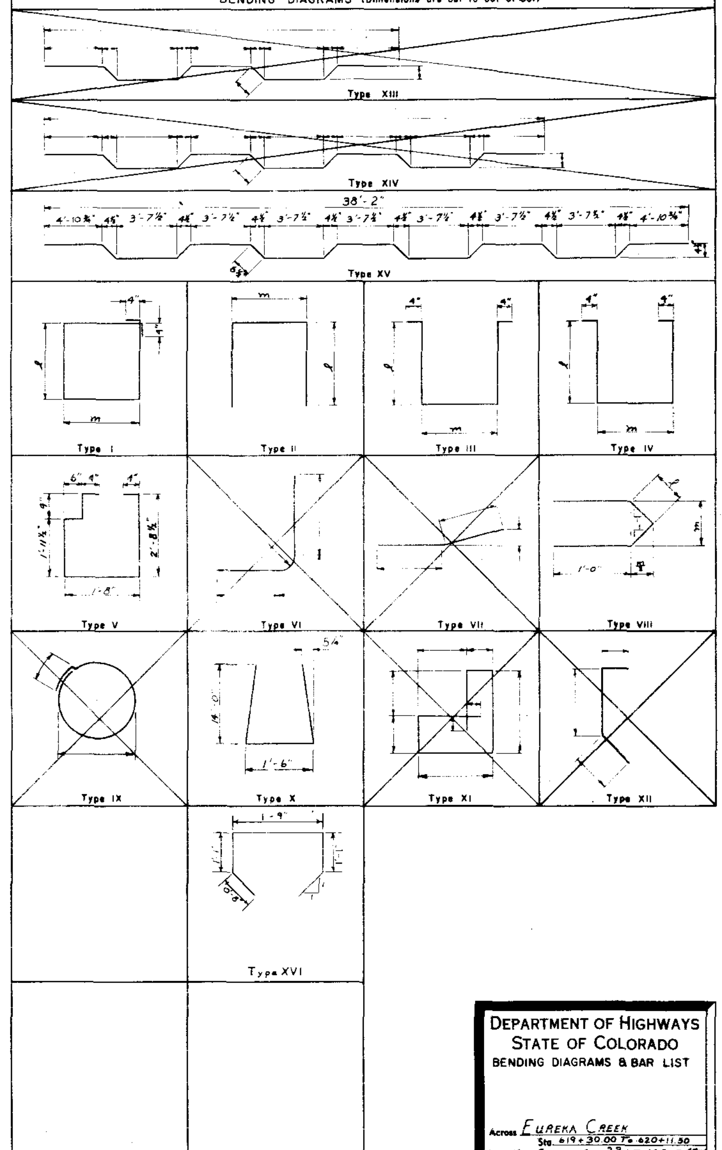
BAR LIST ~ PIER No 2 (PIER No 3 SIMILAR)

MARK	SIZE	No REQ'D	LENGTH	TYPE	DIMENSIONS ℓ	DIMENSIONS m
418	½"ø	22	33'-6"	Str		
419	½"ø	34	5'-3"	XVI		
420	½"ø	4	4'-4"	VIII	1'-2"	1'-8"
421	½"ø		3'-10¾"		0'-11⅜"	1'-3½"
To	½"ø	2 Ea.	By 1½" to	VIII	By ¾" To	By 1" To
429	½"ø		2'-10¾"		0'-5⅜"	0'-7½"
505	⅝"ø	34	29'-6"	X		
506	⅝"ø	2	14'-7"	Str		
804	1"ø	2	33'-6"	Str		
805	1"ø	20	2'-4"	Str		

BAR SUMMARY

994 lin. ft ½"ø @ 0.668 #/ft = 664 lb
1,032 lin. ft. ⅝"ø @ 1.043 #/ft = 1,076 lb
114 lin ft. 1"ø @ 2.670 #/ft = 304 lb
Total: 2,044 lb

BENDING DIAGRAMS (Dimensions are out to out of bar)



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
BENDING DIAGRAMS & BAR LIST

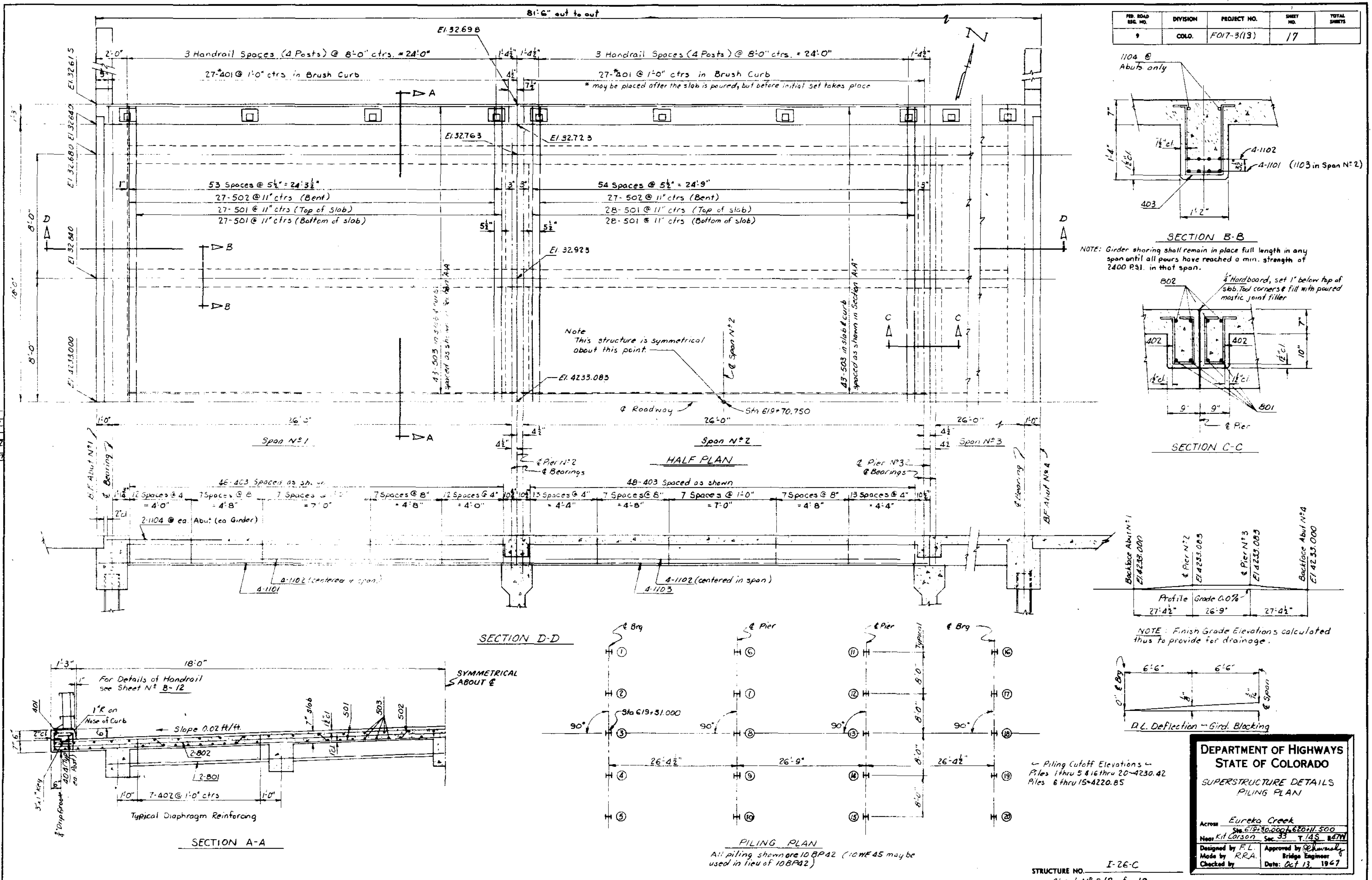
Across Eureka Creek
Sta. 619+30.00 To 620+11.50
Near Kit Carson Sec. 33 T. 14S R. 47W

Designed by F. L. Made by C. J. C. Checked by	Approved by [signature] Bridge Engineer Date: Oct. 13, 1967

STRUCTURE NO. I-26-C

Sheet No. 8 of 12

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	17	



81'-6" out to out
3 Handrail Spaces (4 Posts) @ 8'-0" ctrs. = 24'-0"
27-401 @ 1'-0" ctrs in Brush Curb
* may be placed after the slab is poured, but before initial set takes place
53 Spaces @ 5½" = 24'-3½"
54 Spaces @ 5½" = 24'-9"
27-502 @ 11" ctrs (Bent)
27-501 @ 11" ctrs (Top of slab)
27-501 @ 11" ctrs (Bottom of slab)
28-501 @ 11" ctrs (Top of slab)
28-501 @ 11" ctrs (Bottom of slab)
Note
This structure is symmetrical about this point.
El. 4233.083
℄ Roadway
Sta 619+70.750
Span Nº 1
Span Nº 2
Span Nº 3
HALF PLAN
℄ Pier Nº 2
℄ Bearings
B.F. Abut Nº 1
B.F. Abut Nº 4
46-403 Spaced as shown
48-403 Spaced as shown
2-1104 @ ea. Abut (ea Girder)
4-1101
4-1102 (centered in span)
4-1103
SECTION D-D
1104 @ Abuts only
4-1102
4-1101 (1103 in Span Nº 2)
SECTION B-B
NOTE: Girder shoring shall remain in place full length in any span until all pours have reached a min. strength of 2400 P.S.I. in that span.
¼" Hardboard, set 1" below top of slab. Tool corners & fill with poured mastic joint filler
SECTION C-C
Profile Grade 0.0%
27'-4½"
26'-9"
NOTE: Finish Grade Elevations calculated thus to provide for drainage.
D.L. Deflection – Gird. Blocking
For Details of Handrail see Sheet Nº B-12
SYMMETRICAL ABOUT ℄
Slope 0.02 ft/ft.
7-402 @ 1'-0" ctrs
Typical Diaphragm Reinforcing
SECTION A-A
Sta 619+31.000
26'-4½"
26'-9"
Piling Cutoff Elevations
Piles 1 thru 5 & 16 thru 20 – 4230.42
Piles 6 thru 15 – 4220.85
PILING PLAN
All piling shown are 10 BP42 (10 WF 45 may be used in lieu of 10 BP42)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

SUPERSTRUCTURE DETAILS
PILING PLAN

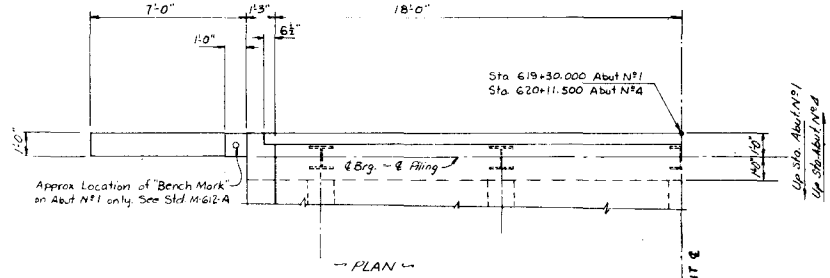
Across Eureka Creek
Sta. 619+30.000 to 620+11.500
Near Kit Carson Sec. 33 T. 14S R. 47W

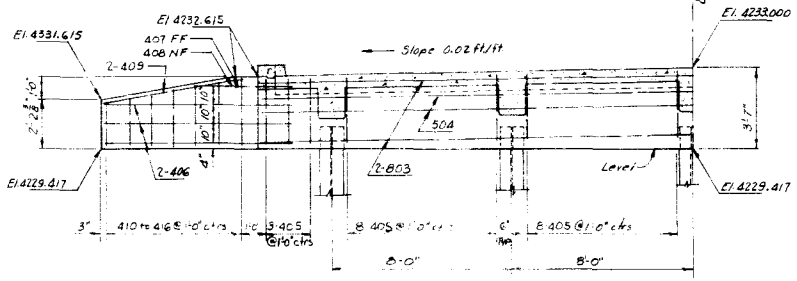
Designed by F.L. | Made by R.R.A. | Checked by
Approved by [signature] Bridge Engineer
Date: Oct 13, 1967

STRUCTURE NO. I-26-C
Sheet Nº 8 10 of 12

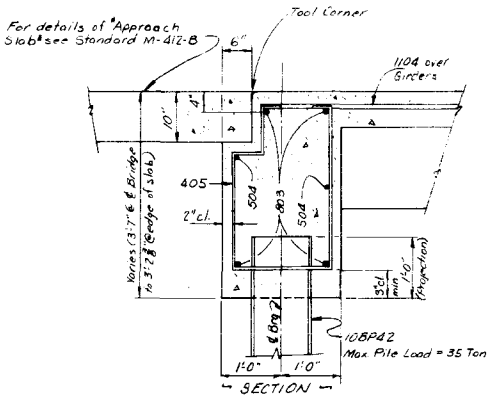
REVISIONS

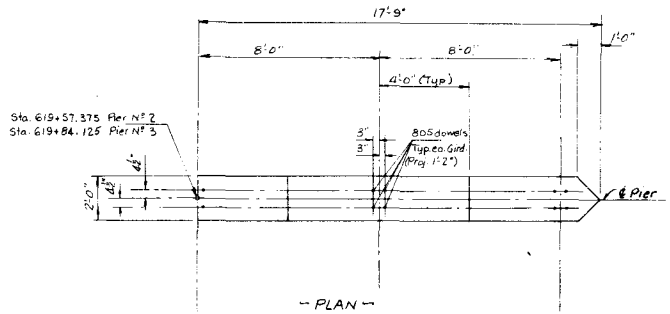
FED. ROAD SEC. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	F017-3(13)	18	

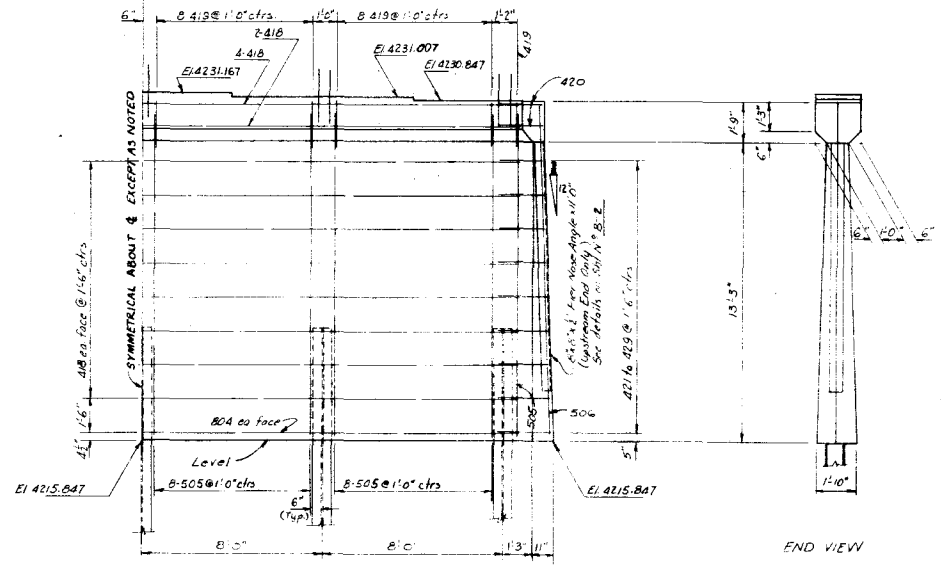


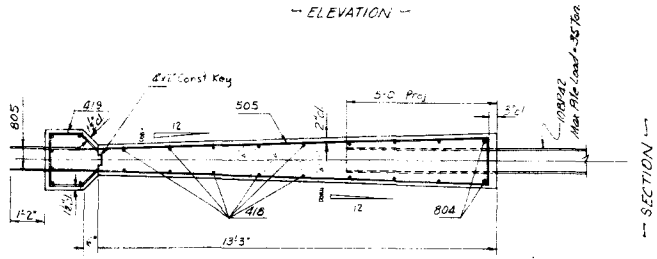


SYMMETRICAL ABOUT ℄









	Initial	Date
DESIGNED BY	F.L.	8-67
CHECKED BY		
DRAWN BY	RRA	8-67
RECOMMENDED BY	DSM	9-67
ACCEPTED BY		
CHECKED BY	F.L.	9-67

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
— DETAILS —
ABUTMENTS & PIERS

Across Eureka Creek
Sta. 619+30.000 to 620+11.500
Near Kit Carson Sec. 33 T. 14S R. 47W

Designed by F.L.
Made by R.R.A.
Checked by

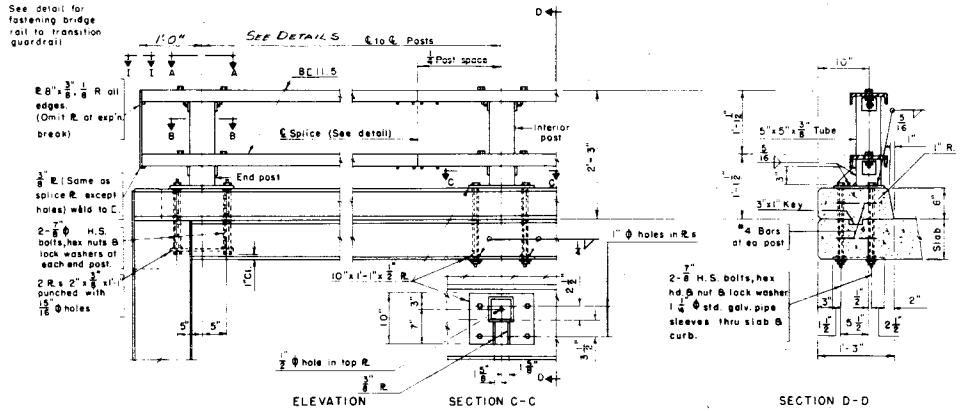
Approved by [signature]
Bridge Engineer
Date: Oct. 13, 1967

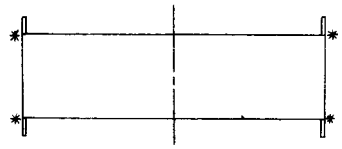
STRUCTURE NO. I-26-C

Sheet N° B-11 of 12

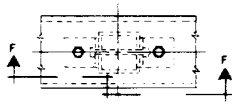
REVISIONS

FED. ROAD REG. NO	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO	F017-3(13)	19	

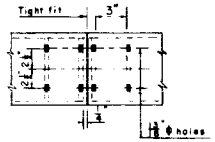




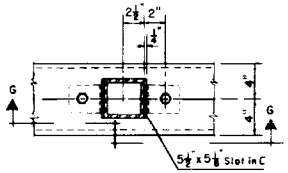
* DIAGRAM SHOWING LOCATION OF DETAILS OF END CONNECTION FOR FASTENING BRIDGE RAIL TO TRANSITION GUARD RAIL



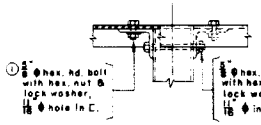
SECTION A—A



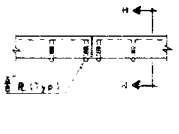
SPLICE PLAN



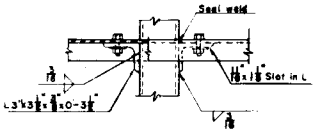
SECTION B—B



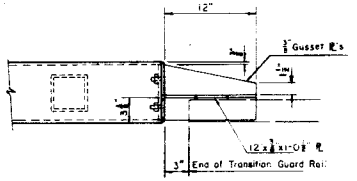
SECTION F—F



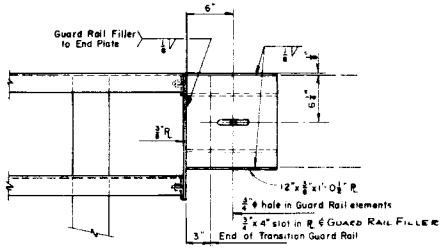
SPLICE DETAIL



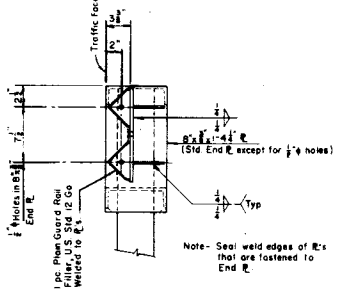
SECTION G—G



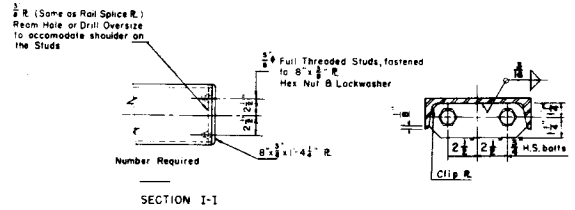
PLAN



ELEVATION

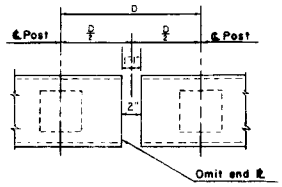


END VIEW (Studs not shown)



SECTION I-I

SECTION H—H



DETAIL AT EXP'N. BREAK

Notes.

Posts to be perpendicular to the grade and slope of deck.

All rail elements to be galvanized after fabrication in accordance with specifications.

A.I.S.I. 1144 steel rods may be used in lieu of H.S. bolts shown. 10° wedge test not required for either bolts or rods used in rail assembly.

① 5/8" ϕ standard full threaded studs welded to the channel may be used. Increase size of slot in the angle to 13/16"x1 1/4".

Channels to be continuous over 3 or 4 posts before splicing.

Number Required
4 EACH STRUCTURE

DETAILS OF END CONNECTION FOR FASTENING BRIDGE RAIL TO TRANSITION GUARD RAIL

(Complete Unit to be Galvanized after fabrication)
Detail Shown Is For Right Hand Rail
Opposite Hand For Left Hand Rail

* I-26-A STA 544+78.250 To 545+59.750
I-26-C STA 619+30.000 To 620+11.500

GALVANIZED STEEL HANDRAIL DETAILS

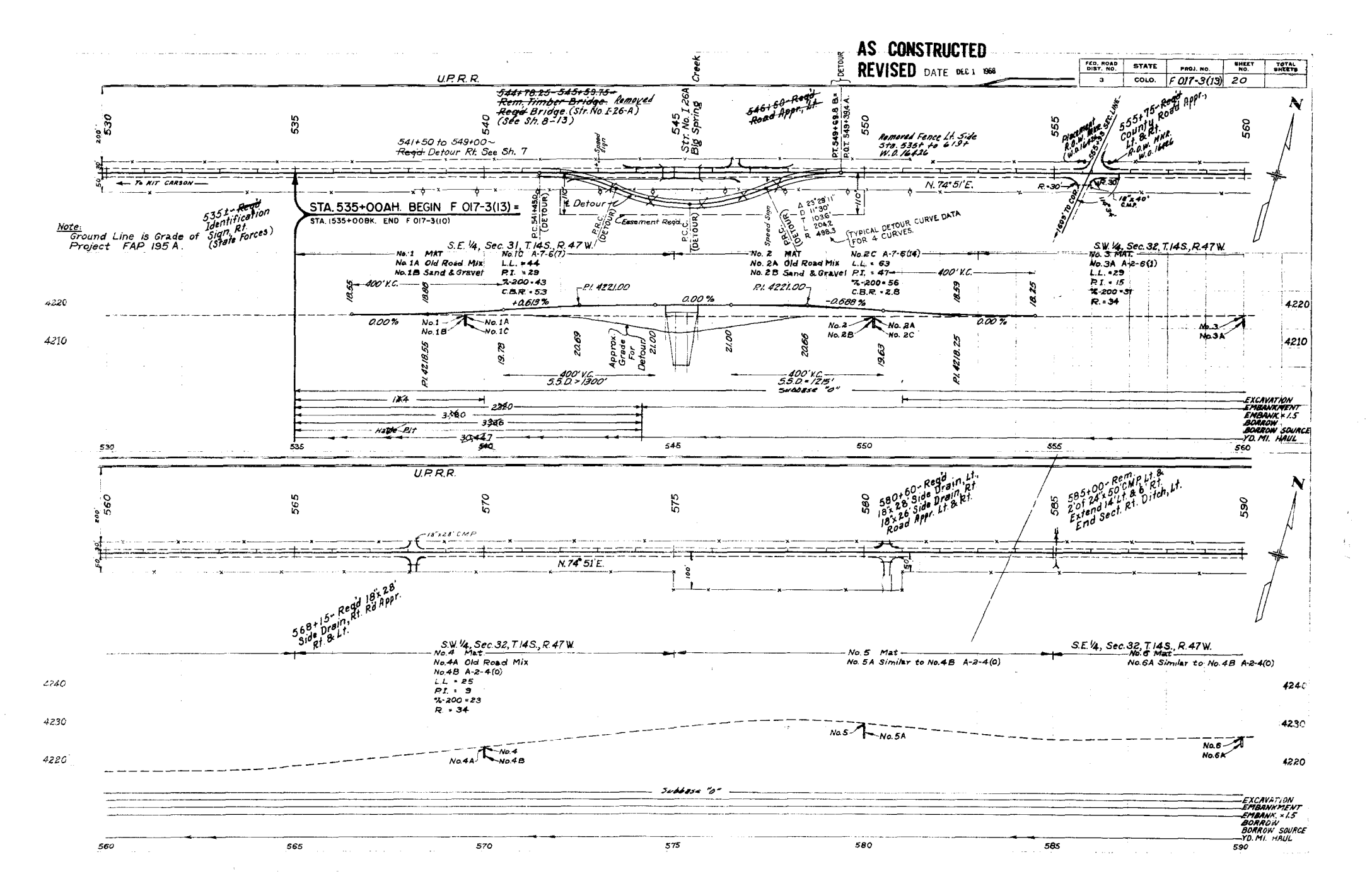
STRUCTURE NO. *
SHEET No. 8-12 of 12

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
HANDRAIL DETAILS

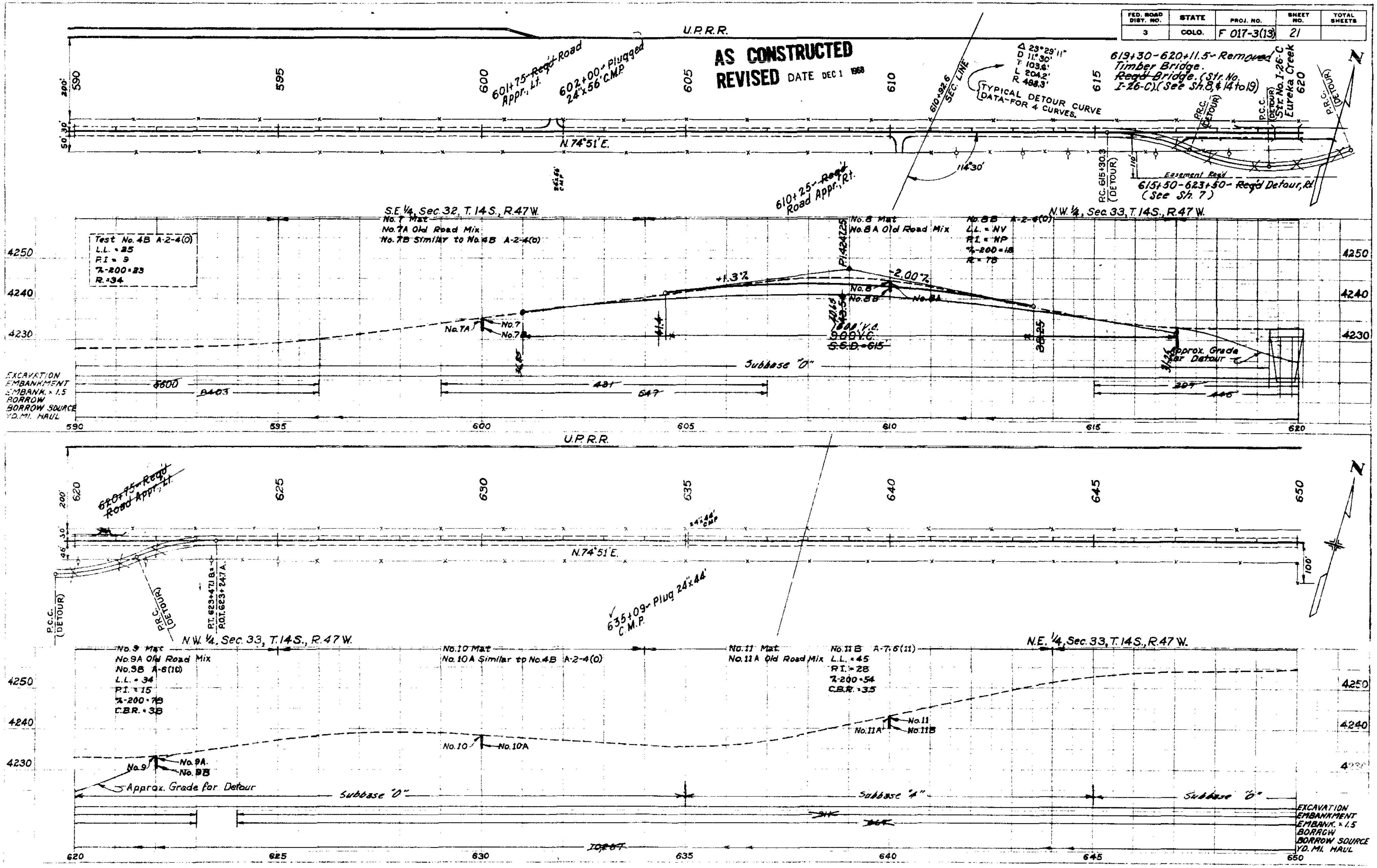
Across
Sta. *
Near KIT CARSON Sec. T. 14 S R 47 W
Designed by F.L.
Made by R.R.R
Checked by
Approved by [signature]
Bridge Engineer
Date: Oct 13, 1967

AS CONSTRUCTED
REVISED DATE DEC 1 1968

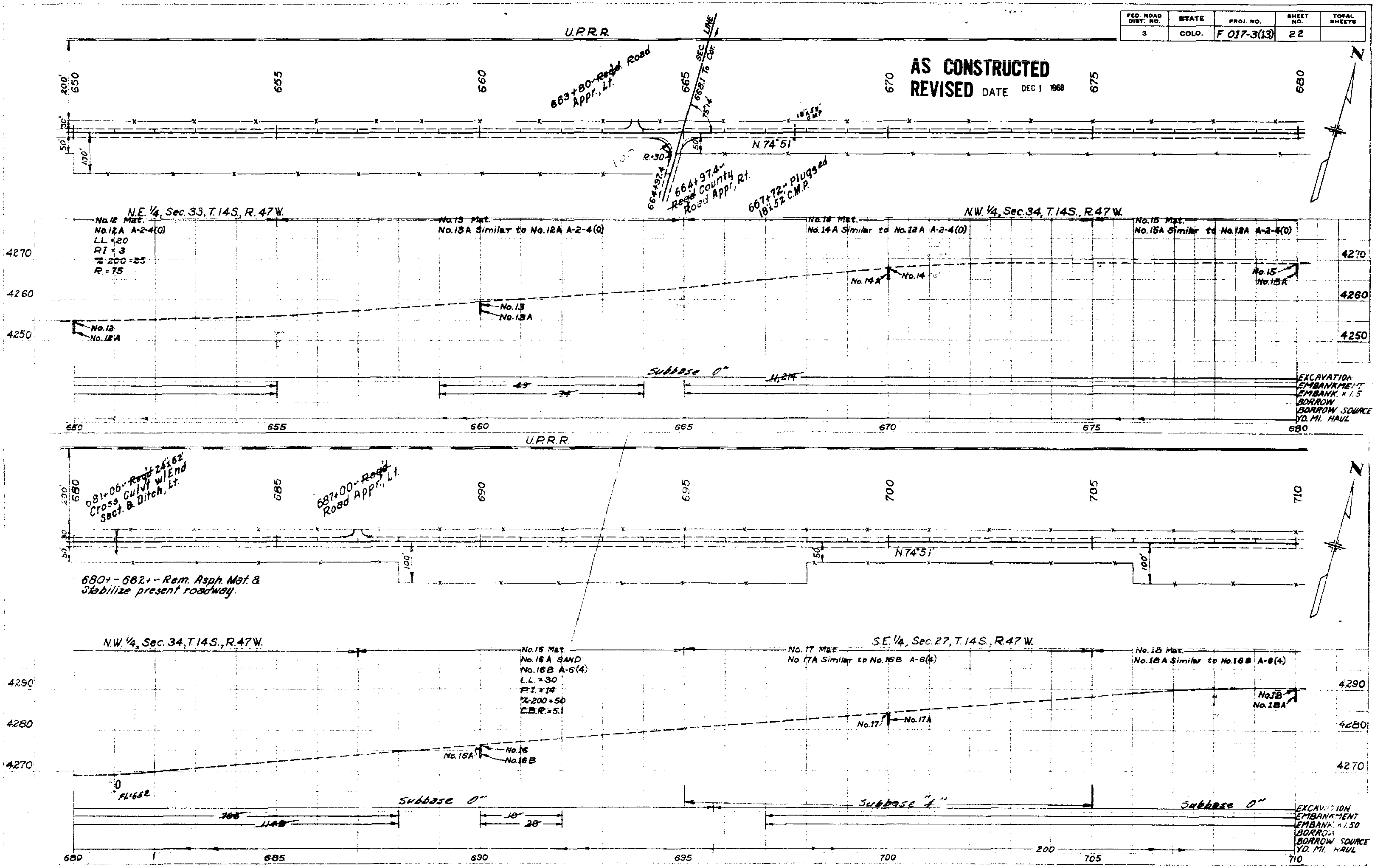
F.C.D. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	F 017-3(13)	20	

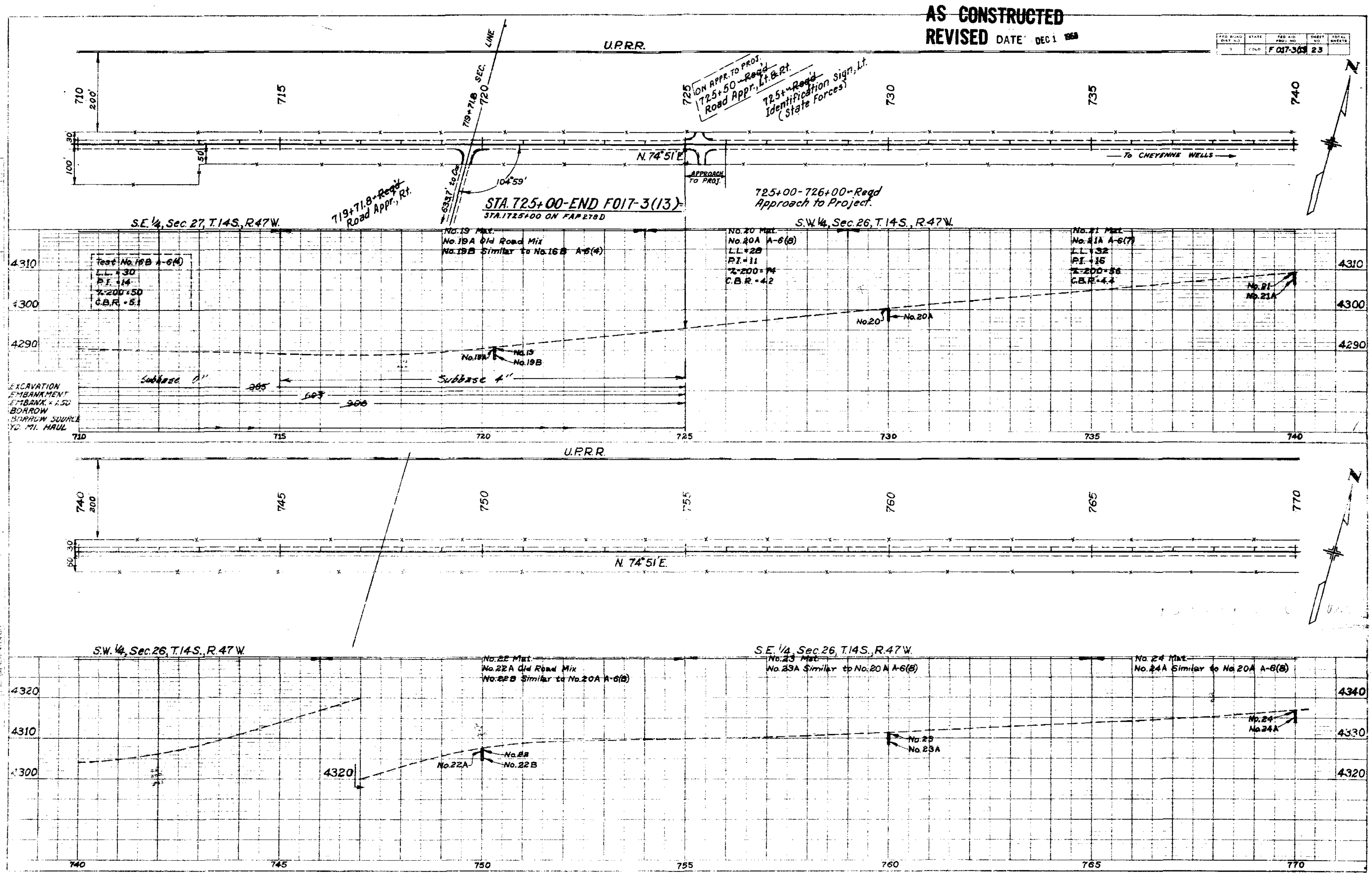


FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	F 017-3(13)	21	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	F 017-3(13)	22	




AS CONSTRUCTED
REVISED DATE DEC 1 1960
F 017-3(13) 23
U.P.R.R.
SEC. LINE
719+71.8 720
ON APPR. TO PROJ. 725+50 Road Appr., Lt. & Rt.
725+ Identification Sign, Lt. (State Forces)
N. 74°51'E.
104°59'
To CHEYENNE WELLS
APPROACH TO PROJ.
719+71.8 Road Appr., Rt.
STA. 725+00-END F017-3(13)
STA. 1725+00 ON FAP 278D
725+00-726+00 Approach to Project.
S.E.¼, Sec. 27, T.14S., R.47W.
S.W.¼, Sec. 26, T.14S., R.47W.
Test No. 16B A-6(4) L.L. = 30 P.I. = 14 %-200 = 50 C.B.R. = 5.1
No. 19 Mat. No. 19A Old Road Mix No. 19B Similar to No. 16B A-6(4)
No. 20 Mat. No. 20A A-6(8) L.L. = 28 P.I. = 11 %-200 = 74 C.B.R. = 4.2
No. 21 Mat. No. 21A A-6(7) L.L. = 32 P.I. = 16 %-200 = 56 C.B.R. = 4.4
Subbase 0"
Subbase 4"
EXCAVATION
EMBANKMENT
EMBANK. × 1.50
BORROW
BORROW SOURCE
YD. MI. HAUL
U.P.R.R.
N. 74°51'E.
S.W.¼, Sec. 26, T.14S., R.47W.
S.E.¼, Sec. 26, T.14S., R.47W.
No. 22 Mat. No. 22A Old Road Mix No. 22B Similar to No. 20A A-6(8)
No. 23 Mat. No. 23A Similar to No. 20A A-6(8)
No. 24 Mat. No. 24A Similar to No. 20A A-6(8)

STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

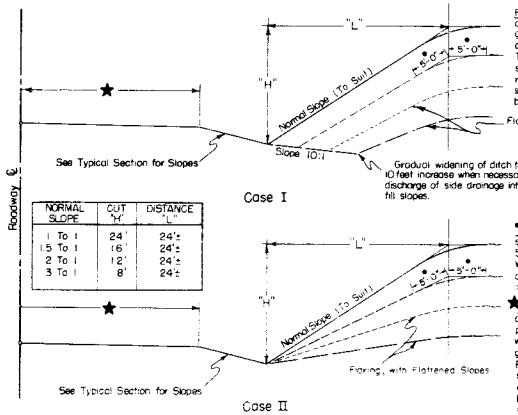
STANDARD M-203-B

(JULY 1, 1965)

FED. ROAD RES. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS			

GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



NORMAL SLOPE	CUT "H"	DISTANCE "L"
1 To 1	24'	24'±
1.5 To 1	16'	24'±
2 To 1	12'	24'±
3 To 1	8'	24'±

FLARING OF EARTH CUTS : The backslopes at ends of all earth cuts shall be flattened & where necessary the ditch shall be widened gradually to discharge side ditch drainage away from the base of adjacent fill slopes in order to avoid erosion & to improve appearance. The transition of flattened backslopes & widened ditch shall be constructed in such a manner that a uniform appearance of slope & ditch results. Backslopes shall be flared to the approximate "L" distance shown on Slope Table included with this detail. Rock cuts shall not be flared.

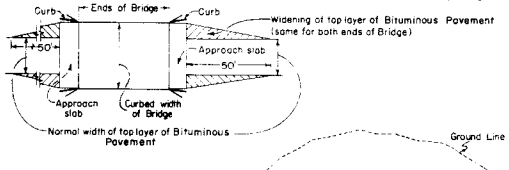
Flaring, with widened ditch.

Gradual widening of ditch to minimum of 10 feet increase when necessary to avoid discharge of side drainage into adjoining fill slopes.

CUT SLOPE TREATMENT IN EARTH CUTS: The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft. outside the slope stake and extending 5 ft. down the cut slope. Where the cut slope is less than 5 ft. reduce each of the above widths of slope treatment to the actual slope distance. Quantities shall be included in "Unclassified Excavation".

★ WIDENING AT BRIDGE APPROACHES: Roadway embankment at bridge approaches shall be so constructed that base of surfacing at shoulder point is a Min. of 2 ft. beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over a distance of 300 ft. The bottom layer of Bituminous Pavement shall be placed on widened sections to conform with dimensions shown on typical section. This is done to accomodate guard fence and Delineators at bridge approaches. The top layer of Bituminous Pavement shall be widened to meet the curbed width of the bridge or approach slab as shown in sketch, left.

WIDENING OF TOP LAYER OF BITUMINOUS PAVEMENT AT BRIDGE APPROACHES

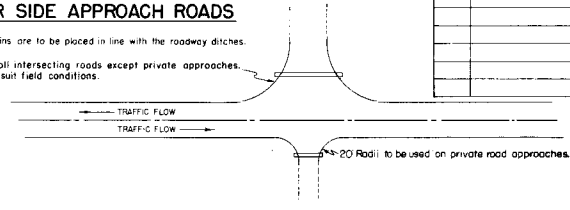


PLAN OF FLARING IN EARTH CUTS

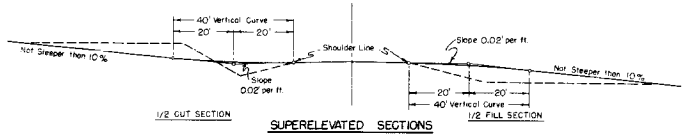
TYPICAL PLANS FOR SIDE APPROACH ROADS

Where practical Side Drains are to be placed in line with the roadway ditches.

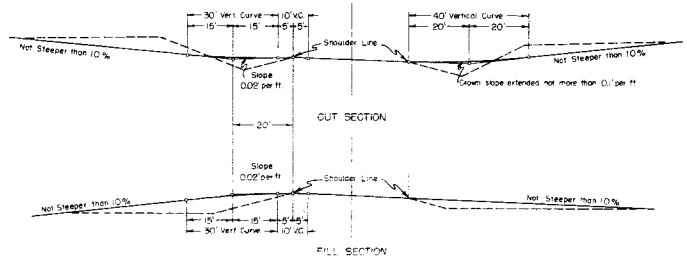
50' Radii to be used on all intersecting roads except private approaches. Radii may be varied to suit field conditions.



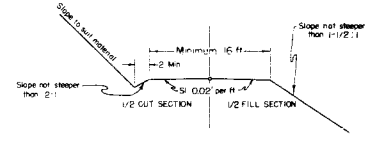
STANDARD CROWNED SECTION



SUPERELEVATED SECTIONS



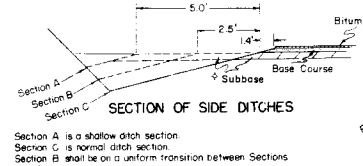
TYPICAL SECTION FOR APPROACH



NOTE:
Road Approaches shall conform to the above details unless otherwise indicated on plans. The width of the crowned section shall not be less than the width of the crowned section of the existing approach road and the new construction shall not be less than 16 feet in width.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

(TO BE USED ONLY WHERE SIGHT DISTANCE AT CREST OF GRADE IS 600 FT. OR LESS)



SECTION OF SIDE DITCHES

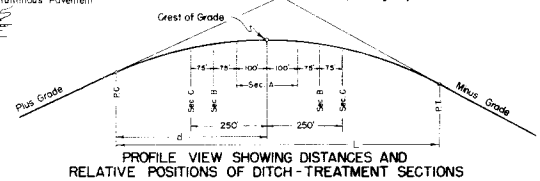
Section A is a shallow ditch section.
Section C is normal ditch section.
Section B shall be on a uniform transition between Sections A and C.
The modification of the ditch indicated shall be used only at the crest of grades from which drainage breaks both ways.

Formula for finding the Crest of Grade

$d = \frac{\text{Plus Grade}}{\text{Algebraic Diff.}} \times L$

NOTE

Where section is in embankment at crest of grades, the shoulder shall be widened an amount equivalent to that used on ditch sections, thus providing a symmetrical section at all crests.



PROFILE VIEW SHOWING DISTANCES AND RELATIVE POSITIONS OF DITCH-TREATMENT SECTIONS

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the Project.

All side approach roads to the Project shall be Gravel Surfaced with a 4 inch thickness of Aggregate Base Course extending approximately to the Right of Way Line. Estimated tonnage and class of material required for this operation are shown in the Aggregate Base Course Plan.

The maximum grades shown are to be the limiting grades for all road approaches. Modifications of grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades less than the maximum shown are to be used wherever feasible.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

APPROACH ROADS, FLARING, CUT SLOPE TREATMENT, BRIDGE & CREST WIDENING

Designed by A.Z.
Made by W.J.M. & A.B.H.
Checked by C.R.S.

Approved by [signature]
Staff Design Engr.
Date: [illegible], 1965.

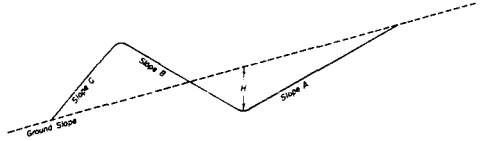
STANDARD TYPES *of* DITCHES *and* CONSTRUCTION METHODS

STANDARD M-203-C
(JULY 1, 1965)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

DETAILS *for* CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



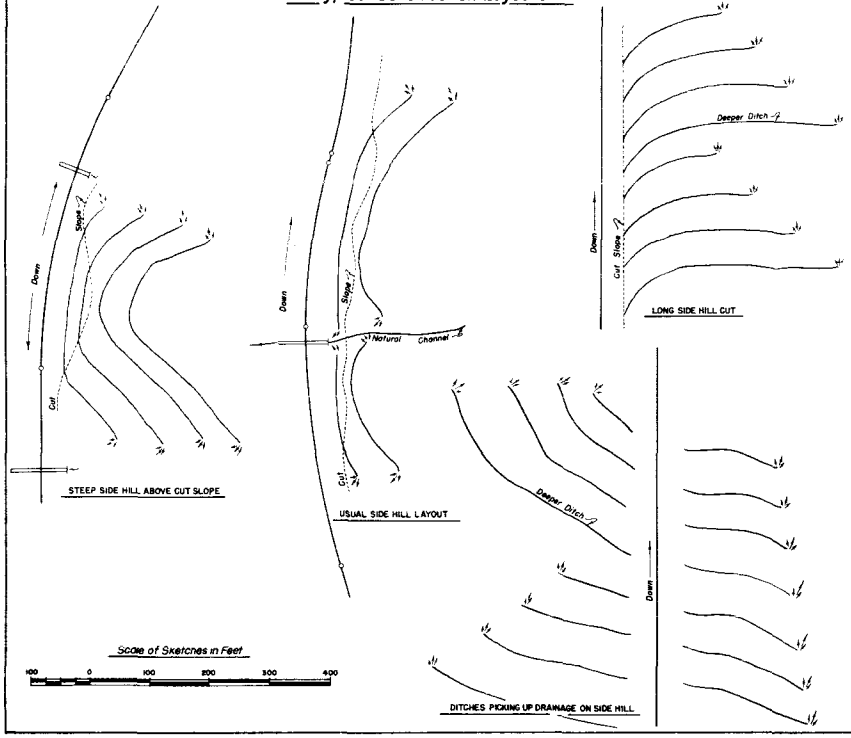
PURPOSE & USE OF THE TABLE

The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved.

Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section.

By properly arriving at the combination of values shown on the Typical Section and in the Table for a specified condition, the number of cubic yards of excavation per 100 lin. ft. of ditch may be read under the appropriate column for this item.

Typical Construction Layouts



Scale of Sketches in Feet

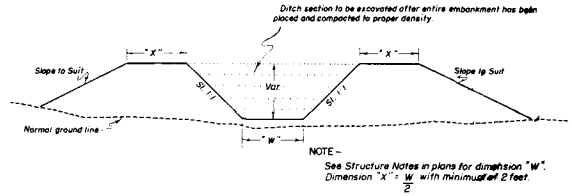
100 0 100 200 300 400

Table of Slopes and Yardages

SLOPES ▲ Ground	A	B	C	H	Cubic Yards per 100 lin. ft. of Ditch
5:1 Or Flatter	2:1	4:1	2:1	15"	16
				18"	23
				21"	32
		3:1		15"	15
				18"	22
				21"	30
		2:1		15"	14
				18"	20
				21"	27
		1-1/2:1		15"	13
				18"	19
				21"	25
	1-1/2:1	4:1	1-1/2:1	15"	12
				18"	18
				21"	25
		3:1		15"	12
				18"	17
				21"	23
		2:1		15"	10
				18"	15
				21"	20
		1-1/2:1		15"	10
				18"	14
				21"	19
4:1	2:1	4:1	2:1	15"	17
				18"	25
				21"	34
		3:1		15"	17
				18"	24
				21"	32
		2:1		15"	15
				18"	22
				21"	30
		1-1/2:1		15"	15
				18"	21
				21"	29
	1-1/2:1	4:1	1-1/2:1	15"	13
				18"	18
				21"	25
		3:1		15"	12
				18"	17
				21"	23
		2:1		15"	11
				18"	16
				21"	21
		1-1/2:1		15"	10
				18"	14
				21"	20
3:1	2:1	3:1	2:1	15"	22
				18"	31
				21"	43
		2:1		15"	21
				18"	30
				21"	41
		1-1/2:1		15"	20
				18"	29
				21"	40
	1-1/2:1	3:1	1-1/2:1	15"	13
				18"	19
				21"	26
		2:1		15"	18
				18"	17
				21"	24
		1-1/2:1		15"	12
				18"	17
				21"	23
2:1	1-1/2:1	2:1	1-1/2:1	15"	20
				18"	29
				21"	40
		1-1/2:1		15"	20
				18"	28
				21"	39
	1:1	2:1	1:1	15"	9
				18"	13
				21"	17
		1-1/2:1		15"	8
				18"	12
				21"	16
1-1/2:1	1:1	1-1/2:1	1:1	15"	11
				18"	16
				21"	21

▲ *Slopes are approximate and may be varied to suit conditions encountered during construction.*

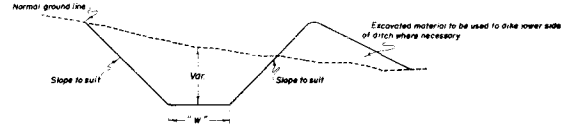
TYPICAL SECTIONS *for* DRAINAGE, IRRIGATION DITCHES *and* CHANNEL CHANGES



NOTE –
See Structure Notes in plans for dimension "W".
Dimension "X" = $\frac{W}{2}$ with minimum of 2 feet.

For Embankment Sections

(Generally for use in Irrigation Ditches & Channel Changes)



NOTE –
Unless otherwise shown in Structure Notes of plans, dimension "W" = 1 foot.

For Cut Sections

REVISIONS

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the Project.

All ditches are to be constructed to lines and grades as staked by the Engineer using the ditch section shown on plans or as ordered by the Engineer.

CONTOUR INTERCEPTING DITCHES: *Ditches are to be laid out along the ground contour on a grade of not over 1% (Type of soil shall govern the grade).*

Ends of ditches are to be lined up so that concentration of flow from a higher contour ditch into one of lower contour is, as far as possible avoided. The use of a deeper ditch is recommended where this condition is encountered.

The following horizontal spacing of ditches is recommended:

4% to 6%	Approximately 70' Centers
8% to 10%	Approximately 60' Centers
20% to 4:1 Slope	Approximately 55' Centers
30% to 1-1/2:1 Slope	Approximately 50' Centers

Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of 1.0%. Details of checks will be shown on plans when required.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DITCH TYPES

Designed by C.G.M.	Approved by S. E. Olson
Made by C.G.M.	Staff Design Engr.
Checked by	Date: July 1, 1965

STANDARD M-206-A

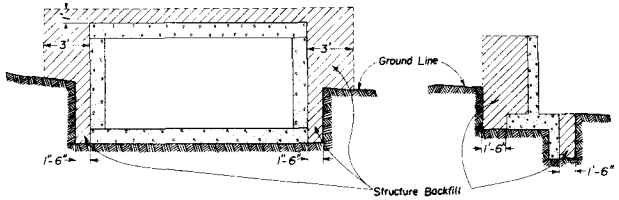
(JULY 1, 1965)

(SHEET 1 OF 2 SHEETS)

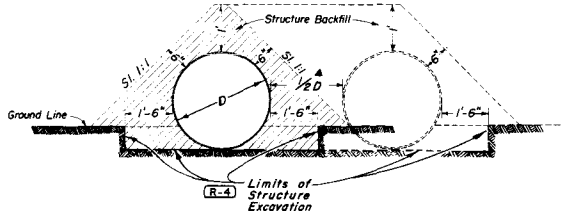
FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISION			
R-1	10-20-65	ADDED PIER VIEW	M.R.H.
R-2	12-7-65	STR. EXCV.	M.R.H.
R-3	4-25-66	Class 2 Backfill (Trench)	M.R.H.
R-4	3-17-67	Conduit, Underdr'n, Box	M.R.H.

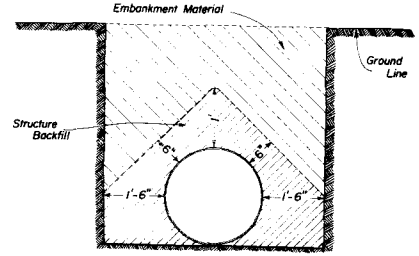
CONCRETE BOX CULVERTS & WINGWALLS



CIRCULAR CONDUIT

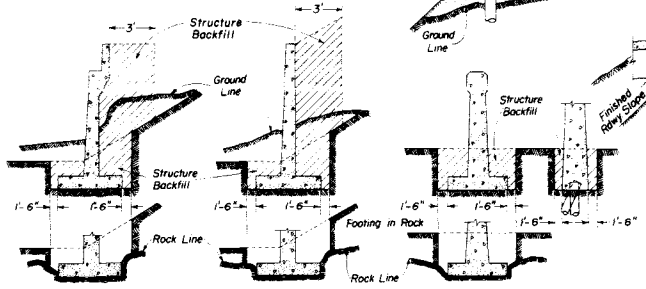


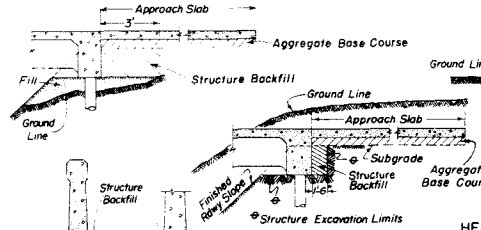
SIPHONS OR CONDUIT IN TRENCH



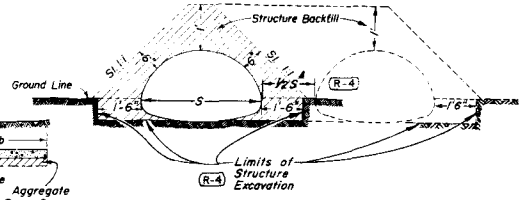
PIERS, ABUTMENTS, RETAINING WALLS ETC.

All material that is to be compacted shall be placed in horizontal layers not more than 6" inches in depth and compacted before the next layer is placed. For Arches, Rigid Frames and Box Culverts the fill shall be brought up uniformly on both sides of the center of structure to avoid stresses in the structure caused by unsymmetrical loading.





ELLIPTICAL OR ARCH CONDUIT



R-4 *NOTES:*

▲ *When two or more conduits are laid side by side they shall be spaced so that adjacent sides of pipe shall be ½ the Diameter or Span or 3 feet apart whichever is less. Minimum spacing shall not be less than 1 foot.* R-4

For additional culvert installation details see M Standards for metal, concrete, or structural plate pipe culverts.

GENERAL NOTES

All work shall be done according to the Standard Specifications applicable to the Project.

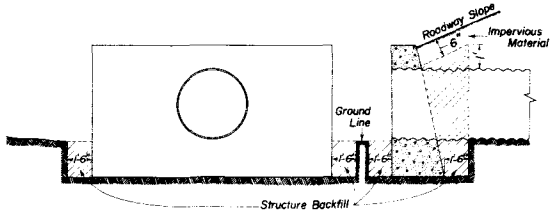
Where the roadway cross section is in fill, excavation for concrete footings (except those in rock or those on piles) and for box culverts shall be done according to the following:

Embankment shall be built up and compacted to a point one foot above the flowline of the box or the top of the footing. The trench shall then be excavated to accomodate construction of the box or footing.

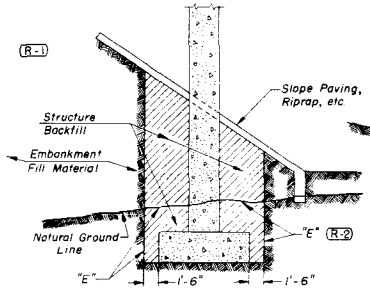
Excavation and backfill patterns different from those indicated on these sheets will be shown elsewhere on the plans.

R-4 *Excavation for structure installation shall be classified as "Structure Excavation" unless otherwise shown on plans.*

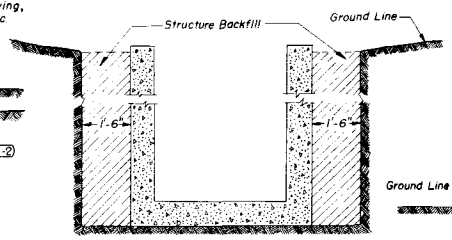
HEADWALLS AND END OF CULVERTS

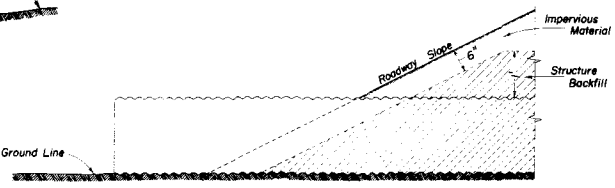


DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS, ETC.

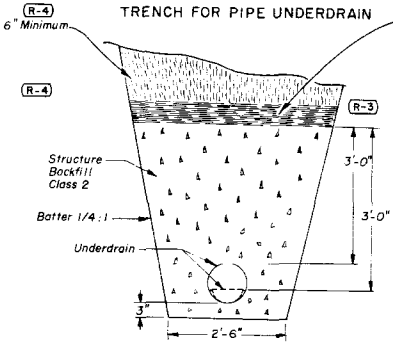


Note:
"E" = Limits of Structure Excavation





TRENCH FOR PIPE UNDERDRAIN



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

EXCAVATION AND BACKFILL FOR STRUCTURES

Designed by H.E.P.	Approved by L. E. O'Brien
Made by D.M.E.	Staff Design Engr.
Checked by L.E.O.	Date: July 1, 1965

STANDARD M-206-A

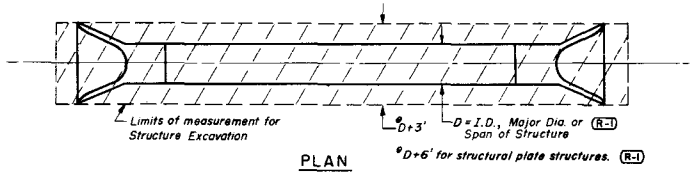
(SHEET 2)

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	COLORADO			

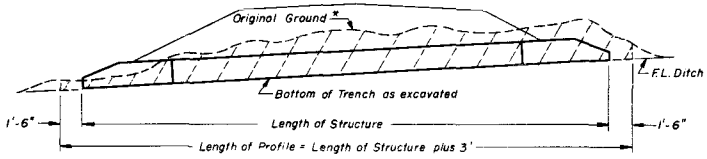
	REVISIONS:	
(R-1)	3-17-67	I. D. on Pipe Culvert Span or D.	M.R.H.

STRUCTURE EXCAVATION MEASUREMENT FOR PIPE CULVERTS



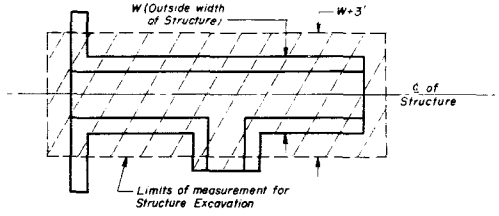
PLAN

*D+6' for structural plate structures. (R-1)

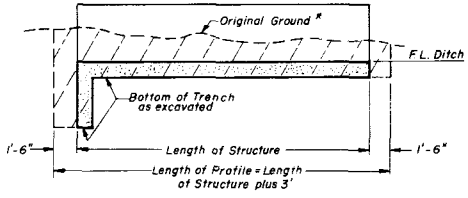


PROFILE

STRUCTURE EXCAVATION MEASUREMENT FOR DIVERSION OR DIVISION BOXES

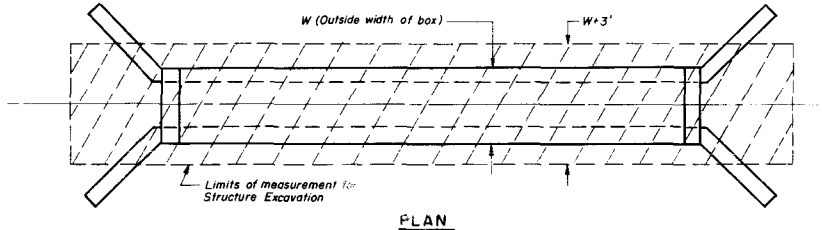


PLAN



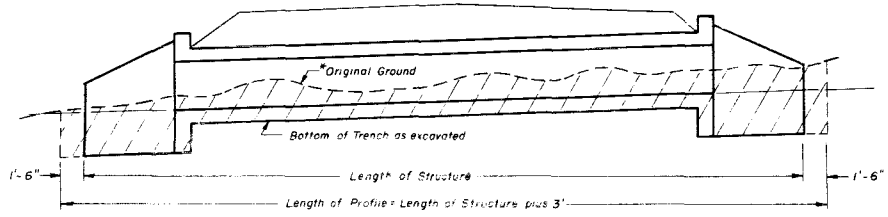
PROFILE

STRUCTURE EXCAVATION MEASUREMENT FOR CONCRETE BOX CULVERTS



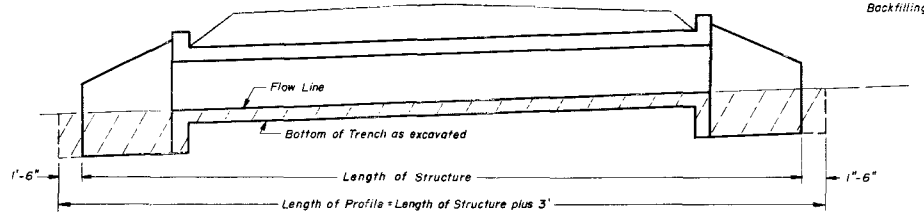
PLAN

Without Channel Change or Channel Improvement



PROFILE

With Channel Change or Channel Improvement



PROFILE

NOTE:
See Sheet 1 for General Notes and Backfilling Details.

* Along ℄ of Structure

Areas to be used for Structure Excavation computations.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

EXCAVATION AND BACKFILL FOR STRUCTURES

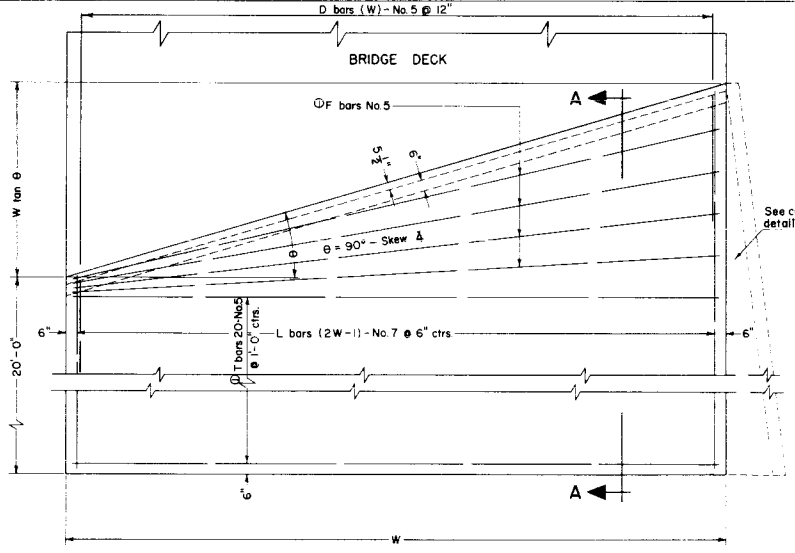
Designed by: M.R.H.	Approved by:
Made by: H.P.B.	Staff Design Engr.
Checked by:	Date: July 1, 1965

STANDARD M-412-B

(JULY 1, 1965)

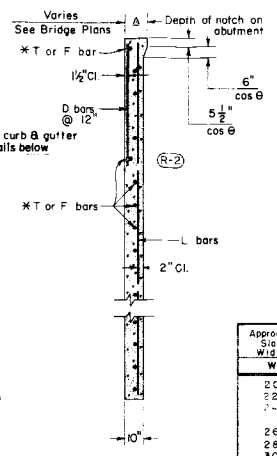
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS			
R-1	11-16-65	Curb subtitles	M.R.H.
R-2	4-6-66	T & F bars and ✱Note	M.R.H.
R-3	12-8-66	Exp. Joint Mat'l. – Detail "K"	M.R.H.
R-4	1-24-67	Exp. Joint Mat'l. – Ø Note	M.R.H.



① Note: One T or F bar to be placed near top of slab at each end of D bars.

APPROACH SLAB – PLAN



SECTION A–A

(R-2) ✱ Includes 2 T or F bars placed in top of slab as shown.

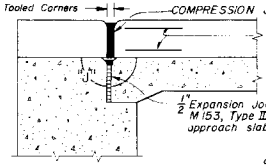
Quantity of Compression Joint Sealer Material for one Approach Slab

SAFETY CURB

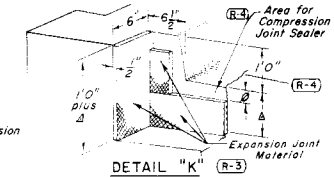
$\frac{W+1}{\cos\theta} + 2' = \_\_\_$ LINEAR FEET

BRUSH CURB

$\frac{W}{\cos\theta} + 1' = \_\_\_$ LINEAR FEET



(R-4) (R-3) $\frac{\Delta W}{\cos\theta} + 4 = \frac{.167 \times W}{\cos\theta} = \_\_\_\_\_ ft^2$ Expansion Joint Material



DETAIL "K" (R-3)

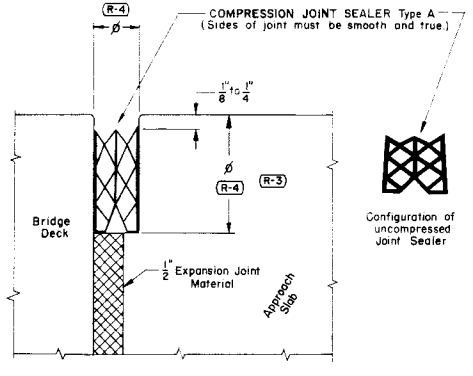
EXPANSION JOINT MATERIAL

DETAIL AT BRIDGE ABUTMENT

(R-2) Bar List and Quantities required for one Approach Slab

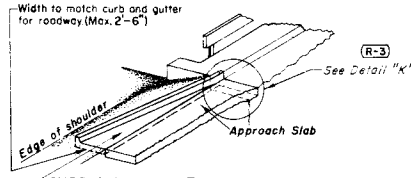
Approach Slab Width	T = No. 5; Str.		D = No. 5; Str.		L = No. 7; Str.		F = No. 5, Str.		Reinforcing Steel (Lbs.)			Additional Steel for Skew (Lbs.)		Concrete Pavement
W	✱ No.	Length	No.	Length	No.	Length	✱ No.	Length	T Bar	D Bar	L Bar	F Bar	L Bar	(Sq. Yds.)
20	20	19'-6"	20	5'-0"	39	19'-6" tan θ + (W-1) tan θ	10 tan θ	19'-6"	411	105	1570	205 tan θ	765 tan θ	44.4 + 22.2 tan θ
22		21'-6"	22		43		11 tan θ	21'-6"	452	116	1731	249 tan θ	932 tan θ	48.9 + 26.9 tan θ
[illegible]		23'-6"	24		47		12 tan θ	23'-6"	494	126	1892	297 tan θ	1116 tan θ	53.3 + 32.0 tan θ
26		25'-6"	26		51		13 tan θ	25'-6"	537	137	2053	349 tan θ	1316 tan θ	57.8 + 37.6 tan θ
28		27'-6"	28		55		14 tan θ	27'-6"	580	147	2214	406 tan θ	1533 tan θ	62.2 + 43.6 tan θ
30		29'-6"	30		59		15 tan θ	29'-6"	621	158	2375	466 tan θ	1766 tan θ	66.7 + 50.0 tan θ
32		31'-6"	32		63		16 tan θ	31'-6"	663	169	2536	531 tan θ	2016 tan θ	71.1 + 56.9 tan θ
34		33'-6"	34		67		17 tan θ	33'-6"	706	179	2697	600 tan θ	2282 tan θ	75.6 + 64.2 tan θ
36		35'-6"	36		71		18 tan θ	35'-6"	748	190	2858	673 tan θ	2565 tan θ	80.0 + 72.0 tan θ
38		37'-6"	38		75		19 tan θ	37'-6"	790	200	3019	751 tan θ	2864 tan θ	84.4 + 80.2 tan θ
40		39'-6"	40		79		20 tan θ	39'-6"	832	211	3180	832 tan θ	3180 tan θ	88.9 + 88.9 tan θ
42		41'-6"	42		83		21 tan θ	41'-6"	874	221	3341	918 tan θ	3513 tan θ	93.3 + 98.0 tan θ
44		43'-6"	44		87		22 tan θ	43'-6"	916	232	3502	1008 tan θ	3862 tan θ	97.8 + 107.6 tan θ
46		45'-6"	46		91		23 tan θ	45'-6"	958	242	3663	1102 tan θ	4227 tan θ	102.2 + 117.6 tan θ
48		47'-6"	48		95		24 tan θ	47'-6	1001	253	3824	1201 tan θ	4609 tan θ	106.7 + 128.0 tan θ
50		49'-6"	50		99		25 tan θ	49'-6"	1043	263	3985	1304 tan θ	5007 tan θ	[illegible] + 138.9 tan θ
52		51'-6"	52		103		26 tan θ	51'-6	1084	274	4146	[illegible] tan θ	5422 tan θ	115.6 + 150.2 tan θ
54	20	53'-6"	54	5'-0"	107		27 tan θ	53'-6"	1127	284	4307	1522 tan θ	5854 tan θ	120.0 + 162.0 tan θ

(R-4) *Lengths shown include 1 percent for overrun.*

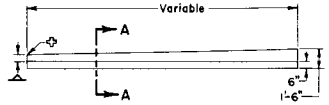


(R-4) Ø *Dimension of groove to be proportionate with compression joint sealer supplied.*

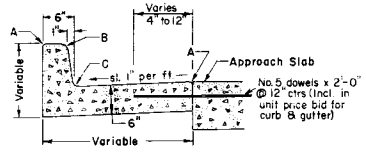
DETAIL "J"



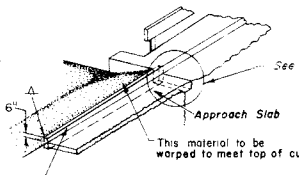
CURB & GUTTER Type 2 (R-1) (Section-Variable)



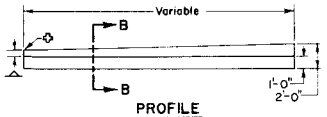
PROFILE



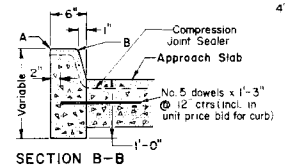
SECTION A–A



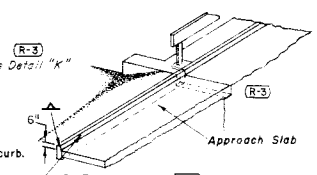
CURB Type 2 (R-1) (Section-Variable)



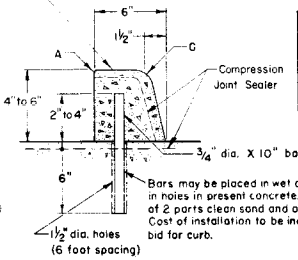
PROFILE



SECTION B–B



CURB Type 2 (R-3) (R-1) (Section-Variable) (R-3) CURB Type 4 on Bridge Deck



GENERAL NOTES

Concrete for Approach slabs shall be Class "P" (R-1)

Approach slab shall be paid for under Section 412 as "Concrete Pavement" of the specified thickness.

Reinforcing Steel required in Approach Slab will be paid for under Section 602

Class "A" concrete aggregate may be used in the pavement.

(R-1)

- 6" min. curb height when no curb is used on abutting roadway
- 4" where Bituminous Curbing is used. (Shape bituminous curb to meet concrete curb.)
- 6" To meet concrete Curb or Curb and Gutter (R-1)

Use 1½" R. when no bituminous or concrete curb is to be met. No radius required when meeting bituminous or concrete curb.

LEGEND FOR RADII
A = ⅛"
B = 1"
C = 1½"

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

CONCRETE PAVEMENT BRIDGE APPROACH SLAB

Designed by J.G.G.
Made by T.F.
Checked by P.C.

Approved by [signature]
Bridge Engineer
Date: July 1, 1965

STANDARD M-500-A

(JULY 1, 1965)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

1 2 3 4 5 6 7 8 9 0 .

A B C D E F G H I J K L

M N O P Q R S T U V W

a f g l J 14 K 1950

Scale in inches

SECTION

abcdefghijklmnopqrstuvwxyz

SAMPLE BRIDGE NUMBER

SAMPLE YEAR NUMBER

White Background

Do not bushhammer this area

J 14 K

ROADWAY

1950

TYPICAL FOR CONCRETE END POST

TYPICAL FOR STEEL HANDRAIL END POST

TYPICAL FOR SIGN POSTS

LETTERS TO FACE TRAFFIC

Centered between posts

TYPICAL FOR TIMBER WING HANDRAIL

5'-0"

POST

Location of indentured year numbers

TYPICAL FOR LARGE BOX CULVERTS & STRUCTURES WITHOUT END POSTS

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

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

THE YEAR NUMBERS ARE RECESSED IN CONCRETE ¾" MINIMUM AS SHOWN INTO THE PANEL OF THE ENDPOST ON THE RIGHT HAND SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE DOWNSTREAM HEADWALL OF CULVERTS AS SHOWN ON PLAN DETAILS. NUMBERS TO BE MADE OF WOOD, METAL OR OTHER SUITABLE MATERIAL AND ATTACHED TO THE FORMS BEFORE CONCRETE IS POURED. THE YEAR NUMBER OF EACH STRUCTURE SHALL CORRESPOND WITH THE YEAR IN WHICH THE CONCRETE IS POURED.

THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED, WHERE THE STRUCTURE HAS NO END POSTS, THE NUMBER SHALL BE PLACED ON A POST ON THE RIGHT HAND SIDE OF THE ROAD AS SHOWN. FOR SIGNS THE NUMBER SHALL BE PLACED ON SIGN POSTS ON THE RIGHT HAND SIDE OF THE ROADWAY.

THE CORRECT NUMBER FOR EACH BRIDGE OR SIGN IS SHOWN ON THE PLANS.

THE NUMBERS FOR MAJOR STRUCTURES OF OVER 20 FEET CLEAR SPAN SHALL BE UPPER CASE LETTERS. THE NUMBERS FOR MINOR STRUCTURES OF 12 TO 20 FEET CLEAR SPAN SHALL BE LOWER CASE. LETTERS SIGN BRIDGES SHALL BE CONSIDERED AS MAJOR STRUCTURES.

A PROPER WHITE BACKGROUND, RECTANGULAR IN SHAPE AND EXTENDING THREE INCHES BEYOND THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED. BEFORE PAINTING THE SURFACE MUST BE THOROLY DRIED, CLEANED AND PROPERLY SIZED ON TIMBER HANDRAILS. THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY.

AFTER THE WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED WITH "EXTERIOR BLACK PAINT" AS SPECIFIED IN SECTION 708 - PAINTS, OR AN ACCEPTABLE EQUIVALENT. 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 THORO DRYING.

THE COST OF PAINTING OF STRUCTURE NUMBERS AND FURNISHING AND PLACING POSTS FOR STRUCTURE NUMBERS SHALL BE CONSIDERED SUBSIDIARY WORK AND SHALL BE INCLUDED IN THE ORIGINAL CONTRACT ITEMS AND WILL NOT PAID FOR AS SEPARATE ITEMS.

* THE LENGTH OF SPAN OF STRUCTURE SHALL BE MEASURED ALONG CENTER LINE OF ROADWAY. IN CASE OF DOUBLE OR MULTIPLE BOX CULVERTS THE CENTER WALL OR WALLS SHALL BE DISREGARDED AND CLEAR SPAN MEASURED FROM INSIDE OF END WALLS.

IN ADDITION TO THE REQUIREMENTS STATED ABOVE, STRUCTURE NUMBERS FOR HIGHWAYS PASSING UNDER CROSSROADS ARE TO BE PLACED AT THE FOLLOWING POINTS:

(A) FOR STRUCTURES OF 3 OR MORE SPANS, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF THE END COLUMN OF THE RIGHT-HAND PIER.

(B) FOR 2-SPAN STRUCTURES, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF EACH END COLUMN IN THE CENTER PIER.

STRUCTURE NO. .....

REVISIONS

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

LETTERS AND FIGURES
FOR
STRUCTURE NUMBERS

Designed by	Approved by: R. E. Trumbull
Made by	Bridge Engineer
Checked by	Date: July 1, 1965

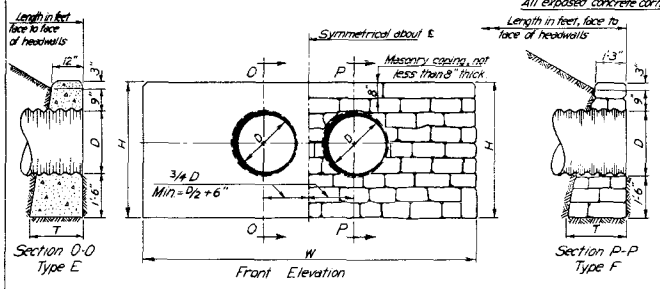
STANDARD M-603-C

(JULY 1, 1965)

FEDERAL ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS

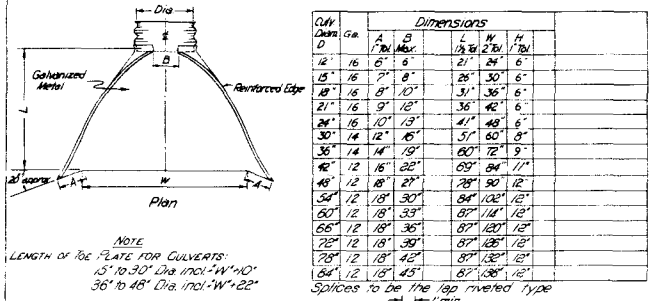
All exposed concrete corners shall be beveled.



STANDARD HEADWALLS FOR DOUBLE CORRUGATED STEEL PIPE CULVERTS

Table of Dimensions and Quantities

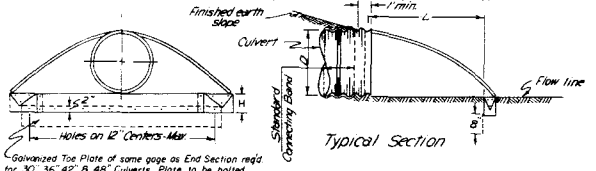
D Diam.	T	Both Types: * Concrete in Two Headwalls	W	H	Type F: Mortar Rubble Masonry in Two Headwalls	T	D Diam.
15"	1'-6"	2.4 Cu. Yds.	7'-6"	3'-9"	3.1 Cu. Yds.	2'-0"	15"
18"	1'-7"	3.0 Do	8'-6"	4'-0"	3.8 Do	2'-1"	18"
24"	1'-10"	4.4 Do	10'-6"	4'-6"	5.5 Do	2'-4"	24"
30"	2'-0"	6.1 Do	12'-9"	5'-0"	7.5 Do	2'-6"	30"
36"	2'-2"	8.1 Do	15'-0"	5'-6"	10.0 Do	2'-8"	36"
42"	2'-5"	10.8 Do	17'-3"	6'-0"	12.8 Do	2'-10"	42"
48"	2'-7"	13.6 Do	19'-6"	6'-6"	16.3 Do	3'-0"	48"



NOTE
LENGTH OF TOE PLATE FOR CULVERTS:
15" to 30" Dia. incl - "W" + 10"
36" to 48" Dia. incl - "W" + 22"

Culv. Diam. D	Gage	Dimensions: A ℄ Tol	Max.	B	L 1½ Tol	2 Tol	W	H ℄ Tol
12"	16	6"	6"		21"	24"	6"	
15"	16	7"	8"		26"	30"	6"	
18"	16	8"	10"		31"	36"	6"	
21"	16	9"	12"		36"	42"	6"	
24"	16	10"	13"		41"	48"	6"	
30"	14	12"	15"		51"	60"	8"	
36"	14	14"	19"		60"	72"	9"	
42"	12	16"	22"		69"	84"	11"	
48"	12	18"	27"		78"	90"	12"	
54"	12	18"	30"		84"	102"	12"	
60"	12	18"	33"		87"	114"	12"	
66"	12	18"	36"		87"	120"	12"	
72"	12	18"	39"		87"	126"	12"	
78"	12	18"	42"		87"	132"	12"	
84"	12	18"	45"		87"	138"	12"	

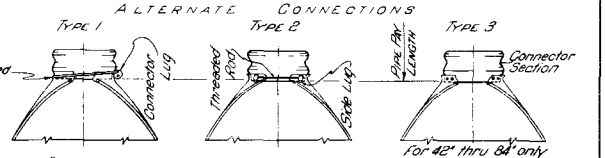
Splices to be the lap riveted type



Galvanized Toe Plate of same gage as End Section req'd for 30", 36", 42", & 48" Culverts. Plate to be bolted to End Section with 3/8" galvanized bolts.

Elevation

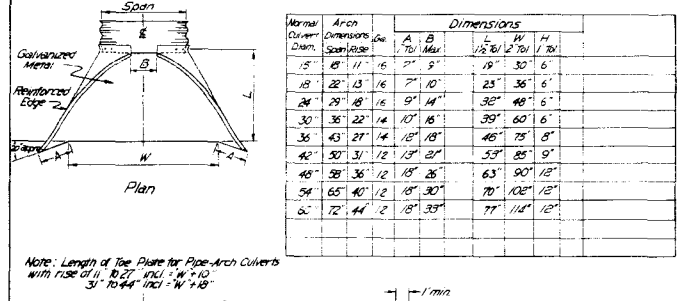
STANDARD END SECTIONS FOR ROUND ANNULAR OR HELICALLY CORRUGATED STEEL PIPE CULVERTS



STANDARD HEADWALLS FOR SINGLE CORRUGATED STEEL PIPE CULVERTS

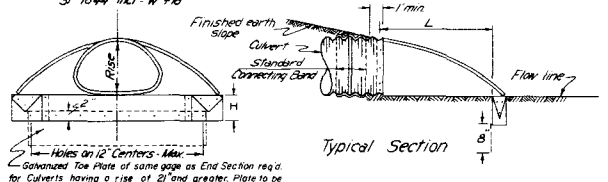
Table of Dimensions and Quantities

D Diam.	T	Type A: * Concrete in Two Headwalls	Both Types: W	H	Type C: Mortar Rubble Masonry in Two Headwalls	T	D Diam.
15"	1'-6"	1.8 Cu. Yds.	5'-3"	3'-9"	2.2 Cu. Yds.	2'-0"	15"
18"	1'-7"	2.2 Do	6'-0"	4'-0"	2.8 Do	2'-1"	18"
24"	1'-10"	3.3 Do	7'-6"	4'-6"	4.1 Do	2'-4"	24"
30"	2'-0"	4.5 Do	9'-0"	5'-0"	5.6 Do	2'-6"	30"
36"	2'-2"	6.0 Do	10'-6"	5'-6"	7.4 Do	2'-8"	36"
42"	2'-5"	8.0 Do	12'-0"	6'-0"	9.2 Do	2'-10"	42"
48"	2'-7"	10.0 Do	13'-6"	6'-6"	11.5 Do	3'-0"	48"



Normal Culvert Diam.	Arch Dimensions: Span	Rise	Dimensions: A ℄ Tol	Max.	B	L 1½ Tol	2 Tol	W	H ℄ Tol
15"	18"	11"	16	7"	9"	19"	30"	6"	
18"	22"	13"	16	7"	10"	23"	36"	6"	
24"	29"	18"	16	9"	14"	32"	48"	6"	
30"	36"	22"	14	10"	16"	39"	60"	6"	
36"	43"	27"	14	13"	18"	46"	75"	8"	
42"	50"	31"	12	13"	21"	53"	85"	9"	
48"	58"	36"	12	15"	26"	63"	90"	12"	
54"	65"	40"	12	18"	30"	70"	102"	12"	
60"	72"	44"	12	18"	33"	77"	114"	12"	

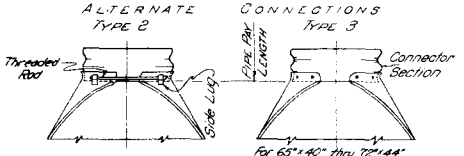
Note: Length of Toe Plate for Pipe-Arch Culverts with rise of 11" to 27" incl. = "W" + 10"
31" to 44" incl = "W" + 18"

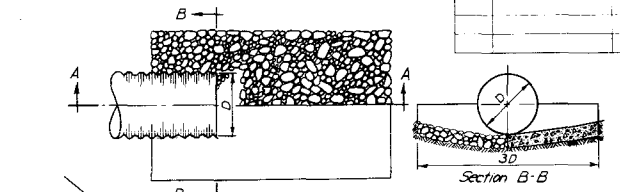


Galvanized Toe Plate of same gage as End Section req'd for Culverts having a rise of 21" and greater. Plate to be bolted to End Section with 3/8" galvanized bolts.

Elevation

STANDARD END SECTIONS FOR CORRUGATED STEEL PIPE ARCH CULVERTS

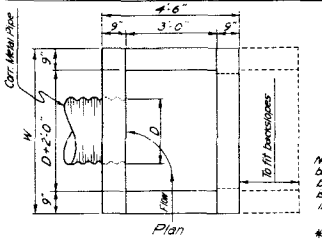




CONCRETE OR GROUTED RUBBLE APRON FOR PIPE CULVERT

Square Yards of Slope and Ditch Paving

Fill Slope	D	9"	7½	9"	12"	15"	18"	21"	24"	27"	30"	33"	36"	42"	48"
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	72	
4:1	4'-0"	3	5	8	12	16	22	28	34	42	50	59	69	79	



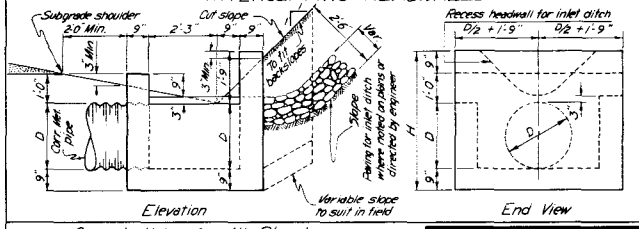
Quantities of * Concrete or Cement Rubble Masonry

Size of Pipe D	Width of Wall W	Height of Wall H	Quantities in One Headwall Cu. Yds.
15"	4'-9"	3'-9"	.49
18"	5'-0"	4'-0"	1.64
24"	5'-6"	4'-6"	1.99
30"	6'-0"	5'-0"	2.34
36"	5'-6"	5'-6"	2.72

Note: Backwall to be eliminated and end walls connected to back slope where ordered by the Engineer. Floor slab is to be extended with side walls if in common material and is to be omitted when inlet is in rock. Actual quantities involved in such operation shall be allowed and paid for.

* See plan sheets for concrete classification

INTERCEPTING HEADWALLS



General Notes for All Structures

All work shall be done according to the Standard Specifications applicable to the Project.

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

When culvert is skewed, headwalls shall be placed parallel to ℄ or roadway.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

HEADWALLS AND END SECTIONS FOR C.S.P. CULVERTS

Designed by P.S.B-GHD
Made by H.G.P.
Checked by M.W.M.
Approved by L. C. Skyberg
Staff Design Engr.
Date: July 1, 1965

STANDARD M-603-M
(MARCH 20, 1967)

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS		

FILL HEIGHT AND GAGE TABLES FOR METAL CULVERT PIPE (RIVETED, WELDED OR HELICAL FABRICATION)

TABLE I
CORRUGATED STEEL PIPE
(2" x 1/2") OR (2·2/3" x 1/2") CORRUGATIONS

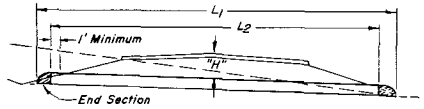
PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET														
		1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100
		GAGE														
12	0.8	16	16	16	16	16	16	16	16	16	16	16	16	16	14	12
15	1.2	16	16	16	16	16	16	16	16	16	16	16	14	12	12	10
18	1.8	16	16	16	16	16	16	16	16	14	14	12	12	10	8	
24	3.1	16	16	16	16	16	14	12	10	10	8					
30	4.9	16	16	16	16	14	14	12	12	10	8					
36	7.1	16	16	16	16	14	12	10	8							
42	9.6	16	16	16	16	16	14	14	12							
48	12.6	16	16	16	16	14	14	12	8							
54	15.9	14	14	14	14	14	12	12								
60	19.6	12	12	12	12	12	12	10								
66	23.8	12	12	12	12	10	10	8								
72	28.3	10	10	10	10	8										
78	33.0	8	8	8	8											
84	38.0	8	8	8												

---- See General Note.

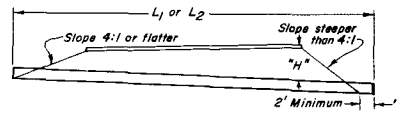
TABLE II
CORRUGATED STEEL PIPE ARCH
(2" x 1/2") OR (2·2/3" x 1/2") CORRUGATIONS

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET					
			1.5 to 7	7+ to 8	8+ to 9	9+ to 10	10+ to 12	12+ to 13
			GAGE					
18 x 11	1.1	3 1/2	16	16	16	16	16	16
22 x 13	1.6	4	16	16	16	16	16	
25 x 16	2.2	4	16	16	16	16		
29 x 18	2.8	4 1/2	16	16	16			
36 x 22	4.4	5	16	16	16			
43 x 27	6.4	5 1/2	16					
50 x 31	8.7	6	14					
58 x 36	11.4	7	12					
65 x 40	14.3	8	12					
72 x 44	17.6	9	10					

METAL CULVERT WITH END SECTIONS



METAL CULVERT WITHOUT END SECTIONS



"H" = Maximum height of fill over top of Culvert, including pavement.

L_1 = Length of Culvert to be measured when placed in accordance with Section 617.

L_2 = Length of pipe to be measured when placed in accordance with Section 603.

TABLE III
CORRUGATED STEEL PIPE
3" x 1" CORRUGATIONS
RIVETED OR HELICAL FABRICATION

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET												
		1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80
		GAGE												
36	7.1	16	16	16	16	16	14	14	12	12	12	12	10	8
42	9.6	16	16	16	16	14	14	14	12	12	12	12	8	
48	12.6	16	16	16	14	14	14	12	12	12	10	8		
54	15.9	16	16	16	14	14	12	12	10	8				
60	19.6	16	16	16	14	12	12	12	10					
66	23.8	16	16	14	14	12	12	10						
72	28.3	16	16	14	12	12	12	10						
78	33.0	16	16	14	12	10	8							
84	38.0	14	14	14	12	12								
90	44.0	14	14	12	12	12								
96	50.3	12	12	12	12	10								
102	57.0	12	12	12	12									
108	64.0	12	12	12	10									
114	70.9	10	10	10	8									
120	78.6	10	10	10	8									

---- See General Note.

5/16" rivets or helical fabrication shall be used on pipes with gages to the left of or above the heavy solid line.

3/8" rivets or helical fabrication shall be used on pipes with gages to the right of or below the heavy solid line.

TABLE IV
CORRUGATED STEEL PIPE
3" x 1" CORRUGATIONS
* SPOT WELDED OR BOLTED (1/2" ASTM A 325 BOLTS) FABRICATION

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET														
		1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100
		GAGE														
36	7.1	16	16	16	16	16	16	16	14	14	14	12	12	12	12	10
42	9.6	16	16	16	16	16	16	16	14	14	14	12	12	12	10	8
48	12.6	16	16	16	16	16	14	14	14	12	12	12	10	8		
54	15.9	16	16	16	16	16	14	14	12	12	10	10				
60	19.6	16	16	16	16	16	14	14	12	12	10	8				
66	23.8	16	16	16	14	14	12	12	10	8						
72	28.3	16	16	16	14	14	12	12	10							
78	33.0	16	16	16	14	12	12	10	8							
84	38.0	14	14	14	14	12	12	10								
90	44.0	14	14	14	14	12	12	10								
96	50.3	12	12	12	12	12	10	8								
102	57.0	12	12	12	12	12	10	8								
108	64.0	12	12	12	12	12	10									
114	70.9	10	10	10	10	10	8									
120	78.6	10	10	10	10	10										

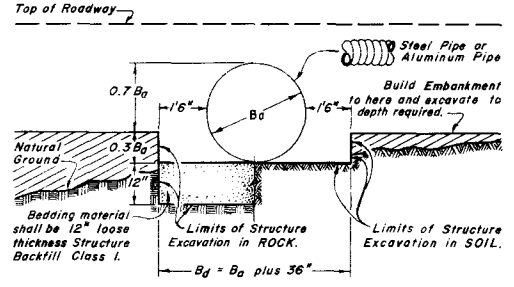
---- See General Note.

* 3/8" rivets may be used on pipes with gages to the left of or above the heavy solid line.
7/16" rivets may be used on pipes with gages to the right of or below the heavy solid line.

TABLE V
CORRUGATED STEEL PIPE ARCH
3" x 1" CORRUGATIONS

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET				
			1.5 to 10	10+ to 11	11+ to 12	12+ to 14	14+ to 15
			GAGE				
43 x 27	6.4	7 3/4	16	16	16		
50 x 31	8.7	9	16	16	16		
58 x 36	11.4	10 1/2	16	16	16		
65 x 40	14.3	12	16	16	16		
72 x 44	17.6	13 1/4	16	16	16		
73 x 55	22.0	18	16	16	16	16	16
81 x 59	26.0	18	14	14	14	14	14
87 x 63	31.0	18	14	14	14	14	
95 x 67	35.0	18	12	12	12		
103 x 71	41.0	18	12	12			
112 x 75	46.0	18	12				
117 x 79	52.0	18	12				
128 x 83	58.0	18	10				

INSTALLATION OF METAL CULVERT PIPE



NOTE: Spacing for multiple pipe installations shall conform to the details shown on M Standard for Excavation and Backfill for Structures.

TABLE VI
CORRUGATED ALUMINUM PIPE
2·2/3" x 1/2" CORRUGATIONS

PIPE SIZE (B_d) Inches	AREA (Sq.Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET												
		1 to 10	10+ to 15	15+ to 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80
		GAGE												
12	0.8	16	16	16	16	16	16	16	14	12	12	12	12	12
18	1.8	16	16	16	16	14	12	10	8	8				
24	3.1	16	16	16	14	10								
30	4.9	16	16	16	12	12	8							
36	7.1	16	16	14	12	8								
42	9.6	14	14	12	14	12	12	8						
48	12.6	12	12	12	12	10	8	8						
54	15.9	12	12	10	8	8								
60	19.6	10	10	8										
66	23.8	10	8											
72	28.3	8												

---- See General Note.

TABLE VII
CORRUGATED ALUMINUM PIPE ARCH
2·2/3" x 1/2" CORRUGATIONS

PIPE SIZE Span-Rise (Inches)	AREA (Sq.Ft.)	CORNER RADIUS (Inches)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET						
			1.5 to 7	7+ to 9	9+ to 11	11+ to 13	13+ to 14	14+ to 15
			GAGE					
18 x 11	1.1	4 3/4	16	16	16	16	16	16
22 x 13	1.6	4 3/4	16	16	16	16	16	
25 x 16	2.2	4 1/2	16	16	16	16		
29 x 18	2.8	4 1/2	16	16	16			
36 x 22	4.4	5	16	16				
43 x 27	6.4	5 1/2	14					
50 x 31	8.7	6	12					
58 x 36	11.4	7	10					
65 x 40	14.3	8	10					
72 x 44	17.6	9	8					

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

The tables on this sheet show minimum gages for structural requirements only. They are intended for use only where corrosive and/or abrasive conditions are negligible. Heavier gages and/or protective coatings shall be used where site investigations indicate corrosive and/or abrasive conditions.

Gages shown are U.S. Standard and are minimum requirements for use with adequate bedding and backfill, in accordance with the Standard Specifications.

Gages shown are for finished construction. During construction, adequate cover shall be provided to protect the structure from damage.

The minimum depth of fill excluding pavement over corrugated metal pipe culverts shall be as staked by the Engineer but in no case shall it be less than shown in the following tabulation:

Diameter of Culvert (B_d)	Minimum Allowable Cover
96" and smaller	1 foot
102" and larger	2 feet
Pipe Arch	1.5 feet

Structural plate pipes of equal or larger diameter, conforming to Section 510 of the Standard Specifications, may be substituted for the pipes shown on this sheet at no additional cost to the State.

NOTES FOR TABLES

---- Pipes with gages to the right of or below the heavy dashed line shown in the tables on this sheet, shall be elongated 5 percent on the vertical axis as installed. (Tables I, III, IV and VI.)

Maximum fill heights shown are for bearing pressures of 2 tons per square foot. (Tables II, V and VII.)

Fill heights greater than 90' shall be used only after thorough investigation of foundation material. (Tables I and IV.)

Variations from corner radii shown will be acceptable provided the pipe is of sufficient strength to support it's designated fill height. (Tables II, V, and VII.)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

METAL CULVERT PIPE
H-20 LOADING

Designed by M.R.H. Approved by
Made by J.R.B. Staff Design Engineer
Checked by R.S.M. Date:

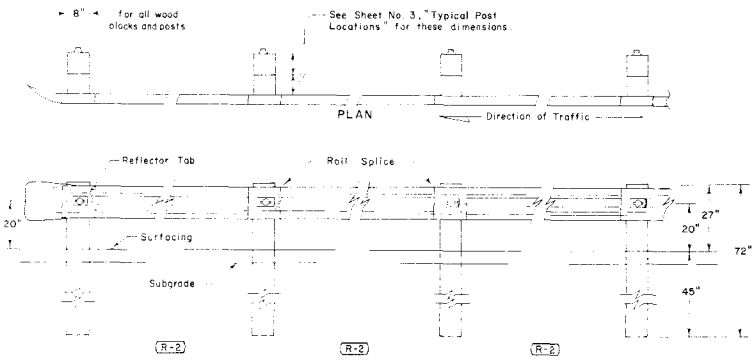
STANDARD M-606-AA

(MAY 26, 1967)
(SHEET 1 OF 3)

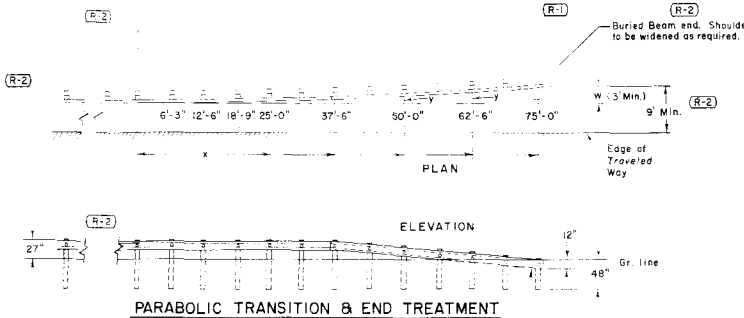
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS

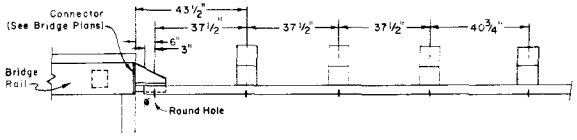
R-1	6-26-67 Added rail for 2-lane bridges	M.R.H.
R-2	8-1-67 Guard Rail at Bridges, Post Sp.	R.S.M.



TYPICAL GUARD RAIL FOR ROADWAYS

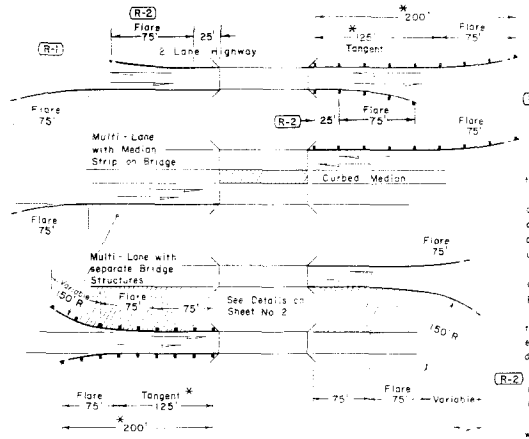


PARABOLIC TRANSITION & END TREATMENT



NOTE: The first rail panel section shall require holes and additional posts as indicated.
Factory punch ¾" hole in center of rail 3" from this end. Omit rail splice holes at this end.

GUARD RAIL AT BRIDGES



* NOTE.
250' Over 60 mph.
200' Up to 60 mph.
Up to 60 mph. 125' Tangent
75' Flare
Over 60 mph. 175' Tangent
75' Flare

BRIDGE APPROACH GUARD RAIL

See alternate end treatment on Sheet No. 2

GENERAL NOTES

All **work shall** be done in **accordance with** the Standard Specifications applicable to the **project**.

All timber shall be close grained **Douglas** Fir of the Coast Region, **Dense** Longleaf or Shortleaf Southern Pine, or **Lodgepole** Pine. Timber shall be free of **heart** centers and shall conform to Construction Grade, Paragraph 1258 of Standard No. 15 Grading and Dressing Rules of West Coast Douglas Fir (1956) or Dense Structural 58 and Ll. Structural 58, Paragraph 285 of 1956 Grading Rules for Southern Pine.

All timber shall be square edged, full sawn, and the tops of posts shall be beveled as shown. Blocks and posts shall be 8"x8" except that posts fabricated from **Lodgepole** Pine **shall** be 8"x10". Install with 8" face parallel to roadway center line).

Timber shall be incised and pressure treated with Grade 1 **Creosote** to a net retention of 8 pounds per cubic foot with a minimum penetration of 5/8 of an inch, except that blocks need not be incised before treatment. All bolt holes are to be drilled 1/16 inch larger than diameter of bolt before treatment is applied.

Posts shall be spaced at 6'-3" center to center except when otherwise designated by note or in the guardrail tabulation on the plans, and except for the first rail section adjacent to the bridge as shown hereon.

Where pedestrian hazards exist, sidewalks are to be constructed on the roadway shoulder. Guard rail shall be placed between the sidewalk and the edge of traffic lane.

Guard rail plate shall not be lighter than No. 12 U.S. Standard Gage. 25' long elements will be permitted.

Metal plate guard rail shall be painted in accordance with standard specifications.

Metal plate guard rail galvanized in accordance with AASHO Designation M-111 or with Coating Class 2.50 of Table 1 of ASTM Designation A 525 may be furnished in lieu of painting requirements.

Standard galvanized wrought steel washers shall be used under all bolt heads or nuts coming in contact with wood posts.

LEGEND

W = Full Parabolic Offset.

L = Length of Parabolic Transition.

x = Distance - ℄'s of Posts, from ℄ of first Post at beginning of Flare.

y = Offset of each Post = $W \cdot \frac{x^2}{L^2}$

TABLE OF OFFSETS
FOR 75' PARABOLIC FLARES

x	W-2	W-3	W-4	W-5	W-7	W-9
6'-3"	0.02	0.03	0.03	0.04	0.05	0.06
12'-6"	0.08	0.11	0.14	0.17	0.19	0.22
18'-9"	0.19	0.25	0.31	0.37	0.44	0.50
25'-0"	0.33	0.44	0.56	0.67	0.78	0.89
31'-3"	0.52	0.69	0.87	1.04	1.22	1.39
37'-6"	0.75	1.00	1.25	1.50	1.75	2.00
43'-9"	1.02	1.36	1.70	2.04	2.38	2.72
50'-0"	1.33	1.78	2.22	2.67	3.11	3.56
56'-3"	1.69	2.25	2.81	3.38	3.94	4.50
62'-6"	2.08	2.78	3.47	4.17	4.86	5.56
68'-9"	2.52	3.36	4.20	5.04	5.88	6.72
75'-0"	3.00	4.00	5.00	6.00	7.00	8.00

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

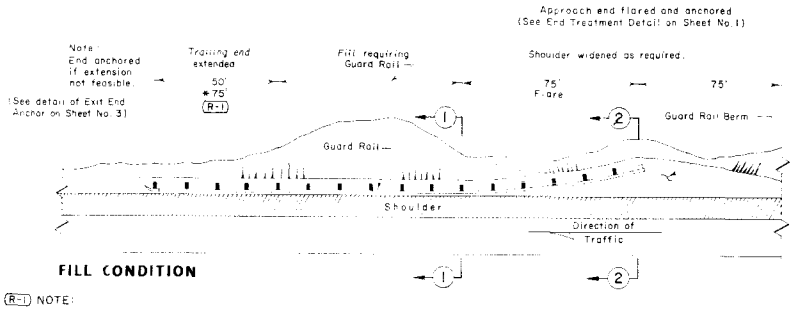
GUARD RAIL
TYPE 3

Designed by M.R.H. Approved by [illegible]
Made by J.R.S. by [illegible] Staff Design Engineer
Checked by R.S.M. Date MAY 26, 1967

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

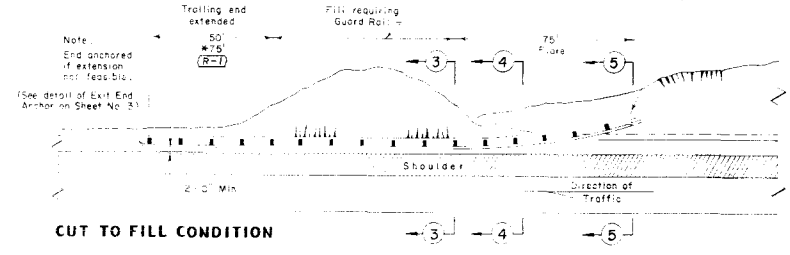
STANDARD M-606-AA

(MAY 26, 1967)
(SHEET 2)

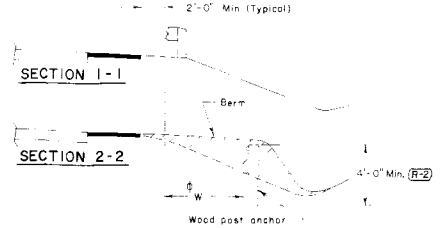


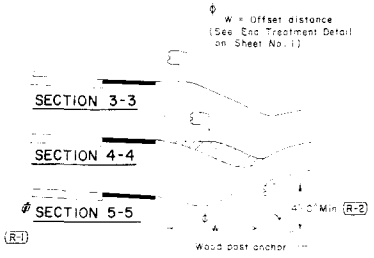
FILL CONDITION

(R-1) NOTE:
* For 2-lane roadways, the exit end is to be flared and anchored the same as approach end

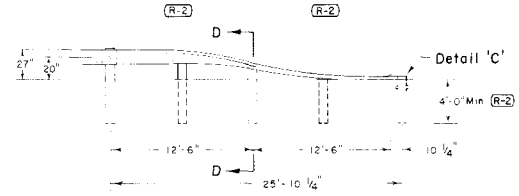


CUT TO FILL CONDITION

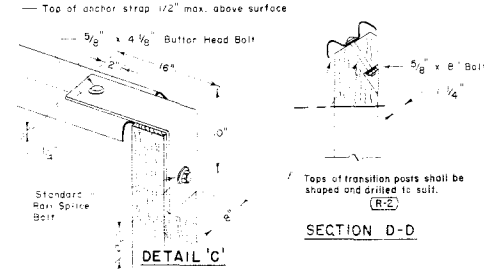




NOTE: Flare side ditch, as shown in Section 2-2 above, where practicable.



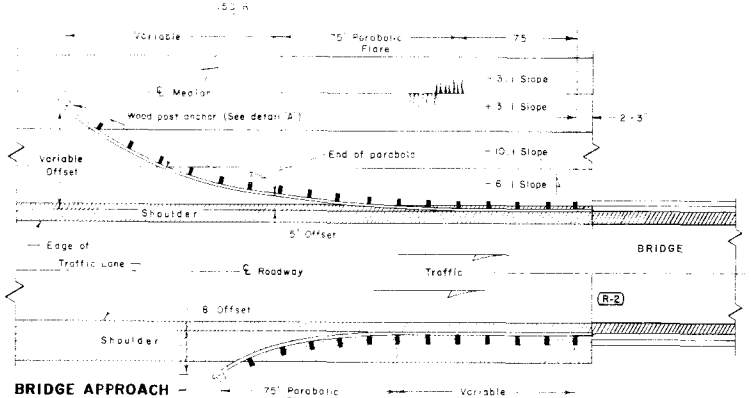
ELEVATION



DETAIL 'C'

SECTION D-D

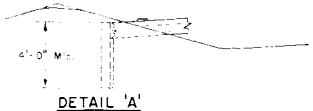
ALTERNATE END TREATMENT - 90° TWISTED BEAM



BRIDGE APPROACH - MEDIAN WIDER THAN 60' IN CUT (R-2)

(R-2)
Medians wider than 60' in fill — Treat as separate roadways with Guard Rail on both sides.

GUARD RAIL END TREATMENT



DETAIL 'A'
WOOD POST ANCHOR

DETAIL 'B'

MULTI-LANE WITH SEPARATE BRIDGE STRUCTURES (R-2)

Note:
Where elevations of paved shoulders differ by more than 2', Guard Rail shall be set as for separate roadways

REVISIONS			
(R-1)	6-26-67	Added note for 2-lane, Ditch flare.	M.R.H.
(R-2)	9-1-67	Bridge Approach, End Treatment	R.S.M.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

GUARD RAIL
TYPE 3

Designed by M.R.H.
Made by R.S.M.
Checked by R.S.M. Date: MAY 26, 1967

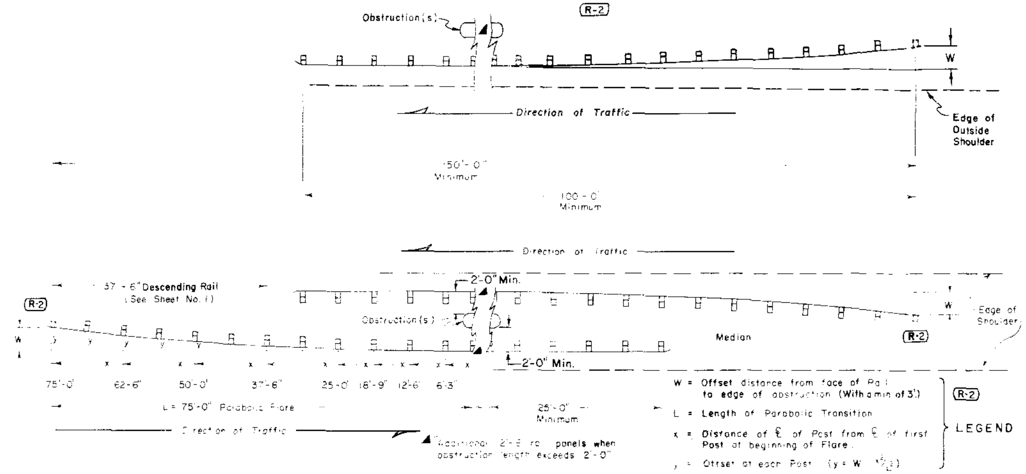
Approved by
Staff Design Engineer

STANDARD M-606-AA

(MAY 26, 1967)
(SHEET 3)

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO	SHEET NO	TOTAL SHEETS
9	COLORADO			

REVISIONS:
(R-2) 8-1-67 Guard Rail for Obstr. & Medians R.S.M.



Obstruction(s)
(R-2)
W
Direction of Traffic
Edge of Outside Shoulder
50'-0" Minimum
100'-0" Minimum
Direction of Traffic
37'-6" Descending Rail (See Sheet No. 1)
2'-0" Min.
Obstruction(s)
Edge of Shoulder
Median
2'-0" Min.
75'-0" 62'-6" 50'-0" 37'-6" 25'-0" 18'-9" 12'-6" 6'-3"
L = 75'-0" Parabolic Flare
25'-0" Minimum
Direction of Traffic
Additional 12'-6" rail panels when obstruction length exceeds 2'-0"

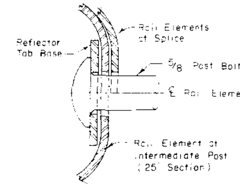
W = Offset distance from face of Rail to edge of obstruction (With a min. of 3') (R-2)
L = Length of Parabolic Transition
x = Distance of ℄ of Post from ℄ of first Post at beginning of Flare.
y = Offset at each Post (y = W x²/L²)

LEGEND

TYPICAL GUARD RAIL FOR OBSTRUCTIONS

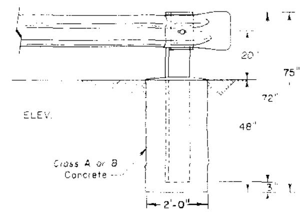
NOTE: Flared end as shown is for approaching traffic. If protection is for traffic from both directions, the 75-foot flare shall be on both ends.

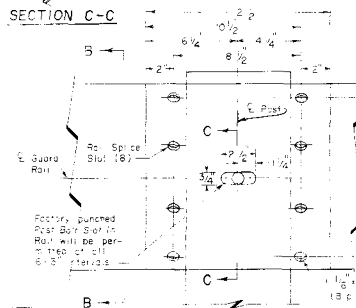
(R-2)



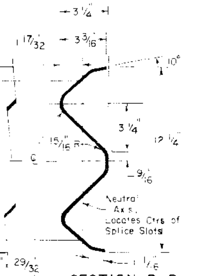
SECTION C-C

EXIT END ANCHOR (Concrete)

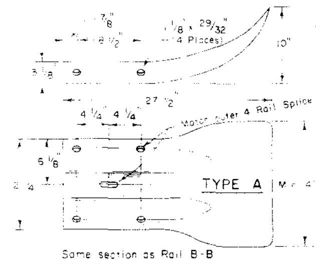


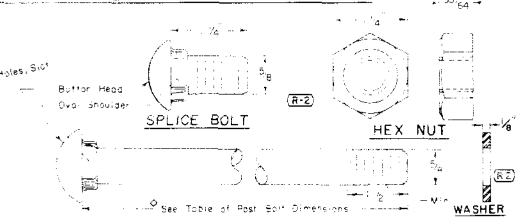


DETAIL OF RAIL SPLICE (Reflector Tab, Bolts Not Shown)



SECTION B-B





SPLICE BOLT

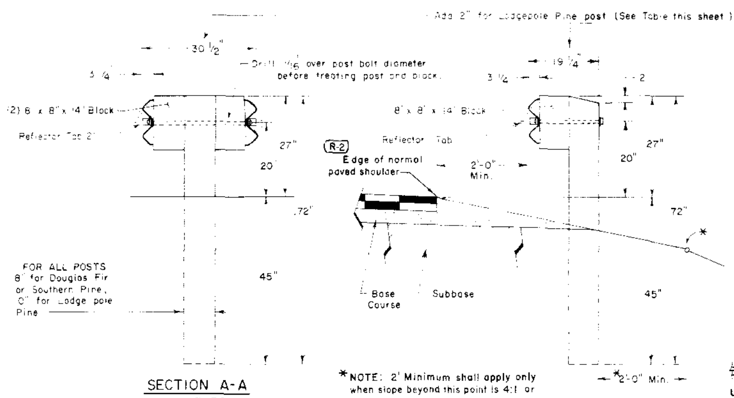
HEX NUT

WASHER (Post Bolt)

DETAIL OF POST BOLT AND SPLICE BOLT FOR GUARD RAIL

TYPE POST		BOLT SIZE
8" (8" 8" 8")	Double Rail	5/8" x 25 3/4"
8" (8" 8")	Single Rail	5/8" x 17 1/2"
Lodgepole Pine		
8" (8" 10" 8")	Double Rail	5/8" x 27 3/4"
8" (8" 10")	Single Rail	5/8" x 19 1/2"
Number Splice Bolts Required: 8 per Splice or 'B' Terminal, 4 per 'A' or 'C' Term.		

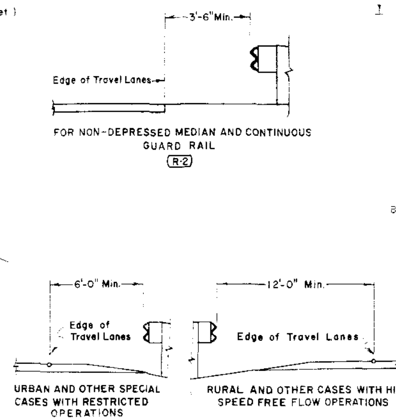
◇ TABLE OF POST BOLT DIMENSIONS



Add 2" for Lodgepole Pine post (See Table this sheet)
30 1/2"
Drill 1/16 over post bolt diameter before treating post and block.
19 1/4"
(2) 8" x 8" x 14" Block
Reflector Tab 2"
27"
20"
72"
FOR ALL POSTS 8" for Douglas Fir or Southern Pine, 10" for Lodgepole Pine
45"
8" x 8" x 14" Block
(R-2)
Reflector Tab
Edge of normal paved shoulder
2'-0" Min.
27"
20"
72"
Base Course
Subbase
45"
2'-0" Min.

SECTION A-A
DOUBLE BEAM

*NOTE: 2' Minimum shall apply only when slope beyond this point is 4:1 or steeper.

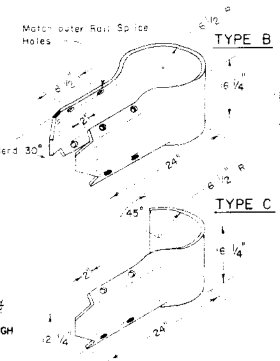


3'-6" Min.
Edge of Travel Lanes
FOR NON-DEPRESSED MEDIAN AND CONTINUOUS GUARD RAIL
(R-2)
6'-0" Min.
Edge of Travel Lanes
12'-0" Min.
Edge of Travel Lanes
URBAN AND OTHER SPECIAL CASES WITH RESTRICTED OPERATIONS
RURAL AND OTHER CASES WITH HIGH SPEED FREE FLOW OPERATIONS

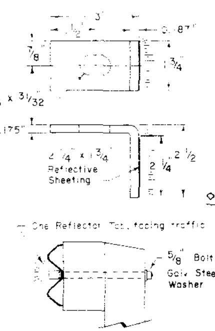
FOR INTRODUCED GUARD RAIL IN MEDIAN

(R-2)

TYPICAL POST INSTALLATIONS



DETAILS OF TERMINAL SECTIONS



INSTALLATION DETAILS OF REFLECTOR TAB

Reflector Tab shall be furnished and installed with Guard Rail.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

GUARD RAIL
TYPE 3

Designed by M.R.H.	Approved by [signature] Staff Design Engineer
Made by JJB by [initials]	
Checked by R.S.M.	Date MAY 26, 1967

STANDARD M-607-A

(SHEET 1 OF 2 SHEETS)

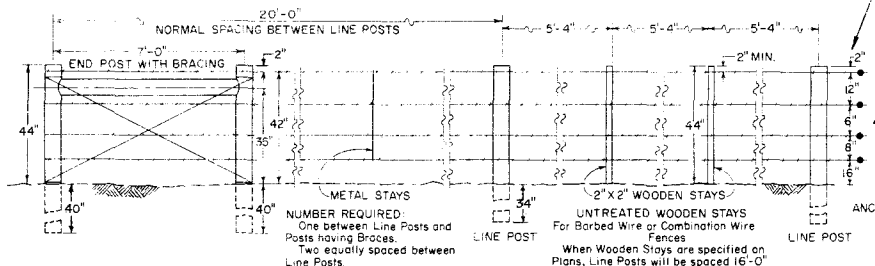
(JULY 1, 1965)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS			
(R-1)	8-2-66	Vertical Dimensions and Note	M.R.H.
(R-2)	12-8-66	Vert. Dims., Std. and Alternate	M.R.H.

BARBED WIRE FENCE WITH WOODEN POSTS

(R-1)

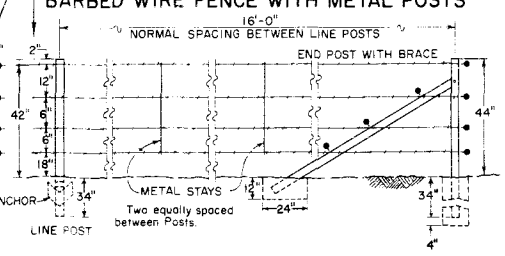


(R-2) STANDARD INSTALLATION

(R-2) ALTERNATE
(For blow-sand and tumbleweed areas, if desired by landowner.)

BARBED WIRE FENCE WITH METAL POSTS

(R-1)



CROSS BRACE DOWELING DETAIL

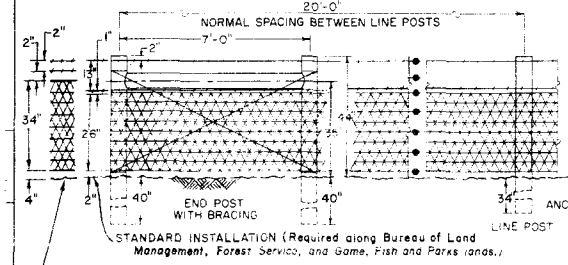
Bore a 3/8" X 2" Hole in each Post and Brace to receive the Pins. Wrap the ends of the Braces tightly with several turns of #21/2 ga. smooth Galv. Wire to prevent splitting or Notch Post and Nail with 40 d Common Nails.

(R-1) NOTE:
See Sheet 2 for General Notes.

COMBINATION WIRE FENCE WITH WOODEN POSTS

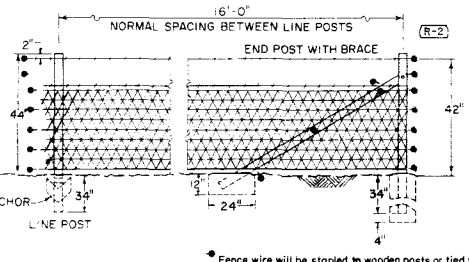
(R-1)

(R-2) (R-2)



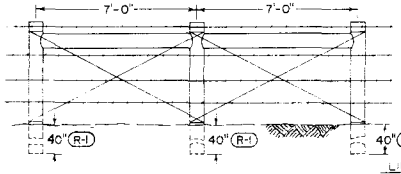
COMBINATION WIRE FENCE WITH METAL POSTS

(R-1)

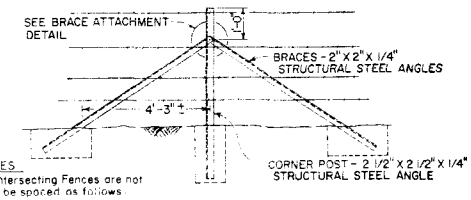


● Fence wire will be stapled to wooden posts or tied to metal posts as shown marked ● on barbed wire or combination wire fence details.

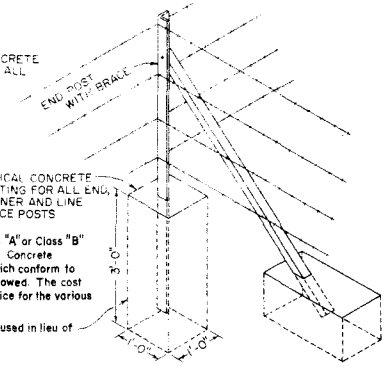
LINE BRACES



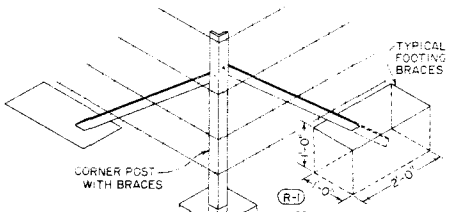
When Gates, Angles, Corners or Intersecting Fences are not specified therein, Line Braces shall be spaced as follows:
Metal Posts - 500' intervals.
Wooden Posts - 1,400' intervals.



TYPICAL INSTALLATION AT FENCE INTERSECTIONS

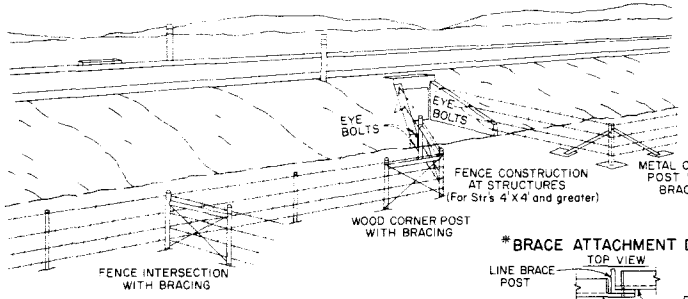


TYPICAL CORNER POST INSTALLATION



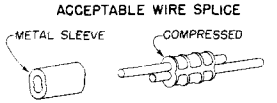
(R-1) NOTE:
Footings or Bases shall be of Class "A" or Class "B" Concrete and shall have crowned tops. Concrete containing light weight aggregates which conform to ASTM Designation C 330 will be allowed. The cost involved shall be included in the Bid Price for the various type Posts.
1' Diameter Circular Holes may be used in lieu of Square Holes.

ILLUSTRATIVE SKETCH SHOWING TYPICAL EXAMPLES FOR CONSTRUCTING FENCES



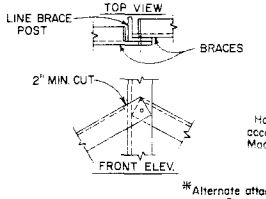
NOTE:
At all structures of 4'x4' and over, the fence shall be ended at eye-bolts in the wings of the structure. Where the type of structure prohibits the use of eye-bolts, an end post with brace shall be used.
Eye-bolts shall be made of 1/2" round bars with a minimum of six (6) inches of body length embedded in the concrete and a minimum of 1" inside eye diameter.
Eye-bolts shall be furnished and installed by the Contractor. Cost of eye bolts will be included in the contract price for fencing.

ACCEPTABLE WIRE SPLICE

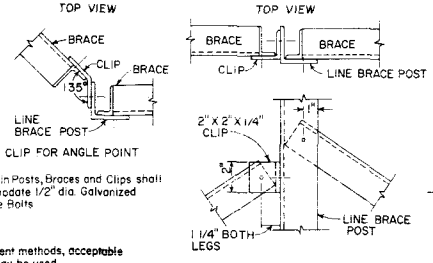


Splicing Sleeve shall be approved by the Engineer

*BRACE ATTACHMENT DETAIL



*ALTERNATE BRACE ATTACHMENT DETAIL

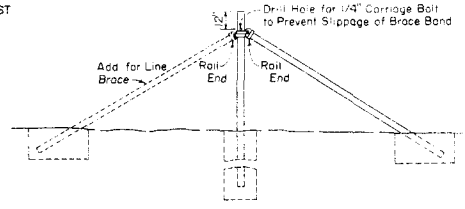


Holes in Posts, Braces and Clips shall accommodate 1/2" dia. Galvanized Machine Bolts

*Alternate attachment methods, acceptable to the Engineer, may be used.

ALTERNATE POST

(FOR END, CORNER OR LINE BRACE POSTS)



DEPARTMENT OF HIGHWAYS STATE OF COLORADO WIRE FENCES AND GATES

(R-1)

Designed by	L. E. O.	Approved by	
Made by	T. E. F.	Staff Des. Engr.	
Checked by	L. E. O.	Date:	July 1, 1965

STANDARD M-607-A

(SHEET 2)

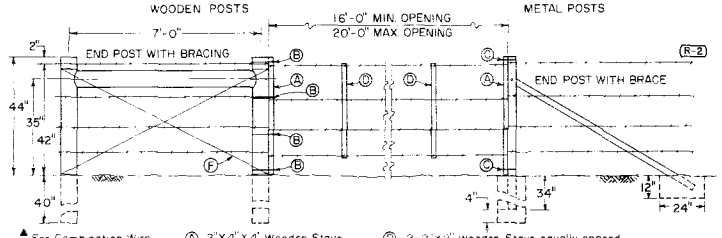
(JULY 1, 1965)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLO.		

REVISIONS

R-1	8-2-66 Vert. Dims. & Gen'l. Notes	M.R.H.
R-2	12-8-66 Vert. Dims., Std. and Alternate	M.R.H.
R-3	2-6-67 Gate and General Notes	M.R.H.

▲BARBED WIRE GATE (R-1)



▲ For Combination Wire Gate use 34" Mesh and (R-1) 1 strand of Barbed Wire. Extend Wooden Stays to Ground.

Ⓐ 2"X4"X4' Wooden Stays.

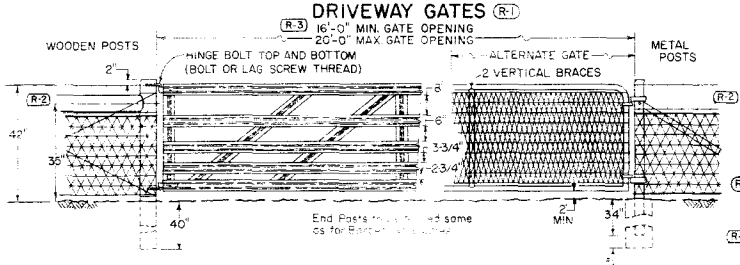
Ⓑ 4 - No. 12 1/2 Ga. Wire Loops to act as Hinges.

Ⓒ No. 12 1/2 Ga. Wire Loops.

Ⓓ 2-2"x2" wooden Stays equally spaced.

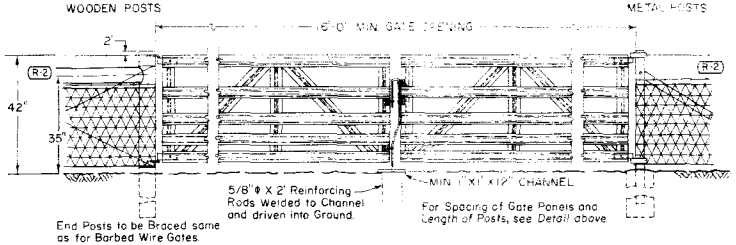
Ⓕ No. 12 1/2 Ga. Brace Wire.

DRIVEWAY GATES (R-1)



End Posts to be Braced same as for Barbed Wire Gates

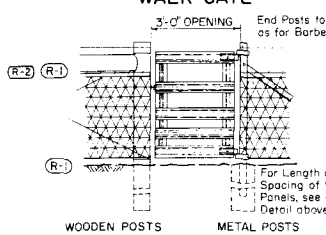
TWIN DRIVEWAY GATES (R-1)



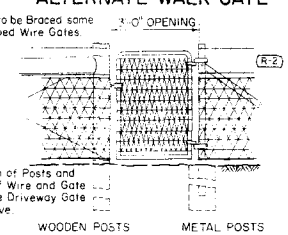
End Posts to be Braced same as for Barbed Wire Gates.

For Spacing of Gate Panels and Length of Posts, see Detail above.

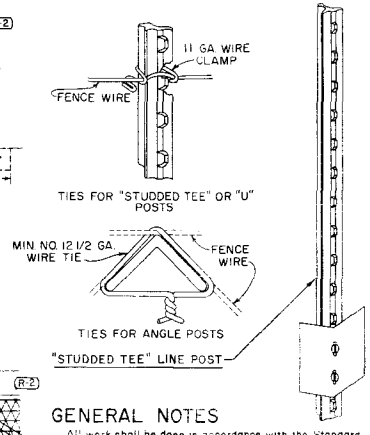
WALK GATE



ALTERNATE WALK GATE



FENCE WIRE TIES



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the Project.

(R-1) **At each location where an electric transmission, distribution or secondary line crosses a wood post fence the Contractor shall furnish and install a ground conforming to Section 9 of the National Electric Safety Code.**

(R-2) Dimensions shown for "Standard" and "Alternate" apply for both wooden and metal post fence.

Fence wire shall be ended, double wrapped and tied off at end posts, angle posts and line brace posts. Fence to be continued straight over be integrated in like manner.

Fence wire to be placed on either road or field side of posts depending on local conditions, i.e. on curves the wire should be placed on the side of the post which would prevent tension on fence ties. This will also apply where wind drift, tumble weeds or other conditions would exert unusual pressure against the wire.

WOOD POSTS:

All line posts shall have a min dia. of four (4) inches & be 6'-6" long.

All end, corner, intersection and brace posts shall have a minimum diameter of five (5) inches and be 7'-0" long.

Fence wire will be stapled to wooden posts or tied to metal posts as shown marked ● on barbed wire or combination wire fence details. Staples shall be No. 9 wire min. at least 1 1/2 inches long & shall be galvanized.

METAL POSTS:

All posts and braces shall be of the types and weights shown or acceptable equivalents.

Holes to be provided in end, corner and gate posts as detailed.

CORNER POSTS:

Type - 2 1/2" X 2 1/2" X 1/4" Structur. Steel Angles.
Weight - 3.81 lbs./Lin. ft. Min.
Length - 6'-6" Min.
No. of Braces - 2

LINE POSTS:

Type - "Studded Tee" or "U"
Weight - 1.28 lbs./Lin ft. Min. (without Anchor)
Length - 6'-6" Min.
Anchor - Securely fastened, with bearing surface sufficient to resist movement of post. Weight - 0.57 lb. Min.

END POSTS:

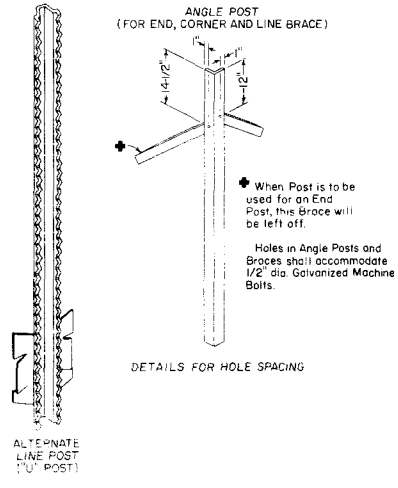
Type - 2 1/2" X 2 1/2" x 1/4" Structural Steel Angles.
Weight - 3.81 lbs./Lin. ft. Min.
Length - 6'-6" Min.
No. of Braces - 1

BRACES: (For Corner, End or Line Brace Posts)

Type - 2" X 2" X 1/4" Structural Steel Angles.
Weight - 3.08 lbs./Lin. ft. Min.
Length - Same as corner and end posts used.

Posts shall meet requirements of Par. 4.5 of U.S. Dept. of Commerce Commercial Standard 184-51. Acceptable material includes re-rolled railroad rails.

TYPICAL METAL POSTS

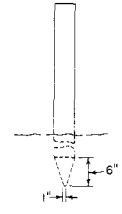


✚ When Post is to be used for an End Post, this Brace will be left off.

Holes in Angle Posts and Braces shall accommodate 1/2" dia. Galvanized Machine Bolts.

DETAILS FOR HOLE SPACING

POST POINTING DETAILS



Where field conditions permit, Wooden Posts may be pointed and driven in lieu of setting and tamping, at the option of the Contractor. Pointing shall be in conformity *with details shown at left.* Driving methods shall not damage Post.

ALTERNATES

END, CORNER AND LINE BRACE POSTS:

Type - 2 1/2" Std. Galvanized Pipe.
Weight - 3.65 lbs./Lin. ft. Min.

BRACES:

Type - 1 3/8" OD Tubular Steel with 2 1/2" Brace Band, Hinge Bolt and 1 3/8" I.D. Rail End, all Galvanized
Weight - 1.6 lbs./Lin. ft. Min.
Length - 6'-6" Min.

(R-1) BARBED WIRE:

Steel barbed wire shall conform to ASTM Designation A 121, 12 1/2 Gauge with Class I coating.

Aluminum barbed wire shall conform to ASTM Designation B 211, with alloy 5052-0 for the line wire and alloy 5052-H38 for the barbs.

4 x 4" WIRE MESH:

Wire mesh used in combination wire fence as shown shall be galvanized and conform to the following:

	STANDARD	ALTERNATE
(R-3) (R-2) Width	26"	34"
Weight - Lbs/Lin.Ft.Min.	0.54	0.76
Horizontal Wires	2 Strands, No. 12 1/2 gage.	
Cross Wires	1 Strand, No. 14 gage.	

Fabrication: cross wires to be woven with horizontal wires making a one piece fabric.

GATES:

DRIVEWAY GATES:

(R-3) Height - approximately 42" (5 panels) --- Width of gate opening - 16'-0" Min.
(R-1) Weight - Galvanized Steel, 75 lbs. Min. --- Tempered Aluminum, 45 lbs. Min.
① Gates to be of Riveted construction as follows: Min. 4 No. 10 rivets at each right angle connection and where diagonal braces connect to horizontal panels; Min. 3 No. 10 rivets where diagonal braces connect to top and bottom panels.

ALTERNATE DRIVEWAY GATES:

Height - 42"
(R-1) Weight - Not less than 90 lbs. complete with latch and hinges.
Width of gate opening - 16'-0"
Gate Frame - 1" I.D. Standard Galvanized Pipe or acceptable equivalent and shall be of all welded construction.
Mesh to be of same construction as shown for 4" x 4" wire mesh except it shall be 2" x 4" mesh 42" high.

① WALK GATES:

Height - approx. 42" (5 panels)
(R-1) Weight - {Galvanized Steel, 16 lbs. Min. / Tempered Aluminum, 10 lbs. Min.
Width of gate opening - 3'-0"

ALTERNATE WALK GATES:

Height - 42"
(R-1) Weight - Not less than 18 lbs. complete with latch and hinges.
Width of gate opening - 3'-0"
Gate Frame - 3/4" I.D. Standard Galvanized Pipe or acceptable equivalent and shall be of all welded construction.
Mesh to be of same construction as shown for Driveway Gate.

Alternate equivalent standard metal gates other than shown will be acceptable subject to the Engineer's approval.

In lieu of galvanized finish on gate frames, Cadmium Plated pipe or Aluminum painting will be considered to be equivalent.

LATCHES AND HINGES:

Galvanized steel or Aluminum of standard make.

Hinges shall be placed as shown, to prevent theft.

In lieu of standard make latches it will be permissible to use an electro-galvanized chain, eyebolt and snaphook type latch. Eyebolt, chain and snaphook assembly to be secured to latch side of gate. Gate closure effected by wrapping chain around end post and snapping hook into chain.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
WIRE FENCES
AND
GATES
(R-1)

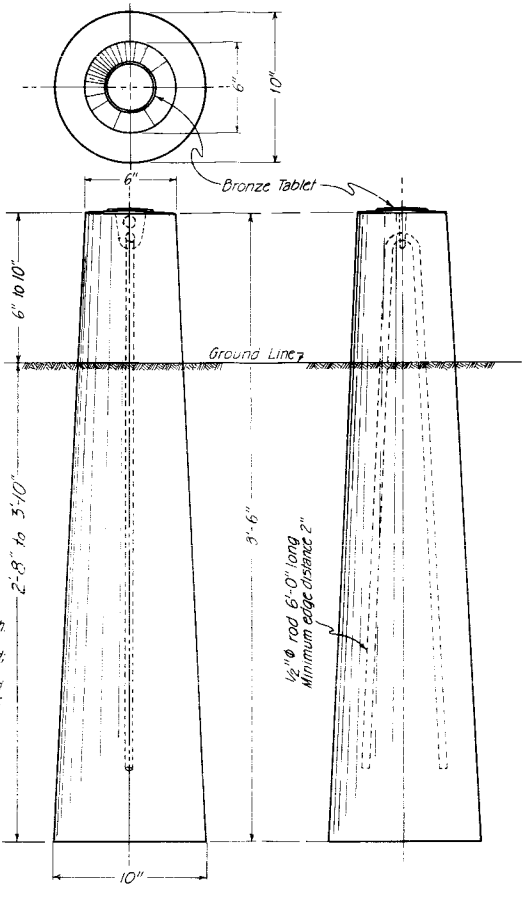
Designed by L.E.O. | Approved by
Made by T.E.F. | Staff Des. Engr.
Checked by E.E.O. | Date: July 1, 1965

RIGHT OF WAY MARKER POST STANDARD M-612-A

(JULY 1, 1965)

FEDERAL ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS			
R-1	5-2-66	R.O.W. Marker Note	M.R.H.



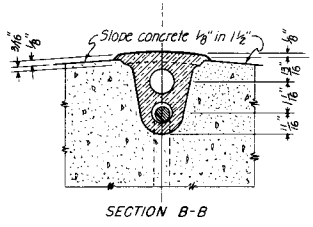
NOTES FOR R.O.W. MARKER POSTS

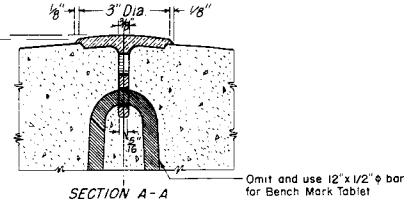
All work shall be done in accordance with the Standard Specifications applicable to the project.

Posts shall be made of class 'A' Concrete. The upper 12 inches of marker posts shall be rubbed free of form marks, and the top surface of the post must be constructed to drain thoroughly.

(R-1) Light weight aggregate conforming to ASTM Designation C-330 will be allowed.

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. Information on the bronze tablet indicated by pin lines is to be stamped in field by the engineering party after post is placed; 3/16 inch letters and figures to be used. Project designations on tablets shall be properly shown. (i.e., I for Fed. Aid Interstate, F for Fed Aid Primary, S for Fed. Aid Secondary, etc & C for State Projects. see detail below.)





DETAIL OF BRONZE TABLET
FOR RIGHT OF WAY MARKER POST AND BENCH MARK

BENCH MARK

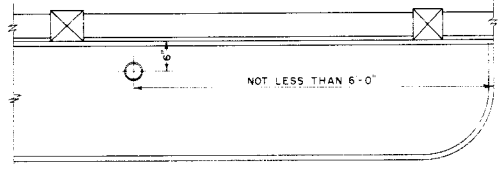
All work shall be done in accordance with Standard Specifications applicable to the project.

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. Information on the bronze tablet indicated by pin lines is to be stamped in field by the engineering party after marker is placed. 3/16 inch letters and figures to be used. Project designation on tablets shall be properly shown (i.e.; I for Fed. Aid Interstate, F for Fed. Aid Primary, S for Fed. Aid Secondary, etc. & C for State Projects. See details below).

Bronze Bench Mark Tablets will be furnished by the Department at no expense to the Contractor.

Installation of Bronze Bench Mark Tablets will not be paid for directly, but shall be included in the price bid for Concrete

Note. Where 2'-0" safety curbs are not used place marker in center of curb



PLAN

ELEVATION

One marker to be placed on Bridges as shown. The station shown on marker shall be the center-line stationing directly opposite the marker

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

MARKER POSTS
AND
BENCH MARKS

Designed by R.E.L.	Approved by L.C. Olson
Made by E.E.O.	Staff Design Engr.
Checked by R.E.L.	Date: July 1, 1965

STANDARD M-612-C

(SHEET 1 OF 2 SHEETS)

JULY 1, 1965

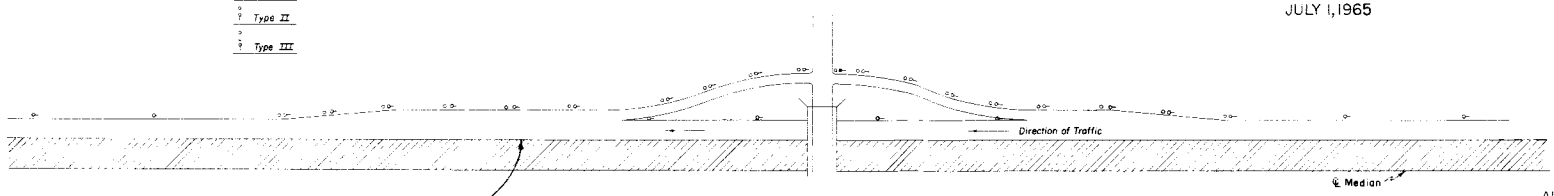
FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS

? Type I

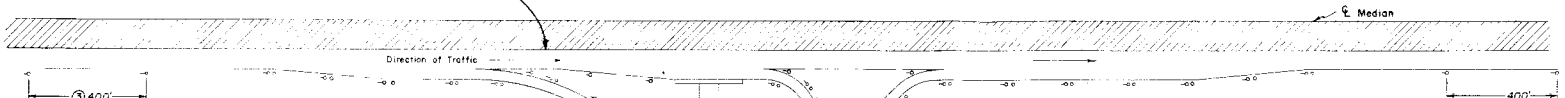
? Type II

? Type III



Typical Installation for Diamond Interchange.

EDGE OF PAVED SHOULDER



③ Interstate spacing

Typical Installation for Cloverleaf Interchange.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

See tabulation in plans for delineator post requirements.

Spacing between Posts on acceleration and deceleration lanes and on relatively straight portions of interchange ramps shall be 100' on Interstate and 200' on Primary and Secondary Projects. Spacing between Posts on the outside of interchange ramp curves shall be as indicated in table for the appropriate degree of curve with a 24' min. spacing. Post spacing in advance and beyond curve shall not apply to ramp curves.

Posts shall meet requirements of Par. 4.5 of U.S. Dept. of Commerce Commercial Standard 184-51. Acceptable material includes re-rolled railroad rails.

When normal delineator spacing falls on a road approach or crossroad, move delineator either direction a distance not to exceed 1/4 normal spacing.

Type, location and spacing of delineators for tunnels and snow sheds shall be as directed by the Engineer.

Delineator Posts are not to be placed along Frontage Roads.

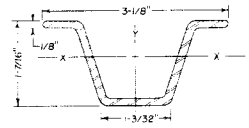
Color of Posts shall be Interstate Green.

SECTION OF U-2 POST

Dimensions shown are approximate. U-2 Post to weigh ● 2 Lbs./Ft.

Alternate post acceptable if section modulus is at least 0.200 in.³ about X-X axis or at least 0.250 in.³ about Y-Y axis.

● A mill tolerance of minus 3 1/2% of the weight of any one post will be allowed.

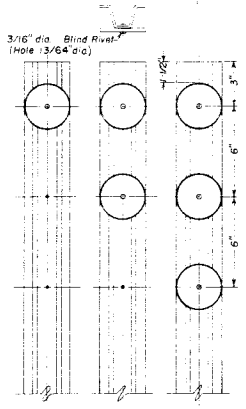


SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

DEGREE OF CURVE	RADIUS	① ② SPACING ON CURVE	① SPACING IN ADVANCE OF AND BEYOND CURVE			DEGREE OF CURVE	RADIUS	① ② SPACING ON CURVE	① SPACING IN ADVANCE OF AND BEYOND CURVE		
			FIRST SPACE	SECOND SPACE	THIRD① SPACE				FIRST SPACE	SECOND SPACE	THIRD① SPACE
		FEET	FEET	FEET	FEET			FEET	FEET	FEET	FEET
0°30'	11460.0'	200	200	200	200	8°00	716.3'	52	94	156	200
1°00	5730.0'	151	200	200	200	8°30'	674.1'	50	90	150	200
1°30'	3820.0'	123	200	200	200	9°00'	636.7'	48	86	144	200
2°00'	2865.0'	106	191	200	200	9°30'	603.2'	47	85	141	200
2°30'	2292.0'	95	171	200	200	10°00'	573.0'	46	83	138	200
3°00'	1910.0'	86	155	200	200	10°30'	545.7'	45	81	135	200
3°30'	1637.1'	80	144	200	200	11°00'	520.9'	43	77	129	200
4°00'	1432.5'	74	133	200	200	11°30'	498.3'	42	76	126	200
4°30'	1273.3'	70	126	200	200	12°00'	477.5'	41	74	123	200
5°00'	1146.0'	66	119	198	200	15°00'	382.0'	36	65	108	200
5°30'	1041.8'	63	113	189	200	18°00'	318.3'	33	59	99	198
6°00'	955.0'	60	108	180	200	21°00'	272.9'	30	54	90	180
6°30'	881.5'	58	104	174	200	25°00'	229.2'	27	49	81	162
7°00'	818.6'	55	99	165	200	30°00'	191.0'	24	43	72	144
7°30'	764.0'	53	95	159	200						

② $S = 2\sqrt{R-50}$ 1-ST. SPACE = 1.8S 2-ND. SPACE = 3S 3-RD. SPACE = 6S
NO SPACES TO EXCEED 200 FT.

① Omit third space on Secondary and Primary Routes and double the distance on the curve and in advance of and beyond curve. For curves less than 2 degrees on Interstate through roadways use Interstate tangent spacing.

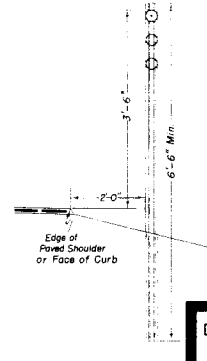


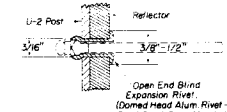
TYPE I
1-3" dia. Crystal Reflector on U-2 Post

TYPE II
2-3" dia. Yellow Reflectors on U-2 Post

TYPE III
3-3" dia. Yellow Reflectors on U-2 Post

Min. 3 holes in all posts required as shown.

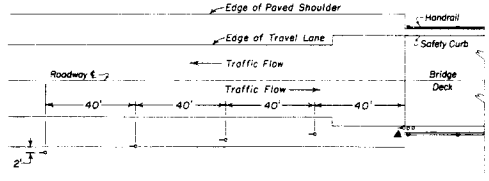




DETAIL
RIVETING REFLECTOR TO POST

Typical Installation at Bridge Approaches

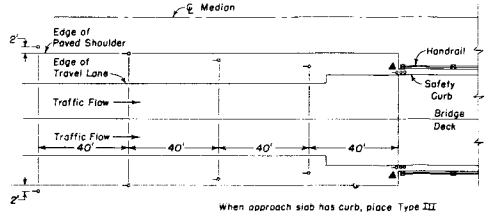
Two Lane - Two Way Traffic



▲ Where curb to curb width of bridge is equal to or greater than roadway width plus usable shoulder width, use this delineator only and omit all others.

Note: Where guard rail is present, place delineators outside of guard rail and at height which will permit clear view of all three Delineator buttons.

Multilane Divided



When approach slab has curb, place Type III delineator immediately behind curb.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DELINEATORS

Designed by CKM	Approved by E Bauer
Made by WNC	Staff Design Engr.
Checked by LEO	Date: July 1, 1965

STANDARD M-612-C

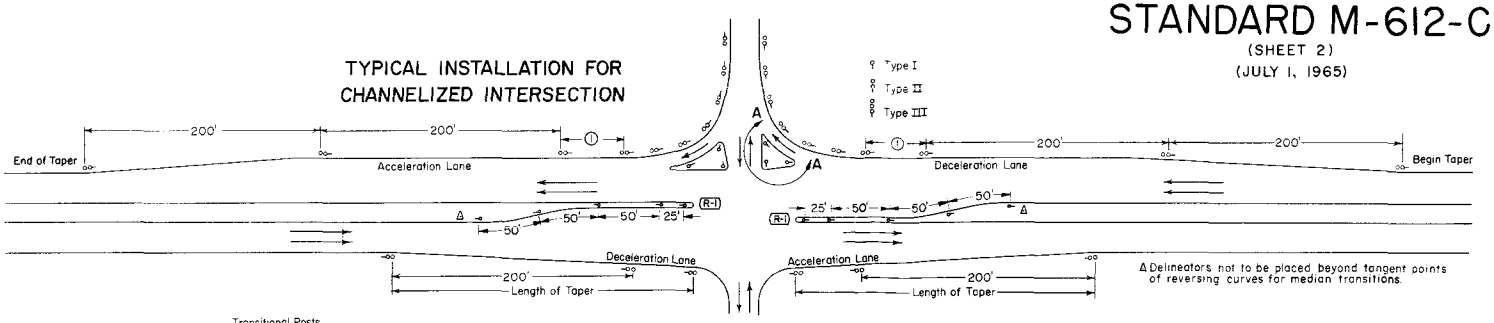
(SHEET 2)

(JULY 1, 1965)

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
R-1	5-4-67	Median and Island Delineators	M.R.H.

TYPICAL INSTALLATION FOR CHANNELIZED INTERSECTION



GENERAL NOTES

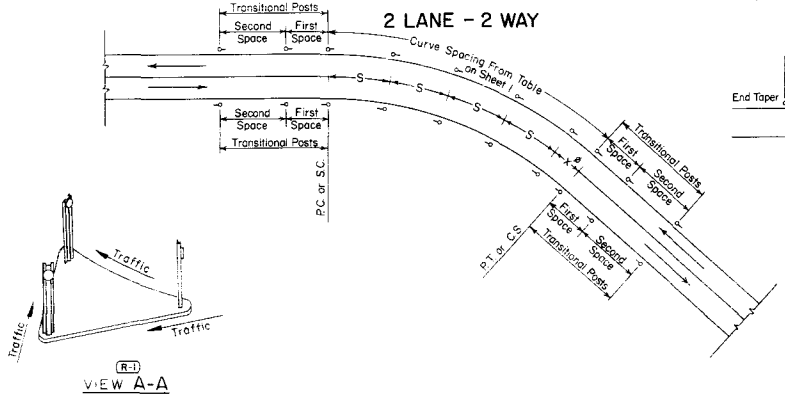
For Radii greater than 200 Feet, use spacing from Table included on Sheet 1 of this Standard.

For additional General Notes, see Sheet 1 of this Standard.

Place face of button at 90° to ℄ of roadway.

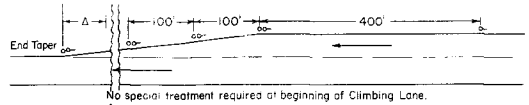
Lengths of speed change lanes including tapers shall be as shown on plans.

2 LANE - 2 WAY



VIEW A-A

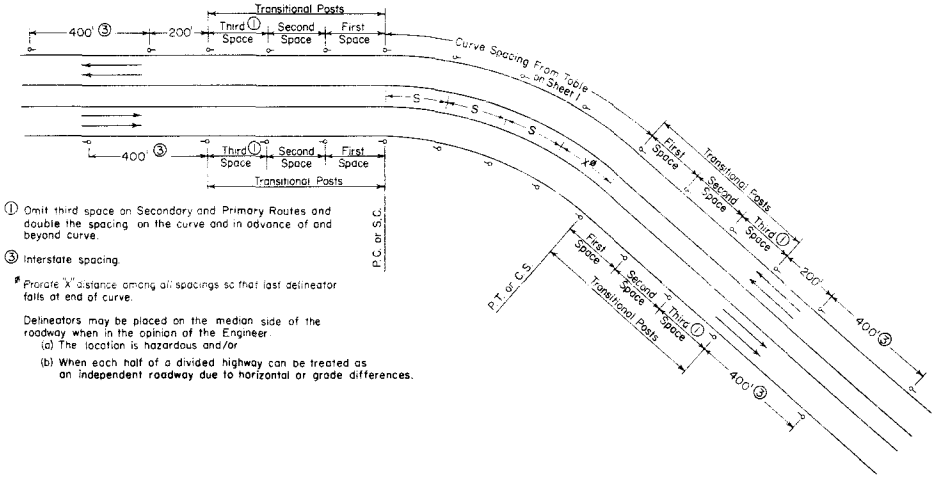
TYPICAL INSTALLATION FOR CLIMBING LANE TRANSITION



No special treatment required at beginning of Climbing Lane.

Δ Last space variable, not to exceed 100'

4 LANE DIVIDED (INTERSTATE)



① Omit third space on Secondary and Primary Routes and double the spacing on the curve and in advance of and beyond curve.

③ Interstate spacing.

Prorate "X" distance among all spacings so that last delineator falls at end of curve.

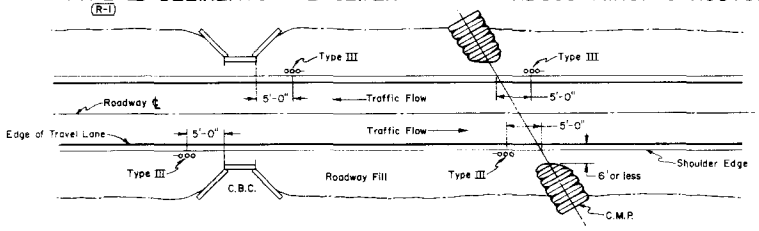
Delineators may be placed on the median side of the roadway when in the opinion of the Engineer.

(a) The location is hazardous and/or

(b) When each half of a divided highway can be treated as an independent roadway due to horizontal or grade differences.

TYPE III DELINEATOR PLACEMENT AT HAZARDOUS MINOR STRUCTURES

R-1



Type III Delineators shall be placed as shown to mark hazardous ends of culverts and other minor structures. These structures are considered hazardous when the exposed barrel of the culvert or the roadway side of headwall or box is 6' or less from the edge of travel lane.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DELINEATORS

Designed by C.K.M.	Approved by R.E. Olsen
Made by T.E.F.	Staff Design Engr.
Checked by L.E.O.	Date: July 1, 1965

STANDARD M-614-A

(JULY 1, 1965)

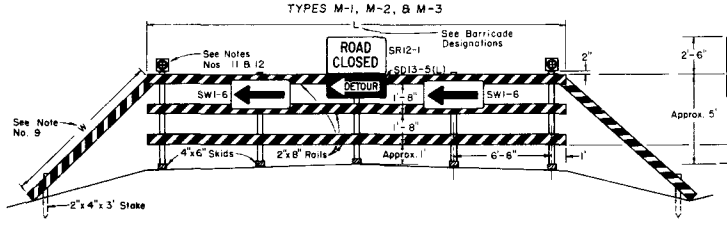
FEDERAL ROAD REGION NO.	DISTRICT	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		

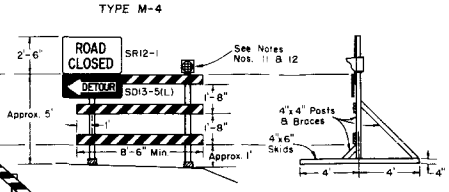
CLASS I BARRICADES (3 RAILS)

MOVABLE

TYPES M-1, M-2, & M-3

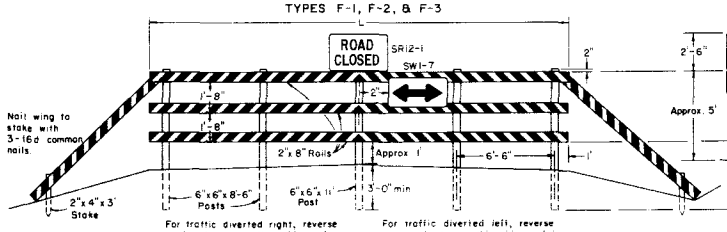


TYPE M-4

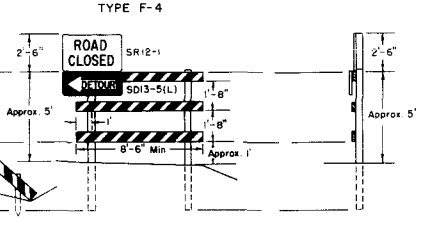


FIXED

TYPES F-1, F-2, & F-3



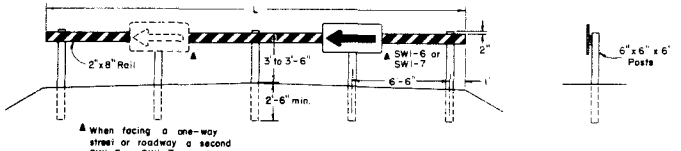
TYPE F-4

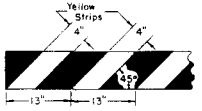


CLASS II BARRICADE (1 RAIL)

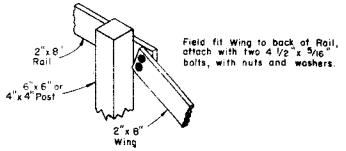
FIXED

TYPE F-6

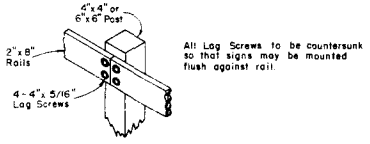




DETAIL OF RAIL AND WING STRIPING

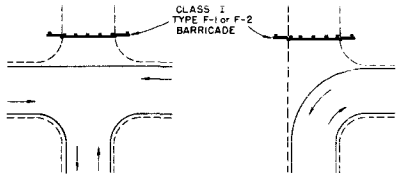


REAR VIEW OF BARRICADE SHOWING WING ATTACHED (See Note No. 9)

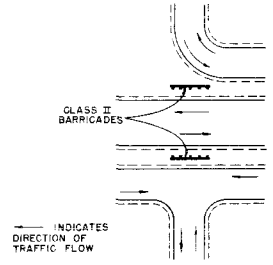


METHOD OF ATTACHING PLANKING TO POSTS AT JOINTS

SITUATION A



SITUATION B



SITUATION C

GENERAL NOTES

1. All work shall be done in accordance with the Standard Specifications applicable to the Project.
2. All signs and sign materials shall conform to the standards set forth in the "Manual on Uniform Traffic Control Devices for All Classes of Streets and Highways" published by the Department of Highways and this standard.
3. The various types and combinations of approved Signs and Beacons for Barricades required for each project shall be governed by field conditions and subject to approval by the Engineer. All traffic controls shall be placed for best visibility and legibility and maintained in good condition at all times. Oversigning is to be avoided.
4. Painting shall conform with Subsection 508.08 of the Standard Specifications. All skids, braces, and posts shall be painted with 2 coats of "Exterior Black Paint." Planking and wings on all barricades shall be painted with 2 coats of "Exterior Black Paint" on all sides before adding reflective strips. Reflective strips shall be "cut from smooth surface yellow reflective sheeting" of a type approved by the Department.
5. Each barricade rail shall be striped on the face side only with reflective yellow strips slanting downward at a 45° angle toward the side to which traffic is to turn or pass. See "DETAIL OF RAIL AND WING STRIPING."
6. When barricades are designated on plans the portion of the posts below ground line shall either be dipped in or painted with hot creosote oil. The portion of the post above ground line shall be painted with 2 coats of "Exterior Black Paint."
7. All skids, braces, and posts shall be nailed together with No. 20d nails. All screws, bolts, nuts, and washers shall be galvanized or cadmium plated. Skids (bases) of movable barricades shall be weighted where necessary to provide stability.
8. All timber used shall conform to the Standard Specifications for Miscellaneous Untreated Timber S4S. Timber shall conform to Construction grade Paragraph 1238 or 1258 of Standard No. 15 Grading & Dressing Rule for West Coast Douglas Fir (1956) or Dense Structural 58 and LL Structural 58 Paragraph 284 or 285 of 1956 Grading Rules for Southern Pine.
9. Detachable extension wings for bypassing of construction equipment are permitted. "W" is variable, length shall be adequate to provide closing of borrow pit and/or shoulder as required.
10. Alternate materials or other reflective elements on Traffic signs or Barricades will be permitted only after approval of such material by the Department in writing.
11. A Flashing Beacon for use on Barricades is a section of a standard traffic signal head or a similar-type device having a yellow lens in the face, which is illuminated by intermittent flashes. Where commercial power is not available, the beacon may be adapted to operate from storage batteries. Each signal unit lens shall have a visible diameter of not less than 8 inches. Each unit complete shall be of such design as to render the lens when illuminated clearly visible to traffic facing the signal at all distances up to 1000 feet under all atmospheric conditions except dense fog. The color of the yellow lens for caution shall be in accordance with Technical Report No. 1 of the Institute of Traffic Engineers. All beacon flashers shall be equipped with filters for suppression of radio interference. The illuminating element in a flashing yellow beacon shall be flashed at a rate of not less than 50 times nor more than 60 times per minute. The illuminated period of each flash shall be not less than half and not more than two-thirds of the total cycle. The use of Flashing Beacons will be governed by field conditions. Flashing Beacons when warranted generally should be operated continuously throughout the 24 hours of the day. Warrant for Flashing Beacons may be found in Sec. 3G of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).
12. Flashers are portable, power-operated, lens-directed, enclosed lights, illuminated by rapid intermittent flashes of short duration. Flashers may be used in connection with barricades when approved by the Engineer. An array of random flashers which tends to obscure rather than delineate the traveled way will not be permitted. The use of flashers on a job will be governed by Sec. 5D of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision). The color of the light emitted by a flasher shall be yellow.
13. Flashing Beacons and Flashers, when used, shall be positioned above the top rail of the barricades to produce the most effective results.
14. Barricades used as "Traffic Controls for Highway Construction" are not to be paid for separately.
15. *Barricades will be paid for separately when designated on plans as bid items.*
16. For additional general information on control of traffic through work areas refer to the "Manual on Uniform Traffic Control Devices for Streets and Highway", Part V, published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).

BARRICADE DESIGNATIONS

Class	Type		Roadway Width	L	Description
	Movable	Fixed			
I	M-1	F-1	26'-34'	28'	Barricade complete with SR12-1 sign and SW1-6 or SW1-7 signs as required.
I	M-2	F-2	35'-44'	41'	Barricade complete with SR12-1 sign and SW1-6 or SW1-7 signs as required
I	M-3	F-3	Variable	28'	Barricade (without extension wings) complete with SR12-1 sign and SW1-6 or SW1-7 signs as required.
I	M-4	F-4	Variable	Variable 8'-6" min.	Wing Barricade (signs only as appropriate).
II	—	F-6	Variable	28'	Barricade complete with appropriate signs.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TIMBER BARRICADES

Designed By: D.R.W.
Made By: J.L.S.
Checked By: J.B.

Approved By: [signature]
Date: JULY 1, 1965

M-142-AA

TYPICAL SIGNS

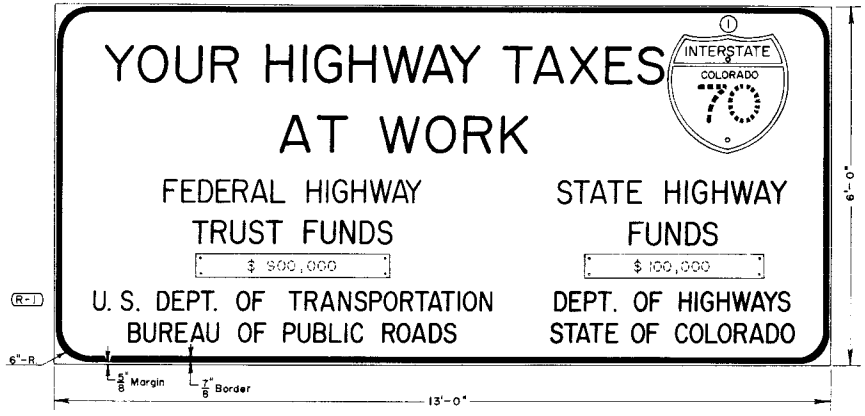
STANDARD M-614-IA

(JULY 1, 1965)

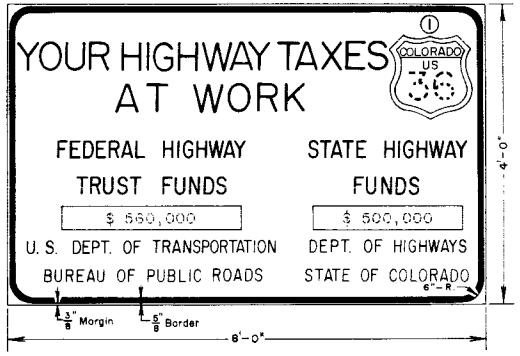
FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS			
R-1	5-25-67	Rev. Gen. Note B. Sign Legend	G.W.F.
R-2	6-19-67	Note regarding timber posts	G.W.F.

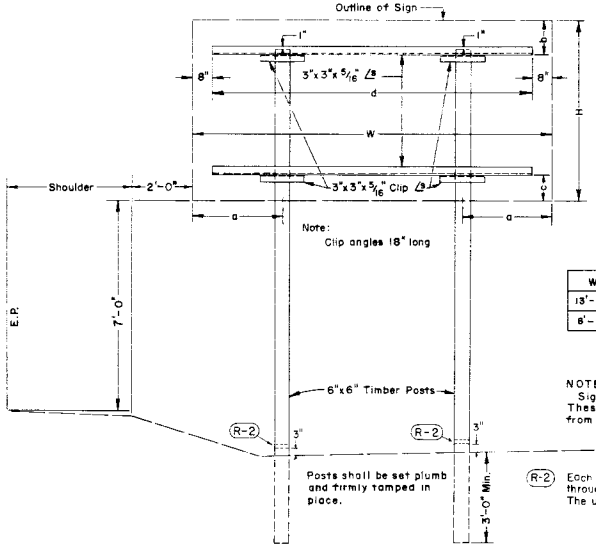
INTERSTATE SYSTEM



PRIMARY & SECONDARY SYSTEM



INSTALLATION DETAIL



W	H	a	b	c	d
13'-0"	6'-0"	2'-6"	1'-1½"	0'-10½"	11'-8"
8'-0"	4'-0"	1'-6"	1'-1½"	0'-10½"	6'-8"

NOTE:
Signs are to be placed facing traffic approaching the work. These signs should be so located as not to obscure or detract from the effectiveness of other official signs.

(R-2) Each timber post shall be provided with a single 1¼" Ø hole through the neutral axis, 3" above the ground level. The underground portion plus 6" shall be treated with creosote

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

Signs shall be made of ¾" Plywood or other material approved by the Department.

When a third governmental agency is participating its official name should be included centrally in lines 6 and 7

Posts shall be 6"X 6" S 4 S timber or other material approved by the Department and shall be painted white.

Signs are to be non-reflectorized, black letters, numerals, and border on plain white background. Route Marker plaques to be the appropriate standard colors, non-reflectorized

(R-1) Layout of signs will be furnished by the Traffic Engineering Section indicating the details as to letter size, symbols, spacing, figure for amount of funds, etc. which are required for these signs.

These signs will be furnished and installed by State Forces.

① Applicable Interstate, U.S. Shield or State Route Shield.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
CONSTRUCTION
IDENTIFICATION
SIGNS

Designed by B.F.R.	Approved by
Made by D.J.S.	Traffic Engineer
Checked by W.R.H.	Date: July 1, 1965

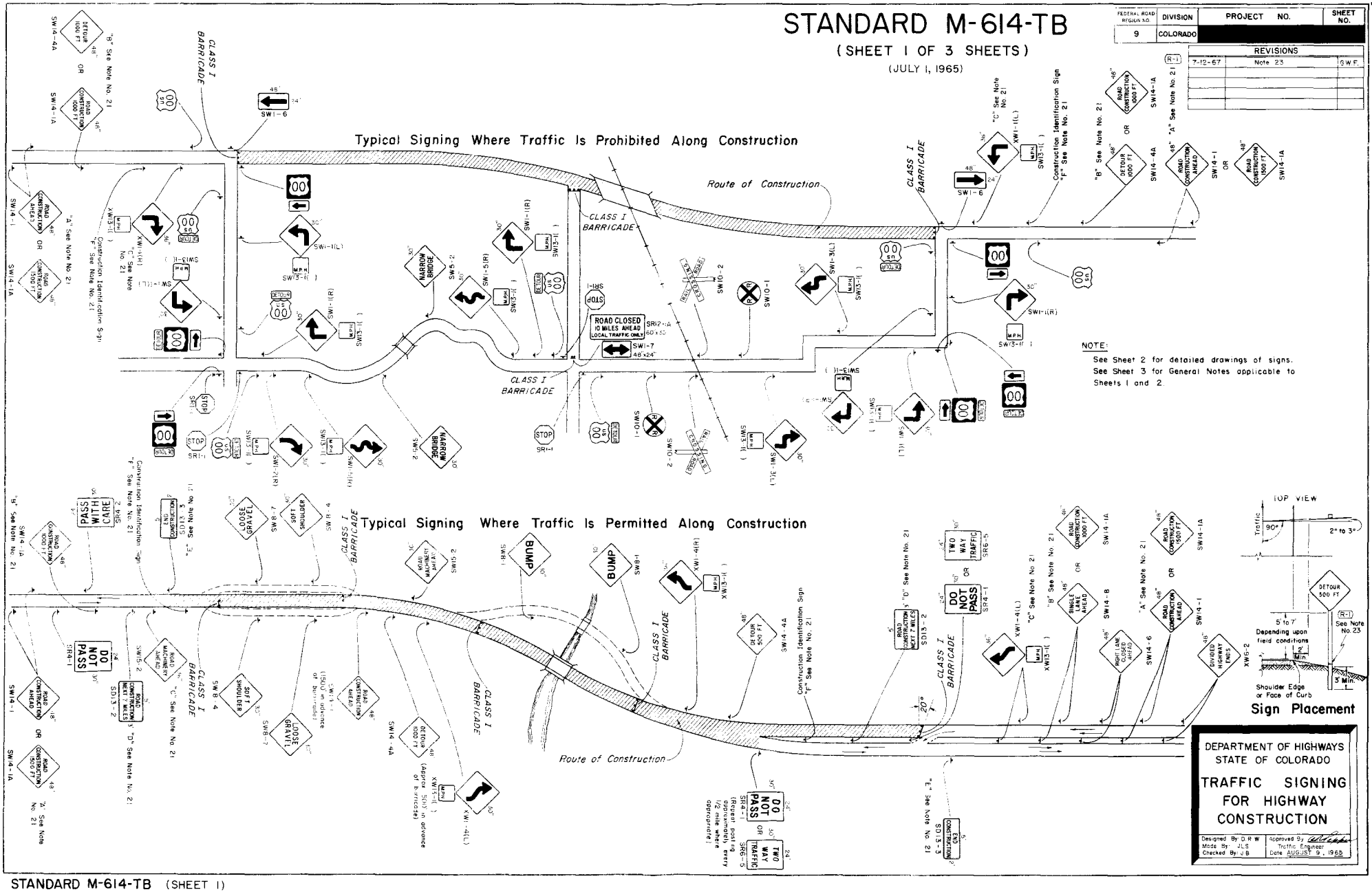
STANDARD M-614-TB

(SHEET 1 OF 3 SHEETS)

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
7-12-67	Note 23	S.W.F.



NOTE:

See Sheet 2 for detailed drawings of signs.

See Sheet 3 for General Notes applicable to Sheets 1 and 2.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By: D.R.W	Approved By:
Made By: J.L.S	Traffic Engineer
Checked By: J.B.	Date AUGUST 9, 1965

STANDARD M-614-TB

(SHEET 2 OF 3 SHEETS)

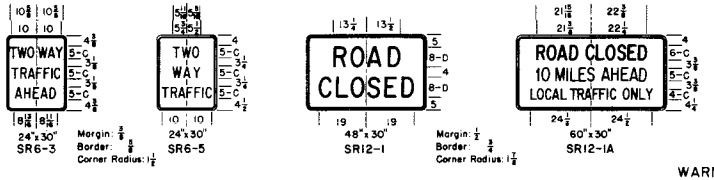
(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS			
(R-1)	7-12-67		M.R.H.

REGULATORY SIGNS

See Note No. 9

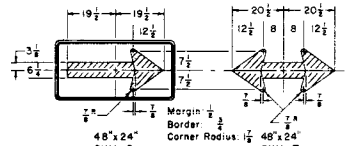


Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

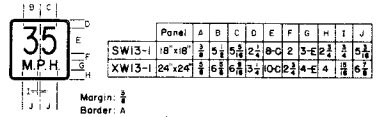
Margin: $\frac{1}{2}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{1}{2}$

WARNING SIGNS

See Note No. 10



Margin: $\frac{1}{8}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{1}{2}$



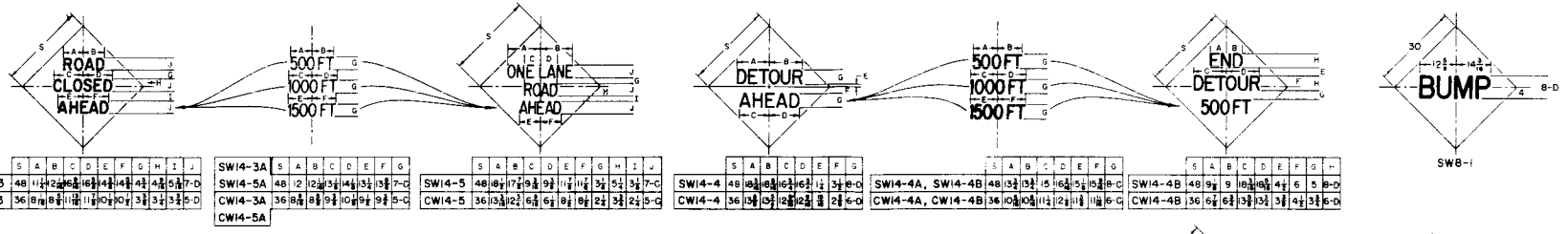
Panel	A	B	C	D	E	F	G	H	I	J
SW13-1	18"x18"	$\frac{3}{8}$	5	$5\frac{5}{8}$	$6\frac{5}{8}$	$2\frac{1}{4}$	8-C	2	3-E	$2\frac{3}{4}$
XW13-1	24"x24"	$\frac{3}{8}$	6	$8\frac{5}{8}$	$8\frac{5}{8}$	$3\frac{1}{2}$	10-C	$2\frac{3}{4}$	4-E	4

Panel	I	J
SW13-1	$\frac{3}{4}$	$6\frac{1}{8}$
XW13-1	$\frac{3}{4}$	$6\frac{1}{8}$

Margin: $\frac{3}{8}$
Border: A
Corner Radius: $1\frac{1}{2}$

WARNING SIGNS

See Note No. 10



	S	A	B	C	D	E	F	G	H	I	J
SW14-3	48	$11\frac{1}{2}$	$12\frac{5}{16}$	$16\frac{5}{8}$	$16\frac{5}{8}$	$4\frac{1}{2}$	$14\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{5}{8}$	$5\frac{1}{8}$	7-D
CW14-3	36	$8\frac{1}{8}$	$8\frac{1}{2}$	$11\frac{1}{8}$	$11\frac{1}{8}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	5-D

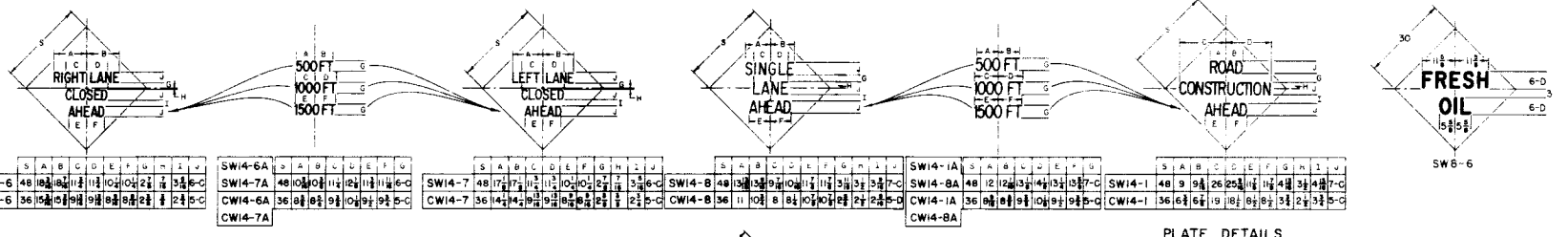
	S	A	B	C	D	E	F	G
SW14-3A	S	A	B	C	D	E	F	G
SW14-5A	48	12	$12\frac{5}{8}$	$13\frac{1}{2}$	$14\frac{5}{8}$	$13\frac{1}{2}$	$13\frac{5}{8}$	7-C
CW14-3A	36	$8\frac{1}{8}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$10\frac{1}{8}$	$9\frac{1}{2}$	$9\frac{1}{2}$	5-C
CW14-5A								

	S	A	B	C	D	E	F	G	H	I	J
SW14-5	48	$18\frac{1}{2}$	$17\frac{1}{2}$	$9\frac{1}{8}$	$9\frac{1}{2}$	$11\frac{1}{2}$	$11\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$3\frac{1}{2}$	7-C
CW14-5	36	$13\frac{1}{8}$	$12\frac{1}{2}$	$6\frac{1}{8}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	5-C

	S	A	B	C	D	E	F	G
SW14-4	48	$10\frac{3}{8}$	$8\frac{1}{8}$	$16\frac{1}{2}$	$16\frac{1}{2}$	$6\frac{1}{2}$	$3\frac{1}{2}$	8-D
CW14-4	36	$8\frac{1}{8}$	$8\frac{1}{2}$	$12\frac{1}{8}$	$12\frac{1}{8}$	$2\frac{1}{2}$	$2\frac{1}{2}$	6-D

	S	A	B	C	D	E	F	G
SW14-4A, SW14-4B	48	$13\frac{1}{2}$	$13\frac{1}{2}$	15	$16\frac{1}{8}$	$5\frac{1}{2}$	$15\frac{1}{8}$	8-C
CW14-4A, CW14-4B	36	$10\frac{1}{8}$	$10\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$11\frac{1}{8}$	$11\frac{1}{8}$	6-C

	S	A	B	C	D	E	F	G	H
SW14-4B	48	$9\frac{1}{2}$	9	$16\frac{1}{8}$	$16\frac{1}{8}$	$4\frac{1}{2}$	6	5	8-D
CW14-4B	36	$6\frac{1}{2}$	$6\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	6-D



	S	A	B	C	D	E	F	G	H	I	J
SW14-6	48	$18\frac{3}{8}$	$18\frac{1}{2}$	$11\frac{1}{2}$	$11\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{8}$	$3\frac{5}{8}$	6-C
CW14-6	36	$15\frac{3}{8}$	$15\frac{1}{2}$	$9\frac{1}{8}$	$9\frac{1}{8}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$	5-C

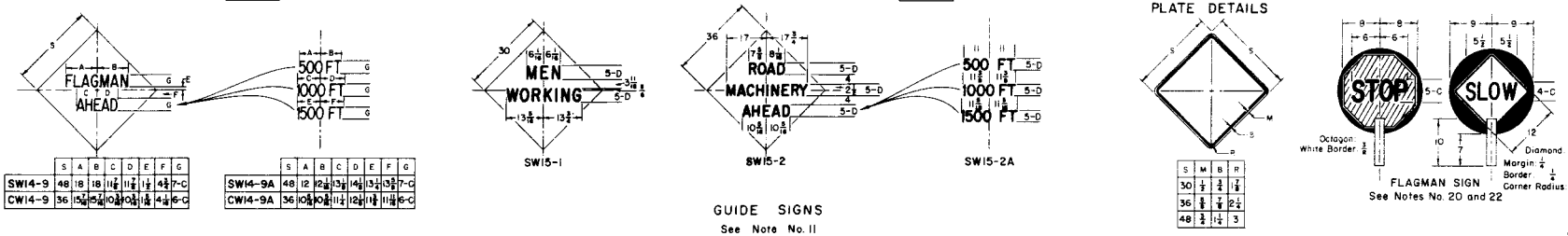
	S	A	B	C	D	E	F	G
SW14-6A	S	A	B	C	D	E	F	G
SW14-7A	48	$10\frac{3}{8}$	$10\frac{1}{2}$	$11\frac{1}{2}$	$12\frac{1}{2}$	$11\frac{1}{2}$	$11\frac{1}{2}$	6-C
CW14-6A	36	$8\frac{1}{8}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$10\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	5-C
CW14-7A								

	S	A	B	C	D	E	F	G	H	I	J
SW14-7	48	$17\frac{1}{2}$	$17\frac{1}{2}$	$11\frac{1}{2}$	$12\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{8}$	$3\frac{5}{8}$	6-C
CW14-7	36	$14\frac{1}{2}$	$14\frac{1}{2}$	$9\frac{1}{8}$	$9\frac{1}{8}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$	5-C

	S	A	B	C	D	E	F	G
SW14-8	48	$13\frac{1}{2}$	$13\frac{1}{2}$	$9\frac{1}{8}$	$10\frac{1}{2}$	$11\frac{1}{2}$	$3\frac{1}{2}$	7-C
CW14-8	36	11	$10\frac{1}{2}$	8	$8\frac{1}{2}$	$10\frac{1}{2}$	$2\frac{1}{2}$	5-D

	S	A	B	C	D	E	F	G
SW14-8A	48	12	12	$13\frac{1}{2}$	$14\frac{1}{2}$	$13\frac{1}{2}$	$13\frac{5}{8}$	7-C
CW14-1A	36	$8\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$10\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	5-C
CW14-8A								

	S	A	B	C	D	E	F	G	H	I	J
SW14-1	48	9	$9\frac{1}{2}$	26	$25\frac{1}{2}$	$11\frac{1}{2}$	$11\frac{1}{2}$	$4\frac{1}{8}$	$3\frac{1}{2}$	$4\frac{1}{8}$	7-C
CW14-1	36	$6\frac{1}{2}$	$6\frac{1}{2}$	19	$18\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	5-C



	S	A	B	C	D	E	F	G
SW14-9	48	18	18	$11\frac{1}{2}$	$11\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	7-C
CW14-9	36	$15\frac{3}{8}$	$15\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	6-C

	S	A	B	C	D	E	F	G
SW14-9A	48	12	$12\frac{1}{2}$	$13\frac{1}{2}$	$14\frac{1}{2}$	$13\frac{1}{2}$	$13\frac{5}{8}$	7-C
CW14-9A	36	$8\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$10\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{1}{2}$	6-C

SW15-1

SW15-2

SW15-2A

PLATE DETAILS

S	M	B	R
30	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
36	$\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
48	$\frac{3}{4}$	$1\frac{1}{2}$	3

FLAGMAN SIGN
See Notes No. 20 and 22

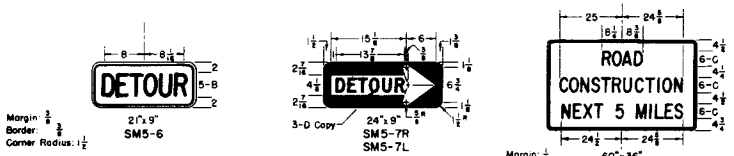
NOTES:

SEE SHEET 1 FOR TYPICAL SIGNING AND SIGN PLACEMENT. SEE SHEET 3 FOR GENERAL NOTES APPLICABLE TO SHEETS 1 AND 2.

ALL DIMENSIONS THAT ARE NOT LABELED ARE IN INCHES.

GUIDE SIGNS

See Note No. 11



Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

Margin: $\frac{1}{4}$
Border: $\frac{3}{4}$
Corner Radius: $1\frac{1}{2}$

Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

Margin: $\frac{3}{8}$
Border: $\frac{3}{8}$
Corner Radius: $1\frac{1}{2}$

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By D.R.W.	Approved By
Made By H.E.D.	Traffic Engineer
Checked By J.B.	Date AUGUST 9, 1965

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	[redacted]	

STANDARD M-614-TB

(SHEET 3 OF 3 SHEETS)

(JULY 1, 1965)

REVISIONS			
(R-1)	7-12-67	Added Note 23	G.W.F.

GENERAL NOTES

1. All work shall be done in accordance with: (a) the Standard Specifications applicable to the Project, and (b) the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the Department of Highways.

2. Where traffic is maintained through or over any part of the Project the Contractor will be required to mark all hazards within the limits of the Project (including connecting roads) with well-maintained Barricades, Warning, and Guide Signs. All Barricades and Signs shall be moved, added to, changed or removed as required during the progress of construction and removed entirely when the Project is completed.

3. Where traffic is prohibited from the Project the Detour will be marked by the Department except that the Contractor shall provide, erect and maintain Barricades, complete, (when required) at the ends of the Project, ends of the Detour and connecting roads. All U. S. or State Route Markers required for the Project will be furnished and installed by the Department. The location and positioning of Warning Signs, Barricades, and Regulatory Signs shall be as recommended by the appropriate District Engineering Forces of the Department.

4. Work on the Project shall not be started until all required signs are in place and approved by the Engineer. Where speed control appears necessary such speed control shall be requested from the Engineer by the Contractor. Control of speed through a construction zone may be achieved by Advisory Speed plates in conjunction with Warning Signs (SW13-1 for use with 30" Warning Signs and XW13-1 for use with 36" and 48" Warning Signs). The Advisory Speed plate is to be posted only at those locations where the safe speed is lower than the imposed Regulatory speed limit.

5. All Signs and Barricades shall be placed for best visibility and legibility, maintained in good condition and kept clean and free of dirt at all times. Contractor's and Engineer's vehicles and equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

6. Where two identical signs are used for dual posting they are to be staggered on the two sides of the roadway for a minimum distance of 75' to avoid a tunneling effect.

7. Examples for marking Projects, as shown on Sheet 1, are typical of signs required and are subject to alteration to fit actual conditions encountered in the field. Locations for control devices are to be staked by the Engineer. In all cases Warning signs are to be placed well in advance of the hazard, the distance depending on topography and existing approach speeds. Additional markings and any special signs required for the guidance and protection of traffic will be placed as required on the Project at the Contractor's expense.

8. Desirable sizes for signs are shown on Sheet 1 of this Standard. Larger or smaller signs shall be used where warranted. Detailed dimensions for signs normally used in connection with construction are shown on Sheet 2 of this Standard. For information on standard roadway signs not detailed on this Standard see the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the Department of Highways.

9. Signs with the prefix "R" in the sign code are <u>Regulatory</u> signs and as such impose legal compulsions or restrictions on drivers and should only be used as authorized by the Engineer.

10. Signs with the prefix "W" in the sign code are <u>Warning</u> signs and are used to alert traffic to existing or potentially hazardous conditions.

11. Signs with the prefix "D" or "M" in the sign code are <u>Guide</u> signs. Those with the prefix "D" convey general information and those with the prefix "M" are used for marking the traffic route.

12. All signs shall be reflectorized unless otherwise specified on plans. <u>Regulatory</u> and <u>Guide</u> signs (unless otherwise specified) shall have a screen processed black legend and border on a white flexible reflective sheeting, non-exposed lens background. The back side of Regulatory and Guide signs shall be painted with two coats of "Exterior Sign White Paint." <u>Warning</u> signs shall have a screen processed black legend and border on a highway yellow flexible reflective sheeting, non-exposed lens background. The back side of Warning signs shall be painted with two coats of "Federal Yellow Synthetic Sign Enamel."

13. Painting for wood surfaces shall conform with Section 508 of the Standard Specifications.

14. Posts for regulatory, warning, and guide signs will normally be 4" x 4" or 6" x 6" and shall conform to the Standard Specifications for Untreated Timber-S4S. Timber shall conform to Construction grade Paragraph 123B or 125B of Standard No. 15 Grading & Dressing Rules for West Coast Douglas Fir (1956) or Dense Structural 58 and LL Structural 58 Paragraph 284 or 285 of 1956 Grading Rules for Southern Pine. Posts shall be painted with one coat of "White Wood Primer" and one coat of "Outside White Paint."

15. Sign panels furnished by the Contractor for use only during construction may be fabricated from plywood, aluminum, steel or other suitable material but shall be stable and durable enough to meet other requirements of this Standard.

16. All material shall be sound and durable. Barricades, signs, symbols, and lettering shall be of good workmanship. Uneven lettering will not be accepted.

17. Alternate methods of processing signs or the substitution of symbols or other reflecting elements for painted symbols will be permitted only after approval by the Department.

18. <u>Torches and Lanterns</u> shall be either of the fuel-burning or battery-powered type approved by the Department. Particular care shall be taken to protect all signs and barricades from smoke and smudge.

19. <u>Barricades, Flashing Beacons and Flashers</u> – Refer to appropriate "M" Standard (Timber Barricades) for details.

20. <u>Flagman Sign</u> – This sign shall have a black painted background on both sides to form a contrast for the octagonal Stop sign and the diamond Warning sign. The "STOP" sign shall be fabricated by reverse screen process using transparent red paint on smooth surface silver reflective sheeting. The "SLOW" side of the Flagman Sign shall be black process paint on smooth surface yellow reflective sheeting. Handle to be grooved on one side to indicate reading of sign to Flagman.

21. <u>Sign "A"</u>: This is the first advance warning sign and shall be placed 1,500 feet ahead of Barricade or project terminal. Postings are required on both sides of the roadway on divided highways. Dual posting is required where warranted on two-lane, two-way highways.
<u>Sign "B"</u>: This is the second advance warning sign and shall be placed 1,000 feet ahead of barricade or project terminal. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
<u>Sign "C"</u>: This is the third advance warning sign in cases where barricades are used and shall be placed 500 to 750 feet ahead of barricade or potentially hazardous condition. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
<u>Sign "D"</u>: SD13-2 – This sign shall be placed to mark the beginning of a Project of more than 2 miles in extent, where traffic is maintained through the project. It shall be placed singly and near the beginning of construction.
<u>Sign "E"</u>: SD13-3 – This sign shall be placed to mark the end of the Project. It shall be placed singly and may be placed opposite barricade if desirable.
<u>Sign "F"</u>: Construction identification signs shall be furnished and installed by the Department on all Federal-Aid and Forest Highway Projects where actual construction is in progress and visible to highway users. These signs should be located so as not to obscure or detract from the effectiveness of other official signs. Where two or more projects are contiguous the appropriate data may be included in one set of signs. Refer to appropriate "M" Standard (Identification Signs) for sign details.
<u>Signs A through F</u> shall be furnished, installed and maintained by the Department.

22. When <u>Flags</u> are used in lieu of the Flagman Sign, they shall be a minimum of 18" x 18", made of a good grade of bright red material, and fastened securely to a staff of approximately 3 foot length. The free edge should be weighted to insure that the flag will hang vertically, even in heavy winds.

(R-1) 23. Each timber post shall be provided with a single hole drilled through the neutral axis normal to the roadway 3" above the ground level. The holes shall be 1¼" Ø for 6" x 6" and 1" Ø for 4" x 4" timber posts. The underground portion plus 6" shall be treated with creosote.

SPECIAL NOTE: Requirements of this Standard are optional to those of Standard M-614-TA through 12-31-65. Following that date Standard M-614-TA will be obsolete.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TRAFFIC SIGNING FOR HIGHWAY CONSTRUCTION

Designed By D.R.W. Made By J.L.S. Checked By J.B.	Approved By [signature] Traffic Engineer Date AUGUST 9, 1965