

HAIGH

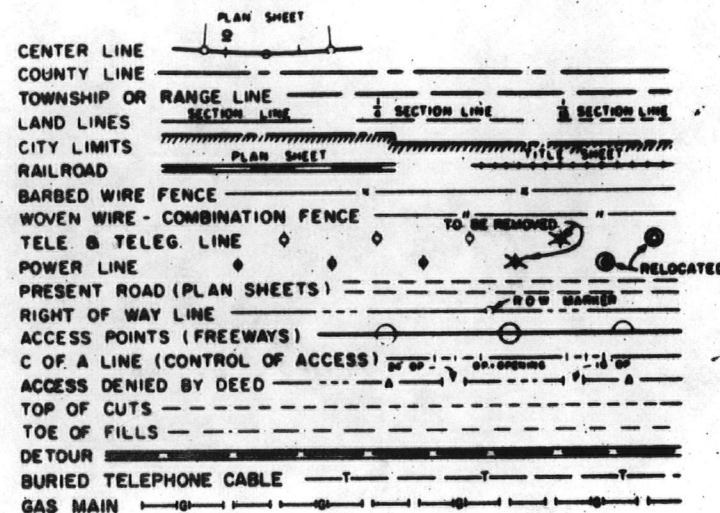
TITLE SHEET

STATE DEPARTMENT OF HIGHWAYS

DIVISION OF HIGHWAYS—STATE OF COLORADO

FEDERAL ROAD DISTRICT NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	S0089 (3)	1

CONVENTIONAL SIGNS



PLAN AND PROFILE OF PROPOSED FEDERAL AID PROJECT NO. S0089 (3) STATE HIGHWAY NO. 89 PROWERS COUNTY AS CONSTRUCTED REVISED DATE 8-29-70

SCALES OF ORIGINAL DRAWINGS

ON PLAN, 1 IN. = 100 FT.
ON PROFILE, 1 IN. = 100 FT. HORIZONTAL
1 IN. = 10 FT. VERTICAL

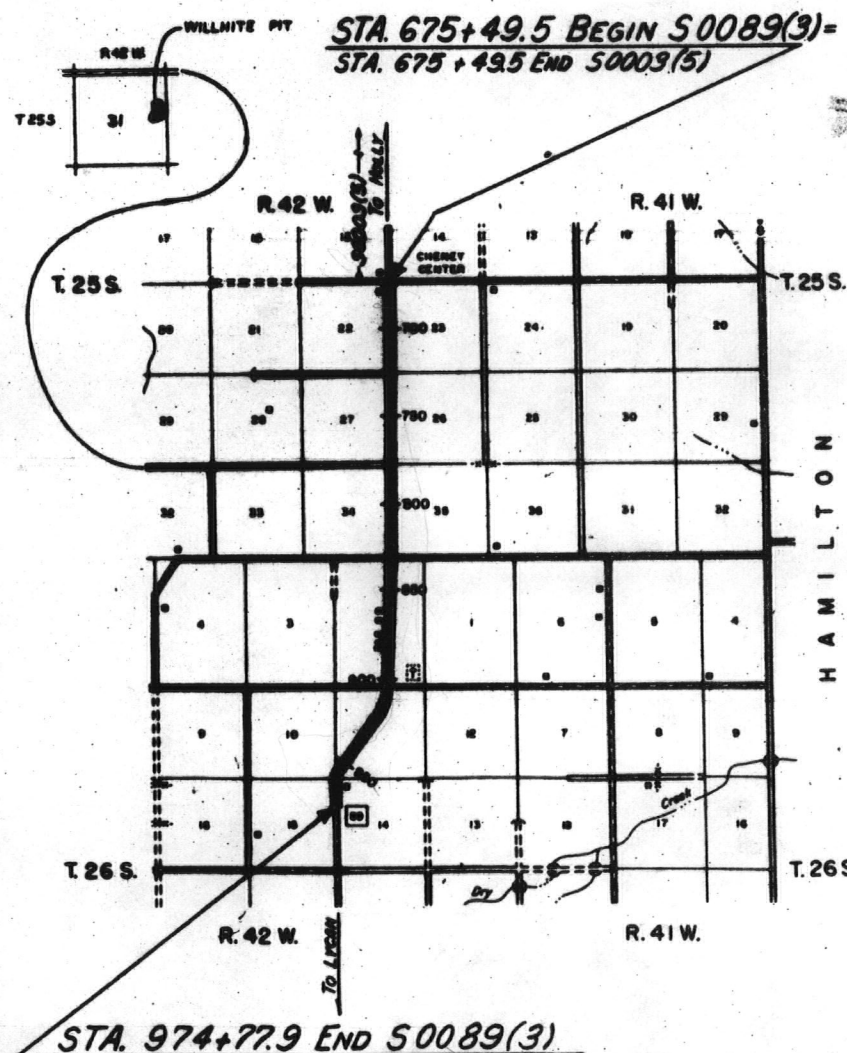
INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE PAGE, SKETCH MAP & TABULATION OF LENGTH & DESIGN DATA.
2	TYPICAL SECTION & GENERAL NOTES.
3	SUMMARY OF APPROXIMATE QUANTITIES.
4	STRUCTURE QUANTITIES.
5	SURFACE COURSE PLAN, BASE COURSE PLAN, TABULATION OF DELINEATORS & SUMMARY OF EARTHWORK QUANTITIES.
6	PIT SKETCH
7 - 17	ALIGNMENT PLAN & PROFILE SHEETS
18	CROSS SECTION (STRUCTURES)

TABULATION OF LENGTH & DESIGN DATA

STATION	ROADWAY	
	LIN. FT.	
675+49.5 BEGIN S0089(3) 675+49.5 END S0003(5)	24,036.3	
915+85.8 Bk.- 915+86.6 Aft.] EQUA.	4,983.4	
965+70.0 Bk.- 965+71.6 Aft.] EQUA.	906.3	
974+77.9 END S0089(3)		
TOTAL	29,926.0	
SUMMARY		
	LIN. FT.	MILES
Roadway (Net & Gross Length)	29,926.0	5.668
DESIGN DATA		
MAXIMUM DEGREE OF CURVE	2°45'	
MAXIMUM GRADE	1.8000%	
MINIMUM S.S.D. HORIZONTAL	860'	
MINIMUM S.S.D. VERTICAL	235'	
MAXIMUM DESIGN SPEED	70 M.P.H.	

1990 DESIGN TRAFFIC VOLUME ADT = 290
DHV = 35



AS CONSTRUCTED
NO REVISIONS
REVISIONS - 1-6

DIVISION OF HIGHWAYS
STATE OF COLORADO

FINAL APPROVAL
AS CONSTRUCTED PLANS

Dwight M. Brown 9-29-70
DIST. CONSTR. ENGR. DATE

Project Started - April 27, 1970
Project Completed - Aug. 29, 1970
Contractor - Rocky Mountain Oil Paving, Inc.
Resident Engineer - N. V. Francis

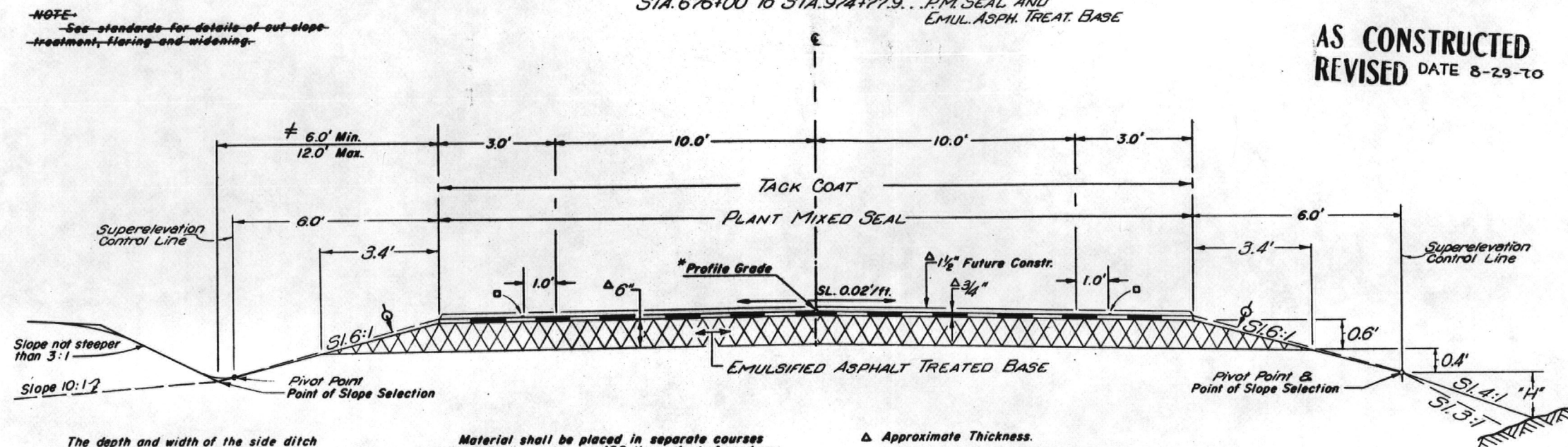
SEE SPECIAL PROVISIONS FOR
NOTICE TO BIDDERS

DIVISION OF HIGHWAYS	
APPROVED:	DATE
<i>John E. Shumate</i>	9-29-70
CHIEF ENGINEER	
<i>L. L. Brown</i> Dep. Chief Engr.	
DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION BUREAU OF PUBLIC ROADS	
APPROVED:	DATE
DIVISION ENGINEER	

P.D.L.

STA. 675+49.5 TO STA. 676+00...P.M. SEAL OVERLAY
STA. 676+00 TO STA. 974+77.9...P.M. SEAL AND
EMUL. ASPH. TREAT. BASE

AS CONSTRUCTED
REVISED DATE 8-29-70



*In special cases, slope may be steepened.

Excavation below 6:1 slope and/or 10:1 slope will not be permitted.

White Paint. 263 gals.

SUMMARY OF APPROXIMATE QUANTITIES

STRUCTURE QUANTITIES AS CONSTRUCTED
REVISED DATE 8-29-70

FEDERAL ROAD DISTRICT NO.	DIVISION	PROJECT NO.	SHEET NO.
0	COLORADO	S 0089(3)	4

REV FEBRUARY 1967

LOCATION	UNCLASSIFIED EXCAVATION			STRUCTURE EXCAVATION	STRUCTURE BACKFILL	PLANT MIXED SEAL (TYPE B)	EMULSIFIED ASPHALT TREATED BASE (CLASS 7)	CULVERT PIPE LINEAR FEET								"H" OVER CULV. FE.	Reference	MISCELLANEOUS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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4 Quantities in Surface Course Plan
0 Quantity in Summary of Earthwork
2 Quantity in Base Course Plan

AS CONSTRUCTED
REVISED DATE 8-29-70

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	500 89 (3)	5	17

SURFACE COURSE PLAN

STATION TO STATION	SOURCE	TONS USED	
		PLANT MIX SEAL (TYPE B)	SEAL
		TOP LAYER	FINAL
675+49.5-676+00	UNDESIGNATED	6	*
676+00-781+00		1,260	1,489.30
781+00-915+85.8 BK.		1,619	1,781.20
915+86.6 Ah-965+70.0 BK.		598	603.35
965+71.6 Ah-974+77.9		109	83.60
Approach to Project, 675+00-675+49.5	UNDESIGNATED	4	*
974+77.9-975+77.9		8	*
From Structure Quantities		168	*
Approaches Seperate from Rdwy. Quant.			29.25
TOTALS:		3,772	3,986.70

* Included in Rdwy. Quant.

BASE COURSE PLAN

STATION TO STATION	SOURCE	TONS USED		HAUL-TON MILE	
		EMULSIFIED ASPHALT TREATED BASE (CLASS 7)	FINAL	EMULSIFIED ASPHALT TREATED BASE (CLASS 7)	FINAL
676+00-781+00	WILLHITE PIT	9,870	9,538.15	54,229	52,403
781+00-915+85.8 BK.		12,677	13,630.25	73,236	78,742
915+86.6 Ah-965+70.0 BK.		4,685	5,184.85	35,260	39,021
965+71.6 Ah-974+77.9		852	795.10	6,887	6,435
Estimated for: Irregularities		2,809	Included in above quantities	16,961	—
Approach to Project, 974+77.9-975+77.9		63	Included in above quantities	515	—
From Structure Quantities		412	Included in above quantities	2,488	—
TOTALS:		31,368	29,148.35	189,576	176,601

Note:

Stabilization based on:

1. EDLA 18K 5.0
2. Regional Factor 1.25
3. Serviceability Index 2.00
4. Plant Mixed Seal (Type B) 0.25
5. Emulsified Asphalt Treated Base (Class 7) 0.23 ($R_t=100+$)

DELINEATORS

STATION	SIDE	SPACING	DELINEATORS	
			TYPE I EACH	FINAL
823+98.2-849+31.2	Lt. & Rt.	0° 50' Curve	16	16
896+40.0-919+67.0	Lt. & Rt.	2° 00' Curve	16	16
948+70.1-967+27.4	Lt. & Rt.	2° 45' Curve	18	18
TOTAL:			50	50

Reference For Unclassified Excav.

Bk. I, Pg. 58
Plans Pg. 4
Plans Pg. 4
Plans Pg. 4
Bk. I, Pg. 59
Bk. I, Pg. 59

SUMMARY OF EARTHWORK QUANTITIES

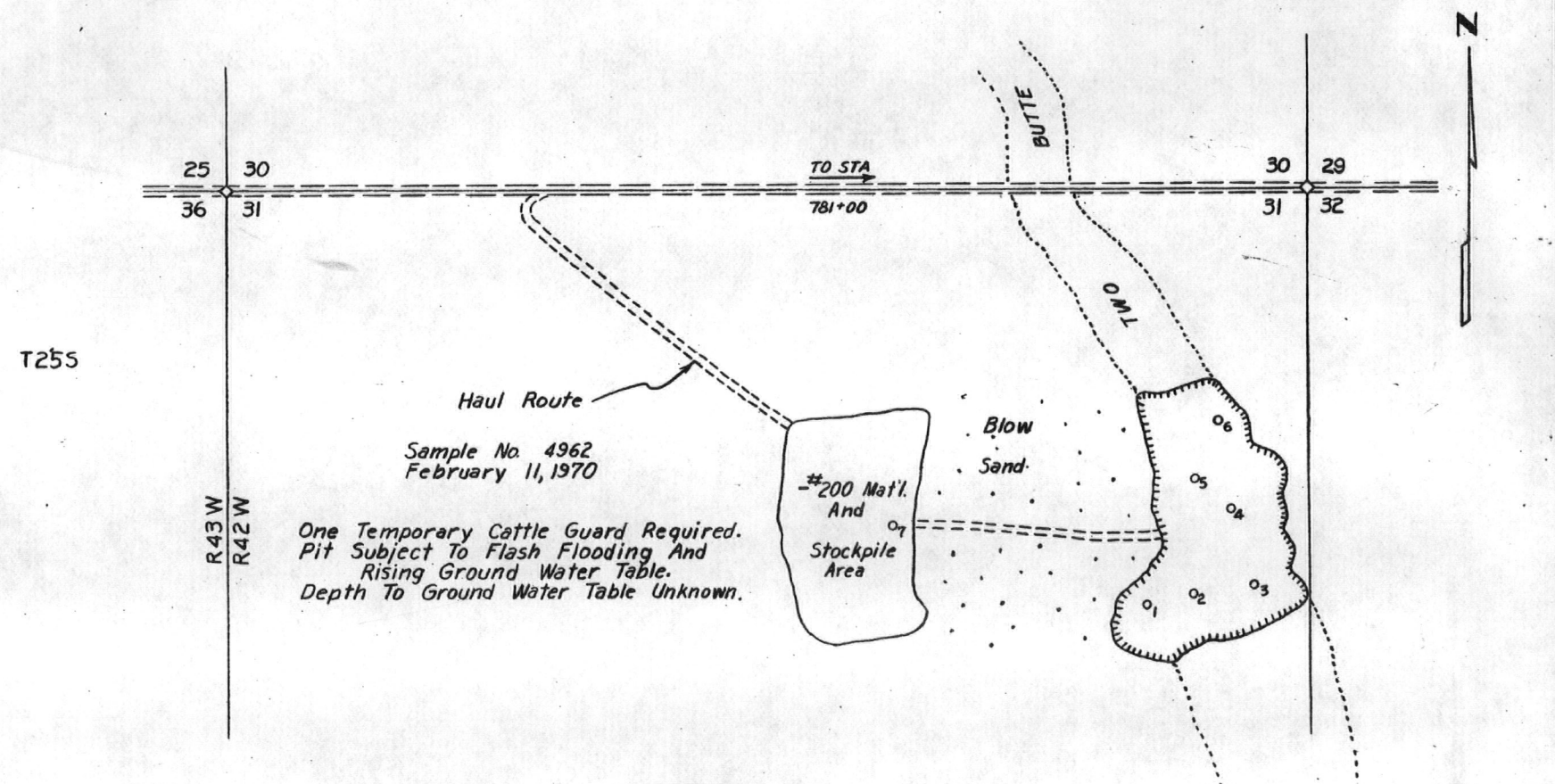
UNCLASSIFIED EXCAVATION	Cu. Yd.	FINAL
ROADWAY, STA. 676+ TO STA. 678+	800	201
STRUCTURE QUANTITIES AS EXCAV	50	50
STRUCTURE QUANTITIES AS EMB	340	340
STRUCTURE QUANTITIES AS DITCH EXCAV.	100	100
STRIPPING (REMOVING OVERBURDEN)	500	331
STRIPPING (REPLACING OVERBURDEN)	500	331
TOTAL	1,690 Cu. Yds.	1,353 Cu

AS CONSTRUCTED
REVISED DATE 8-29-70

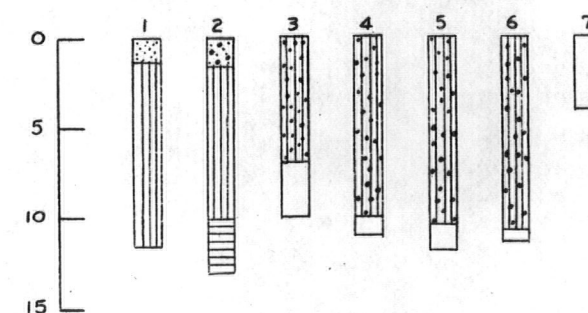
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	5 0089 (3)	6	17

WILLHITE PIT

OWNER: C.E. WILLHITE, HOLLY, COLORADO
LOCATION: PART OF NORTH 1/2 SEC. 31, T25S., R.42 W.
USE: AGGREGATE FOR EMULSIFIED
TREATED BASE
QUANTITY AVAILABLE: 276,000 CU. YD.
HAUL DISTANCE: 4.5 MILES TO STA 781+00
STRIPPING: (REMOVING OVERBURDEN 500 CU. YD. 331
(REPLACING OVERBURDEN 500 CU. YD. 331



LOG OF PIT



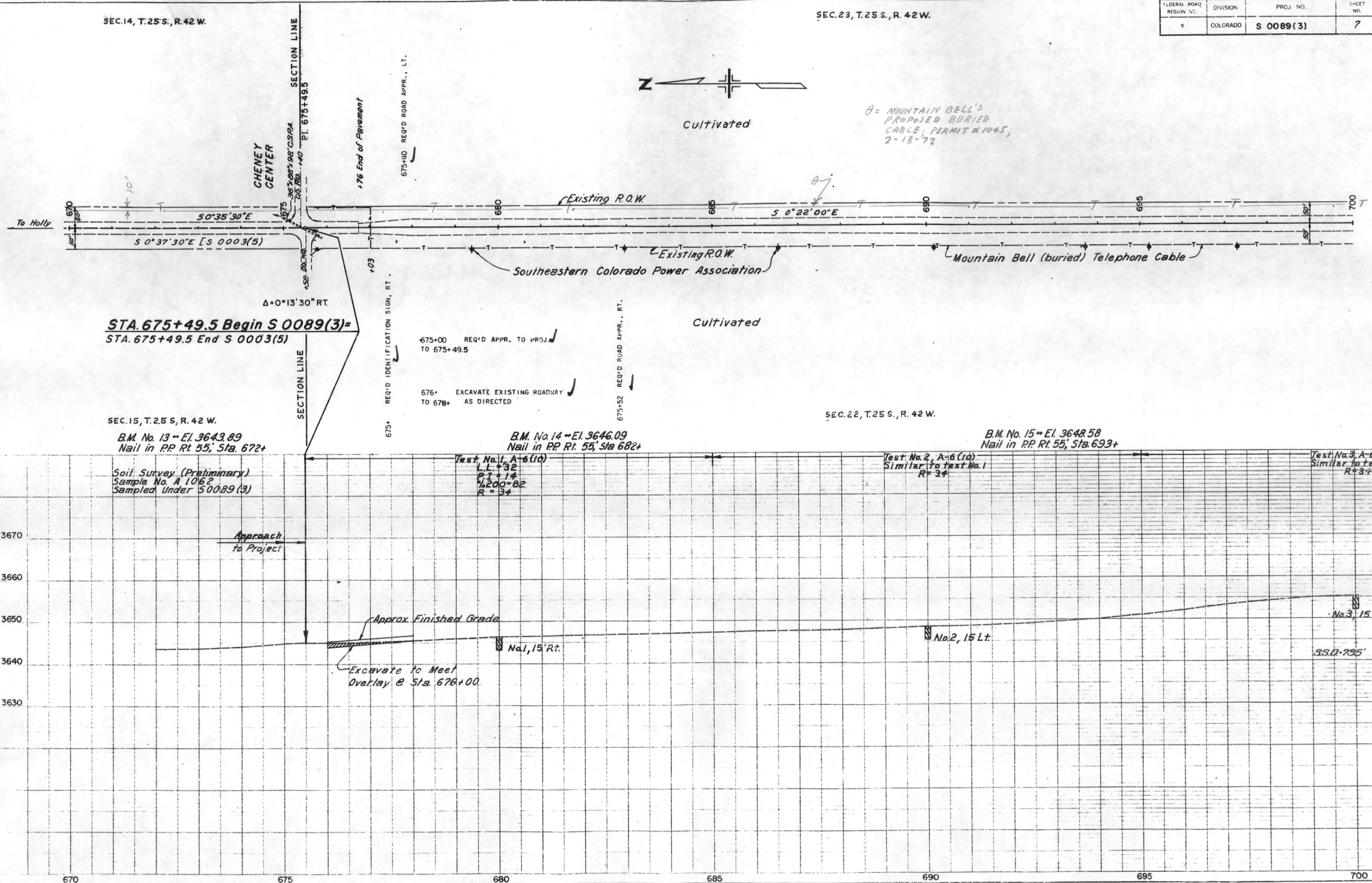
LEGEND

- Clay
- Sand Fine
- Sand Fine Medium
- Sand Fine With Some Gravel
- Sand Fine Medium With Some Gravel
- Sand Fine Medium With 6" Dia. Clay Balls

SEC. 14, T. 25 S., R. 42 W.

SEC. 23, T. 25 S., R. 42 W.

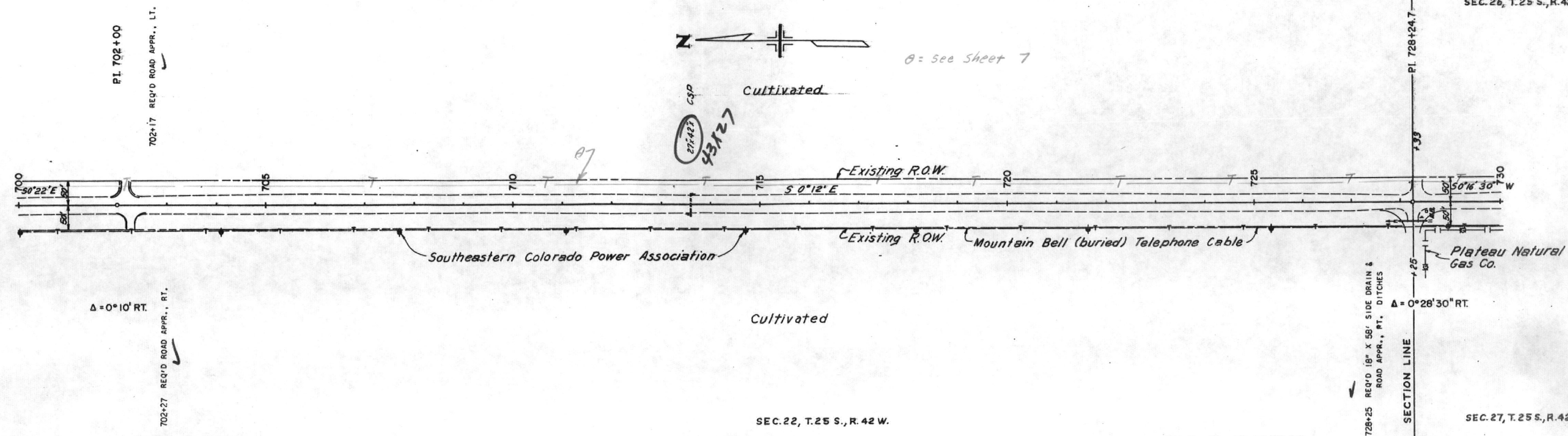
FEDERAL ROAD DISTRICT NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089(3)	7	



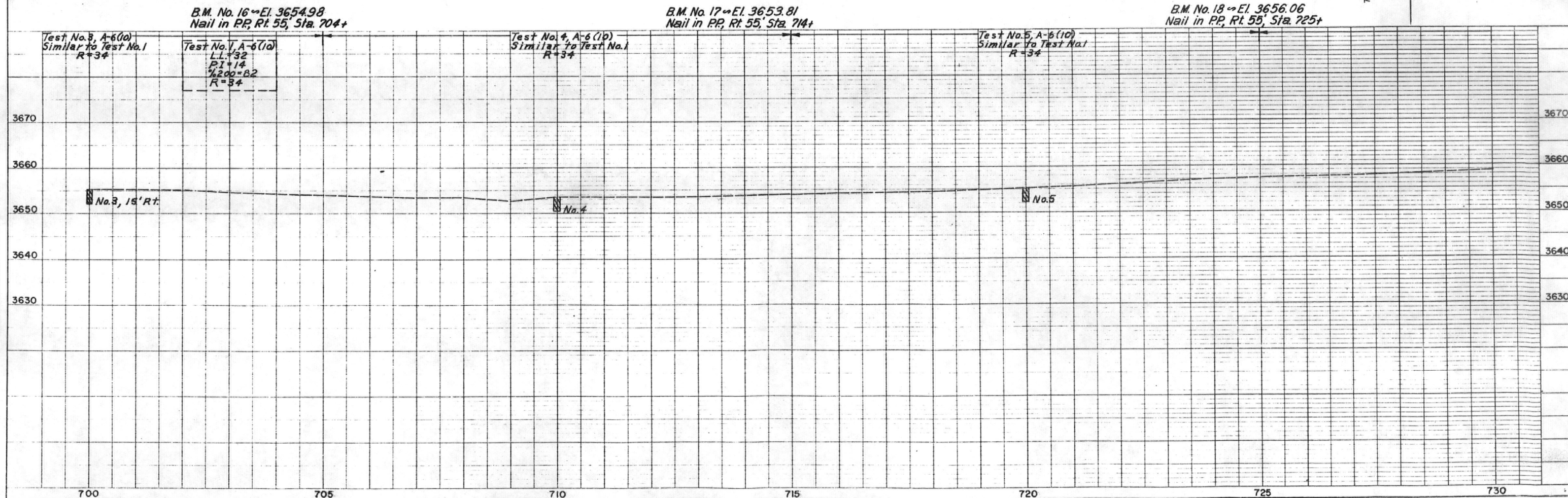
SEC. 23, T. 25 S., R. 42 W.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089 (3)	8	

SEC. 26, T. 25 S., R. 42 W.

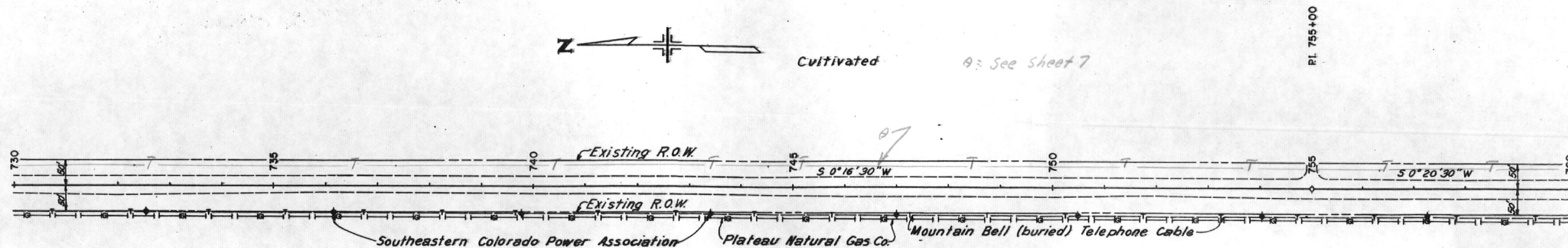


SEC. 27, T. 25 S., R. 42 W.



SEC. 26, T. 25 S., R. 42 W.

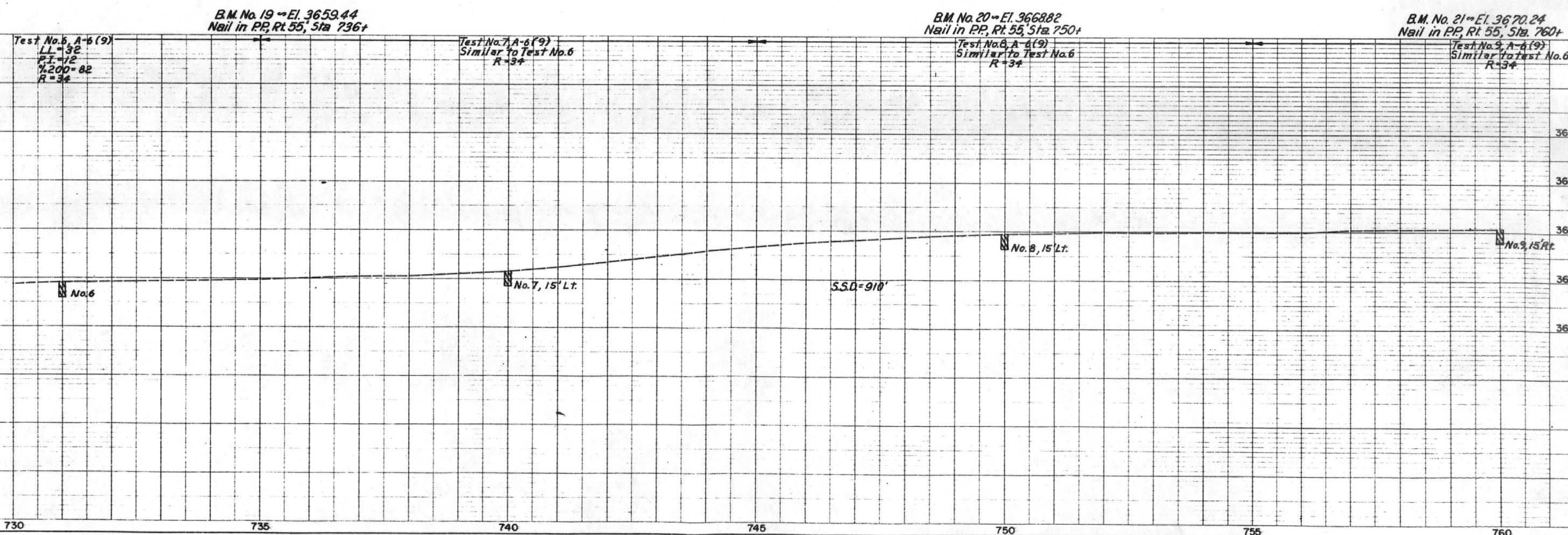
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089(3)	9	



Cultivated

Δ = 0° 04' RT.

SEC. 27, T. 25 S., R. 42 W.



K-E PLATE 1, PLAN-PROFILE
KEUTTEL & ESSER CO.

48 7012 IMPERIAL™ TRACING PLOTTER 200X

N. V. FINE'S 11/18/70
E. M. GIBBONS 11/18/70

PLAN
11/18/70

PROFILE
LUNNON 11/18/70

11/18/70

PLAN
N.V. Francis
E.M. Gibbons
5/24

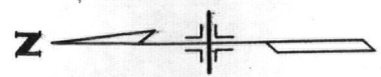
PROFILE
R. L. Johnson
5/24

SEC. 26, T. 25 S., R. 42 W.

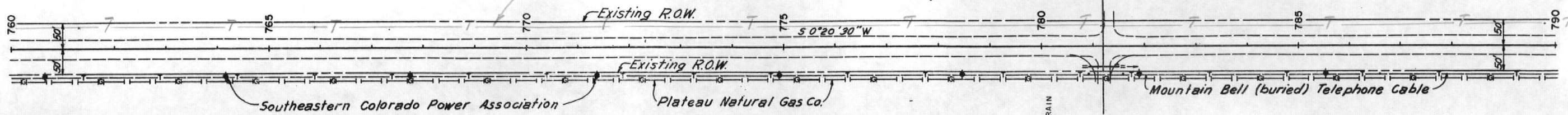
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089 (3)	10	

SEC. 35, T. 25 S., R. 42 W.

θ = See sheet 7



Cultivated



Cultivated

REQD. 18" x 58" SIDE DRAIN
AND ROAD APPR. RT.
DITCHES

SECTION LINE

SEC. 27, T. 25 S., R. 42 W.

SEC. 34, T. 25 S., R. 42 W.

B.M. No. 21 = El. 3670.24
Nail in P.P. Rt. 55, Sta. 760+

Test No. 9, A-6 (9)
Similar to Test No. 6
R = 34

Test No. 6, A-6 (9)
L.L. = 32
P.T. = 12
1/2 200 = 82
R = 34

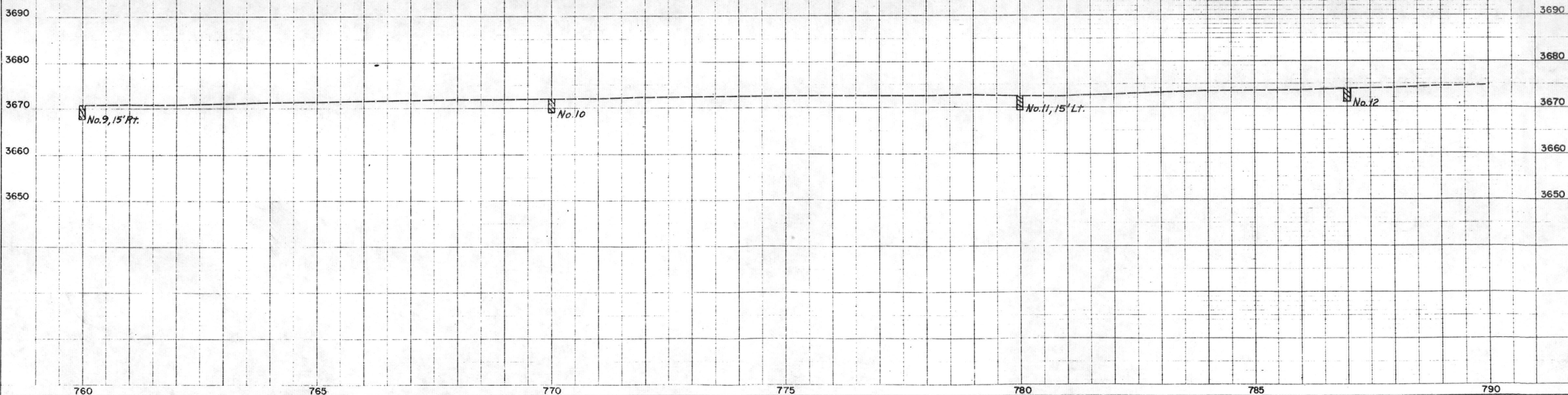
B.M. No. 22 = El. 3671.39
Nail in P.P. Rt. 55, Sta. 771+

Test No. 10, A-6 (9)
Similar to Test No. 6
R = 34

B.M. No. 23 = El. 3672.75
Nail in P.P. Rt. 55, Sta. 781+

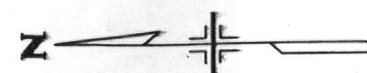
Test No. 11, A-6 (9)
Similar to Test No. 6
R = 34

Test No. 12, A-6 (11)
L.L. = 34
P.T. = 15
1/2 200 = 81
R = 34



FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089(3)	11	3

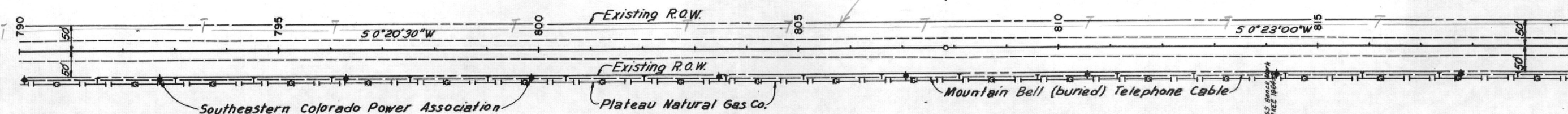
SEC. 35, T. 25 S., R. 42 W.



Cultivated

RI. 807+83.2

$\theta = \text{See Sheet 7}$



Cultivated

$\Delta = 0^{\circ} 02' 30'' \text{ RT.}$

SEC. 34, T. 25 S., R. 42 W.

B.M. No. 24 - El. 3674.50
Nail in PP, Rt. 55, Sta. 792+

Test No. 12, A-6(11)
L.L. = 34
P.I. = 15
e200 = 81
R = 34

Test No. 13, A-6(11)
Similar to Test No. 12
R = 34

B.M. No. 25 - El. 3678.31
Nail in PP, Rt. 55, Sta. 803+

Test No. 14, A-6(11)
Similar to Test No. 12
R = 34

B.M. No. 26 - El. 3678.14
U.S.G.S. Brass Cap #22KEE 1964, Rt. 55, Sta. 814+20

Test No. 15, A-6(11)
Similar to Test No. 12
R = 34

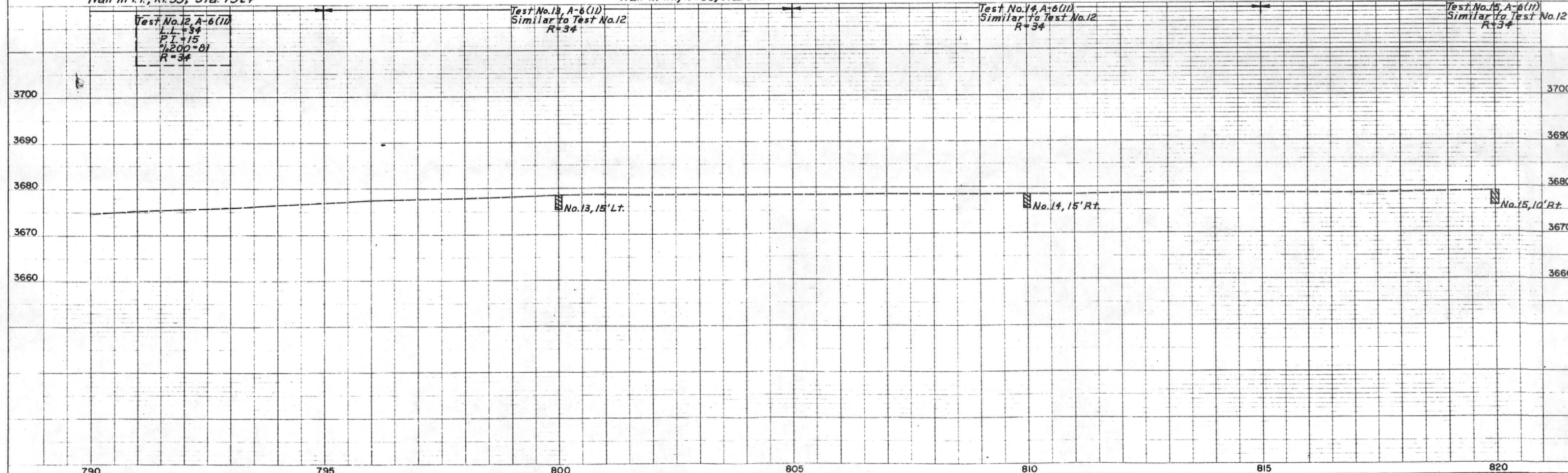


PLATE 1, PLAN-PROFILE
RELIABLE & ESSER CO.

E.V. FERGUSON 11/2/64
E.V. FERGUSON 11/2/64

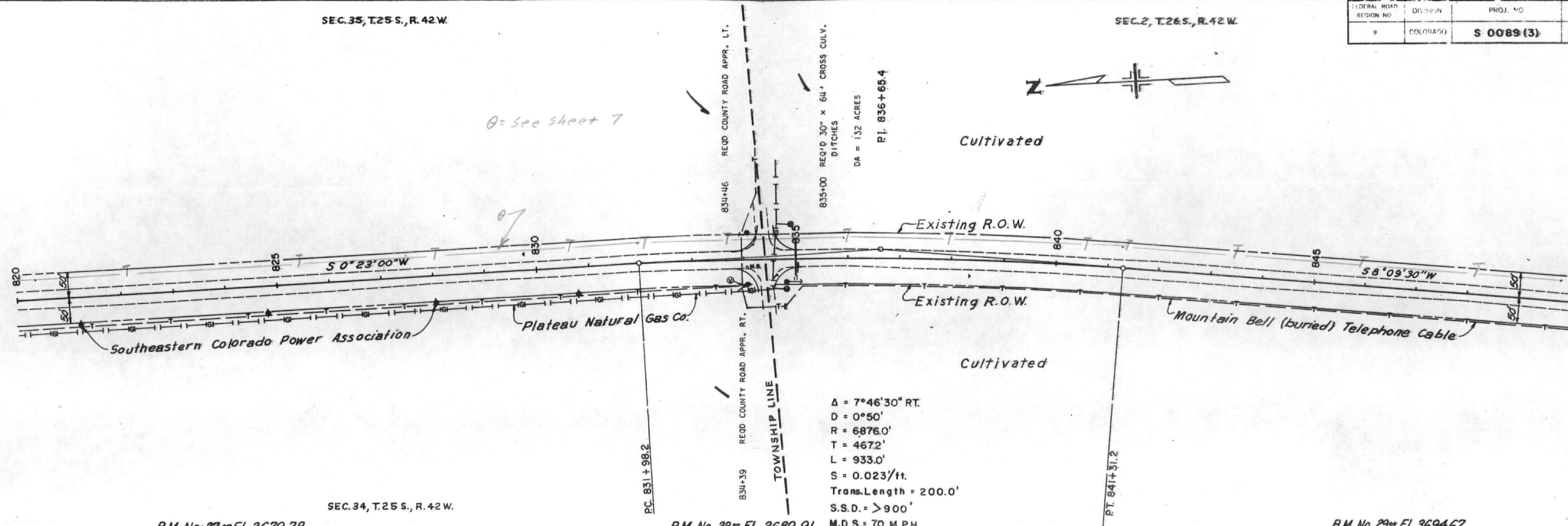
PLAN
NO. 9112

PROFILE
C. LUNDEN 11/2/64
NO. 400

SEC. 35, T.25 S., R. 42 W.

SEC. 2, T.26 S., R. 42 W.

FEDERAL ROAD DISTRICT NO.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO S 0089(3)	12	



B.M. No. 27 - El. 3679.78
Nail in PP, Rt. 55, Sta. 824+

B.M. No. 28 - El. 3689.91
Nail in PP, Rt. 55, Sta. 834+

B.M. No. 29 - El. 3694.67
Hub & Guard, Rt. 55, Sta. 847+00

Test No. 15, A-6(1)
Similar to test No. 12
R=34

Test No. 12, A-6(1)
L.L.=34
P.T.=15
%200=81
R=34

Test No. 16, A-6(1)
Similar to test No. 12
R=34

Test No. 17, A-6(1)
Similar to test No. 12
R=34

Test No. 18, A-6(10)
L.L.=33
P.T.=14
%200=79
R=34

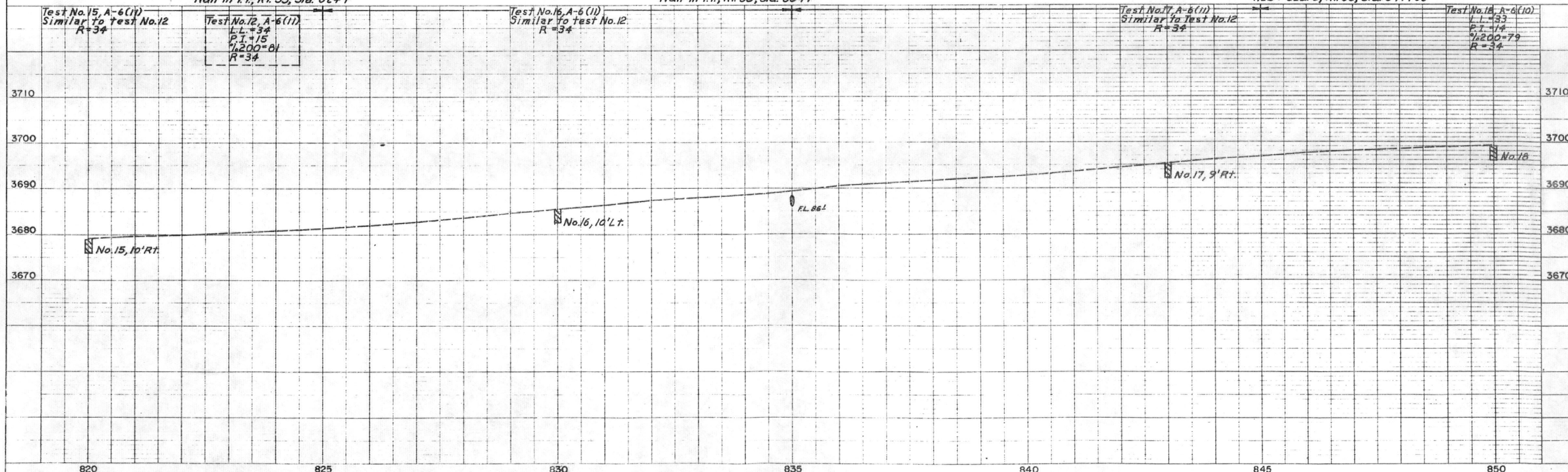


PLATE 1, PLAN-PROFILE
REDFIN & ESSER CO.

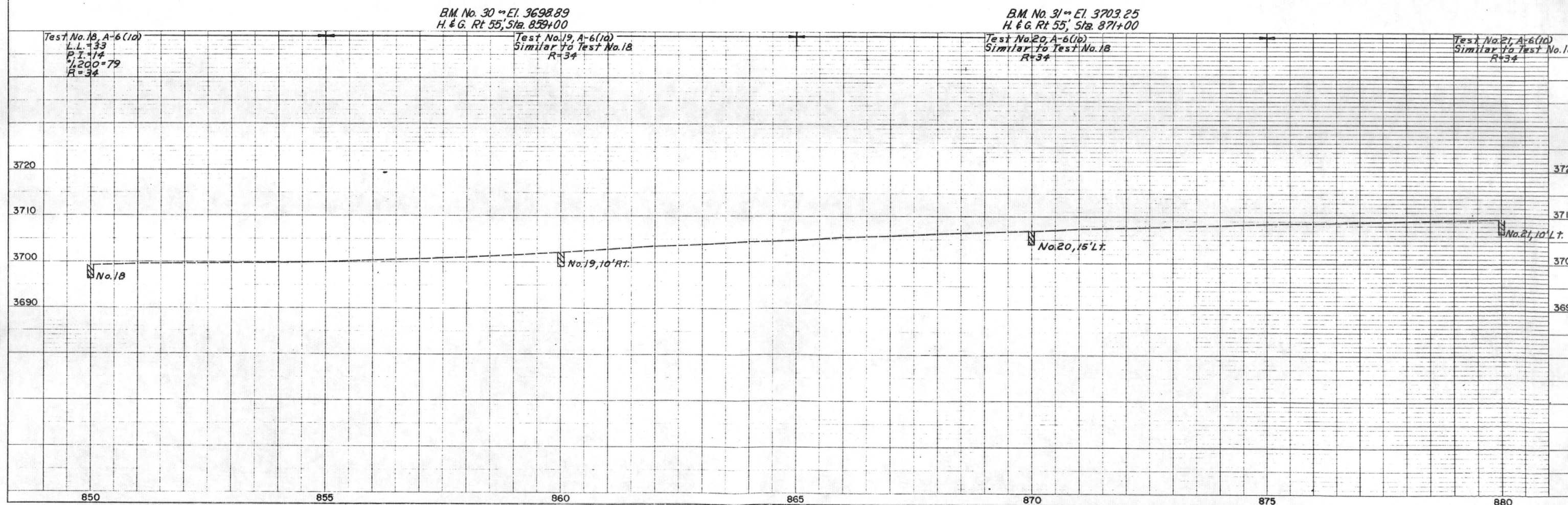
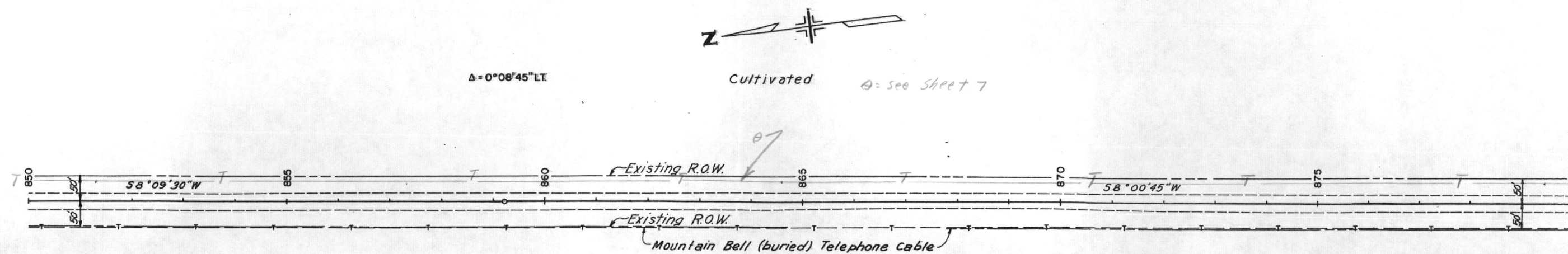
40 7012 IMPERIAL TRAILING CLOTH 2000

SEC. 2, T. 26 S., R. 42 W.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089 (3)	13	

PLAN
NOTE BOOK
NO. 11/12#

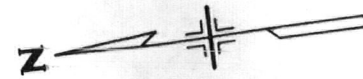
PROFILE
NO. 11/12#



SEC. 2, T. 26 S., R. 41 W.

S 0089 (3)

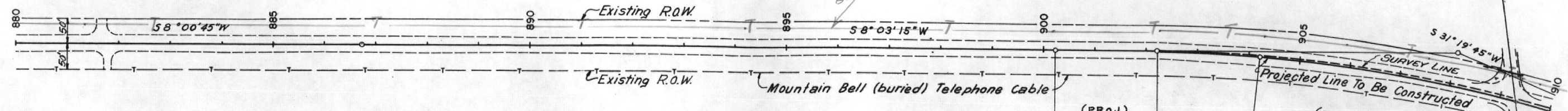
SEC. 11, T. 26 S., R. 41 W.



See Sheet 7

Cultivated

PL 886+73.2



$\Delta = 0^{\circ} 02' 30'' RT.$

Cultivated

(PROJ.)
 $\Delta = 4^{\circ} 00'$
 $L_s = 400'$
 $L.T. = 266.7'$
 $S.T. = 133.4'$

(PROJ.)
 $\Delta = 23^{\circ} 16' 30'' RT.$
 $T_s = 790.5'$
 $\Delta_c = 15^{\circ} 16' 30''$
 $D_c = 2^{\circ} 00'$
 $T_c = 384.2'$
 $L_c = 763.8'$
 $R_c = 2865.0'$
 $S = 0.055' / FT.$
 $S.S.D. = > 900'$
 $M.D.S. = 70 M.P.H.$

(SURV.)
 $\Delta = 23^{\circ} 16' 30'' RT.$
 $D = 2^{\circ} 00'$
 $T = 590.1'$
 $L = 1163.8'$
 $R = 2865.0'$

T.S. 900+22.0 (PROJ.)

P.C. 902+22.4 (SURV.)

S.C. 904+22.0 (PROJ.)

SECTION LINE

909+55 REQ'D 18" x 76" SIDE DRAIN & ROAD APPR., RT., DITCHES

909+14 REQ'D 18" x 52" SIDE DRAIN & ROAD APPR., LT.

B.M. No. 32 = El. 3708.16
H & G, Rt. 55, Sta. 883+00

Test No. 21, A-6(10)
Similar to Test No. 18
R=34

Test No. 18, A-6(10)
LL=33
PI=14
%200=79
R=34

Test No. 22, A-6(10)
Similar to Test No. 18
R=34

B.M. No. 33 = El. 3711.28
H & G, Rt. 55, Sta. 895+00

Test No. 23, A-6(14)
LL=35
PI=16
%200=89
R=34

B.M. No. 34 = El. 3719.12
H & G, Rt. 55, Sta. 907+00

Test No. 24, A-6(14)
Similar to Test No. 23
R=34

3730
3720
3710
3700

3730
3720
3710
3700

No. 21, 10' Lt.

No. 22, 10' Lt.

No. 23

No. 24, 12' Lt.

S.S.D. = 1,090'

880

885

890

895

900

905

910

PROFILE
1/2" = 40'

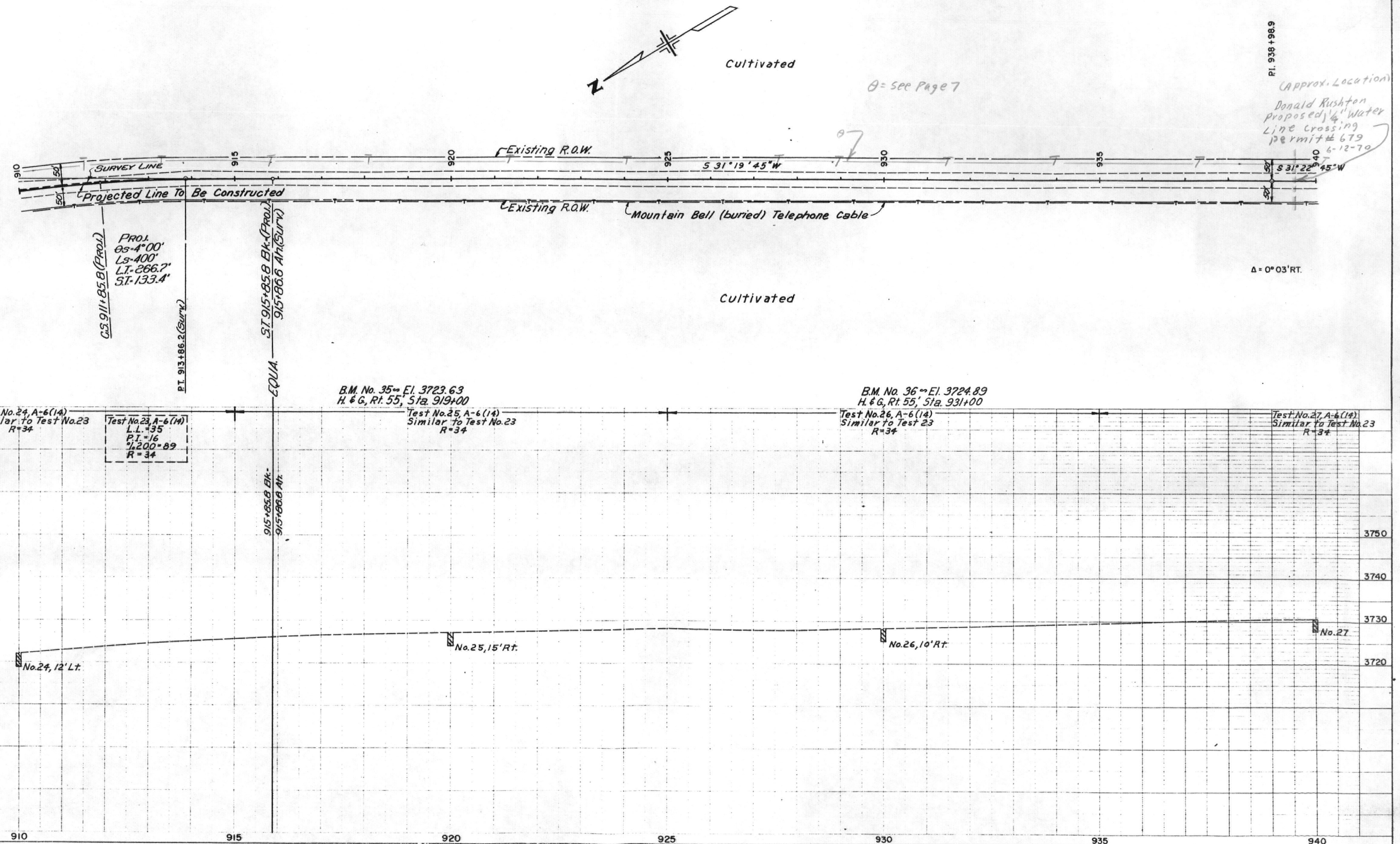
R. Lunnich 12/19

M. E. Green 11/12

3/124

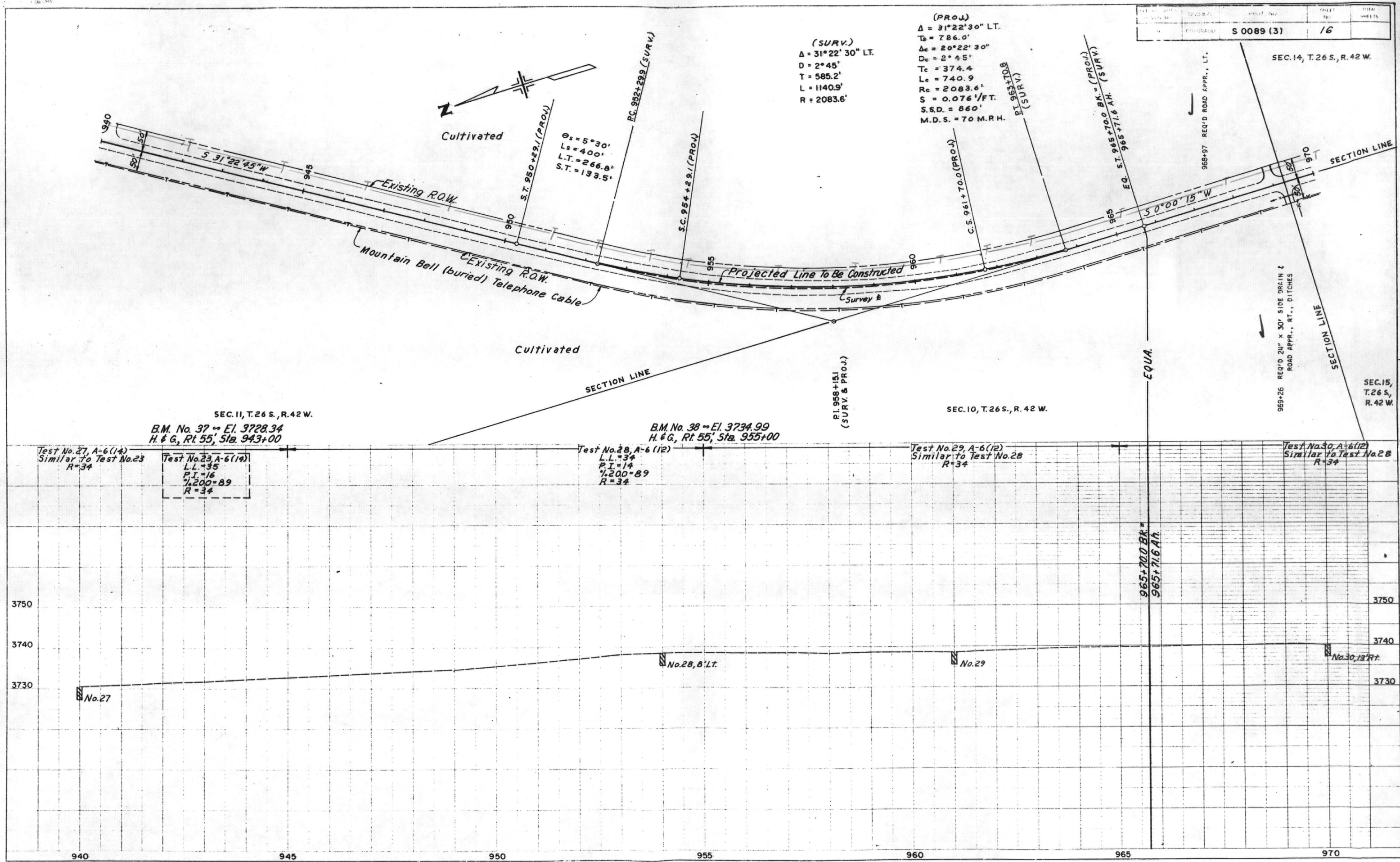
SEC. 11, T. 26 S., R. 42 W.

PROJECT NO.	DIST. NO.	SECTION NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0089 (3)	15	



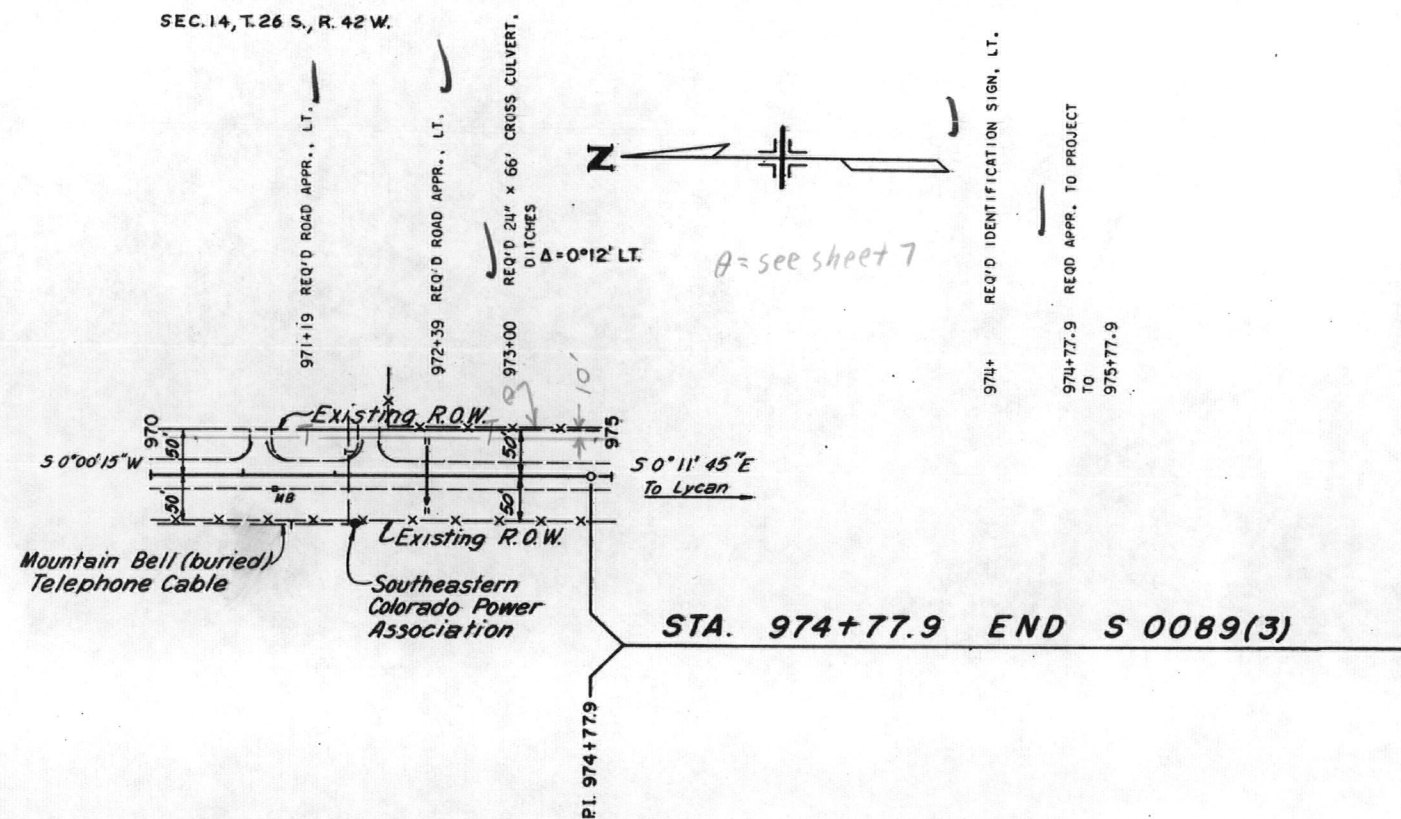
PLAN
N.W. FRANCIS
E.M. CHASE
11/15/70
11/22/70
31124

PROFILE
G.E. LARSON
11/15/70
11/22/70
31124



FILE NO.	PROJECT NO.	SHEET NO.	TOTAL SHEETS
S 0089 (3)		16	

SECTION	ROAD	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	CHURCH		S 0089(3)	17	

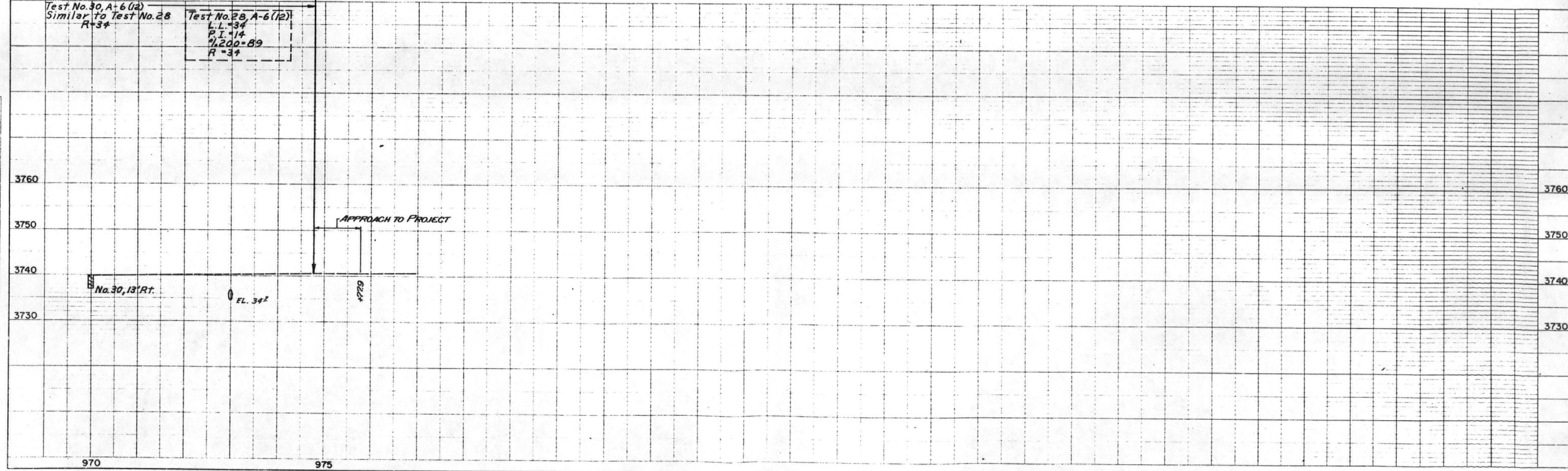


SEC. 15, T. 26 S., R. 42 W.

B.M. No. 39 = El. 3737.65
 U.S.G.S. Brass Cap # 21 KEE 1964, Lt. 69' S 1/4 972+55

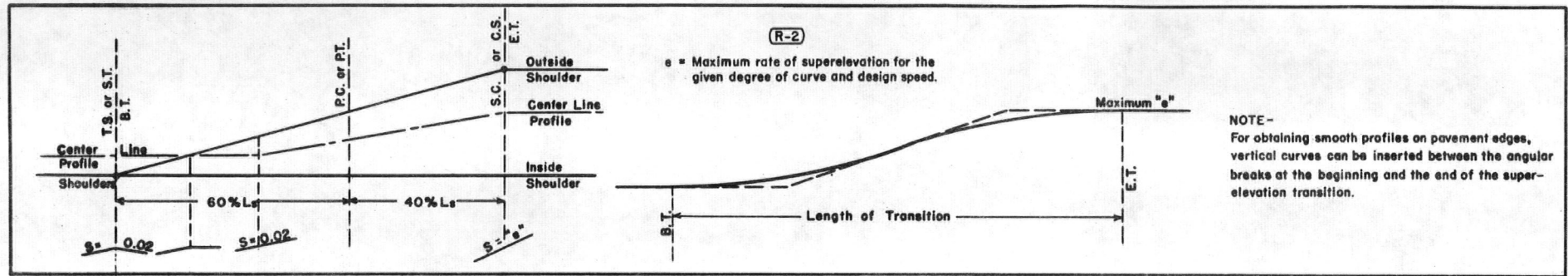
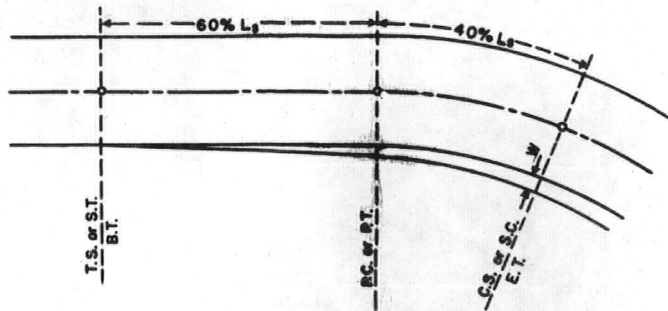
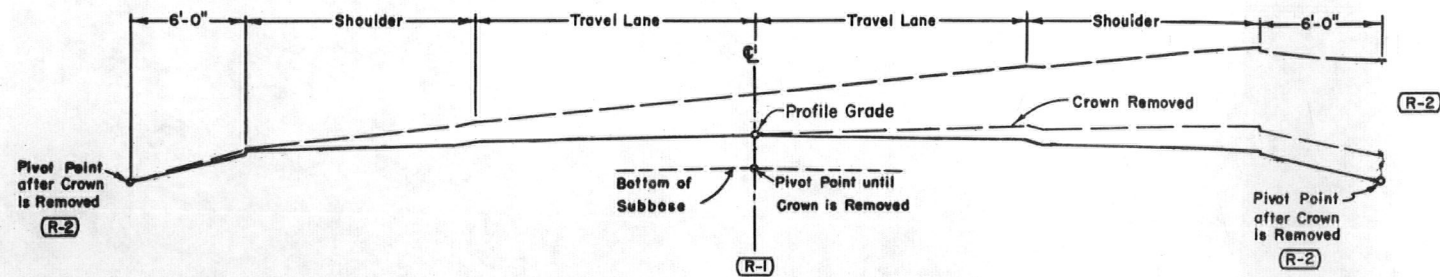
Test No. 30, A+6(12)
 Similar to Test No. 28
 R=34

Test No. 28, A-6(12)
 L.L. 34
 P.I. 14
 1/2 200-819
 R=34



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

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



PAVEMENT WIDENING			
Pavement Width	20 Ft.	22 Ft.	24 Ft.
Degree of Curve			
0° - 3°	0 Ft.	0 Ft.	0 Ft.
4° - 6°	2.0 Ft.	0 Ft.	0 Ft.
7° - 10°	2.5 Ft.	0 Ft.	0 Ft.
11° - 17°	3.0 Ft.	2.0 Ft.	0 Ft.
18° - 21°	3.5 Ft.	2.5 Ft.	0 Ft.
22° - Up	4.0 Ft.	3.0 Ft.	2.0 Ft.

Widening is to be on the inside edge of the pavement and the transition is to extend over the same transition length as the superelevation.

REVISIONS		
(R-1)	5-26-67	Superelev. Template M.R.H.
(R-2)	7-30-68	Template, Rate Tables and Dept. Name. M.R.H.

TABLE 1
SUPERELEVATION RATES FOR TWO LANE CROWNED HIGHWAYS

Degree of Curve	Maximum Superelevation = 0.08			Maximum Superelevation = 0.10		
	Super. Rate Ft./Ft.	Maximum Design Speed M.P.H.	Minimum Transition or Spiral Length	Super. Rate Ft./Ft.	Maximum Design Speed M.P.H.	Minimum Transition or Spiral Length
0°15'	.020	70	200'	.020	70	200'
0°30'	.020	70	200'	.020	70	200'
0°45'	.021	70	200'	.021	70	200'
1°00'	.028	70	200'	.028	70	200'
1°30'	.042	70	200'	.042	70	200'
2°00'	.066	70	200'	.066	70	200'
2°30'	.069	70	200'	.069	70	200'
3°00'	.078	70	250'	.083	70	250'
3°30'	.080	70	250'	.086	70	300'
4°	.080	65	250'	.100	65	300'
5°	.080	60	250'	.100	60	300'
6°	.080	55	200'	.100	55	250'
7°	.080	50	200'	.100	50	250'
8°	.080	45	200'	.100	45	250'
9°	.080	40	200'	.100	40	250'
10°	.080	40	200'	.100	40	250'
11°	.080	40	200'	.100	40	200'
12°	.080	40	200'	.100	40	200'
13°	.080	35	150'	.100	40	200'
14°	.080	35	150'	.100	35	200'
15°	.080	35	150'	.100	35	200'
16°	.080	35	150'	.100	35	200'
17°	.080	30	150'	.100	35	200'
18°	.080	30	150'	.100	30	200'
19°	.080	30	150'	.100	30	200'
20°	.080	30	150'	.100	30	200'
21°	.080	30	150'	.100	30	200'
22°	.080	30	150'	.100	30	200'
23°	.080	30	150'	.100	30	200'
24°	.080	30	150'	.100	30	200'
25°	.080	30	150'	.100	30	200'

NOTES—Plains Areas use 0.10 Maximum Superelevation Rate.
Mountainous Areas & areas where icing conditions frequently exist, use 0.08 Maximum Superelevation Rate.

TABLE 2
SUPERELEVATION RATES FOR SPECIAL CASES

Degree of Curve	30 M.P.H.			35 M.P.H.			40 M.P.H.			45 M.P.H.			50 M.P.H.			55 M.P.H.			60 M.P.H.			Degree of Curve
	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	Required Superelevation Rate Ft./Ft.	Minimum Length of Transition or Spiral	Minimum Length of Transition or Spiral	
0°15'	NC	NC	0	NC	NC	0	NC	NC	0	NC	NC	0	NC	NC	0	NC	NC	0	NC	NC	0	0°15'
0°30'	NC	NC	0	NC	NC	0	NC	NC	0	NC	NC	0	.020	.020	150'	.020	.020	200'	.020	.020	200'	0°30'
0°45'	NC	NC	0	NC	NC	0	.020	.020	150'	.020	.020	150'	.020	.020	150'	.020	.020	200'	.020	.020	200'	0°45'
1°00'	NC	NC	0	.020	.020	150'	.020	.020	150'	.020	.020	150'	.020	.020	150'	.021	.021	200'	.022	.022	200'	1°00'
1°30'	.020	.020	100'	.020	.020	150'	.020	.020	150'	.023	.024	150'	.027	.027	150'	.031	.031	200'	.038	.038	200'	1°30'
2°00'	.020	.020	100'	.020	.021	150'	.025	.027	150'	.030	.032	150'	.036	.036	150'	.041	.042	200'	.046	.046	200'	2°00'
2°30'	.020	.020	100'	.025	.026	150'	.030	.033	150'	.036	.039	150'	.043	.045	150'	.050	.052	200'	.057	.059	200'	2°30'
3°00'	.023	.024	100'	.029	.031	150'	.035	.038	150'	.042	.046	150'	.050	.054	150'	.057	.062	200'	.068	.070	200'	3°00'
3°30'	.026	.027	100'	.033	.035	150'	.040	.045	150'	.048	.053	150'	.056	.063	150'	.064	.072	200'	.072	.081	250'	3°30'
4°	.029	.030	100'	.037	.040	150'	.044	.050	150'	.053	.060	150'	.062	.070	200'	.069	.079	200'	.076	.090	250'	4°
5°	.035	.038	100'	.044	.048	150'	.053	.060	150'	.062	.071	200'	.070	.083	200'	.077	.091	250'	.080	.099	300'	5°
6°	.041	.044	100'	.050	.056	150'	.060	.068	150'	.069	.080	200'	.076	.093	250'	.086	.100	300'	.100	.100	300'	6°
7°	.045	.050	100'	.056	.063	150'	.066	.078	150'	.074	.088	200'	.079	.097	250'	.080	.100	250'				7°
8°	.050	.055	100'	.061	.069	150'	.071	.084	200'	.078	.094	200'	.080	.100	250'							8°
9°	.054	.061	100'	.065	.075	150'	.074	.089	200'	.080	.097	250'										9°
10°	.058	.065	150'	.069	.081	150'	.077	.093	200'	.080	.100	250'										10°
11°	.061	.070	150'	.072	.085	200'	.079	.096	200'													11°
12°	.065	.074	150'	.075	.089	200'	.080	.098	200'													12°
13°	.067	.078	150'	.077	.092	200'																13°
14°	.070	.082	150'	.078	.095	200'																
15°	.072	.085	150'	.079	.097	200'																
16°	.074	.087	150'	.080	.099	200'																
17°	.076	.090	150'		.100	200'																
18°	.077	.093	200'			200'																
19°	.078	.095	200'																			
20°	.079	.098	200'																			
21°	.080	.098	200'																			
22°	.080	.099	200'																			
23°	.080	.099	200'																			
24°	.080	.100	200'																			
25°	.080	.100	200'																			

NOTES—Transition or Spiral Lengths are shown in the tables for 2 Lane Crowned Highways.
For 3 Lane Crowned Highways use 1.2 times the lengths shown, rounded to the nearest 50 feet.
Width of Crowned Highway to be figured for Superelevation—left pivot point to right pivot point.

Table 2 data may be used for City Streets & Interchanges.
NC=Normal Crown section.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

SUPERELEVATION &
WIDENING OF CURVES
CROWNED HIGHWAYS

Designed by S.B.L.
Made by S.B.L.
Checked by L.E.O.
Approved by S.B.L.
Staff Design Engr.
Date July 1, 1965

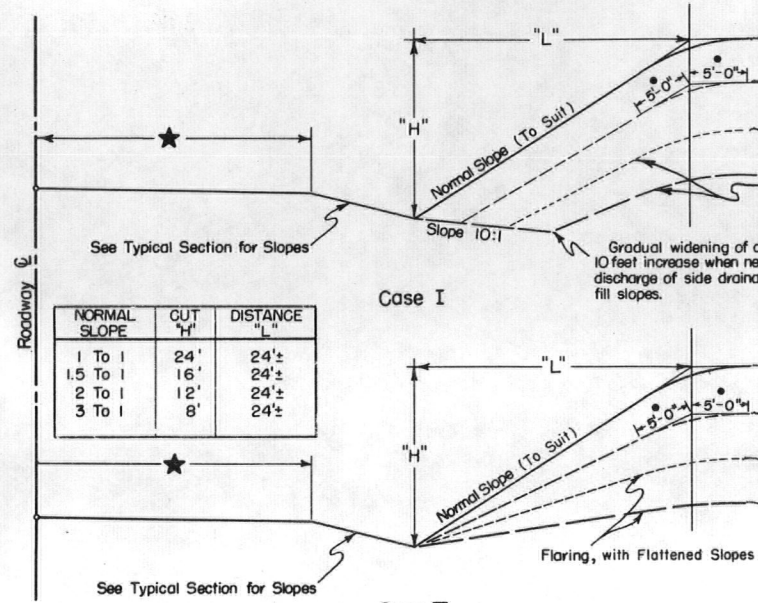
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

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

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

REVISIONS			
(R-1)	2-6-68	Median, Cross Over.	MRH
(R-2)	7-30-68	Dept. Name	MRH
(R-3)	4-1-69	Widening for Guard Rail	MRH

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



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.

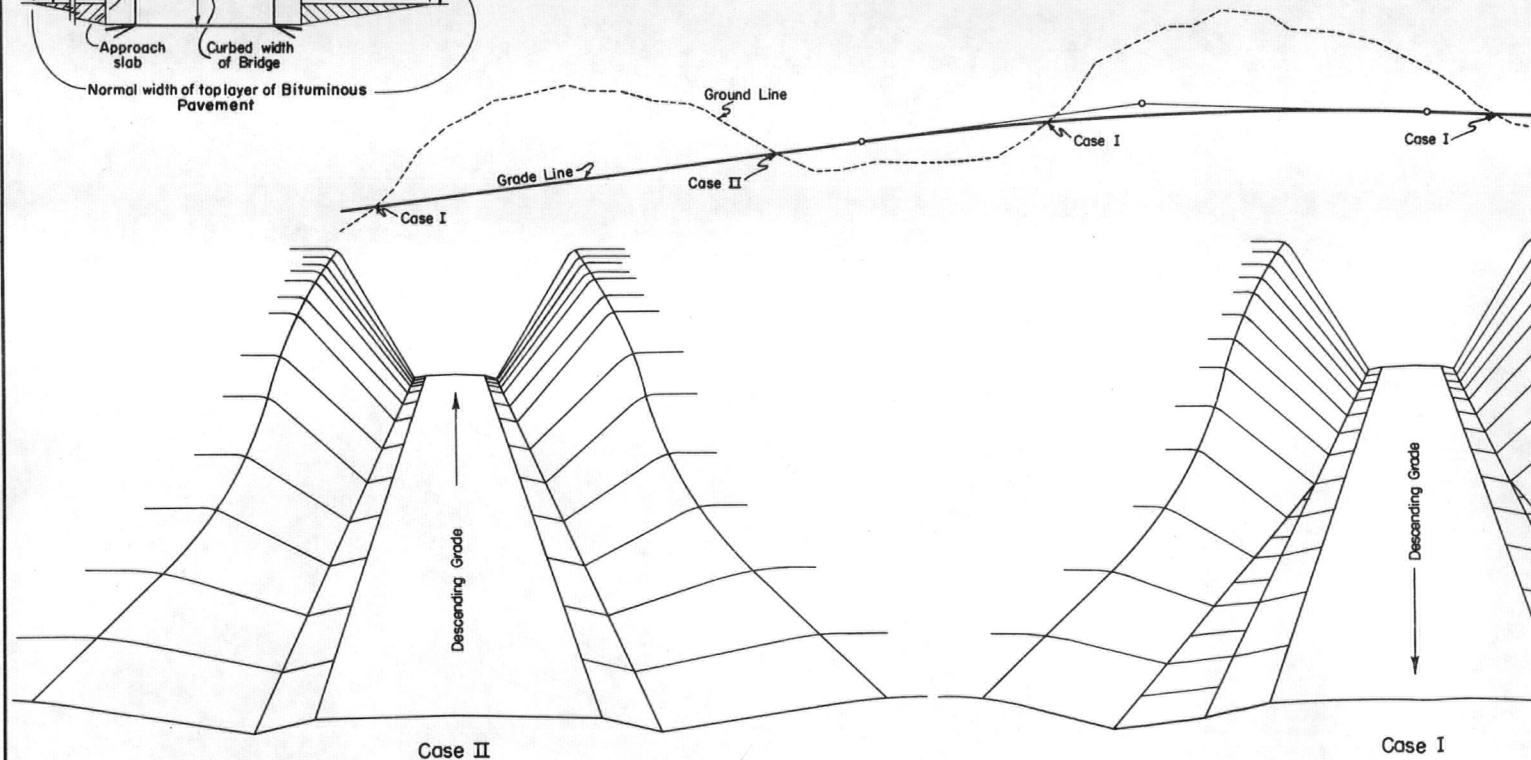
Gradual widening of ditch to minimum of 10 feet increase when necessary to avoid discharge of side drainage into adjoining fill slopes.

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 accommodate 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 FOR BITUMINOUS CURB (Only where Guard Rail is required); See appropriate M-Standard for Guard Rail.

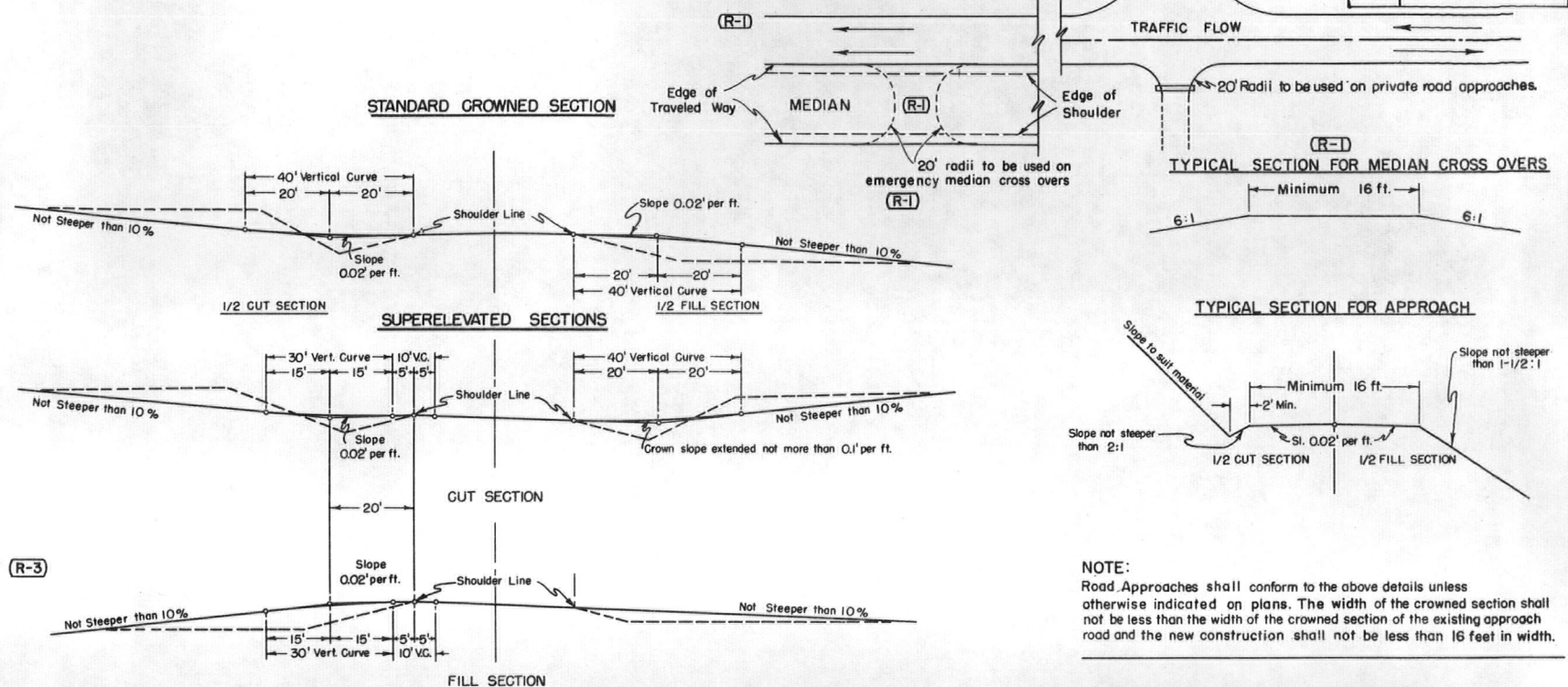
PLAN OF FLARING IN EARTH CUTS



TYPICAL PLANS FOR SIDE APPROACH ROADS AND EMERGENCY MEDIAN CROSS OVERS

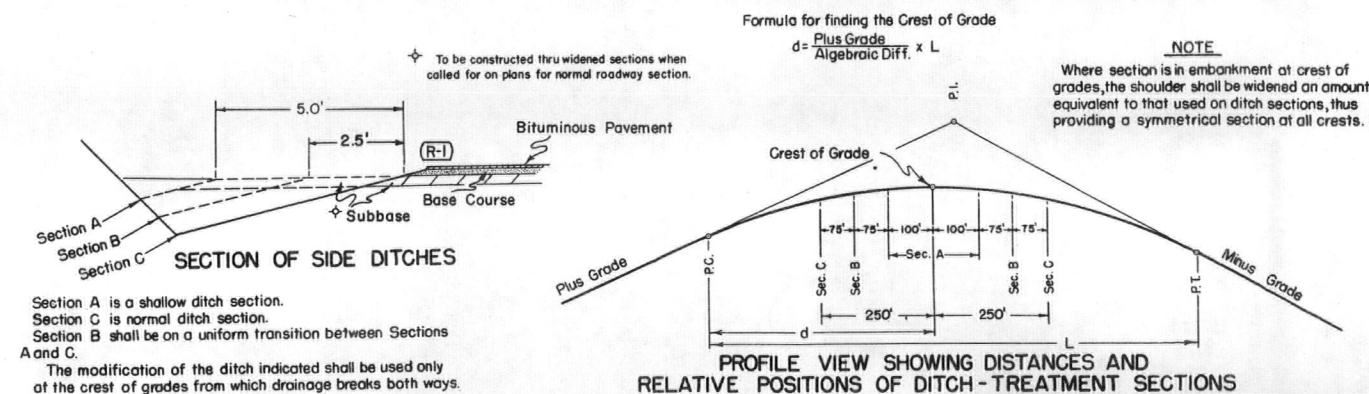
Where practical Side Drains are to be placed in line with the roadway ditches.

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



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)



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
DIVISION OF HIGHWAYS
APPROACH ROADS,
FLARING, CUT SLOPE TREATMENT,
BRIDGE & CREST WIDENING

Designed by A.Z. Approved by J.E. 10/1/65
Made by J.M. & A.B. Staff Design Engr.
Checked by C.R.S. Date: July 1, 1965.

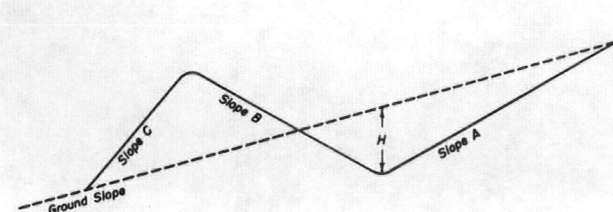
STANDARD TYPES *of* DITCHES *and* CONSTRUCTION METHODS

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

FED. ROAD DES. 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

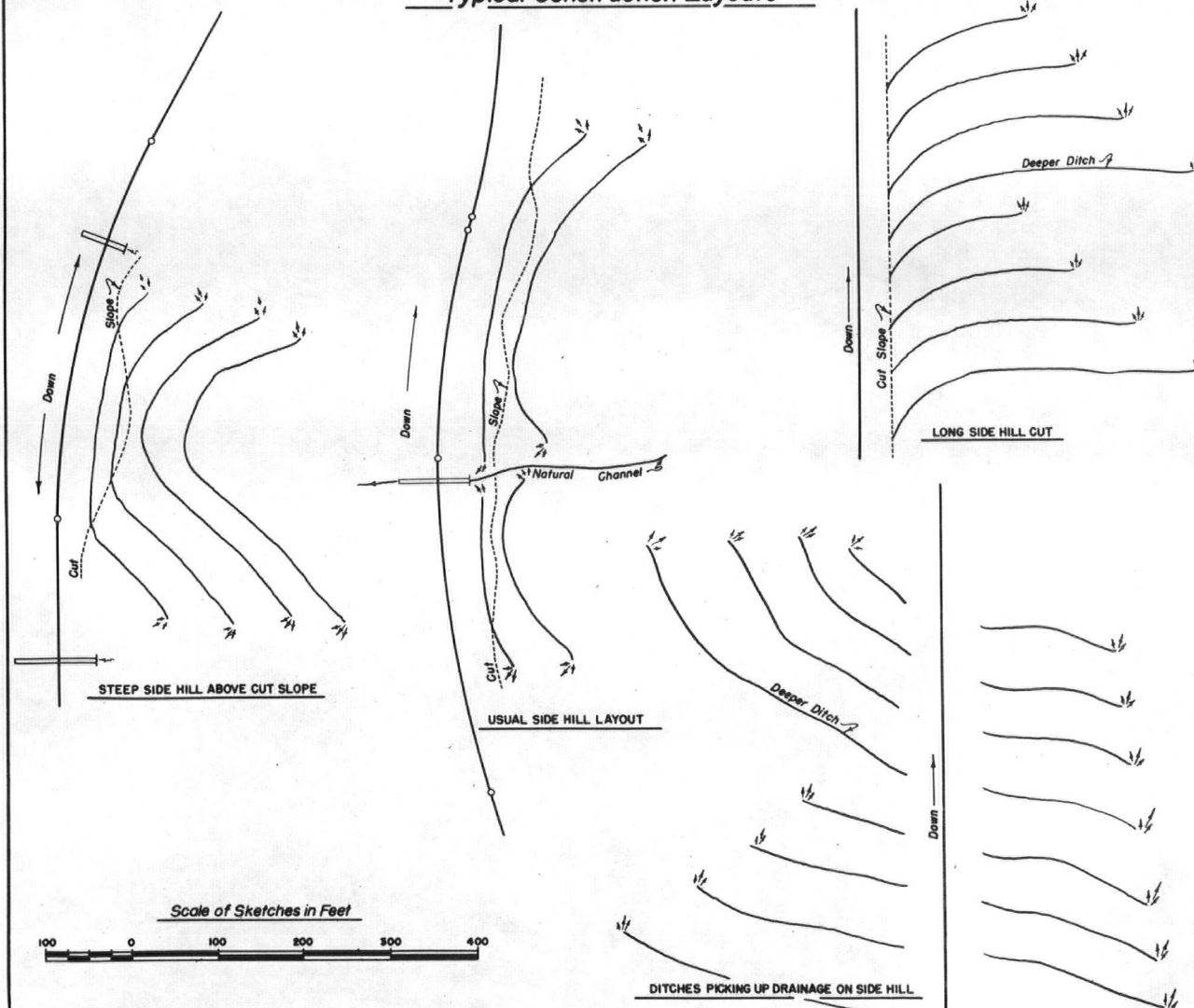
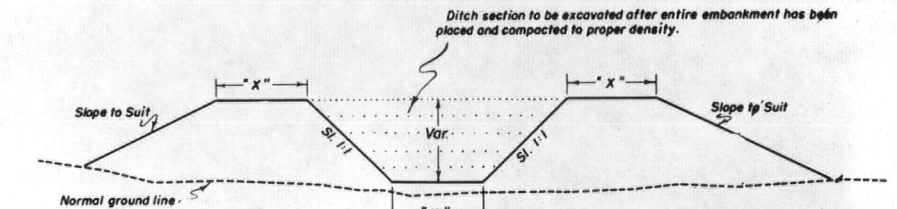


Table of Slopes and Yardages

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

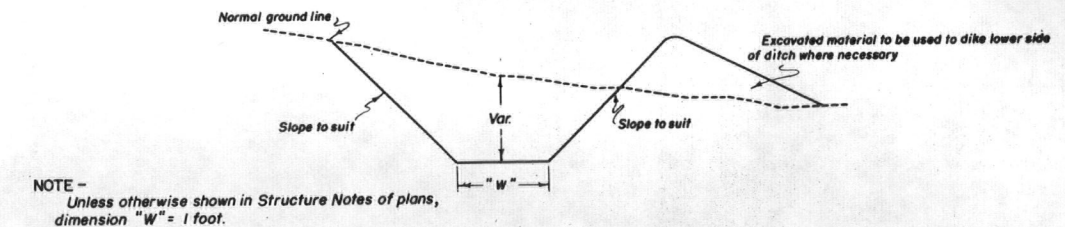
Slopes are approximate and may be varied to suit conditions encountered during construction.

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



NOTE—
See Structure Notes in plans for dimension "W"
Dimension "X" = W 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			
(R-1)	7-23-68	Dept. Name	M.R.H.

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

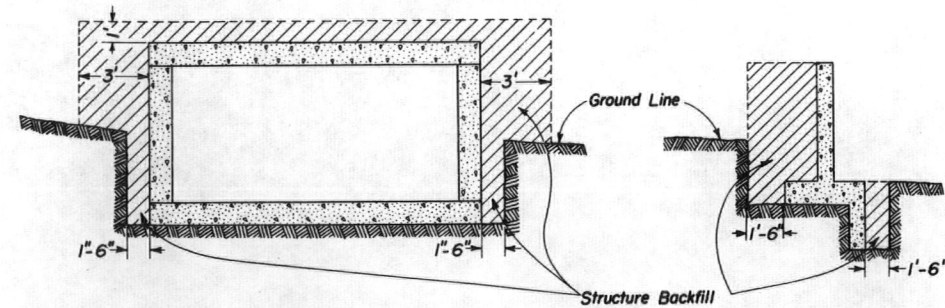
Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of 1.0%. Details of checks will be shown on plans when required.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

DITCH TYPES

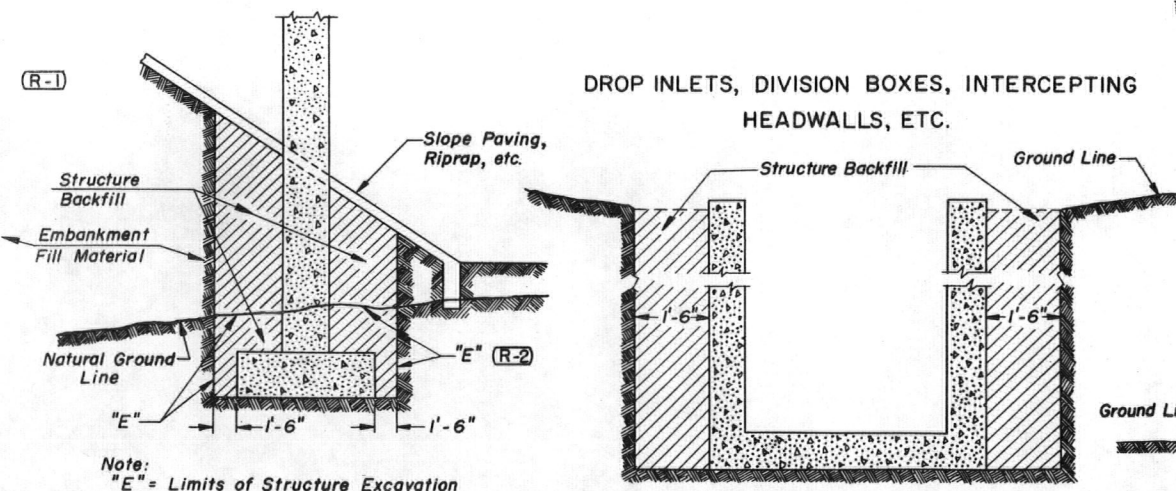
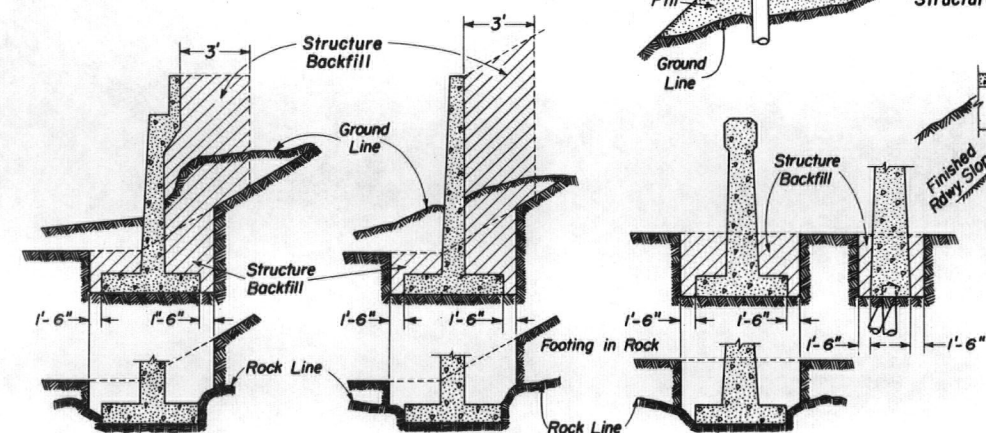
Designed by C.G.M. Approved by *[Signature]*
Made by C.G.M. Staff Design Engr.
Checked by Date: July 1, 1965

CONCRETE BOX CULVERTS & WINGWALLS



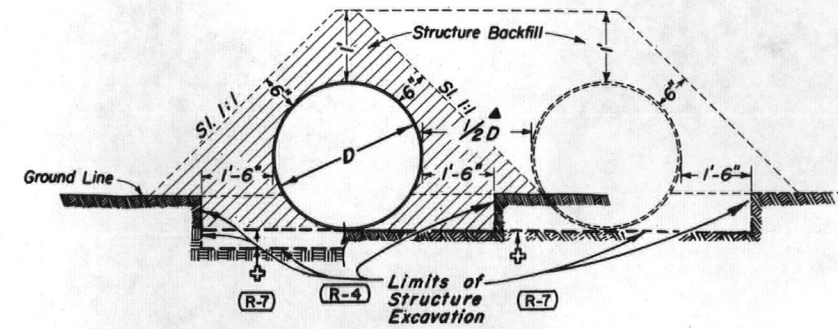
PIERS, ABUTMENTS, RETAINING WALLS ETC.

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.

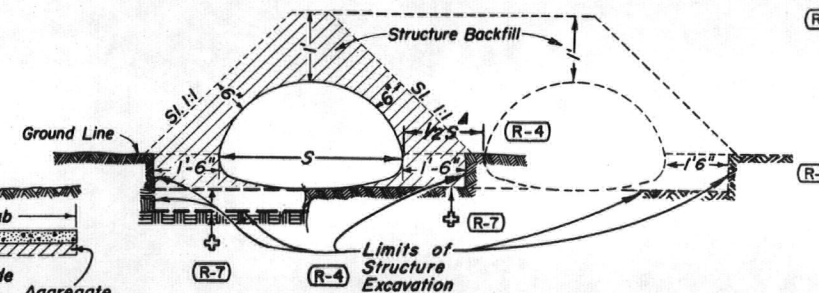


Note: "E" = Limits of Structure Excavation

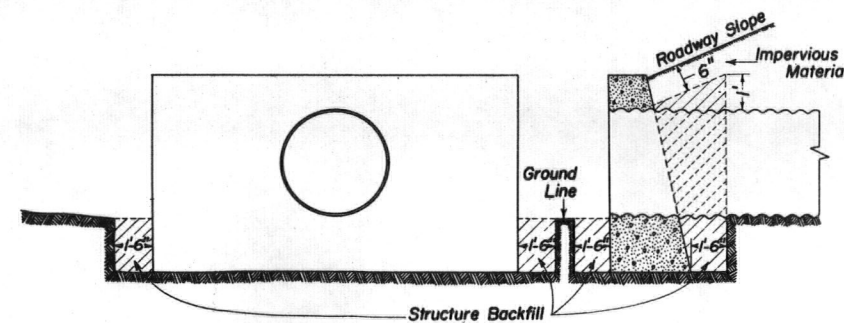
CIRCULAR CONDUIT



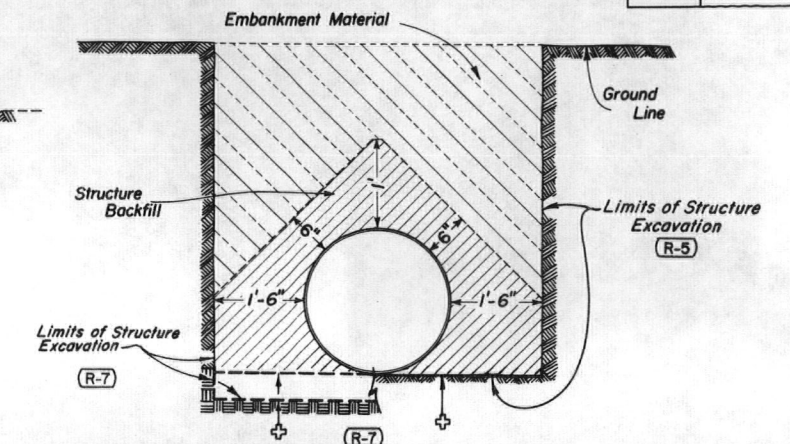
ELLIPTICAL OR ARCH CONDUIT



HEADWALLS AND END OF CULVERTS



SIPHONS OR CONDUIT IN TRENCH



NOTES:

When two or more conduits are laid side by side they shall be spaced so that adjacent sides of pipe shall be $\frac{1}{2}$ the Diameter or Span or 3 feet apart whichever is less. Minimum spacing shall not be less than 1 foot.

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

Bottom of trench as excavated. For applicable limits of Structure Excavation, see bedding details on standards for metal, reinforced concrete, and structural plate pipe culverts.

GENERAL NOTES

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

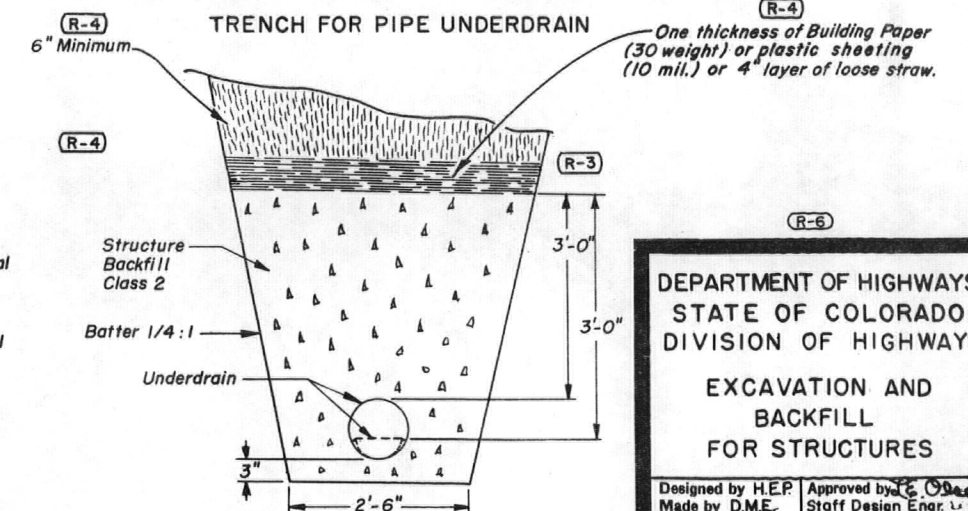
Where the roadway cross section is in fill, excavation for concrete footings (except those in rock or those on piles) and for box culverts shall be done according to the following:

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

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

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

TRENCH FOR PIPE UNDERDRAIN



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
EXCAVATION AND
BACKFILL
FOR STRUCTURES

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

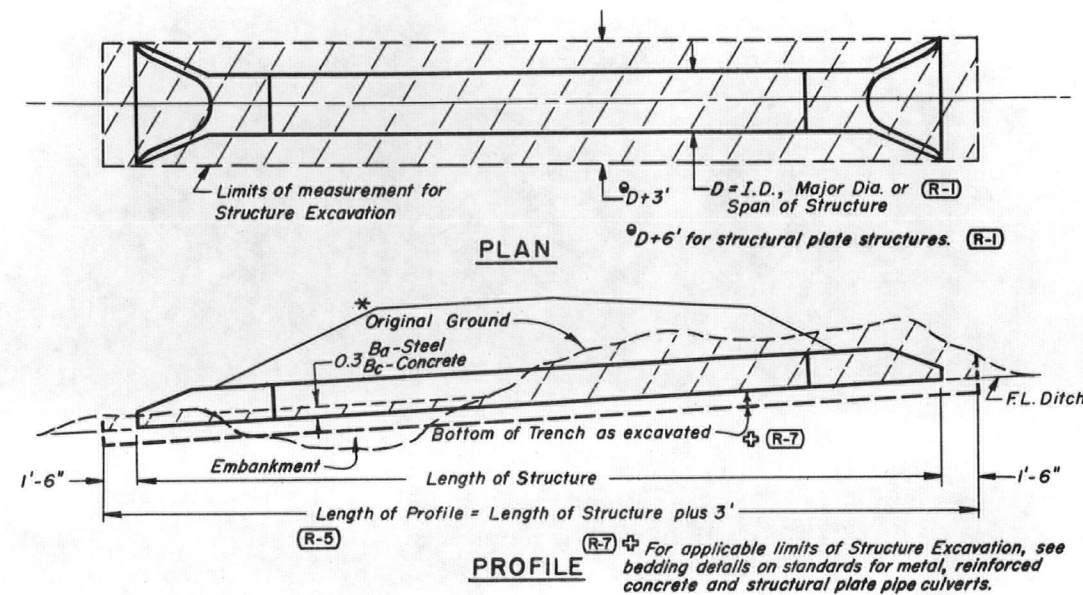
STANDARD M-206-A

(SHEET 2)
(JULY 1, 1965)

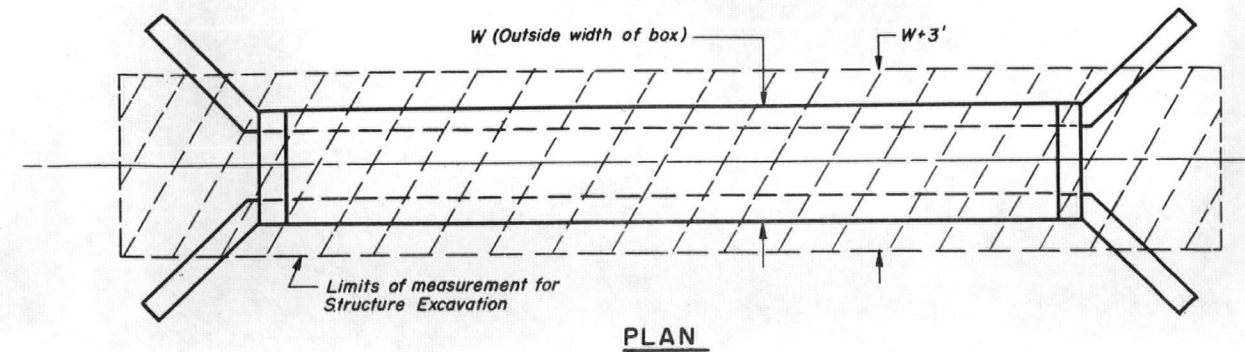
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS:			
(R-1)	3-17-67	I. D. on Pipe Culvert Span or D.	M.R.H.
(R-2)	4-26-68	Structure Excavation in Fill	M.R.H.
(R-3)	7-23-68	Dept. Name & Detail	M.R.H.
(R-7)	11-1-68	Limit Str. Excavation	M.R.H.

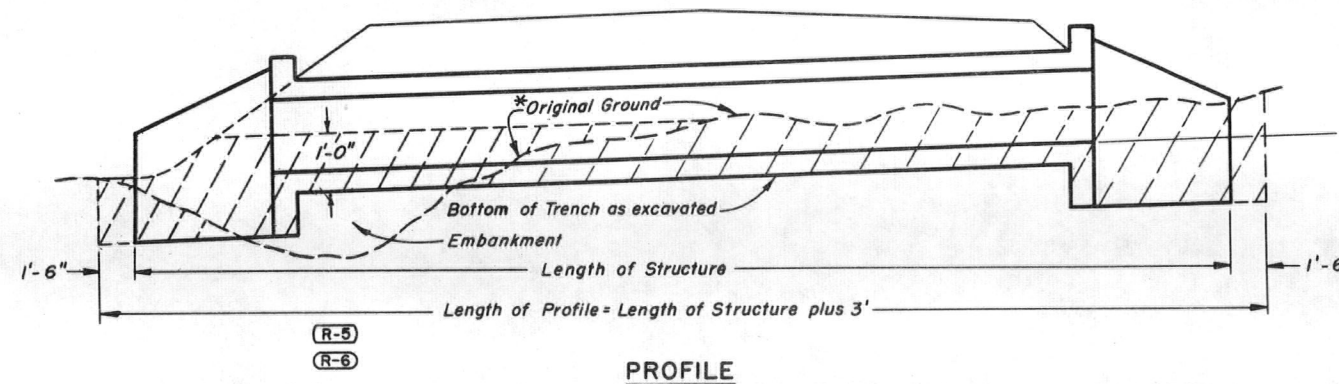
STRUCTURE EXCAVATION MEASUREMENT FOR PIPE CULVERTS



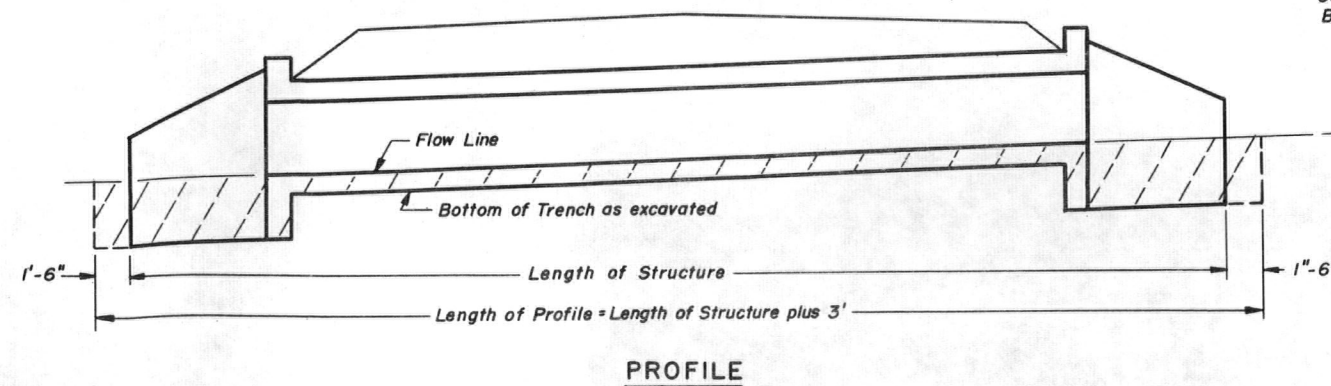
STRUCTURE EXCAVATION MEASUREMENT FOR CONCRETE BOX CULVERTS



Without Channel Change or Channel Improvement

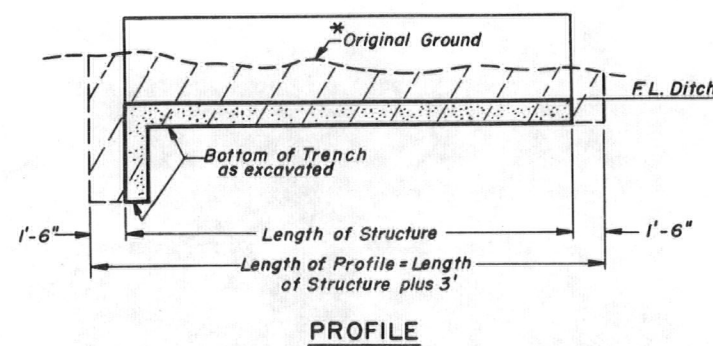
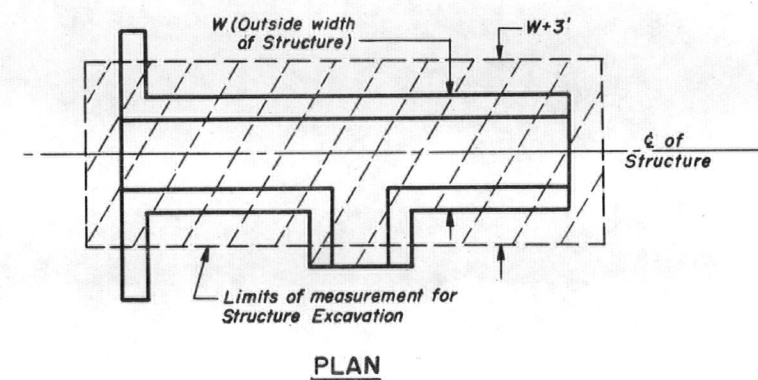


With Channel Change or Channel Improvement



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

STRUCTURE EXCAVATION MEASUREMENT FOR DIVERSION OR DIVISION BOXES



* Along Center of Structure

Areas to be used for Structure Excavation computations.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

EXCAVATION AND BACKFILL FOR STRUCTURES

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

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

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			
REVISIONS				
(R-1)	4-5-68	Added notes.		M.R.H.
(R-2)	7-23-68	Dept. Name. & Ø Note		M.R.H.

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

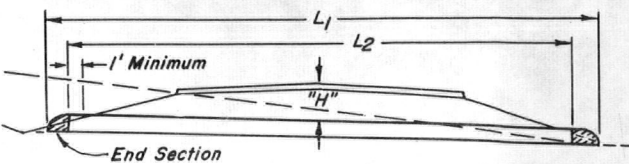
PIPE SIZE (B _g) Inches	AREA (Sq. Ft.)	HEIGHT OF FILL OVER TOP OF PIPE IN FEET															
		1 to 10	10+ 15	15+ 20	20+ to 25	25+ to 30	30+ to 35	35+ to 40	40+ to 45	45+ to 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100	
G A G E																	
12	0.8	16	16	16	16	16	16	16	16	16	16	16	16	16	14	12	
15	1.2	16	16	16	16	16	16	16	16	16	16	16	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	14	12	10	8							
42	9.6	16	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													

TABLE II
CORRUGATED STEEL PIPE ARCH

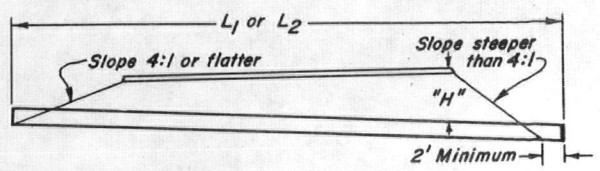
(2" x 1/2") OR (2-2/3" x 1/2") CORRUGATIONS

PIPE SIZE Span- Rise (Inches)	AREA (Sq. Ft.)	CORNER RADIUS (Inches)	GAGE					
			HEIGHT TOP OF 1.5 to 7	OF 7+ to 8	FILL PIPE 8+ to 9	IN 9+ to 10	OVER 10+ to 12	FEET 12+ to 13
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.

L₁ = Length of Culvert to be measured when placed in accordance with Section 617.

L₂ = Length of pipe to be measured when placed in accordance with Section 603.

(R-1) Length of extension, when placed in accordance with Section 617, shall be the actual number of feet of new culvert required.

TABLE III
CORRUGATED STEEL PIPE

3" x 1" CORRUGATIONS

PIPE SIZE (B _g) 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	
		G A G E													
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

PIPE SIZE (B _a) 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+ 35	35+ to 40	40+ 45	45+ 50	50+ to 55	55+ to 60	60+ to 70	70+ to 80	80+ to 90	90+ to 100	
G A G E																	
36	7.1	16	16	16	16	16	16	14	14	14	12	12	12	12	10		
42	9.6	16	16	16	16	16	16	14	14	12	12	12	10	8			
48	12.6	16	16	16	16	16	14	14	12	12	12	10	8				
54	15.9	16	16	16	16	16	14	14	12	12	10	8					
60	19.6	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.

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

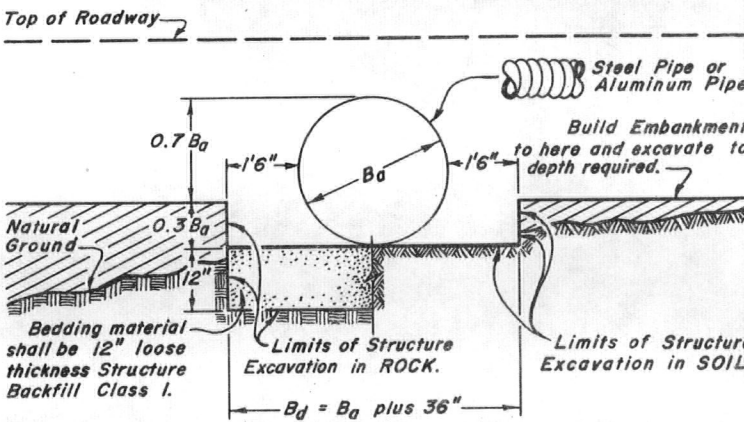
3/8" rivets may be used on pipes with gages to the right of or below the heavy solid line.

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
43 x 27	6.4	7 3/4	G A G E				
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			
							

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.

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 stated by the Engineer but in no case shall it be less than shown in the following tabulation:

Diameter of Culvert (B _g)	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 VII)

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 its designated fill height. (Tables II, V, and VII)

GENERAL NOTES (Continued)

When a culvert is to be extended with pipe of different material, the connection shall conform to the detail on plans or be approved.

Ø May not be available. The designer should contact supplier before calling for the sizes denoted by this symbol.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

METAL CULVERT PIPE
H-20 LOADING

Designed by M.R.H. Approved by J.R.B.
Made by J.R.B. Staff Design Engineer
Checked by R.S.M. Date: March 20, 1967

STANDARD M-603-RC

(MARCH 20, 1967)

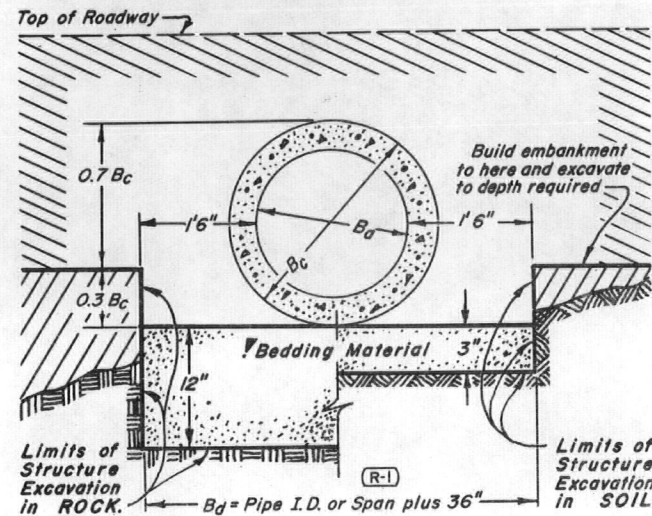
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

REVISIONS		
(R-1)	4-19-68	Add Arch and Elliptical Pipe. Gen. Notes.
(R-2)	7-23-68	Dept. Name.

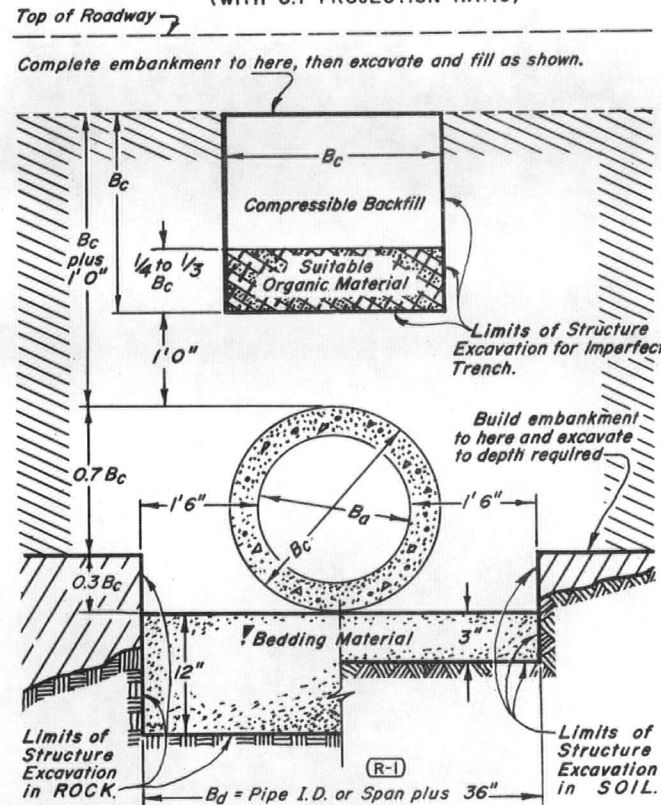
(R-1)

NOTE: B_c is the outside dimension for diameter, span or rise.

PIPE INSTALLATION (WITH 0.7 PROJECTION RATIO)



IMPERFECT TRENCH PIPE INSTALLATION (WITH 0.7 PROJECTION RATIO)



Bedding Material for SOIL shall be 3" loose thickness Structure Backfill Class 3.
Bedding Material for ROCK shall be 12" loose thickness Structure Backfill Class 1.

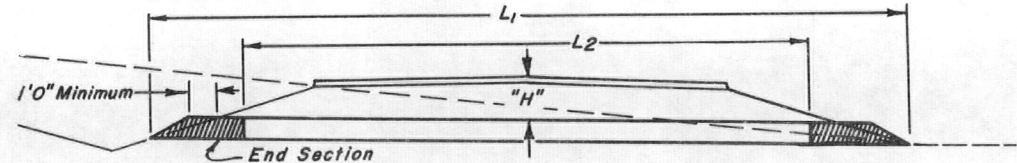
DIMENSIONS FOR REINFORCED CONCRETE PIPE (For Information Only)

CIRCULAR						ARCH		(VE) VERTICAL ELLIPTICAL				(HE) HORIZONTAL ELLIPTICAL			
▲ PIPE SIZE- B_d (In. I.D.)	Wall Thickness (Inches)	0.3 B_c (Outside Dia.) (Feet)	ϕ Span (Inches)	ϕ Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)	Span (Inches)	Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)	Span (Inches)	Rise (Inches)	Wall Thickness (Inches)	0.3 Outside Rise (Feet)	
12	2	0.40													
15	2-1/4	0.49	18	11	2-1/4	0.39					23	14	2-3/4	0.49	
18	2-1/2	0.58	22	13	2-1/2	0.45									
21	2-3/4	0.66	25	16	2-3/4	0.54					30	19	3-1/4	0.66	
24	3	0.75	29	18	3	0.60					34	22	3-1/2	0.73	
27	3-1/4	0.84													
30	3-1/2	0.92	36	22	3-1/2	0.73					38	24	3-3/4	0.79	
33	3-3/4	1.01									42	27	3-3/4	0.86	
36	4	1.10	43	27	4	0.88	29	45	4-1/2	1.35	45	29	4-1/2	0.95	
39															
42	4-1/2	1.28	50	31	4-1/2	1.00	32	49	4-3/4	1.46	49	32	4-3/4	1.04	
48	5	1.45	58	36	5	1.15	34	53	5	1.58	53	34	5	1.10	
							38	60	5-1/2	1.78	60	38	5-1/2	1.23	
54	5-1/2	1.62	65	40	5-1/2	1.28	43	68	6	2.00	68	43	6	1.38	
60	6	1.80	72	44	6	1.40	48	76	6-1/2	2.23	76	48	6-1/2	1.53	
66	6-1/2	1.97					53	83	7	2.43	83	53	7	1.68	
72	7	2.15	88	54	7	1.70	58	91	7-1/2	2.65	91	58	7-1/2	1.83	
78	7-1/2	2.32					63	98	8	2.85	98	63	8	1.98	
84	8	2.50	102	62	8	1.95	68	106	8-1/2	3.08	106	68	8-1/2	2.13	
90	8-1/2	2.68	115	72	8-1/2	2.23	72	113	9	3.28	113	72	9	2.25	
96	9	2.85	122	77	9	2.38	77	121	9-1/2	3.50	121	77	9-1/2	2.40	
102	9-1/2	3.02					82	128	9-3/4	3.69	128	82	9-3/4	2.54	
108	10	3.20	138	87	10	2.68	87	136	10	3.90	136	87	10	2.68	

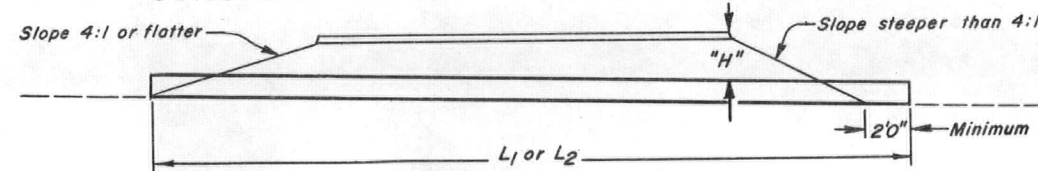
Also equivalent round dimension for Arch and Elliptical pipe.

Sizes shown are for identification purposes only. Actual sizes shall conform to those listed in Fig. 1 of ASTM Spec. C506.

CONCRETE CULVERT WITH END SECTIONS



CONCRETE 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.

Length of extension, when placed in accordance with Section 617, shall be the actual number of feet of new culvert required.

HEIGHTS OF FILL OVER REINFORCED CONCRETE PIPE — ALL SIZES —

TYPE OF PIPE	HEIGHT OF FILL OVER TOP OF PIPE IN FEET (0.01" Crack D-Load)					
	CLASS OF PIPE					
	Class II Class VE II Class HE II	Class III Class VE III Class HE III	Class IV Class VE IV Class HE IV	Class V Class VE V Class HE V	Class VI Class VE VI Class HE VI	Class VII Class VE VII Class HE VII
	1000 D	1350 D	2000 D	3000 D	4000 D	
PIPE INSTALLATION WITH 0.7 PROJECTION RATIO						
CIRCULAR	Min. to 18	Min. to 25	25+ to 37	37+ to 45		
ARCH	Min. to 18	Min. to 25	25+ to 37	37+ to 45	45+ to 62	
VERTICAL ELLIPTICAL	Min. to 18	Min. to 25	25+ to 37	37+ to 45		
HORIZONTAL ELLIPTICAL	Min. to 18	Min. to 25	25+ to 37			
PIPE INSTALLATION WITH IMPERFECT TRENCH						
ALL TYPES	up to 35	up to 48	48+ to 75	75+ to 96		

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.
Minimum cover excluding pavement shall be 1 foot.

Fill heights greater than maximum allowed in the Heights of Fill Table on this sheet will require special design of structure.

Pipe design is based on safety factor of 1.33 on ultimate strength.

The heights of fill over top of pipe are based on unit weight of soil at 120 lbs. per cubic foot.

Pipe Class is determined from .01 inch crack D-load.

Class II pipe shall not be used on main roadway but is permissible in medians, road approaches and other areas not subject to repeated traffic loads.

Changes in design factors will require compensating change in pipe design.

Minimum wall thickness dimensions are based on AASHTO Designation M 170 (Wall B) for Circular Pipe, AASHTO Designation M 206 for Arch Pipe and AASHTO Designation M 207 for Elliptical Pipe.

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

When a culvert is to be extended with pipe of different material, the connection shall conform to the detail on plans or be approved.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

REINFORCED CONCRETE PIPE

Designed by M. R. H. Approved by J. R. B.
Made by J. R. B. Staff Design Eng'r.
Checked by R. S. M. Date: 4-19-68

STANDARD M-612-C

(SHEET 1 OF 2 SHEETS)

JULY 1, 1965

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

REVISIONS			
R-2	1-9-68	Median Crossover, Gen'l. Note	M.R.H.
R-3	7-11-68	Division Name	M.R.H.

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.

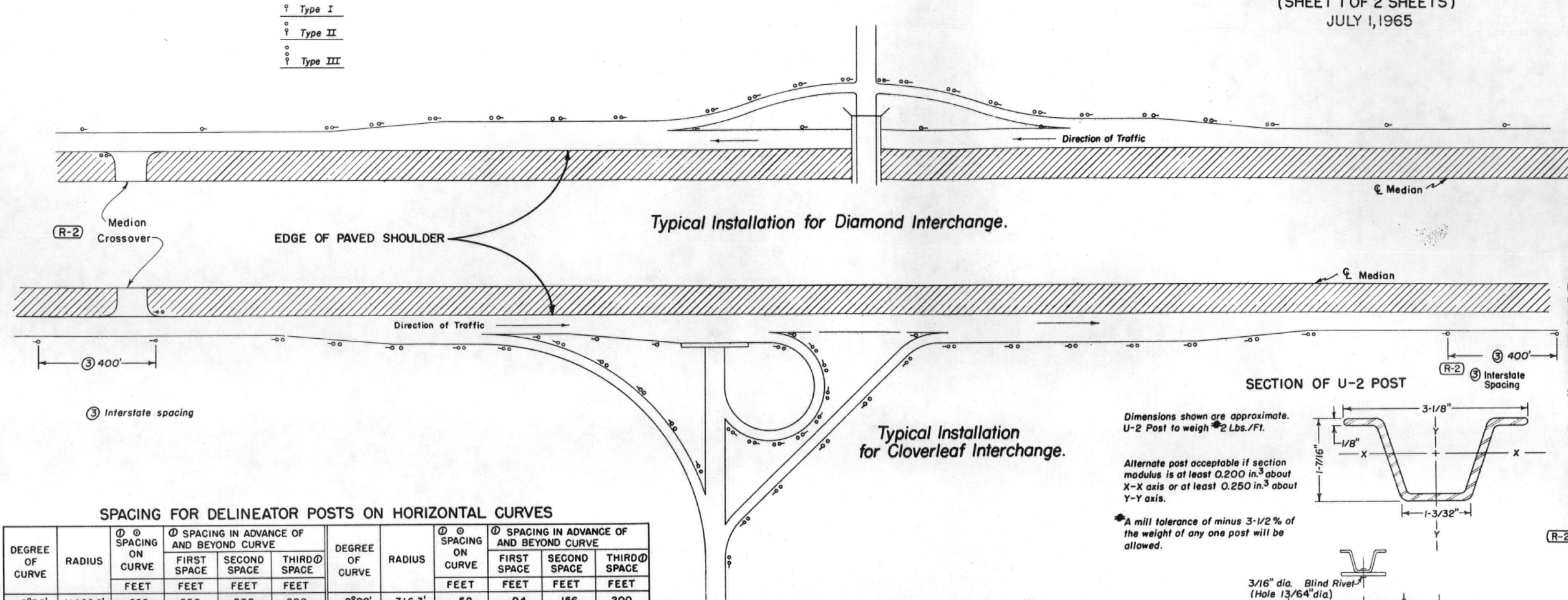
When normal delineator spacing falls on a road approach or crossroad, move delineator either direction a distance not to exceed 1/4 normal spacing.

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.

(R-2) Delineators will not be required on tangents for Primary and Secondary roadways.



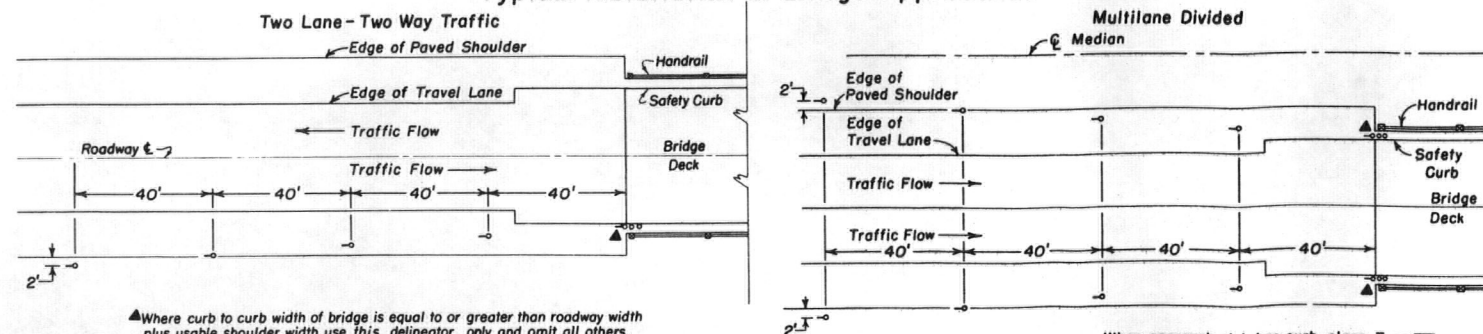
SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

DEGREE OF CURVE	RADIUS	SPACING IN ADVANCE OF AND BEYOND CURVE				DEGREE OF CURVE	RADIUS	SPACING IN ADVANCE OF AND BEYOND CURVE			
		SPACING ON CURVE	FIRST SPACE	SECOND SPACE	THIRD SPACE			SPACING ON CURVE	FIRST SPACE	SECOND SPACE	THIRD 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						

$S = 2 \sqrt{R-50}$ 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.

Typical Installation at Bridge Approaches



▲ 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.

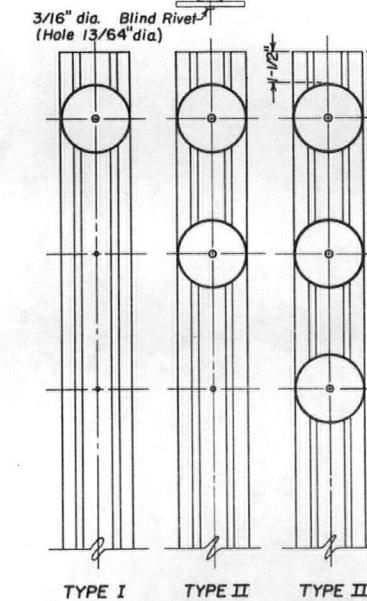
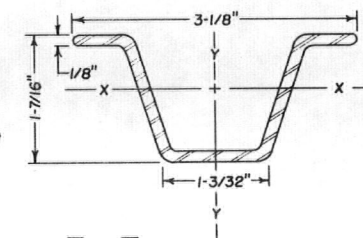
When approach slab has curb, place Type III delineator immediately behind curb.

SECTION OF U-2 POST

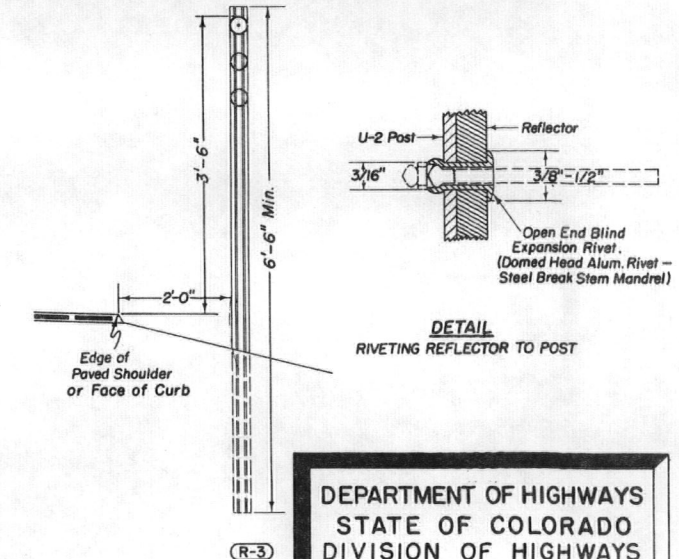
Dimensions shown are approximate.
U-2 Post to weigh 2 Lbs./Ft.

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.



Min. 3 holes in all posts required as shown.



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

DELINEATORS

Designed by CKM
Made by WNC
Checked by LEO
Approved by E. Olson
Staff Design Engr.
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.
(R-2)	1-9-68	Median Crossover	M.R.H.
(R-3)	7-11-68	Division Name	M.R.H.

GENERAL NOTES

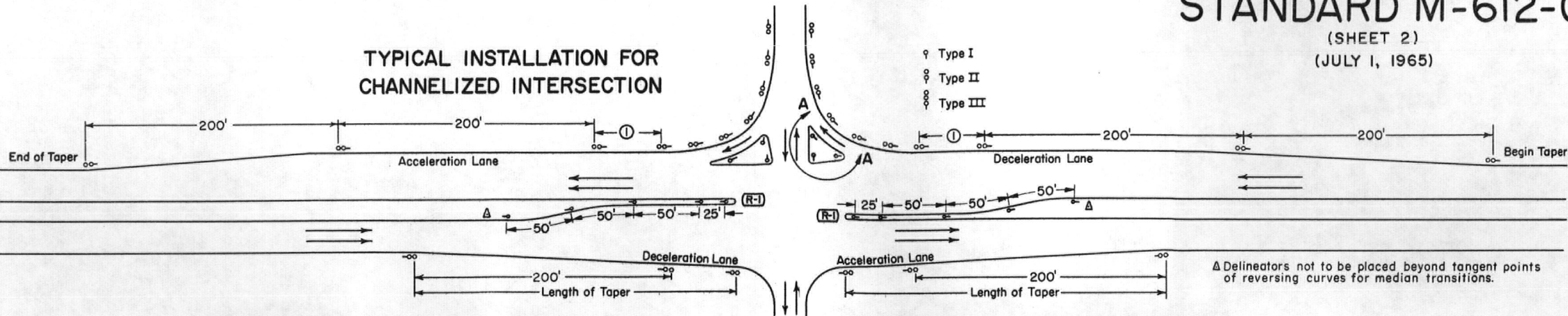
For Radii greater than 200 Feet, use spacing from Table included on Sheet 1 of this Standard.

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

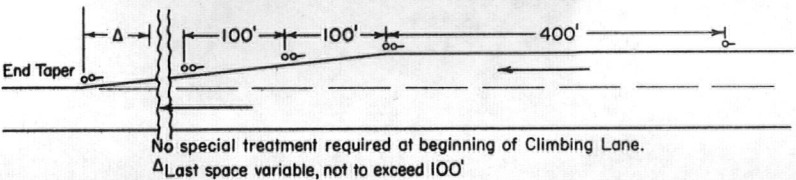
Place face of button at 90° to C of roadway.

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

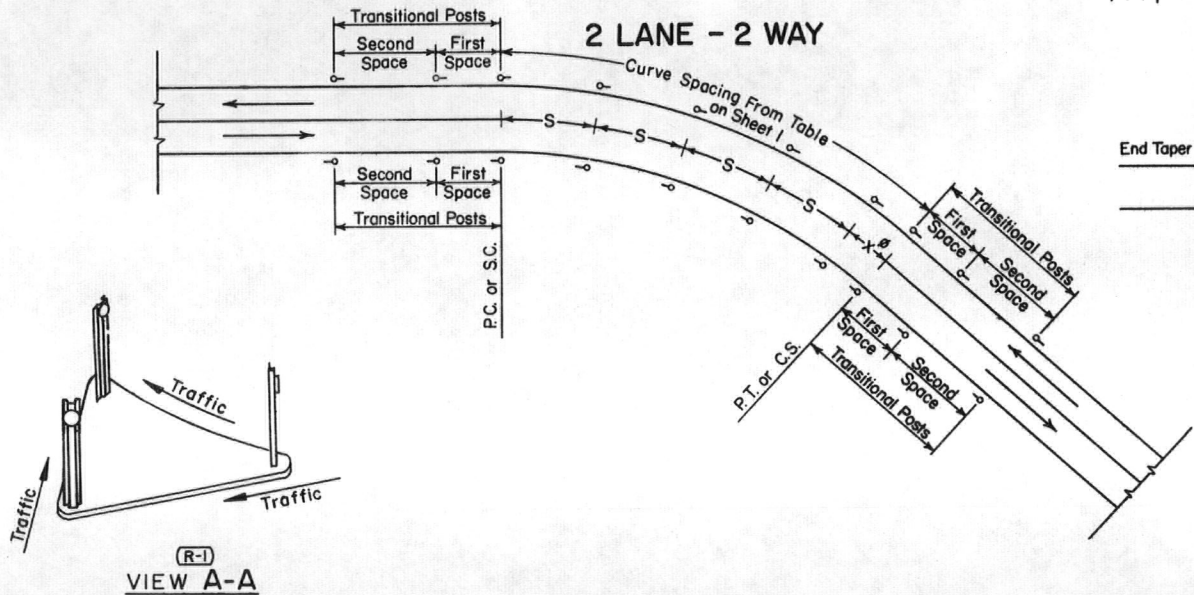
TYPICAL INSTALLATION FOR
CHANNELIZED INTERSECTION



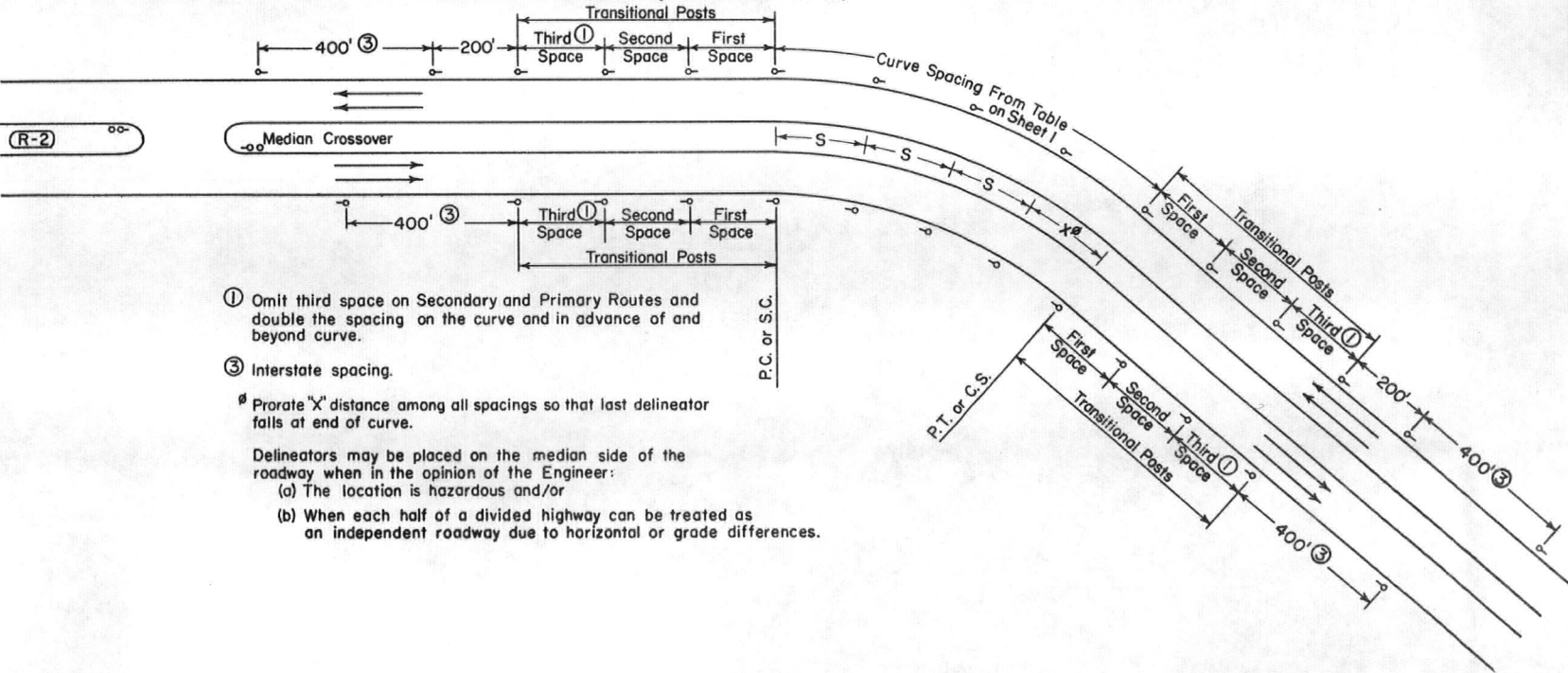
TYPICAL INSTALLATION FOR
CLIMBING LANE TRANSITION



2 LANE - 2 WAY



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.

(R-1)
VIEW A-A

(R-2)

(R-3)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

DELINEATORS

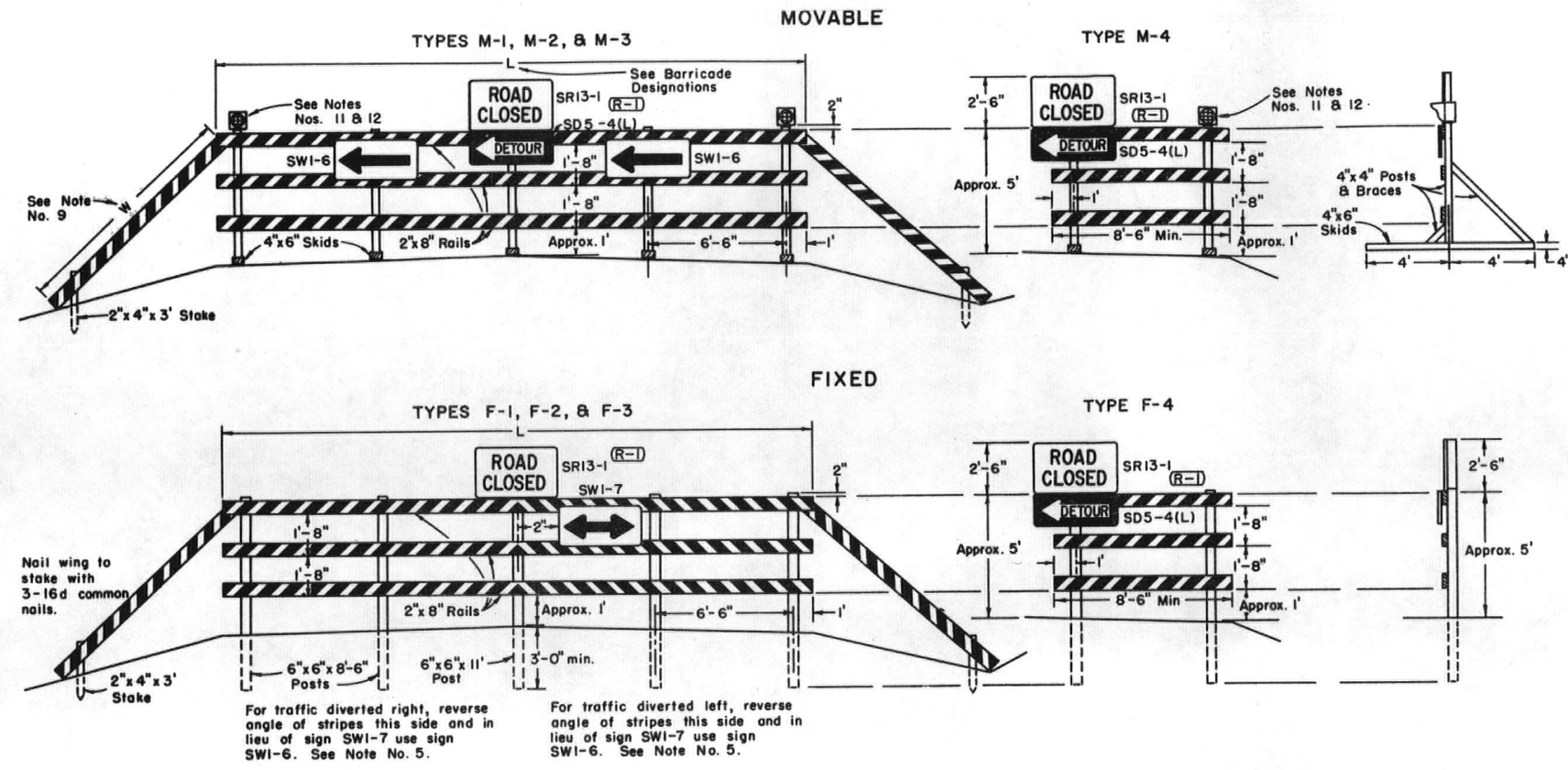
Designed by C.K.M. Approved by J.C. O'Connell
Made by T.E.F. Staff Design Engr.
Checked by L.E.O. Date: July 1, 1965

STANDARD M-614-A

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DISTRICT	PROJECT NO.	SHEET NO.
9	COLORADO		
REVISIONS			
(R-1)	11-15-68	Rev. Dept. Name & Code Nos.	JLS
(R-2)	4-23-69	Rev. Code No. & Notes	JLS

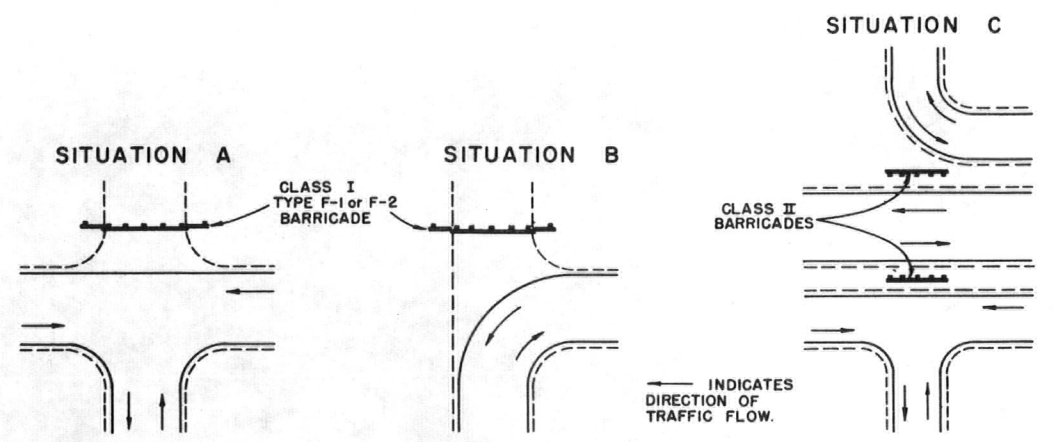
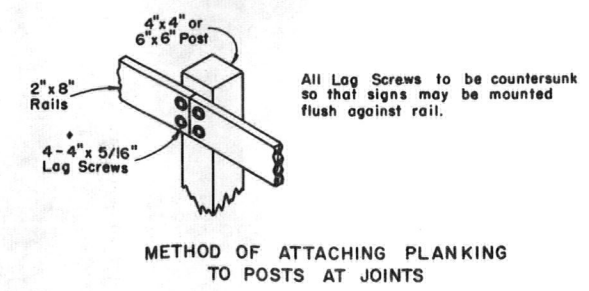
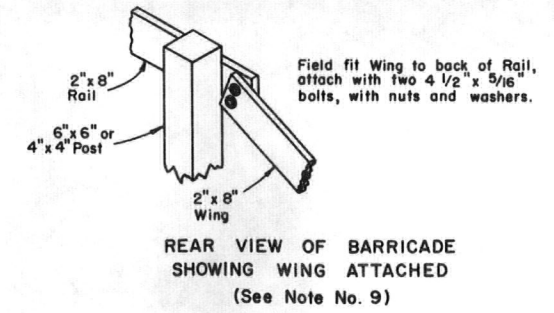
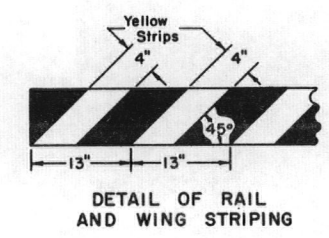
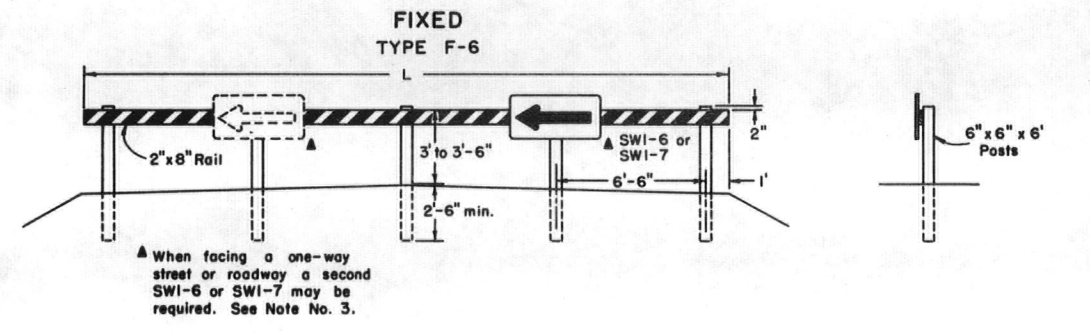
CLASS I BARRICADES (3 RAILS)



GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications applicable to the Project.
- 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 Division of Highways and this standard.
- 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.
- 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 Division.
- 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."
- 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."
- 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.
- All timber shall be Standard Grade or better, S4S, Douglas Fir or Larch, as described in the 1965 Standard Grading Rules published by the Western Wood Products Association, and shall conform to paragraph 123c for the rails and paragraphs 122c and 125c for the posts.
- 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.
- Alternate materials or other reflective elements on Traffic signs or Barricades will be permitted only after approval of such material by the Division in writing.
- 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).
- 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.
- Flashing Beacons and Flashers, when used, shall be positioned above the top rail of the barricades to produce the most effective results.
- Barricades used as "Traffic Controls for Highway Construction" are not to be paid for separately.
- Barricades will be paid for separately when designated on plans as bid items.
- 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 II, published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).

CLASS II BARRICADE (1 RAIL)



BARRICADE DESIGNATIONS					
Class	Type	Roadway Width	L	Description	
(R-1)	I M-1 F-1	26'-34'	28'	Barricade complete with SR13-1 sign and SWI-6 or SWI-7 signs as required.	
(R-2)	I M-2 F-2	35'-44'	41'	Barricade complete with SR13-1 sign and SWI-6 or SWI-7 signs as required.	
(R-1)	I M-3 F-3	Variable	28'	Barricade (without extension wings) complete with SR13-1 sign and SWI-6 or SWI-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
DIVISION OF HIGHWAYS

TIMBER
BARRICADES

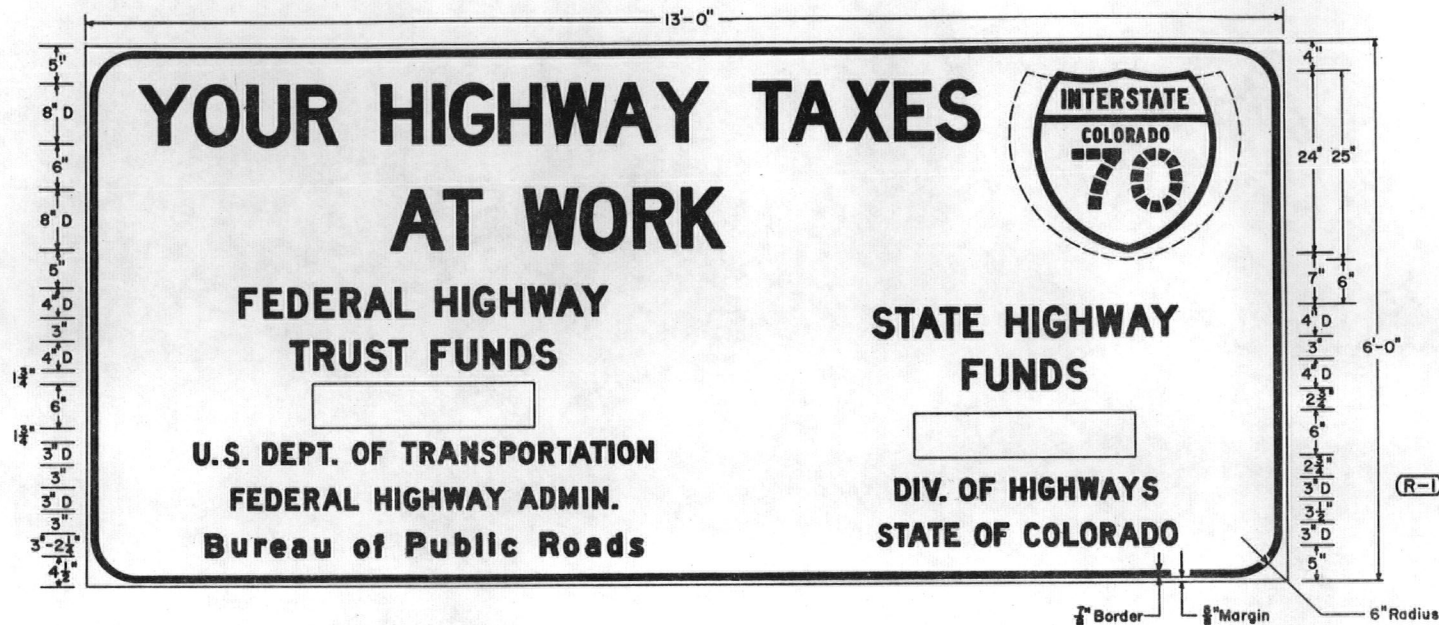
Designed By: D.R.W.
Made By: JLS
Checked By: J.B.

Approved By:
Date: JULY 1, 1965

STANDARD M-614-IC

JULY 5, 1968
(SHEET 1 OF 2 SHEETS)

FEDERAL ROAD REGION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			
REVISIONS				
(R-1)	7-26-68	Rev. Legend and Notes	G.W.F.	
(R-2)	5-20-69	Rev. Lateral Placement	J. J. B.	

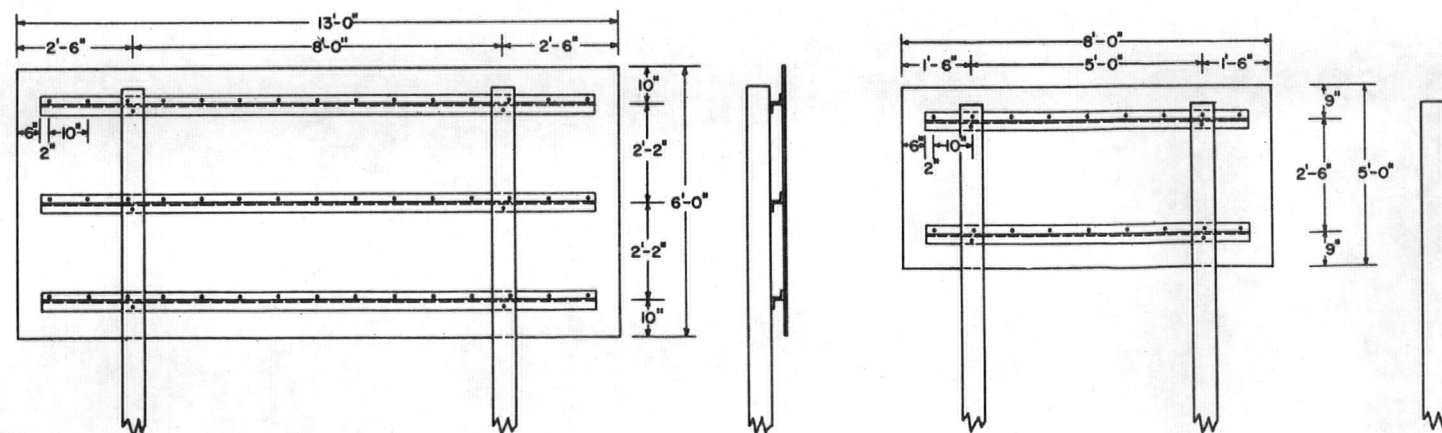


ALTERNATE LEGEND

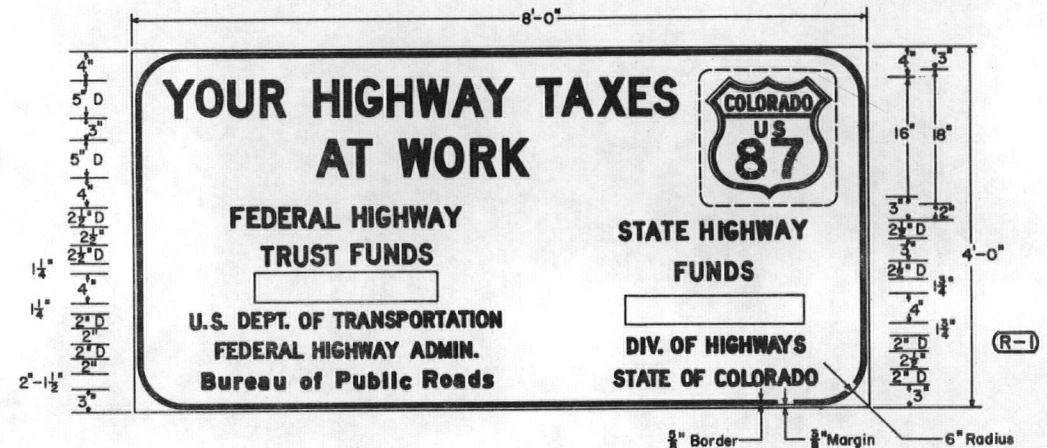
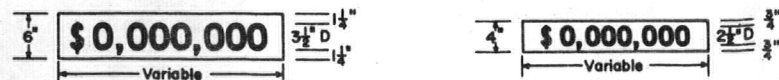
4thD **FEDERAL**

4thD **FUNDS**

FABRICATION DETAILS



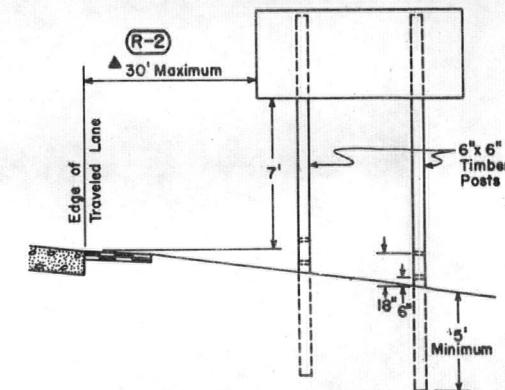
**"AMOUNT OF FUNDS"
PLAQUE DETAILS**



ALTERNATE LEGEND

FEDERAL FUNDS

INSTALLATION DETAIL



GENERAL NOTES

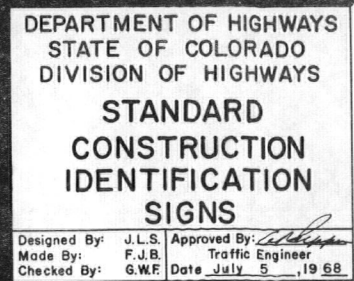
1. These signs shall be furnished and installed by state forces.
2. All work shall be done in accordance with Standard Specifications applicable to the Project.
3. Signs are to be placed facing traffic approaching the Project. They shall be installed at a location where they will not obscure or detract from the effectiveness of other official signs.
- ▲ 4. The lateral placement may be reduced to a minimum of 2 ft. outside of the shoulder edge where necessary to fit field conditions.
5. When these signs are used on Beautification Projects, the words "HIGHWAY" and "TRUST" in lines 3 and 4 shall be deleted and the words "FEDERAL" and "FUNDS" shall be used in accordance with the spacing as shown under "Alternate Legend".
6. Sign panel shall be fabricated with 3/4" plywood.
7. Route Marker plaques and "Amount of Funds" plaques shall be sheet aluminum 0.080" min. thickness.
8. Signs shall have a screen processed black legend and border on a plain white background. "Amount of Funds" plaques shall have a screen processed black legend on a plain white background.
9. Route Marker plaques shall be plain as indicated on the applicable standards.
10. Backing zeos shall be 3" x 2 3/4" x 1/4". Steel zeos shall weigh 6.7 lbs. per ft. and aluminum zeos shall be of 6061-T6 alloy weighing 2.33 lbs. per ft.
11. Posts shall be 6"x6", S4S timber, painted white.
12. Each timber post shall be provided with two 2" diameter holes through the neutral axis, one at 6" and one at 18" above the ground level. The inside portion of each 2" diameter hole shall be painted white.
13. Panels shall be fastened to backing zeos with 1/4" thrust head lockbolt fasteners.
14. Backing zeos shall be fastened to posts with 3/8" machine bolts.
15. Route Marker plaques and "Amount of Funds" plaques shall be fastened to the sign panels with 5/8" #9 round head wood screws.
16. Exposed lockbolt fastener heads and wood screw heads on the face of the sign shall be dipped or painted to match the surrounding color.
17. The underground portion of each timber post shall be treated with creosote.
18. Where a third governmental agency is shown as participating, its official name should be included centrally in lines 6, 7, and 8.
- (R-1) 19. It will not be necessary to change DEPT. to DIV. on any existing signs.

**DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
STANDARD
CONSTRUCTION
IDENTIFICATION
SIGNS**

Designed By:	J.L.S.	Approved By:	<i>[Signature]</i>
Made By:	F.J.B.	Traffic Engineer	
Checked By:	G.W.F.	Date:	July 5, 1968

JULY 5, 1968
(SHEET 2 OF 2 SHEETS)

R-1	7-26-68	Rev. Legend	G.W.F.
R-2	5-20-69	Rev. Lateral Placement	J.J.B.



STANDARD M-614-TB

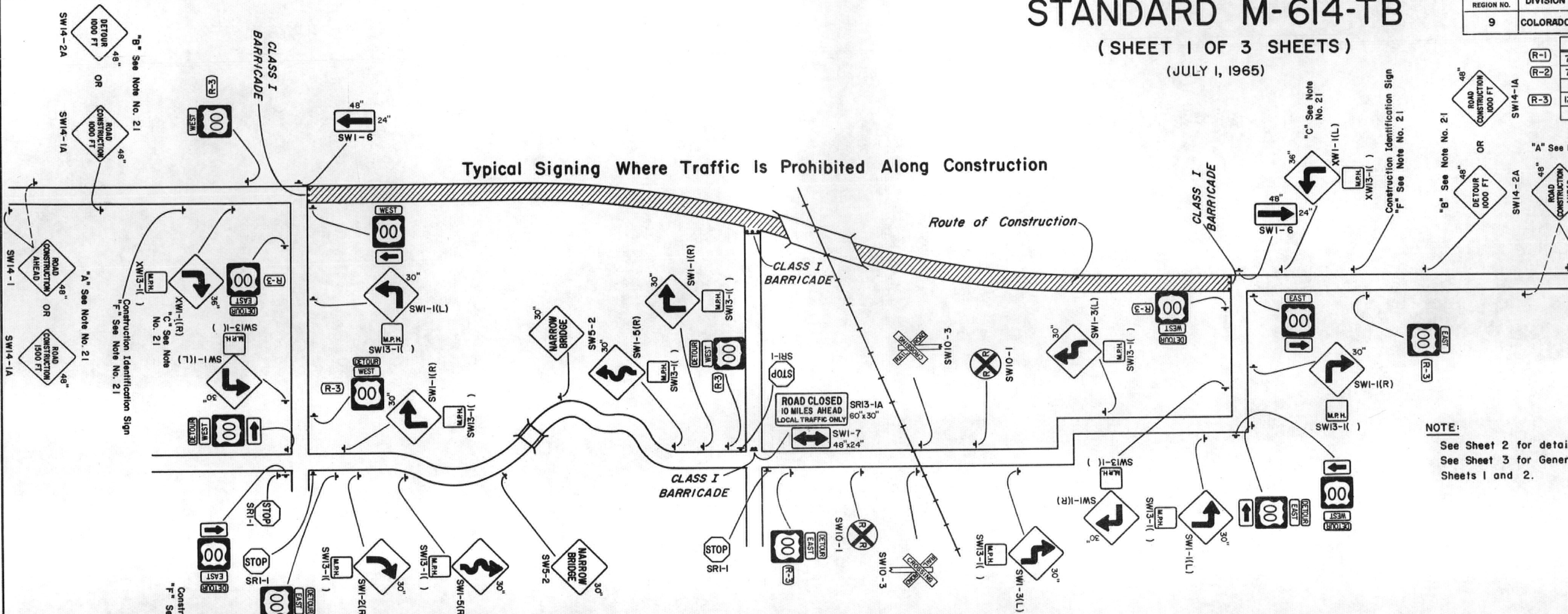
(SHEET 1 OF 3 SHEETS)

(JULY 1, 1965)

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

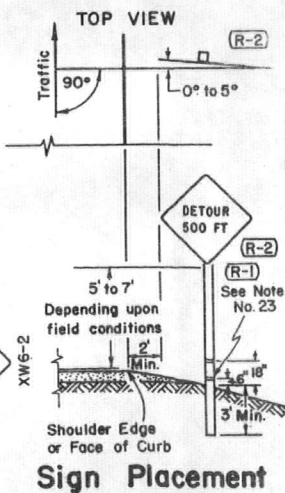
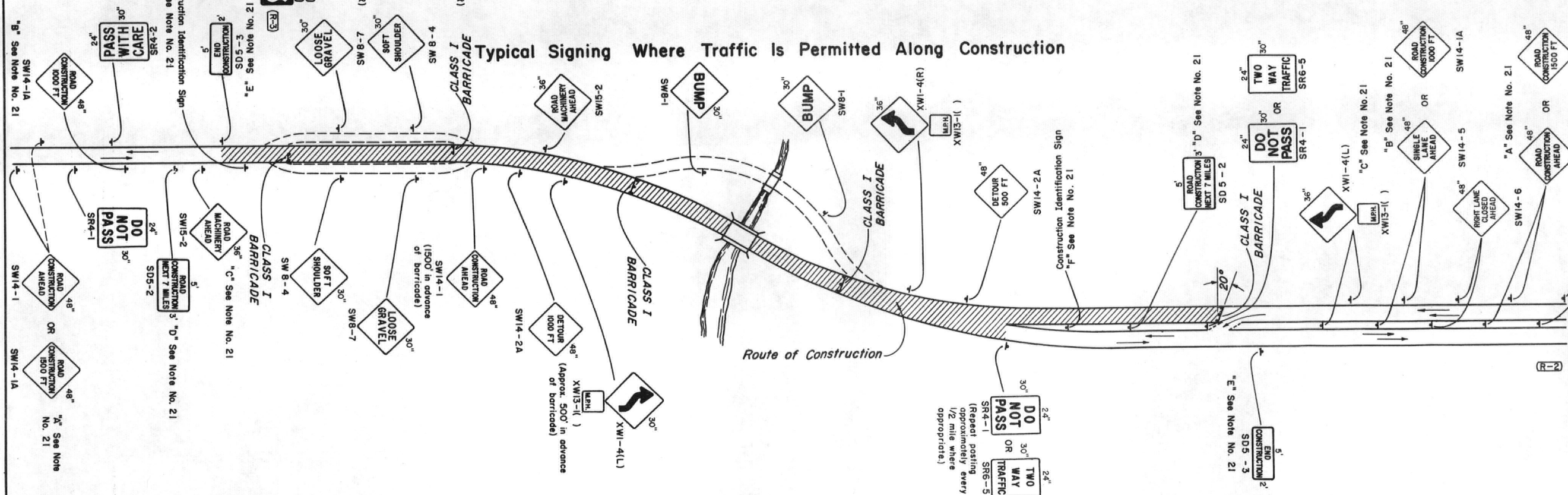
REVISIONS		
R-1	7-12-67	Note 23
R-2	7-8-68	Rev. Break-away, Placement, Code No. 8, Dept. Name
R-3	12-24-68	Rev. U.S. Shields

Typical Signing Where Traffic Is Prohibited Along Construction



NOTE:
See Sheet 2 for detailed drawings of signs.
See Sheet 3 for General Notes applicable to
Sheets 1 and 2.

Typical Signing Where Traffic Is Permitted Along Construction



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
TRAFFIC SIGNING
FOR HIGHWAY
CONSTRUCTION

Designed By: D.R.W. Approved By: J.L.S.
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)

WARNING SIGNS

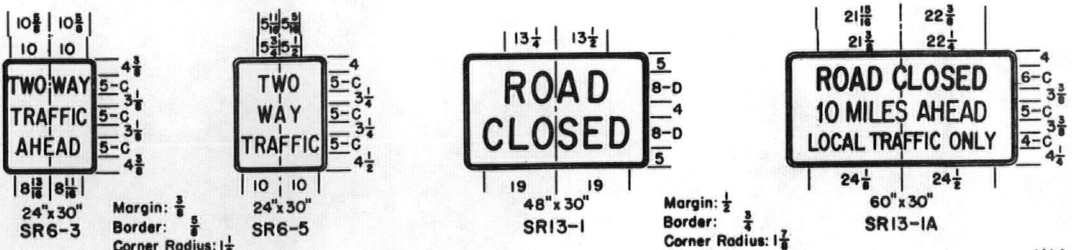
See Note No. 10

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

REVISIONS			
(R-1)	7-12-67		M.R.H.
(R-2)	7-8-68	Rev. Code No. & Dept. Name	G.W.F.
(R-3)	12-24-68	Added Notes	J.L.S.

REGULATORY SIGNS

See Note No. 9



WARNING SIGNS

See Note No. 10

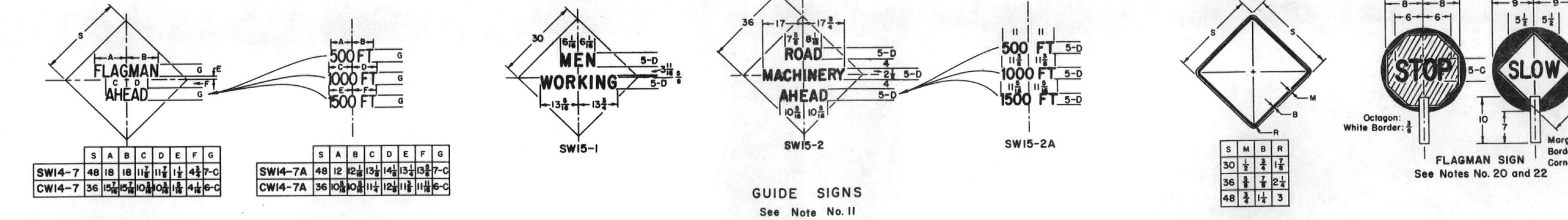
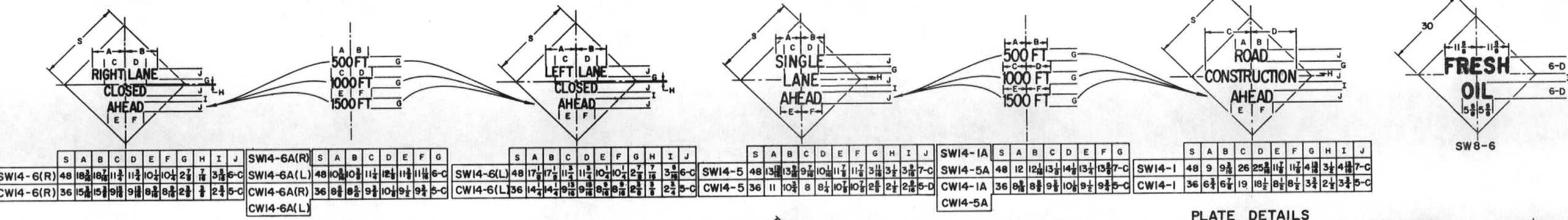
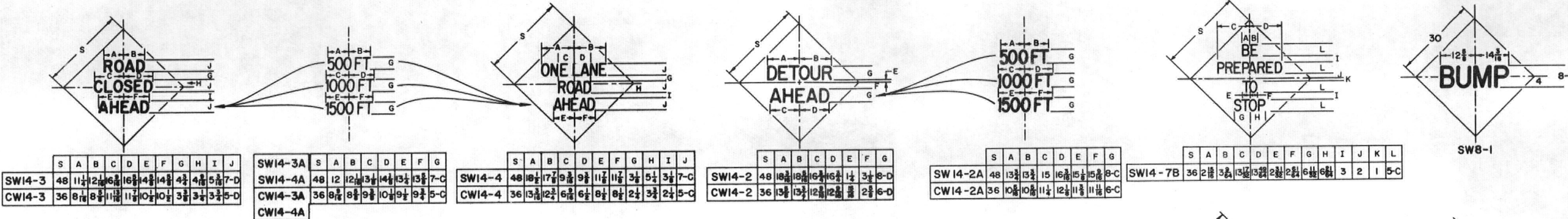
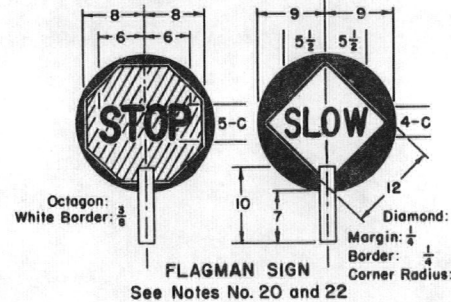
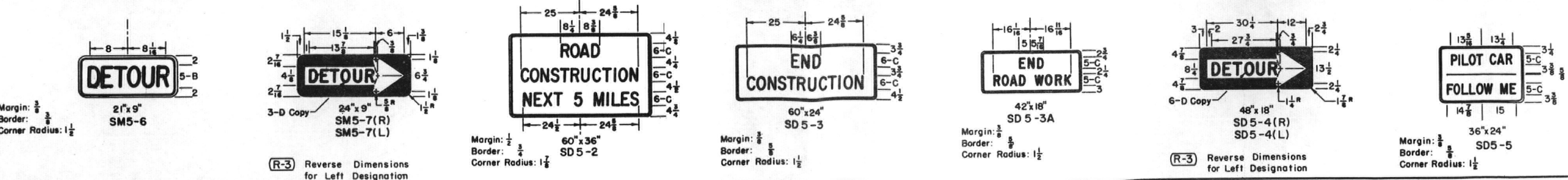


PLATE DETAILS



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.



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
TRAFFIC SIGNING
FOR HIGHWAY
CONSTRUCTION
Designed By: D.R.W.
Made By: H.B.D.
Checked By: J.B.
Approved By: [Signature]
Traffic Engineer
Date: AUGUST 9, 1965

STANDARD M-614-TB

(SHEET 3 OF 3 SHEETS)

(JULY 1, 1965)

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		
REVISIONS			
R-1	7-12-67	Added Note 23	G.W.F.
R-2	7-8-68	Rev. Note 23 & Dept. Name -	G.W.F.
		Deleted Note	G.W.F.
R-3	12-24-68	Rev. Note No. 18	J.L.S.

GENERAL NOTES

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Signs with the prefix "R" in the sign code are Regulatory signs and as such impose legal compulsions or restrictions on drivers and should only be used as authorized by the Engineer.
- Signs with the prefix "W" in the sign code are Warning signs and are used to alert traffic to existing or potentially hazardous conditions.
- Signs with the prefix "D" or "M" in the sign code are Guide signs. Those with the prefix "D" convey general information and those with the prefix "M" are used for marking the traffic route.
- All signs shall be reflectorized unless otherwise specified on plans. Regulatory and Guide 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." Warning 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."
- Painting for wood surfaces shall conform with Section 508 of the Standard Specifications.
- Posts for regulatory, warning, and guide signs will normally be 4"x4" or 6"x6" 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."
- 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.
- All material shall be sound and durable. Barricades, signs, symbols, and lettering shall be of good workmanship. Uneven lettering will not be accepted.
- 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.
- Lanterns and Torches - Lanterns, with red globes, shall be used only in low speed urban areas. Open-flame torches shall not be used under any circumstances.
- Barricades, Flashing Beacons and Flashers - Refer to appropriate "M" Standard (Timber Barricades) for details.
- Flagman Sign - 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.
- Sign "A": 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.
Sign "B": 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.
Sign "C": 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.
Sign "D": SD5-2 - 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.
Sign "E": SD5-3 - 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.
Sign "F": 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.
Signs A through F shall be furnished, installed and maintained by the Department.
- When Flags are used in lieu of the Flagman Sign, they shall be a minimum of 18"x18", 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 Each 6"x6" timber sign post shall be provided with two 2" diameter holes through the neutral axis normal to the roadway, one hole at 6" and one hole at 18" above the ground level. The 4"x4" timber posts shall not be provided with any type of break-away device. The inside portion of each 2" diameter hole shall be painted white. The underground portion of each timber post shall be treated with creosote.

(R-2)

(R-2)

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
TRAFFIC SIGNING
FOR HIGHWAY
CONSTRUCTION

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

STANDARD S-614-29A

(AUG. 1, 1965)

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

REVISIONS			
NO.	DATE	DESCRIPTION	BY
(R-1)	7-11-67	Stopline & Notes	G.W.F.
(R-2)	2-15-68	Diag. edge line & Chevron X-hatch	G.W.F.
(R-3)	7-10-68	Rev. Title Block	G.W.F.

GENERAL NOTES:

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

LANE LINES AND CENTER LINES

1. Broken white, 5 inches wide - 15 foot segments with 25 foot gaps.
2. Solid white, 5 inches wide (if noted).

BARRIER LINES

1. Solid yellow, 5 inches wide.
2. Apply parallel to and spaced 3 inches from other indicated line.

(R-2) EDGE LINES

1. Parallel - Solid white, 3 inches wide.
2. Diagonal - Solid white, 12 inches wide, spaced at intervals of 20' - 100'.

CHANNELIZING LINES

1. Solid white, 10 inches wide.

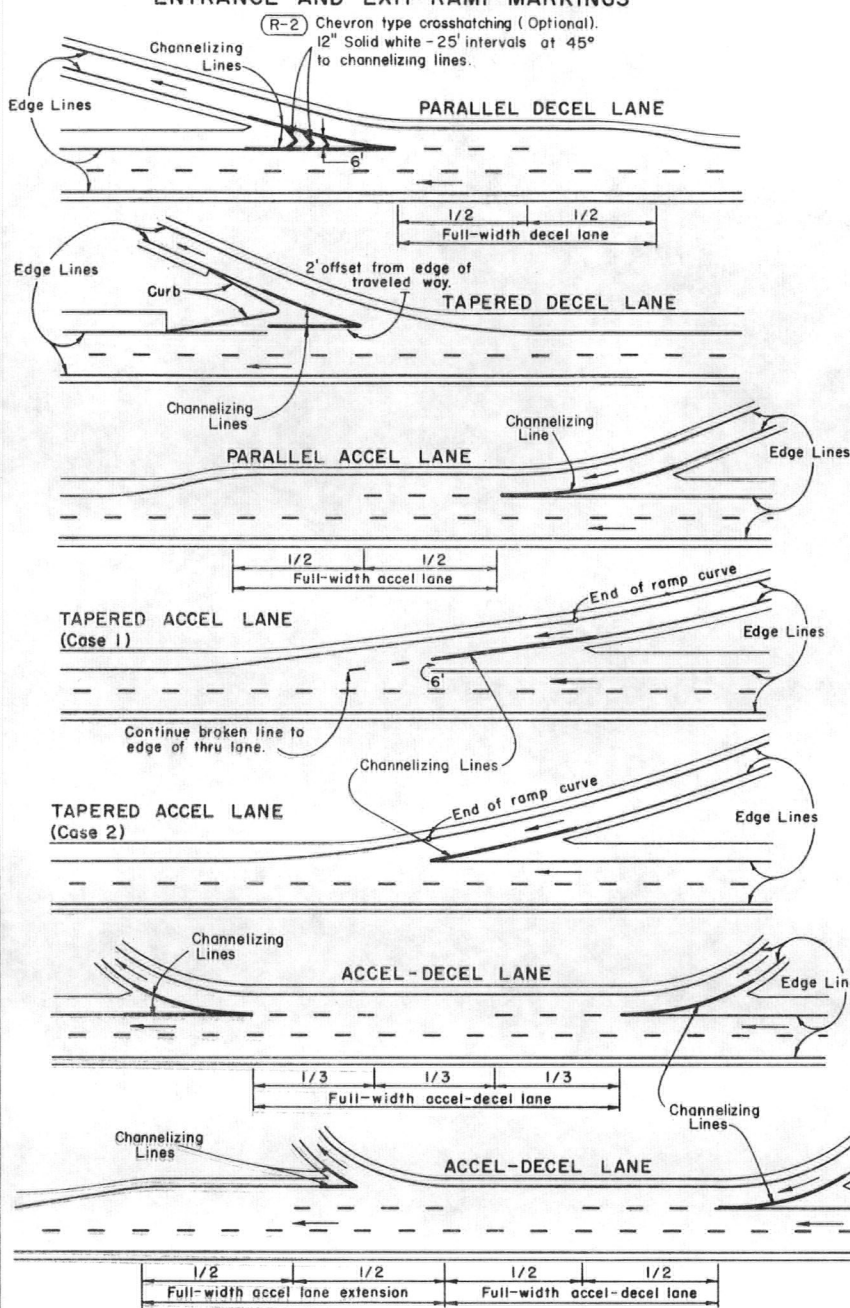
STOP LINES

1. Solid white, 24 inches wide.
2. Shall extend across all approach lanes at locations indicated on plans.
3. Locate at the desired stopping point, not more than 30 feet nor less than 4 feet from the nearest edge of the intersecting traffic lane.

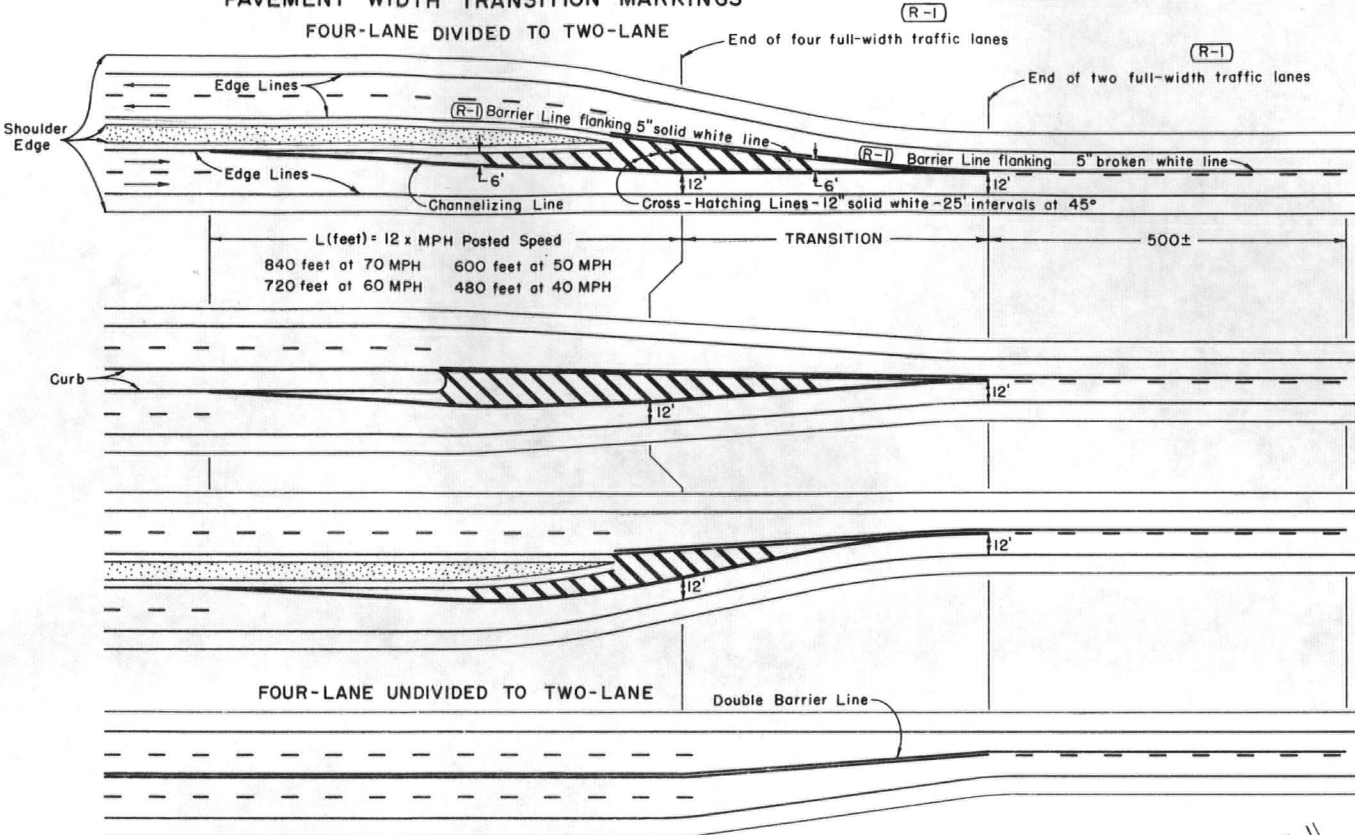
CROSSWALK LINES

1. Solid white, 12 inches wide. If no advance stop line is provided, increase the width of the crosswalk lines to 24 inches.
2. Extend across entire width of pavement.
3. The distance between lines is usually determined by the width of the sidewalks so connected, however, in no case less than 6 feet.

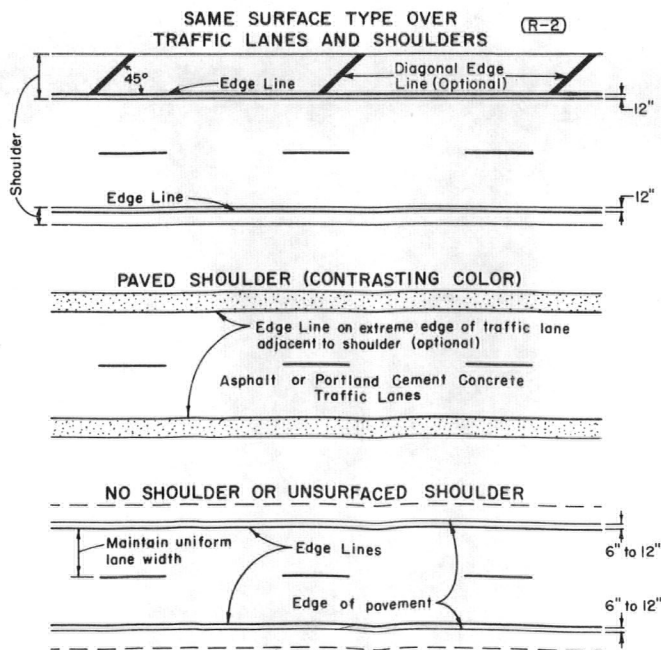
ENTRANCE AND EXIT RAMP MARKINGS



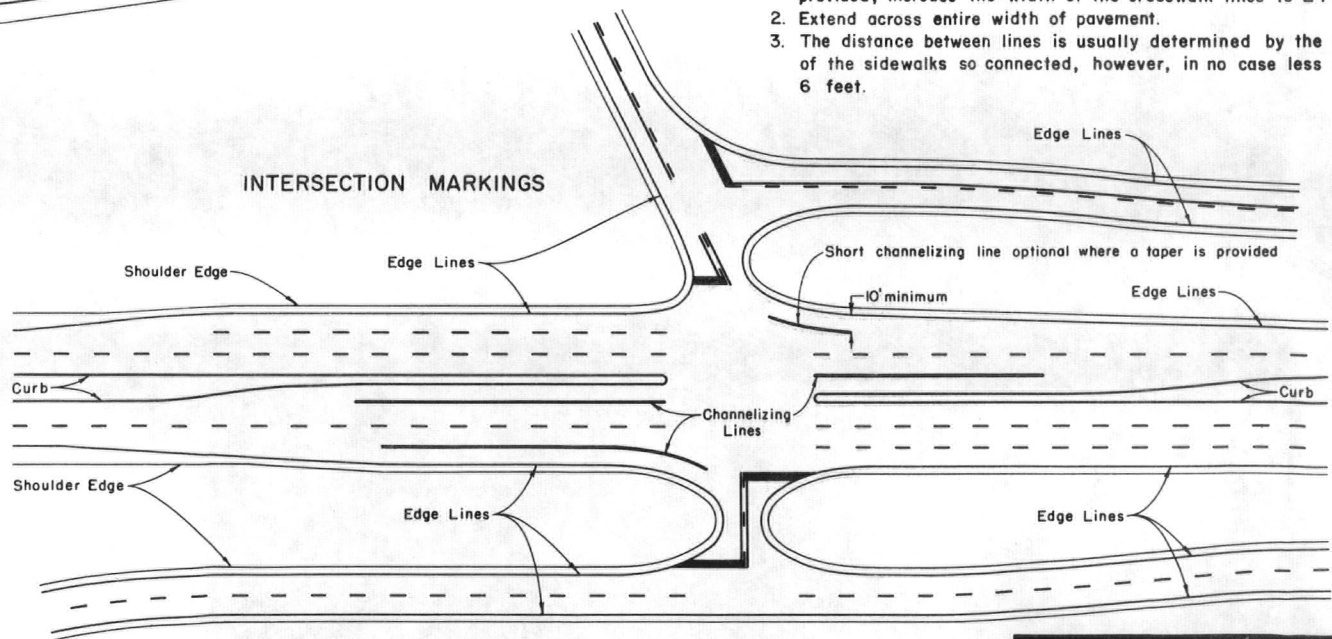
PAVEMENT WIDTH TRANSITION MARKINGS



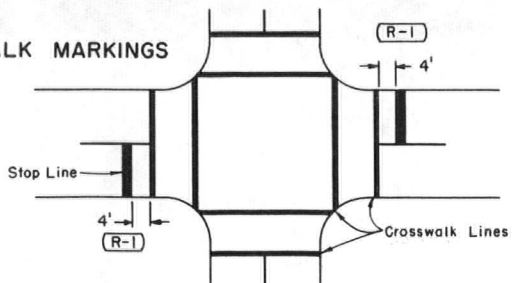
PAVEMENT EDGE LINE TYPICAL APPLICATIONS



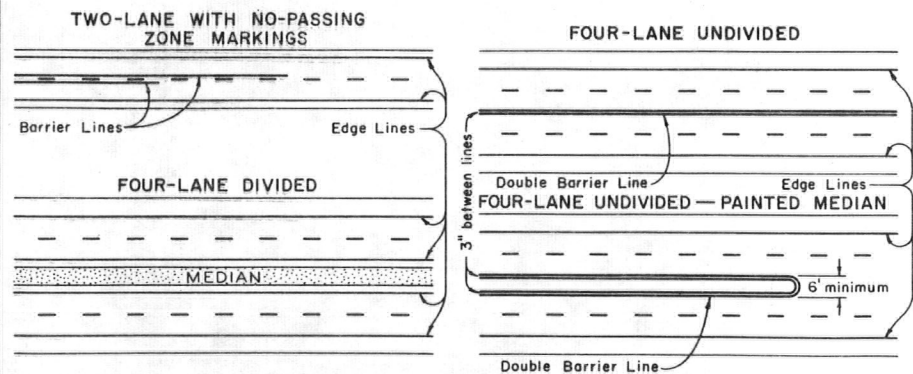
INTERSECTION MARKINGS



CROSSWALK MARKINGS



CENTER LINE AND LANE LINE MARKINGS



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS
TYPICAL
PAVEMENT
MARKINGS

Designed By: J.B.
Made By: H.B.D.
Checked By: D.R.W.

Approved By: [Signature]
Traffic Engineer
Date: AUGUST 11, 1965