FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S 0003(4)	1	

COLORADO
DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED
FEDERAL AID PROJECT NO. S0003(4)
STATE HIGHWAY NO. 89
PROWERS COUNTY

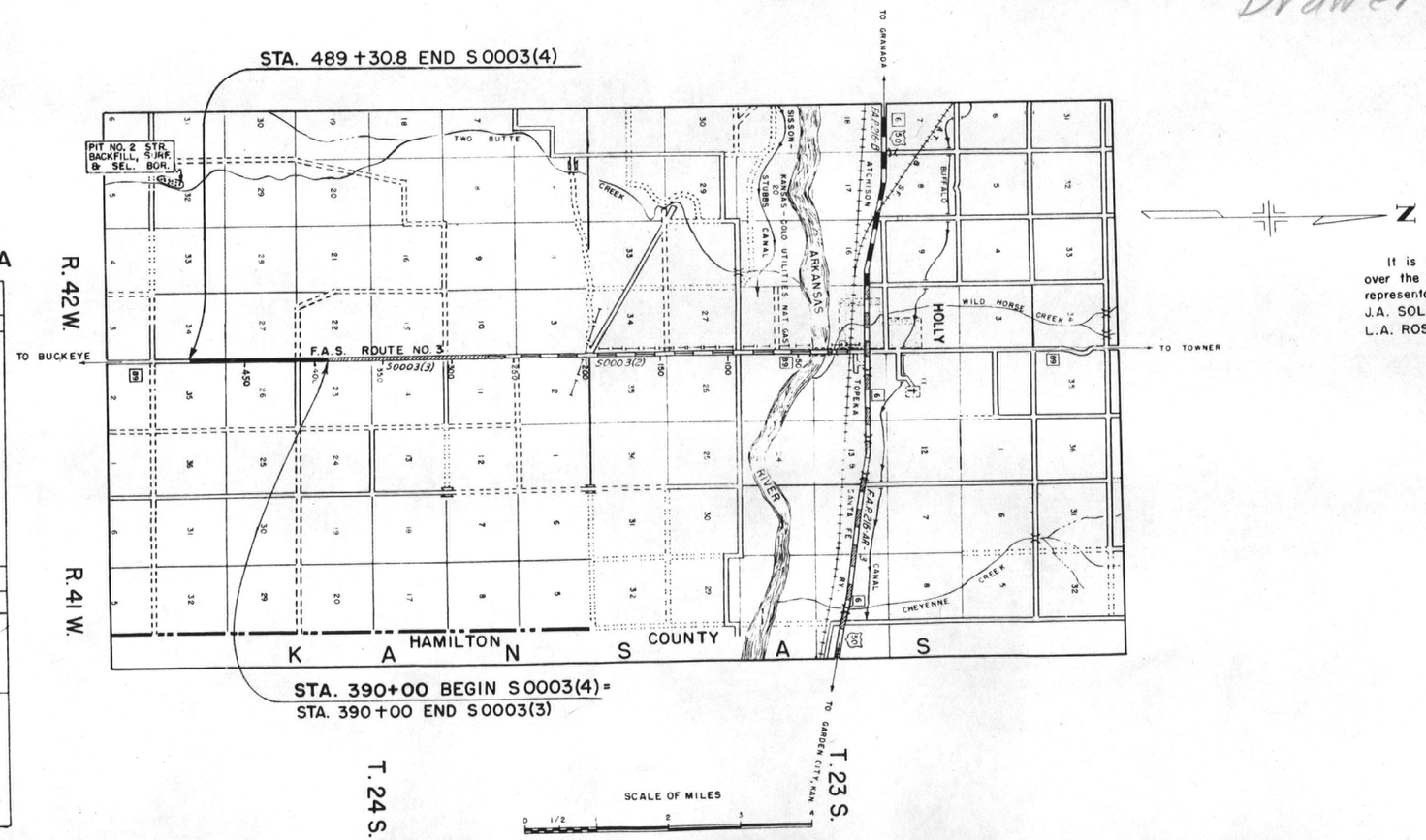
SCALE OF ORIGIONAL TRACINGS
ON PLAN, 1 IN. - 100 FT.
ON PROFILE 1 IN. - 100 FT. HORIZONTAL
1 IN. - 10 FT. VERTICAL
GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD
GROSS LENGTH OF PROJECT } 9930.8 FT. = 1.881 MILE
NET LENGTH OF PROJECT

INDEX OF SHEETS

CONVENTIONAL SIGNS

CENTER LINE
RIGHT-OF-WAY LINE
TOWNSHIP OR RANGE LINE
SECTION LINE
QUARTER SECTION LINE
SIXTEENTH SECTION LINE
PROPERTY OR TRACT LINE
CITY LIMITS
RAILROAD
BARBED WIRE FENCE
WOVEN WIRE COMBINATION FENCE
TELEPH. & TELEG. LINE
POWER LINE
PRESENT ROAD (Plan Sheets)
GAS MAIN

Return to Drawer No. [redacted] 39



TABULATION OF LENGTH AND DESIGN DATA

STATION	ROADWAY LIN. FT.	
390+00 Begin S0003(4) = End S0003(3)	9,930.8	
489+30.8 End S0003(4)		
TOTAL	9,930.8	
SUMMARY	LIN. FT.	MILES
Roadway	9,930.8	1.881

DESIGN DATA

Maximum Grade	2.88%
Maximum Degree of Curve	1°00'
Minimum N.P.S.D. - Horizontal	>1300'
Minimum N.P.S.D. - Vertical	450'
Maximum Design Speed	50 M.P.H.

NOTICE TO BIDDERS

It is recommended that bidders on this Project go over the plan details with one of the following field representatives of this Department:
J.A. SOLMONSON, Construction Engineer, Pueblo, Colo.
L.A. ROSE, Resident Engineer, Lamar, Colo.

COLORADO
DEPARTMENT OF HIGHWAYS

APPROVED: [signature] 5-6-52
CHIEF ENGINEER DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

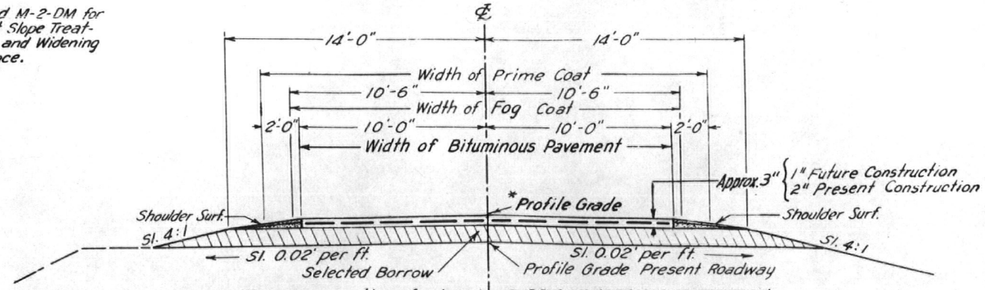
RECOMMENDED FOR APPROVAL:
DISTRICT ENGINEER DATE

APPROVED:
DIVISION ENGINEER DATE

FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S 000 3(4)	2	

TYPICAL CROSS SECTION OF IMPROVEMENT AND SUMMARY OF QUANTITIES

See Standard M-2-DM for details of Cut Slope Treatment, Flaring and Widening for Guard Fence.



The upper portion of subgrade is to be constructed of Selected Borrow Material at locations designated in Selected Borrow Tabulation. Estimated quantities involved in this operation and thickness of material required are tabulated on sheet No. 3.

SURFACING (PRESENT CONSTRUCTION)
Approximate 2" compacted thickness of Gravel or Crushed Rock Surfacing shall be placed in separate courses at the following approximate rates per 100 lin. ft. of roadway.

Top Course ..... 23 Tons

Surfacing for Shoulder Areas ..... 5 Tons

* At locations where grade is not shown, grade shall be approximately the combined thickness of Selected Borrow and Surfacing above profile of present roadway.

GENERAL NOTES

This project is to be constructed in conformity with the Standard Specifications of the Colorado State Highway Department adopted January 1, 1948.

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

All concrete used on this project shall be "Air-Entrained Concrete."

Culverts projecting from embankments shall be covered with approximately 6 inches of embankment material in such a manner that a minimum of pipe shall be exposed in the completed work. This shall be accomplished by warping embankment slopes around and adjacent to the culvert.

Payment for overhaul will be based on measurement along the centerline of the project.

All side approach roads to the project shall be prime coated to approximately 50 feet out from edge of the oil mat or to the Right of Way line, whichever is less.

It is estimated that rolling of the Oil Mat with Flat Wheeled Roller will be necessary after compaction with Rubber Tired Rollers in order to provide a firm smooth surface.

For preliminary plan quantities of Asphaltic Road Materials the following rates of application were used.

PRIME COAT - MC ..... @ 0.4 Gals. per Sq. Yd.
PROCESS OIL - RC ..... @ 1.12 Gals. per Sq. Yd. per 2 inch Thickness
FOG COAT RC ..... @ 0.10 Gals. per Sq. Yd.

Rate of application and grade of oil shall be determined by the Engineer at time of application.

It is estimated that Item 119, Shaping Roadbed, will be required as shown on Sheet No. 3.

All curves are to be superelevated and widened as provided by the Standard Superelevation sheet included with the plans.

SUMMARY OF APPROXIMATE QUANTITIES

ITEM NO.	ITEM	UNIT	ROADWAY			PROJECT TOTALS
11d	Removing and Resetting Mail Boxes	Lump Sum	•			•
13c	Unclassified Excavation	Cu. Yd.	4,000			4,000
13d	Unclassified Ditch Excavation	Cu. Yd.	100			100
13x	Selected Borrow	Cu. Yd.	14,700			14,700
13y	Unclassified Excavation (Stripping)	Cu. Yd.	2,000			2,000
14a	Dry Rock Excavation (Str.)	Cu. Yd.	10			10
14b	Dry Common Excavation (Str.)	Cu. Yd.	100			100
14c	Wet Rock Excavation (Str.)	Cu. Yd.	10			10
14d	Wet Common Excavation (Str.)	Cu. Yd.	10			10
16a	Structure Backfill (Class 1)	Cu. Yd.	120			120
16d	Mechanical Tamping	Hour	20			20
17ax	Rolling with Tamping Roller (2 Unit)	Hour	40			40
17b	Rolling with Flat Wheeled Roller	Hour	80			80
17c	Rolling with Rubber Tired Roller	Hour	40			40
17dx	Furnishing Tamping Roller (2 Unit)	Each	1			1
17e	Furnishing Flat Wheeled Roller	Each	1			1
17f	Furnishing Rubber Tired Roller	Each	1			1
17g	Wetting	M Gal.	630			630
18a	Station Yard Overhaul	Sta. Yd	164,000			164,000
18b	Yard Mile Overhaul	Yd. Mi.	45,000			45,000
18c	Ton Mile Overhaul	Ton Mi.	6,800			6,800
26d	Gravel or Crushed Rock Surf (Grading D)	Ton	2,900			2,900
30x	Asphaltic Road Material MC (Prime)	Gal.	11,200			11,200
30y	Asphaltic Road Material RC	Gal.	28,500			28,500
31a	Road Mix Oil Processing	Sq. Yd.	22,300			22,300
51c	Relaying 24" Pipe	Lin. Ft	40			40
53b	18" Corrugated Metal Culvert Pipe	Lin. Ft.	30			30
53c	24" Corrugated Metal Culvert Pipe	Lin. Ft.	159			159
53d	30" Corrugated Metal Culvert Pipe	Lin. Ft.	116			116
92	Timber Guard Posts	Each	12			12
119	Shaping Roadbed	Mile	1.5			1.5
	STATE FORCES					
81a	Project Markers	Each	1			1
	STATE FORCES (NON FED. AID)					
	Signing and Striping entire project	Lump Sum	•			•

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	S 0003(4)	3	

LIST OF STRUCTURES

STATION	DESCRIPTION		EXCAVATION UNCL. DITCH CU. YDS.	STRUCTURAL EXCAVATION CUBIC YARDS CU. YDS. Φ	STRUCTURE BACKFILL CLASS I CU. YDS.	MECHANICAL TAMPING HOURS	GRAVEL OR CRUSHED ROCK SURF. TONS	SELECTED BORROW CU. YDS.		CORRUGATED METAL CULVERT PIPE LIN. FT. 18"	24"	30"	MISCELLANEOUS
391+08	Road Approach, Rt.							20					
402+00	Cross Culvert, Ditches		10	20	16						50		
409+96	Road Approach, Rt. & Lt.							90					
419+26	Relay 24" X 40' C.M.P. Cross Culvert & Extend 8 ft.			7	13						* 9		Relay 24" X 40' C.M.P.
422+00	Cross Culvert, Ditches		10	23	21							52	
432+00	Cross Culvert, Ditches		5	11	16						50		
440+22	Road Approach, Rt.							33					
441+10	Road Approach, Lt.							33					
452+00	Cross Culvert, Ditches		5	15	16						50		
462+00	Cross Culvert, Ditches		5	30	26							64	
462+73	Side Drain & Road Approach, Rt.			10	8			45		30			
489+15	Road Approach, Rt.							28					
489+30.8	Approach to Project						‡ 28	99					
489+30.8	Project Marker, Rt.												1- Project Marker (To be furnished & installed by State Forces)
	Mechanical Tamping Entire Project.					12							
	Removing & Resetting Mail Boxes Entire Project.												Removing & Resetting Mail Boxes
TOTALS			35	116	116	12	28	348		30	159	116	

Φ Structural excavation is estimated to be 90% common & 10% rock each of which is estimated to be 90% dry & 10% wet.
‡ Includes Top Course and Shoulder Area Surfacing.
* Includes allowance of 1 ft. for connecting band.

TIMBER GUARD POSTS

STATION	SPACING	SIDE	NO.
402+00	Culvert	Lt. & Rt.	2
419+26	Culvert	Lt. & Rt.	2
422+00	Culvert	Lt. & Rt.	2
432+00	Culvert	Lt. & Rt.	2
452+00	Culvert	Lt. & Rt.	2
462+00	Culvert	Lt. & Rt.	2
TOTAL:			12

SHAPING ROADBED

STATION	MILE
390+00 to 419+00	0.55
439+50 to 489+30.8	0.94
TOTAL:	1.49

SURFACING PLAN

It is estimated that material for Gravel Surfacing for the project is available in the vicinity of the pit indicated in the following tabulation. Estimated quantities involved in this operation are shown below.

Alteration of the Surfacing Plan as here outlined will be allowed only on written permission from the Department.

MATERIAL TO BE PLACED	SOURCE, QUANTITY AVAILABLE & "R" VALUE	QUANTITY TONS USED GRADING D TOP COURSE	BOTTOM COURSE	SHOULDER AREA	OVERHAUL TON MILE TOP COURSE	BOTTOM COURSE	SHOULDER AREA
390+00 to 461+00	Pit No. 2 (Romer) S.W. ¼ Sec. 32, T. 24 S., R. 42 W.	1,633		355	4,119		895
461+00 to 489+30.8	100,000 cu. yds.	651		142	1,379		301
From List of Structures	R = 72	23	Δ	5	55		12
TOTALS		2,307		502	5,553		1,208

✓ Shoulder Surfacing material is not to be placed across road approaches.
Δ Selected Borrow to be used on Road Approaches.

SELECTED BORROW PLAN

It is estimated that Selected Borrow material for the project is available in the vicinity of the pit indicated in the following tabulation. Estimated quantities involved in this operation are shown below.

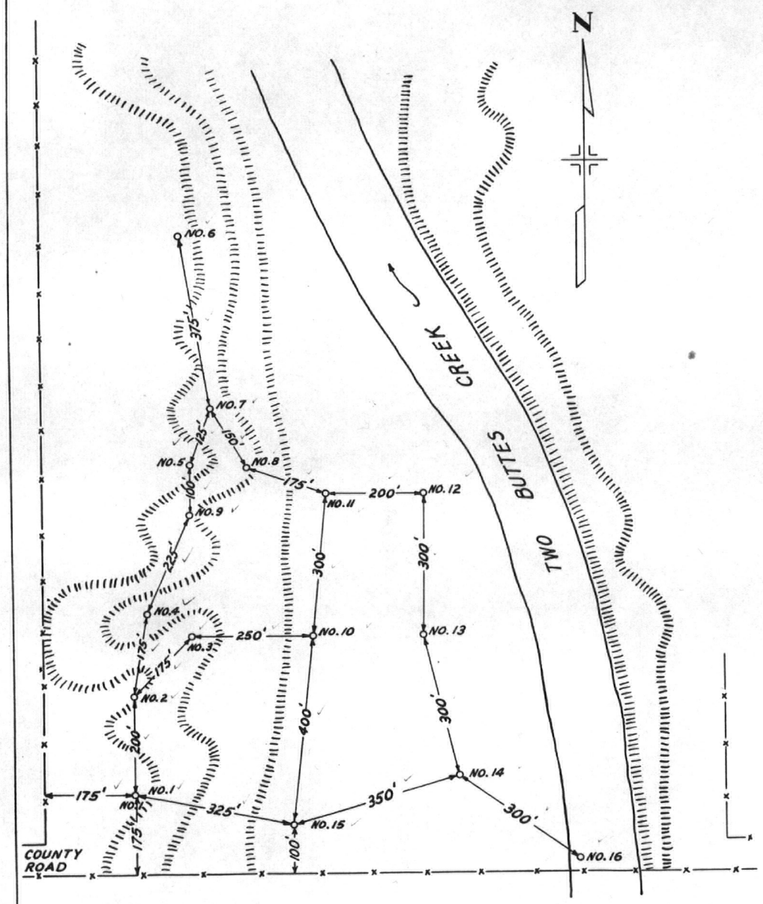
Alteration of the Selected Borrow Plan as here outlined will be allowed only on written permission from the Department.

MATERIAL TO BE PLACED	SOURCE, QUANTITY AVAILABLE & "R" VALUE	QUANTITY THICKNESS * INCHES	CUBIC YARDS	OVERHAUL STATION YARDS	YARD MILES
390+00 to 415+00	Pit No. 2 (Romer)	7	2,150	23,650	7,858
415+00 to 435+00	S.W. ¼ Sec. 32,	11	2,800	30,800	9,041
435+00 to 461+00	T. 24 S., R. 42 W.	12	4,030	44,330	11,257
461+00 to 465+00		12	620	6,820	1,603
465+00 to 489+30.8	100,000 cu. yds.	11	3,403	37,433	9,708
From List of Structures.	R = 72		348	3,828	1,056
Estimated for Correcting Irregularities in Subgrade.			1,335	14,685	4,052
TOTALS			14,686	161,546	44,575

* Based on Curve "C".
Changes in thickness shall take place over a 300 ft. transition.

FEDERAL ROAD DIVISION NO.	DISTRICT	PROJ. NO.	SHEET NO.	SHEETS
9	COLORADO	S 000 3 (4)	4	

STRUCTURE BACKFILL, SURFACING AND SELECTED BORROW PIT NO. 2
LOCATION - S.W. 1/4, SEC. 32, T. 24 S., R. 42 W.
OWNER - I. R. ROMER
QUANTITY AVAILABLE - 100,000 CU. YDS.



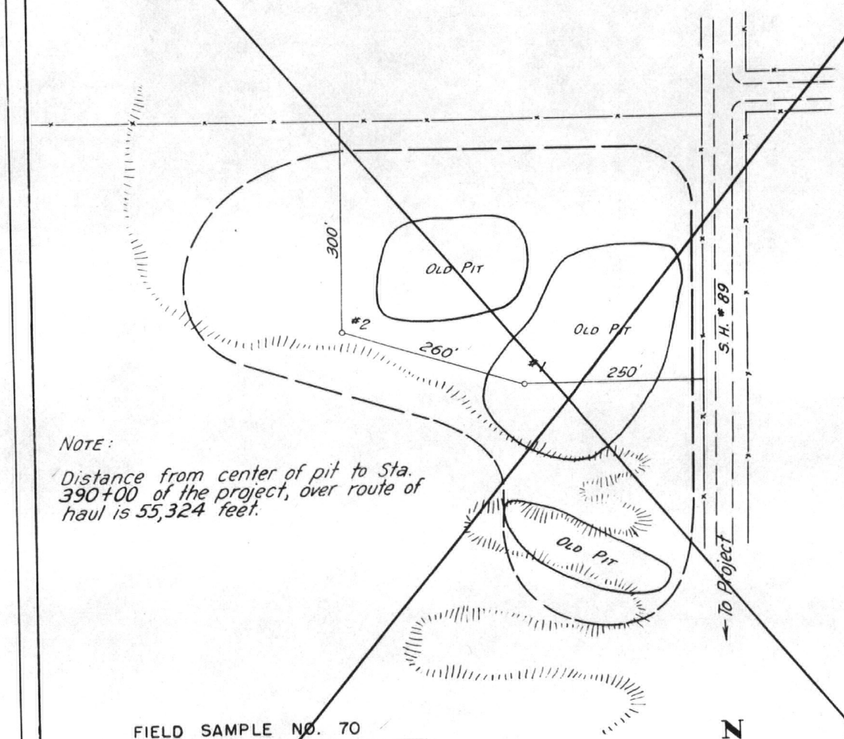
FIELD SAMPLE NO. 938

TEST NO.	DEPTH	DESCRIPTION OF TEST HOLE MATERIAL
1	0.0 - 5.0	O.B.
1-A	5.0 - 12.0	Sand and Gravel
2	0.0 - 9.0	O.B.
2-A	9.0 - 12.0	Sand and Gravel
3	0.0 - 1.0	O.B.
3-A	1.0 - 12.0	Sand and Gravel (2 samples)
4	0.0 - 0.5	O.B.
4-A	0.5 - 6.5	Sand and Gravel. Clay from 6.5'
5	0.0 - 5.0	O.B.
5-A	5.0 - 12.0	Sand and Gravel
6	0.0 - 6.0	O.B.
6-A	6.0 - 9.0	Sand and Gravel. Clay at 9.0'
7	0.0 - 4.0	Sand and Gravel. Sandy clay at 4.0'
8	0.0 - 2.5	Sand and Gravel. Sandy clay at 2.5'
9	0.0 - 9.0	O.B.
10	0.0 - 2.5	O.B.
10-A	2.5 - 11.0	Sand and Gravel
11	0.0 - 2.0	O.B.
11-A	2.0 - 9.5	Sand and Gravel. Clay at 9.5'
12	0.0 - 2.0	O.B.
12-A	2.0 - 11.5	Sand and Gravel. Sandy clay at 11.5'
13	0.0 - 4.0	O.B.
13-A	4.0 - 11.0	Sand and Gravel
14	0.0 - 2.5	O.B.
14-A	2.5 - 10.0	Sand and Gravel
15	0.0 - 3.0	O.B.
15-A	3.0 - 10.5	Sand and Gravel. Sandy clay at 10.5'
16	0.0 - 6.0	Sand and Gravel. Cave-in at 6.0'

NOTE:

Distance from center of pit to Sta. 461+00 of the Project, over route of haul is 2.85 miles.

SURFACING AND SELECTED BORROW PIT NO. 1
LOCATION - N.E. 1/4 SEC. 34, T. 22 S., R. 42 W.
OWNER - WILL HAZEN
QUANTITY AVAILABLE - 48,000 CU. YDS.



NOTE:

Distance from center of pit to Sta. 390+00 of the project, over route of haul is 55,324 feet.

FIELD SAMPLE NO. 70

TEST NO.	DEPTH	DESCRIPTION OF TEST HOLE MATERIAL
1	0.0 - 10.0	Sand and Gravel
2	0.0 - 4.0	O.B.
2-A	4.0 - 10.0	Sand and Gravel

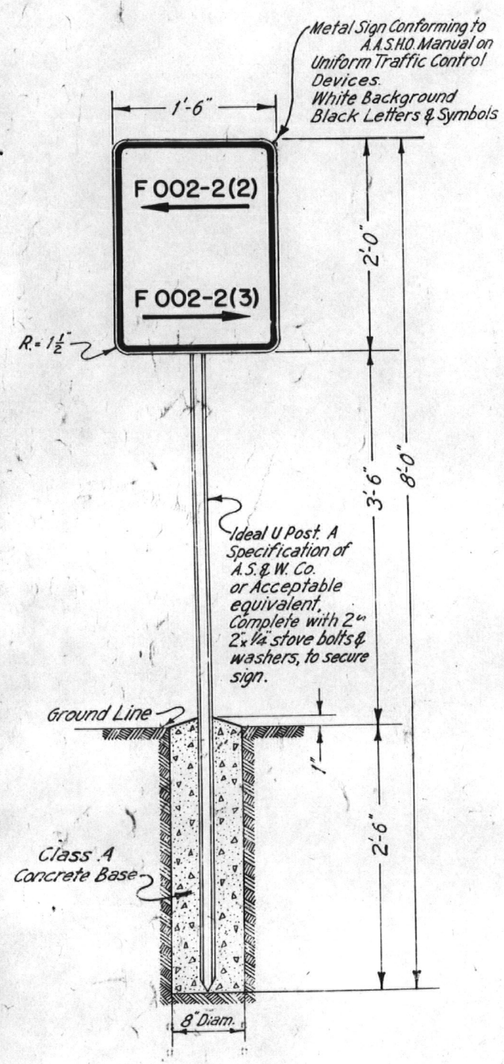
FED. ROAD DIST. NO.	STATE		NO.	SHEETS
3	COLO.	S0003(4)		5

STANDARD M-7-B

Rev. 8 Jan. 46 P.S.B. 1/2" ø to 1/2" ϕ
Rev. June 10 '46, W.E.M. Bronze Tablet
Rev. Mar. 21-1947, W.H.M. ~ Project Marker Post.
Rev. Nov. 20-1947, J.P.K. ~ Metal Project Marker
Rev. Dec. 15-1947, J.P.K. ~ Concrete Base for Metal Project Marker
Rev. July 5-1950, J.C.R. ~ Rev. Note Re. Metal Sign for Project Marker, & R.O.W. Marker Markings.

PROJECT MARKER POST

ITEM Nº 81a



NOTES FOR PROJECT MARKER POSTS

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1st 1948

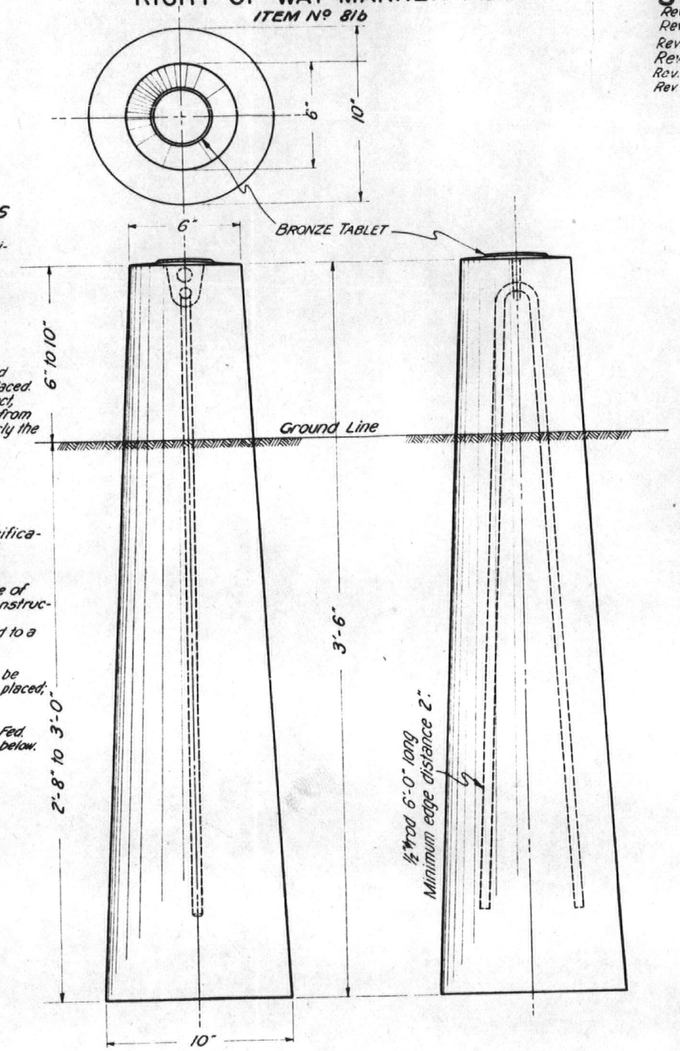
Numbers and arrows shall show the proper numbers and directions of the projects each way from where the post is placed. Post to be set with sign facing the road at the end of the project, two feet inside the R.O.W. line or at a point amply protected from traffic in such a position that the sign will indicate properly the projects to which it refers.

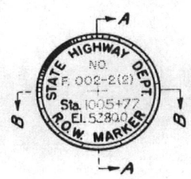
NOTES FOR R.O.W. MARKER POSTS

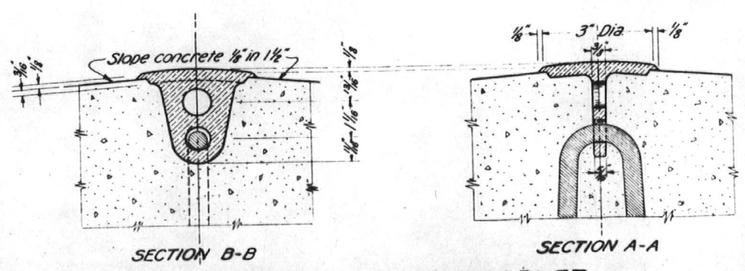
All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department, adopted January 1st 1948
Posts shall be made of Class "A" Concrete.
The upper 12 inches of marker posts shall be rubbed free of form marks, and the top surface of the post must be constructed to drain thoroughly.
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 the 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., F.I. for Fed. Aid Interstate, F. for Fed. Aid Primary, S. for Fed. Aid Secondary etc. & S.P. Nº for State Projects, See detail below.

RIGHT OF WAY MARKER POST

ITEM Nº 81b







DETAIL OF BRONZE TABLET FOR RIGHT OF WAY MARKER POST

Initial	Date

COLORADO STATE HIGHWAY DEPARTMENT
STANDARD MARKER POSTS

Designed by R.E.L.
Made by F.F.S.
Checked by R.E.L.
Approved by [signature]
Date: January 1st 1948

STANDARD M-7-B

STANDARD TIMBER GUARD POSTS

STANDARD M-19-C

FED. ROAD DIVISION NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO.	50003(4)	6	

Rev. 2-13-52, C.G.M., Added Note Re Reflector Buttons on Divided Highway

SPECIFICATIONS

POSTS- Lodgepole Pine, Southern Yellow Pine or West Coast Douglas Fir, not less than six (6) inches in diameter. All posts shall be pressure treated after being peeled and shaved in accordance with specifications.

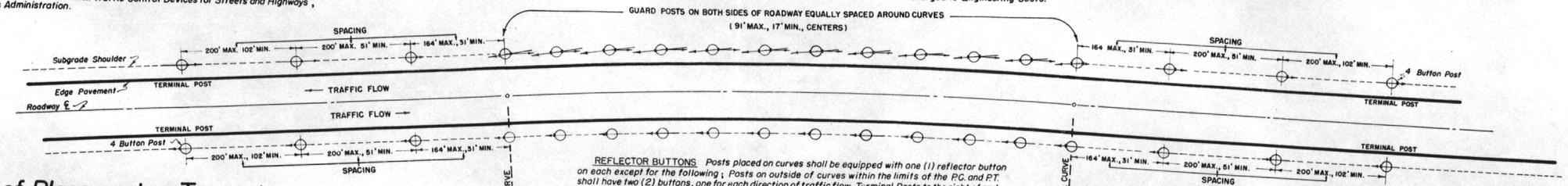
REFLECTOR BUTTONS - No. 1 Stimsonite reflector buttons or an acceptable equivalent including reflectorized sheeting or prefabricated delineator units. Holes drilled in posts to accomodate reflector buttons shall be 1/16" diameter less than the base of the button.

PAINTING (WORK BY STATE FORCES) - Posts shall be painted with aluminum paint and a black band placed around each post as per details on this sheet. Number of coats and type of paint applied shall be in accordance with specifications.

DATE NAILS (WORK BY STATE FORCES) - Nails shall be installed one (1) per post and driven flush. Cost of furnishing and installing to be charged to Engineering Costs.

Typical Installation on Curves

INSTALLATION of guard posts on curves shall be in accordance with details shown below. Spacing shall be in conformity with Section 157, Table I of "Manual on Uniform Traffic Control Devices for Streets and Highways", Issue of Aug. 1948 by the Public Roads Administration.



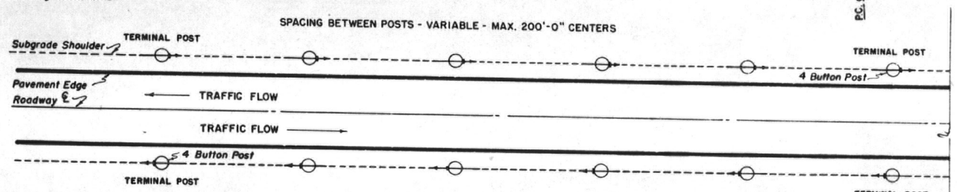
REFLECTOR BUTTONS Posts placed on curves shall be equipped with one (1) reflector button on each except for the following; Posts on outside of curves within the limits of the P.C. and P.T. shall have two (2) buttons, one for each direction of traffic flow. Terminal Posts to the right of, and facing approaching traffic, shall be equipped with four (4) buttons.

Reflector Buttons on posts to the right of and facing approaching traffic shall be placed on a line parallel to the roadway centerline. Buttons on posts on the outside of curves, to the left of and facing approaching traffic, shall be placed at angles whereby reflection is attained at a distance of 500 feet.

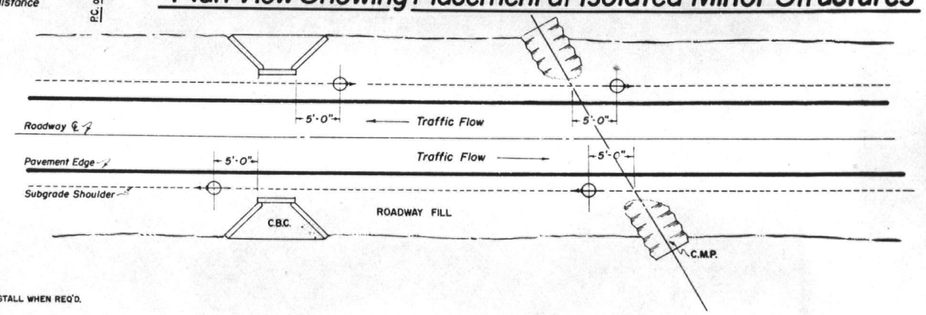
On Divided Highways, Reflector Buttons will not be required on back side of posts.

Method of Placement on Tangents

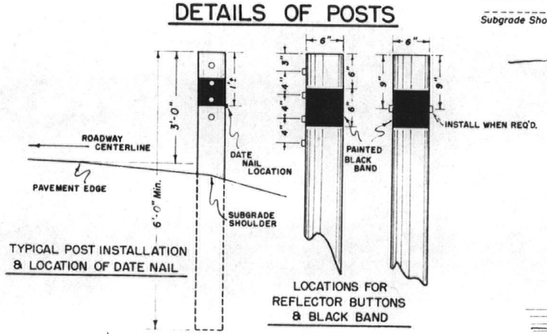
INSTALLATION of guard posts on tangents shall be in conformity with details shown below and in accordance with the following; Reflector Buttons shall be installed one (1) to each post except terminal posts to the right of and facing approaching traffic which will have four (4) buttons. All buttons shall be placed on a line parallel to the roadway centerline



Plan View Showing Placement at Isolated Minor Structures

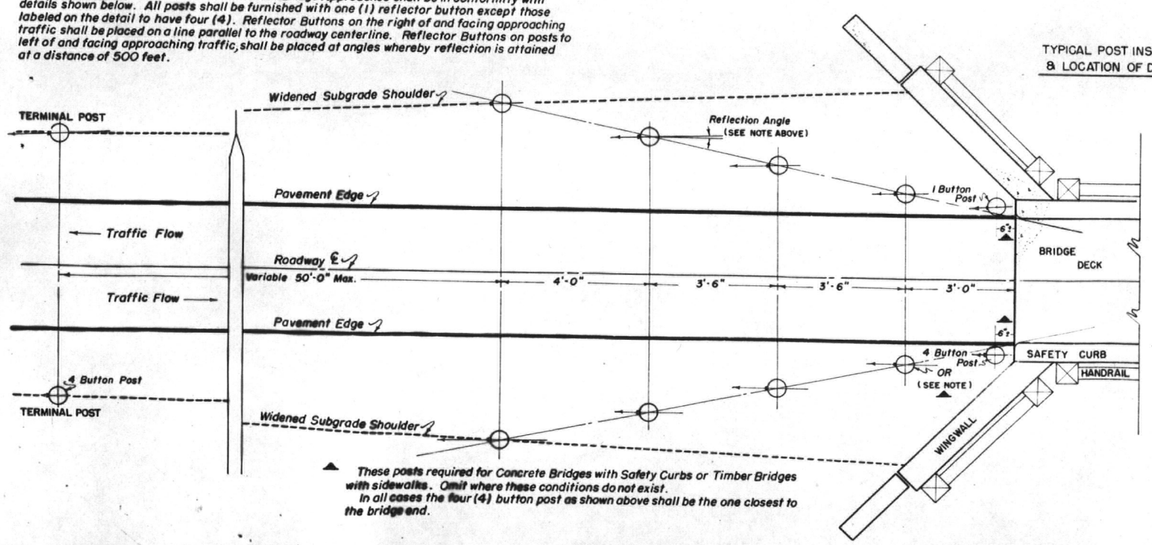


DETAILS OF POSTS



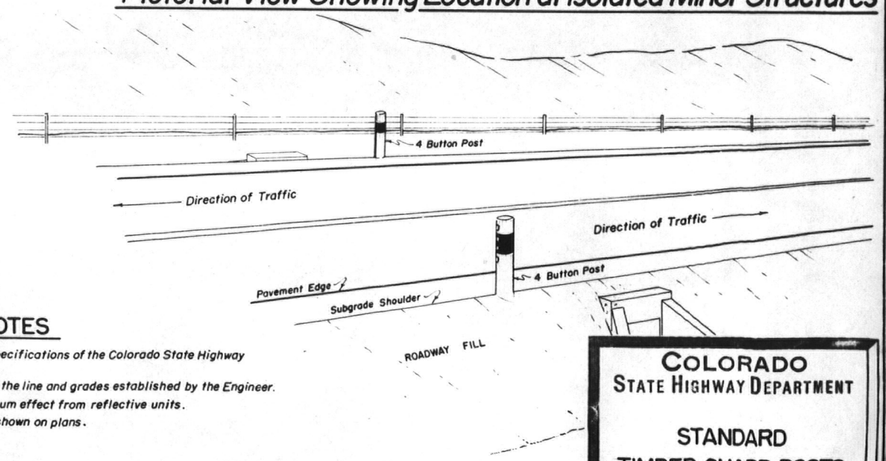
Typical Installation at Bridge Approaches

INSTALLATION of Timber Guard Posts at Bridge Approaches shall be in conformity with details shown below. All posts shall be furnished with one (1) reflector button except those labeled on the detail to have four (4). Reflector Buttons on the right of and facing approaching traffic shall be placed on a line parallel to the roadway centerline. Reflector Buttons on posts to left of and facing approaching traffic, shall be placed at angles whereby reflection is attained at a distance of 500 feet.



These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist.
In all cases the four (4) button post as shown above shall be the one closest to the bridge end.

Pictorial View Showing Location at Isolated Minor Structures



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project.

All posts shall be set and tamped in, plumb and firm, to the line and grades established by the Engineer.

In all instances a test shall be made to assure the maximum effect from reflective units.

The number, location and spacing of guard posts will be shown on plans.

COLORADO
STATE HIGHWAY DEPARTMENT

STANDARD
TIMBER GUARD POSTS

Designed by C.G.M.
Made by C.G.M.
Checked by

Approved by R. Zuliani
Engineer, Surveys & Plans
Date: March 2, 1951

REVISIONS

Rev. 10-25-50-C.G.M., Accel. Lanes, Ballast note re widen crest grades

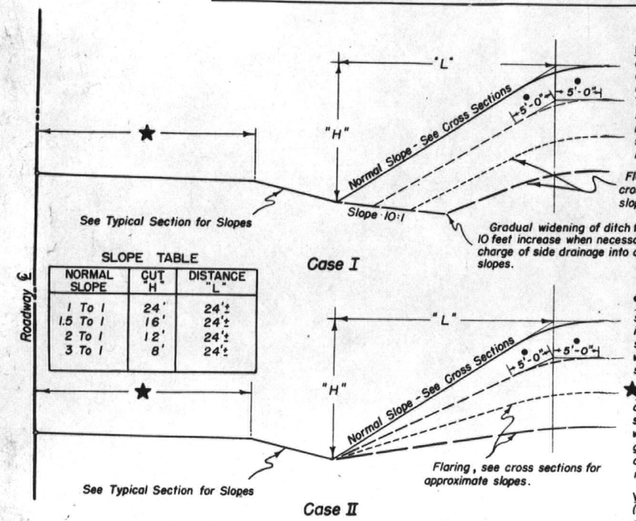
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-DM

Rev. 7-12-49, C.G.M., Details for widening at Crest of Grades
Rev. 12-7-49, C.G.M., Rev. notes re Type I Rd. Apprs. & widen. at Bridge Apprs., added note re accell. & decell. lanes.

FED. ROAD DIVISION NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9.	COLO.	500-3(4)	7	

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



SLOPE TABLE

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, see cross sections for approximate slopes.

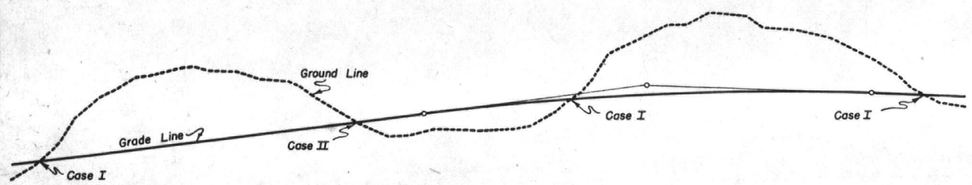
Gradual widening of ditch to minimum of 10 feet increase when necessary to avoid discharge of side drainage into adjoining fill slopes.

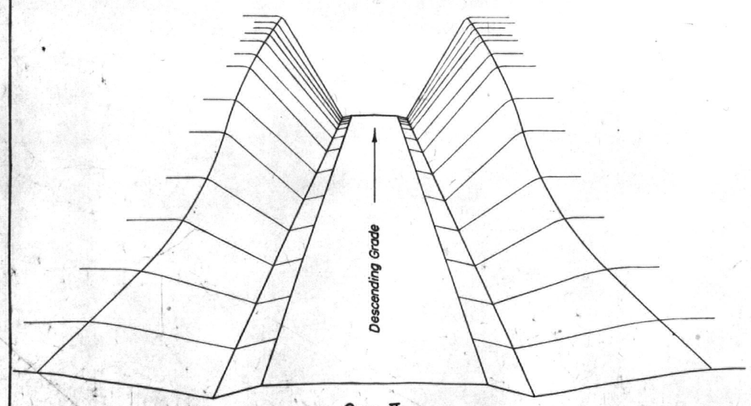
•CUT SLOPE TREATMENT IN EARTH CUTS: *The intersection of cut slopes with the existing ground shall be rounded in earth cuts, beginning 5 ft. outside the slope stake and extending 5 ft. down the cut slope. Where the cut slope is less than 5 ft. reduce each of the above widths of slope treatment to the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

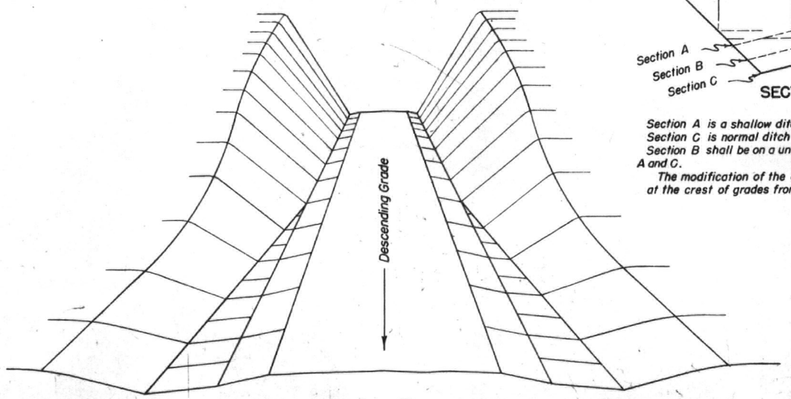
★ WIDENING AT BRIDGE APPROACHES: *Roadway embankment at bridge approaches shall be so constructed that the finish point of the subgrade shoulder is a Min. of 2 ft. beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over a distance of 300 ft. This is done to accomodate guard fence and/or guard or marker posts at bridge approaches. (See additional requirements for Guard Fences below)*

WIDENING TO ACCOMODATE GUARD FENCES: *At all locations on the project (except as provided above for bridge approaches) where guard fence is to be constructed the shoulders shall be widened 2 ft. to provide additional lateral support for guard fence posts.*

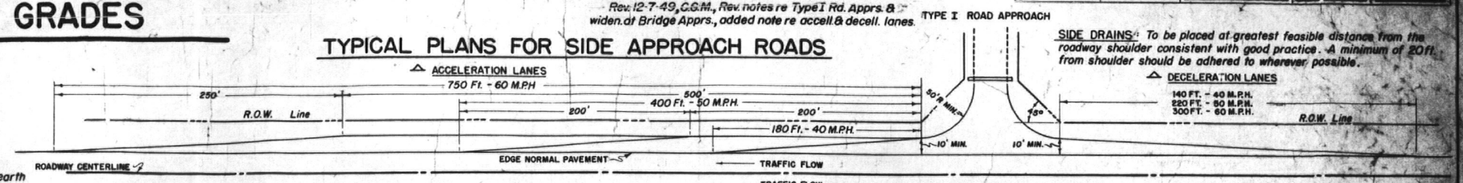
PLAN OF FLARING IN EARTH CUTS



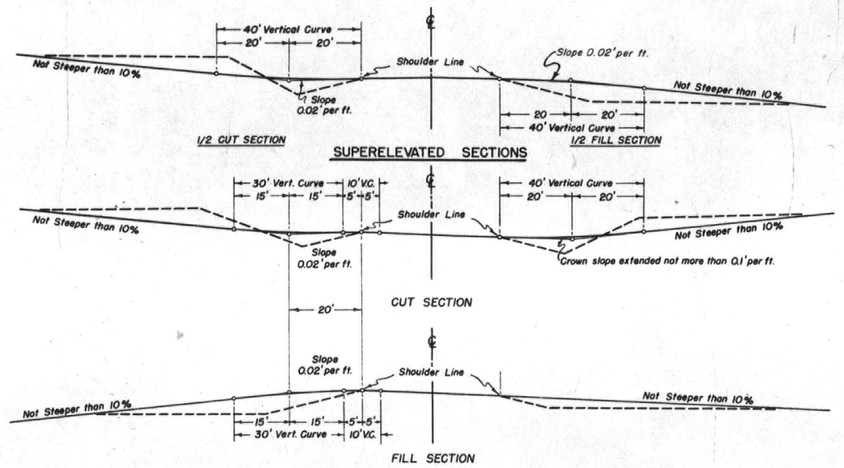


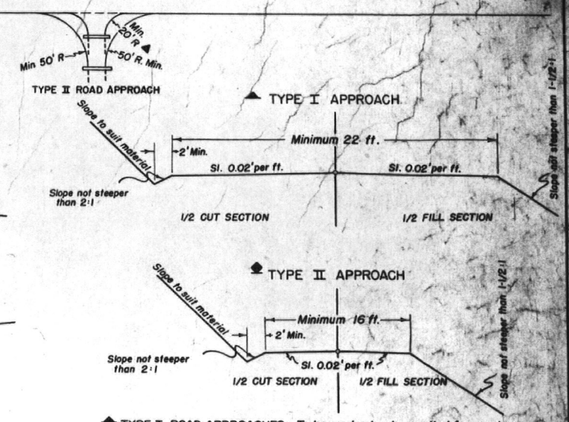


TYPICAL PLANS FOR SIDE APPROACH ROADS



△ *Values shown are general, see plans for specific requirements of each Type I Road Approach.*





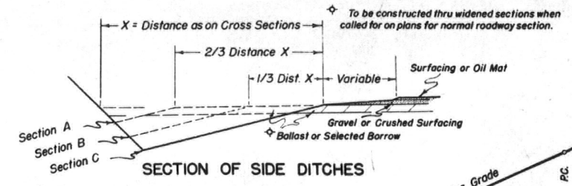
▲ TYPE I ROAD APPROACHES: *To be used only when called for on plans. The width of crowned section shall not be less than the existing crowned width of the approaching road but in no case shall be less than twenty two (22) feet.*

◆ TYPE II ROAD APPROACHES: *To be used at all places which are not indicated as "Type I Road Approaches". The width of crowned section shall not be less than the existing crowned width of the approaching road but in no case shall be less than sixteen (16) feet.*

▲ 20 FT. RADII: *To be used only on private road approaches.*

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)

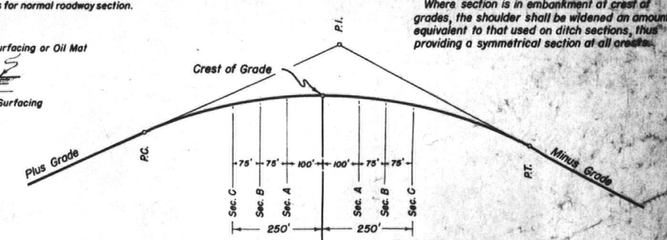


SECTION OF SIDE DITCHES

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.

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 of the Colorado State Highway Department applicable to the Project.

All side approach roads to the Project shall be Gravel Surfaced with a four (4) inch thickness of "Gravel or Crushed Rock Surfacing" extending approximately to the Right of Way Line. Estimated tonnage & type of material required for this operation are shown in the Surfacing 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.

COLORADO
STATE HIGHWAY DEPARTMENT

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

Designed by A.Z.
Made by C.G.M.
Checked by [illegible]

Approved by [illegible]
Engineer, Surveys & Plans
Date: April 20th, 1949

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

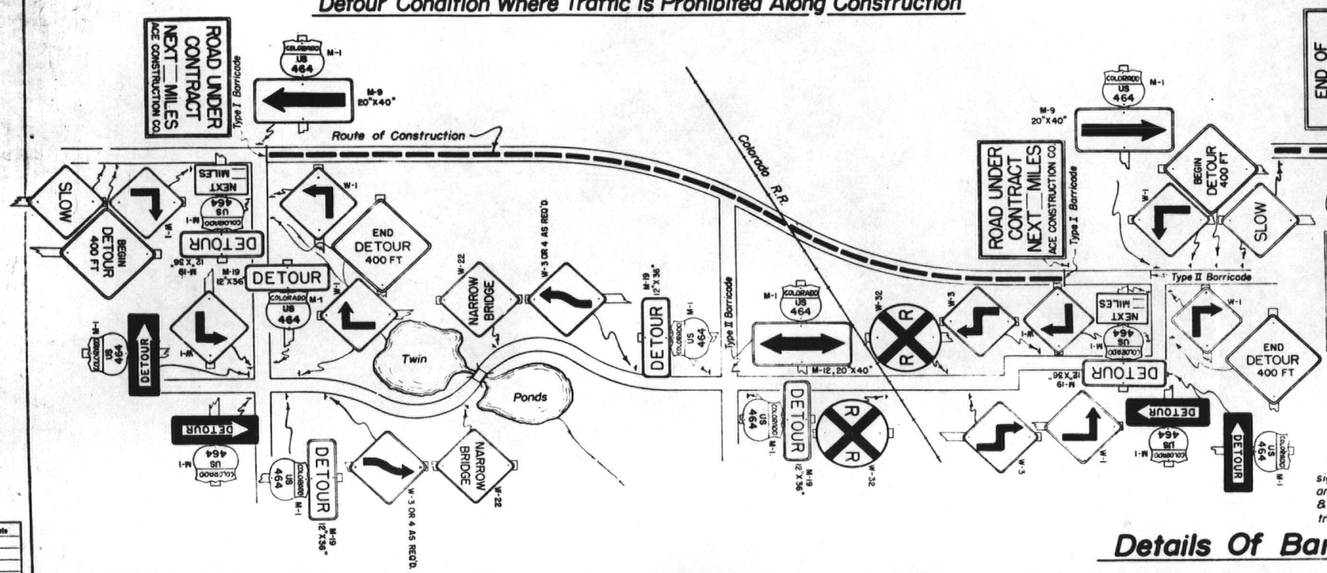
STANDARD M-2-DS

FED. ROAD DIVISION NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9	COLO.	S0003(4)	8	

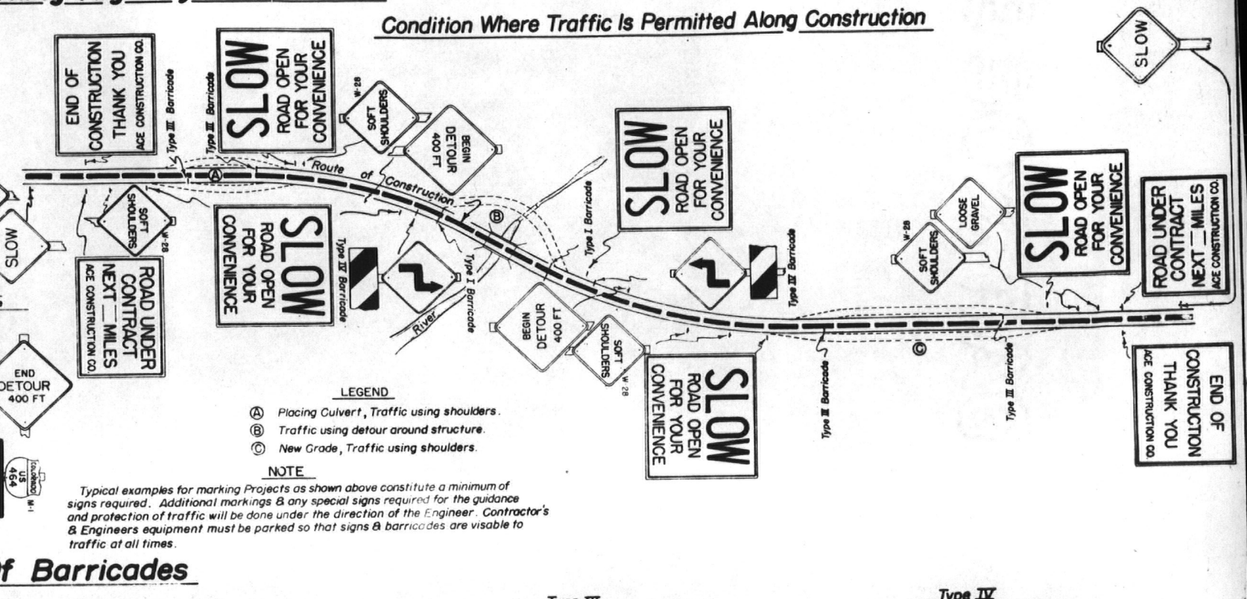
REV.-8/16/49-E.E.O.
REV.-2/3/50-E.A.R.

Typical Methods Of Marking Highways & Detours

Detour Condition Where Traffic Is Prohibited Along Construction



Condition Where Traffic Is Permitted Along Construction



LEGEND

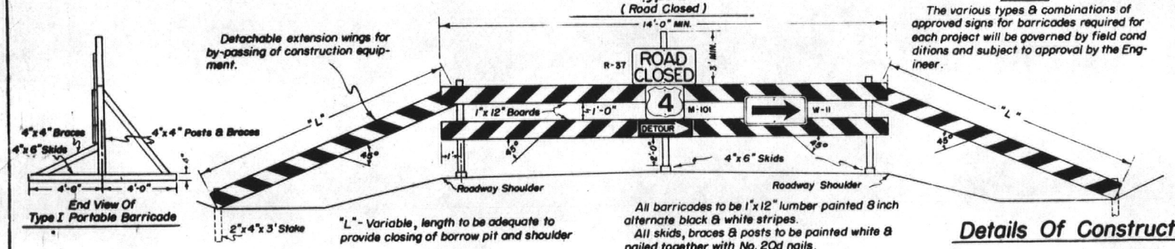
Ⓐ Placing Culvert, Traffic using shoulders.
Ⓑ Traffic using detour around structure.
Ⓒ New Grade, Traffic using shoulders.

NOTE

Typical examples for marking Projects as shown above constitute a minimum of signs required. Additional markings & any special signs required for the guidance and protection of traffic will be done under the direction of the Engineer. Contractor's & Engineers equipment must be parked so that signs & barricades are visable to traffic at all times.

Details Of Barricades

Type I
(Road Closed)

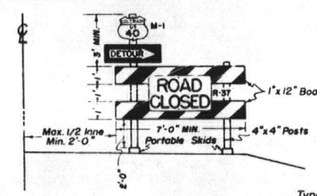


All barricades to be 1"x12" lumber painted 8 inch alternate black & white stripes.
All skids, braces & posts to be painted white & nailed together with No. 20d nails.
Bases to be weighted where necessary to provide stability

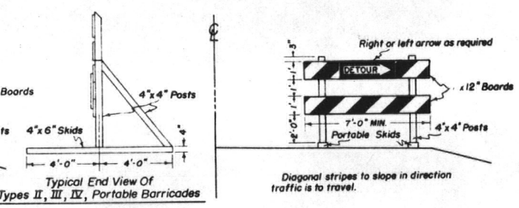
NOTE

The various types & combinations of approved signs for barricades required for each project will be governed by field conditions and subject to approval by the Engineer.

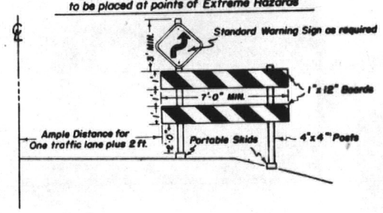
Type II
(Beginning of Detour for Through Traffic)



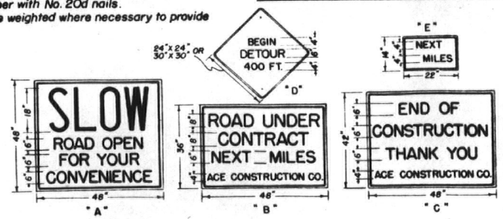
Type III
(Both Ends of By-Pass Areas within Project)



Type IV
Supplement to Advance Warning Signs, to be placed at points of Extreme Hazards



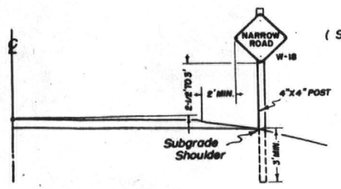
Details Of Construction Signs



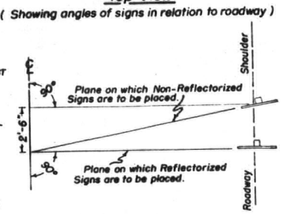
MARKINGS

Construction Sign "A" - to be of 1" material painted White, the word "SLOW" lettered in Red, balance of lettering to be Black.
Construction Signs "B", "C", "E" - to be of 1" material painted White, all lettering to be Black.
Detour Warning Sign "D" to be of 1/4" (min.) plywood or No. 10 (min.) gauge metal, painted Yellow, all lettering to be Black.
Construction Signs - "B", "E" - 3/4"x 9" metal slides to be placed between words "Next & Miles" spaced so as to accomodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor.
Signs to be fastened to 2- 4"x 4" posts set 4 ft. in the ground with a minimum of 3 cleats on the back.

Position Of Signs Relative To Roadbed & Hazards



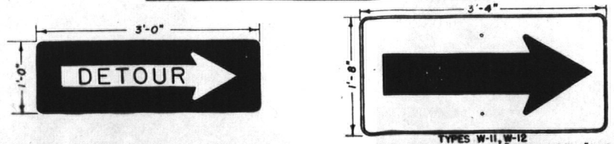
Top View
(Showing angles of signs in relation to roadway)



NOTE

Warning Signs to be made of 1/4" (Min.) plywood or No. 10 Gauge (Min.) metal.
Location to be governed by field conditions. Exact location to be staked by the Engineer. In all cases warning signs are to be placed well in advance of hazard, the distance depending on topography, and existing approach speeds.

Details Of Reflectorized Arrows



MARKINGS A White Reflectorized Arrow of "Scotchlite" Reflective Sheeting or suitable equivalent to be placed on a Black background. Letters to be 4" in height.

TYPES W-11, W-12
MARKINGS A Black Arrow on a "Highway Yellow" background of "Scotchlite" Reflective Sheeting or suitable equivalent.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department applicable to the Project

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 with well painted, well maintained Barricades, Warning Signs and Directional Type Signs. All Barricades & Signs shall be moved, added to, changed or removed as required during the progress of construction

All Warning & Directional Type Signs will be "Reflectorized" with "Scotchlite" Reflective Sheeting or a suitable equivalent. Except for variations noted on this sheet all signs will be in conformity with the specifications outlined in "Manual on Uniform Traffic Control Devices for Streets & Highways" issue of August 1948 by the U.S. Public Roads Administration. U.S. or State Route Markers required for the Project will be furnished by the Department and installed by the Contractor. Numbers adjacent to signs refer to Standards in the Manual

The Contractor shall furnish & install the following as required within the limits of the Project

1. All Barricades		As Required
2. "SLOW, ROAD OPEN FOR YOUR CONVENIENCE" Signs		Minimum 2
3. Standard Warning & Directional Signs		As Required
4. "ROAD UNDER CONTRACT, NEXT __ MILES, CONTRACTORS NAME" Signs		Minimum 2
5. Approved Directional Arrows for Barricades		As Required
6. "END OF CONSTRUCTION, THANK YOU, CONTRACTORS NAME" Signs	Type I Barricades	Minimum 2
7. Torches and Flares as follows:	Type III, IV Barricades	Minimum 3
	Standard Warning Signs	Minimum-1
		Minimum-1

Where traffic is prohibited from the Project, the Detour will be marked by the Department except for Barricades complete with approved Warning Signs & Arrows which will be provided, erected & maintained by the Contractor at ends of Project and intersecting roads

All numbers used shall be of sound durable material. Barricades, Signs, Symbols & Lettering conforming to styles noted hereon will be well painted & maintained. Uneven or smeared lettering will not be accepted.

Flares and Torches shall be of the Oil Burning Type approved by the Department and shall be placed 3 ft. to 5 ft. ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudge arising from torches and flares

COLORADO
STATE HIGHWAY DEPARTMENT

Standard Roadway Construction Traffic Signs

Designed by
Made by C.G.M.
Checked by

Approved by [signature]
Engineer, Specs & Plans
Date: 7-25-1949

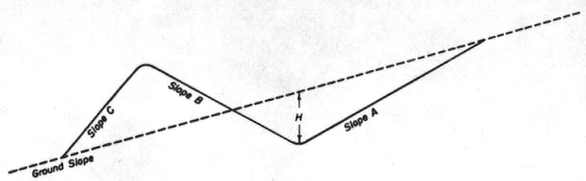
Initial	Date

FED. ROAD DIVISION NO.	DISTRICT		SHEET NO.	TOTAL SHEETS
9.	COLO.	50003 (4)	9	

STANDARD TYPES *of* DITCHES *and* CONSTRUCTION METHODS

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

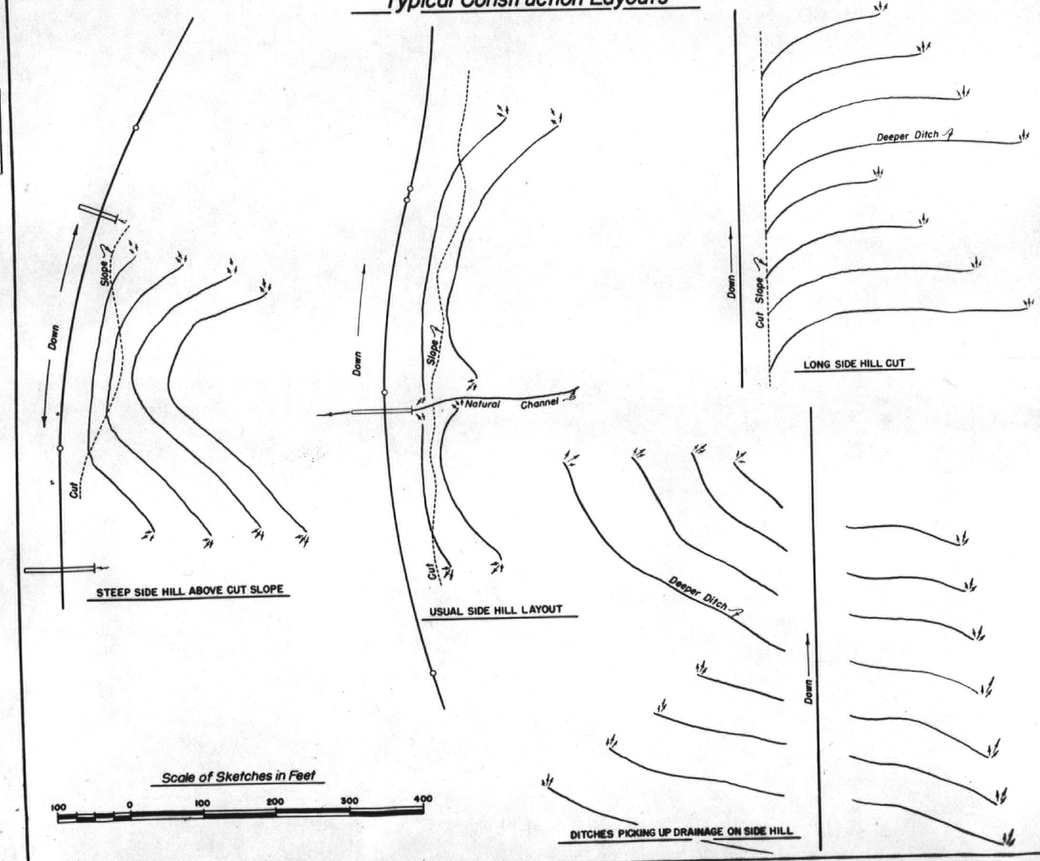
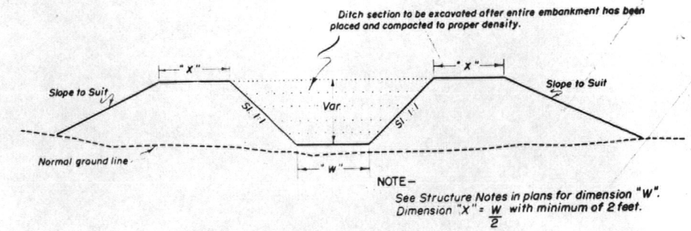


Table of Slopes and Yardages

▲ SLOPES 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"	12
				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.*

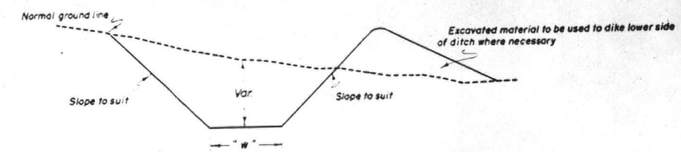
TYPICAL SECTIONS *for* DRAINAGE, IRRIGATION DITCHES *and* CHANNEL CHANGES



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

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado State Highway Department 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.

COLORADO
STATE HIGHWAY DEPARTMENT

Standard Types of Ditches and Construction Methods

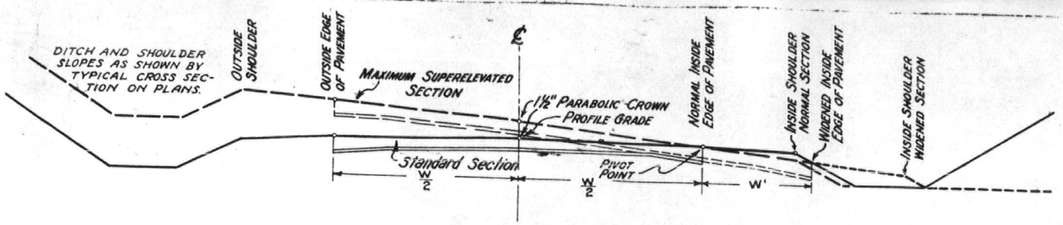
Designed by C.G.M.
Made by C.G.M.
Checked by

Approved by J. Marshall
Engineer, Surveys & Plans
Date: Aug. 18, 1950

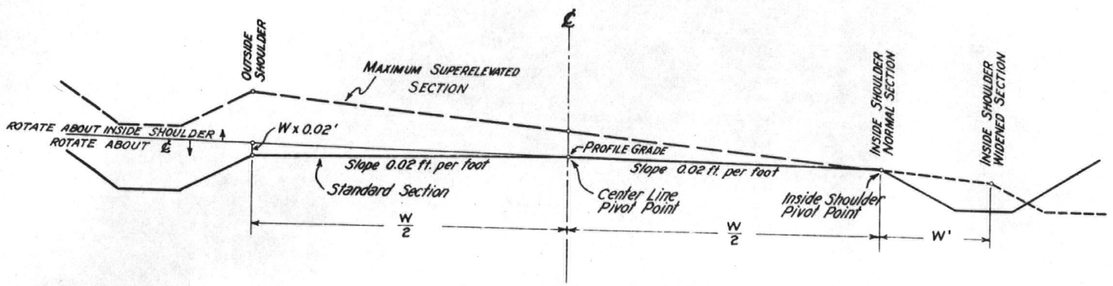
STANDARD M-I-B

FED. ROAD DIST. NO.	STATE		
3	COLO.	S0003(4)	10

Rev. 11-2-38 P.B.B. Widening Transition.
Rev. 12-13-47 by J.P.K.



PAVEMENT SECTION

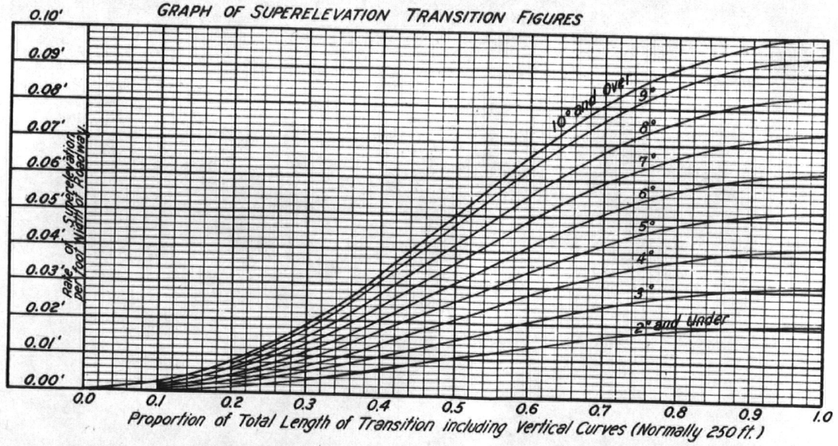


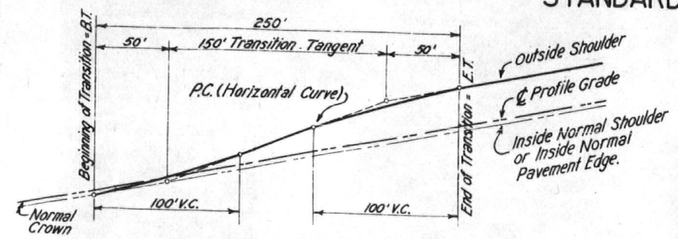
GRADED OR SURFACED SECTION

SUPERELEVATION AND WIDENING TABLES

DISTANCE FROM B.T. (PROPORTION)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	MAX. 1.0
Degree of Curvature	RATE OF SUPERELEVATION (IN FEET) PER FOOT WIDTH OF ROADWAY									
2° and Under	0.00044	0.00175	0.00394	0.00700	0.01050	0.01400	0.01706	0.01925	0.02056	0.02100
3°	0.00066	0.00263	0.00591	0.01050	0.01575	0.02100	0.02559	0.02888	0.03084	0.03150
4°	0.00088	0.00350	0.00788	0.01400	0.02100	0.02800	0.03413	0.03850	0.04113	0.04200
5°	0.00109	0.00438	0.00984	0.01750	0.02625	0.03500	0.04266	0.04813	0.05141	0.05250
6°	0.00131	0.00525	0.01181	0.02100	0.03150	0.04200	0.05119	0.05775	0.06169	0.06300
7°	0.00153	0.00613	0.01378	0.02450	0.03675	0.04900	0.05972	0.06738	0.07197	0.07350
8°	0.00175	0.00700	0.01575	0.02800	0.04200	0.05600	0.06825	0.07700	0.08225	0.08400
9°	0.00197	0.00788	0.01772	0.03150	0.04725	0.06300	0.07678	0.08663	0.09253	0.09450
10° and Over	0.00208	0.00833	0.01875	0.03333	0.05000	0.06667	0.08125	0.09166	0.09792	0.10000
	OFFSETS FOR WIDENING - W'- (IN FEET)									
Over 10°- Under 12°	0.03	0.12	0.27	0.48	0.75	1.08	1.47	1.92	2.43	3.00
12°- " 15°	0.04	0.16	0.36	0.64	1.00	1.44	1.96	2.56	3.24	4.00
15°- " 20°	0.05	0.20	0.45	0.80	1.25	1.80	2.45	3.20	4.05	5.00
20° and Over	0.06	0.24	0.54	0.96	1.50	2.16	2.94	3.84	4.86	6.00

GRAPH OF SUPERELEVATION TRANSITION FIGURES

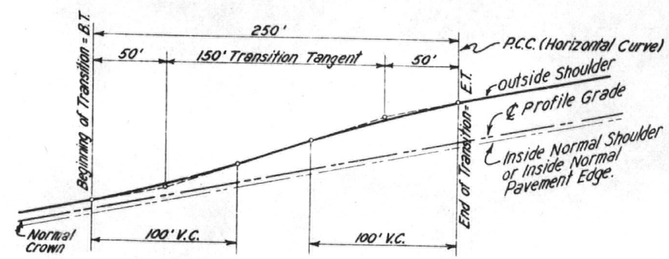




CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

NOTE: CASE I

The transition in this case, from crowned section to superelevated section, shall proceed uniformly by raising the outside shoulder, over a distance of 250 ft. as shown, beginning at a point on the tangent 150 ft. from the end of the curve and acquiring full superelevation at a point 100 ft. inside the curve.



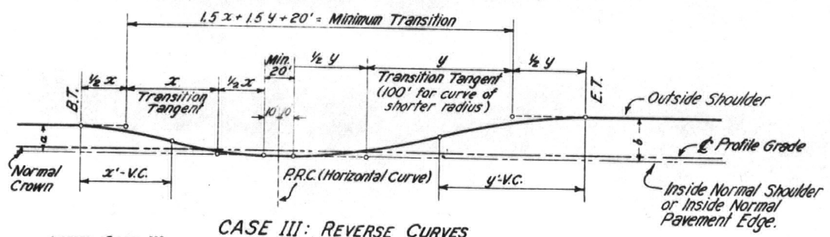
CASE II: COMPOUND CURVE

NOTE: CASE II

Superelevation transitions at the outside ends of compound curves shall be constructed in accordance with rules given under CASE I.

Superelevation transition between the arcs of different radii shall be made as in CASE I, except that the entire transition shall lie within the limits of the curve of the longer radius.

In cases where curves in the same direction have a tangent distance of less than 300 ft. between points of curve, the intervening tangent shall be superelevated an amount equal to that of the curve of greater radius and the transition shall be made as in the case of a true compound curve.



CASE III: REVERSE CURVES

NOTE: CASE III

Transitions between true reverse curves shall be accomplished as shown on the above diagram.

Transition tangents shall be directly proportional to the amount of superelevation of the respective curves.

EXAMPLE: Let a represent the amount of superelevation on 1st curve;
" b " " " " " 2nd " ;
" x " " " " transition tangent on 1st " ;
" y " " " " " " 2nd " ;
then, $a:b = x:y$.

The transition tangent of the curve having the shorter radius shall be set at 100 ft.

A normal crowned section 20 ft. long, 10 ft. on each side of the P.R.C. shall be used.

In cases where curves in opposite directions are in such proximity that a standard transition can not be had, the practice outlined for true reversing curves shall be used.

The total distance between the P.T. of the first curve and the P.C. of the succeeding curve shall be prorated into the transition distance of the respective curves until a maximum of 150 ft. of transition tangent for each curve is achieved.

GENERAL NOTES

Curves on projects using the Sections shown are to be superelevated and widened as indicated in the accompanying drawings and tables.

The normal inside edge of the Pavement slab is to remain at the standard elevation of 0.125 ft. below the profile grade, and the outside edge of the slab is to be superelevated at the rate per foot width of roadway given in the table. The Section is to be rotated about the normal inside edge of the Pavement, with a 1½" parabolic crown for curves of 10° and under, and a flat crown for widened Sections.

The normal inside edge of the Graded or Surfaced Section is to remain at the standard elevation of 0.02 ft. per foot width of roadway below the profile grade, or as shown on the Typical Section for the Project. Also, the centerline pivot point is to be used until the superelevation equals 0.02 ft. per foot width of roadway, but when this elevation is exceeded the normal inside shoulder pivot point is to be used.

When the degree of curvature exceeds 10°, the inside edge of the Pavement slab or the inside shoulder of the Graded or Surfaced Section is to be widened from the normal inside edge or shoulder, respectively, as shown by the table and plan or by cross-sections. Curves of 10° or less are not to be widened.

The slope of the shoulders and widened sections shall conform to the rate per foot width of roadway required, except that the inside shoulder of paved sections shall maintain the Typical Section slope until this slope is exceeded by the required superelevation slope.

The outside ditch on superelevated Sections is to be modified, where necessary to provide drainage. Otherwise, this ditch shall conform to normal ditch section shown for Project.

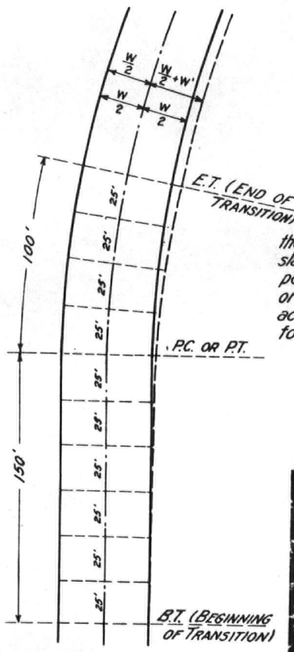
The rate of superelevation per foot width of roadway to be applied at the outside shoulder of the roadway is computed as follows:

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

0.0105 ft. x Degree of Curvature.

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

Special transition problems not covered by this standard sheet shall be covered by appropriate notes included with curve data on plans.



GENERAL PLAN OF WIDENING

Curves of over 10° are to have the inside portion of the pavement slab and shoulder, or the inside portion and shoulder in a graded or surfaced section, widened in accordance with the plan, offsets for widening, and cross sections.

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

Designed by R.E.L. | Approved by J. S. Marshall
Made by P.B.B.
Checked by R.E.S. & P.B.B. | Date January 1st 1948

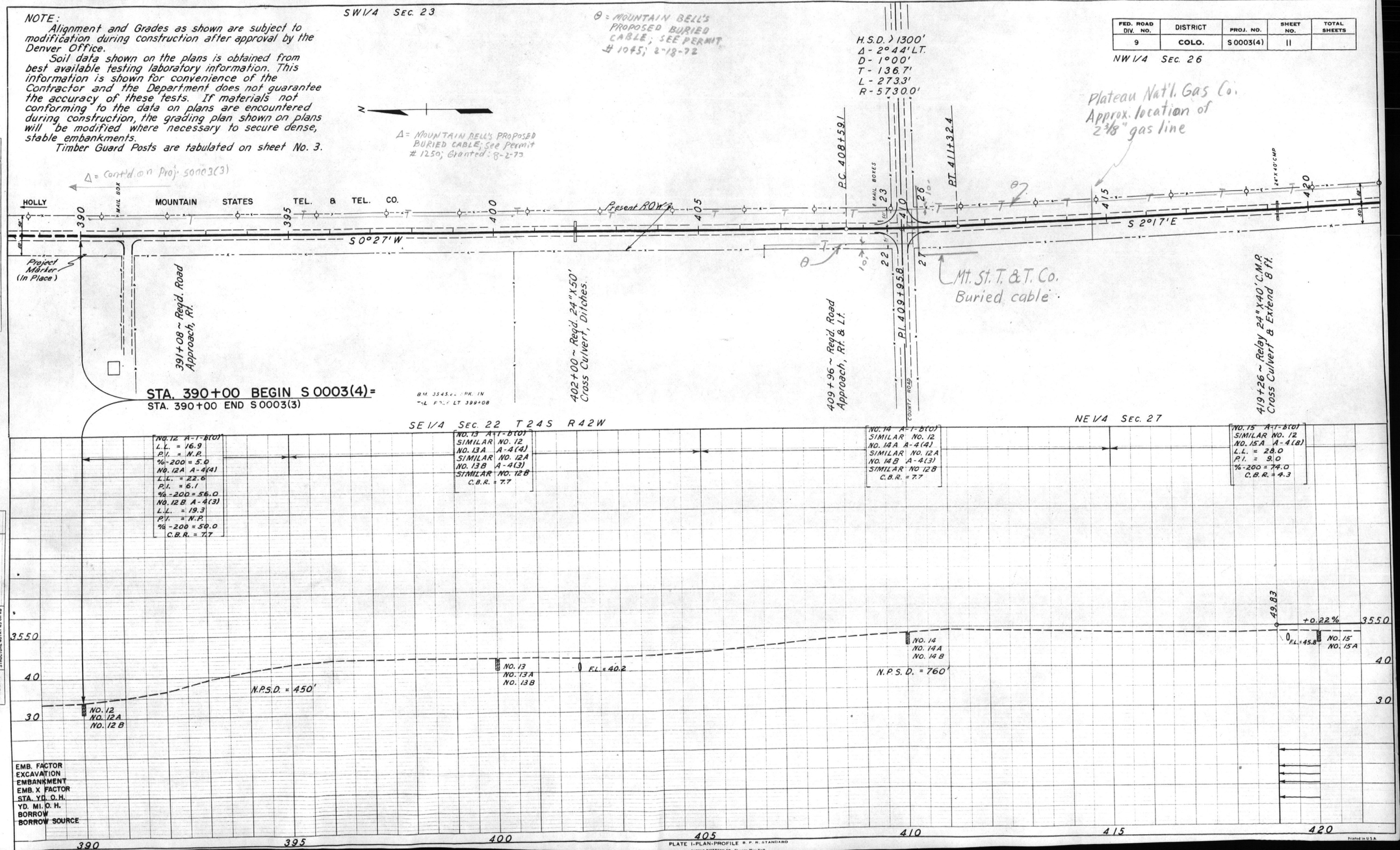
FED. ROAD DIV. NO.	DISTRICT	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	S 0003(4)	11	

NOTE:

Alignment and Grades as shown are subject to modification during construction after approval by the Denver Office.

Soil data shown on the plans is obtained from best available testing laboratory information. This information is shown for convenience of the Contractor and the Department does not guarantee the accuracy of these tests. If materials not conforming to the data on plans are encountered during construction, the grading plan shown on plans will be modified where necessary to secure dense, stable embankments.

Timber Guard Posts are tabulated on sheet No. 3.



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PROFILE — SURVEYED / PLOTTED / NOTE BOOK / CHECKED / B.M. & NOTED / STRUCTURE NOTAT'NS CH'KD / NO. 1220 — BY / DATE

PLATE I-PLAN-PROFILE B. P. R. STANDARD

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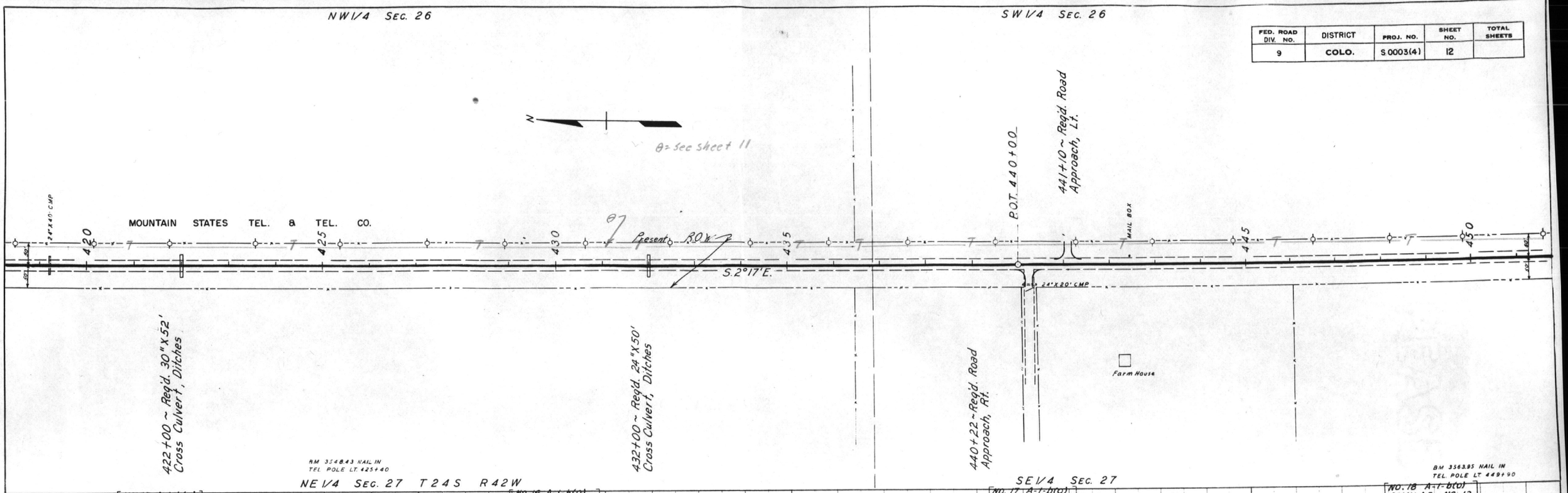

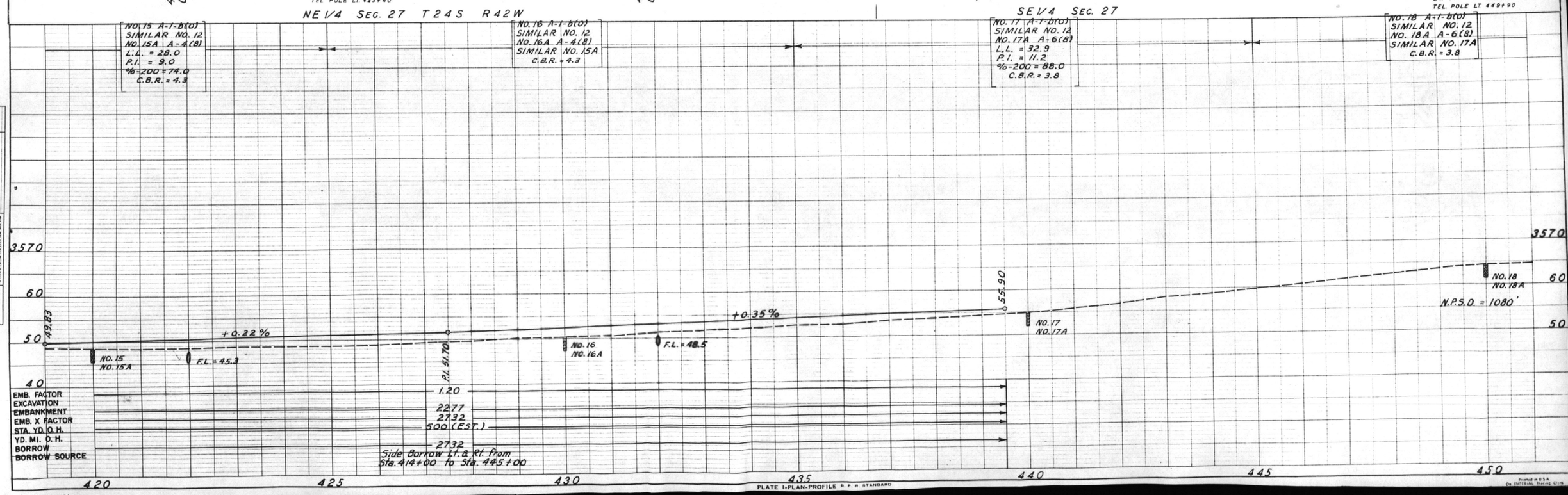

PLATE I-PLAN-PROFILE B. P. R. STANDARD

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PROFILE — SURVEYED, PLOTTED, GRADES CHECKED, B.M.'s NOTED, STRUCTURE NOTATIONS CHKD — NOTE BOOK NO. 16200 — BY — DATE

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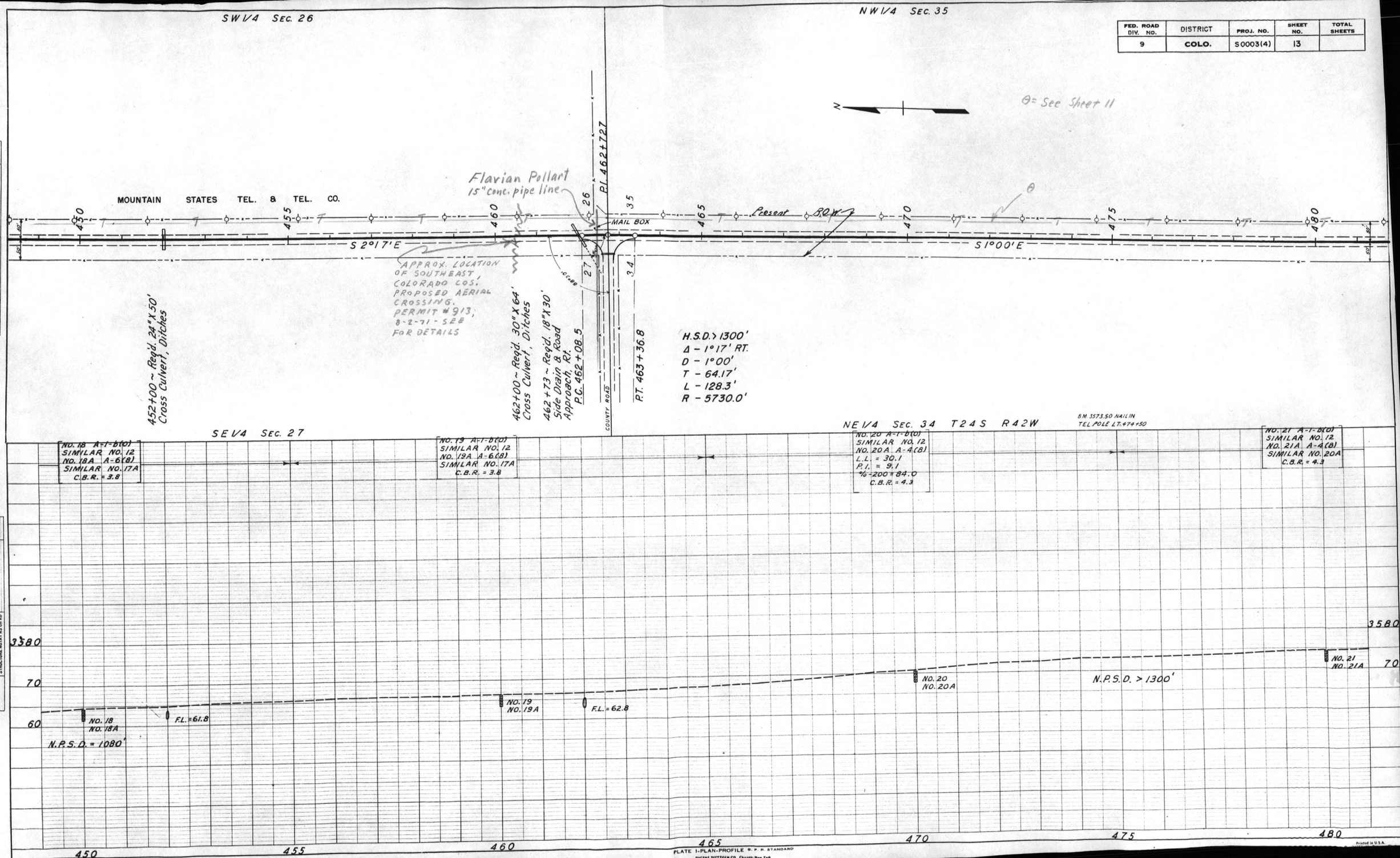

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NOTE BOOK
NO. 16200
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PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE

PROFILE
NOTE BOOK
NO. 16200
SURVEYED
PLOTTED
GRADES CHECKED
B.M.'s NOTED
STRUCTURE NOTATIONS CHKD
BY
DATE

PLATE 1-PLAN-PROFILE B. P. R. STANDARD
EUGENE DIETZGEN CO., Chicago-New York

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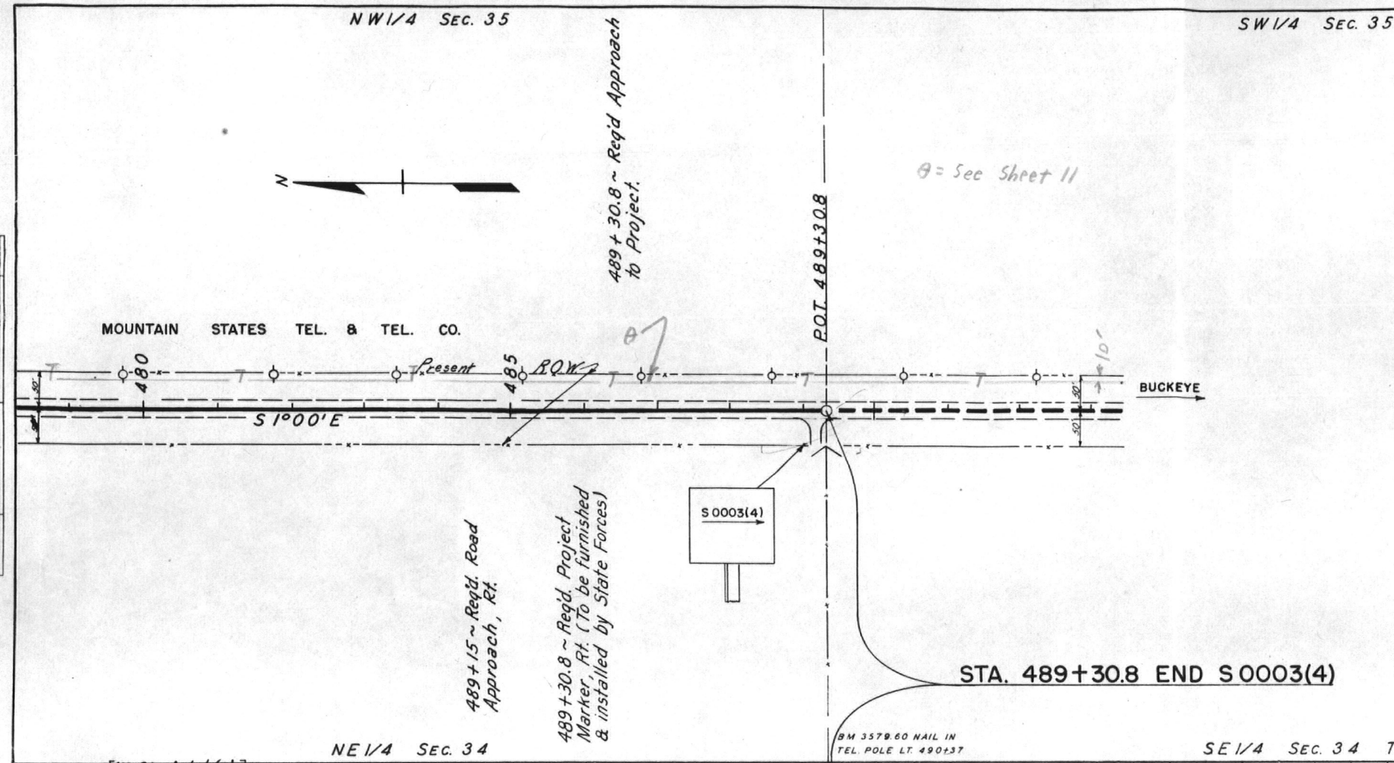

490+37
+7+4.50
15.87

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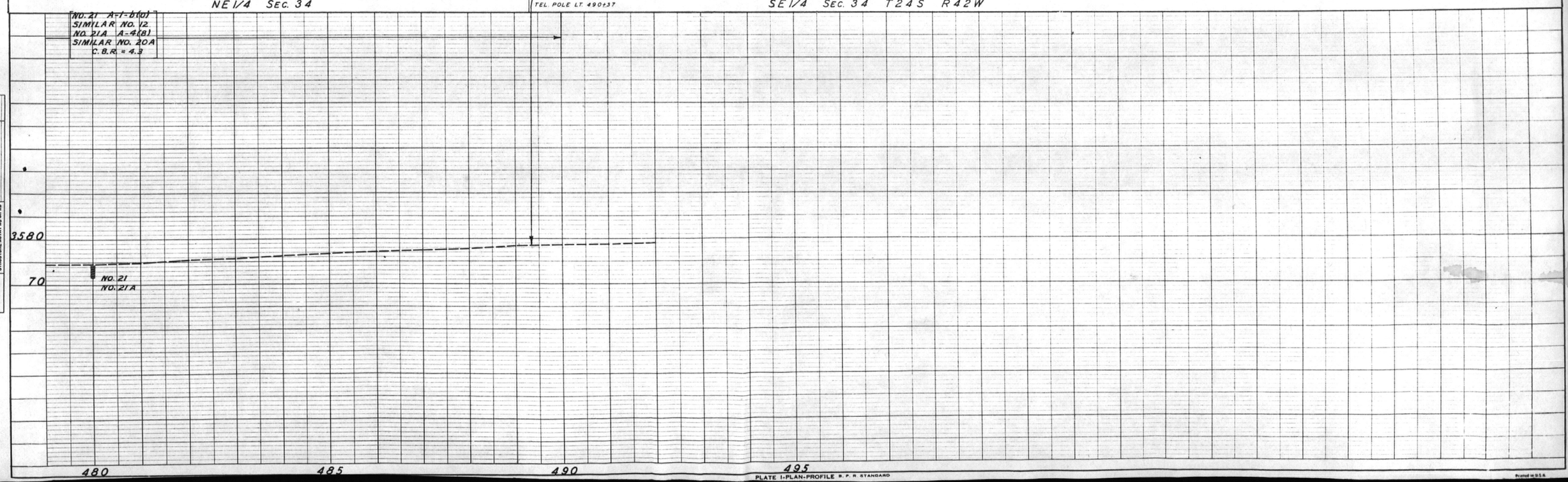
SIMILAR NO. 12
NO. 21A A-4(8)
SIMILAR NO. 20A
C.B.R. = 4.3



PLAN
SURVEYED
PLOTTED
NOTE BOOK
ALIGNMENT CHECKED
NO. 6202
RT. OF WAY CHECKED
BY
DATE

PROFILE
SURVEYED
PLOTTED
NOTE BOOK
GRADES CHECKED
B.M.'s NOTED
NO. 6202
STRUCTURE NOTAT'NS CH'KD
BY
DATE