COLORADO DEPT. OF HIGHWAYS
FORM C. D. H. 128
JANUARY, 1954

TITLE SHEET

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.
9	COLORADO	C 02-0010-03	1

COLORADO DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED STATE **PROJECT NO.** C 02-0010-03 STATE HIGHWAY NO. 10 PUEBLO & OTERO COUNTIES

INDEX OF SHEETS

SCALES OF ORIGINAL DRAWINGS

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

GROSS LENGTH OF PROJECT 81,088 Lin Ft. = 15.358 Miles
NET LENGTH OF PROJECT 80,488 Lin Ft. = 15.244 Miles

CONVENTIONAL SIGNS

CENTER LINE (PLAN SHEET / TITLE SHEET)
RIGHT OF WAY LINE (R.O.W. MARKER)
COUNTY LINE
TOWNSHIP OR RANGE LINE (SECTION LINE / 1/4 SECTION LINE / 1/16 SECTION LINE)
LAND LINES (TITLE SHEET / PLAN SHEET)
RAILROAD
BARBED WIRE FENCE
COMBINATION WIRE FENCE
SNOW FENCE
TELEPHONE & TELEGRAPH LINES
POWER LINE
DETOUR
PRESENT ROAD (Plan Sheets)

TABULATION OF LENGTH & DESIGN

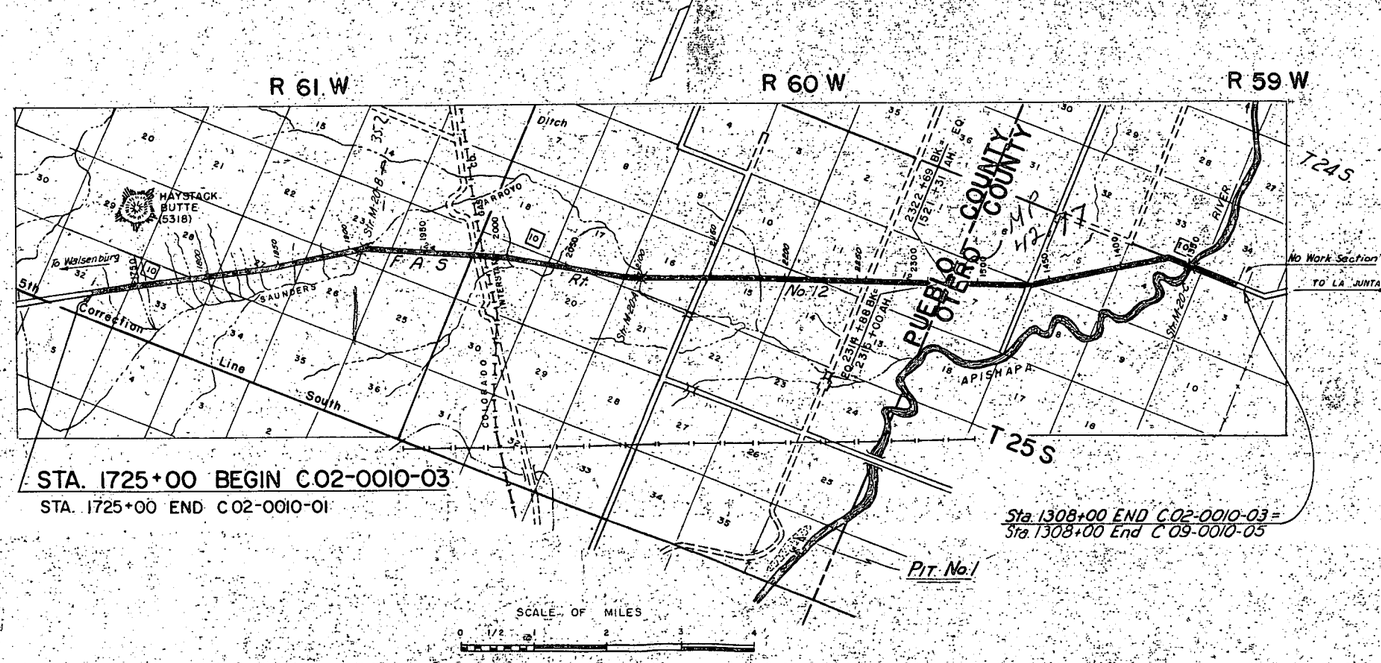
STATIONS	Roadway Lin. Ft.	No Work	
1725+00 Begin C02-0010-03 = 1725+00 End C02-0010-01	18,183.8		
1906+83.8 Bridge	109.5		
1907+93.3	19,872.3		
2106+65.6 Bridge	86.8		
2107+52.4	20,735.6		
2314+88 Bk. = 2315+00 Ah. Equation	769.0		
2322+69 Bk. = 1521+31 Ah. Pueblo Co. Equation. Otero Co.	17,340.5		
1347+90.5 Bridge Apishapa River	183.7		
1346+06.8	3,206.8		
1314+00 End Work Section		600.0	
1308+00 End C02-0010-03 = 1308+00 End C 09-0010-05			
TOTALS	80,488.0	600.0	

SUMMARY

	Lin. Ft.	Miles
Roadway (Net Length)	80,488.0	15.244
No Work Section	600.0	0.114
TOTAL (Gross Length)	81,088.0	15.358

DESIGN DATA

Maximum Degree of Curve	4°.00
Maximum Grade	4%
Minimum N.P.S.D. (Horizontal)	710'
Minimum N.P.S.D. (Vertical)	280'
Maximum Design Speed	40 M.P.H.



SEE SPECIAL PROVISIONS FOR NOTICE TO BIDDERS.

COLORADO DEPARTMENT OF HIGHWAYS

APPROVED: _____ CHIEF ENGINEER

10-24-58 DATE

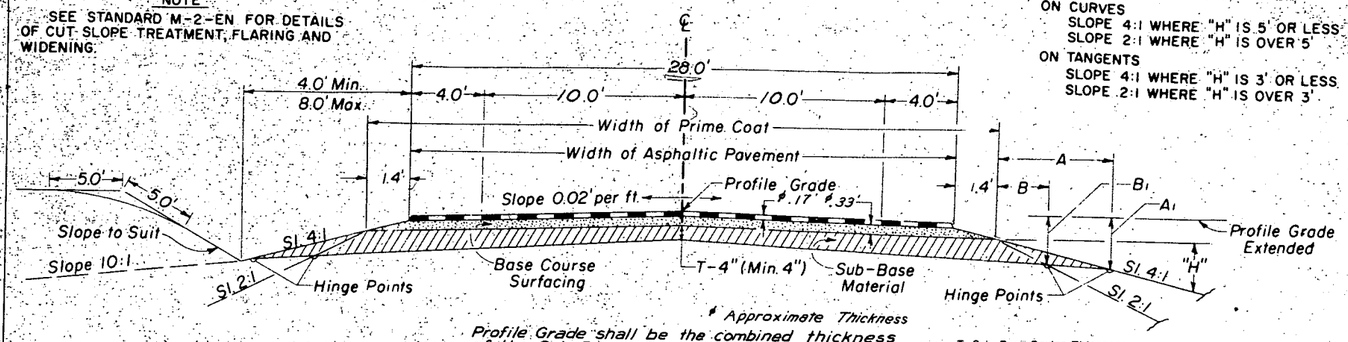
C. O. H. 126
1956

Rev. 10-31-58 - Item 52 - J.C.R.
Rev. 11-7-58 - Tr. Timb. Item 42 - J.C.R.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	C02-0010-03	2	

TYPICAL CROSS SECTION

NOTE
SEE STANDARD M-2-EN FOR DETAILS OF CUT SLOPE TREATMENT, FLARING AND WIDENING.



FILL SLOPES:
ON CURVES
SLOPE 4:1 WHERE "H" IS 5' OR LESS
SLOPE 2:1 WHERE "H" IS OVER 5'
ON TANGENTS
SLOPE 4:1 WHERE "H" IS 3' OR LESS
SLOPE 2:1 WHERE "H" IS OVER 3'

* Approximate Thickness

Profile Grade shall be the combined thickness of the Sub-Base Material, Base Course Surf. and Plant Mixed Asphaltic Surf. over the present road after Blading operations.

T = Sub-Base Design Thickness

EXCAVATION OR BORROW BELOW 4:1 SLOPE AND/OR 10:1 SLOPE WILL NOT BE PERMITTED

THE DEPTH AND WIDTH OF THE SIDE DITCH SHALL BE VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE AND/OR ENTRANCE TO DRAINAGE STRUCTURES.

GRAVEL OR CRUSHED ROCK SURFACING SHALL BE PLACED IN SEPARATE COURSES AT THE FOLLOWING RATES PER 100 LIN. FT. OF ROADWAY

ASPHALTIC PAVEMENT	34 TONS
BASE COURSE SURFACING	65 TONS

MATERIAL ABOVE THE SUBGRADE IS TO BE CONSTRUCTED OF SUB-BASE MATERIAL AT LOCATIONS DESIGNATED IN SUB-BASE MATERIAL TABULATION. ESTIMATED QUANTITIES INVOLVED IN THIS OPERATION AND THICKNESS OF MATERIAL REQUIRED ARE TABULATED IN THE SUB-BASE MATERIAL PLAN.

HINGE POINTS FOR SUB-BASE MATERIAL

SUB-BASE DESIGN THICKNESS RANGES		"T" - 4" (MIN. 4")	SL. 4:1		SL. 2:1	
INCHES	FOOT	FOOT	A	A1	B	B1
6	.50	.33	2.2	-1.4	1.0	-1.3
7	.58	.33	2.2	-1.4	1.0	-1.3
8	.67	.33	3.9	-1.8	1.8	-1.7
13	1.08	.75	5.6	-2.2	2.5	-2.1

GENERAL NOTES

This project is to be constructed in conformity with the Standard Specifications of the Colorado Department of Highways, adopted Jan. 1, 1958.

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

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

Prime Coat and Asphaltic Surfacing shall be placed over the curbed width of all Bridges on this Project.

Approximate 390 hours of Blading (Item 207) will be required on this Project.

All Reinforced Concrete Culvert Pipe Specified under Item 52 for this project shall be Class III.

For preliminary plan quantities of Asphaltic Road Materials, the following rates of application were used.
Prime coat-(Roadway)-------@ 0.40 Gals per Sq. Yd.
Prime coat-(Bridges)-------@ 0.10 Gals per Sq. Yd.
Paving Asphalt-------@ 5.9 % by weight

Rate of application and grade of Asphaltic Material shall be as determined by the Engineer at time of application.

Road Approaches as shown on Structure list shall be primed & asphaltic processed 2" thick 50 feet out from edge of the Asphaltic Surfacing or to the Right of Way line, whichever is less.

*Asphalt with an additive and *Asphalt without the additive are to be used on this project for experimental purposes.*
Asphalt with the additive is to be used Sta. 1806+ to 2322 +69 Bk. = 1521+31 Ah to 1308+.
Asphalt without additive is to be used Sta. 1725+ to Sta. 1806+

When Asphalt without the additive is used the wet-dry Stability ratio shown in paragraph 32.2.2.2. of the Standard Specification, is modified to not less than six tenths (0.6).

Application methods for liquid Asphaltic Road Material, which result in the discoloration of wheelguards or handrails, will not be permitted.

SUMMARY OF APPROXIMATE QUANTITIES

ITEM No.	ITEM	UNIT	PROJECT TOTALS
11	Removal of Portions of Bridge Sta. 1799+	Lump Sum	•
11	Removal of 6' Structures	Lump Sum	•
11	Reset Mail Boxes	Lump Sum	•
11	Reset Guard Posts	Each	116
11	Cleaning Culverts	Each	9
13	Unclassified Excavation	Cu. Yd.	4000
13	Unclassified Ditch Excavation	Cu. Yd.	400
13	Stripping	Cu. Yd.	60,000
14	Unclassified Structural Excavation- Miscellaneous	Cu. Yd.	340
16	Structure Backfill (Class 1)	Cu. Yd.	220
17	Compaction (Modified)	Cu. Yd.	56,000
17	Wetting	M. Gal.	3640
18	Station Yard Overhaul	Sta. Yd.	3000
18	Yard Mile Overhaul	Yd. Mi.	1300
18	Ton Mile Overhaul	Ton Mi.	1,403,600
23	Sub-Base Material (Class 2)	Ton	97,700
26	Gravel or Crushed Rock Surfacing (Grading C)	Ton	52,500
26	Detour Surfacing	Cu. Yd.	150
29	Asphalt (120-150 penetration) (Additive)	Ton	1610
29	Asphalt (120-150 penetration)	Ton	180
30	Asphaltic Road Material (M C) Prime	Gal.	110,100
32	Plant Mixed Asphaltic Surfacing	Ton	27,550
42	Untreated Bridge Timber	M ft. bm.	0.7
42	Treated Bridge Timber	M ft. bm.	4.7
42	Transport and Erect Treated Bridge Timber	M ft. bm.	2.6
52	18" Reinforced Concrete Culvert Pipe	Lin. ft.	52
52	24" Reinforced Concrete Culvert Pipe	Lin. ft.	250
52	48" Reinforced Concrete Culvert Pipe	Lin. ft.	132
53	24" Corrugated Metal Culvert Pipe	Lin. ft.	26
53	30" Corrugated Metal Culvert Pipe	Lin. ft.	38
53	36" Corrugated Metal Culvert Pipe	Lin. ft.	24
63	Grouted Rubble Slope & Ditch Paving	Cu. Yd.	47
65	Concrete Slope and Ditch Paving	Cu. Yd.	7
67	Riprap	Cu. Yd.	30
92	Timber Guard Posts	Each	294
95	43"x27" Metal Aprons for Corrugated Metal Pipe Arch Culverts	Each	2
134	29"x18" Corrugated Metal Pipe Arch Culverts	Lin. ft.	44
134	43"x27" Corrugated Metal Pipe Arch Culverts	Lin. ft.	52
134	58"x36" Corrugated Metal Pipe Arch Culverts	Lin. ft.	52
207	Blading	Hour	390
	STATE FORCES		
42	Treated Bridge Timber (Furnished by State Forces)	M ft. bm.	2.6
	Signing and Striping Entire Project	Lump Sum	

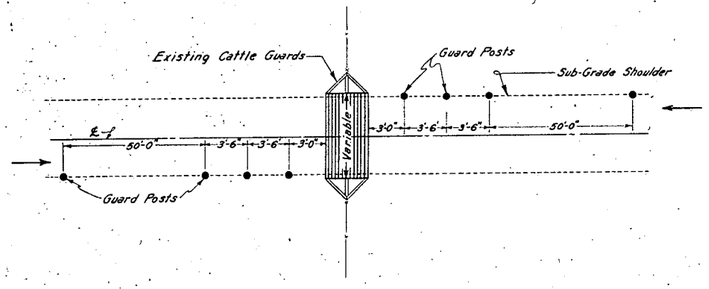
D. H. 128
R 1956

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	C02-0010-03	3	

SUMMARY OF EARTHWORK QUANTITIES

EXCAVATION		
List of Structures as Excavation	3270	Cu. Yds.
* List of Structures as Embankment	310	Cu. Yds.
* Est. for Covering Ends of Culverts	280	Cu. Yds.
TOTAL	3860	Cu. Yds.
STATION YARD OVERHAUL		
Est. for Structure Backfill	2398	Sta. Yds.
TOTAL	2398	Sta. Yds.
YARD MILE OVERHAUL		
Est. for Structure Backfill	1255	Yd. Mi.
TOTAL	1255	Yd. Mi.
COMPACTION		
* From Unclassified Excavation	590	Cu. Yds.
Blading Areas	54890	Cu. Yds.
TOTAL	55,480	Cu. Yds.
UNCLASSIFIED DITCH EXCAVATION		
From List of Structures	320	Cu. Yds.
TOTAL	320	Cu. Yds.

GUARD POST SPACING for CATTLE GUARDS



TIMBER GUARD POSTS

STATION	Side	Spacing	Number	Reset	
1736+48	Lt. & Rt.	Culvert		2	
1749+97	" "	Bridge		2	
1759+47	" "			2	
1777+30	" "	Cattle Gd.	6	2	
1790+20	" "	Bridge	16	4	
1799+12	" "	Bridge	18	2	
1810+00	" "	Bridge		2	
1819+45	" "	Culvert		2	
1824+64	" "	Bridge		2	
1832+16	" "	Culvert		2	
1838+93	" "	Culvert		2	
1840+38 to 1855+06	" "	1° Curve	22		
1852+39	" "	Culvert		2	
1881+10	" "	Culvert		2	
1891+50	" "	Culvert	2		
1899+10	" "	Cattle Gd.	2	6	
1904+81 to 1916+65	" "	4°Curve	26		
1907+39	" "	Bridge	18	6	
1930+35	" "	Culvert		2	
1950+24	" "	Culvert		2	
1953+36	" "	Culvert		2	
1965+33	" "	Culvert		2	
2000+35	" "	Culvert		2	
2014+83 to 2030+19	" "	2°Curve	26		
2016+64	" "	Cattle Gd.	4	4	
2020+14	" "	Culvert		2	
2047+83	" "	Culvert		2	
2075+38	" "	Culvert		2	
2090+71 to 2104+53	" "	2°Curve	30		
2107+09	" "	Bridge	12	12	
2112+82	" "	Cattle Gd.	4	4	
2122+39	" "	Culvert		2	
2142+40	" "	Culvert		2	
2154+10	" "	Cattle Gd.	4	4	
2162+40	" "	Culvert		2	
2177+04 to 2190+12	" "	1°Curve	16		
2184+41	" "	Culvert		2	
2205+84	" "	Culvert		2	
2238+95	" "	Culvert		2	
2266+93	" "	Cattle Gd.	4	4	
2275+45	" "	Culvert		2	
2306+40	" "	Culvert	14	2	
1467+14 to 1460+16	" "	4°Curve			
1465+45	" "	Cattle Gd.	4	4	
1402+88	" "	Cattle Gd.	4	4	
1366+12 to 1349+13	" "	3°Curve	44		
1347+	" "	Bridge	16	8	
1339+	Lt. & Rt.	Culvert	2		
TOTALS			294	116	

It is estimated that material for Sub-Base Material and Surfacing for the Project is available in the vicinity of the Pit indicated in the following tabulations. Estimated quantities involved in these operations are shown below.

Alteration of the Sub-Base Material and Surfacing Plans, as here outlined, will be allowed only on written permission from the Department.

SUB-BASE MATERIAL PLAN

Material to be placed	Source & Quantity Available	Quantity CLASS 2 TONS	Overhaul TON MILES	* "T" Thickness INCHES
1725+00 to 1785+00	Pit No. 1 4 miles to sta. 2667+00 & 5 miles to sta. 2154+00	8160	102,465	8
1785+00 to 1825+00		9440	105,598	13
1825+00 to 1885+00		5700	60,779	7
1885+00 to 1906+83.8		2970	29,367	6
1907+93.3 to 1985+00		10481	93,606	8
1985+00 to 2154+00		16,055	105,963	6
2154+00 to 2184+10		2860	15,115	6
2184+10 to 2267+00		7876	37,687	6
2267+00 to 2314+88 Bk.	Ample R=77	4549	20,257	6
2315+00 to 2322+69 Bk.		731	3,640	6
1521+31 to 1347+90.5		16,473	110,287	6
1346+06.8 to 1314+00		3046	26,424	6
Estimated for Approach to project		136	1,785	8
" " "		95	853	6
List of Structures		230	1862	
Correcting for irregularities in Sub-Grade		8880	71,969	
TOTALS		97,682	791,657	

*Based on Curve B

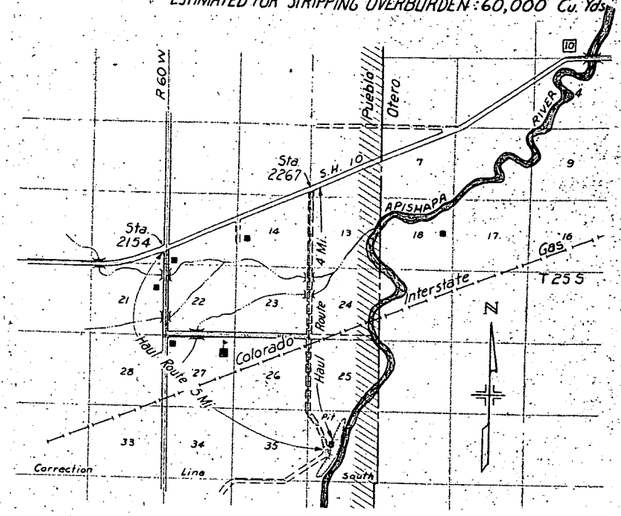
SURFACING PLAN

Material to be placed	Source & Quantity Available	Tons Used Plant Mix	Tons Used Base Course Grading "C"	Overhaul (Ton Miles) Plant Mix	Overhaul (Ton Miles) Base Course
1725+00 to 1799+02.1	Pit no. 1 4 miles to sta. 2267+00 & 5 miles to sta. 2154+00	2517		31,271	
1799+21.1 to 1906+83.8		3659		39,151	
1907+93.3 to 2106+65.6		6757		52,563	
2107+52.4 to 2154+00		1580		8,595	
2154+00 to 2184+10		1023		5,407	
2184+10 to 2267+00		2819		13,489	
2267+00 to 2314+88 Bk.		1628		7,249	
2315+00 to 2322+69 Bk.		261		1,300	
1521+31 to 1347+90.5		5896		39,474	
1346+06.8 to 1314+00		1090		9,456	
Estimated for Approaches to Project	Ample R=80	66		729	
List of Structures		252		1924	
1725+00 to 1906+83.8			11,819		134,772
1907+93.3 to 2106+65.6			12,917		100,481
2107+52.4 to 2154+00			3021		16,434
2154+00 to 2184+10			1957		10,343
2184+10 to 2267+00			5389		25,786
2267+00 to 2314+88 Bk.			3112		13,858
2315+00 to 2322+69 Bk.			500		2490
1521+31 to 1347+90.5			11,271		75,459
1346+06.8 to 1314+00			2084		18,079
Estimated for Approaches to Project			130		1437
List of Structures			286		2184
TOTALS		27,548	52,486	210,608	401,323

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TO SHE
9	COLORADO	C02-0010-03	4	

PIT NO. 1

LOCATION: W½ Sec. 36, T25S, R.60W.
OWNER: Arnold-Harriman Co. Inc.
QUANTITY AVAILABLE: 175,000 Cu. Yds.
PROPOSED USE: Sub Base, Surfacing, and ... Structure Backfill
HAUL DISTANCE: Sta. 2267 = 4 mi., Sta. 2154 = 5 mi.
ESTIMATED FOR STRIPPING OVERBURDEN: 60,000 Cu. Yds.



FIELD SAMPLE NO. 2194

TEST NO.	DEPTH IN FT.	DECRIPTION OF TEST HOLE MATERIAL
1	0.0-2.0	Overburden
1A	2.0-12.0	Sand and Gravel Sample
2	0.0-4.0	Overburden
2A	4.0-12.0	Sand and Gravel (12.0 plus Clay Shale)
3	0.0-7.0	Overburden
3A	7.0-12.0	Sand and Gravel
4	0.0-3.0	Overburden
4A	3.0-12.0	Sand and Gravel
5	0.0-2.0	Overburden
5A	2.0-12.0	Sand and Gravel (12.0 plus Clay Shale)
6	0.0-5.0	Overburden
6A	5.0-12.0	Sand and Gravel
7	0.0-5.0	Overburden
7A	5.0-12.0	Sand and Gravel
8	0.0-6.0	Overburden
8A	6.0-12.0	Sand and Gravel
9	0.0-2.0	Overburden
9A	2.0-8.5	Sand and Gravel (8.5 plus Clay Shale)
10	0.0-2.0	Overburden
10A	2.0-7.0	Sand and Gravel (7.0 plus Clay Shale)
11	0.0-2.0	Overburden
11A	2.0-5.0	Sand and Gravel (5.0 plus Clay Shale)
12	0.0-2.0	Overburden Sample
12A	2.0-10.5	Sand and Gravel (10.5 Clay Shale) Sample
13	0.0-8.0	Overburden
13A	8.0-12.0	Sand and Gravel
14	0.0-4.0	Overburden
14A	4.0-12.0	Sand and Gravel

COLORADO STATE HIGHWAY DEPARTMENT
S H D Form 125
JANUARY 1932

LIST OF STRUCTURES

FED. ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
8.	COLO.	C02-0010-03	5	

LOCATION		REMOVE STRUCTURE		EXCAVATION CUBIC YARDS			UNCLASSIFIED STRUCTURAL EXCAVATION MISCELLANEOUS	STRUCTURE BACKFILL	SUB-BASE MATERIAL	GRAVEL OR CRUSHED ROCK SURFACING	PLANT MIXED ASPHALTIC SURFACING			CLEANING CULVERTS	CORRUGATED METAL CULVERT PIPE LINEAR FEET			REINFORCED CONCRETE CULVERT PIPE LIN. FT.			CORRUGATED METAL PIPE ARCH CULVERTS LIN. FT.		METAL APRONS FOR C.M.P. CULVERTS (ARCH) NO.	MISCELLANEOUS
		NO.	KIND	UNCL.	EMB.	UNCL. DITCH	CUBIC YARDS	CUBIC YARDS CL.	TONS	TONS	TONS			EACH	24"	30"	36"	18"	24"	48"	29"x18"	58"x36"	48"x27"	
1725 ±									*	*	*													
1736+48					10	10																		
1747+27																								
1749+97				100			60		20	17	7			1										
1759+46.5				50																				6.3 Cu. Yds. Concrete Slope & Ditch Paving
1777+30				125										4										
1775+00 To 1790+00							52																	
1790+20				150																				22.1 Cu. Yds. Grouted Rubble Slope & Ditch Paving
1797+ to 1801+		1		450	300		5	10																
1799+12				150							8					38								150 Cu. Yds. Detour Surfacing
																								1-Remove Portions of Bridge. 0.628 M ft. bm. Untreated Bridge timber. 0.826 M ft. bm. Treated Bridge Timber. 2.556 M ft. bm. Transport & Erect Treated bridge timber. (2.556 M ft. bm. Treated Bridge Timber, State furnished material.)
1810+00																								
1818+ To 1820+				150		200	6																	
1819+45																								3.4 Cu. Yds. Grouted Rubble Slope & Ditch Paving
1823+ To 1826+				75		10	2	3										8						
1824+64				150																				
1832+16				50			10	24										14						
																		14						
																		14						
																		14						
																		6						
																		6						
																		6						
1838+93							20	8										6						
1845+ To 1849+							12											6						
1852+39				10			10	10										6						6.8 Cu. Yds. Grouted Rubble Slope & Ditch Paving
																		4						12 Cu. Yds. Grouted Rubble Slope & Ditch Paving
1867+				20														4						
1871+33									10	17	7							4						
1881+10							5	5										4						
																		4						
																		4						
1891+50						10	10	11																
1899+10				150														38						
1907+38.5				100																				
1930+35						10	5	3			31							4						
																		4						

LIST OF STRUCTURES

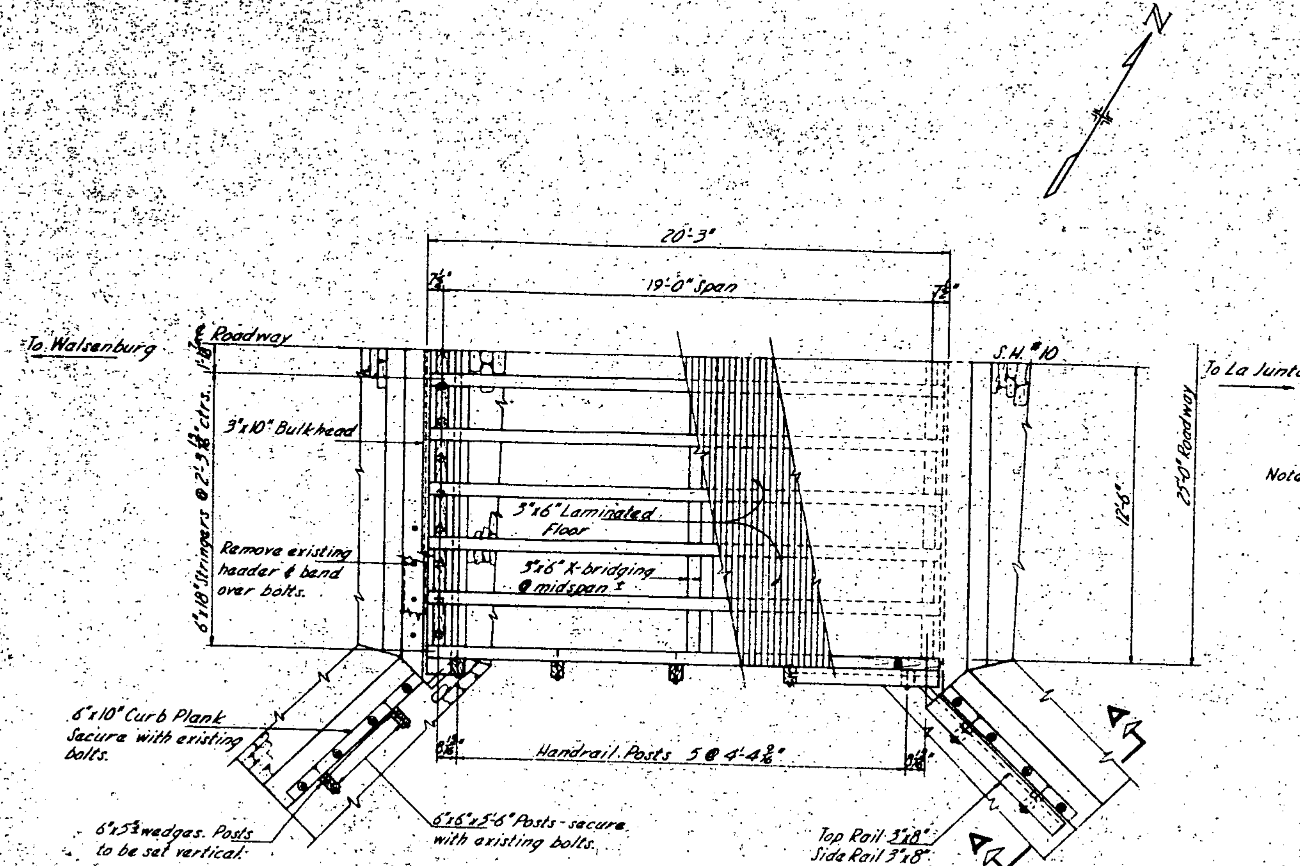
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	C02-0010-03	6	

LOCATION	DESCRIPTION	REMOVE STRUCTURE		EXCAVATION (CUBIC YARDS)			UNCLASSIFIED STRUCTURAL EXCAVATION MISCELLANEOUS (CUBIC YARDS)	STRUCTURE BACKFILL (CUBIC YARDS)	SUB-BASE MATERIAL	GRAVEL OR CRUSHED ROCK SURFACING	PLANT-MIXED ASPHALTIC SURFACING			CLEANING CULVERTS	CORRUGATED METAL CULVERT PIPE (LINEAR FEET)			REINFORCED CONCRETE CULVERT PIPE (LIN. FT.)			CORRUGATED METAL PIPE ARCH CULVERTS (LIN. FT.)		METAL APRONS FOR C.M.P. CULVERTS (ARCH)	MISCELLANEOUS
		NO.	KIND	UNCL.	EMB.	UNCL. DITCH		CL. I	TONS	TONS	TONS			EACH	24"	30"	36"	18"	24"	48"	25"x18"	58"x36"	NO. 43"x27"	
1950+54						5	5	3							[18" 24"									
1953+36						5	5	3										[6 6						23 Cu.Yds. Grouted Rubble Slope & Ditch Paving.
1965+33							2	2										6						
1994+69									30	34	14													
2000+34						5	2	2										6						
2016+64				100																				
2020+14							5																	
2047+69				195			15	70												[66 66				26 Cu.Yds. Riprap
2047+83				5			5	10							[4" 4" 6" 8"									
2075+38						10								1										
2107+09				75							27													
2112+82				100																				
2154+10				100																				
2154+49		1					5	5	30	34	20			1				26						
2184+41		1				5	5	2							[6" 4"									
2205+60						10	40	16															2	1-43"x27"x52' C.M.A.P. Culvert.
2205+84		1																						
2210+96		1					5	4	10	17	7													
2238+95		1				10	5	7										26			44			
2241+36									10	17	7													
2266+93				100																				
2267+26									10	17	7			1										
2306+40						10								1										
1465+38.2				100																				
1463+55									50	58	30													
1463+37									50	58	30													
1402+85				100																				
1357+50									10	17	7													
1353+				500 ⊖																				
1346+ To 1347+				65							50													
1339+00						20	40	20																
1314+00				100					*	*	*										52			
PROJECT TOTALS		6		3270	310	320	336	218	230	286	252			9	26	38	24	52	250	132	44	52	2	

* Quantities included in Surfacing Plan and Sub-Base plan.
▲ Allowance for Connecting Band.
⊖ Dyke to be made from Unclassified Excavation.
⊠ Dyke to be made from Ditch and/or Structural Excavation.

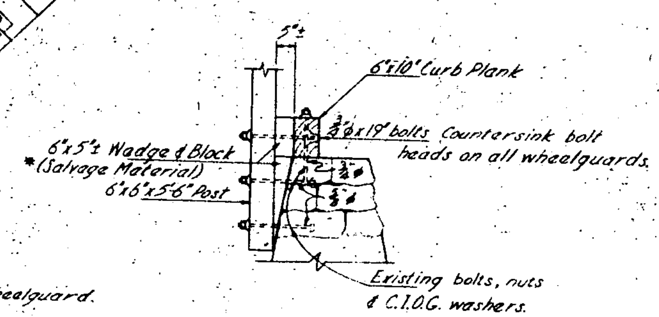
Rev. 11-7-58 Treated Br. Timb. Quantity. J.C.C.

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C 02-0010-03	7	

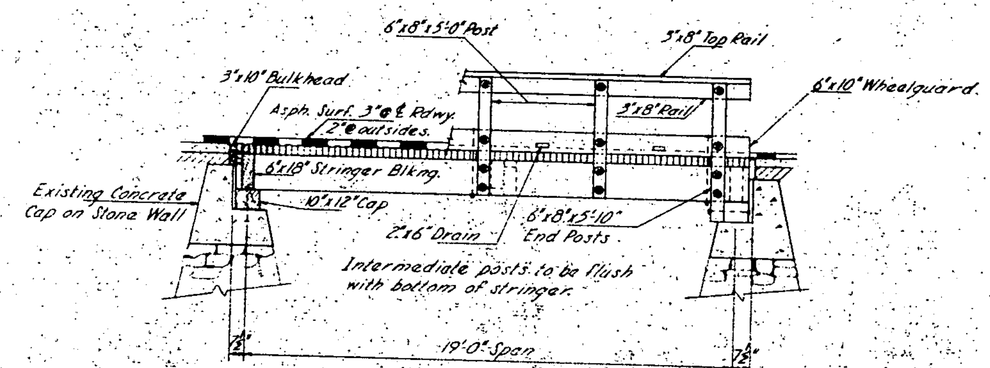


Note: Flooring may be random lengths providing the joints are placed over the stringers & not closer than every third plank.

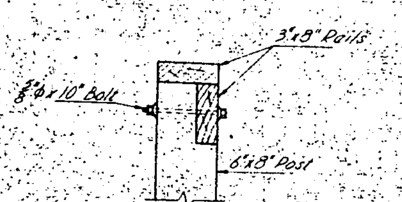
HALF PLAN - SUPERSTRUCTURE
Structure symmetrical about ℄ Roadway



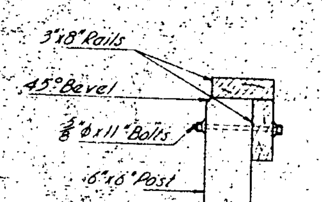
SECTION A-A
* To be included in Bid Price of Item 42.



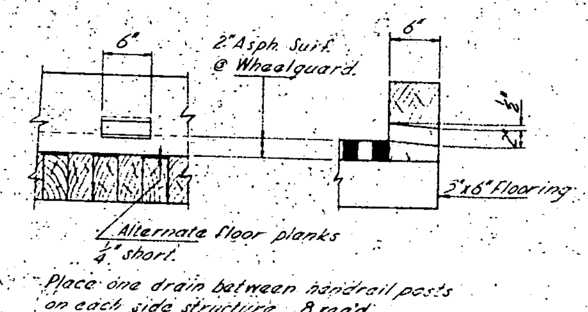
SECTIONAL ELEVATION



HANDRAIL - SUPERSTRUCTURE



HANDRAIL - WINGS



Place one drain between handrail posts on each side structure. 8 req'd.

DRAIN DETAIL

BOLTS & WASHERS - SUPERSTRUCTURE

Location	Item	Size	No.	Length	Wt. Each	Total Wt.
Posts to Rails	Bolts	⅝"	6	10"	1.08 Lb.	7.0 Lb.
Posts to Wheelguards	Bolts	¾"	6	14"	2.12 Lb.	12.7 Lb.
Posts to Stringers	Bolts	¾"	12	16"	2.37 Lb.	28.3 Lb.
Wheelguards to Stringers	Bolts	¾"	6	36"	4.83 Lb.	29.0 Lb.
Washers - Std. C.I.O.G.	Washers ⅝" & ¾" 12/48					69.0 Lb.
Total						146.0 Lb.

BOLTS & WASHERS - ONE ABUTMENT

Location	Item	Size	No.	Length	Wt. Each	Total Wt.
Posts to Rails	Bolts	⅝"	2	10"	1.08 Lb.	2.2 Lb.
Post to Cap	Bolts	⅝"	2	20"	1.90 Lb.	3.8 Lb.
Posts to Stringers	Bolts	¾"	4	18"	2.60 Lb.	10.4 Lb.
Posts to Wheelguards	Bolts	¾"	2	14"	2.12 Lb.	4.3 Lb.
Wheelguards to Stringers	Bolts	¾"	2	36"	4.83 Lb.	9.7 Lb.
Washers - Std. C.I.O.G.	Washers ⅝" & ¾" 8/16					25.6 Lb.
Total						56.0 Lb.

BOLTS & WASHERS - ONE WING

Location	Item	Size	No.	Length	Wt. Each	Total Wt.
Posts to Rails	Bolts	⅝"	2	11"	1.16 Lb.	2.3 Lb.
Posts to Curb Plank	Bolts	¾"	2	19"	2.72 Lb.	5.4 Lb.
Washers - Std. C.I.O.G.	Washers ⅝" & ¾" 4/4					8.0 Lb.
Total						15.7 Lb.

NAILS

Location	Item	Weight
Superstructure	30d Common	25 Lb.
	40d Common	135 Lb.
One Abutment	40d Common	5 Lb.
	7" Wire Spikes	5 Lb.
One Wing	40d Common	1 Lb.

NAILING DIRECTIONS

Rails to Posts: 2-40d nails per rail per post.
Stringer Blocking: 4-40d nails per block.
Stringer Bridging: 4-40d nails per piece.
Stringers to Cap: 2-40d nails per stringer.
Bulkhead to Stringers: 3-7" wire spikes per stringer.
Floor Planks to Floor Planks: 1-40d nail @ 12" centers and toe-nail planks to stringers with 1-30d nail per stringer, every other plank.

GENERAL NOTES (Cont.)

All bolts must have Std. C.I.O.G. or Malleable Cast Washers under each head and nut. Bolt lengths are calculated assuming Std. C.I.O.G. Washers. The contractor is cautioned to check bolt lengths before ordering because of variations in thickness of lumber.
The entire exposed surface of all untreated timber shall be painted one coat as specified, immediately after material is delivered to the job.
All hardware, except nails, to be galvanized. Weights of hardware shown are for ungalvanized materials.
All caps must be surfaced on vertical grain face.

SUMMARY OF QUANTITIES

	ITEM	DESCRIPTION	UNIT	SUPER-STRUCT.	ABUT. Nº-1②	ABUT. Nº-2②	TOTAL
③	11	Removal of Portions of Bridge Sta 1799+	Lump Sum				Lump Sum
	32	Plant Mixed Asphaltic Surfacing	Ton	8			8
	42	Untreated Bridge Timber	M ft. b.m.	0.280	0.174	0.174	0.628
	42	Treated Bridge Timber	M ft. b.m.	3872	0.413	0.413	4.698
	30	Asphaltic Road Material (MC)	Gal.	6			6
	42	Transport & Erect Trt'd. Bridge Tim.	M ft. b.m.	2.160	0.198	0.198	2.556
①	42	State Furnished Material	M ft. b.m.	2.160	0.198	0.198	2.556

① Required material to be furnished by the Colo. Dept. of Highways from the Maintenance Yard at Craig, Colo.
② Quantity shown includes 2-WINGS.
③ Remove all of present timber on superstructure and wings.

SUPERSTRUCTURE

Description	Size	No.	Length	Total
Untreated Timber				
Handrails S4S	3"x8"	4	20'-0"	160 BD. FT.
Handrail Posts S4S	6"x8"	6	5'-0"	120 BD. FT.
Total Untreated Timber				280 BD. FT.
Treated Timber				
Flooring ▲	3"x6"	92	26'-0"	3588 BD. FT.
Bridging	3"x6"	4	14'-0"	84 BD. FT.
Wheelguards	6"x10"	2	20'-0"	200 BD. FT.
Stringers	6"x18"	12	20'-0"	①
Total Treated Timber				3872 BD. FT.

ONE ABUTMENT

Description	Size	No.	Length	Total
Untreated Timber				
Handrail Posts S4S	6"x8"	2	6'-0"	48 BD. FT.
Total Untreated Timber				48 BD. FT.
Treated Timber				
Cap	10"x12"	1	27'-4"	274 BD. FT.
Bulkhead Plank	3"x10"	1	26'-0"	65 BD. FT.
Stringer Blocking	6"x18"	1	22'-0"	①
Total Treated Timber				339 BD. FT.

ONE WING

Description	Size	No.	Length	Total
Untreated Timber				
Handrails S4S	3"x8"	2	7'-4"	30 BD. FT.
Handrail Posts S4S	6"x6"	2	5'-6"	33 BD. FT.
Total Untreated Timber				63 BD. FT.
Treated Timber				
Curb Plank	6"x10"	1	7'-4"	37 BD. FT.
Total Treated Timber				37 BD. FT.

▲ 50% S2S; 50% S2S, ¼" off 1 edge

GENERAL NOTES

All work shall be done according to the Standard Specifications of The Colorado Department of Highways applicable to the project.
All timber to be treated or untreated as shown in bills of materials.
All timber shall be dense southern Yellow Pine or west coast Douglas Fir.
All caps shall be edged to an even depth. The ends of all stringers shall be dapped on one edge to obtain an even depth over caps.
All cut surfaces or bored holes in treated timber shall be thoroughly saturated with hot creosote oil.
Joints in top handrail must be staggered with joints in side rail.
All handrailing and posts above the wheelguards shall be painted white and all handrail posts below the top of wheelguards shall be painted black as specified.
All bolts more than 12" long must be threaded not less than 4 inches.
Bolts in the finished structure shall not project more than one-half inch beyond the nut.

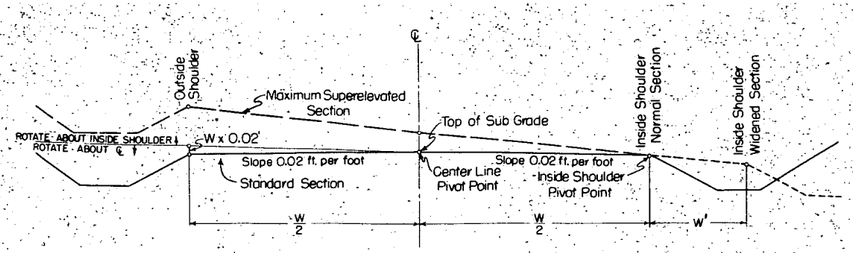
LOADING DATA

LIVE LOAD: A.A.S.H.O. 1944 H-20-44
DEAD LOAD: Assumes 25 Lb/sq.ft. additional wearing surface (includes asph. wearing surface). No impact. f_t = 1800 lb/sq.ft.

COLORADO
DEPARTMENT OF HIGHWAYS

SUPERSTRUCTURE, ABUTMENTS & WINGS REPLACEMENT DETAILS

Across BRANCH of SAUNDERS ARROYO
Sta. 1799+12
Near Walsenburg Sec. 27/28 T. 25 S R. 61 W
Designed by

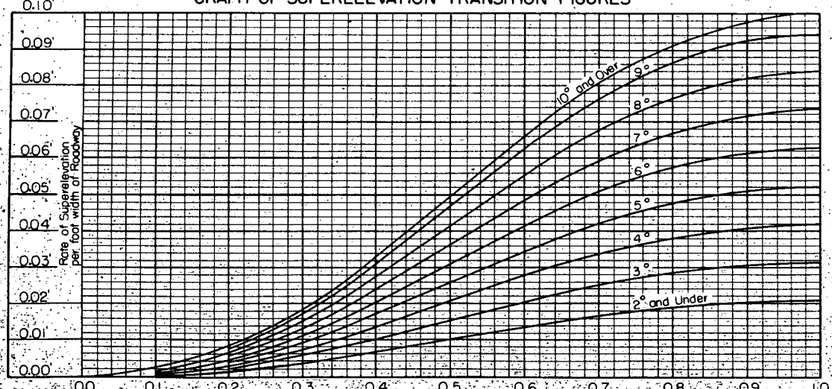


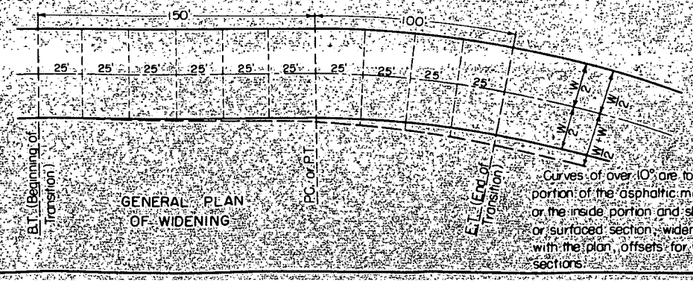
GRADED OR SURFACED SECTION

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

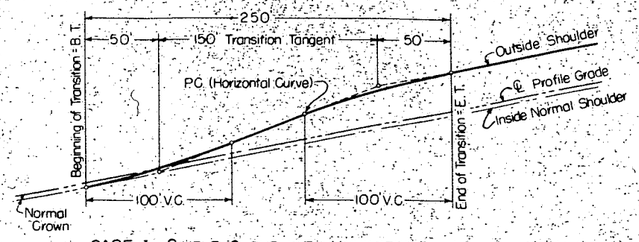
GRAPH OF SUPERELEVATION TRANSITION FIGURES





GENERAL PLAN OF WIDENING

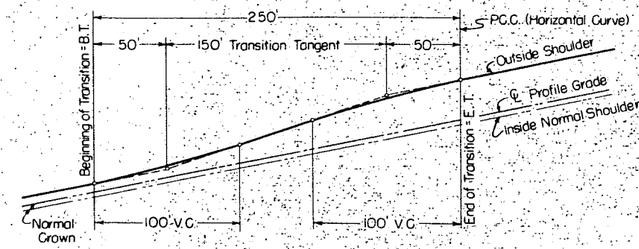
Curves of over 10° are to have the inside portion of the asphaltic mat and shoulder, or the inside portion and shoulder in a graded or surfaced section, widened in accordance with the plan, offsets for widening, and cross sections.



CASE I: SIMPLE CURVE WITH UNLIMITED TANGENT APPROACH

NOTE: CASE I

The transition in this case, from crowned section to superelevated section, shall proceed 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.



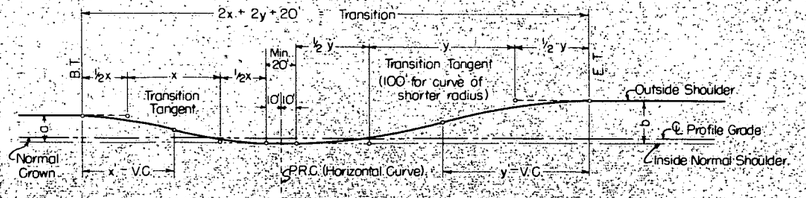
CASE II: COMPOUND CURVE

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 " 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 distances 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 Section shown are to be superelevated and widened as indicated in the accompanying drawings and tables.

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. The centerline pivot point is to be used until the superelevation equals 0.02 ft. per foot width of roadway. 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 Asphaltic Mat 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 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 proper 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.

Where spiral curves are used, the transition from normal crowned section to full superelevation and widening shall take place over the full length of spiral curve.

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

Initial	Date

COLORADO DEPARTMENT OF HIGHWAYS

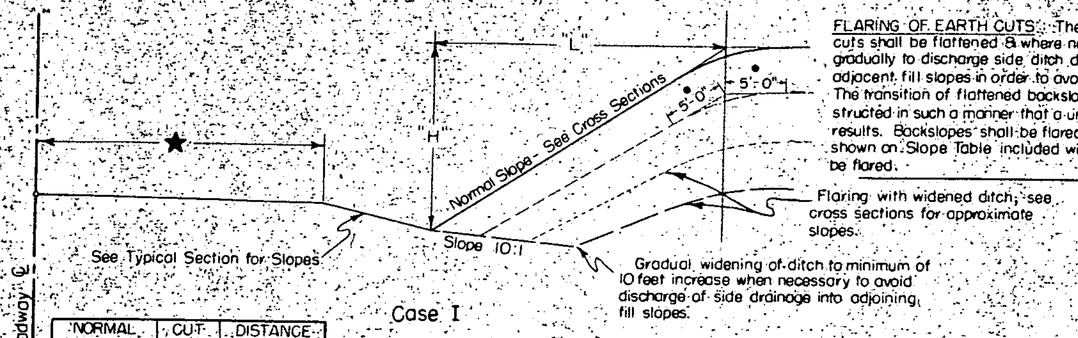
STANDARD METHODS FOR SUPERELEVATION & WIDENING OF CURVES

Designed by R.E.L.	Approved by A. Julian
Made by S.U.M.	
Checked by C.R.S.	Date November 1953

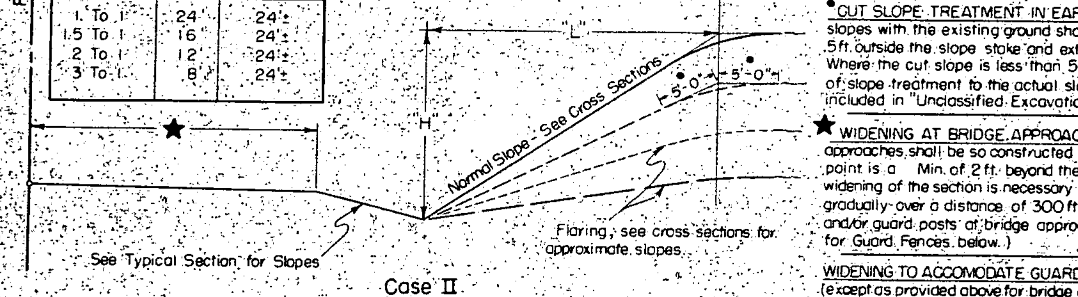
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-EN

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



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



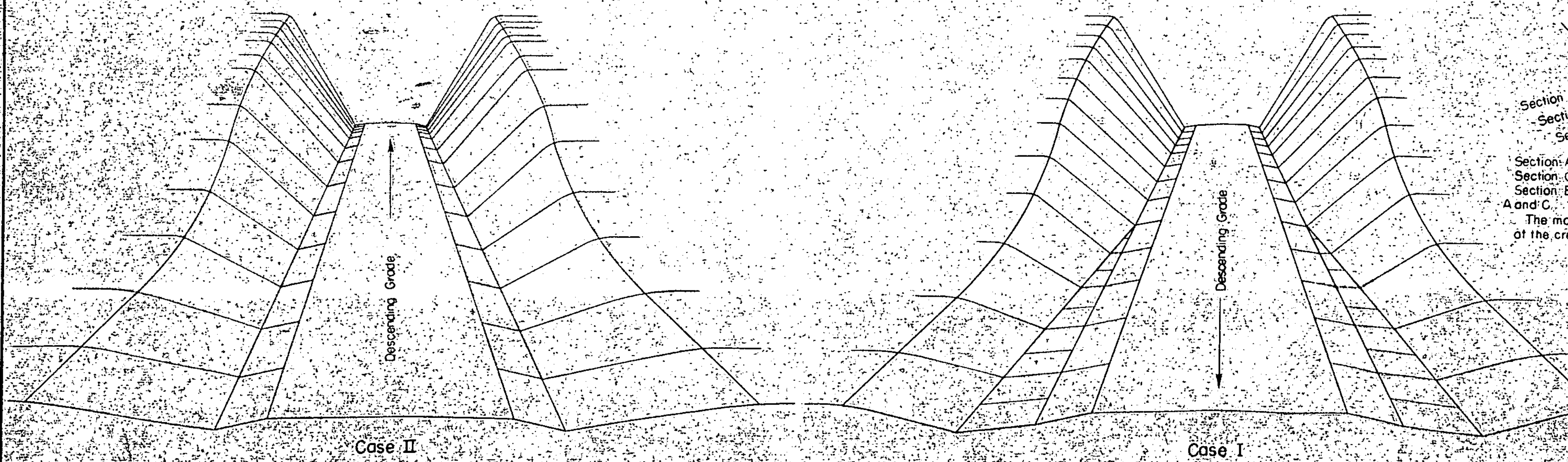
FLARING OF EARTH CUTS: The backslopes at ends of all earth cuts shall be flattened & where necessary the ditch shall be widened gradually to discharge side ditch drainage away from the base of adjacent fill slopes in order to avoid erosion & to improve appearance. The transition of flattened backslopes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

● 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".

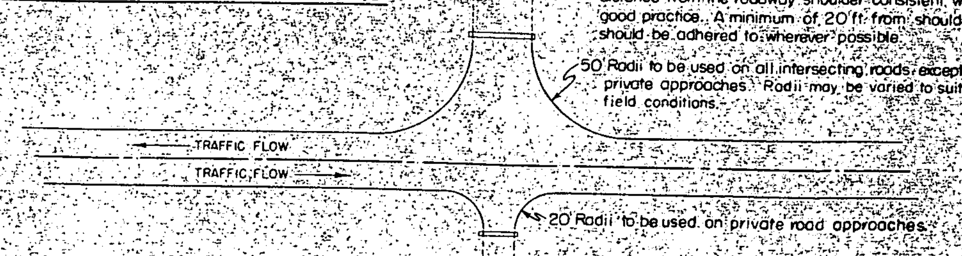
★ WIDENING AT BRIDGE APPROACHES: Roadway embankment at bridge approaches shall be so constructed that base of surfacing at shoulder point is a Min. of 2 ft. beyond the outside edge of bridge deck. Where widening of the section is necessary to achieve this result it shall take place gradually over a distance of 300 ft. This is done to accomodate guard fence and/or guard 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.

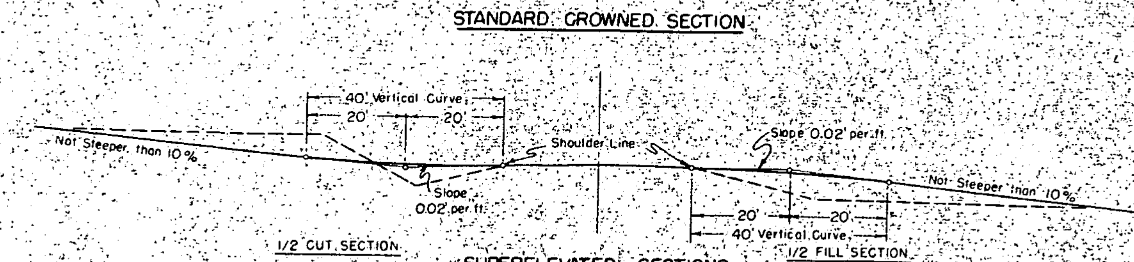
PLAN OF FLARING IN EARTH CUTS

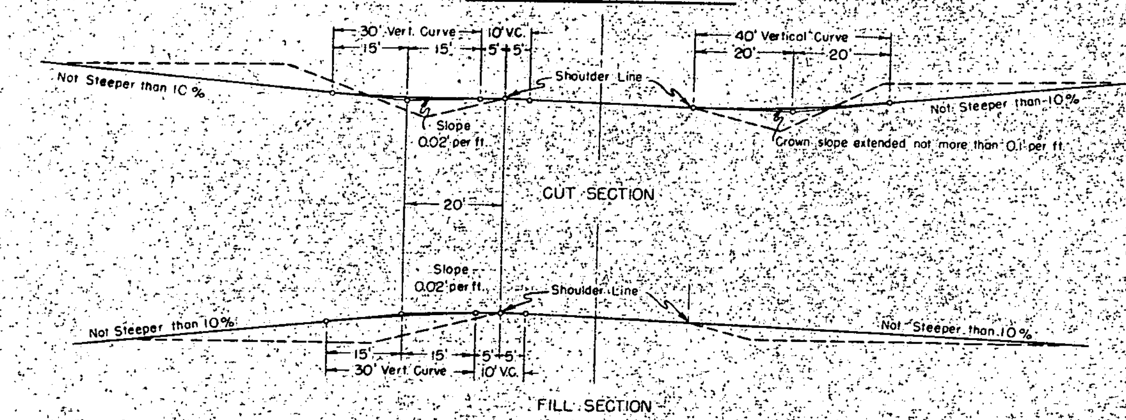


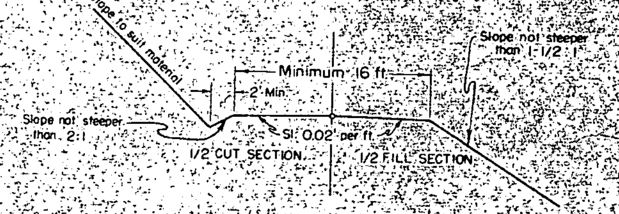
TYPICAL PLANS FOR SIDE APPROACH ROADS



SIDE DRAINS: To be placed at greatest feasible distance from the roadway shoulder consistent with good practice. A minimum of 20 ft. from shoulder should be adhered to wherever possible.



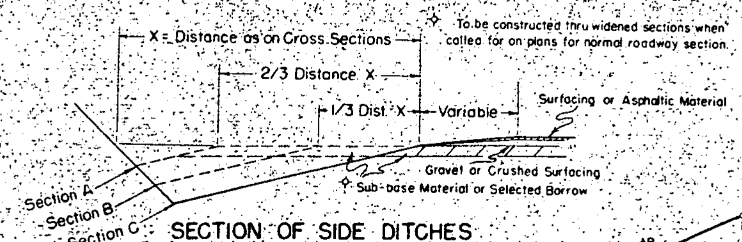




NOTE:
ROAD APPROACHES: To conform to the above details unless otherwise indicated on plans by Special Details. The width of the crowned section shall be not less than the width of the crowned section of the existing approach road and in no case shall the new construction be less than sixteen (16) feet in width.

DETAILS FOR DITCH & WIDENED SHOULDERS AT CREST OF GRADES

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



SECTION OF SIDE DITCHES

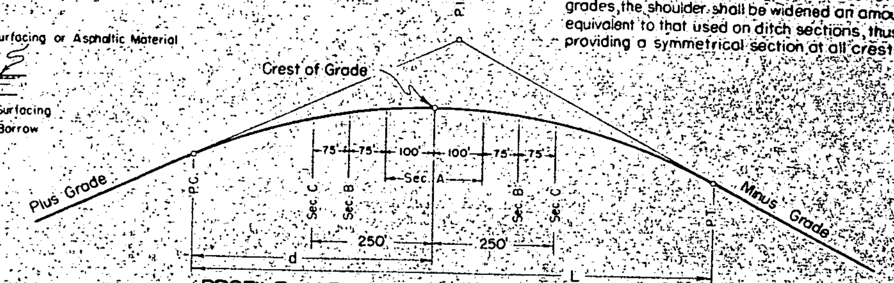
Section A is a shallow ditch section.
Section C is normal ditch section.
Section B shall be on a uniform transition between Sections A and C.

The modification of the ditch indicated shall be used only at the crest of grades from which drainage breaks both ways.

Formula for finding the Crest of Grade

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

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



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

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways 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 DEPARTMENT OF HIGHWAYS
STANDARD
SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT AND WIDENING AT BRIDGES AND AT CREST OF GRADES

Designed by A.Z. Made by S.J.M. & A.B.H. Checked by C.R.S.	Approved by A. Zulian Date: November 1, 1953

OF HIGHWAYS
937

RACING
PLAIN

Initial	Date

REVISIONS

STANDARD M-10-D

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C02-0010-03	10	

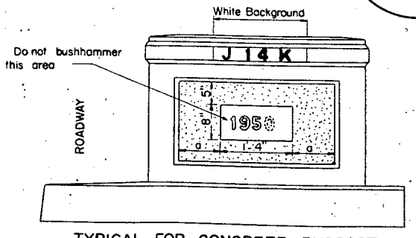
1 2 3 4 5 6 7 8 9 0 .

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

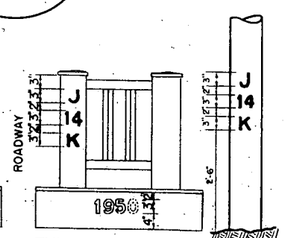
M N O P Q R S T U V W

a f g l J 14 K 1950

abcdefghijklmnopqrstuvwxyz

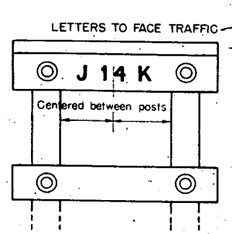


TYPICAL FOR CONCRETE ENDPOST



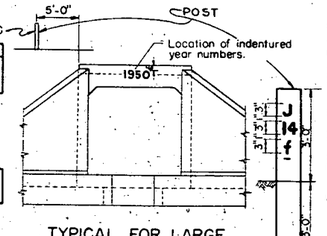
TYPICAL FOR STEEL HANDRAIL END POST

TYPICAL FOR SIGN POSTS



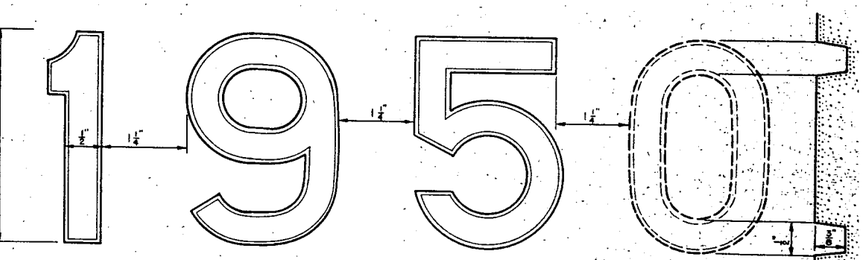
TYPICAL FOR TIMBER WING HANDRAIL

SAMPLE BRIDGE NUMBER



TYPICAL FOR LARGE BOX CULVERTS & STRUCTURES WITHOUT END POSTS.

SAMPLE YEAR NUMBER



SECTION

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS APPLICABLE TO THE PROJECT.
THE SIZE SHAPE AND SPACING OF THE LETTERS AND FIGURES SHALL BE IN ACCORDANCE WITH THE FULL SIZE SHOWN ON THIS SHEET. ADDITIONAL COPIES OF THIS FULL SIZE SHEET CAN BE OBTAINED FROM THE DEPARTMENT WITHOUT CHARGE.
THE YEAR NUMBERS ARE RECESSED IN CONCRETE ¾" MINIMUM AS SHOWN INTO THE PANEL OF THE ENDPOST ON THE RIGHT HAND SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE DOWNSTREAM HEADWALL OF CULVERTS AS SHOWN ON PLAN DETAILS. NUMBERS TO BE MADE OF WOOD, METAL OR OTHER SUITABLE MATERIAL AND ATTACHED TO THE FORMS BEFORE CONCRETE IS POURED. THE YEAR NUMBER OF EACH STRUCTURE SHALL CORRESPOND WITH THE YEAR IN WHICH THE CONCRETE IS POURED.
THE STRUCTURE NUMBER SHALL BE STENCILED ON THE RIGHT HAND SIDE OF EACH BRIDGE END AS SHOWN ON THIS STANDARD AND AS SPECIFIED. WHERE THE STRUCTURE HAS NO END POSTS THE NUMBER SHALL BE PLACED ON A POST ON THE RIGHT HAND SIDE OF THE ROAD AS SHOWN. FOR SIGNS THE NUMBER SHALL BE PLACED ON SIGN POSTS ON THE RIGHT HAND SIDE OF THE ROADWAY.

THE CORRECT NUMBER FOR EACH BRIDGE OR SIGN IS SHOWN ON THE PLANS.
THE NUMBERS FOR MAJOR STRUCTURES OF OVER 20 FEET CLEAR SPAN SHALL BE UPPER CASE LETTERS. THE NUMBERS FOR MINOR STRUCTURES OF 12 TO 20 FEET CLEAR SPAN SHALL BE LOWER CASE LETTERS. SIGN BRIDGES SHALL BE CONSIDERED AS MAJOR STRUCTURES.
A PROPER WHITE BACKGROUND RECTANGULAR IN SHAPE AND EXTENDING THREE INCHES BEYOND THE LIMITS OF THE NUMBER SHALL BE PAINTED WITH TWO COATS OF ACCEPTABLE WHITE PAINT UNLESS AN APPROVED WHITE CONCRETE PAINT IS USED. BEFORE PAINTING THE SURFACE MUST BE THOROLY DRIED, CLEANED AND PROPERLY SIZED. ON TIMBER HANDRAILS THE WHITE PAINT USED ON THE BRIDGE WILL BE SATISFACTORY.
AFTER THE WHITE BACKGROUND HAS DRIED SUFFICIENTLY, THE CORRECT STRUCTURE NUMBER SHALL BE CAREFULLY STENCILED ON IT, WITH TWO COATS OF "SECOND FIELD COATS-DARK" OR "EXTERIOR BLACK PAINT (MAINT)" AS SPECIFIED UNDER ITEM 38 "PAINTS AND PAINTING." THE BRACES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.
SUFFICIENT TIME BETWEEN SUCCESSIVE COATS SHALL BE ALLOWED TO PERMIT THORO DRYING.
THE COST OF PAINTING OF STRUCTURE NUMBERS AND FURNISHING AND PLACING POSTS FOR STRUCTURE NUMBERS SHALL BE CONSIDERED SUBSIDIARY WORK AND SHALL BE INCLUDED IN THE ORIGINAL CONTRACT ITEMS AND WILL NOT PAID FOR AS A SEPERATE ITEM.

STRUCTURE NO.

COLORADO DEPARTMENT OF HIGHWAYS

STANDARD LETTERS AND FIGURES FOR YEAR NUMBERS AND STRUCTURE NUMBERS

Designed by	Approved by L.A. Marshall
Made by	Bridge Engineer
Checked by	Date: Feb. 17, 1958

STANDARD TIMBER GUARD POSTS

STANDARD M-19-E

REGION NO.			
9	COLO.	0010-03	11

REVISIONS

10-9-58	Added Spacing Table	J.C.R.

SPECIFICATIONS

(Work By Contractor)

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 with Pentachlorophenol as provided under paragraph 42.2.20 of the specifications, after being peeled and shaved in accordance with specifications.

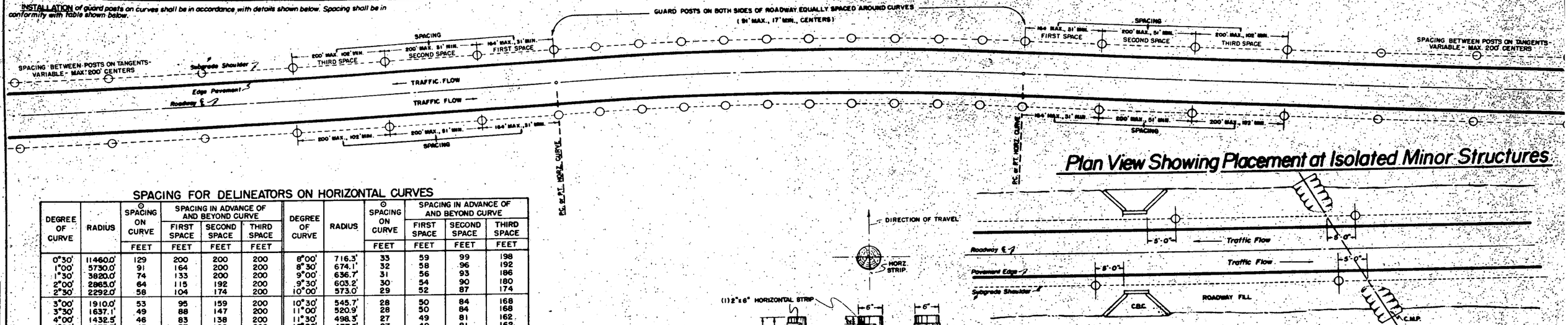
PAINTING - Posts shall be painted with aluminum paint and a black band placed around each post as per details on this sheet. Number of coats and type of paint applied shall be in accordance with specifications.

(Work By State Forces)

REFLECTIVE SHEETING - In accordance with the details hereon, State Forces will furnish and place the required 2"x6" smooth surfaced reflective delineators fabricated from 3s-H14 aluminum alloy, minimum thickness 0.025", reflectorized with reflective sheeting strips or other approved reflective materials. Strips shall be suitable for placement around a curved surface.

Typical Installation on Curves & Tangents

INSTALLATION of guard posts on curves shall be in accordance with details shown below. Spacing shall be in conformity with table shown below.



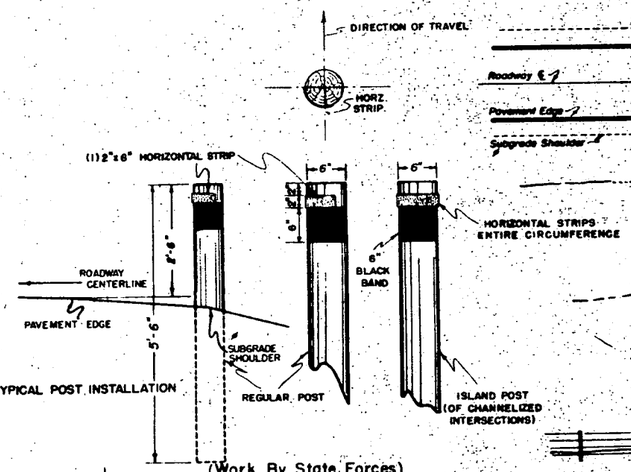
SPACING FOR DELINEATORS ON HORIZONTAL CURVES

DEGREE OF CURVE	RADIUS	⊙ SPACING ON CURVE	SPACING IN ADVANCE OF AND BEYOND CURVE			DEGREE OF CURVE	RADIUS	⊙ SPACING ON CURVE	SPACING IN ADVANCE OF AND BEYOND CURVE		
			FIRST SPACE	SECOND SPACE	THIRD SPACE				FIRST SPACE	SECOND SPACE	THIRD SPACE
		FEET	FEET	FEET	FEET			FEET	FEET	FEET	FEET
0°30'	11460.0'	129	200	200	200	8°00'	716.3'	33	59	99	198
1°00'	5730.0'	91	164	200	200	8°30'	674.1'	32	58	96	192
1°30'	3820.0'	74	133	200	200	9°00'	636.7'	31	56	93	186
2°00'	2865.0'	64	115	192	200	9°30'	603.2'	30	54	90	180
2°30'	2292.0'	58	104	174	200	10°00'	573.0'	29	52	87	174
3°00'	1910.0'	53	95	159	200	10°30'	545.7'	28	50	84	168
3°30'	1637.1'	49	88	147	200	11°00'	520.9'	28	50	84	168
4°00'	1432.5'	46	83	138	200	11°30'	498.3'	27	49	81	162
4°30'	1273.3'	43	77	129	200	12°00'	477.5'	27	49	81	162
5°00'	1146.0'	41	75	123	200	15°00'	382.0'	24	43	72	144
5°30'	1041.8'	39	70	117	200	18°00'	318.3'	22	40	66	132
6°00'	955.0'	37	67	111	200	21°00'	272.9'	20	36	60	120
6°30'	881.5'	36	65	108	200	25°00'	229.2'	19	34	57	114
7°00'	818.6'	35	63	105	200	30°00'	191.0'	17	31	51	102
7°30'	764.0'	34	61	102	200						

⊙ $S = 1.2\sqrt{R+18}$ 1-ST. SPACE = 1.8S 2-ND. SPACE = 3S 3-RD. SPACE = 6S

NO SPACES TO EXCEED 200 FT.

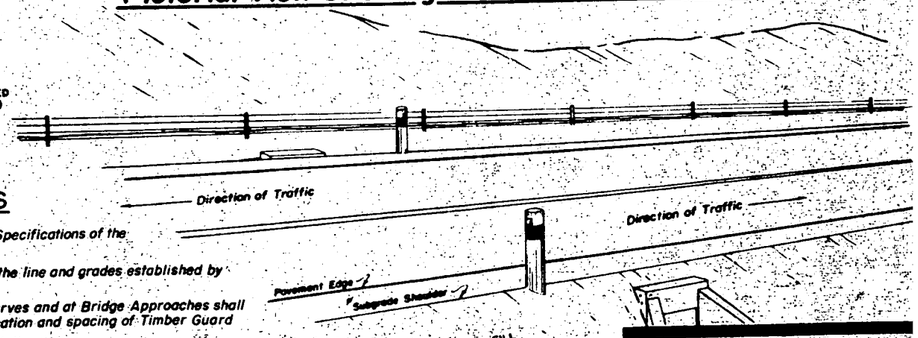
Plan View Showing Placement at Isolated Minor Structures



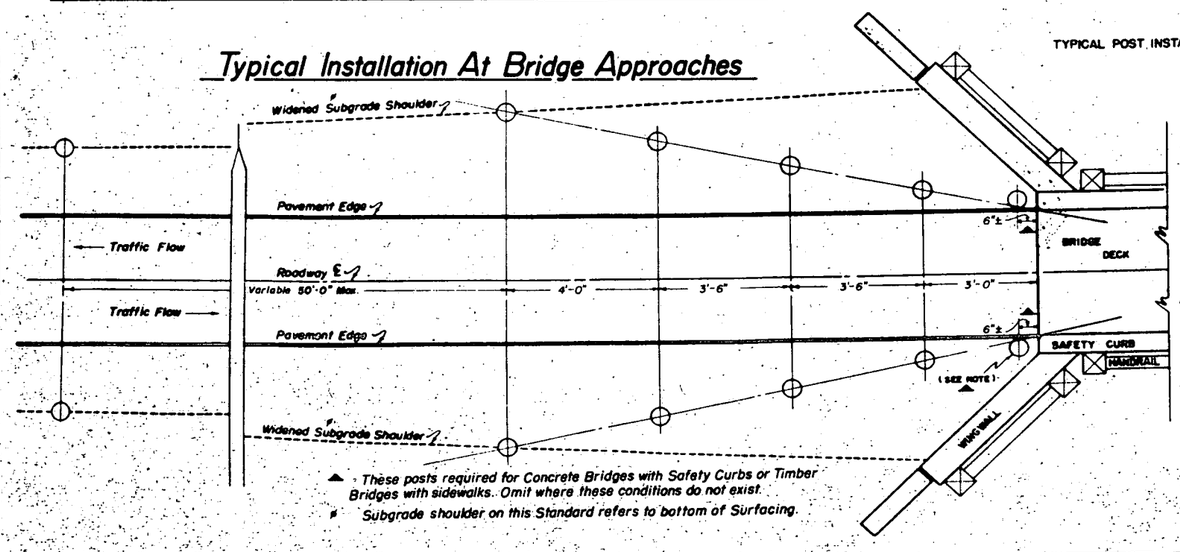
(Work By State Forces)

INSTALLATION DETAILS OF REFLECTORIZED STRIPS

Pictorial View Showing Location at Isolated Minor Structures



Typical Installation At Bridge Approaches



▲ These posts required for Concrete Bridges with Safety Curbs or Timber Bridges with sidewalks. Omit where these conditions do not exist.

Subgrade shoulder on this Standard refers to bottom of Surfacing.

GENERAL NOTES

(Work By Contractor)

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the project.

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

INSTALLATION of Timber Guard Posts on Tangents, Curves and at Bridge Approaches shall be in conformity with details on this sheet. The number, location and spacing of Timber Guard Posts is shown on plans.

(Work By State Forces)

Reflective delineators shall be furnished and installed by State Forces after the Contractor has finished his operations.

Installation of reflective delineators shall be in accordance with the following: Wrap Around Reflective Sheeting Strips shall be installed horizontally one (1) sheet on all posts. Island posts shall have Wrap Around Reflective Sheeting Strips placed horizontally to cover entire circumference of Post.

On Divided Highways and Islands, Reflective Sheeting Strips shall be placed in a manner to obtain maximum visibility for the primary direction of travel. In all instances tests shall be made to insure the maximum effectiveness of reflective delineators.

All Traffic Islands shall be marked with Island Posts as indicated hereon.

COLORADO DEPARTMENT OF HIGHWAYS

STANDARD TIMBER GUARD POSTS

Designed by	Approved by C. Julian
Made by	Engineer, Survey & Plans
Checked by	Date: March 25, 1953

EPT. OF HIGHWAYS
.D.H. 137
953

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-29-C
(SHEET 1 OF 2 SHEETS)

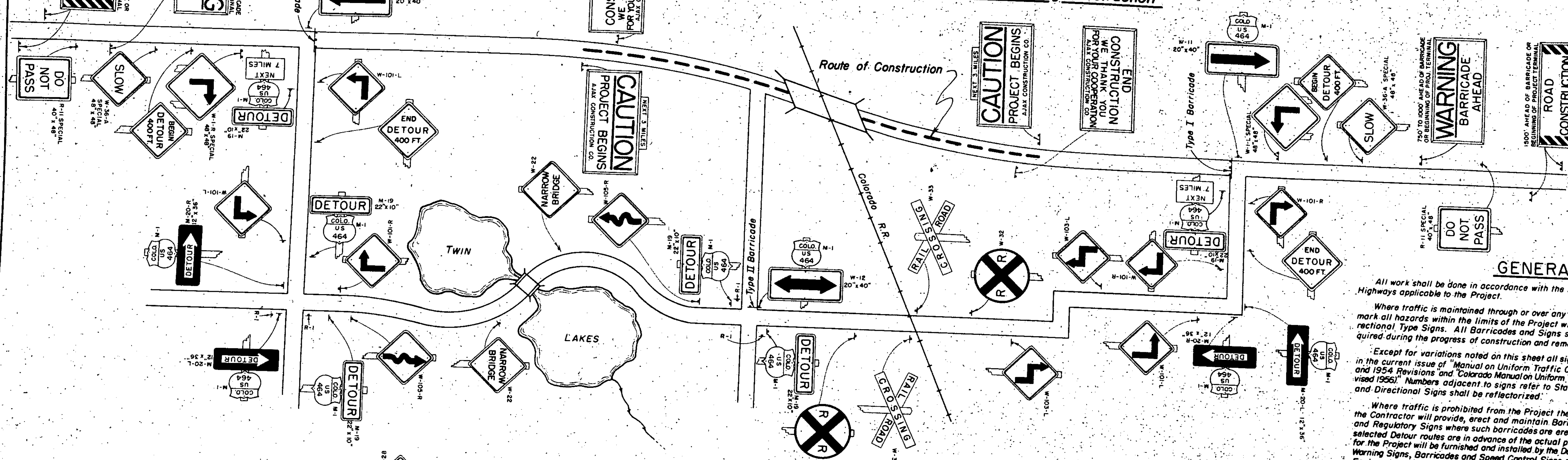
FED. ROAD REG. NO.	DIVISION	C02-	SHEET NO.
9	COLO.	0010-03	12

REVISIONS	
10-23-58	General

	Initial	Date

TYPICAL METHODS OF MARKING HIGHWAYS & DETOURS

Detour Condition Where Traffic is Prohibited Along Construction



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Departme
Highways applicable to the Project.

Where traffic is maintained through or over any part of the Project, the Contractor will be required
mark all hazards within the limits of the Project with well maintained Barricades, Warning Signs and
rectional Type Signs. All Barricades and Signs shall be moved, added to, changed or removed as
quired during the progress of construction and removed entirely when project is completed.

Except for variations noted on this sheet all signs will be in conformity with the specification outli
in the current issue of "Manual on Uniform Traffic Control Devices for Streets & Highways, PRA August
and 1954 Revisions" and "Colorado Manual on Uniform Traffic Control Devices for Streets & Highways CDOH IS
vised 1956)." Numbers adjacent to signs refer to Standards in the manual. Standard Warning, Regulat
and Directional Signs shall be reflectorized.

Where traffic is prohibited from the Project the Detour will be marked by the Department except th
the Contractor will provide, erect and maintain Barricades complete with approved Directional Arrows
and Regulatory Signs where such barricades are erected and maintained at the ends of the Project or w
selected Detour routes are in advance of the actual project terminal. U.S. or State Route Markers require
for the Project will be furnished and installed by the Department. The location and positioning of Advance
Warning Signs, Barricades and Speed Control Signs shall be as recommended by the appropriate District
Engineering Forces of the Department.

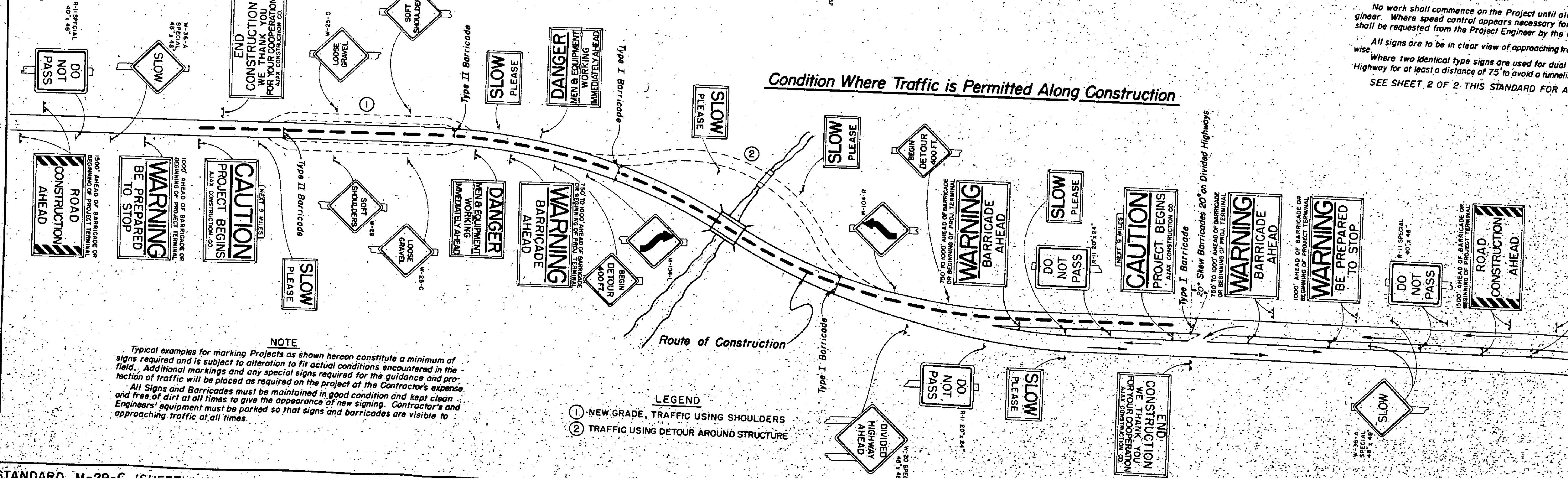
No work shall commence on the Project until all Warning Signs are in place and approved by the E
gineer. Where speed control appears necessary for protection of the travelling public, such speed con
shall be requested from the Project Engineer by the Contractor.

All signs are to be in clear view of approaching traffic and are not to be obstructed by equipment, weeds or o
wise.

Where two identical type signs are used for dual posting they are to be staggered on the two sides of th
Highway for at least a distance of 75' to avoid a tunneling effect.

SEE SHEET 2 OF 2 THIS STANDARD FOR ADDITIONAL NOTES AND DETAILS.

Condition Where Traffic is Permitted Along Construction



NOTE

Typical examples for marking Projects as shown hereon constitute a minimum of signs required and is subject to alteration to fit actual conditions encountered in the field. 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.

All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signing. Contractor's and Engineers' equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

LEGEND

(1) NEW GRADE, TRAFFIC USING SHOULDERS
(2) TRAFFIC USING DETOUR AROUND STRUCTURE

COLORADO
DEPARTMENT OF HIGHWAYS

Standard Roadway Construction Traffic Signs

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

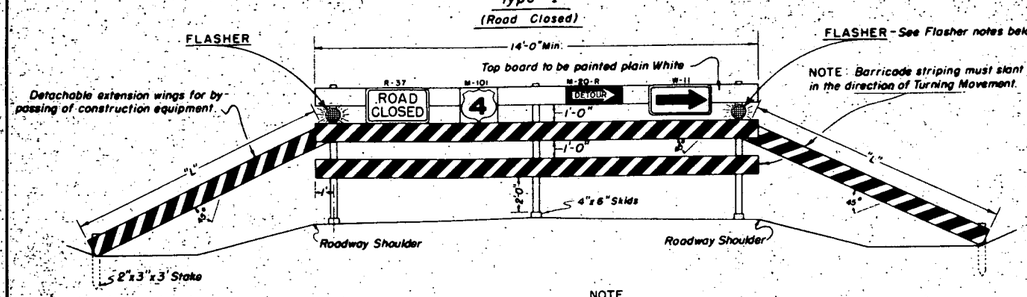
STANDARD M-29-C
(SHEET 2 OF 2 SHEETS)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	CO2-0010-03	13	

Rev. 10-23-58 — J.C.R.

DETAILS OF BARRICADES

Type I
(Road Closed)



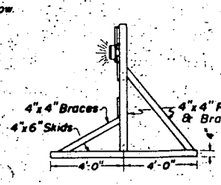
FLASHER - See Flasher notes below.

NOTE: Barricade striping must slant in the direction of Turning Movement.

"L" Variable, length to be adequate to provide closing of borrow pit and shoulder.

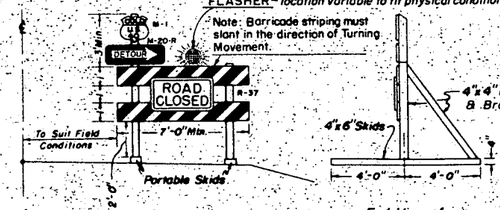
NOTE

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



End View of Type I Portable Barricade (Optional)

Type II
(Beg. of Detour, By-Pass Areas within Proj; Extreme Hazards; etc.)



End View of Type II Portable Barricade (Optional)

NOTE: Alternate materials or other reflective elements on Construction Traffic Signs and Barricades will be permitted only after approval of such material by the Department.

SPECIFICATIONS

PAINT - *All paint and methods of painting shall be in conformity with the Standard Specifications of the Colorado Department of Highways for painting of Timber Structures.*

STRIPING - *Planking and Wings shall be painted with Maintenance Flat Black on both sides before adding any one of the following acceptable Reflective Strips:*
(a) Wide Angle White, 7" strip, spaced 8" apart.
(b) Flat Top Silver, 3" strip, spaced 7" apart.
▲(c) Direct Process of Glass Beads on Paint, 3" strip, spaced 7" apart.
Stripes shall be applied on both front and back of barricades for opposite direction use.
Diversion of traffic will be accomplished as follows:
1- Stripes for barricades diverting traffic to the left shall start on the right hand side of the lower plank and progress up to the left. Traffic diversion to the right will be just the opposite.
2- Stripes on barricades diverting traffic in both directions shall begin at the center of the lower plank and progress up in both directions.

TIMBER - *All timber used shall conform to the Standard Specifications for Miscellaneous Untreated Timber.*

Planking	1"x12" or 2"x12"	S4S
Posts (Barricades)	6"x6"	S4S
Posts (Signs)	4"x4"	S4S

The Reflectorized Stripes on planking & wings on all barricades shall be reflectorized with White or Silver Reflective Material of a type acceptable to the Department.

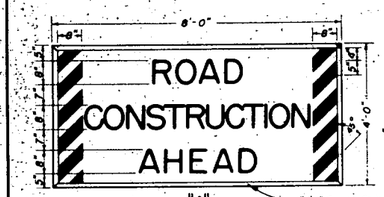
Barricades may be either portable as shown or fixed with posts set into the ground.

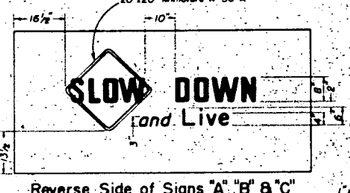
All skids, braces and posts to be painted white and nailed together with No. 20d nails.

Bases to be weighted where necessary to provide stability.

▲ When this method is used as described above or when white binder and beads are applied to planking and wings, alternate black stripes using Maintenance Flat Black paint shall be applied over the reflective material in the prescribed pattern. All measurements for striping are to be made along the horizontal axis of the board.

DETAILS OF CONSTRUCTION SIGNS





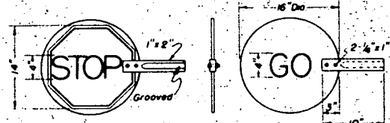
Reverse Side of Signs "A", "B" & "C"

1"x2" Facing Strip (Painted White) "D"

3-4" Butt Hinges, Tight Pin, mortised in split panel. "E"

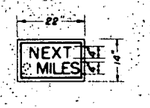
"F"

"G"



"H"

"I"



"J"

DETAILS OF SIGN AND BEACON FABRICATION AND USAGE

Construction Signs "A" through and including "G" shall be made of ¾" Plywood or other material after approval by the Department, and as per details above. Signs shall be reflectorized with reflective sheeting or other reflective materials of types approved by the Department.

CONSTRUCTION SIGN "A" - *Wide Angle White background with painted Black lettering. Barricade stripes of 4" Wide Angle White placed over Black painted vertical stripe spaced as shown above. This sign is the First advance warning sign and shall be placed 1500 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way in all cases.*

CONSTRUCTION SIGN "B" - *Apply top 23" strip of Flat Top Silver, reversed screened or sprayed with Transparent Red Paint allowing the words "WARNING" and 1-inch Underline to remain as Flat Top Silver. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Second advance warning sign and shall be placed 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.*

CONSTRUCTION SIGN "C" - *Apply top 23" strip of Flat Top Silver, reversed screened or sprayed with Transparent Red Paint allowing the words "WARNING" and 1-inch Underline to remain as Flat Top Silver. Balance of lettering painted Black on a 22" strip of Wide Angle White. This sign is the Third advance warning sign in cases where barricades are used and shall be placed 750 to 1000 feet ahead of barricade or beginning of project terminal and on both sides of the travelled way on divided highways and singly on two-lane highways.*

REVERSE SIDES OF SIGNS "A", "B" and "C" - *The word "SLOW" shall be painted Black and superimposed over a Yellow miniature W-36-A background panel. Balance of lettering shall be painted Black on a White background.*

CONSTRUCTION SIGN "D" - *Apply top 24½" strip of Flat Top Silver, reversed screened or sprayed with Transparent Red Paint allowing the words "CAUTION" and 1½-inch Underline to remain as Flat Top Silver. Balance of lettering painted Black on a 20½" strip of Wide Angle White. This sign will be provided with a detachable 1" material board mounted on back of sign with 2-⅛"x 2" bolts. This board shall be painted White with Black lettering. (Indicate to the nearest Mile). This sign shall be placed to mark the Beginning of the Project. To be placed singly and may be placed opposite barricade if desirable.*

CONSTRUCTION SIGN "E" - *Apply top 17½" strip of Flat Top Silver, reversed screened or sprayed with Transparent Red Paint allowing the words "DANGER" and 1-inch Underline to remain as Flat Top Silver. Balance of lettering painted Black on a 27½" strip of Wide Angle White. The sign is of the hinged and fold type to facilitate the closing down of sign when the need is not prevalent. This sign shall be placed 500 feet ahead of the situation on hand.*

CONSTRUCTION SIGN "F" - *The words "END CONSTRUCTION" and "CONTRACTORS NAME" shall be painted Black on strips 22" and 6½" respectively of Wide Angle White. For balance of lettering, apply 16½" strip of Flat Top Silver, reversed screened or sprayed with Transparent Red Paint allowing "WE THANK YOU FOR YOUR COOPERATION" remaining in Flat Top Silver. This sign shall be placed to mark the Ending of the Project. To be placed singly and may be placed opposite barricade if desirable.*

CONSTRUCTION SIGN "G" - *The words "SLOW" and "PLEASE" shall be painted Black on a background of Wide Angle Yellow. This sign shall be used frequently within the limits of the Project.*

All of the preceding signs shall be fastened to 2-4"x4" posts set 4 feet in the ground with a minimum of 3-1"x4" nailing strips on the back. Bottom of sign to be not less than 36" above the ground.

FLAGMAN WARNING SIGN "H" - *This sign shall be made of Plastic or other lightweight material, painted Red background with White lettering on the "STOP" side and painted Green background with White lettering on the "GO" side. Handle to be grooved on one side to indicate reading of sign to flagman. This sign will be used whenever flagmen are necessary. Sign to be reflectorized if used to stop traffic at night.*

DETOUR WARNING SIGN "I" - *To be of ⅜" (Min.) plywood or No. 16 (Min.) gauge metal with Black painted letters on a Wide Angle Yellow Background.*

CONSTRUCTION SIGN "J" - *⅜"x 9" metal slides to be placed between "NEXT ___ MILES," spaced so as to accommodate appropriate size numerals. Required numerals to be furnished by the Department and to be installed by the Contractor. Numerals calculated to the nearest Mile.*

All material shall be sound and durable. Barricades, signs, symbols and lettering conforming to styles noted hereon will be of good workmanship and well maintained. Uneven lettering will not be accepted.

FLARES AND TORCHES *shall be either of the oil burning or electrical type approved by the Department and shall be placed 3 feet to 5 feet ahead of the object to be illuminated. Particular care shall be taken to protect all signs and barricades from smoke and smudge arising from the use thereof.*

FLASHERS *used on Type I or II Barricade shall be of the Battery or Electrical Type and shall have no less than 12.566 sq. inches of light area (4" dia. lens). The illuminating element in a flashing amber beacon or signal shall be flashed continuously at a rate between 50 or 60 flashes per minute which will be clearly distinguishable to traffic. The duration in which Flashers will be left in operation will be governed by field conditions and subject to approval by the Engineer.*

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

The Department shall furnish and install the following as required OUTSIDE THE LIMITS of the Project:

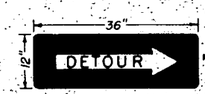
1.	"ROAD CONSTRUCTION AHEAD"	Minimum 4
2.	"WARNING BE PREPARED TO STOP"	Minimum 2
3.	"WARNING BARRICADE AHEAD"	As Required
4. ■	Standard Warning & Directional Signs	As Required

The Contractor shall furnish and install the following as required WITHIN THE LIMITS of the Project:

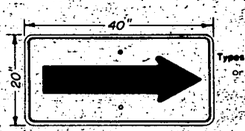
1.	All Barricades	As Required
2.	"CAUTION PROJECT BEGINS"	Minimum 2
3.	"DANGER MEN & EQUIPMENT WORKING IMMEDIATELY AHEAD"	As Required
4.	"END CONSTRUCTION WE THANK YOU FOR YOUR COOPERATION"	Minimum 2
5.	"SLOW PLEASE"	As Required
6.	Standard Warning & Directional Signs	As Required
7.	Approved Directional Arrows & Regulatory Signs for Barricades	As Required
8.	Torches and Flares as follows: Type I Barricade	Minimum 3
	Type II Barricade	Minimum 1
9.	Flashers - Type I Barricade	2 Required
	Type II Barricade	As Required

■ *Including Type I Barricade located immediately inside of Project terminal points.*

Details of Reflectorized Arrows



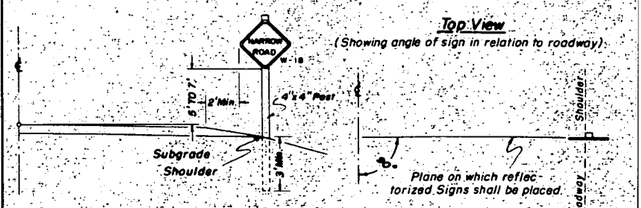
MARKINGS - *A Wide Angle White Reflectorized Arrow of Reflective Material acceptable to the Department to be placed on a Black background. Letters to be 4" in height.*



MARKINGS - *A Black Arrow on a Wide Angle Yellow background of Reflective Material acceptable to the Department.*

Position of Signs Relative to Roadbed & Hazards

Top View
(Showing angle of sign in relation to roadway)



NOTE

Warning Signs to be made of 3/8" (Min.) plywood or No. 16 Gauge (Min.) metal and shall be reflectorized.

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.

COLORADO DEPARTMENT OF HIGHWAYS

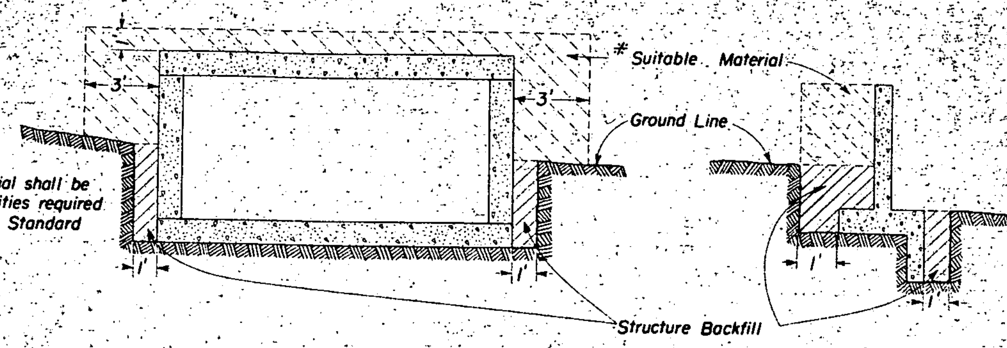
Standard Roadway Construction Traffic Signs

Designed by J.C.R.	Approved by J. Tucker
Made by J.C.R.	Engineer, Surveys & Plans
Checked by	Date: July 22, 1955

FED. ROAD REGION NO.	DIVISION	C02-0010-03	SHEET NO.
9	COLO.		14

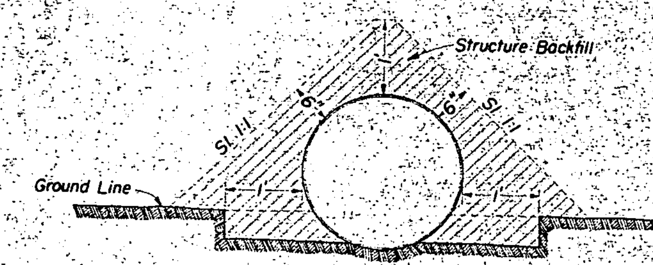
STANDARD M-60-B

CONCRETE BOX CULVERTS & WINGWALLS

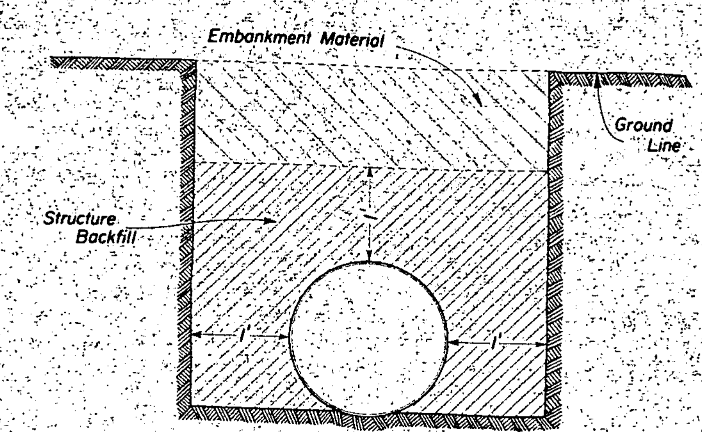


Suitable Material shall be compacted to densities required for Item 16 of the Standard Specifications.

CIRCULAR CONDUIT

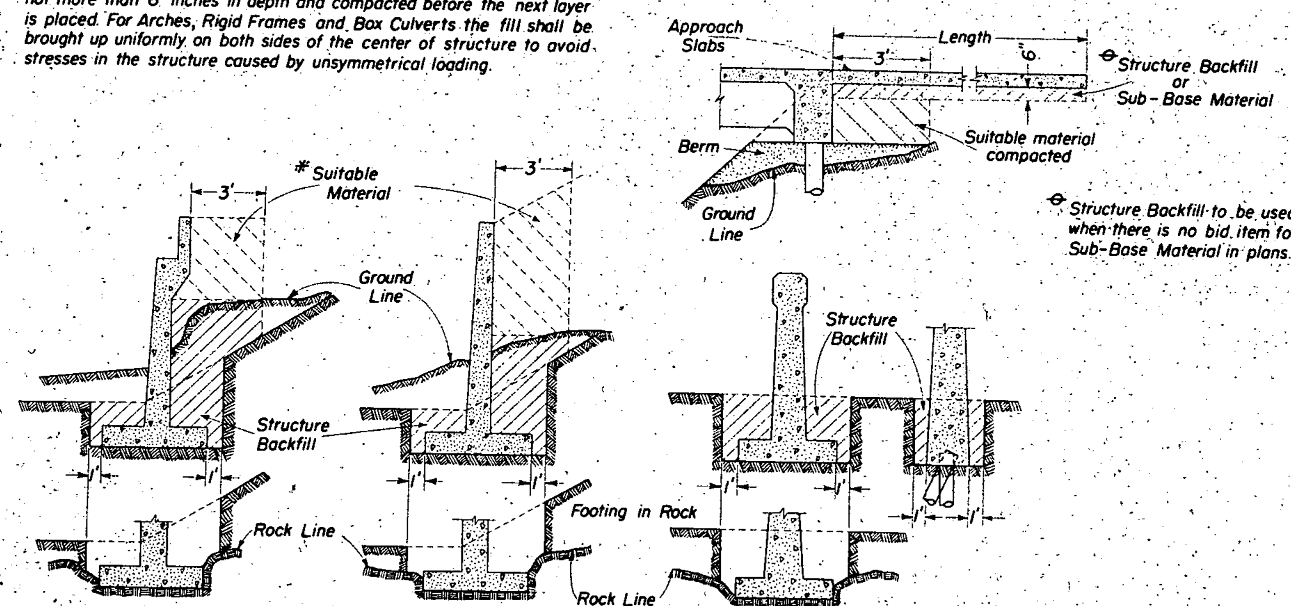


SIPHONS OR CONDUIT IN TRENCH



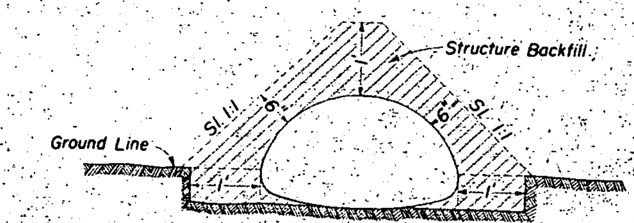
PIERS, ABUTMENTS, RETAINING WALLS ETC.

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



⊖ Structure Backfill to be used when there is no bid item for Sub-Base Material in plans.

ELLIPTICAL OR ARCH CONDUIT



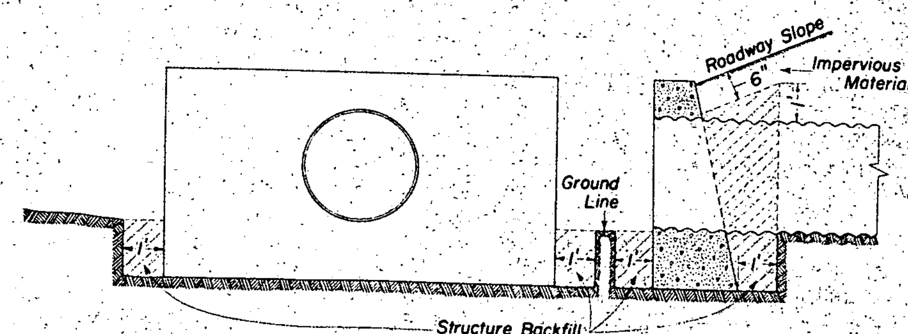
GENERAL NOTES

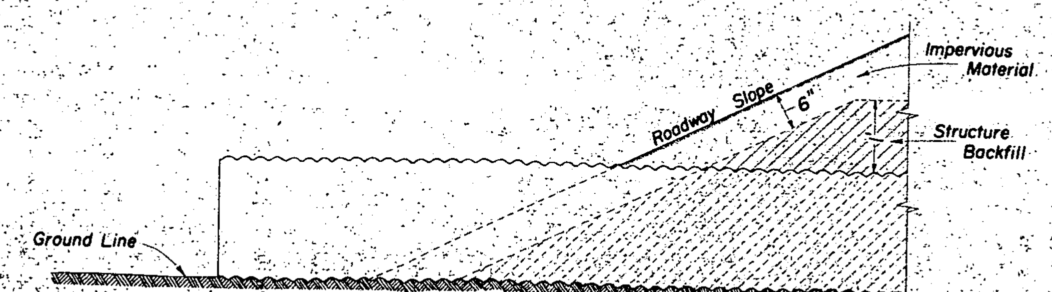
All work shall be done according to the Standard Specifications of the Colorado Department of Highways applicable to the Project.

If, in the opinion of the Engineer, the material beneath the Structure is of such character as to cause unequal settlement along the length of the Structure, the material shall be removed to such a depth ordered, and backfilled with gravel or other suitable material and compacted in accordance with Item 16 of the Standard Specifications.

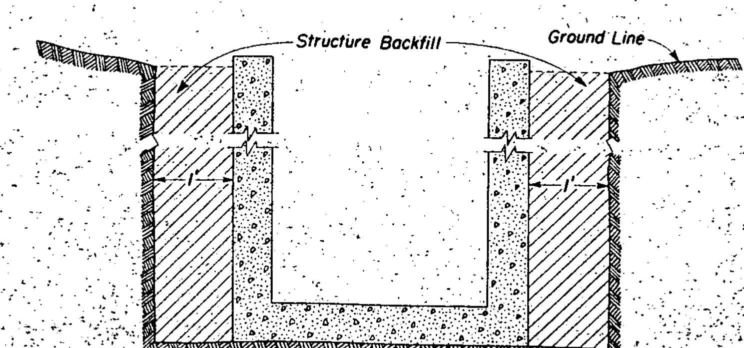
Suitable Material shall be any "Unclassified Excavation" material developed on the project except large rock, boulders or other materials considered by the Engineer to be undesirable for backfill around culverts, boxes etc.

HEADWALLS AND END OF CULVERTS





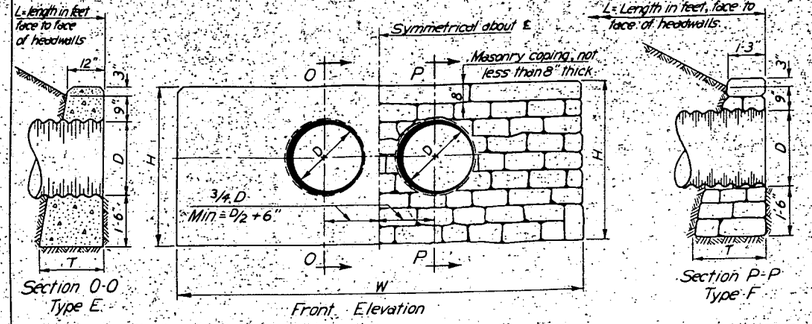
DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS ETC.



COLORADO DEPARTMENT OF HIGHWAYS

STANDARD METHODS OF BACKFILL AROUND STRUCTURES

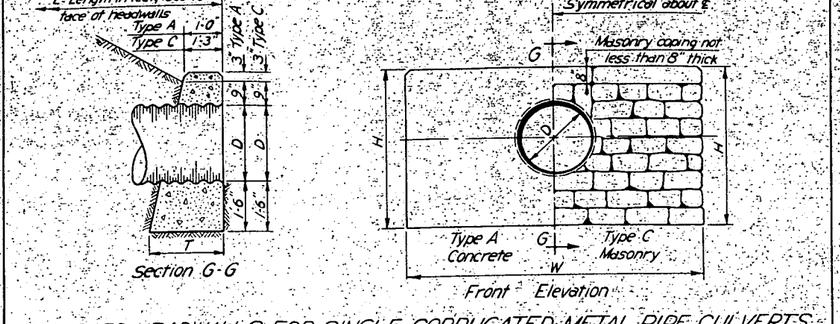
Designed by H.E.P. | Approved by [signature] Bridge Engineer
Made by D.M.F.



STANDARD HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

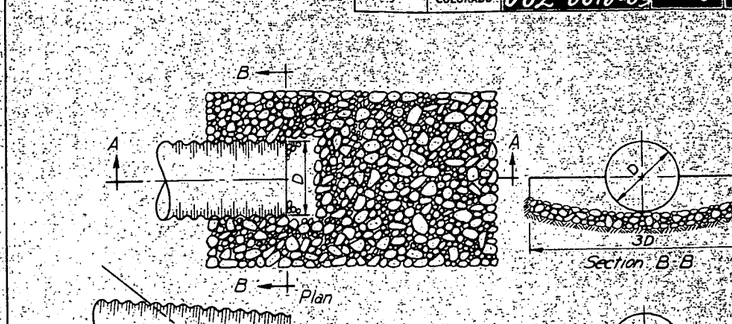
Type E			Both Types				Type F		
D Diam.	T	Class B Concrete in two Headwalls	W	H	Corrugated Metal Pipe		Cement Rubble Masonry in two Headwalls	T	D Diam.
15"	1'-6"	2.4 Cu. Yds.	7'-6"	3'-9"	16 Gage	2 X L = Lin. ft.	3.1 Cu. Yds.	2'-0"	15"
18"	1'-7"	3.0 DO	8'-6"	4'-0"	16 DO	2 X L = DO	3.8 DO	2'-1"	18"
24"	1'-10"	4.4 DO	10'-6"	4'-6"	14 DO	2 X L = DO	5.5 DO	2'-4"	24"
30"	2'-0"	6.1 DO	12'-9"	5'-0"	14 DO	2 X L = DO	7.5 DO	2'-6"	30"
36"	2'-2"	8.1 DO	15'-0"	5'-6"	12 DO	2 X L = DO	10.0 DO	2'-8"	36"
42"	2'-5"	10.8 DO	17'-3"	6'-0"	12 DO	2 X L = DO	12.8 DO	2'-10"	42"
48"	2'-7"	13.6 DO	19'-6"	6'-6"	12 DO	2 X L = DO	16.3 DO	3'-0"	48"



STANDARD HEADWALLS FOR SINGLE CORRUGATED METAL PIPE CULVERTS

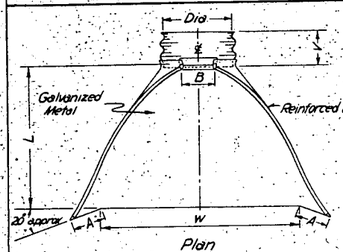
Table of Dimensions and Quantities

Type A			Both Types					Type C		
D Diam.	T	Class B Concrete in two Headwalls	W	H	Corrugated Metal Pipe			Cement Rubble Masonry in Two Headwalls	T	D Diam.
15"	1'-6"	1.8 Cu. Yds.	5'-3"	3'-9"	16 Gage	L = Lin. ft.		2.2 Cu. Yds.	2'-0"	15"
18"	1'-7"	2.2 DO	6'-0"	4'-0"	16 DO	L = DO		2.8 DO	2'-1"	18"
24"	1'-10"	3.3 DO	7'-6"	4'-6"	14 DO	L = DO		4.1 DO	2'-4"	24"
30"	2'-0"	4.5 DO	9'-0"	5'-0"	14 DO	L = DO		5.6 DO	2'-6"	30"
36"	2'-2"	6.0 DO	10'-6"	5'-6"	12 DO	L = DO		7.4 DO	2'-8"	36"
42"	2'-5"	8.0 DO	12'-0"	6'-0"	12 DO	L = DO		9.2 DO	2'-10"	42"
48"	2'-7"	10.0 DO	13'-6"	6'-6"	12 DO	L = DO		11.5 DO	3'-0"	48"



STANDARD GROUTED RUBBLE APRON FOR PIPE CULVERT

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



Plan

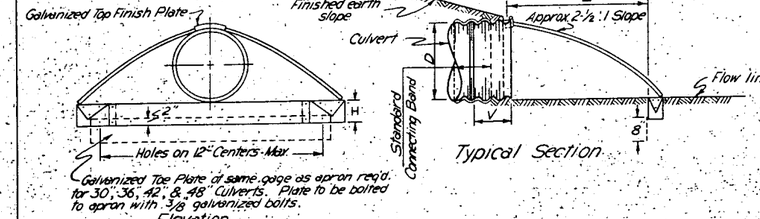
V = 7" for 12" D. to 30" D
V = 12" for 36" D. to 48" D

Type K

Culv. Diam. DA	Gage	Dimensions A ±Tol	B Max.	L 1½ Tol	W 2 Tol.	H ±Tol	Remarks
12"	16	4¾"	6"	21"	24"	6"	One piece skirt
15"	16	6"	8"	26"	30"	6"	One piece skirt
18"	16	7"	9"	31"	36"	6"	One piece skirt
21"	16	8¼"	11"	36"	42"	6"	One piece skirt
24"	14	9½"	12"	42"	48"	6"	One piece skirt
30"	14	12"	15"	52½"	60"	1'½"	Two piece skirt ⊖
36"	12	14"	18"	63"	72"	9"	Two piece skirt ⊖
42"	12	16"	21"	73½"	84"	10½"	Two piece skirt ⊖
48"	12	18"	27"	84"	90"	12"	Two piece skirt ⊖

Splices to be the lap riveted type.
⊖ One splice on ℄ made by either riveting or bolting. Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt section.
▲ Culvert diameter is equal to dimension D at connector section.

Note: Length of Toe Plate for Culverts 15" to 30" Dia. incl. = W + 10"
36" to 48" Dia. incl. = W + 22"

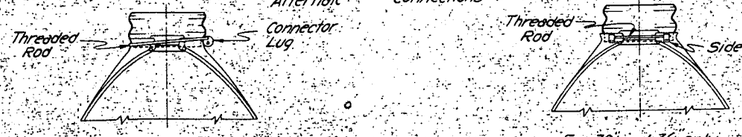


Galvanized Toe Plate of same gage as apron req'd. for 30", 36", 42" & 48" Culverts. Plate to be bolted to apron with 3/8" galvanized bolts.

Elevation

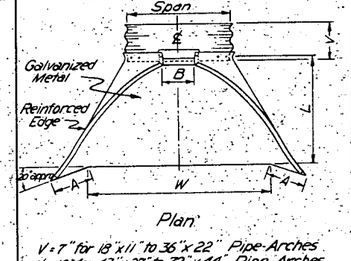
STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K

ROUND METAL PIPE Alternate Connections



For 12" thru 24" Only

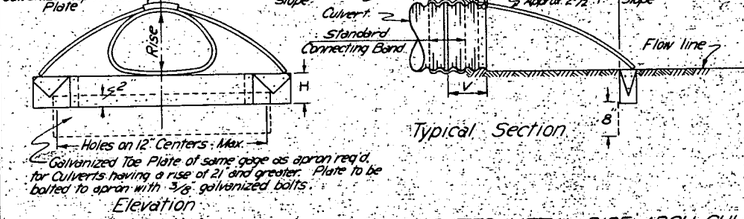
For 30" and 36" only



Plan

V = 7" for 18"x11" to 36"x22" Pipe-Arches
V = 12" for 43"x27" to 72"x44" Pipe-Arches

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



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

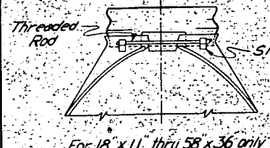
Elevation

Type L

Normal Culvert Diam.	Arch Dimensions Span	Rise	Gage	Dimensions A ±Tol	B Max.	L 1½ Tol.	W 2 Tol.	H ±Tol	Remarks
15"	18"	11"	16	4½"	9"	19"	30"	6"	One piece skirt
18"	22"	13"	16	5¼"	10"	23"	36"	6"	One piece skirt
24"	29"	18"	14	7"	14"	31½"	48"	6"	One piece skirt
30"	36"	22"	14	8¾"	16"	38½"	60"	6"	One piece skirt
36"	43"	27"	12	10¾"	17½"	47"	75"	7⅝"	Two piece skirt ▲
42"	50"	31"	12	12¼"	20"	54"	85"	9⅛"	Two piece skirt ▲
48"	58"	36"	12	14"	26"	63"	96"	10⅝"	Two piece skirt ▲
54"	65"	40"	12	15¾"	23"	70"	112"	10⅝"	Three piece skirt ⊕
60"	72"	44"	10	17¼"	24"	77"	128"	12⅛"	Three piece skirt ⊕

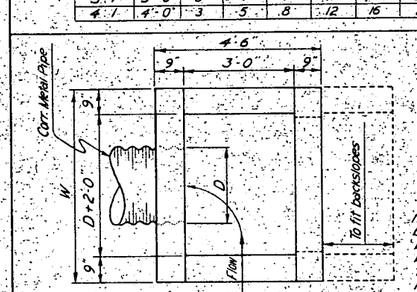
▲ Splices to be the lap riveted or bolted on ℄
⊕ Sections to be joined by riveting or bolting equal distance from ℄ Galvanized Connector Section, Corner Plate & Toe Plate to be same gage as skirt Section.

PIPE ARCHES Alternate Connection



For 18"x11" thru 58"x36" only

STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L



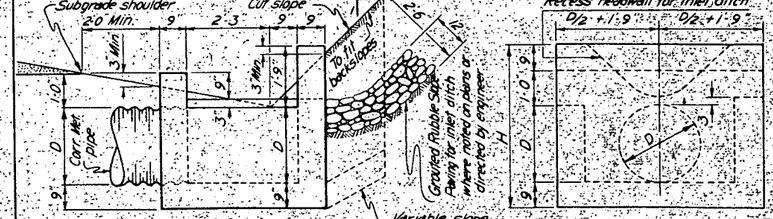
Quantities of *Concrete or Cement Rubble Masonry

Size of Pipe D	Width of Wall W	Height of Wall H	Quantities in One Headwall cu. Yds.
15"	4'-9"	3'-9"	1.48
18"	5'-0"	4'-0"	1.66
24"	5'-6"	4'-6"	1.99
30"	6'-0"	5'-0"	2.34
36"	6'-6"	5'-6"	2.72

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

* See plan sheets for concrete classification

INTERCEPTING HEADWALLS



Elevation

General Notes for All Structures

All work shall be done according to the standard specifications of the Colorado Department of Highways applicable to the Project.

All construction joints shall be thoroughly cleaned before fresh concrete is poured.
All walls shall have forms on both sides.
The minimum fill over top of culverts shall be 1'-0"
When culvert is skewed, headwalls shall be placed parallel to ℄ of roadway.
Minimum grade of pipe shall be 1%
For size and location of culverts See plan sheets for project.
Footings in rock shall be poured out to rock and not formed.
For Std. methods of Structure Backfill see Std. M-60-8.

COLORADO
DEPARTMENT OF HIGHWAYS
STANDARD HEADWALLS
INTERCEPTING HEADWALLS
GALVANIZED METAL APRONS
GROUTED RUBBLE APRONS
FOR CORR. METAL PIPE CULVERT

Designed by PSB-GND	Approved by
Made by H.G.P.	Bridge Engineer
Checked by M.W.M.	Date

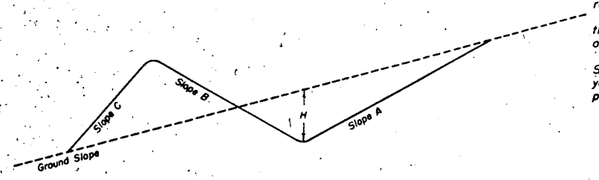
STANDARD TYPES of DITCHES and CONSTRUCTION METHODS

STANDARD M-107-D

FED. ROAD REG. NO.	DIVISION	SHEET NO.	TOTAL SHEETS
9	COLO.	0010-03	16

DETAILS for CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



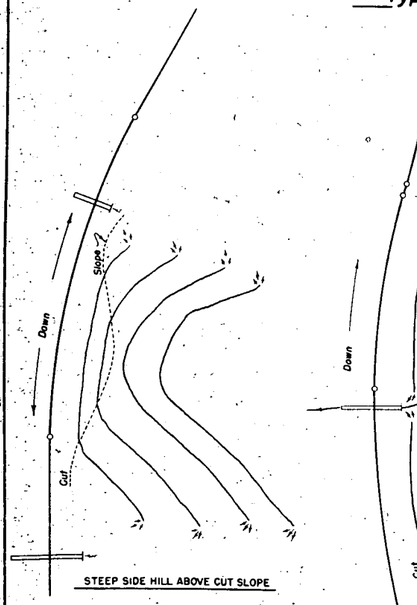
PURPOSE & USE OF THE TABLE

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.

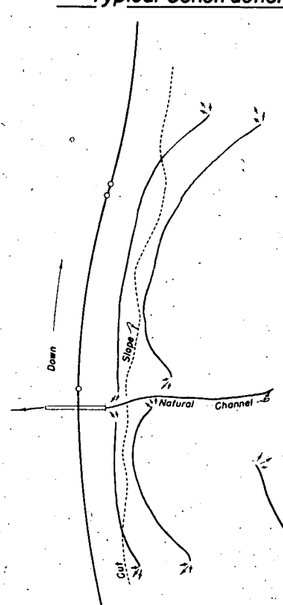
Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section.

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.

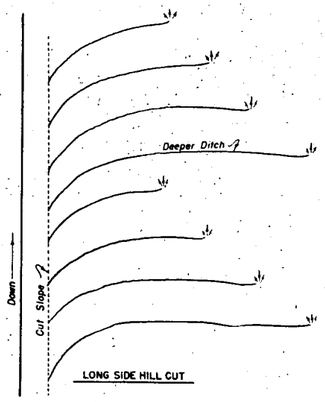
Typical Construction Layouts



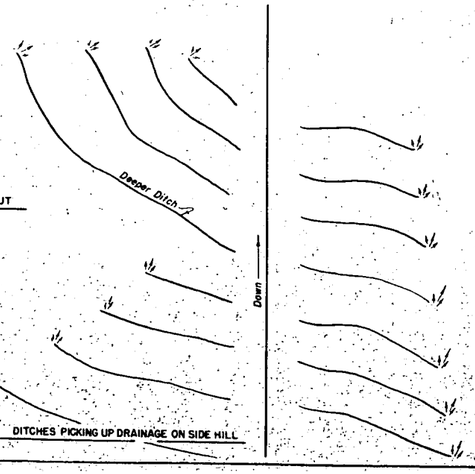
STEEP SIDE HILL ABOVE CUT SLOPE



USUAL SIDE HILL LAYOUT



LONG SIDE HILL CUT



DITCHES PICKING UP DRAINAGE ON SIDE HILL

Scale of Sketches in Feet

100 0 100 200 300 400

Table of Slopes and Yardages

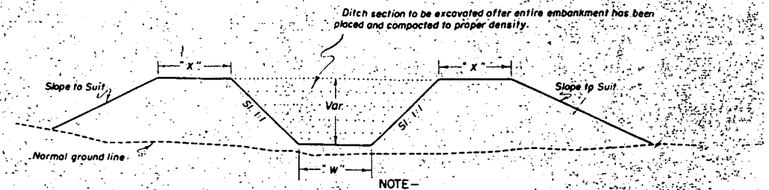
SLOPES ▲ Ground	A	B	C	H	Cubic Yards per 100 lin. ft. of Ditch
5:1 Or Flatter	2:1	4:1	2:1	15"	.16
				18"	23
				21"	32
		3:1		15"	15
				18"	22
				21"	30
		2:1		15"	14
				18"	20
				21"	27
		1-1/2:1		15"	13
				18"	19
				21"	25
	1-1/2:1	4:1	1-1/2:1	15"	12
				18"	18
				21"	25
		3:1		15"	12
				18"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

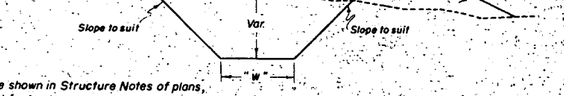
TYPICAL SECTIONS for DRAINAGE, IRRIGATION DITCHES and CHANNEL CHANGES

For Embankment Sections

(Generally for use in Irrigation Ditches & Channel Changes)



NOTE –
See Structure Notes in plans for dimension "W".
Dimension "X" = W/2 with minimum of 2 feet.



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.

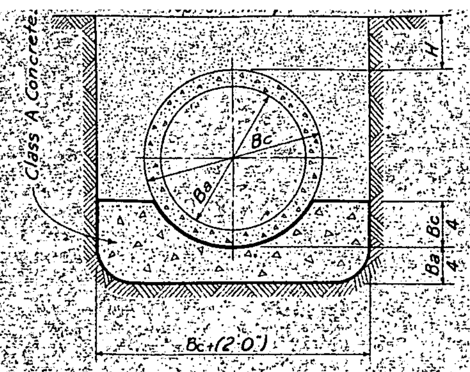
COLORADO DEPARTMENT OF HIGHWAYS

Standard Types of Ditches and Construction Methods

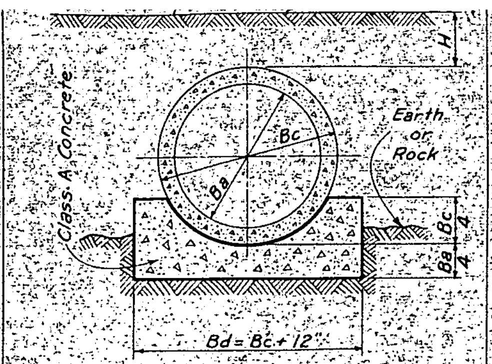
Designed by C.G.M.	Approved by [signature]
Made by C.G.M.	Engineer, Surveys & Plans
Checked by	Date: Aug. 18, 1950

Initial	Date

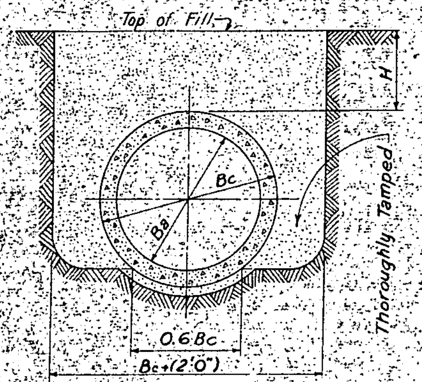
Initial	Date
W.W.D.	3-1-52
P.C.	3-7-52
W.W.D.	3-5-52
P.C.	3-7-52
L.W.F.	3-10-52
P.C.	3-14-52



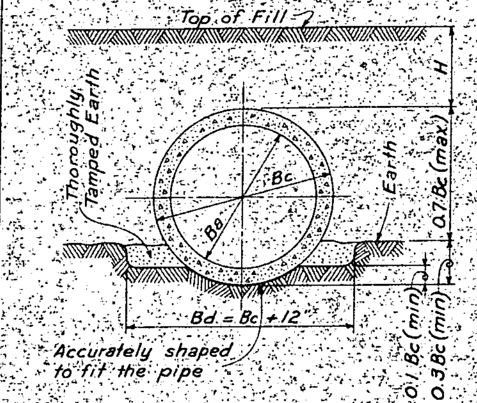
CONCRETE CRADLE BEDDING IN TRENCHES



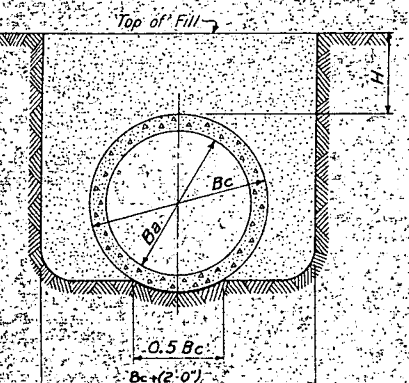
CONCRETE CRADLE BEDDING IN FILLS



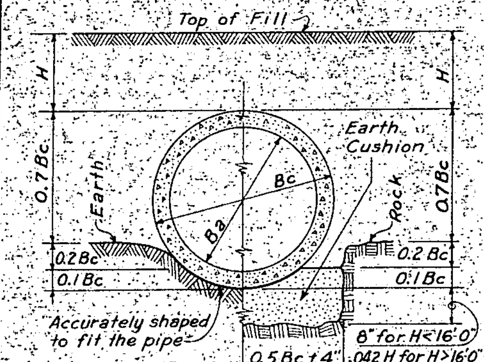
FIRST CLASS BEDDING IN TRENCHES



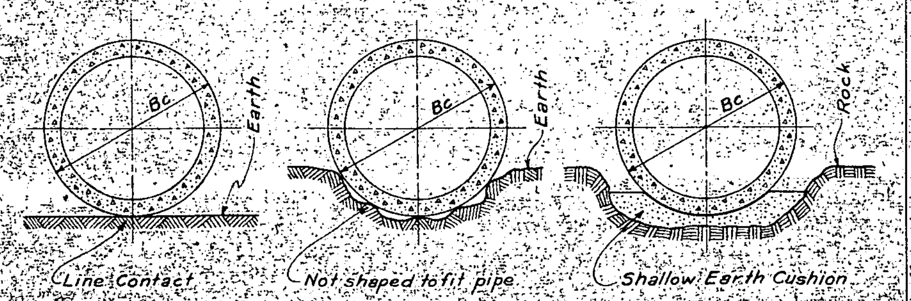
FIRST CLASS BEDDING IN FILLS



ORDINARY BEDDING IN TRENCHES



ORDINARY BEDDING IN FILLS

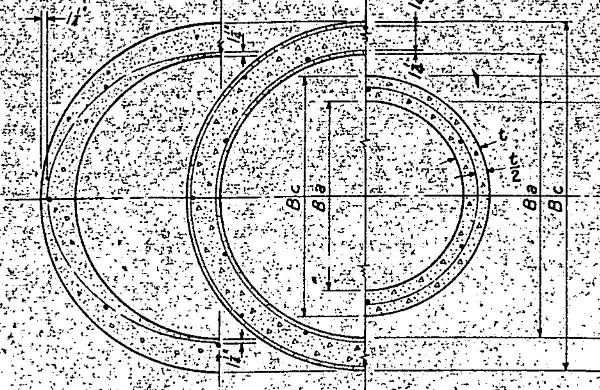


IMPERMISSIBLE BEDDINGS IN TRENCHES OR FILLS THESE THREE TYPES SHALL NOT BE USED

STANDARD M-112-1

9	COLO.	C02-0010-03 17

Rev. - Ref. of Conc. Pipe to Class - 7-9-58 E.E.O.

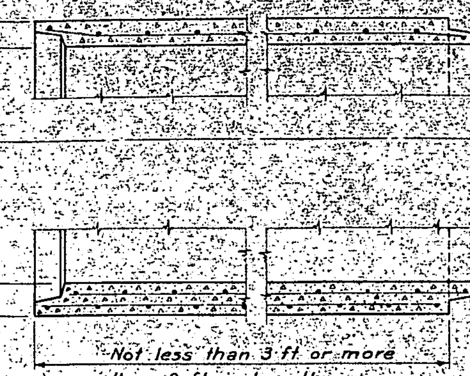


Sections with elliptical reinforcement or two lines of circular reinforcement

Section with one line of circular reinforcement

PIPE CROSS SECTIONS

Where two lines of steel are contemplated a single line placed elliptically may be used, and the area of this shall be at least 50 % of the total steel area required for two lines of reinforcement. Pipe with elliptical reinforcing shall have the word "Top" or "Bottom" clearly stenciled on the inside of the pipe at the correct place to indicate the proper position when laid.



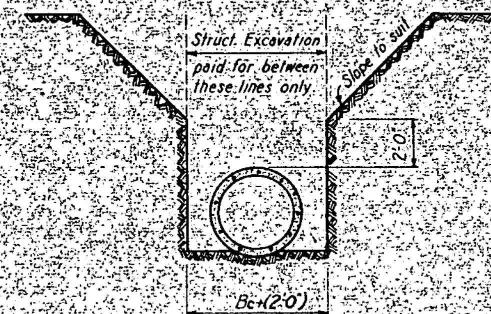
Not less than 3 ft. or more than 8 ft. in length.

LONGITUDINAL SECTIONS

If machine made pipe is used a modified bell will be acceptable to the department.

CONCRETE COLLAR

Where the flow line grade of the pipe is 10 % or greater, all pipe shall be the bell and spigot type or shall be tongue and groove pipe with concrete collars as detailed above or a type approved in writing by the Engineer.



Where it is necessary to bed the pipe in a deep trench the contractor may, for his own convenience and at his own expense, slope the cut from a point 2'-0" above the top of the pipe as shown above.
Note: For Concrete Sewer Pipe Structural Excavation is not a separate pay item.

	Ba Int. Diameter (Inches)	* Bc Ext. Diameter (Inches)	Three Edge Bearing Method: Crack Point (Pounds)	Three Edge Bearing Method: Ultimate Load (Pounds)	Max. depth of fill "H" in ft. for 3 types of bedding — Concrete Cradle: Pipe in Trench	Concrete Cradle: Pipe in Fills	First Class: Pipe in Trench	First Class: Pipe in Fills	Ordinary: Pipe in Trench	Ordinary: Pipe in Fills
Reinforced Conc. Culv. Pipe Class III - A.S.T.M. C 76	12	16	2250	3500	No Limit	30	No Limit	19	No Limit	16
	15	19½	2625	4065		28		18		15
	18	23	3000	4500		28		18		15
	24	30	3000	5000		22	44	14	18	12
	30	37	3375	5750		21	25	14	15	12
	36	44	4050	6600	54	21	17	14	14	12
	42	51	4725	7350	47	22	17	14	13	12
	48	58	5400	8000	46	22	17	14	13	12
	54	65	5850	9000	38	22	17	14	12	12
	60	72	6000	10000	32	21	15	14	11	12
	66	79	6300	11000	28	20	15	13	10	12
	72	86	6600	12000	26	20	14	13	10	11
	84	100			24	20	13	13	10	11
Reinforced Conc. Culv. Pipe Class IV - A.S.T.M. C 76	24	30	4000	6000	No Limit	29	No Limit	18	No Limit	15
	30	37	5000	7500		30	No Limit	19	48	16
	36	44	6000	9000		30	40	19	22	16
	42	51	7000	10500		31	40	20	22	17
	48	58	8000	12000		31	37	20	23	17
	54	65	9000	13500		32	36	20	23	17
	60	72	9000	15000		29	28	19	20	16
	66	79	9500	16500	128	28	26	19	18	16
	72	86	9900	18000	64	28	24	18	17	16
	84	100			46	28	22	18	16	15
Reinforced Conc. Sewer Pipe Class as called for on Plans - A.S.T.M. C 76	12	16	1800	2700	No Limit	24	No Limit	15	25	13
	15	19½	2000	3000		22	No Limit	14	19	12
	18	23	2200	3300		21	48	13	16	11
	21	26½	2400	3600		20	28	13	14	11
	24	30	2400	3600		18	18	12	12	10
	27	33	2550	3800		18	17	11	11	10
	30	37	2700	4050		17	15	11	10	9
	33	40½	2850	4300	49	17	14	11	10	9
	36	44	3000	4500	22	16	11	11	8	9
	42	51	3200	4800	19	16	10	10	7	9
	48	58	3400	5100	17	15	9	10	7	9
	54	65	3700	5550	17	15	9	10	7	8
	60	72	4000	6000	16	15	9	10	7	8
	66	79	4250	6350	16	15	9	10	6	8
	72	86	4500	6750	15	15	8	10	6	8
Std. Str. Unreinforced Conc. Sewer Pipe - A.S.T.M. C 14	4	5⅞	1000		No Limit	35	No Limit	24	No Limit	20
	6	7¼	1100			31		20		17
	8	9½	1300			28		18		15
	10	11¾	1400			25		16	27	13
	12	14	1500			23		14	19	12
	15	17½	1750			21		13	16	11
	18	21	2000			21		13	15	11
	21	24½	2200			20	27	12	14	11
	24	28¼	2400			19	22	12	13	10

* Note: External diameter of pipe shown in the table is approximate only, having been determined by using 3000 lbs. per sq. in. concrete. If greater strength concrete is used this diameter may be decreased accordingly.

GENERAL NOTES

All work shall be done according to the Standard Specifications of the Colorado State Highway Department applicable to the project.

The type of Pipe Joint used and the field construction there-of to make the joint reasonably water-tight shall be submitted to the Department for approval.

Unless otherwise noted the type of bedding shall be Ordinary Bedding. When the maximum fill height as noted hereon, for this type of bedding, is exceeded then that type of bedding which is indicated by the allowable fill height shall be used.

All culverts shall have headwalls or flared end sections if and as shown on the plans in accordance with Department Standards.

For size, type and location of pipe see plan sheets for project.

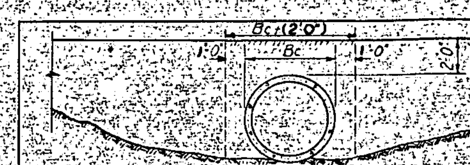
Supporting soils shall be composed of firm and uniform material throughout the entire length of Culvert. The soil shall be accurately shaped to fit the Pipe in accordance with the bedding conditions shown.

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

For Std. Methods of Structure Backfill See Std. M-60-B.

Minimum Depth of Fill over Concrete Pipe.

Main Roadways	2 Foot
Approach Roadways	1 Foot



If the desired fill height for pipe in a fill exceeds that given in the table, new embankment may be constructed to an elevation of two feet above the top of the pipe, a trench may then be excavated in the embankment and the pipe installed in accordance with a pipe in a trench. This work shall conform to the requirements for "Embankments" as shown in the specifications.

COLORADO DEPARTMENT OF HIGHWAYS

REINF. CONCRETE CULVERT PIPE
STD. STRENGTH 12", 15", 18", 24", 30", 36", 42", 48", 54", 60", 66", 72", 84"
EXTRA STR. 24", 30", 36", 42", 48", 54", 60", 66", 72", 84"

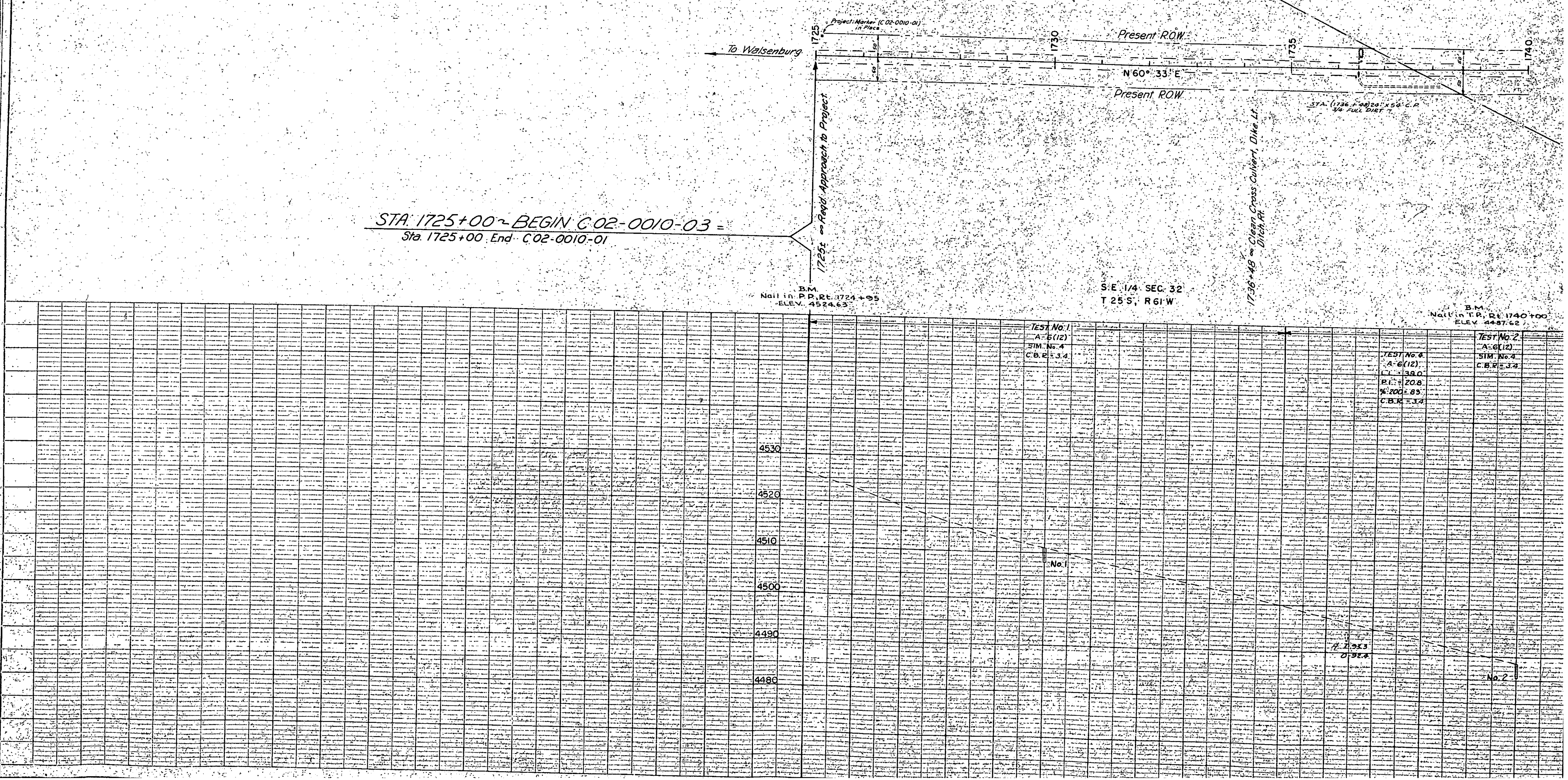
CONCRETE SEWER PIPE
REINF. 12", 15", 18", 21", 24", 27", 30", 33", 36", 42", 48", 54", 60", 66", 72"
UNREINF. 4", 6", 8", 10", 12", 15", 18", 21", 24"

Designed by W.W.D.	Approved by [signature]
Made by W.W.D.	Bridge Engineer
Checked by P.C.	Date:

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOT. SHE[ETS]
9	COLO.	C-02-0010-03	18	

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

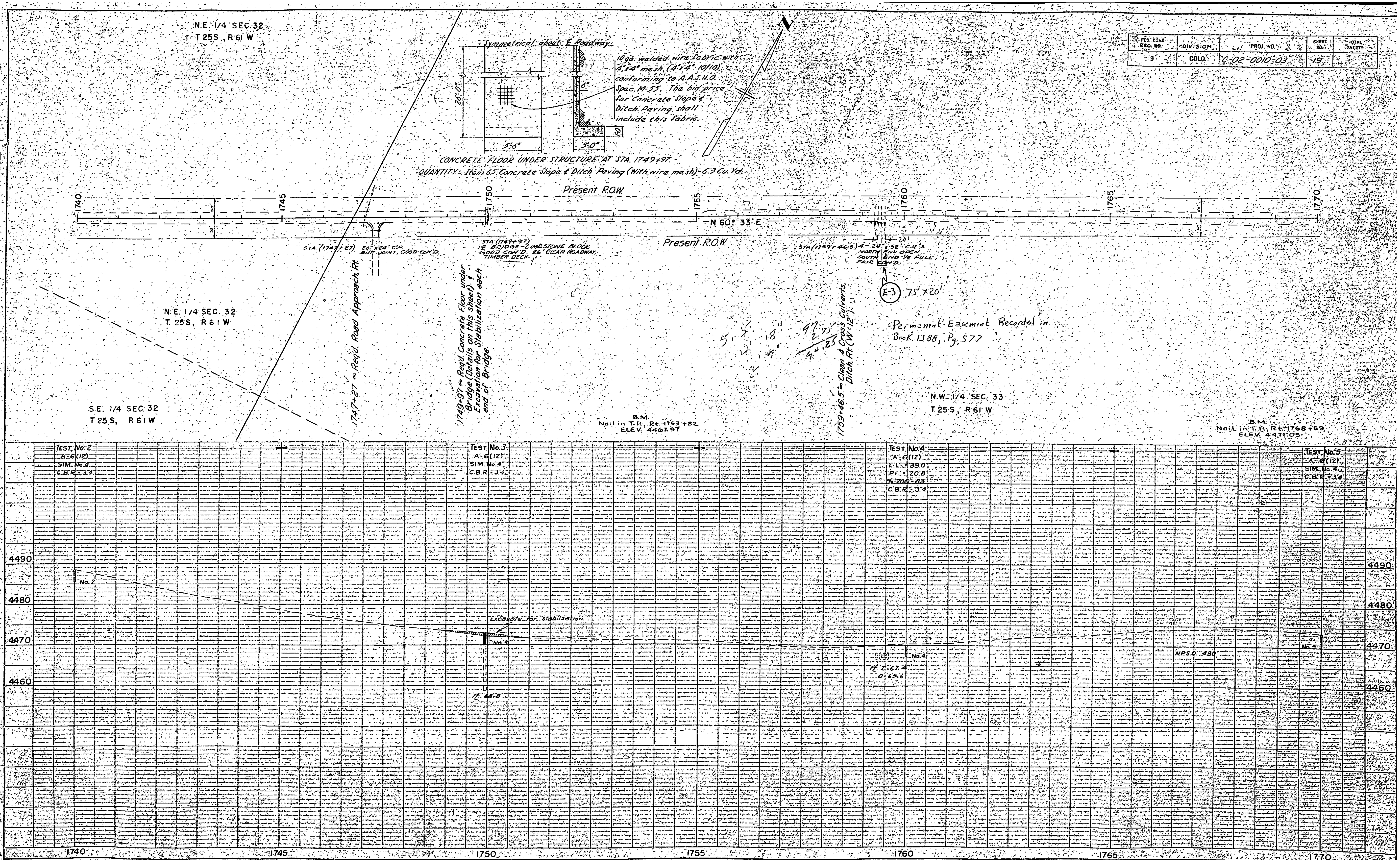
Unclassified Excavation at cattle guards and bridge approaches shall be used to widen shoulders within free haul distance.



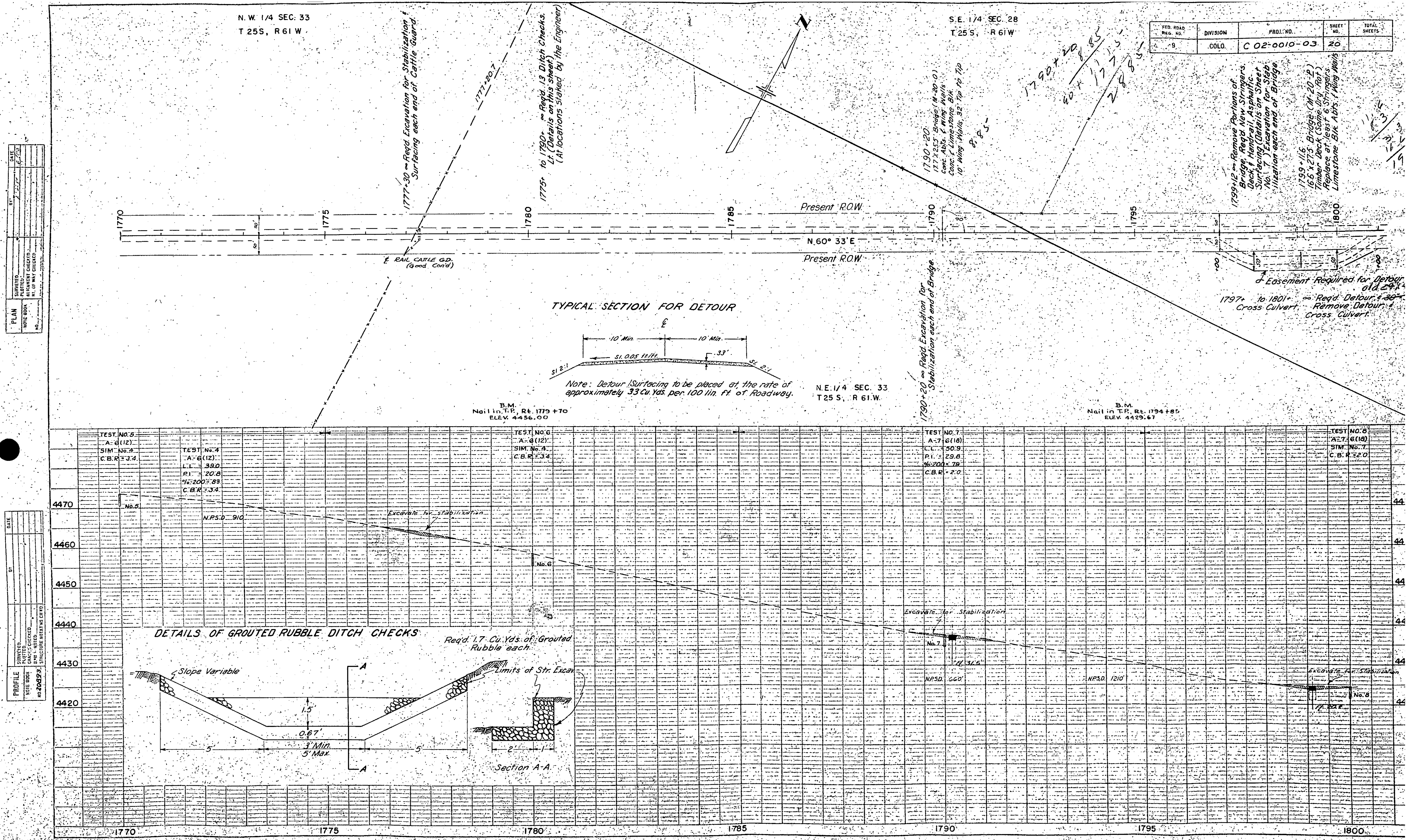
PLAN — NOTE BOOK / NO. — SURVEYED / PLOTTED / ALIGNMENT CHECKED / RT. OF WAY CHECKED — BY — DATE

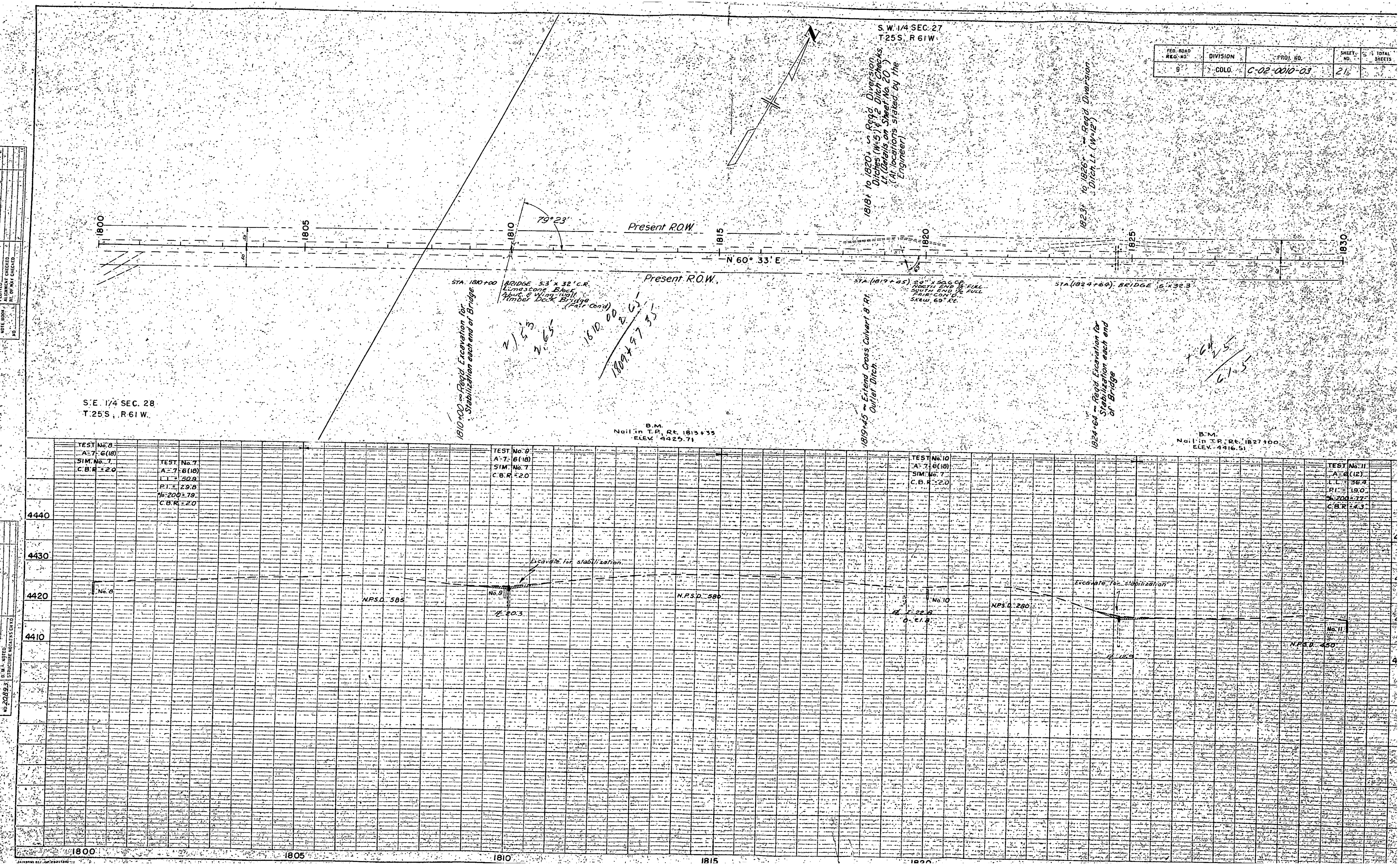
PROFILE — NOTE BOOK / NO. 20893 — SURVEYED / PLOTTED / GRADES CHECKED / B.M.'s NOTED / STRUCTURE NOTATIONS CH'KD — BY — DATE

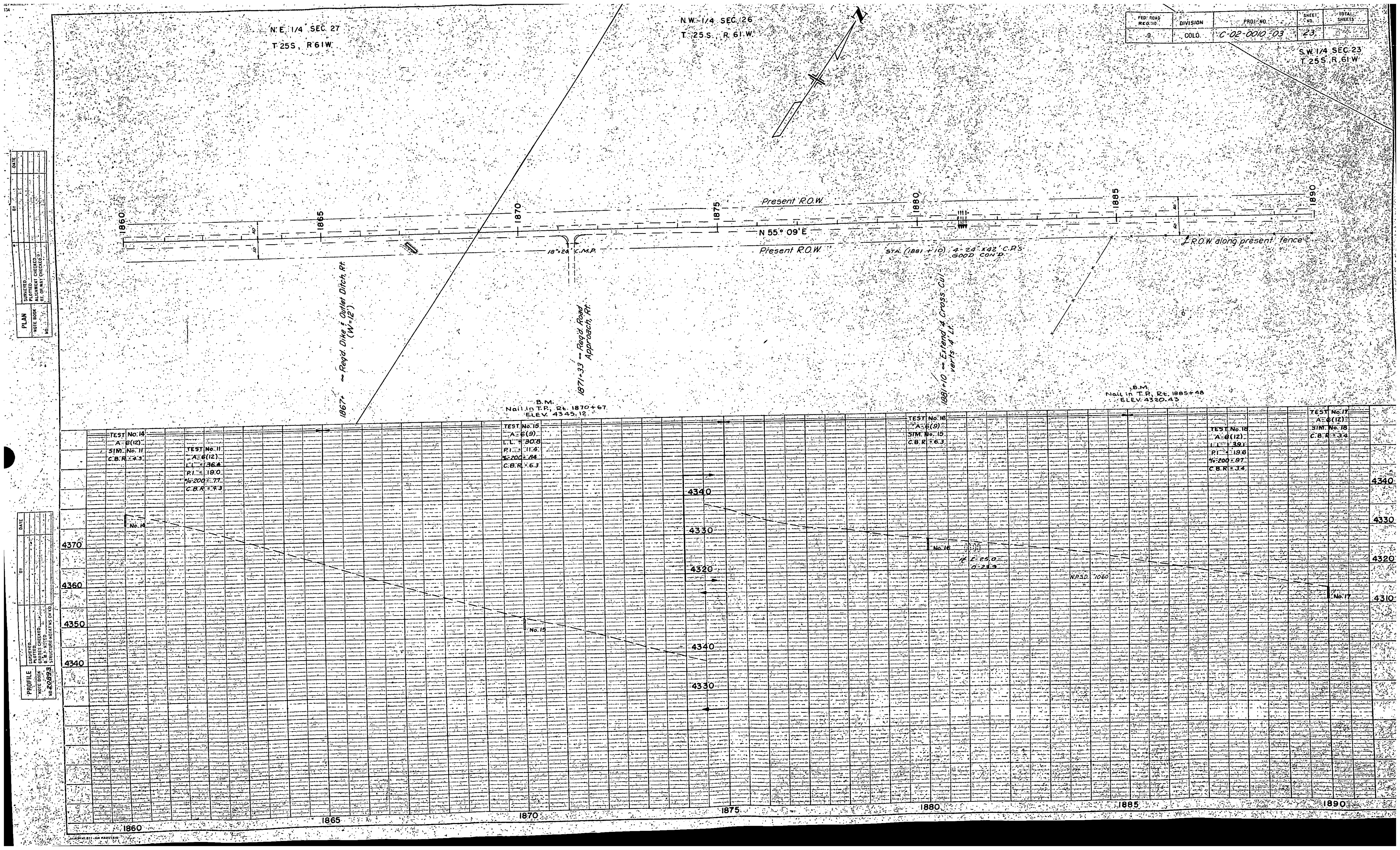
FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	19	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C 02-0010-03	20	

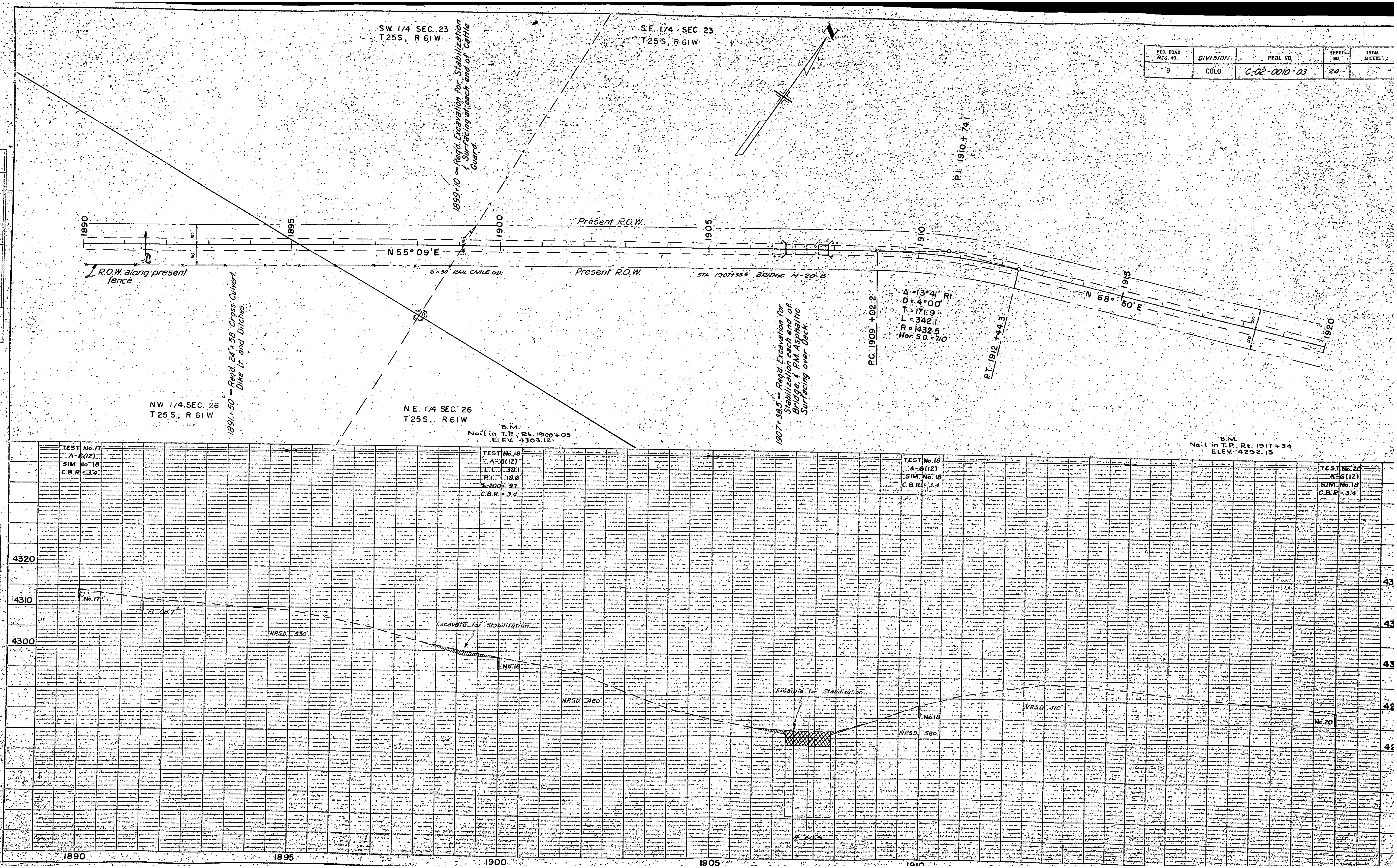



FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 21
S.W. 1/4 SEC. 27
T.25S, R.61W.
N
1818± to 1820± — Req'd. Diversion Ditches (W-5) & 2 Ditch Checks Lt. (Details on Sheet No. 20) (At locations stated by the Engineer)
1823± to 1826± — Req'd. Diversion Ditch Lt. (W-12)
1800
1805
1810
1815
1820
1825
1830
79° 23'
Present R.O.W.
N 60° 33' E
Present R.O.W.
STA. 1810+00 BRIDGE 5.3' x 32' C.R. Limestone Block Abut. & Wing-wall Timber Deck Bridge (Fair Cond.)
STA. (1819+45) 20" x 50' C.C.P. North End 1/2 Full South End 1/2 Full Fair Cond. Skew 60° Rt.
STA. (1824+64) BRIDGE 5' x 32.3'
1810+00 — Req'd. Excavation for Stabilization each end of Bridge.
1819+45 — Extend Cross Culvert 8' Rt. Outlet Ditch.
1824+64 — Req'd. Excavation for Stabilization each end of Bridge
S.E. 1/4 SEC. 28
T.25S., R.61W.
B.M. Nail in T.P. Rt. 1813+35 ELEV. 4425.71
B.M. Nail in T.P. Rt. 1827+00 ELEV. 4416.51
TEST No. 6 A-7-6(18) SIM. No. 7 C.B.R. = 2.0
TEST No. 7 A-7-6(18) L.L. = 50.8 P.I. = 29.8 % -200 = 79 C.B.R. = 2.0
TEST No. 9 A-7-6(18) SIM. No. 7 C.B.R. = 2.0
TEST No. 10 A-7-6(18) SIM. No. 7 C.B.R. = 2.0
TEST No. 11 A-6(12) L.L. = 36.4 P.I. = 19.0 % -200 = 77 C.B.R. = 4.3
4440
4430
4420
4410
Excavate for stabilization
Excavate for stabilization
No. 6
No. 9
No. 10
No. 11
N.P.S.D. 585
N.P.S.D. 580
N.P.S.D. 280
N.P.S.D. 450
PLAN
PROFILE
NOTE BOOK
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
GRADES CHECKED
EST. NOTED
STRUCTURE NOTATIONS CH'KD
No. 2089.3
BY
DATE
1800
1805
1810
1815
1820

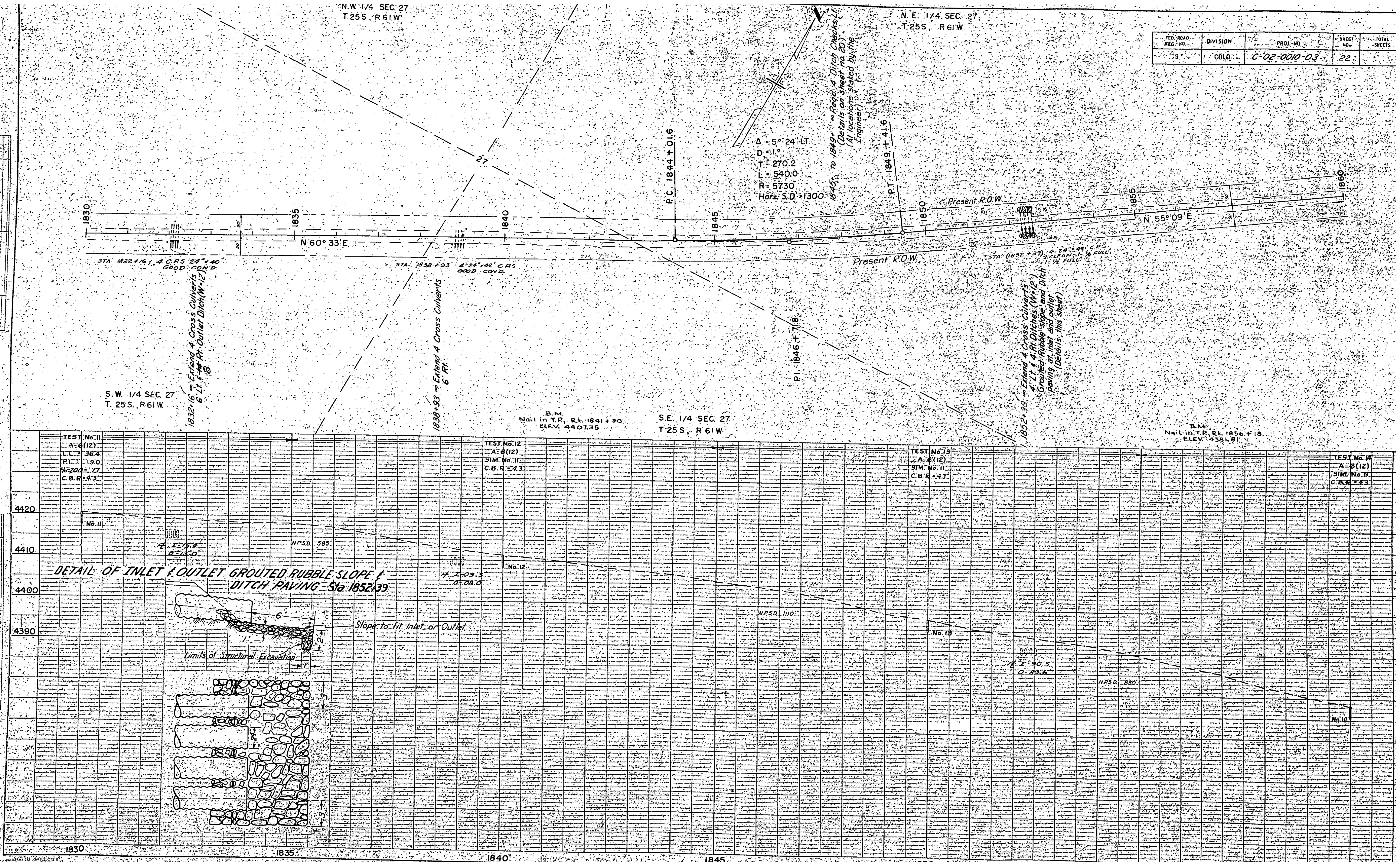


FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 23
TOTAL SHEETS
N.E. 1/4 SEC. 27
T. 25 S., R. 61 W.
N.W. 1/4 SEC. 26
T. 25 S., R. 61 W.
S.W. 1/4 SEC. 23
T. 25 S., R. 61 W.
Present R.O.W.
N 55° 09' E
Present R.O.W.
18"x24" C.M.P.
STA. (1881+10) 4-24"x42' C.P.S. GOOD CON'D.
R.O.W. along present fence
1867+ ~ Req'd Dike & Outlet Ditch, Rt. (W=12')
1871+33 ~ Req'd Road Approach, Rt.
1881+10 ~ Extend 4 Cross Culverts 4' Lt.
B.M. Nail in T.P., Rt. 1870+67 ELEV. 4345.12
B.M. Nail in T.P., Rt. 1885+48 ELEV. 4320.43
TEST No. 14 A-6(12) SIM. No. 11 C.B.R. = 4.3
TEST No. 11 A-6(12) L.L. = 36.4 P.I. = 19.0 %-200 = 77 C.B.R. = 4.3
TEST No. 15 A-6(9) L.L. = 30.8 P.I. = 11.4 %-200 = 84 C.B.R. = 6.3
TEST No. 16 A-6(9) SIM. No. 15 C.B.R. = 6.3
TEST No. 18 A-6(12) L.L. = 39.1 P.I. = 19.6 %-200 = 97 C.B.R. = 3.4
TEST No. 17 A-6(12) SIM. No. 18 C.B.R. = 3.4
No. 14
No. 15
No. 16
No. 17
N.P.S.D. 1060
1860
1865
1870
1875
1880
1885
1890
4370
4360
4350
4340
4330
4320
4310
PLAN
PROFILE
NOTE BOOK No. 20893

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	24	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	22	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO	C-02-0010-03	25	

S.W. 1/4 SEC. 24
T 25 S, R 61 W

N

Remove
1930+35 Extend Cross Culvert 4 Ft.
4 Ft. Outlet Ditch
30° XS2 CMP

1920 1925 1930 1935 1940 1945 1950

Present R.O.W.

N 68° 50' E

STA. (1930 + 35) 24" x 48" C.P. FULL OF DIRT FAIR COND.

Present R.O.W.

S.E. 1/4 SEC. 23
T 25 S, R 61 W

B.M.
Nail in T.P., Rt. 1932 + 26
ELEV. 4278.60

B.M.
Nail in T.P., Rt. 1947 + 25
ELEV. 4265.12

TEST No. 20
A-6 (12)
SIM. No. 18
C.B.R. = 3.4

TEST No. 18
A-6 (12)
L.L. = 39.1
P.I. = 19.8
%-200 = 97
C.B.R. = 3.4

TEST No. 21
A-6 (12)
SIM. No. 18
C.B.R. = 3.4

TEST No. 22
A-6 (12)
SIM. No. 18
C.B.R. = 3.4

TEST No. 23
A-6 (12)
L.L. = 38.8
P.I. = 19.0
%-200 = 61
C.B.R. = 3.4

No. 20

NPSD 1140

No. 21

R = 76.2
D = 75.7

No. 22

No. 23

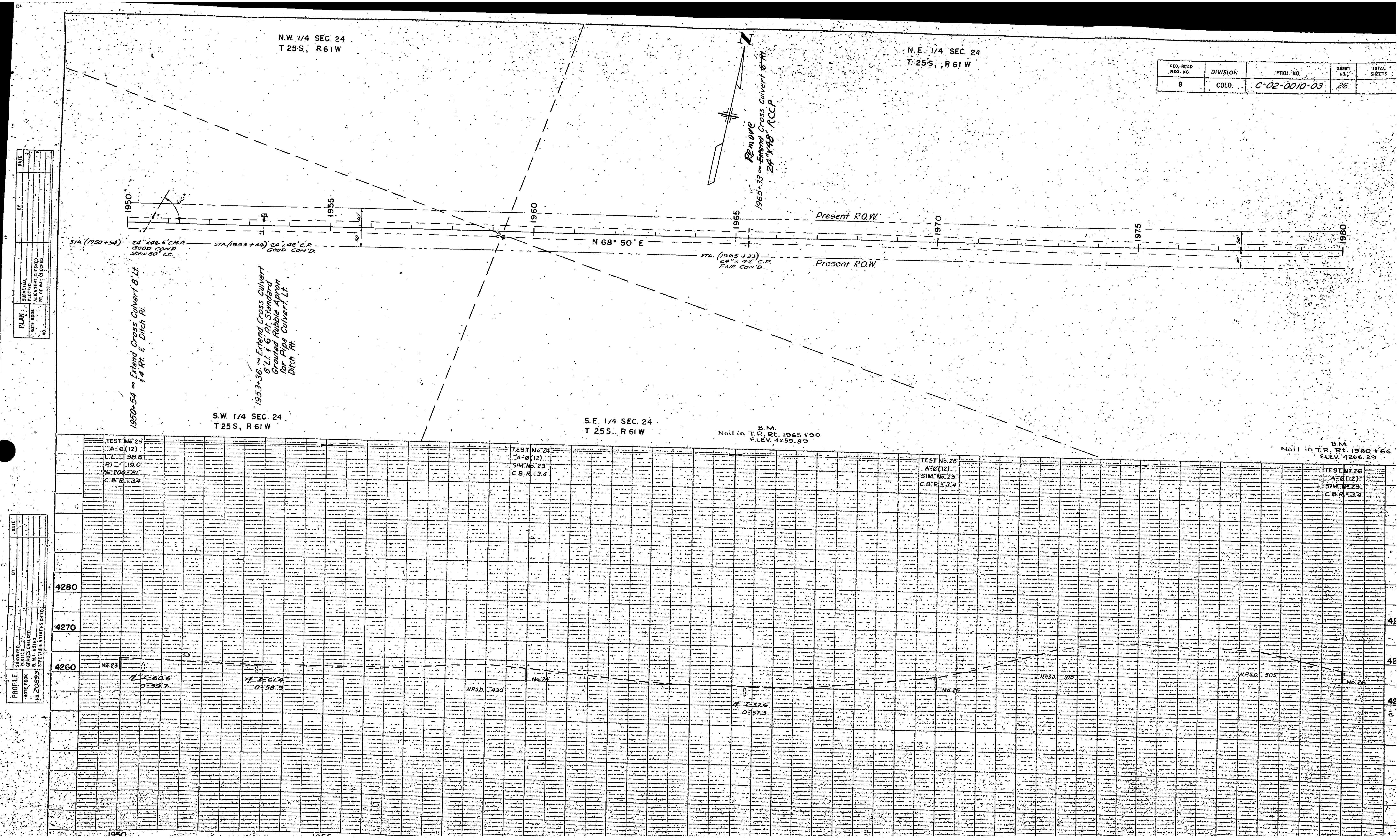
4290 4280 4270 4260

1920 1925 1930 1935 1940 1945

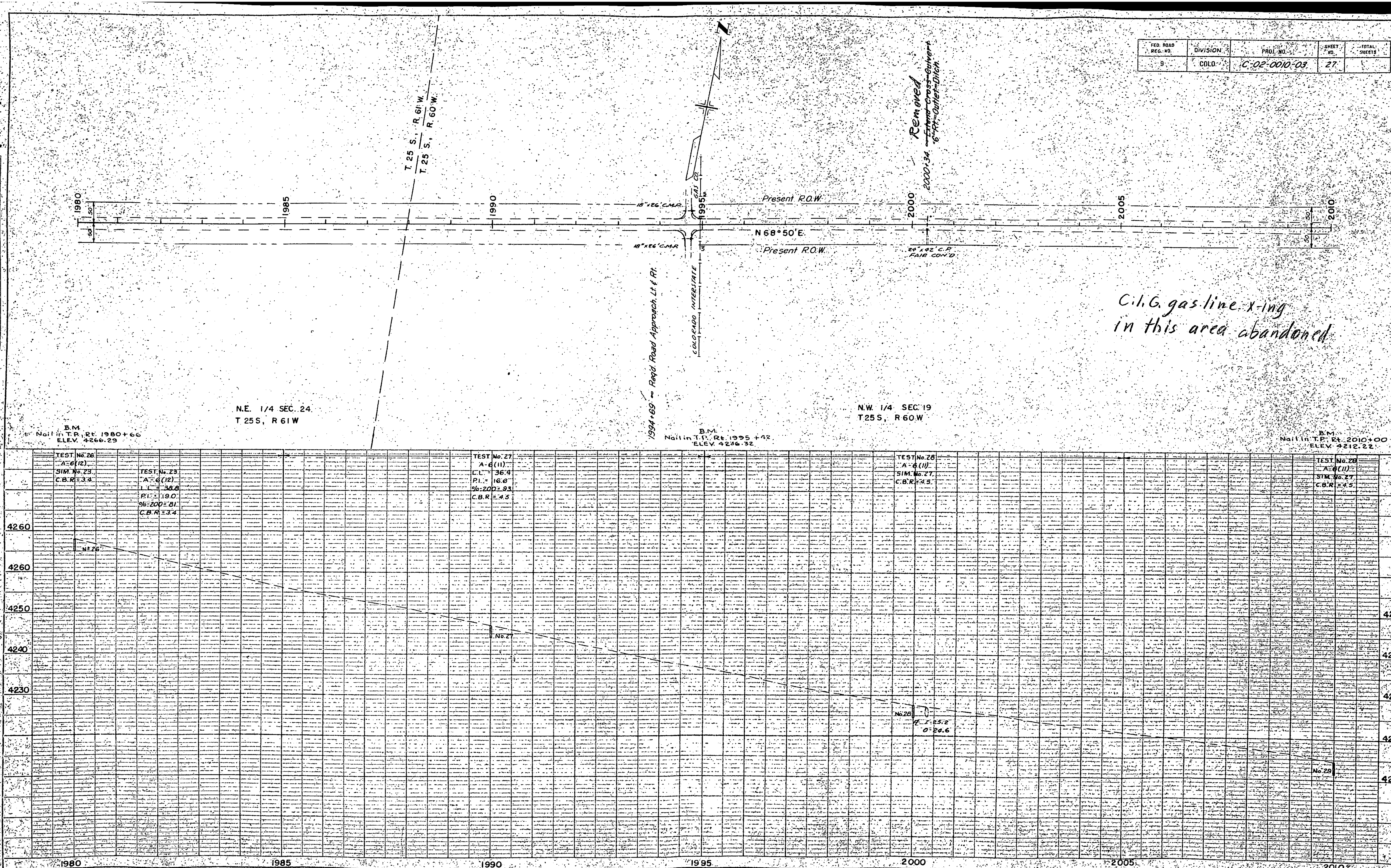
PLAN
SURVEYED BY
PLOTTED BY
NOTE BOOK
NO.
ALIGNMENT CHECKED
RT. OF WAY CHECKED
DATE
BY

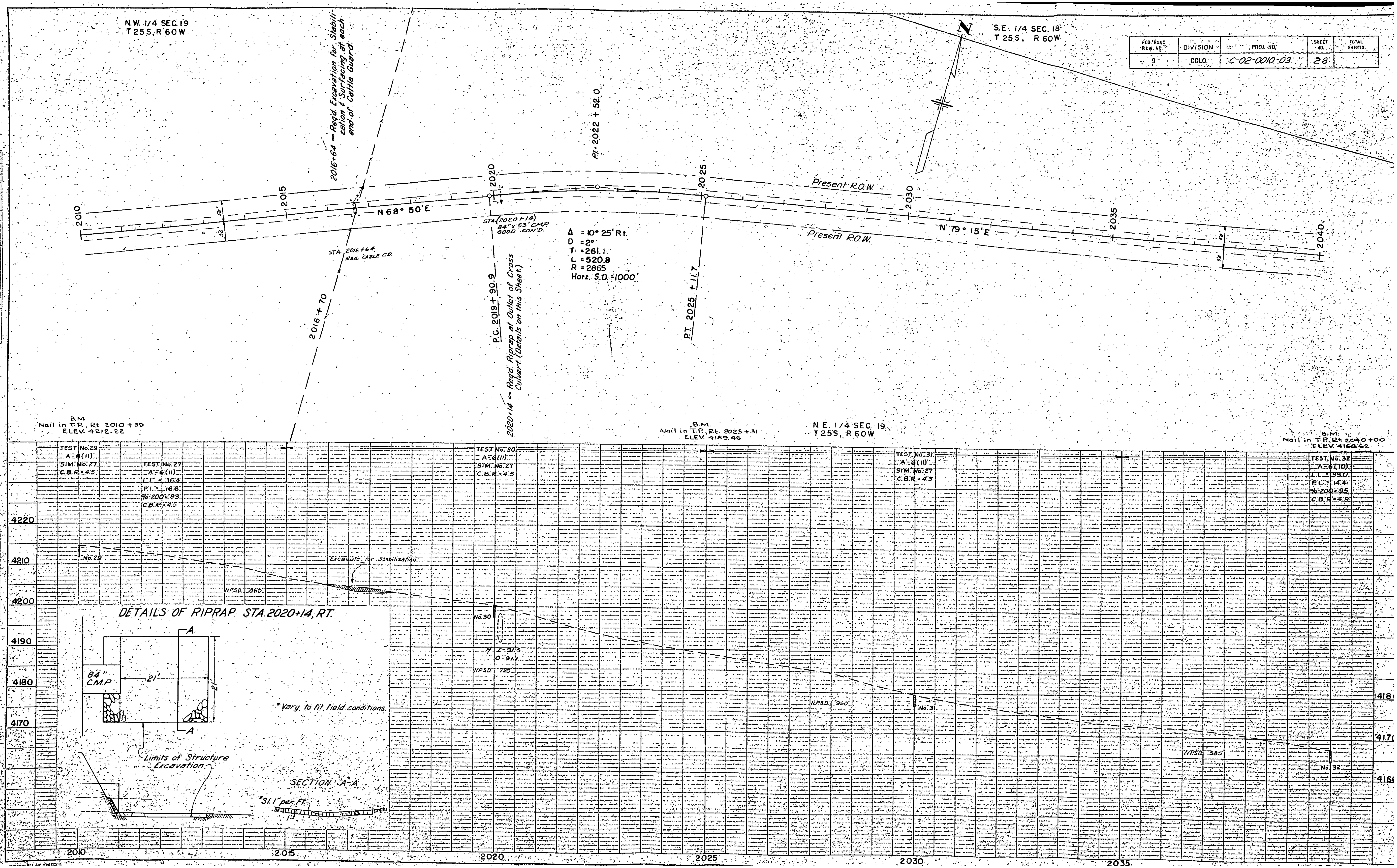
PROFILE
SURVEYED BY
PLOTTED BY
NOTE BOOK
NO. 2093
GRADES CHECKED
B. M.'s NOTED
STRUCTURE NOTATIONS OK'D
DATE
BY

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	26	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	27	




FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 28
TOTAL SHEETS
N.W. 1/4 SEC. 19
T 25 S, R 60 W
S.E. 1/4 SEC. 18
T 25 S, R 60 W
N
2016+64 ~ Reqd. Excavation for Stabilization & Surfacing at each end of Cattle Guard.
PI. 2022 + 52.0
Present R.O.W.
N 68° 50' E
N 79° 15' E
STA. (2020+14) 84" x 53' CMP. GOOD COND.
Δ = 10° 25' Rt.
D = 2°
T = 261.1
L = 520.8
R = 2865
Horz. S.D. = 1000'
STA. 2016+64 RAIL CATTLE GD.
2016 + 70
P.C. 2019 + 90.9
2020+14 ~ Reqd. Riprap at Outlet of Cross Culvert. (Details on this Sheet.)
P.T. 2025 + 11.7
2010
2015
2020
2025
2030
2035
2040
PLAN
NOTE BOOK
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE
B.M. Nail in T.P. Rt. 2010 + 39 ELEV. 4212.22
B.M. Nail in T.P. Rt. 2025 + 31 ELEV. 4189.46
N.E. 1/4 SEC. 19
T 25 S, R 60 W
B.M. Nail in T.P. Rt. 2040 + 00 ELEV. 4168.62
TEST No. 29
A-6(11)
SIM. No. 27
C.B.R. = 4.5
TEST No. 27
A-6(11)
L.L. = 36.4
P.I. = 16.6
% -200 = 93
C.B.R. = 4.5
TEST No. 30
A-6(11)
SIM. No. 27
C.B.R. = 4.5
TEST No. 31
A-6(11)
SIM. No. 27
C.B.R. = 4.5
TEST No. 32
A-6(10)
L.L. = 33.0
P.I. = 14.4
% -200 = 95
C.B.R. = 4.9
4220
4210
4200
4190
4180
4170
4160
No. 29
Excavate for Stabilization
N.P.S.D. 860'
No. 30
I - 91.5
O - 91.1
N.P.S.D. 720'
N.P.S.D. 960'
No. 31
N.P.S.D. 585'
No. 32
DETAILS OF RIPRAP STA. 2020+14, RT.
A
84" C.M.P.
21'
21'
* Vary to fit field conditions.
Limits of Structure Excavation
SECTION A-A
* Sl. 1" per Ft.
PROFILE
NOTE BOOK
SURVEYED
PLOTTED
GRADE CHECKED
B.M.'s NOTED
STRUCTURE NOTATIONS CHECKED
2010
2015
2020
2025
2030
2035

FED. ROAD REG. NO	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	29	

Permenent Easement Recorded in Book 1395, at page 464

S.E. 1/4 SEC. 18
T 25 S, R 60 W

S.W. 1/4 SEC. 17
T 25 S, R 60 W

N.E. 1/4 SEC. 19
T 25 S, R 60 W

N.W. 1/4 SEC. 20
T. 25 S, R 60 W

E-4

30' 66.1'

15'

450'

18 17 19 20

2040 2045 2050 2055 2060 2065 2070

Present R.O.W.

50' 50' 50' 50'

N 79° 15' E

60°

STA. (2047+83)
2 - 36" x 58' CM.RS
SKEW 60° Lt.

2047+69 ± Repl. Double 48"x66" Cross Culvert (7' Center to Center) & Channel Improvement. (W=12')

2047+83 ± Extend 2 Cross Culverts 6' Lt & 4' Rt. Ditches (W=12')

B.M.
Nail in T.P. 100' Rt. 2040+00
ELEV. 4168+62

B.M.
Nail in Tele. Pole, Rt. 2054+00
ELEV. 4172.94

B.M.
H & G. 100' Rt. 2068+00
ELEV. 4153.11

TEST No. 32
A-6(10)
L.L. = 33.0
P.I. = 14.4
%-200 = 95
C.B.R. = 4.9

TEST No. 33
A-6(10)
SIM. No. 32
C.B.R. = 4.9

TEST No. 34
A-6(10)
SIM. No. 32
C.B.R. = 4.9

TEST No. 35
A-6(10)
SIM. No. 32
C.B.R. = 4.9

4170 4160 4150 4140

No. 32

No. 33

N.P.S.D. 340

No. 34

N.P.S.D. 550

No. 35

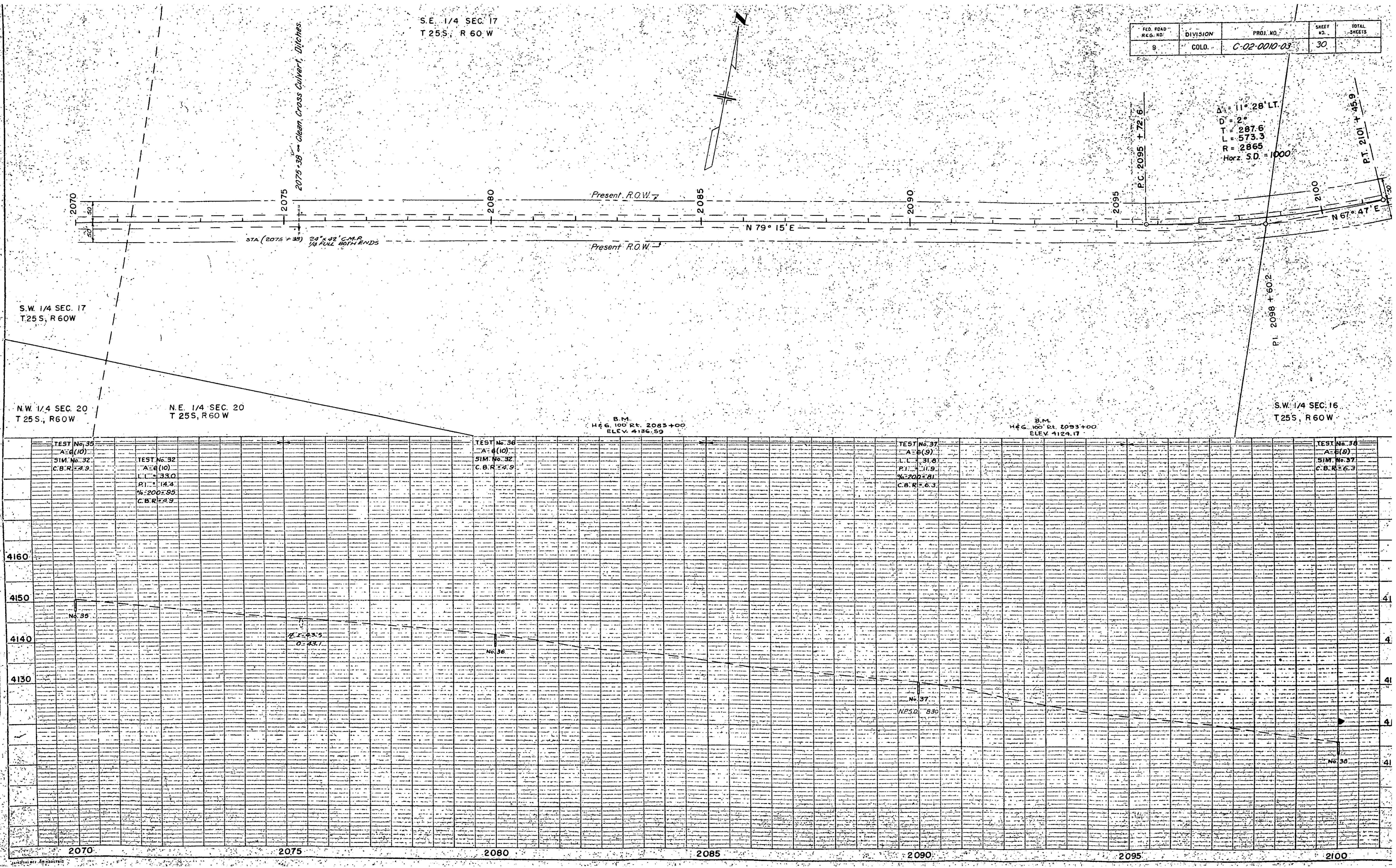
FL 54.6
R: I-54.9
O-54.0

2040 2045 2050 2055 2060 2065 2070

DT | DATE
PLAN | SURVEYED | PLOTTED | ALIGNMENT CHECKED | RT. OF WAY CHECKED
NOTE BOOK | NO.

PROFILE | SURVEYED | PLOTTED | GRADES CHECKED | B.M.'S NOTED | STRUCTURE NOTATK'S CHKD.
NOTE BOOK NO. 2893

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	30	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	31	

S.E. 1/4 SEC. 16
T. 25 S., R 60 W.

PT. 2101 + 45.9

2100 2105 2110 2115 2120 2125 2130

Present R.O.W.

N 67° 47' E

℄ STA. (2107+09) BRIDGE M-20-A
24'x87'

STA. (2112+82)
RAIL CABLE GD.

STA. (2122+39)
24'x42' C.M.P.

2107+09 — Reqd. Excavation for Stabilization each end of Bridge & PM Asphaltic Surfacing over Deck.

2112+82 — Reqd. Excavation for Stabilization & Surfacing each end of Cattle Guard

S.W. 1/4 SEC. 16
T. 25 S., R 60 W

B.M.
H & G. 100' Rt. 2110+00
ELEV. 4103.58

B.M.
H & G. 100' Rt. 2123+00
ELEV. 4095.47

TEST No. 38
A-6(9)
SIM. No. 37
C.B.R. = 6.3

TEST No. 37
A-6(9)
L.L. = 31.8
P.I. = 11.9
% -200 = 81
C.B.R. = 6.3

TEST No. 39
A-6(9)
SIM. No. 37
C.B.R. = 6.3

TEST No. 40
A-6(9)
SIM. No. 37
C.B.R. = 6.3

TEST No. 41
A-6(9)
SIM. No. 37
C.B.R. = 6.3

Excavate for Stabilization

Excavate for Stabilization

No. 38

No. 39

No. 40

No. 41

N.P.S.D. = 480'

N.P.S.D. = 1300'

℄ = 90.3

℄ = 95.2
0.94%

4130
4120
4110
4100
4090

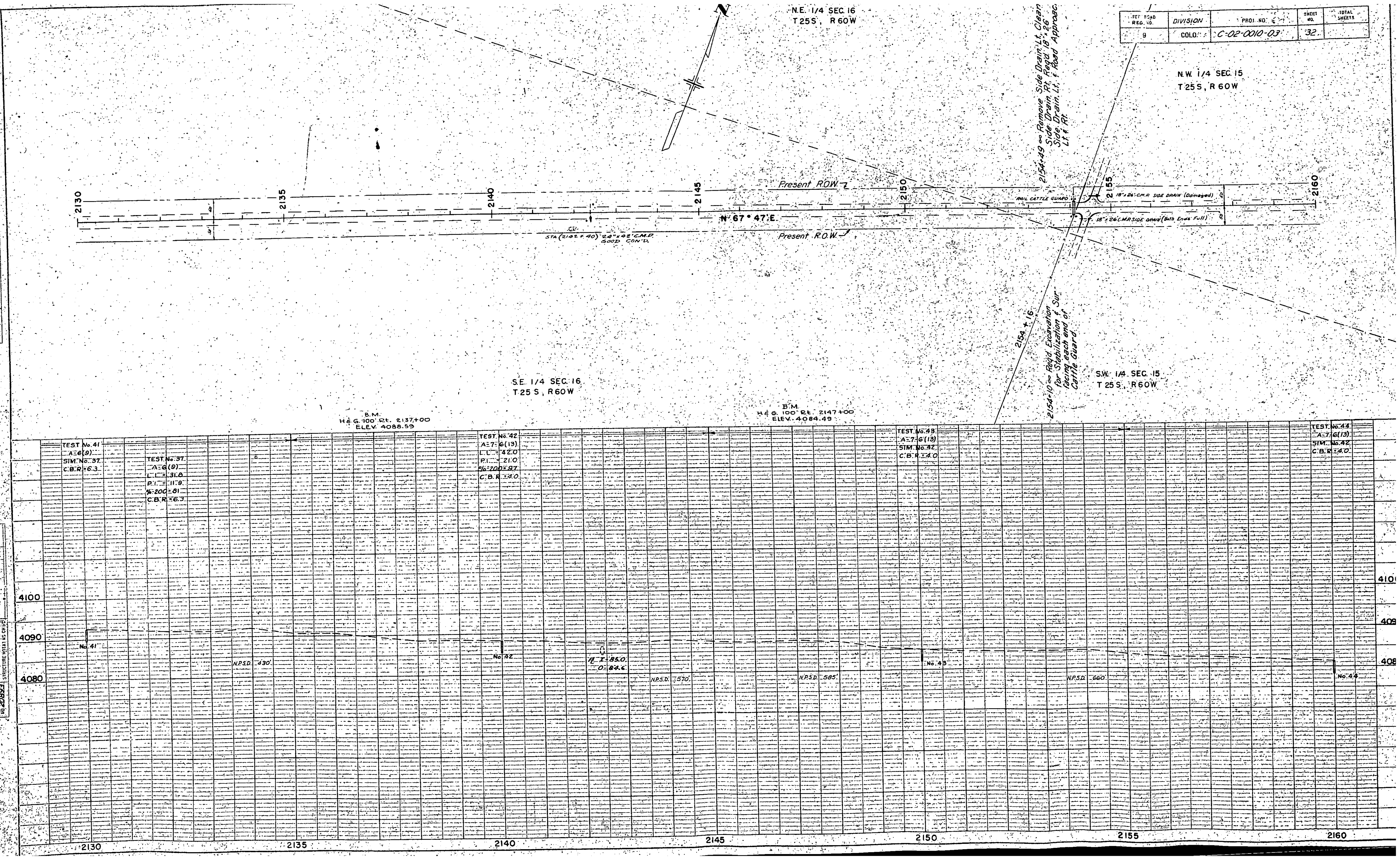
2100 2105 2110 2115 2120 2125 2130

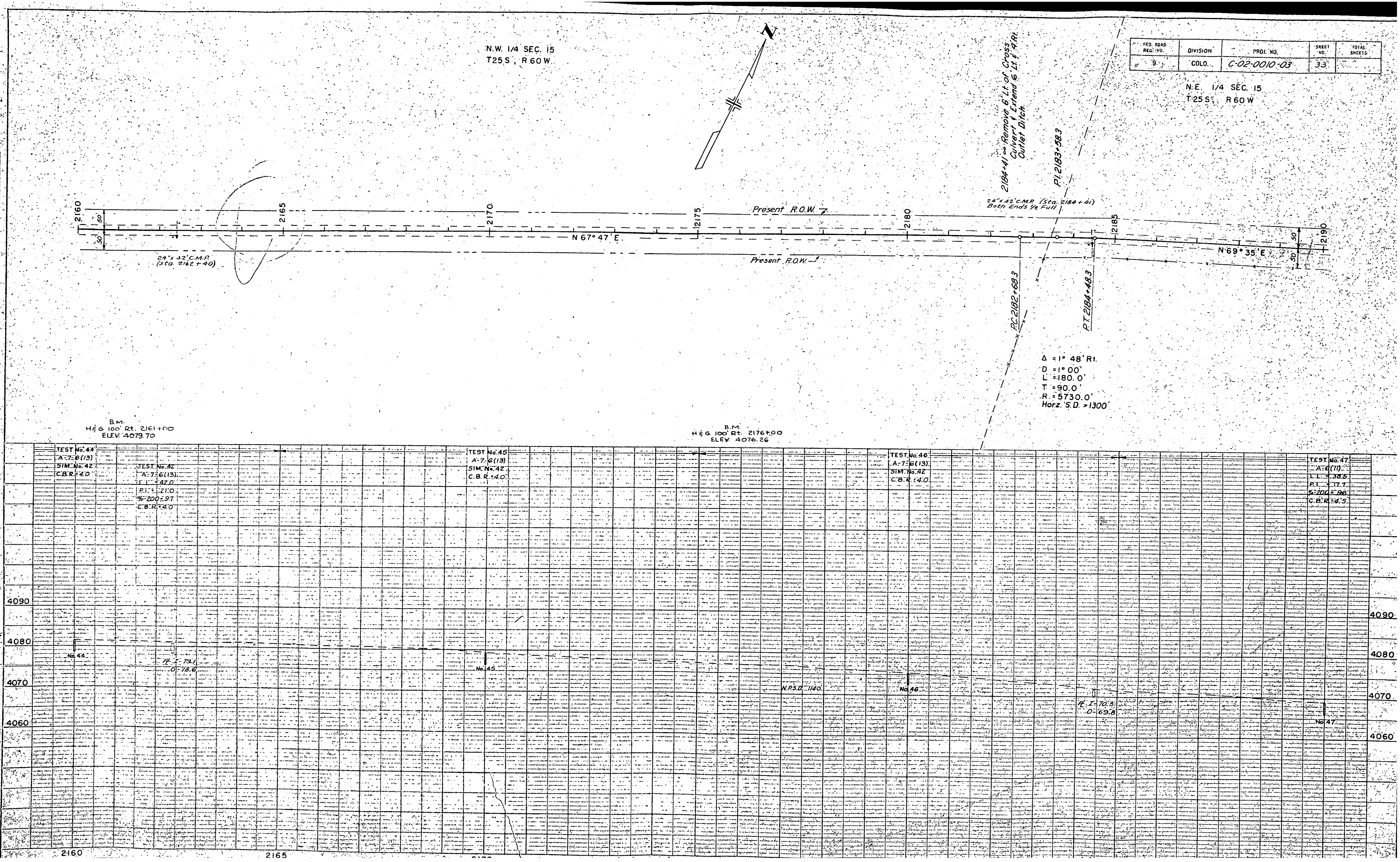
PLAN
SURVEYED
PLOTTED
GRADES CHECKED
R/W OR CHECKED
NOTE BOOK
NO.

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
BY
NOTE BOOK
NO. 20893
STRUCTURE NOTES CKD

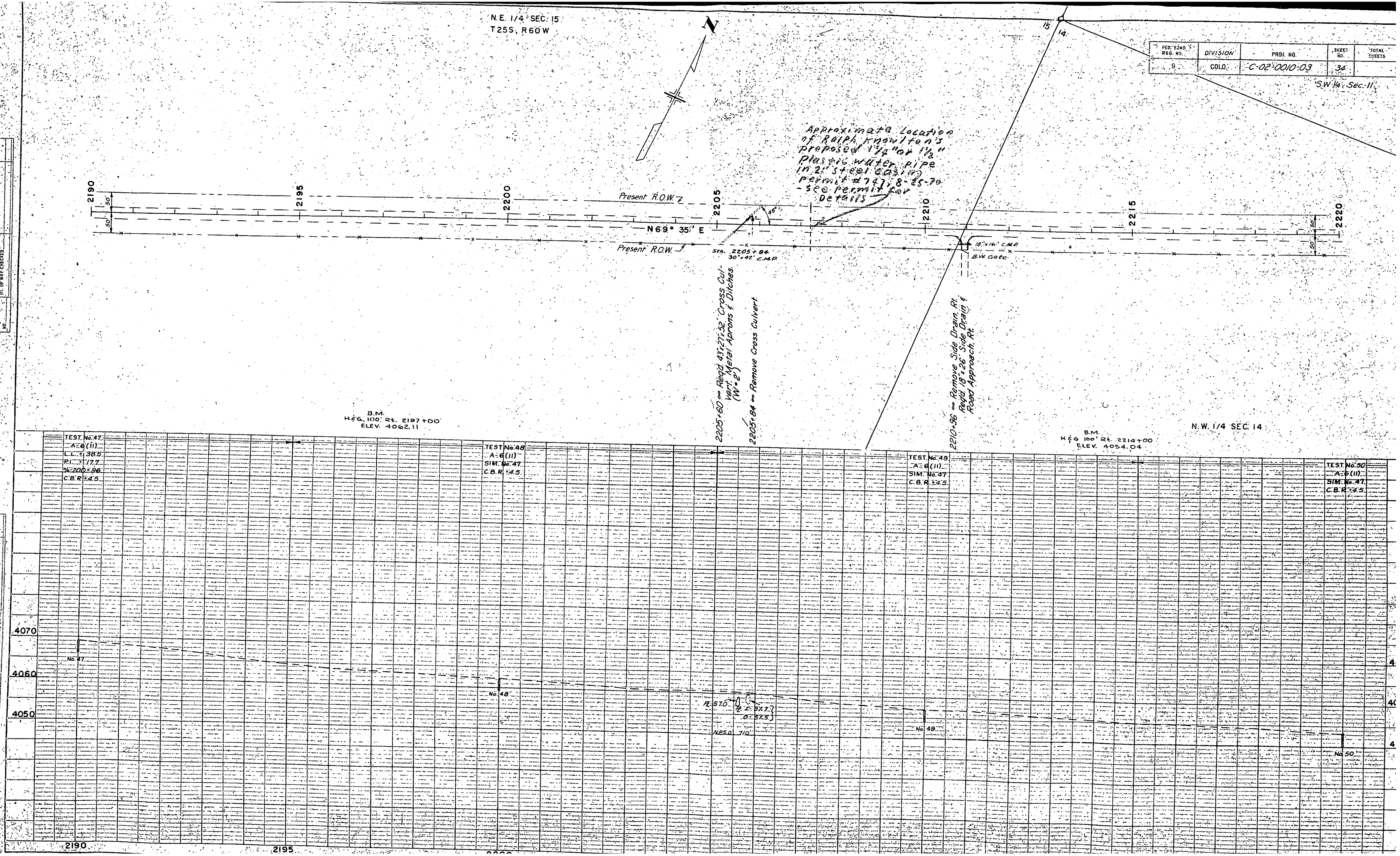
DATE
BY

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	32	




FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 33
TOTAL SHEETS
N.W. 1/4 SEC. 15
T25S, R60W.
N.E. 1/4 SEC. 15
T25S, R60W
N
2184+41 ∞ Remove 6' Lt. of Cross Culvert & Extend 6' Lt. & Rt. Outlet Ditch
P.I. 2183+58.3
24"x42" C.M.P. (Sta. 2184+41) Both Ends 1/2 Full
2160
2165
2170
2175
2180
2185
2190
Present R.O.W.
N 67° 47' E.
N 69° 35' E
24"x42" C.M.P. (Sta. 2162+40)
P.C. 2182+68.3
P.T. 2184+48.3
Δ = 1° 48' Rt.
D = 1° 00'
L = 180.0'
T = 90.0'
R = 5730.0'
Horz. S.D. > 1300'
B.M. H&G 100' Rt. 2161+00 ELEV. 4079.70
B.M. H&G 100' Rt. 2176+00 ELEV. 4076.26
TEST No. 44 A-7-6(13) SIM. No. 42 C.B.R. = 4.0
TEST No. 42 A-7-6(13) L.L. = 47.0 P.I. = 21.0 % -200 = 97 C.B.R. = 4.0
TEST No. 45 A-7-6(13) SIM. No. 42 C.B.R. = 4.0
TEST No. 46 A-7-6(13) SIM. No. 42 C.B.R. = 4.0
TEST No. 47 A-6(11) L.L. = 38.5 P.I. = 17.1 %-200 = 96 C.B.R. = 4.5
4090
4080
4070
4060
No. 44
No. 45
No. 46
No. 47
N.P.S.D. 1140
PLAN
PROFILE
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
GRADES CHECKED
NOTE BOOK
NO. 20893

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	34	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	35	

S.W. 1/4 SEC. 11
T 25 S, R 60 W

S.E. 1/4 SEC. 11
T 25 S, R 60 W

N

2238+95 ∞ Remove Cross Culvert Regd
29"x18"x44' Cross Culvert
Outlet Ditch

2241+35 ∞ Regd Road Approach Lt.

11' Cattle Guard

Present R.O.W.

N 69° 35' E

Present R.O.W.

STA. (2238+50)
24"x42" C.M.P.

2220 2225 2230 2235 2240 2245 2250

N.W. 1/4 SEC. 14
T 25 S, R 60 W

B.M.
H&G. 100' Rt. 2232+00
ELEV. 4045.21

B.M.
H&G 100' Rt. 2247+00
ELEV. 2240+00

TEST No. 50
A-6(11)
SIM. No. 47
C.B.R.=4.5

TEST No. 47
A-6(11)
L.L. = 38.5
P.I. = 17.7
%-200 = 96
C.B.R.=4.5

TEST No. 51
A-6(11)
SIM. No. 47
C.B.R.=4.5

TEST No. 52
A-6(11)
L.L. = 38.0
P.I. = 16.9
%-200 = 91
C.B.R.=4.5

TEST No. 53
A-6(11)
SIM. No. 52
C.B.R.=4.5

4060
4050
4040
4030

No. 50
No. 51
No. 52
No. 53

℄ = 40.2'

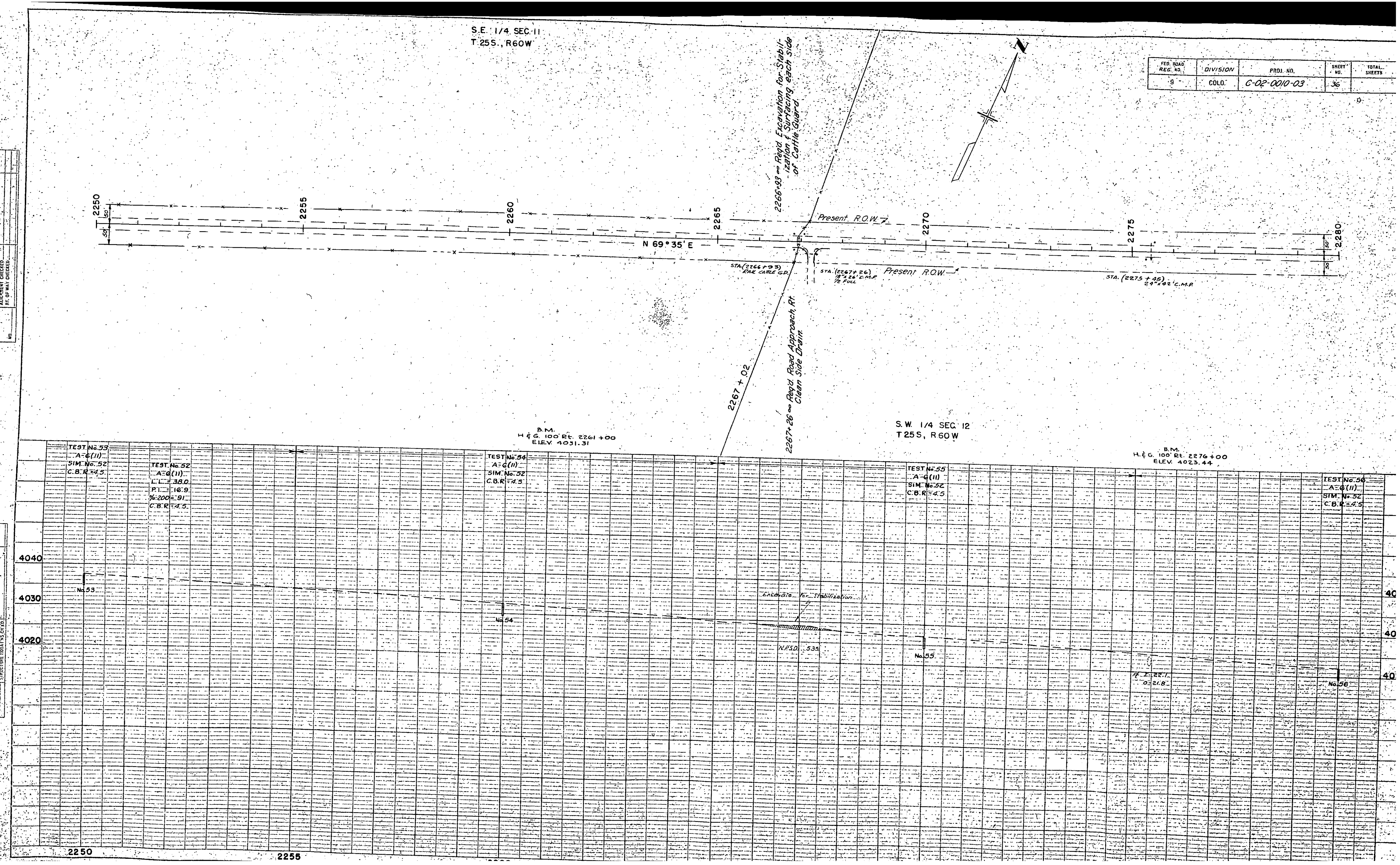
N.P.S.D. >1300

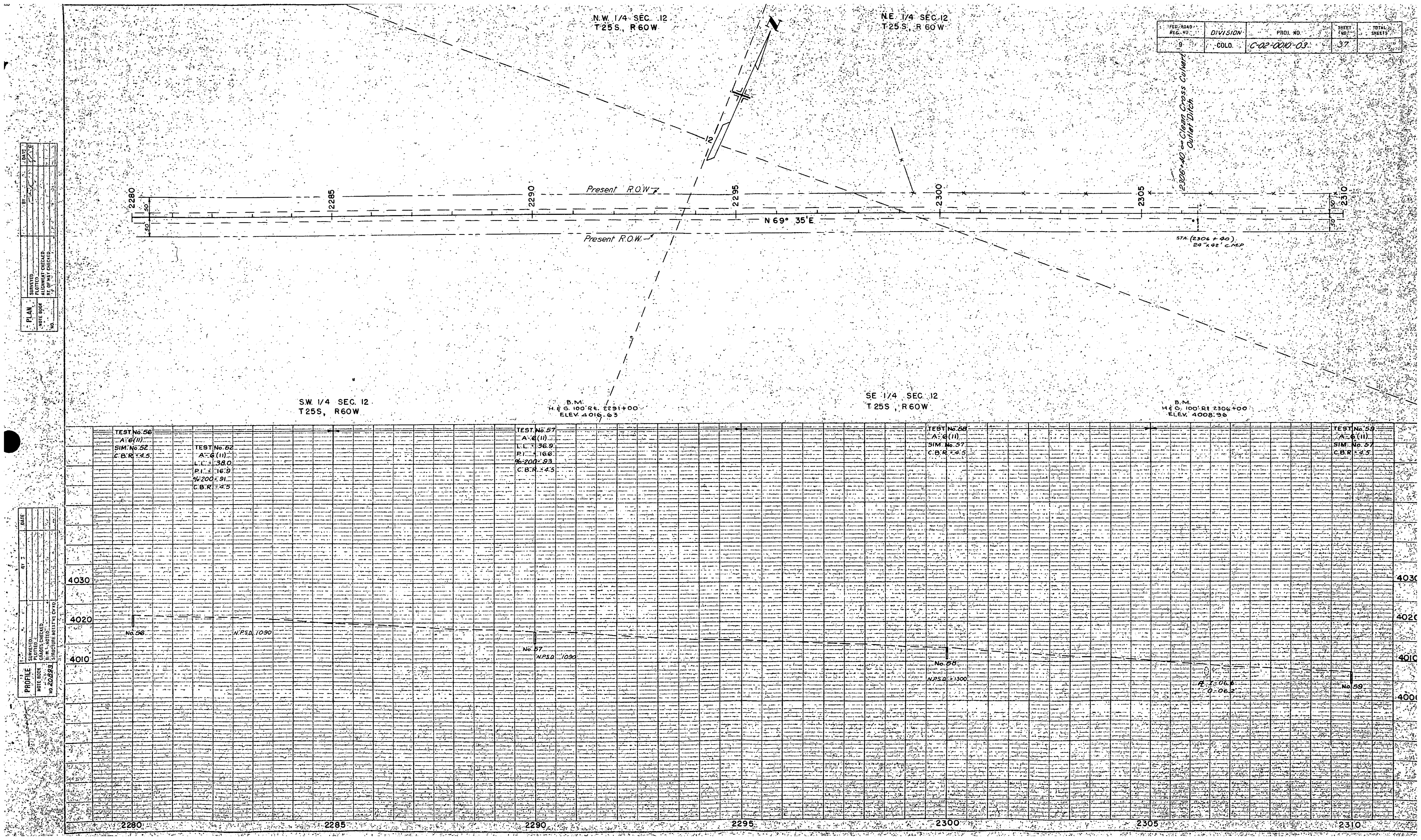
2220 2225 2230 2235 2240 2245 2250

PLAN
SURVEYED
DRAWN
TRACED
NOTE BOOK
NO.
ALIGNMENT CHECKED
RT. OF WAY CHECKED
DATE
BY

PROFILE
SURVEYED
DRAWN
TRACED
NOTE BOOK
NO. 2093
GRADES CHECKED
D. M. C. NOTED
STRUCTURE NOTATIONS CHKD
DATE
BY

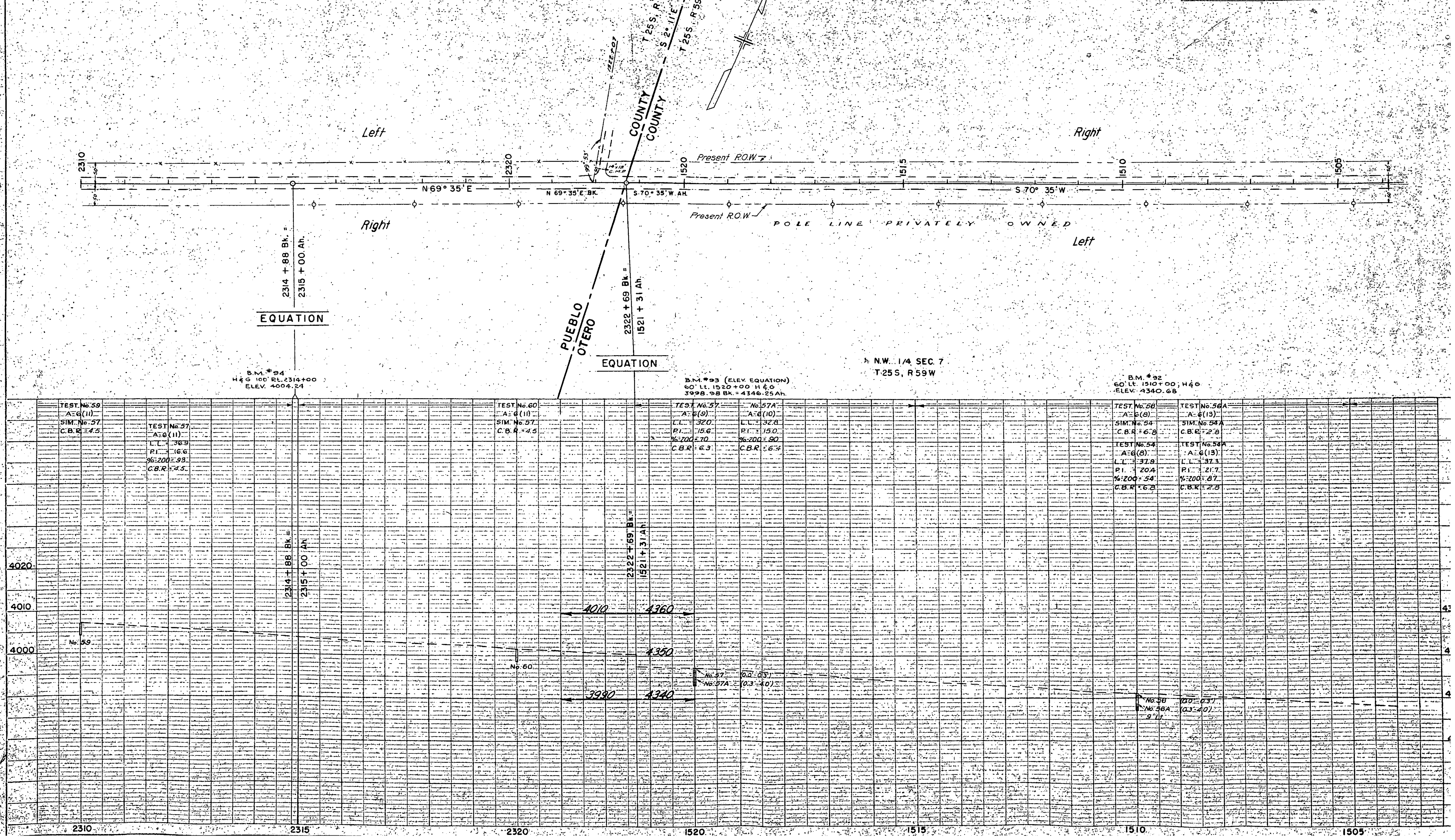
FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	36	





FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 37
TOTAL SHEETS
N.W. 1/4 SEC. 12
T25S, R60W
N.E. 1/4 SEC. 12
T25S, R60W
2306+40 — Clean Cross Culvert Outlet Ditch.
Present R.O.W.
N 69° 35' E
Present R.O.W.
STA. (2306+40) 24"x 42" C.M.P.
2280
2285
2290
2295
2300
2305
2310
S.W. 1/4 SEC. 12
T25S, R60W
B.M. H.&G. 100' Rt. 2291+00 ELEV. 4016.63
SE 1/4 SEC. 12
T25S, R60W
B.M. H&G. 100' Rt 2306+00 ELEV. 4008.96
TEST No. 56
A-6(11)
SIM. No. 52
C.B.R. = 4.5
TEST No. 62
A-6(11)
L.L. = 38.0
P.I. = 16.9
%-200 = 91
C.B.R. = 4.5
TEST No. 57
A-6(11)
L.L. = 36.9
P.I. = 16.6
%-200 = 93
C.B.R. = 4.5
TEST No. 68
A-6(11)
SIM. No. 57
C.B.R. = 4.5
TEST No. 59
A-6(11)
SIM. No. 57
C.B.R. = 4.5
4030
4020
4010
4000
No. 56
N.P.S.D. 1090
No. 57
N.P.S.D. 1090
No. 68
N.P.S.D. 1300
No. 59
PLAN
NOTE BOOK
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE
PROFILE
NOTE BOOK
NO. 20893
SURVEYED
PLOTTED
GRADES CHECKED
STRUCTURE NOTATNS CHKD

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	38	



FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	39	

N.W. 1/4 SEC. 7
T 25S, R 59W

S.E. 1/4 SEC. 6

N

P.O.T. 1498 + 00

P.O.T. 1481 + 11.9

1505 1500 1495 1490 1485 1480 1475

Present R.O.W.

S 70° 35' W

POLE LINE PRIVATELY OWNED

Present ROW

B.M. # 91
H & O, 60' Lt. 1500+00
ELEV. 4336.98

B.M. # 90
H & S, 60' Lt. 1490+00
ELEV. 4329.52

N.E. 1/4 SEC. 7
T 25S, R 59W

B.M. # 89
H & S 60' Lt. 1480+00
ELEV. 4325.09

TEST No. 55
A-6(8)
SIM. No. 54
C.B.R. = 6.8

TEST No. 55A
A-6(8)
SIM. No. 54A
C.B.R. = 2.8

TEST No. 54
A-6(8)
L.L. = 37.9
P.I. = 20.4
%-200 = 54
C.B.R. = 6.8

TEST No. 54A
A-6(13)
L.L. = 37.3
P.I. = 21.7
%-200 = 67
C.B.R. = 2.8

TEST No. 53
A-4(6)
SIM. No. 50
C.B.R. = 5.5

TEST No. 53A
A-6(9)
SIM. No. 50A
C.B.R. = 6.3

TEST No. 50
A-6(6)
L.L. = 28.0
P.I. = 12.4
%-200 = 62
C.B.R. = 5.5

TEST No. 50A
A-6(0)
L.L. = 31.1
P.I. = 13.6
%-200 = 64
C.B.R. = 6.3

No. 55 (0.0-0.4')
No. 55A (0.4-4.0')
9' Rt.

N.P.S.D. = 555

No. 54 (0.0-0.3')
No. 54A (0.3-4.0')

No. 53 (0.0-0.3')
No. 53A (0.3-4.0')
9' Rt.

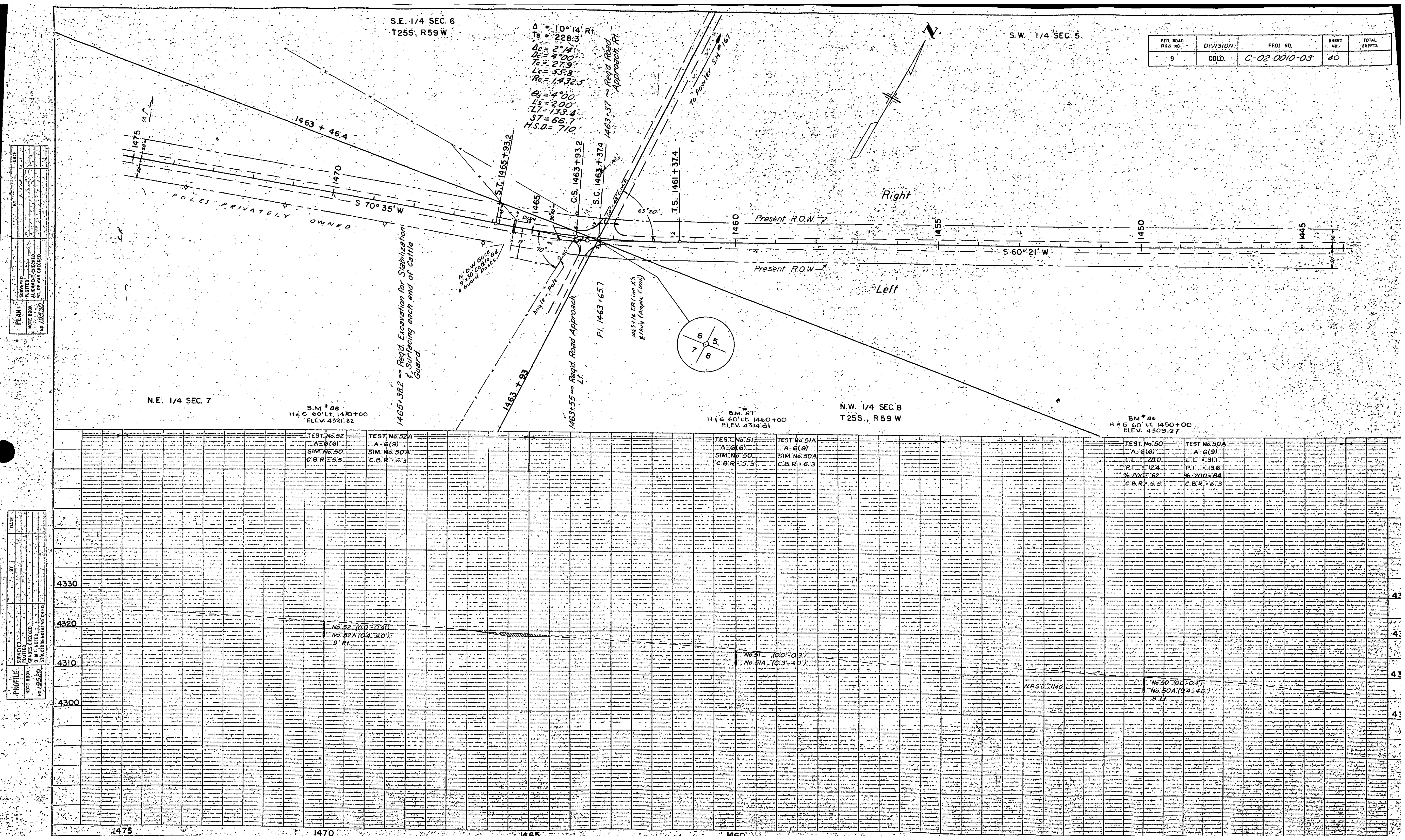
4350
4340
4330
4320

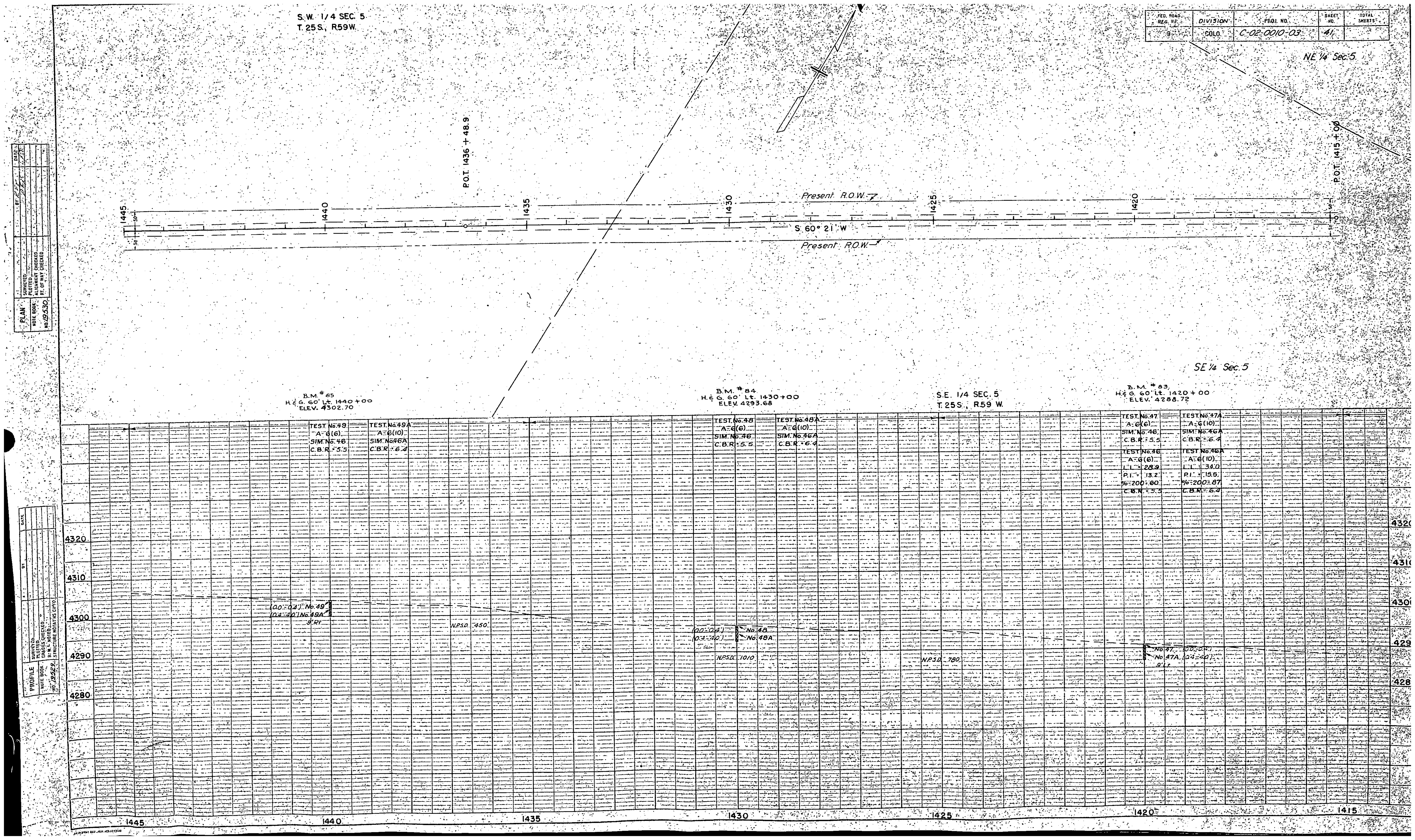
1505 1500 1495 1490 1485 1480 1475

PLAN
SURVEYED
PLOTTED
NOTE BOOK
NO. 9930
BY
DATE
ALIGNMENT CHECKED
RT. OF WAY CHECKED

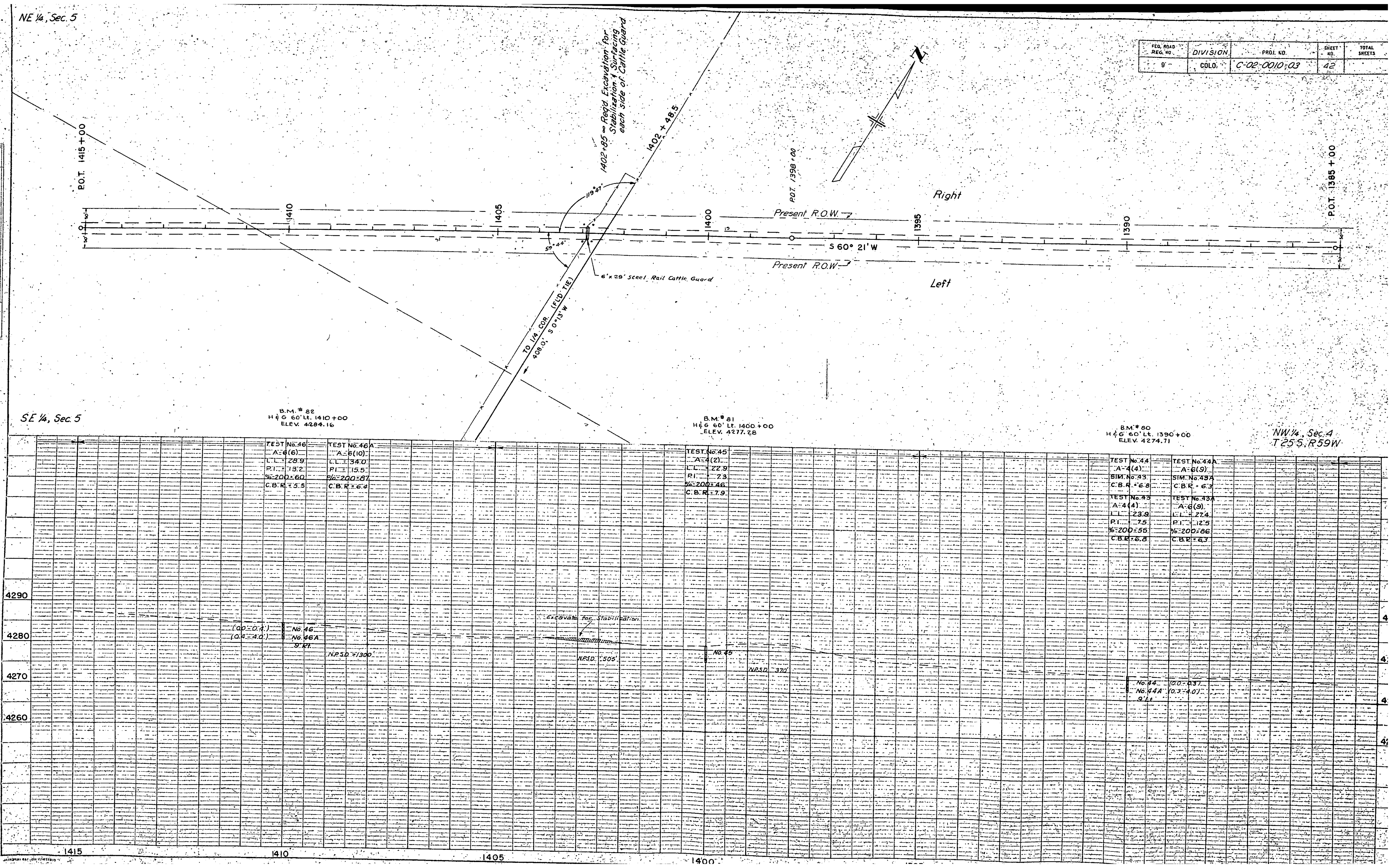
PROFILE
SURVEYED
PLOTTED
NOTE BOOK
NO. 9929
BY
DATE
GRADES CHECKED
ALIGNMENT CHECKED
STRUCTURE BOUNDS CHECKED

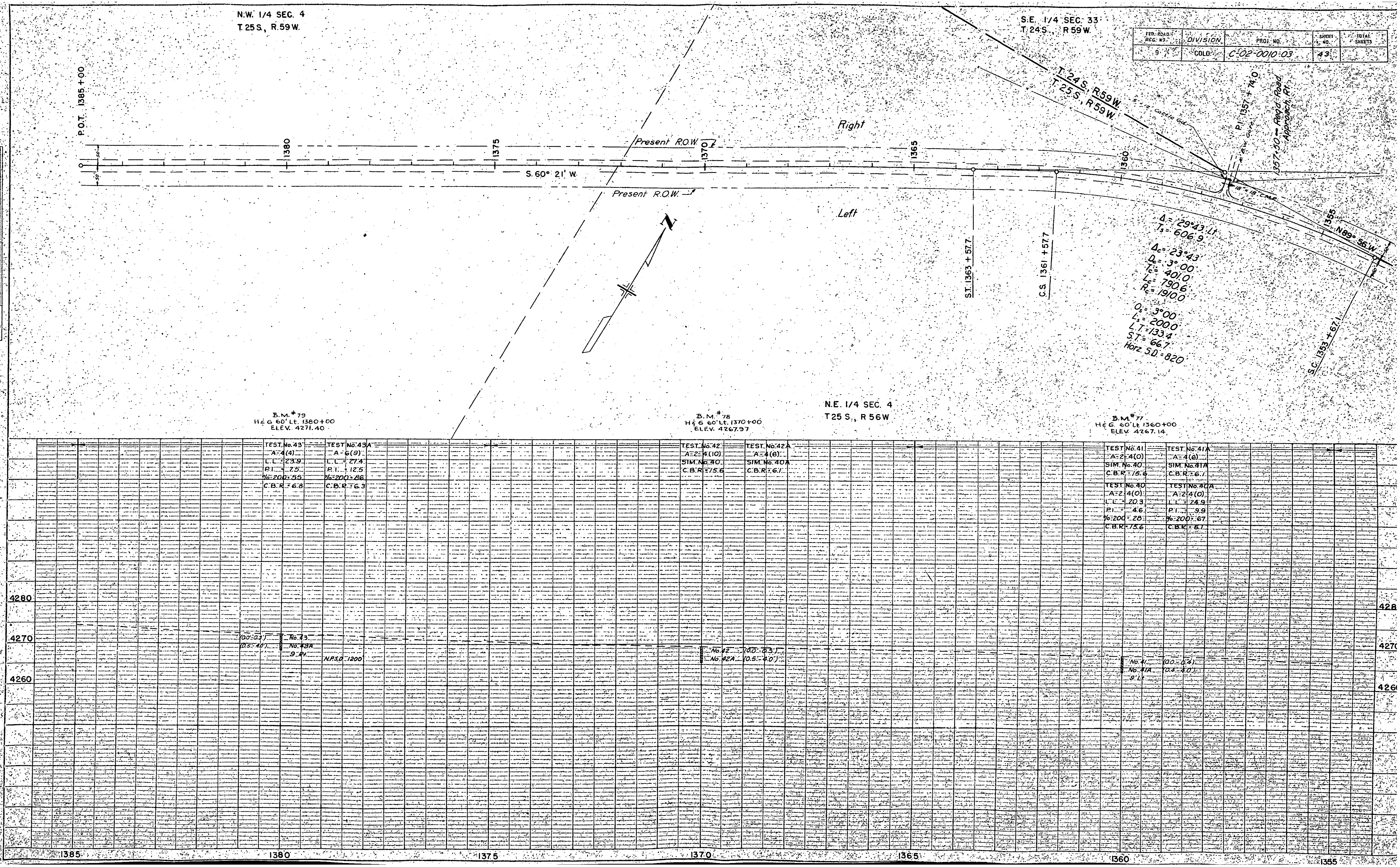
FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	40	




FED. ROAD REG. NO. | DIVISION | PROJ. NO. | SHEET NO. | TOTAL SHEETS
9 | COLO. | C-02-0010-03 | 41
S.W. 1/4 SEC. 5
T. 25 S., R59W.
NE 1/4 Sec. 5
P.O.T. 1436 + 48.9
P.O.T. 1415 + 00
Present R.O.W.
S. 60° 21' W
Present R.O.W.
1445
1440
1435
1430
1425
1420
SE 1/4 Sec. 5
PLAN
NOTE BOOK
NO. 19530
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE
B.M. #85
H. & G. 60' Lt. 1440 + 00
ELEV. 4302.70
B.M. #84
H. & G. 60' Lt. 1430 + 00
ELEV. 4293.68
S.E. 1/4 SEC. 5
T. 25 S., R59 W.
B.M. #83
H. & G. 60' Lt. 1420 + 00
ELEV. 4288.72
TEST No. 49
A-6(6)
SIM. No. 46
C.B.R. = 5.5
TEST No. 49A
A-6(10)
SIM. No. 46A
C.B.R. = 6.4
TEST No. 48
A-6(6)
SIM. No. 46
C.B.R. = 5.5
TEST No. 48A
A-6(10)
SIM. No. 46A
C.B.R. = 6.4
TEST No. 47
A-6(6)
SIM. No. 46
C.B.R. = 5.5
TEST No. 47A
A-6(10)
SIM. No. 46A
C.B.R. = 6.4
TEST No. 46
A-6(6)
L.L. = 28.9
P.I. = 13.2
% -200 = 80
C.B.R. = 5.5
TEST No. 46A
A-6(10)
L.L. = 34.0
P.I. = 15.5
% -200 = 87
C.B.R. = 6.4
4320
4310
4300
4290
4280
(00'-04') No. 49
(04'-40') No. 49A
N.P.S.D. 450
(00'-04') No. 48
(04'-40') No. 48A
N.P.S.D. 1010
N.P.S.D. 780
No. 47 (00'-04')
No. 47A (04'-40')
PROFILE
NOTE BOOK
NO. 19529
SURVEYED
PLOTTED
GRADES CHECKED
1445
1440
1435
1430
1425
1420
1415

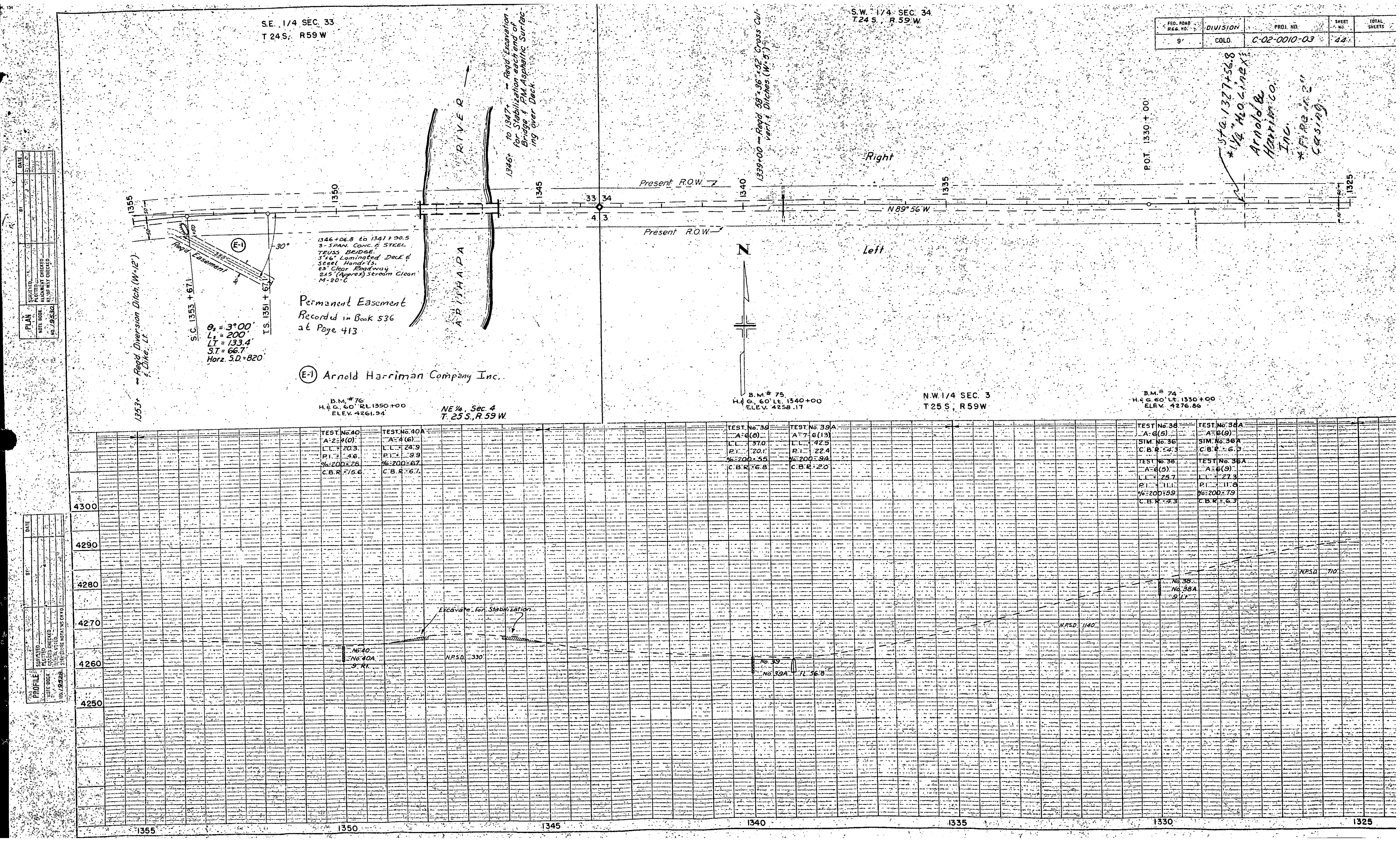
FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	42	

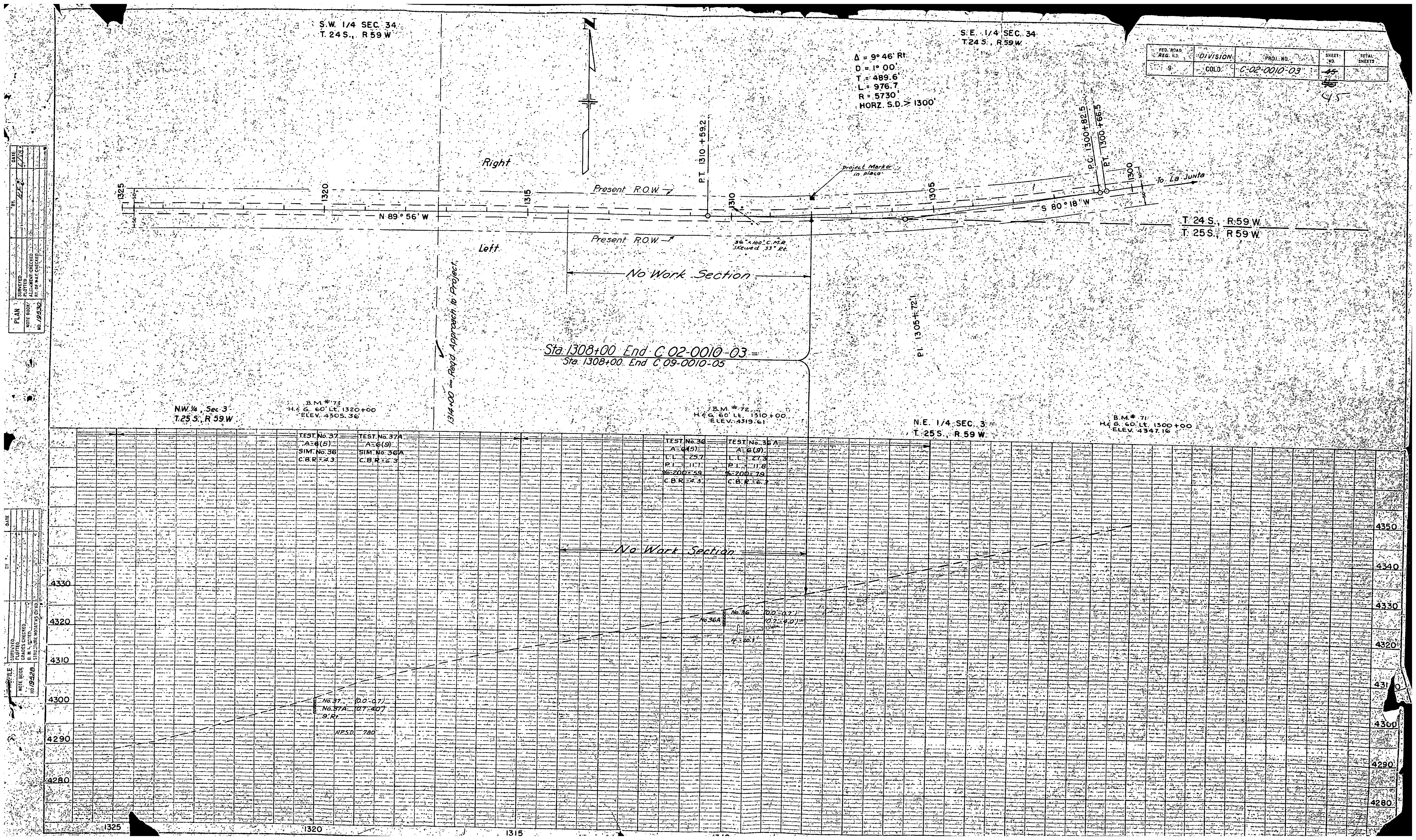




FED. ROAD REG. NO. 9
DIVISION COLO
PROJ. NO. C-02-0010-03
SHEET NO. 43
TOTAL SHEETS
N.W. 1/4 SEC. 4
T. 25 S., R. 59 W.
S.E. 1/4 SEC. 33
T. 24 S., R 59 W.
T. 24 S., R. 59 W.
T. 25 S., R. 59 W.
P.O.T. 1385+00
Present R.O.W.
S. 60° 21' W.
Present R.O.W.
Right
Left
1380
1375
1370
1365
1360
1355
S.T. 1363+57.7
C.S. 1361+57.7
P.I. 1357+74.0
1357+50 — Req'd. Road Approach Rt.
18" x 18' C.M.P.
N 89° 56' W
Δ = 29°43' Lt.
Ts = 606.9
Δc = 23°43'
Dc = 3°00'
Tc = 401.0
Lc = 790.6
Rc = 1910.0
θs = 3°00'
Ls = 200.0
L.T. = 133.4
S.T. = 66.7
Horz. S.D. = 820
S.C. 1353+67.1
N.E. 1/4 SEC. 4
T 25 S., R 56 W
B.M. # 79
H & G 60' Lt. 1380+00
ELEV. 4271.40
B.M. # 78
H & G 60' Lt. 1370+00
ELEV. 4267.97
B.M. # 77
H & G 60' Lt 1360+00
ELEV. 4267.14
TEST No. 43
A-4(4)
L.L. = 23.9
P.I. = 7.5
% 200 = 55
C.B.R. = 6.8
TEST No. 43A
A-6(9)
L.L. = 27.4
P.I. = 12.5
% 200 = 86
C.B.R. = 6.3
TEST No. 42
A-2-4(10)
SIM. No. 40
C.B.R. = 15.6
TEST No. 42A
A-4(8)
SIM. No. 40A
C.B.R. = 6.1
TEST No. 41
A-2-4(0)
SIM. No. 40
C.B.R. = 15.6
TEST No. 41A
A-4(8)
SIM. No. 41A
C.B.R. = 6.1
TEST No. 40
A-2-4(0)
L.L. = 20.3
P.I. = 4.6
% 200 = 28
C.B.R. = 15.6
TEST No. 40A
A-2-4(0)
L.L. = 24.9
P.I. = 9.9
% 200 = 67
C.B.R. = 6.7
4280
4270
4260
(0.0-0.3)
(0.5-4.0)
No. 43
No. 43A
9' Rt.
N.P.S.D. 1200
No. 42 (0.0-0.3)
No. 42A (0.5-4.0)
No. 41 (0.0-0.4)
No. 41A (0.4-4.0)
9' Lt.
1385
1380
1375
1370
1365
1360
1355
PLAN
NOTE BOOK NO. 19530
PROFILE
NOTE BOOK NO. 19529

FED. ROAD REG. NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLO.	C-02-0010-03	44	




FED. ROAD REG. NO. 9
DIVISION COLO.
PROJ. NO. C-02-0010-03
SHEET NO. 45
TOTAL SHEETS
45
S.W. 1/4 SEC. 34
T. 24 S., R 59 W
S.E. 1/4 SEC. 34
T. 24 S., R 59 W.
N
Δ = 9° 46' Rt.
D = 1° 00'
T = 489.6'
L = 976.7'
R = 5730'
HORZ. S.D. > 1300'
Right
Left
Present R.O.W.
Present R.O.W.
P.T. 1310+59.2
P.C. 1300+82.5
P.T. 1300+66.5
P.I. 1305+72.1
Project Marker in place
To La Junta
N 89° 56' W
S 80° 18' W
T. 24 S., R 59 W.
T. 25 S., R 59 W.
36" x 100' C.M.P. Skewed 33° Rt.
No Work Section
1314+00 Req'd Approach to Project.
Sta. 1308+00 End C 02-0010-03 =
Sta. 1308+00 End C 09-0010-05
1325
1320
1315
1310
1305
1300
N.W. 1/4, Sec. 3
T. 25 S., R 59 W.
B.M. # 73
H. & G. 60' Lt. 1320+00
ELEV. 4305.36
B.M. # 72
H. & G. 60' Lt. 1310+00
ELEV. 4319.61
N.E. 1/4 SEC. 3
T. 25 S., R 59 W.
B.M. # 71
H. & G. 60' Lt. 1300+00
ELEV. 4347.16
TEST No. 37
A-6(5)
SIM. No. 36
C.B.R. = 4.3
TEST No. 37A
A-6(9)
SIM. No. 36A
C.B.R. = 6.3
TEST No. 36
A-6(5)
L.L. = 25.7
P.I. = 11.1
%-200 = 59
C.B.R. = 4.3
TEST No. 36A
A-6(9)
L.L. = 27.3
P.I. = 11.8
%-200 = 79
C.B.R. = 6.3
No Work Section
No. 36 (0.0'-0.7')
No. 36A (0.7'-4.0')
No. 37 (0.0'-0.7')
No. 37A (0.7'-4.0')
N.P.S.D. 780'
4350
4340
4330
4320
4310
4300
4290
4280
PLAN
NOTE BOOK NO. 19530
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
PROFILE
NOTE BOOK NO. 19528
SURVEYED
PLOTTED
GRADES CHECKED
B.M.'s CHECKED
STRUCTURE NOTATIONS CH'KD.
BY
DATE