AS CONSTRUCTED

NO REVISIONS [ ] REVISED [ ] VOID [ ]

STATE DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS — STATE OF COLORADO

P.E., R.O.W. & UTILITIES UNDER IXFU 470-1(2).

FEDERAL ROAD REGION NO	DIVISION	PROJECT NO.	SHEET NO.
VIII	COLORADO	IXFU 470-1(10)	1

REVISIONS

R-1	8-27-84	Sheets 1, 4, 7 & Added Sheets 105 & 106.	EB/GH

336

FINAL PLAN AND PROFILE OF ~~PROPOSED~~

FEDERAL AID PROJECT NO. IXFU 470-1(10)

STATE HIGHWAY NO. 470

DOUGLAS COUNTY

LENGTH AND DESIGN DATA

STATION	LINEAR FEET ROADWAY	LINEAR FEET MAJOR STRUCTURE	LINEAR FEET MAJ. STR. (INFO ONLY)
926+50 BEGIN IXFU 470-1(10) = 465+03.69 on CC 10-0075-06 MP 16.92			
	2,129.75		
947+79.75 BEGIN STR. NOS F-16-KL and F-16-KM		101.00	
948+80.75 END STR. NOS. F-16-KL and F-16-KM			
	1,175.84		
960+56.59 BEGIN STR. NO. F-16-KP	26.93		26.83
960+83.42 END STR. NO. F-16-KP			
	8,119.69		
STA. 1042+03.11 END IXFU 470-1(10) = STA. 1042+03.11 on IXFU 470-1(7) = MP 19.11			
TOTALS	11,452.11	101.00	26.83

SUMMARY	LIN. FT.	MILES
ROADWAY (NET LENGTH)	11,452.11	2.169
MAJOR STRUCTURE	101.00	0.019
TOTAL (NET & GROSS LENGTH)	11,553.11	2.188

DESIGN DATA

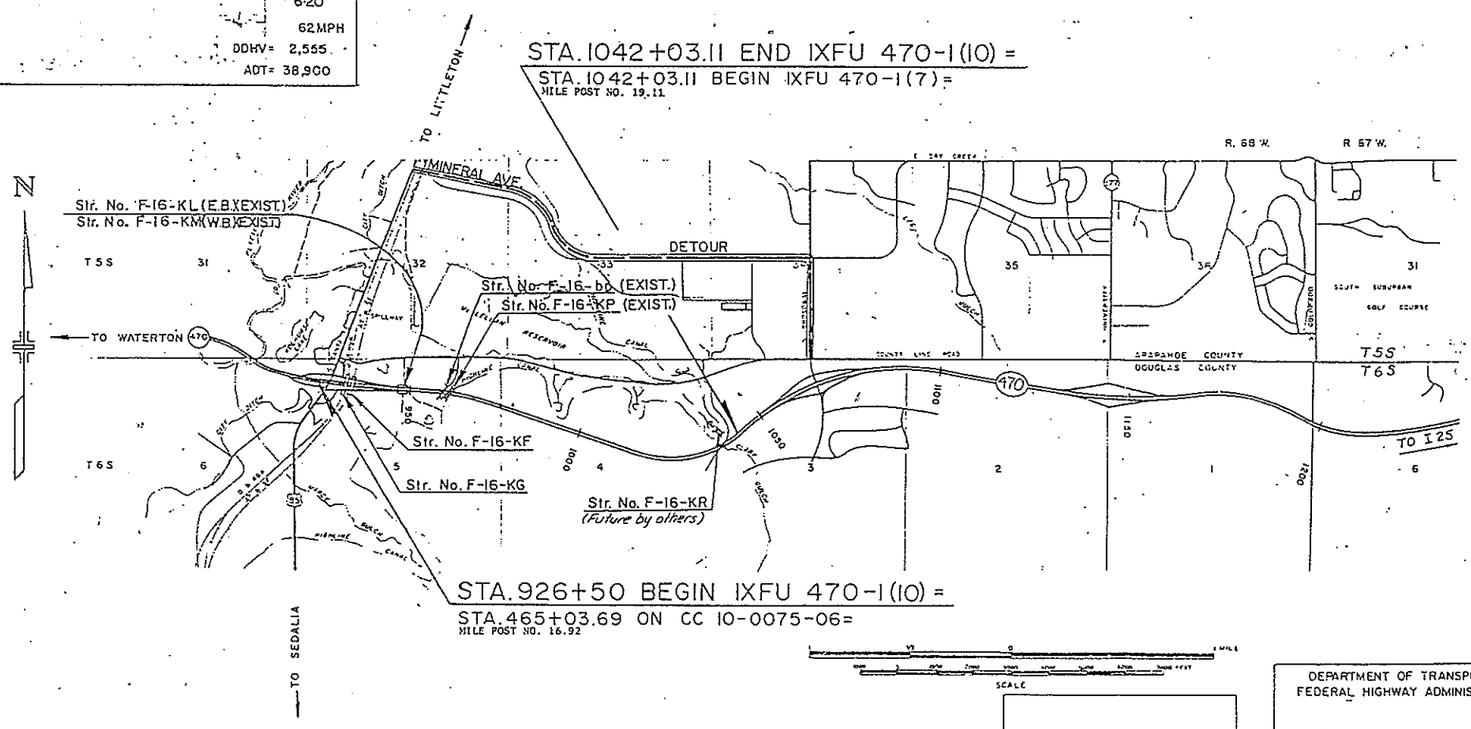
MAXIMUM DEGREE OF CURVE	2°00'
MAXIMUM GRADE	5.68%
MINIMUM S.S.D. HORIZONTAL	600'
MINIMUM S.S.D. VERTICAL	6.20'
MAXIMUM DESIGN SPEED	62 MPH
2004 DESIGN TRAFFIC VOLUME	DDHV= 2,555
	ADT= 38,900

SCALES OF ORIGINAL DRAWINGS

ON PLAN, 1 IN = 100 FT

ON PROFILE { 1 IN = 100 FT HORIZONTAL; 1 IN = 10 FT VERTICAL }

GRADE LINE ON PROFILE IS SHOWN AS GRADE OF FINISHED ROAD



CENTENNIAL ENGINEERING, INC.

INDEX OF SHEETS

SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET, SKETCH MAP, TABULATION OF LENGTH AND DESIGN DATA
2	STANDARD PLANS LIST
3-5	TYPICAL SECTIONS
6	TYPICAL SECTIONS OF UNDERDRAINS
7	GENERAL NOTES, TRAFFIC DIAGRAMS FOR SH 470 AND SANTE FE INTERCHANGE AND SUMMARY OF EARTHWORK AND SUBEXCAVATION
8-~~13~~/13.8X	SUMMARY OF ~~APPROXIMATE~~ FINAL QUANTITIES
14	TABULATION OF REMOVALS, RESETTING AND ADJUSTMENTS
15	TABULATION OF DRAINAGE ITEMS
16	TABULATION OF FENCING
17	TABULATION OF CONCRETE PAVEMENT, LIME TREATED SUBGRADE, BITUMINOUS PAVEMENT, AND GUARD RAIL
18	TABULATION OF DELINEATORS, TABULATION OF CURB AND GUTTER, MEDIAN COVER MATERIAL, SOIL STERILIZATION AND CONCRETE BIKEWAY, AND TABULATION OF ITEMS FOR UNDERDRAIN.
19-34	DETAILS OF STRUCTURE NO. F-16-KG
35-49	DETAILS OF STRUCTURE NO. F-16-KF
50-53	DETAILS DOUBLE CONCRETE BOX CULVERT AT STA 1037+25
54-64	ROADWAY PLAN, PROFILE, AND DRAINAGE
65-66	RAILROAD PLAN AND PROFILE
67-68	INTERCHANGE CONTOUR GRADING AND UNDERDRAIN PLANS
69-70	TRAFFIC SIGNAL PLANS
71	TABULATION OF SIGNING QUANTITIES AND CONSTRUCTION TRAFFIC CONTROL DEVICES.
72-95	SIGNING AND PAVEMENT MARKING PLANS
96-99	SEEDING PLANS
100	LOWFLOW CULVERT DETAILS (INLET 1039 R)
101	STANDARD M-604-10 SPECIAL FOR THIS PROJECT, INLET TYPE C
102-103	STANDARD M-607-1 SPECIAL FOR THIS PROJECT
104	STANDARD M-412-1 SPECIAL FOR THIS PROJECT
R-1 105-106	GENERAL LAYOUT STR. NOS. F-16-KM AND F-16-KL APPROACH SLAB DETAILS STR. NOS. F-16-KM AND F-16-KL.

NEW AND REVISED M & S STANDARDS

M-606-12 GUARDRAIL TYPE 4 CONCRETE BARRIER (9 SHEETS) 2-18-83

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED: _____ DATE

DIVISION ADMINISTRATOR

DIVISION OF HIGHWAYS

APPROVED: Robert L. Chisholm 7-31-84

CHIEF ENGINEER DATE

AS CONSTRUCTED INFORMATION

CONTRACTOR C.A. Pawley Construction Co.

Resident ENGINEER John J. Wood, CAOH

(Project ~~or Resident~~) Carl A. Miller, CEI

PROJECT STARTED October 15, 1984

PROJECT COMPLETED August 12, 1986

AS CONSTRUCTED PLANS APPROVED 8-6-87 [illegible]

Construction 9-4-87

TITLE DATE

DIST. 6 / E.B.

AS CONSTRUCTED		
NO. REVISIONS 8/13/86	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VII	COLORADO	IXFU 470-1 (10)	2	108

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THE STANDARD PLAN SHEETS INDICATED HEREON BY A MARKED BOX ARE TO BE USED TO CONSTRUCT THIS PROJECT.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

STANDARD PLANS LIST

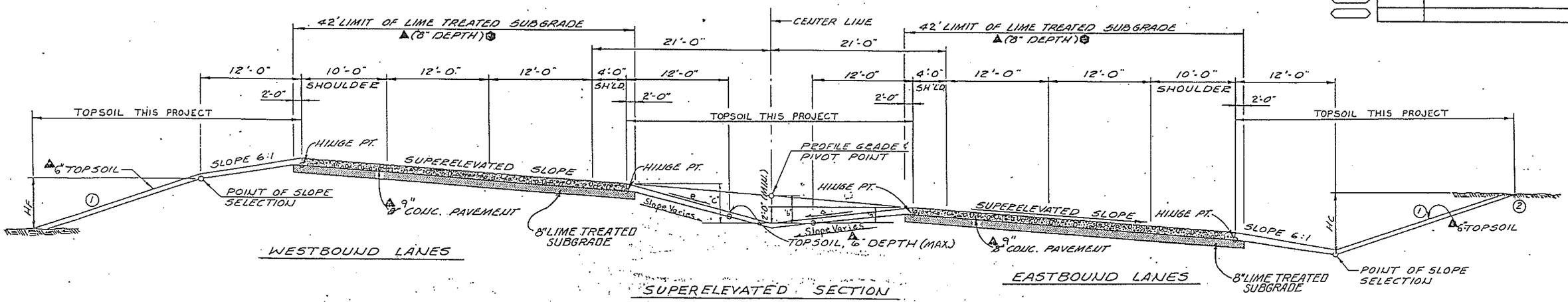
M & S STANDARDS ~ JANUARY, 1982

AS CONSTRUCTED		
NO REVISIONS ☐	REVISED 9/13/86	VOID ☐

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	3	108

REVISIONS		

TYPICAL SECTIONS



SUPERELEVATED SECTION

~~10"~~ 12" Depth Sta 1041+00 to 1042+03 (see Profile)
+ Sta 1022+00 to 1033+00

Median Slope Table

Degree of Curve	Slope	Distance "a"	Distance "b"	Distance "c"	Slope Δ	Slope θ
Tangent	0.015 1/1	2.83'	3.09'	2.83'	6:1	6:1
0°30'	R.C.	2.32'	2.58'	2.83'	7.33:1	6:1
1°00'	0.038 1/1	2.00'	2.65'	3.29'	8.5:1	5.16:1
2°00'	0.065 1/1	2.00'	3.10'	4.21'	8.5:1	4.04:1

FILL SLOPES	
HF	SLOPE
10' OR LESS	6:1
10' TO 25'	4:1
OVER 25'	3:1

CUT SLOPES	
Hc	SLOPE
10' OR LESS	6:1
10' TO 15'	4:1
OVER 15'	3:1

IN SPECIAL CASES THE SLOPE ~~MAY~~ WAS BE STEEPENED OR FLATTENED (SEE CROSS SECTIONS)

TYPICAL SECTION NOTES:

FOR CUT AND FILL SLOPES SEE TABLES THIS SHEET

SEE STANDARD M-203-1 FOR DETAILS OF CUT SLOPE TREATMENT, FLARING AND WIDENING.

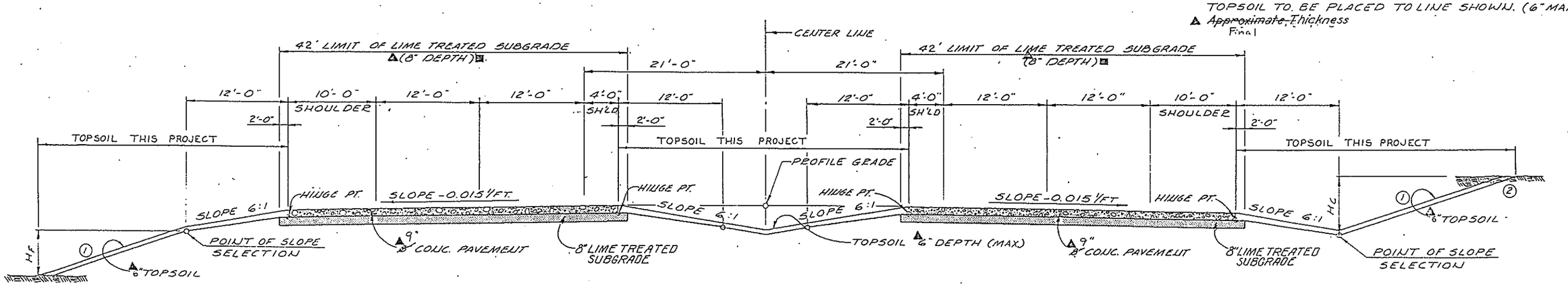
EARTH SLOPES ~~SHALL BE~~ WERE DISCED OR ROUGHENED BY OTHER APPROVED METHODS FOR MULCHING OR EROSION PROTECTION.

THE DEPTH AND WIDTH OF THE SIDE DITCH ~~SHALL~~ WAS BE VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE.

BREAK POINTS ON SLOPES AND IN BOTTOMS OF DITCHES ~~SHALL BE~~ WERE ROUNDED ON CONSTRUCTION FOR A PLEASING APPEARANCE.

TOPSOIL TO BE PLACED TO LINE SHOWN. (6" MAX.)

▲ ~~Approximate Thickness~~ Final



SH-470

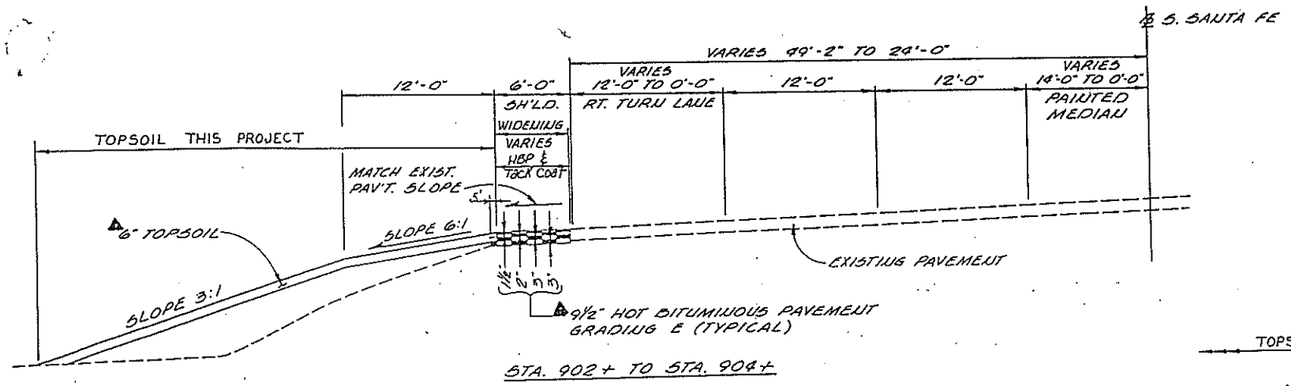
■ Sta. 1002+00 to 1010+00 and Sta. 1022+00 to 1033+00 ~~to be~~ was subexcavated ~~40~~ 12 inches below subgrade (See profile). Also, Sta 932+00 to Sta 936+00

AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/86	VOID

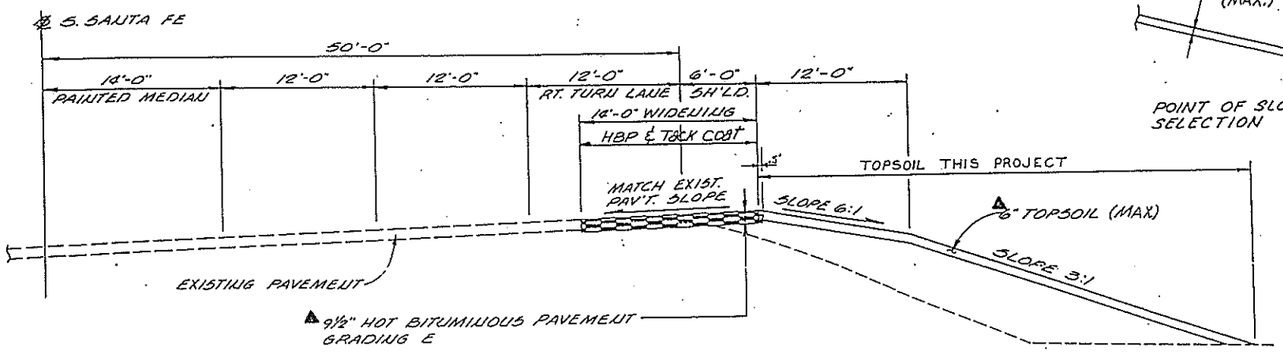
FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	4	108

REVISIONS		
R-1	8-27-84	Added Reference Note	EB/GK

TYPICAL SECTIONS

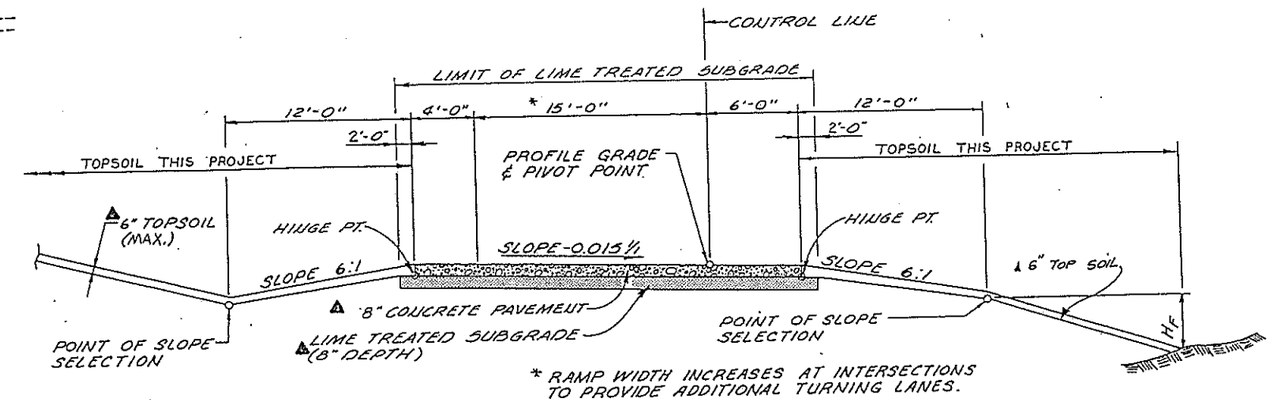


STA. 902+ TO STA. 904+



STA. 892+ TO STA. 897+

SO. SANTA FE



* RAMP WIDTH INCREASES AT INTERSECTIONS TO PROVIDE ADDITIONAL TURNING LANES.

RAMP B

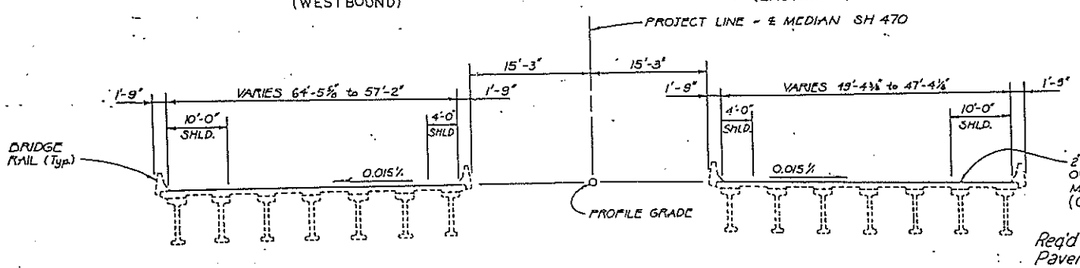
RAMP D OPPOSITE HAND
RAMP D STA. 432+55 TO 443+00
WAS ~~TO BE~~ SUBEXCAVATED ~~48 INCHES~~ 24 INCHES
BELOW SUBGRADE (SEE PROFILE)

TYPICAL SECTION NOTES:

- FOR CUT AND FILL SLOPES SEE TABLES SHEET NO. 3
- SEE STANDARD M-203-1 FOR DETAILS OF CUT SLOPE TREATMENT, FLARING AND WIDENING
- EARTH SLOPES ~~SHALL BE~~ LIES DISCED OR ROUGHENED BY OTHER APPROVED METHODS FOR MULCHING OR EROSION PROTECTION.
- THE DEPTH AND WIDTH OF THE SIDE DITCH SHALL ~~BE~~ BE VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE.
- BREAK POINTS ON SLOPES AND IN BOTTOMS OF DITCHES ~~SHALL BE~~ ROUNDED ON CONSTRUCTION FOR A PLEASING APPEARANCE.
- TOPSOIL TO BE PLACED TO LINE SHOWN (6" MAX.)
- ▲ ~~APPROXIMATE~~ FINAL THICKNESS

STR. NO. F-16-KM (WESTBOUND)

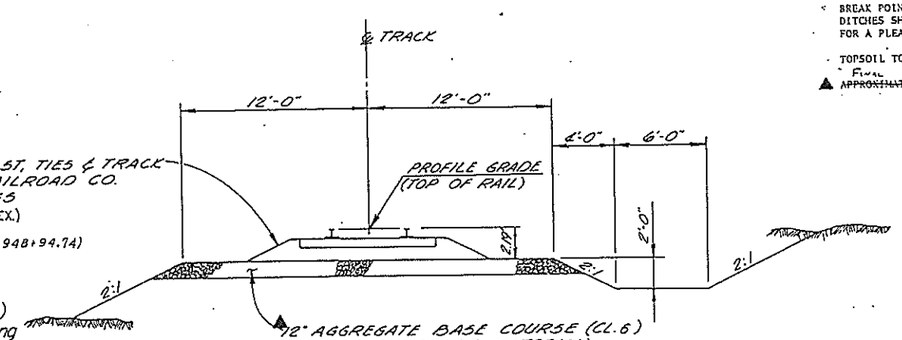
STR. NO. F-16-KL (EASTBOUND)



Req'd ~~153~~ 150.19 tons of Hot Bituminous Pavement (Gr. EX) (Haul and Asphalt) and ~~1226~~ 1227 sq. yd. of waterproofing (membrane) and ~~160~~ 163 lin. ft. of Bridge Compression Joint Sealer (Deleted from IXFU 470-1(15)) (See Sheet Nos. 105 and 106)

TYPICAL SECTION
BOWEN FARM STRUCTURES
(EXISTING)

R-1



(FOR AT & SF PERMANENT RELOCATION ONLY)
~~IT IS ESTIMATED THAT~~ ~~3360~~ TONS OF ABC (CLASS 6) WERE ~~WILL BE~~ REQUIRED. 2,844.01

RAILROAD RELOCATIONS

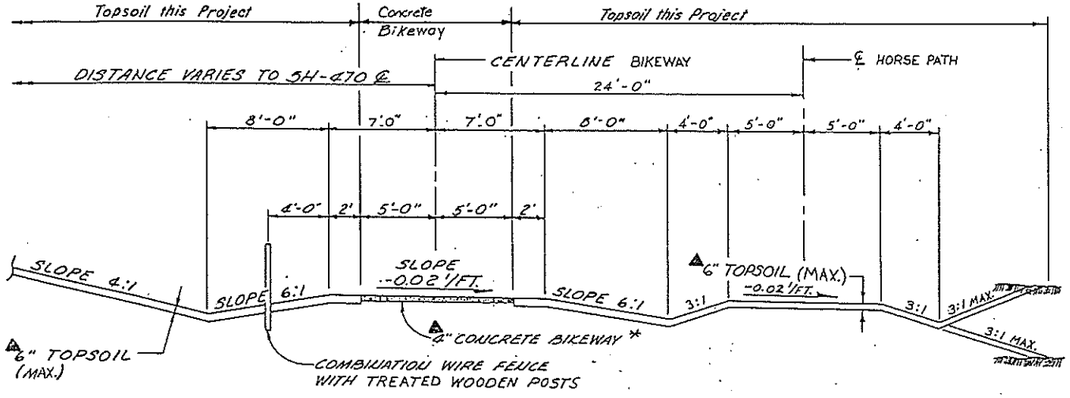
STATE OF COLORADO

AS CONSTRUCTED		
NO REVISIONS	REVISED 3/13/86	VOID

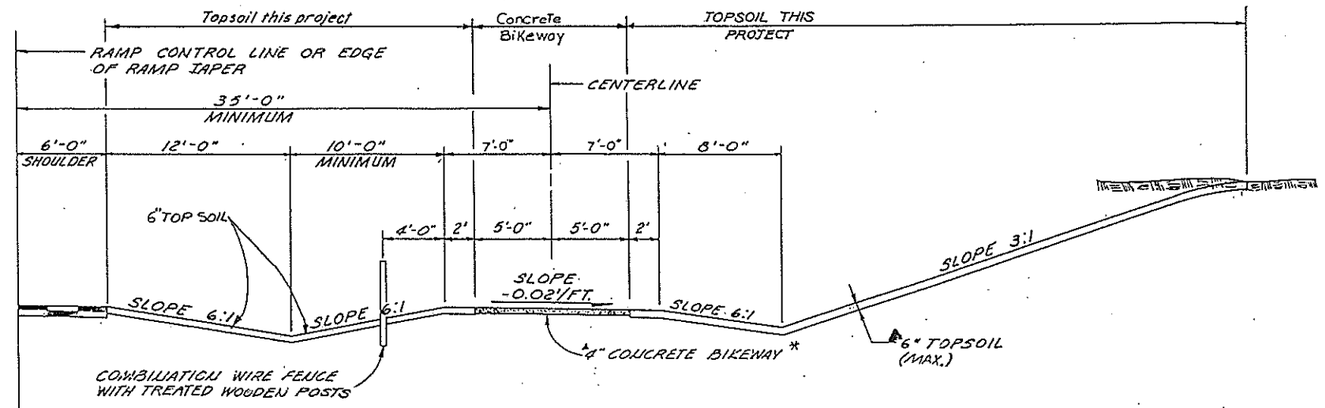
FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	5	108

REVISIONS		

TYPICAL SECTIONS



BIKEWAY
(SEPARATED FROM SH-470 ROADWAY)
STA 948+50± - STA 959+50± (Structure F-16-bf)



BIKEWAY, STA 932± TO STA 933±
(IN PROXIMITY TO RAMP)

TYPICAL SECTION NOTES:

1. FOR CUT AND FILL SLOPES SEE TABLES (SHEET NO. 3
2. SEE STANDARD M-203-1 FOR DETAILS OF CUT SLOPE TREATMENT, FLARING AND WIDENING

EARTH SLOPES ~~SHALL~~ WERE BE DISCED OR ROUGHENED BY OTHER APPROVED METHODS FOR MULCHING OR EROSION PROTECTION.

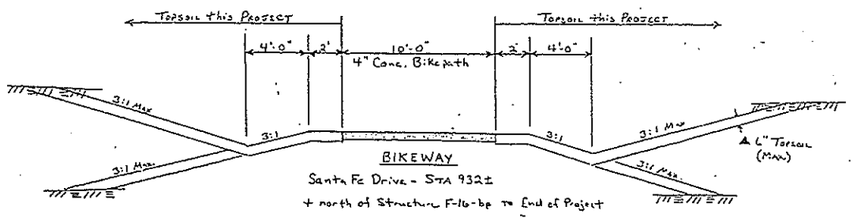
THE DEPTH AND WIDTH OF THE SIDE DITCH ~~SHALL~~ WAS BE VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE.

BREAK POINTS ON SLOPES AND IN BOTTOMS OF DITCHES ~~SHALL~~ WERE BE ROUNDED ON CONSTRUCTION FOR A PLEASING APPEARANCE.

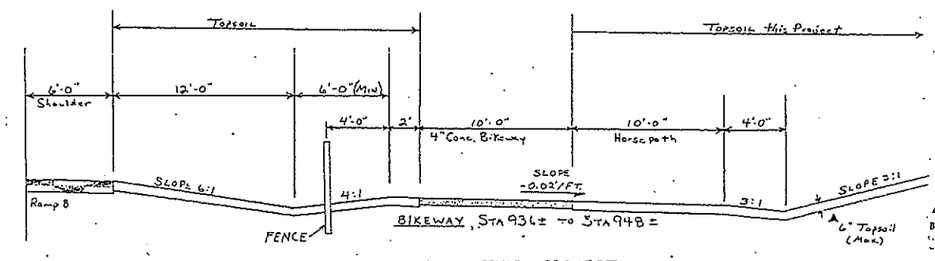
TOPSOIL TO BE PLACED TO LINE SHOWN (6" MAX.)

~~APPROXIMATE~~ FINAL THICKNESS

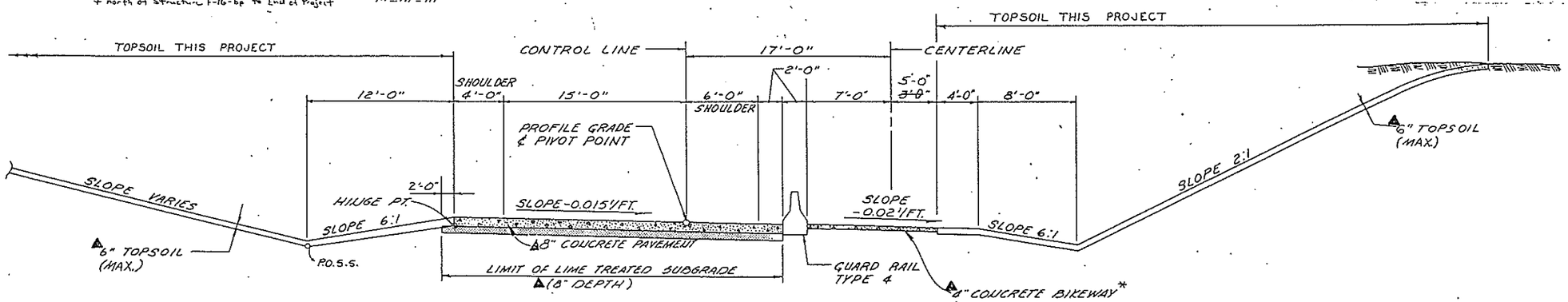
BIKEWAY GRADE SHALL BE AS ESTABLISHED BY THE ENGINEER.



BIKEWAY
Santa Fe Drive - STA 932±
+ north of Structure F-16-bp to End of Project



BIKEWAY, STA 936± TO STA 948±



RAMP B

BIKEWAY STA 933± TO STA 936±
(ADJACENT TO RAMP)

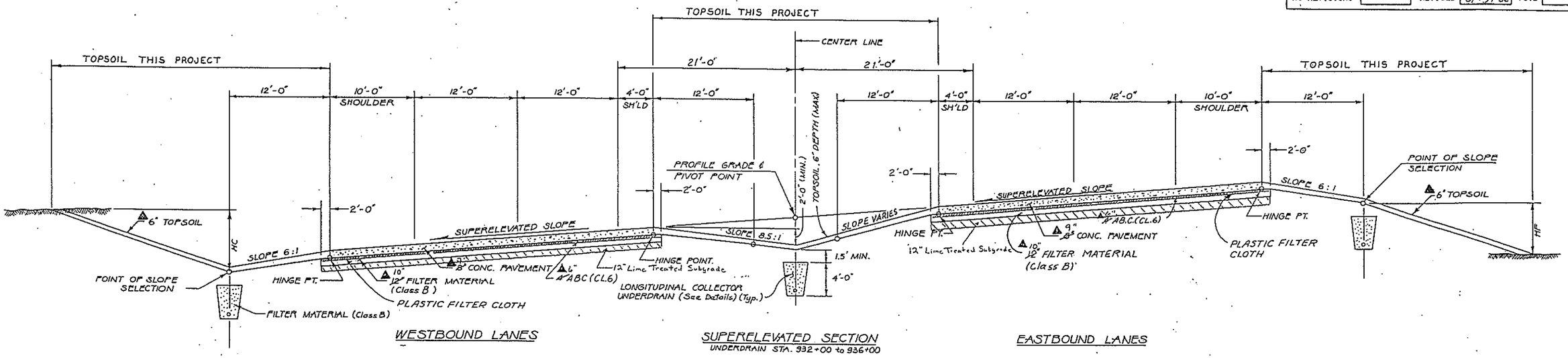
* 6" Compaction AASHTO T-99 Required under concrete Bikeway.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	6	108

AS CONSTRUCTED

NO REVISIONS ☐ REVISED 8/13/86 VOID ☐

TYPICAL SECTIONS OF UNDERDRAINS



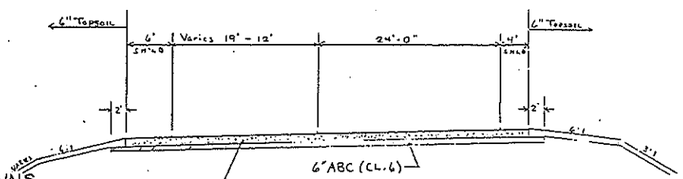
WESTBOUND LANES

SUPERELEVATED SECTION
UNDERDRAIN STA. 932+00 to 936+00

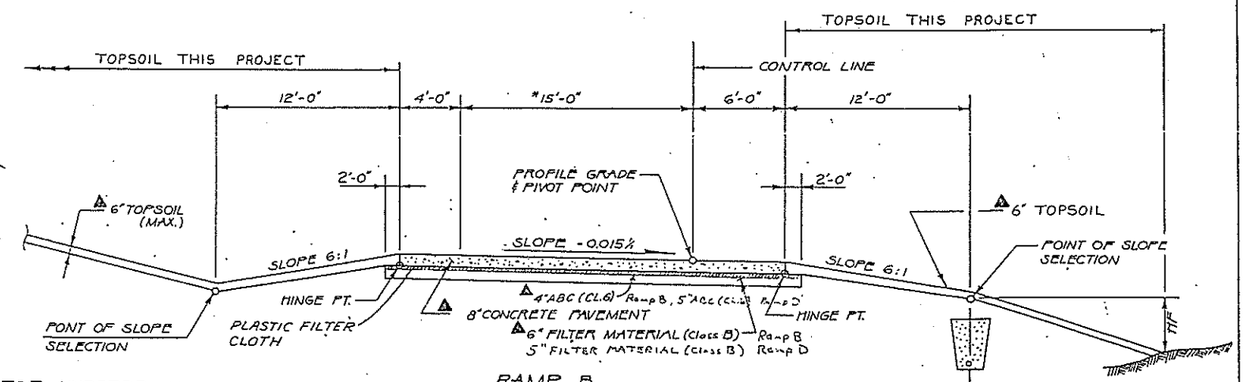
EASTBOUND LANES

DETAIL OF LONGITUDINAL COLLECTOR UNDERDRAINS

STA. 932+ to 936+ MAIN LINE
231+50 to ~~236+00~~ 237+64 RAMP B
~~432+00~~ to 436+00 RAMP D
433+00



RAMP D STA 431+50 to STA 432+55
(As-Constr. 'No Work Section')



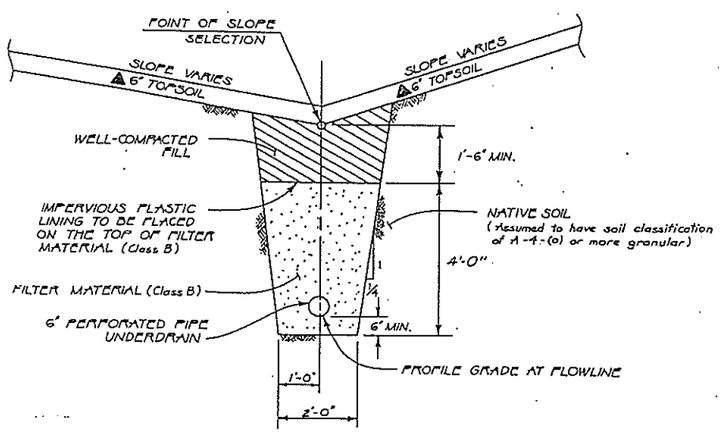
RAMP B
RAMP D OPPOSITE HAND

■ UNDERDRAIN STA. 231+50 to ~~236+00~~ 237+64 RAMP B
STA. ~~432+00~~ to 436+00 RAMP D
433+00

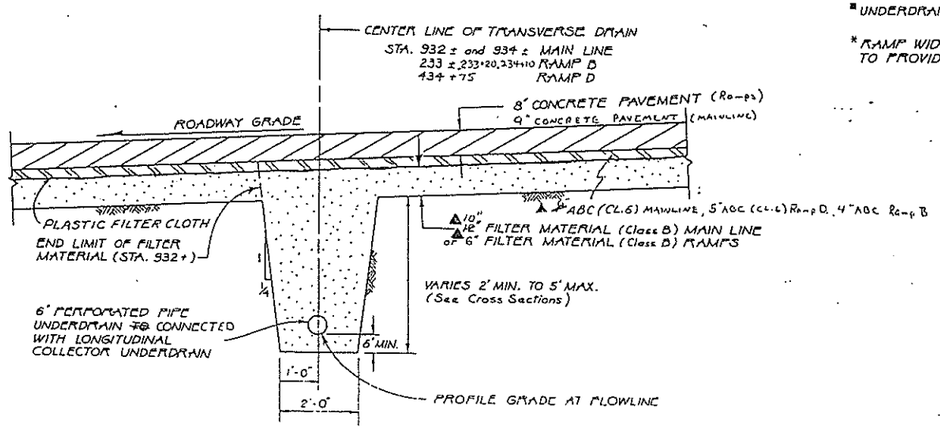
* RAMP WIDTH INCREASES AT INTERSECTIONS TO PROVIDE ADDITIONAL TURNING LANES

■ LONGITUDINAL COLLECTOR UNDERDRAIN (See Detail)

DETAIL OF TRANSVERSE INTERCEPTOR UNDERDRAIN



REFER TO PLAN SHEETS FOR OUTLET LOCATION



NOTE: CROSS SECTION VIEW PARALLEL TO ROADWAY

TYPICAL SECTION NOTES:

FOR CUT AND FILL SLOPES SEE TABLES SHEET NO. 3.

SEE STANDARD M-203-1 FOR DETAILS OF CUT SLOPE TREATMENT, FLARING AND WIDENING.

EARTH SLOPES ~~SHALL BE~~ WERE DISCED OR ROUGHENED BY OTHER APPROVED METHODS FOR MULCHING OR EROSION PROTECTION.

THE DEPTH AND WIDTH OF THE SIDE DITCH WERE ~~SHALL BE~~ VARIED WHERE NECESSARY IN ORDER TO PROVIDE PROPER DRAINAGE.

BREAK POINTS ON SLOPES AND IN BOTTOMS OF DITCHES ~~SHALL BE~~ WERE ROUNDED ON CONSTRUCTION FOR A PLEASING APPEARANCE.

TOPSOIL ~~TO BE~~ WAS PLACED TO LINE SHOWN (6" MAX.)

▲ ~~APPROXIMATE~~ FINAL THICKNESS

STATE OF COLORADO

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	7	108

AS CONSTRUCTED

NO REVISIONS [ ] REVISED [8-13-86] VOID [ ]

	REVISIONS	
R-1 8-27-84	Revised Note	EB/GM

GENERAL NOTES

~~FOR PRELIMINARY PLAN QUANTITIES OF BITUMINOUS MATERIALS,~~ THE FOLLOWING RATES OF APPLICATION WERE USED:

TACK COAT DILUTED EMULSIFIED ASPHALT (SLOW-SETTING) @ 0.10 GALS./SQ. YD. (DILUTED)
BITUMINOUS PAVEMENT @ 110 LBS/SQ. YD./INCH THICK
AGGREGATE BASE COURSE (CLASS 6) @ 133 LBS/CU. FT.

DILUTED EMULSIFIED ASPHALT FOR TACK COAT ~~SHALL CONSIST~~ CONSISTED OF 1 PART EMULSIFIED ASPHALT AND 1 PART WATER.

RATES OF APPLICATION ~~SHALL BE~~ WERE AS DETERMINED BY THE ENGINEER AT THE TIME OF APPLICATION.

WATER ~~SHALL BE~~ WAS USED AS A DUST PALLIATIVE WHERE REQUIRED. LOCATIONS ~~SHALL BE~~ WERE AS ORDERED.

THE FOLLOWING ~~SHALL BE~~ WAS FURNISHED WITH EACH BITUMINOUS PAVER:

1. A SKI TYPE DEVICE AT LEAST 30 FEET IN LENGTH
2. SHORT SKI OR SHOE

ANY LAYER OF BITUMINOUS PAVEMENT THAT ~~IS TO HAVE~~ HAD A SUCCEEDING LAYER PLACED THEREON ~~SHALL BE~~ WAS COMPLETED FULL WIDTH BEFORE SUCCEEDING LAYER ~~IS~~ WAS PLACED.

DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT ~~SHALL BE~~ WAS AS FOLLOWS:

FULL DEPTH OF ALL EMBANKMENTS.
BASE OF FILLS 1/2 FOOT.
EXCAVATION REQUIRED FOR COMPACTION OF BASES OF FILLS ~~WILL BE~~ WAS CONSIDERED AS SUBSIDIARY TO THAT OPERATION AND ~~WILL~~ WAS NOT BE PAID FOR SEPARATELY.

THE TYPE OF COMPACTION ~~SHALL BE~~ WAS AASHTO T-99.

CONCRETE PIPE JOINT FASTENERS AS SHOWN ON M STANDARD ~~ARE~~ WERE REQUIRED ON ALL CONCRETE CULVERT INSTALLATIONS, INCLUDING SIDE DRAINS WHEREVER RIPRAP IS USED TO PREVENT EROSION DUE TO WATER VELOCITY.

FLEXIBLE CONDUITS ON THIS PROJECT WITH HELICAL CORRUGATIONS, JOINED BY DIMPLED CONNECTING BANDS, ~~SHALL~~ DID USE A SEALING COMPOUND OR GASKET WITH THE CONNECTING BAND.

UTILITY LINES AS SHOWN ON PLAN AND PROFILE SHEETS ARE PLOTTED FROM THE BEST AVAILABLE INFORMATION. ~~THE CONTRACTOR'S ATTENTION IS DIRECTED TO PARAGRAPH 107.18 OF THE STANDARD SPECIFICATIONS CONCERNING UTILITIES. THE CONTRACTOR WILL CALL 534-6700 FOR UTILITY LOCATIONS 48 HOURS PRIOR TO DIGGING.~~

BEFORE PLACING THE CONCRETE PAVEMENT THE FINISHED SUBGRADE ~~SHALL BE~~ WAS PROCESSED TO A DEPTH OF 8 INCHES WITH 4% HYDRATED LIME TO PROVIDE A LIME STABILIZED SUBGRADE. CERTAIN AREAS ~~TABULATED~~ IN THESE PLANS ~~WILL~~ REQUIRED LIME STABILIZATION TO A DEPTH OF ~~40~~ 24 INCHES. ~~THIS TABULATION IS A PRELIMINARY ESTIMATE AND QUANTITIES MAY BE REVISED UPWARDS OR DOWNWARDS WHEN THE CUT SECTIONS ARE EXAMINED AT SUBGRADE ELEVATION.~~ PROCESSING LIME TREATED SUBGRADE ~~SHALL BE~~ WAS DONE IN 8 INCH (and 12) LIFTS AND ~~SHALL BE~~ WAS PAID BY THE SQUARE YARD FOR EACH LAYER.

THE MAXIMUM THICKNESS OF TOPSOIL ~~SHALL BE~~ IS 6 INCHES WITH A MINIMUM OF 4 INCHES. ~~IT IS ESTIMATED THAT 45,887~~ 38,865 CUBIC YARDS ~~WILL BE~~ WERE REQUIRED ~~AND WILL BE~~ OBTAINED FROM WITHIN THE RIGHT-OF-WAY LIMITS AND STOCKPILED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

ALL DISTURBED AREAS ~~SHALL~~ DID RECEIVE SOIL PREPARATION IN ACCORDANCE WITH SECTION 212.06(A) OF THE SPECIFICATIONS.

SEEDING, SOIL PREPARATION, FERTILIZING WITH COMMERCIAL FERTILIZER, AND MULCHING ~~WILL BE~~ WERE REQUIRED FOR ~~APPROXIMATELY 57~~ 80.4 ACRES FOR ROADWAY WITH RIGHT-OF-WAY LIMITS ON ALL DISTURBED AREAS NOT ~~TO BE~~ SURFACED.

THE FOLLOWING TYPES AND RATES ~~SHALL BE~~ WERE USED:

DRYLAND PASTURE MIX - NATIVE SEEDING. (ALL AREAS EXCEPT THOSE SEEDED WITH WILDFLOWERS-FORBS) (~~48.37~~ 72.37 ACRES)

COMMON NAME	BOTANICAL NAME	RATE-LBS. PLS/ACRE
BUFFALO GRASS	BUCHLOE DACTYLOIDES	~~4~~ 5.3
BLUE GRAMA	BOUTELOUA GRACILIS	~~2~~ 2.7
SAND DROPSEED	SPOROBOLUS CRYPTANDRUS	~~1~~ 1.3
SIDEOATS GRAMA	BOUTELOUA CURTIPENDULA	~~4~~ 5.3
SMOOTH BROME	BROMUS INERMIS	~~4~~ 5.3
WESTERN WHEATGRASS	AGROPYRON SMITHII	~~6~~ 8.1
TOTAL PLS/ACRE SEEDING (NATIVE)		~~21~~ 28

WILDFLOWER STAND TYPES - SEEDING (FORBS) (8.03 ACRES)

COMMON NAME	BOTANICAL NAME	RATE OZ./ACRE	ACRES	TOTAL OUNCES
YARROW	ACHILLEA MILLEFOLIUM	80	0.677	54
PRAIRIE ASTER	ASTER TANACETIFOLIUS	96	2.377	228
OX EYE DAISY	CHRYSANTHEMUM LEUCANTHEMUM	80	0.833	67
LANCELEAF COREPOSIS	COREOPSIS LANCEOLATA	32	0.562	18
BLUEBONNET	LUPINUS TEXENSIS	320	1.744	558
ROCKY MOUNTAIN PENSTEMON	PENSTEMON STRICTUS	64	1.210	77
BLACK EYED SUSAN	RUDBECKIA HIRTA	80	0.631	50

15 LBS. PLS/ACRE OF CHEWINGS FESCUE (FESTUCA RUBRA COMMUTATA) ~~SHALL BE~~ WERE SEEDED WITH WILDFLOWER SPECIES AND ~~SHALL BE~~ WERE INCLUDED IN THE PRICE OF SEEDING (FORBS).

~~IT IS ESTIMATED THAT~~ 121 POUNDS PLS OF CHEWINGS FESCUE ~~WILL BE~~ WERE REQUIRED.

MULCHING MATERIAL:

NATIVE HAY.....2 TONS PER ACRE

PROJECT TOTALS

• SEEDING (NATIVE)	~~1,920~~ 2044 LBS.
SEEDING (FORBS)	1,052 OUNCES
MULCHING	~~114~~ 151.11 TONS
FERTILIZER (AVAILABLE N)	~~3,078~~ 4278 LBS.
FERTILIZER (AVAILABLE P)	~~7,866~~ 10,785 LBS.
SOIL PREPARATION (NATIVE)	~~57~~ 60.4 ACRES

COMMERCIAL FERTILIZER	LBS/ACRE
AVAILABLE N	54
AVAILABLE P	138

~~IT IS ESTIMATED THAT 58~~ 43 EROSION BALES ~~WILL BE~~ WERE REQUIRED FOR THIS PROJECT AND ~~SHALL BE~~ WERE PLACED AS DIRECTED BY THE ENGINEER

• SEED ~~SHALL BE~~ WAS MECHANICALLY DRILLED TO A DEPTH OF 0.5 INCHES INTO TOPSOIL.

~~IT IS ESTIMATED THAT 2,603 S.Y.~~ 3359 S.Y. OF REMOVAL OF ASPHALT MAT ~~WILL BE~~ WERE REQUIRED OUTSIDE THE GRADING LIMITS LEFT AND RIGHT BETWEEN STATION 926+50 AND STATION 933+30, Right of Sta 1032 and Left of Sta 1037.

ISLANDS AT SANTA FE DRIVE ~~TO BE~~ WERE FILLED WITH 4" OF MEDIAN COVER MATERIAL (STONE).

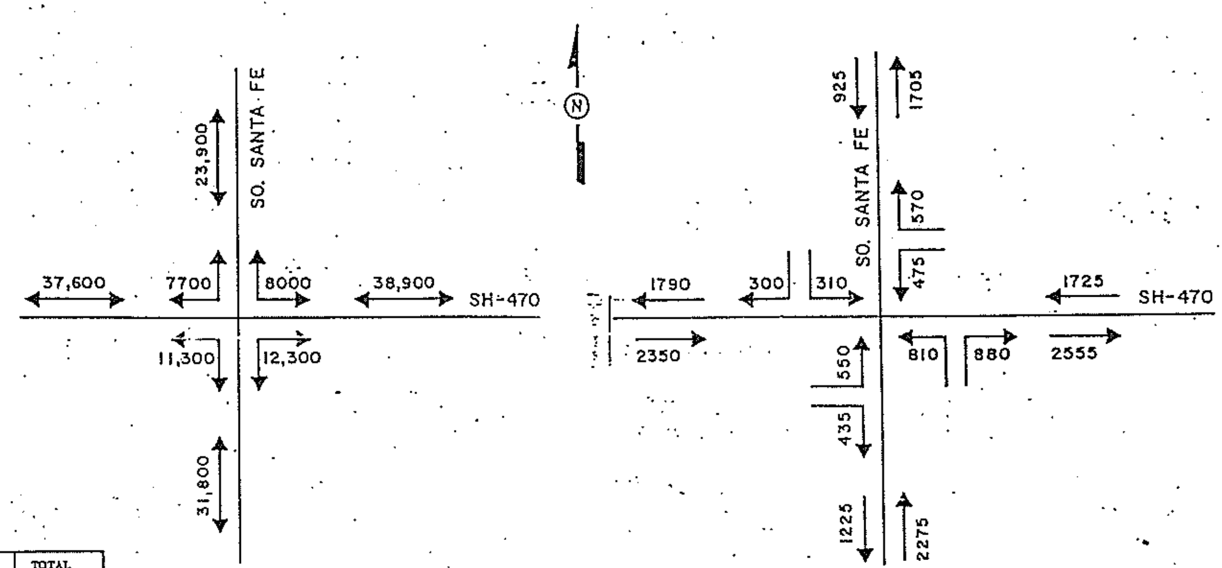
DPM - INDICATES AREAS ON PLAN ~~TO RECEIVE~~ THAT RECEIVED DRYLAND PASTURE MIX.

MULCHING OF ALL DISTURBED AREAS ~~SHALL BE~~ WAS ACCOMPLISHED IN ACCORDANCE WITH SECTION 213 OF THE SPECIFICATIONS.

ALL ASPHALT CUTS ~~TO BE~~ WERE MADE WITH A CUTTING WHEEL ATTACHED TO A MOTOR GRADER OR OTHER APPROVED METHOD AND ~~SHALL BE~~ ARE INCLUDED IN THE WORK.

~~IT IS ESTIMATED THAT 4630~~ 3998 CU. YDS. OF MUCK EXCAVATION ~~WILL BE~~ WERE REQUIRED BETWEEN STA 1015+50 AND STA 1016+50 FOR REMOVAL OF TRASH (EST. 6.5' TO 11.5' DEEP)

TRAFFIC DIAGRAMS



YEAR 2004 ADT

YEAR 2004 DDHV

~~▲ SUB-EXCAVATION (32" DEPTH)~~

STA. TO STA.	CU. YD.
1002+00 TO 1010+00	6637
1022+00 TO 1033+00	9126
1041+00 TO 1042+03.11	855
RAMP D 432+55 TO 443+00	3310
TOTAL	19928

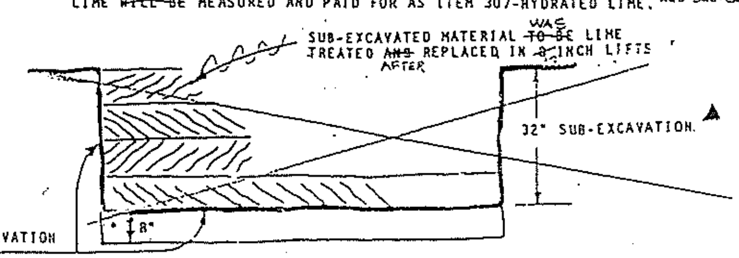
SUB-EXCAVATION (12" Depth)

Sta. To Sta.	Cu.Yd.
932+00 To 936+00	1253 ▲
932+32 To 933+00	452 ■
1002+00 To 1010+00	2489 ▲
1022+00 To 1026+00	1245 ▲
1026+00 To 1033+00	2178 ■
Ramp D: 424+50 To 439+00	500 ■
Ramp D: 432+55 To 443+00	1247 ▲
TOTAL	9364

▲ 12" was subexcavated and stockpiled. The 12" layer below was lime treated in-place. The 12" stockpiled was then replaced + treated.

■ This 12" of existing material was unsuitable for lime treatment, was sub-excavated and replaced with suitable material.

R-1 REPLACING SUB-EXCAVATED MATERIAL ~~WILL~~ WAS NOT BE MEASURED AND PAID FOR SEPARATELY BUT ~~SHALL BE~~ WAS INCLUDED IN THE WORK. LIME ~~WILL BE~~ WAS MEASURED AND PAID FOR AS ITEM 307-HYDRATED LIME.



▲ ~~TO BE~~ PAID AS UNCLASSIFIED EXCAVATION (HAUL)

• ~~TO BE~~ LIME TREATED BEFORE REPLACING SUB-EXCAVATED MATERIAL

FINAL SUMMARY OF EARTHWORK QUANTITIES

BOOK	PAGE (Field)	LINE SHEET (Item)		PROJECT TOTALS	AS-CONST
			UNCLASSIFIED EXCAVATION (HAUL)	CU. YD.	CU. YD
			ROADWAY (FROM ELECTRONIC COMPUTER)	766,760▲	775,150
			SUBEXCAVATION	19,928	9,364
			EST. FOR CUT SLOPE TREATMENT	3,726	—
			FROM TABULATION OF DRAINAGE ITEMS	1,794	1,750
			FOR HORSE PATH	14,757	8,418 ⊖
1	305	15	TOTAL PAY QUANTITY	806,965	797,682
			MUCK EXCAVATION	4,630	5,137
1	305	17	TOTAL PAY QUANTITY	4,630	5,137
			COMPACTION (AASHTO T-99) (MOISTURE AND DENSITY CONTROL)		
			EMBANKMENT (NET)	624,964	707,470
			*EXCESS MATERIAL	28,363	—
			BASE OF FILLS	24,075	26,552
			EMBANKMENT TO REPLACE TOPSOIL (NET)	20,606	-917
			FROM TABULATION OF DRAINAGE ITEMS	4,118	4,147
			FOR HORSE PATH	1,414	—
1	305	18	TOTAL PAY QUANTITY	703,540	737,252
			WETTING	M. GAL.	M.G.GAL
			COMPACTION	27,996	7,500
			ROADWAY DUST PALLIATIVE	2,889	478
1	305	25	TOTAL PAY QUANTITY	30,855	7,978
			ROADWAY QUANTITIES BALANCE (FOR INFORMATION ONLY)		
			UNCLASSIFIED EXCAVATION TOTAL	766,760▲	782,392 ▲
			EMBANKMENT (NET)	642,084+	653,892 +
			EMBANKMENT X FACTOR ~~(1.15)~~ (1.11)	738,397	759,120
			*EXCESS	28,363	23,272 *
			*EXCESS FROM HORSE PATH	13,343	—
			A.T. & S.F. RAILROAD RELOCATION		
			UNCLASSIFIED EXCAVATION (CIP)	CU. YD.	CU. YD
			ROADBED ~~(FROM ELECTRONIC COMPUTER)~~ (FROM PLOTTED X-SECTIONS)	10,526	7,633
1	305	16	TOTAL PAY QUANTITY	10,526	7,633
	—		~~FOR INFORMATION ONLY~~		
			~~EMBANKMENT~~		
			~~EMBANKMENT (NET)~~	~~6,626~~	
			~~COMPACTION (RAILROAD)~~		
			~~EMBANKMENT~~	~~6,626~~	
			~~BASE OF CUT AND FILL~~	~~1,022~~	
			~~TOTAL~~	~~7,648~~	

* 23,272 cy is the excess beyond that which was used to flatten slopes, which is included in the roadway quantities. 7539 cy was wasted outside the north R/W and 15,733 cy was wasted outside the south R/W. These quantities were not paid for as compaction.

~~EXCESS MATERIAL TO BE USED TO FLATTEN SLOPES AS DIRECTED BY THE ENGINEER.~~

~~THE CONTRACTOR IS REMINDED OF CONFORMITY TO SPECIFICATION 107.25 PERTAINING TO EROSION CONTROL FOR THIS PROJECT.~~

▲ INCLUDES ~~18507~~ 16029 CU. YDS. OF UNCLASSIFIED EXCAVATION ~~FOR~~ TO + FROM D. & R.G. W. R.R. SHOOFLY.

\+ INCLUDES ~~10507~~ 21951 CU. YDS. OF EMBANKMENT (NET) FOR D. & R.G. W. R.R. SHOOFLY.

A MINIMUM R VALUE OF 25 ~~SHALL BE REQUIRED~~ WAS OBTAINED FOR A.T. & S.F. RAILROAD RELOCATION EMBANKMENT WHICH ~~MAY NOT BE~~ WAS AVAILABLE ON THE PROJECT.

⊖ 8418 cy of Uncl. Exc. includes 90 cy for NW Santa Fe Drive widening, 3998 cy for second handling to replace muck exc. at Sta 1016±, 4152 cy for retention pond at Sta 924± Rt and 178 cy for an engineering error.

HIGHWAYS
STATE OF COLORADO

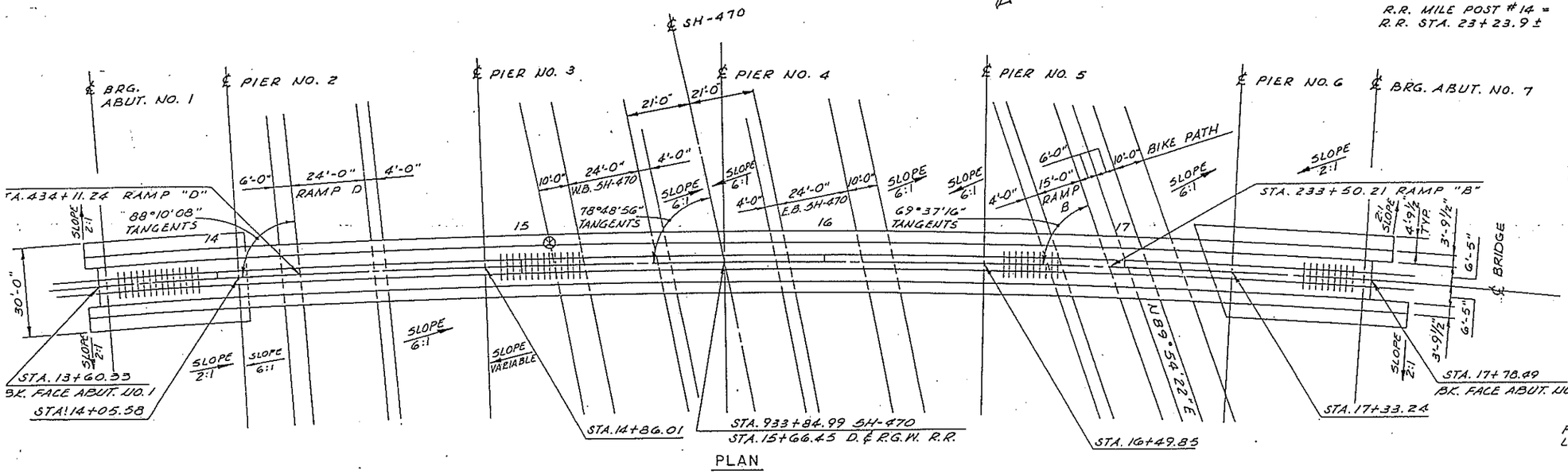
AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/96	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	20	108

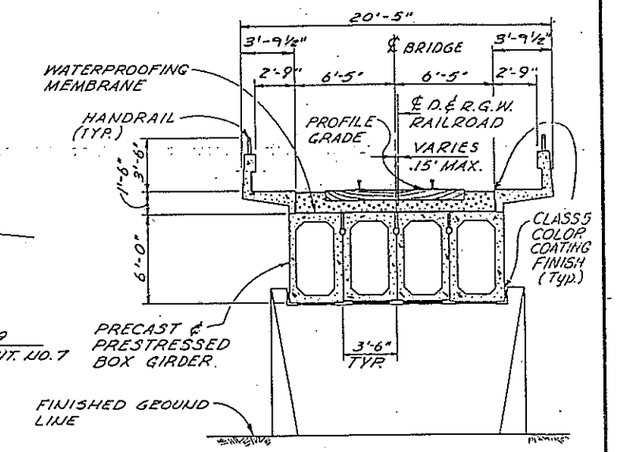
REVISIONS		

R.R. MILE POST #14 =
R.R. STA. 23+23.9 ±

NOTE: BALLAST, TIES AND RAILS BY RAILROAD FORCES.



PLAN

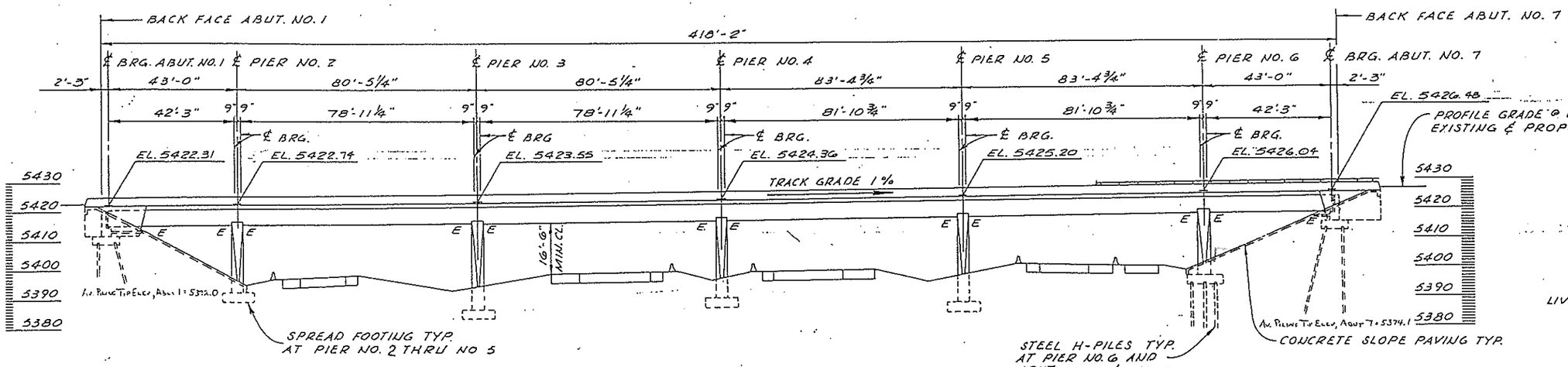


TYPICAL SECTION
LOOKING SOUTH

BASE OF LOW RAIL TO BRIDGE SEAT

TIE & TIE PL	0'-7¾"
BALLAST ±	8"
WTRPFG.	0⅞"
BEAM	6'-0⅜"
BRG. PAD	1⅞"
TOTAL	7'-6⅞"

⊗ INDICATES LOCATION OF MIN. VERTICAL CLEARANCE



ELEVATION
DIMENSIONS @ ℄ OF TRACK

TRACK CURVE DATA

I =	33°01'
L =	260.00'
Δ =	2°36'
D =	2°01' (CHORD DEF.)
R =	2841.26'
U =	172.52'
V =	87.52'
X =	259.95'
Y =	3.97'
T_S =	972.35'
E_S =	123.18'
Δ_c =	27°49'

LIVE LOADING: COOPER E-80 WITH DIESEL IMPACT.

CENTENNIAL ENGINEERING, INC. ARVADA, COLORADO

DIVISION OF HIGHWAYS

D. & R.G.W. RAILROAD
OVER
SH-470

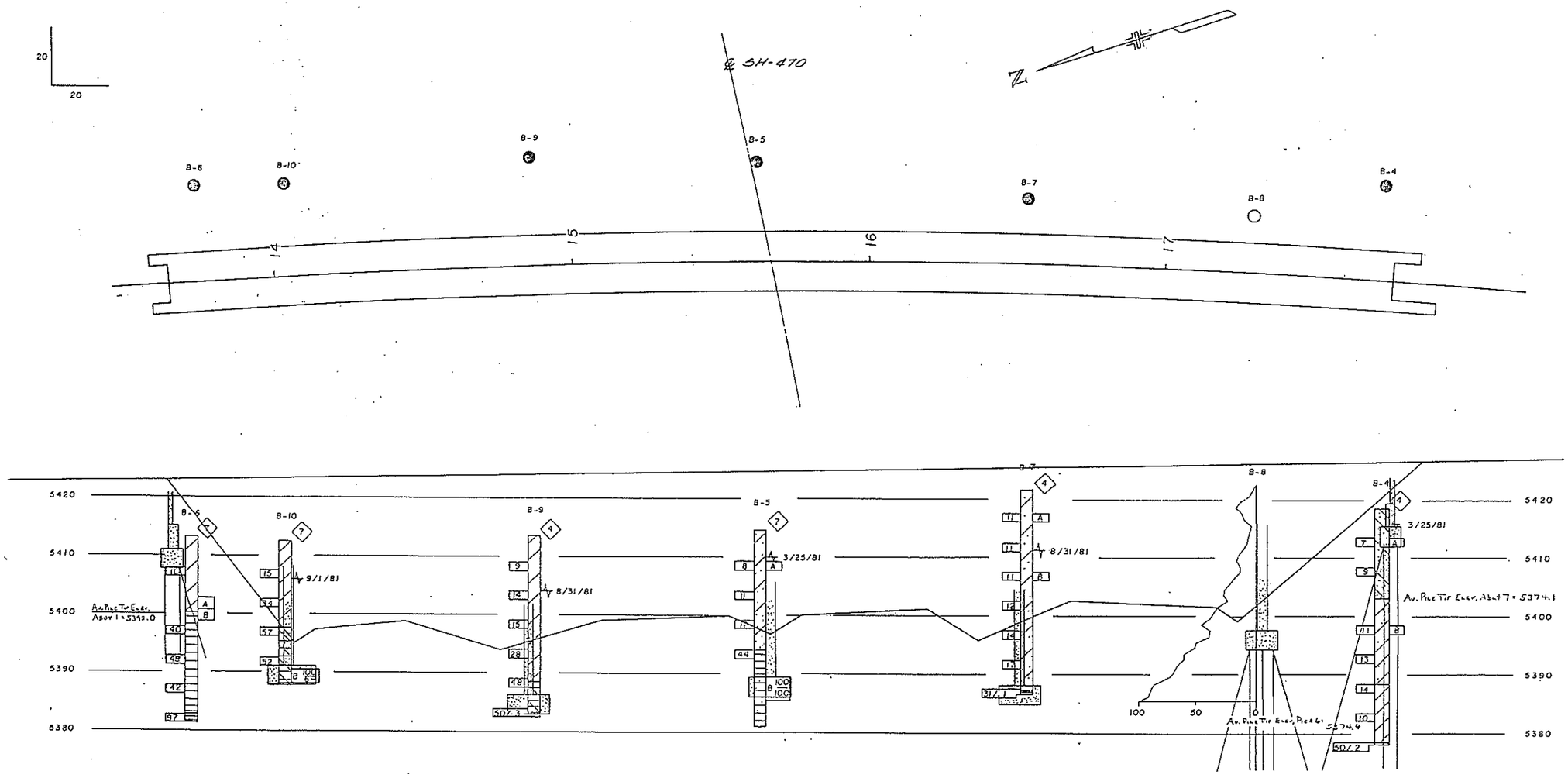
GENERAL LAYOUT

Designer B. OLDENBURG		Structure Numbers	F-16-KG
Detailer C. NECESSARY			
Drawing Number B 2	of 16		Drawings

AS CONSTRUCTED			
NO REVISION		REVISED 9/17/86	VOID

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	21	105

REVISIONS		



SUMMARY OF TEST RESULTS

Boring No.	Depth	Classification: Comm. of Engrs. or Visual	Classification: AASHTO	Grading Analysis Percent: Gravel	Coarse Sand	Fine Sand	Silt and Clay	Atterberg Limits: Liquid Limit L_w	Plastic Limit P_w	Plastic Index I_p	Water Cont. W %	Wet Unit Weight γ P.C.F.	Unconfined Strength Q_u T.S.F.	Triaxial Shear Strength: φ	C P.S.I.	Dia. of Sample (inches)
	-6.5'	CLAYEY SAND	A-2-4(0)	2	32	40	26	26	17	9	22.2					
B	20.0'-21.5'	SANDY CLAY	A-7-6(14)	0	9	28	63	44	17	27	23.9					
A	5.5'-7.0'	SANDY CLAY	A-6 (12)	0	3	26	71	36	17	19	24.2					
B	26.0'-26.5'	SANDY CLAY	A-6(7)	0	0	36	64	32	17	15	13.9					
A	10.5'-12.5'	CLAY	A-7-6(43)	0	0	6	94	64	23	41	27.9			4.91	2.52	
B	12.5'-14.5'	CLAY	A-7-6(34)	0	0	1	99	55	26	29	23.7					
A	4.0'-5.5'	SANDY CLAY	A-6 (10)	0	10	31	59	34	11	23	15.5					
B	14.0'-15.5'	SANDY CLAY	A-7-6(18)	0	3	20	77	45	21	24	23.2					
2A	22.3'-22.8	SHALE(Clayey														

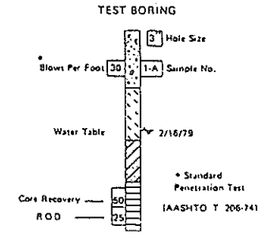
NS 6 C 8

TYPE OF MATERIAL

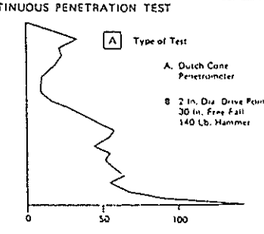
- CLAYEY SAND
- SANDY CLAY
- CLAY
- CLAYEY SHALE
- SANDY SHALE
- SHALE

LEGEND

TEST BORING



CONTINUOUS PENETRATION TEST



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

DIVISION OF HIGHWAYS

ENGINEERING GEOLOGY

D. & R.G.W. R.R

Geologist LSB
Drawn by PM
Checked by GCP
Date 05 OCT 81

STRUCTURE NO F-16-KG

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	22	108

AS CONSTRUCTED

NO REVISIONS 8/13/26 REVISED VOID

LONGITUDINAL LINE: CL BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
[illegible] A1	13+62.5800	-.1530	5414.8908		-.0000	0.0000	-.0000	0.0000
[illegible]ER 2	14+05.5800	-.1530	5415.3244		-2.8029	42.9105	-2.8076	43.0023
CL PIER 3	14+86.0100	-.1530	5416.1354		-6.3012	123.2660	-6.3039	123.4366
CL PIER 4	15+66.4500	-.1530	5416.9465		-7.5237	203.6983	-7.5237	203.8810
CL PIER 5	16+49.8500	-.1530	5417.7874		-6.3865	287.0921	-6.3891	287.2855
CL PIER 6	17+33.2400	-.1530	5418.6283		-2.8029	370.4066	-2.8076	370.6800
CL BRG A7	17+76.2400	-.1530	5419.0619		-.0000	413.3170	-.0000	413.6823

LONGITUDINAL LINE: OUTSIDE EDGE BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	-10.3616			-10.1816	-.7425	-10.2086	0.0000
CL PIER 2	14+05.5800	-10.3616			-12.9946	42.3221	-13.0162	43.1564
CL PIER 2	14+05.5800	-10.3623			-12.9953	42.3221	-13.0169	0.0000
CL PIER 3	14+86.0100	-10.3623			-16.5061	122.9664	-16.5132	80.7206
CL PIER 3	14+86.0100	-10.3623			-16.5061	122.9664	-16.5132	0.0000
CL PIER 4	15+66.4500	-10.3623			-17.7330	203.6877	-17.7330	80.7307
CL PIER 4	15+66.4500	-10.3624			-17.7331	203.6877	-17.7331	0.0000
CL PIER 5	16+49.8500	-10.3624			-16.5918	287.3811	-16.5985	83.7012
CL PIER 5	16+49.8500	-10.3624			-16.5918	287.3811	-16.5985	0.0000
CL PIER 6	17+33.2400	-10.3624			-12.9954	370.9949	-13.0170	83.6911
CL PIER 6	17+33.2400	-10.3616			-12.9946	370.9949	-13.0162	0.0000
CL BRG A7	17+76.2400	-10.3616			-10.1816	414.0595	-10.2086	43.1564

LONGITUDINAL LINE: CL BOX GIRDER 1

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	-5.4032	5414.8908		-5.2362	-.3818	-5.2502	0.0000
CL PIER 2	14+05.5800	-5.4032	5415.3244		-8.0444	42.6079	-8.0578	43.0814
CL PIER 2	14+05.5800	-5.4035	5415.3244		-8.0447	42.6079	-8.0581	0.0000
CL PIER 3	14+86.0100	-5.4035	5416.1354		-11.5495	123.1119	-11.5544	80.5803
CL PIER 3	14+86.0100	-5.4035	5416.1354		-11.5495	123.1119	-11.5544	0.0000
CL PIER 4	15+66.4500	-5.4035	5416.9465		-12.7742	203.6929	-12.7742	80.5903
CL PIER 4	15+66.4500	-5.4036	5416.9465		-12.7742	203.6929	-12.7742	0.0000
[illegible]IER 5	16+49.8500	-5.4036	5417.7874		-11.6350	287.2407	-11.6397	83.5556
[illegible]IER 5	16+49.8500	-5.4036	5417.7874		-11.6350	287.2407	-11.6397	0.0000
[illegible]IER 6	17+33.2400	-5.4036	5418.6283		-8.0448	370.7091	-8.0582	83.5456
CL PIER 6	17+33.2400	-5.4032	5418.6283		-8.0444	370.7091	-8.0578	0.0000
CL BRG A7	17+76.2400	-5.4032	5419.0619		-5.2362	413.6989	-5.2502	43.0814

LONGITUDINAL LINE: CL BOX GIRDER 2

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	-1.9031	5414.8908		-1.7454	-.1273	-1.7501	0.0000
CL PIER 2	14+05.5800	-1.9031	5415.3244		-4.5501	42.8096	-4.5577	43.0284
CL PIER 2	14+05.5800	-1.9032	5415.3244		-4.5502	42.8096	-4.5578	0.0000
CL PIER 3	14+86.0100	-1.9032	5416.1354		-8.0506	123.2146	-8.0541	80.4812
CL PIER 3	14+86.0100	-1.9032	5416.1354		-8.0506	123.2146	-8.0541	0.0000
CL PIER 4	15+66.4500	-1.9032	5416.9465		-9.2738	203.6965	-9.2738	80.4912
CL PIER 4	15+66.4500	-1.9032	5416.9465		-9.2738	203.6965	-9.2739	0.0000
CL PIER 5	16+49.8500	-1.9032	5417.7874		-8.1360	287.1416	-8.1393	83.4529
CL PIER 5	16+49.8500	-1.9032	5417.7874		-8.1360	287.1416	-8.1393	0.0000
CL PIER 6	17+33.2400	-1.9032	5418.6283		-4.5502	370.5074	-4.5578	83.4429
CL PIER 6	17+33.2400	-1.9031	5418.6283		-4.5501	370.5074	-4.5577	0.0000
CL BRG A7	17+76.2400	-1.9031	5419.0619		-1.7454	413.4443	-1.7501	43.0284

LONGITUDINAL LINE: CL BOX GIRDER 3

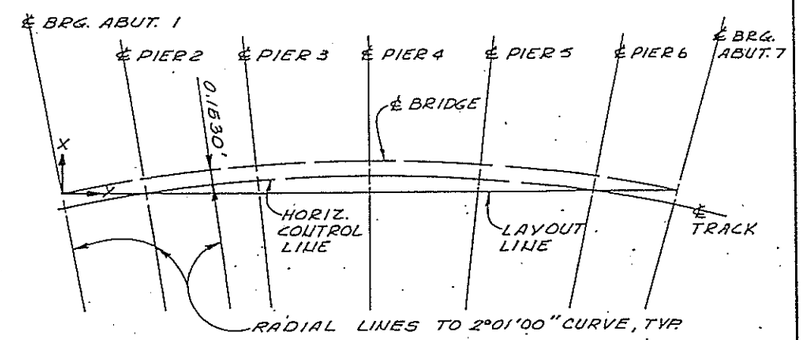
BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	1.5971	5414.8908		1.7454	.1273	1.7501	0.0000
CL PIER 2	14+05.5800	1.5971	5415.3244		-1.0558	43.0113	-1.0576	42.9754
CL PIER 2	14+05.5800	1.5972	5415.3244		-1.0557	43.0113	-1.0574	0.0000
CL PIER 3	14+86.0100	1.5972	5416.1354		-4.5518	123.3174	-4.5537	80.3821
CL PIER 3	14+86.0100	1.5972	5416.1354		-4.5518	123.3174	-4.5537	0.0000
CL PIER 4	15+66.4500	1.5972	5416.9465		-5.7735	203.7002	-5.7735	80.3921
CL PIER 4	15+66.4500	1.5972	5416.9465		-5.7735	203.7002	-5.7735	0.0000
CL PIER 5	16+49.8500	1.5972	5417.7874		-4.6370	287.0425	-4.6389	83.3501
CL PIER 5	16+49.8500	1.5972	5417.7874		-4.6370	287.0425	-4.6389	0.0000
CL PIER 6	17+33.2400	1.5972	5418.6283		-1.0557	370.3057	-1.0574	83.3401
CL PIER 6	17+33.2400	1.5971	5418.6283		-1.0558	370.3057	-1.0576	0.0000
CL BRG A7	17+76.2400	1.5971	5419.0619		1.7454	413.1897	1.7501	42.9754

LONGITUDINAL LINE: CL BOX GIRDER 4

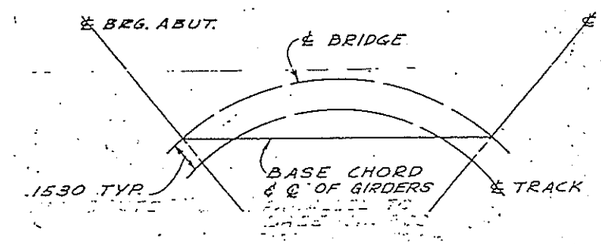
BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	5.0972	5414.8908		5.2362	.3818	5.2502	0.0000
CL PIER 2	14+05.5800	5.0972	5415.3244		2.4385	43.2130	2.4425	42.9224
CL PIER 2	14+05.5800	5.0975	5415.3244		2.4389	43.2130	2.4429	0.0000
CL PIER 3	14+86.0100	5.0975	5416.1354		-1.0529	123.4201	-1.0534	80.2830
CL PIER 3	14+86.0100	5.0975	5416.1354		-1.0529	123.4201	-1.0534	0.0000
CL PIER 4	15+66.4500	5.0975	5416.9465		-2.2731	203.7038	-2.2731	80.2930
CL PIER 4	15+66.4500	5.0976	5416.9465		-2.2731	203.7038	-2.2731	0.0000
CL PIER 5	16+49.8500	5.0976	5417.7874		-1.1381	286.9435	-1.1385	83.2474
CL PIER 5	16+49.8500	5.0976	5417.7874		-1.1381	286.9435	-1.1385	0.0000
CL PIER 6	17+33.2400	5.0976	5418.6283		2.4389	370.1040	2.4430	83.2374
CL PIER 6	17+33.2400	5.0972	5418.6283		2.4385	370.1040	2.4425	0.0000
CL BRG A7	17+76.2400	5.0972	5419.0619		5.2362	412.9352	5.2502	42.9224

LONGITUDINAL LINE: INSIDE EDGE BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE: OFFSET X	COORDINATES FROM LAYOUT LINE: ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A1	13+62.5800	10.0556			10.1816	.7425	10.2086	0.0000
CL PIER 2	14+05.5800	10.0556			7.3887	43.4988	7.4010	42.8474
CL PIER 2	14+05.5800	10.0563			7.3894	43.4988	7.4017	0.0000
CL PIER 3	14+86.0100	10.0563			3.9037	123.5656	3.9054	80.1427
CL PIER 3	14+86.0100	10.0563			3.9037	123.5656	3.9054	0.0000
CL PIER 4	15+66.4500	10.0563			2.6857	203.7090	2.6857	80.1526
CL PIER 4	15+66.4500	10.0564			2.6857	203.7090	2.6857	0.0000
CL PIER 5	16+49.8500	10.0564			3.8188	286.8831	3.8203	83.1018
CL PIER 5	16+49.8500	10.0564			3.8188	286.8831	3.8203	0.0000
CL PIER 6	17+33.2400	10.0564			7.3895	369.8182	7.4018	83.0919
CL PIER 6	17+33.2400	10.0556			7.3887	369.8182	7.4010	0.0000
CL BRG A7	17+76.2400	10.0556			10.1816	412.5745	10.2086	42.8474



BRIDGE LAYOUT



TYPICAL SPAN LAYOUT

*FINISHED ELEVATIONS ARE AT BRIDGE SEAT.

BRIDGE STANDARD 3

REVISIONS		

DIVISION OF HIGHWAYS

D. & R. G. W. RAILROAD
OVER
SH-470

BRIDGE GEOMETRY

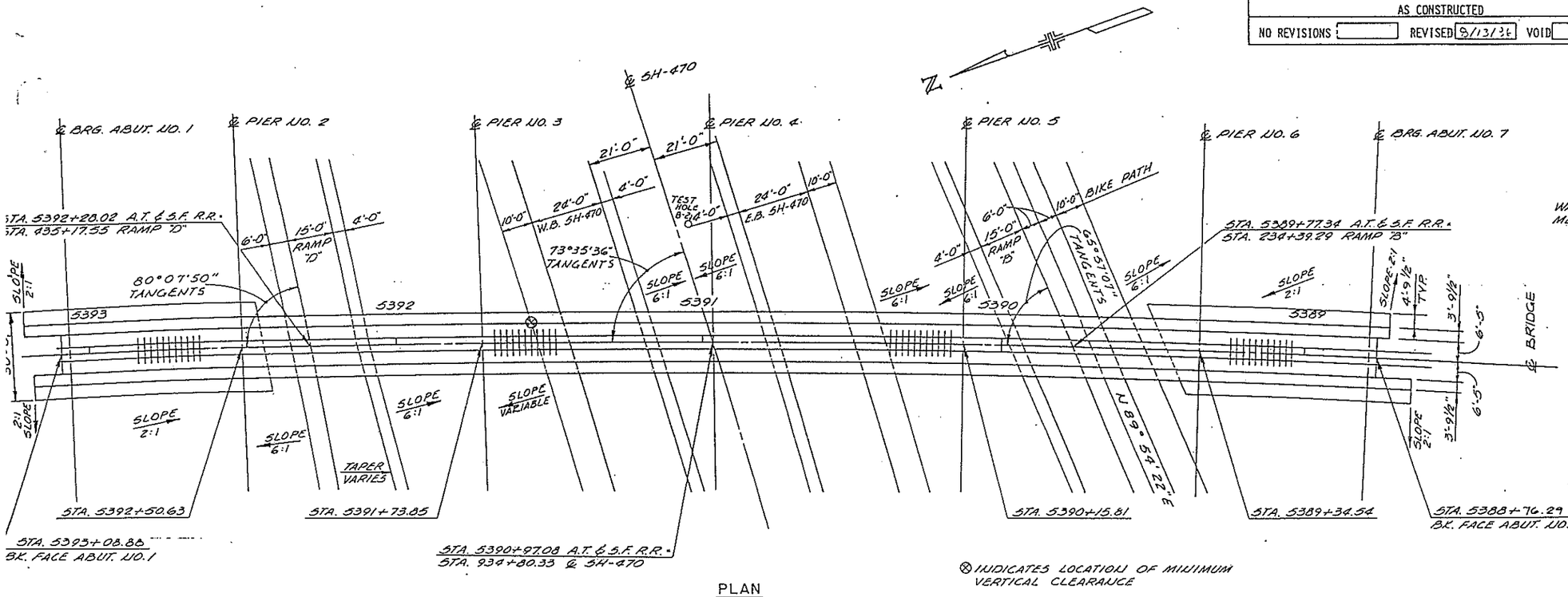
Designer B. OLDENBURG	Structure Numbers	F-16-KG	
Detailer L. PACHECO			
Drawing Number B 4	of 16	Drawings	

STATE OF COLORADO

AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/76	VOID

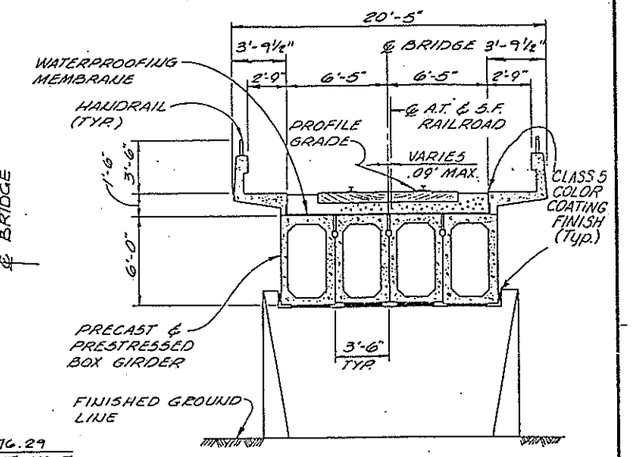
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	36	108

REVISIONS		



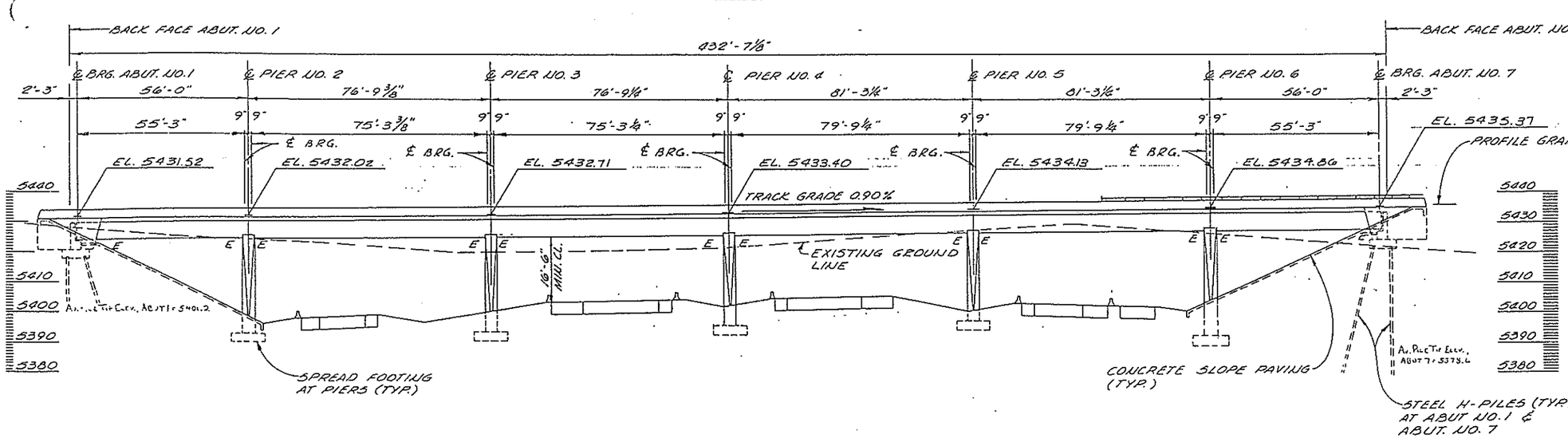
⊗ INDICATES LOCATION OF MINIMUM VERTICAL CLEARANCE

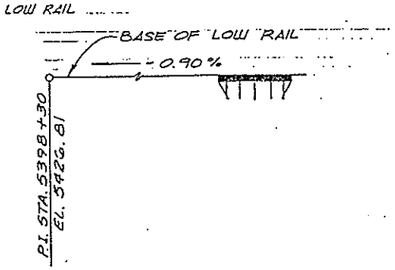
PLAN



NOTE: BALLAST, TIES AND RAILS BY RAILROAD FORCES.

TYPICAL SECTION
LOOKING SOUTH





LIVE LOADING: COOPER E-80 WITH DIESEL IMPACT.

ELEVATION
DIMENSIONS AT ℄ OF TRACK

5393 ⊥ 5392 ⊥ 5391 ⊥ 5390 ⊥ 5389 ⊥

BASE OF LOW RAIL TO BRIDGE SEAT

TIE & TIE PL	0'-7¾"
BALLAST ±	8"
WTRPFG.	0 ⅞"
BEAM	6'-0 ⅜"
BRG. PAD	1 ⅞"
TOTAL	7'-6 ⅞"

TRACK CURVE DATA

P.I. =	5387 + 71.56
I. =	28°21'11"
L =	100.00'
Δ =	0°37'30"
D =	1°15'00" (CHORD DEF.)
R =	4583.75'
U =	66.67'
V =	33.33'
X =	100.00'
Y =	0.36'
Ts =	1207.89'
Es =	144.07'
Δc =	27°06'11"
Lc =	2168.29'

CENTENNIAL ENGINEERING, INC. ARVADA, COLORADO

DIVISION OF HIGHWAYS

A.T. & S.F. RAILROAD
OVER
SH-470

GENERAL LAYOUT

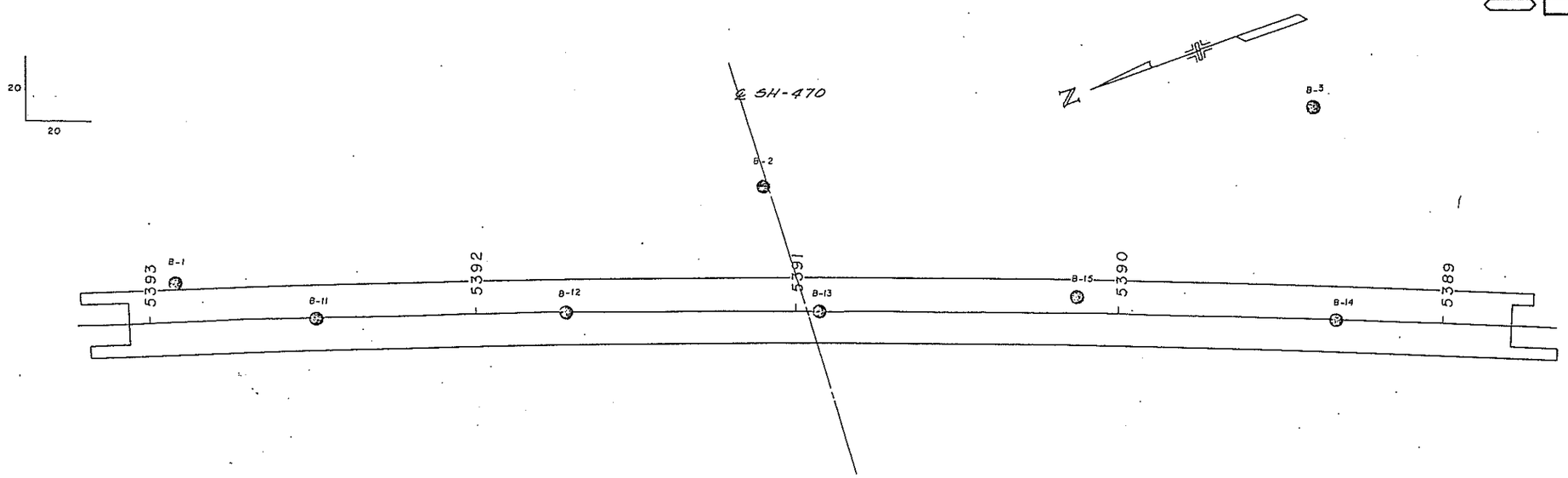
Designer B. OLDENBURG	Structure Numbers	F-16-KF
Detailer E. HAYASHIDA		
Drawing Number B 2	of 15	Drawings

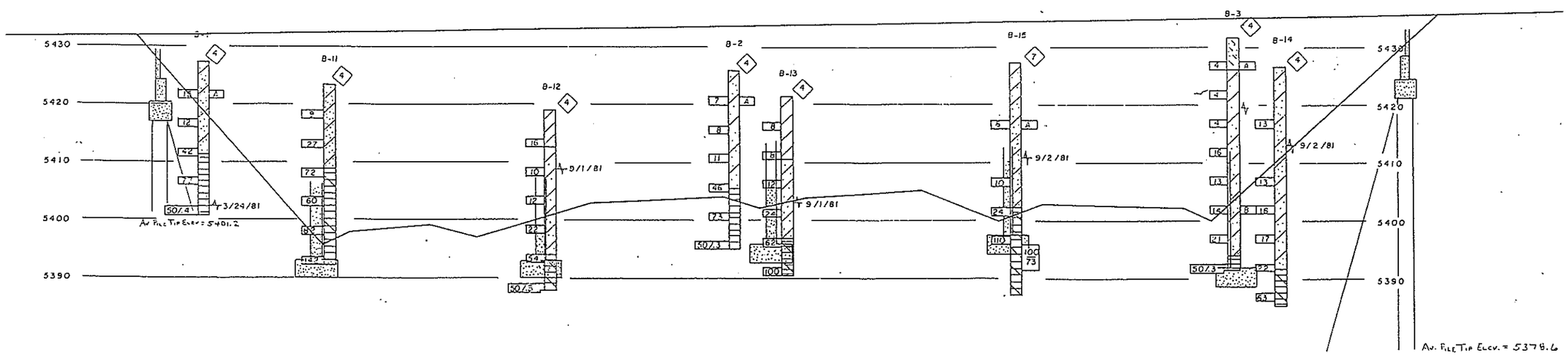
(Preliminary Stage Only)

AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/86	VOID

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	37	103

REVISIONS		





SUMMARY OF TEST RESULTS

Sample No.	Depth	Classification: Comm. of Engrs. or Visual	Classification: AASHTO	Grading Analysis (Percent): Gravel	Coarse Sand	Fine Sand	Silt and Clay	Atterberg Limits: Liquid Limit L_m	Plastic Limit P_m	Plastic Index I_p	Water Cont. W %	Wet Unit Weight γ P.C.F.	Unconfined Strength Q_u T.S.F.	Triaxial Shear Strength: φ	C P.S.I.	Dur. of Sample Required
	0'-6.5'	SANDY CLAY	A-6 (14)	0	7	23	70	40	17	23	18.6					
2 A	4.5'-6.0'	SANDY CLAY	A-6 (8)	0	5	32	63	34	17	17	19.0					
3 A	4.0'-5.5'	SILTY SAND	A-4 (0)	0	14	49	37	24	19	5	11.8					
3 B	29.0'-30.5'	SANDY CLAY	A-7-6(23)	0	5	20	75	49	17	32	25.3					
15 A	10.0'-11.5'	SANDY CLAY	A-7-6(14)	1	4	18	77	41	22	19	23.2					

TYPE OF MATERIAL

- SANDY CLAY
- CLAY
- SILTY SAND
- SHALE
- SANDY SHALE

LEGEND

TEST BORING

- 3" Hole Size
- Blows Per Foot 30
- 1-A Sample No.
- Water Table 2/16/79
- Core Recovery
- RQD
- * Standard Penetration Test (AASHTO T 206-74)

CONTINUOUS PENETRATION TEST

- A Type of Test
  - A. Dutch Cone Penetrometer
  - B. 2 In. Dia. Driven Points 30 In. Free Fall 140 Lb. Hammer
- 0 50 100

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

DIVISION OF HIGHWAYS

ENGINEERING GEOLOGY

A.T. & S.F. R.R.

Geologist L S B
Drawn by P M
Checked by P M
Date 05 OCT 81

STRUCTURE NO. F-16-KF

STATE OF COLORADO

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	38	108

AS CONSTRUCTED

NO REVISIONS 3/31/96 REVISED ____ VOID ____

LONGITUDINAL LINE: CL BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	.0901	5427.7934		.0000	0.0000	.0000	0.0000
CL PIER 6	5389+34.5400	.0901	5427.2898		2.2724	55.9546	2.2737	56.0011
CL PIER 5	5390+15.8108	.0901	5426.5589		4.3539	137.1993	4.3545	137.2735
CL PIER 4	5390+97.0817	.0901	5425.8281		4.9946	218.4682	4.9946	218.5469
CL PIER 3	5391+73.8525	.0901	5425.1376		4.2765	295.2363	4.2771	295.3183
CL PIER 2	5392+50.6338	.0901	5424.4471		2.2724	371.9920	2.2737	372.1011
CL BRG A1	5393+06.6338	.0901	5423.9435		-.0000	427.9466	0.0000	428.1022

LONGITUDINAL LINE: INSIDE EDGE BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	-10.1184			-10.1974	.4765	-10.2085	0.0000
CL PIER 6	5389+34.5400	-10.1184			-7.9301	56.3065	-7.9348	55.8760
CL PIER 6	5389+34.5400	-10.1186			-7.9303	56.3066	-7.9350	0.0000
CL PIER 5	5390+15.8108	-10.1186			-5.8534	137.3703	-5.8542	81.3903
CL PIER 5	5390+15.8108	-10.1186			-5.8534	137.3703	-5.8542	0.0000
CL PIER 4	5390+97.0817	-10.1186			-5.2141	218.4582	-5.2141	81.0904
CL PIER 4	5390+97.0817	-10.1186			-5.2140	218.4582	-5.2140	0.0000
CL PIER 3	5391+73.8525	-10.1186			-5.9306	295.0553	-5.9315	76.6004
CL PIER 3	5391+73.8525	-10.1186			-5.9306	295.0553	-5.9315	0.0000
CL PIER 2	5392+50.6338	-10.1186			-7.9302	371.6401	-7.9350	76.6109
CL PIER 2	5392+50.6338	-10.1184			-7.9301	371.6401	-7.9348	0.0000
CL BRG A1	5393+06.6338	-10.1184			-10.1974	427.4701	-10.2085	55.8760

LONGITUDINAL LINE: CL BOX GIRDER 1

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	-5.1600	5427.7934		-5.2444	.2451	-5.2501	0.0000
CL PIER 6	5389+34.5400	-5.1600	5427.2898		-2.9746	56.1356	-2.9764	55.9366
CL PIER 6	5389+34.5400	-5.1601	5427.2898		-2.9747	56.1356	-2.9765	0.0000
CL PIER 5	5390+15.8108	-5.1601	5426.5589		-.8956	137.2872	-.8957	81.1782
CL PIER 5	5390+15.8108	-5.1601	5426.5589		-.8956	137.2872	-.8957	0.0000
CL PIER 4	5390+97.0817	-5.1601	5425.8281		-.2556	218.4631	-.2556	81.1783
CL PIER 4	5390+97.0817	-5.1601	5425.8281		-.2555	218.4631	-.2555	0.0000
CL PIER 3	5391+73.8525	-5.1601	5425.1376		-.9729	295.1432	-.9730	76.6835
CL PIER 3	5391+73.8525	-5.1601	5425.1376		-.9729	295.1432	-.9730	0.0000
CL PIER 2	5392+50.6338	-5.1601	5424.4471		-2.9747	371.8110	-2.9765	76.6940
CL PIER 2	5392+50.6338	-5.1600	5424.4471		-2.9746	371.8110	-2.9764	0.0000
CL BRG A1	5393+06.6338	-5.1600	5423.9435		-5.2444	427.7016	-5.2501	55.9366

LONGITUDINAL LINE: CL BOX GIRDER 2

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	-1.6599	5427.7934		-1.7481	.0817	-1.7500	0.0000
CL PIER 6	5389+34.5400	-1.6599	5427.2898		.5234	56.0150	.5237	55.9794
CL PIER 6	5389+34.5400	-1.6600	5427.2898		.5233	56.0150	.5236	0.0000
CL PIER 5	5390+15.8108	-1.6600	5426.5589		2.6040	137.2286	2.6044	81.2403
CL PIER 5	5390+15.8108	-1.6600	5426.5589		2.6040	137.2286	2.6044	0.0000
CL PIER 4	5390+97.0817	-1.6600	5425.8281		3.2446	218.4665	3.2446	81.2404
CL PIER 4	5390+97.0817	-1.6600	5425.8281		3.2446	218.4665	3.2446	0.0000
CL PIER 3	5391+73.8525	-1.6600	5425.1376		2.5267	295.2052	2.5271	76.7421
CL PIER 3	5391+73.8525	-1.6600	5425.1376		2.5267	295.2052	2.5271	0.0000
CL PIER 2	5392+50.6338	-1.6600	5424.4471		.5233	371.9317	.5236	76.7526
CL PIER 2	5392+50.6338	-1.6599	5424.4471		.5234	371.9317	.5237	0.0000
CL BRG A1	5393+06.6338	-1.6599	5423.9435		-1.7481	427.8650	-1.7500	55.9794

LONGITUDINAL LINE: CL BOX GIRDER 3

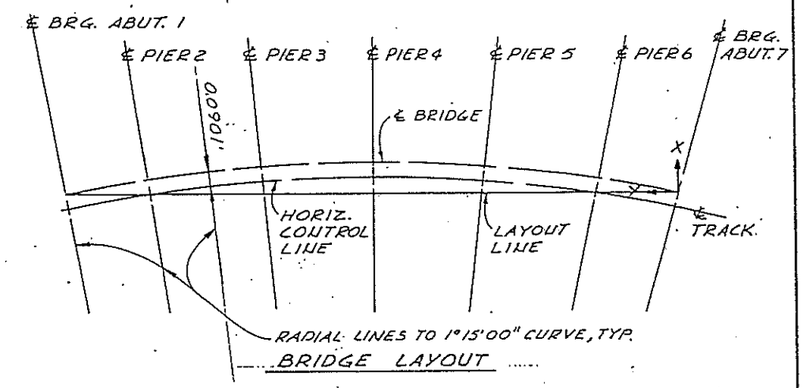
BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	1.8401	5427.7934		1.7481	-.0817	1.7500	0.0000
CL PIER 6	5389+34.5400	1.8401	5427.2898		4.0213	55.8943	4.0237	56.0221
CL PIER 6	5389+34.5400	1.8402	5427.2898		4.0214	55.8943	4.0238	0.0000
CL PIER 5	5390+15.8108	1.8402	5426.5589		6.1037	137.1700	6.1045	81.3024
CL PIER 5	5390+15.8108	1.8402	5426.5589		6.1037	137.1700	6.1045	0.0000
CL PIER 4	5390+97.0817	1.8402	5425.8281		6.7447	218.4699	6.7447	81.3025
CL PIER 4	5390+97.0817	1.8402	5425.8281		6.7447	218.4699	6.7447	0.0000
CL PIER 3	5391+73.8525	1.8402	5425.1376		6.0263	295.2673	6.0272	76.8007
CL PIER 3	5391+73.8525	1.8402	5425.1376		6.0263	295.2673	6.0272	0.0000
CL PIER 2	5392+50.6338	1.8402	5424.4471		4.0214	372.0523	4.0238	76.8112
CL PIER 2	5392+50.6338	1.8401	5424.4471		4.0213	372.0523	4.0237	0.0000
CL BRG A1	5393+06.6338	1.8401	5423.9435		1.7481	428.0283	1.7500	56.0221

LONGITUDINAL LINE: CL BOX GIRDER 4

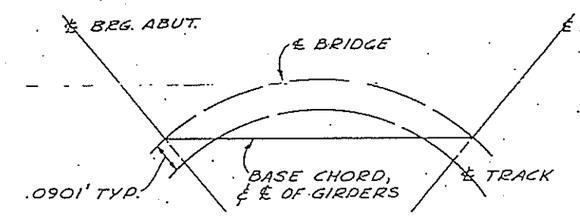
BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	5.3402	5427.7934		5.2444	-.2451	5.2501	0.0000
CL PIER 6	5389+34.5400	5.3402	5427.2898		7.5193	55.7736	7.5238	56.0649
CL PIER 6	5389+34.5400	5.3403	5427.2898		7.5194	55.7736	7.5239	0.0000
CL PIER 5	5390+15.8108	5.3403	5426.5589		9.6033	137.1114	9.6047	81.3644
CL PIER 5	5390+15.8108	5.3403	5426.5589		9.6033	137.1114	9.6047	0.0000
CL PIER 4	5390+97.0817	5.3403	5425.8281		10.2448	218.4734	10.2449	81.3645
CL PIER 4	5390+97.0817	5.3403	5425.8281		10.2448	218.4734	10.2448	0.0000
CL PIER 3	5391+73.8525	5.3403	5425.1376		9.5258	295.3293	9.5273	76.8593
CL PIER 3	5391+73.8525	5.3403	5425.1376		9.5258	295.3293	9.5273	0.0000
CL PIER 2	5392+50.6338	5.3403	5424.4471		7.5194	372.1730	7.5239	76.8699
CL PIER 2	5392+50.6338	5.3402	5424.4471		7.5193	372.1730	7.5238	0.0000
CL BRG A1	5393+06.6338	5.3402	5423.9435		5.2444	428.1917	5.2501	56.0649

LONGITUDINAL LINE: OUTSIDE EDGE BRIDGE

BENT LINE DESCRIPTION OR FRACTIONAL POINT DESIGNATION	STATION	OFFSET	* FINISHED ELEVATION	ELEVATION ADJUSTED FOR DEAD LOAD DEFLECTION	COORDINATES FROM LAYOUT LINE OFFSET X	COORDINATES FROM LAYOUT LINE ORDINATE Y	BENT LINE LENGTH FROM Y-AXIS or OFFSET FROM EXTERIOR GIRDER	GIRDER LINE LENGTH
CL BRG A7	5388+78.5400	10.2986			10.1974	-.4765	10.2085	0.0000
CL PIER 6	5389+34.5400	10.2986			12.4748	55.6027	12.4822	55.1255
CL PIER 6	5389+34.5400	10.2988			12.4750	55.6027	12.4824	0.0000
CL PIER 5	5390+15.8108	10.2988			14.5611	137.0283	14.5632	81.4523
CL PIER 5	5390+15.8108	10.2986			14.5611	137.0283	14.5632	0.0000
CL PIER 4	5390+97.0817	10.2988			15.2033	218.4782	15.2033	81.4524
CL PIER 4	5390+97.0817	10.2988			15.2033	218.4782	15.2033	0.0000
CL PIER 3	5391+73.8525	10.2988			14.4835	295.4172	14.4858	76.9424
CL PIER 3	5391+73.8525	10.2988			14.4835	295.4172	14.4858	0.0000
CL PIER 2	5392+50.6338	10.2988			12.4749	372.3439	12.4824	76.9529
CL PIER 2	5392+50.6338	10.2986			12.4748	372.3439	12.4822	0.0000
CL BRG A1	5393+06.6338	10.2986			10.1974	428.4232	10.2085	56.1255



BRIDGE LAYOUT



TYPICAL SPAN LAYOUT

*FINISHED ELEVATIONS ARE AT BRIDGE SEAT.

BRIDGE STANDARD 3

REVISIONS		

DIVISION OF HIGHWAYS

A. T. & S. F. RAILROAD
OVER
SH-470

BRIDGE GEOMETRY

Designer B. OLDENBURG		Structure Numbers	F-16-KF
Detailer L. PACHECO			
Drawing Number B 4	of 15	Drawings	

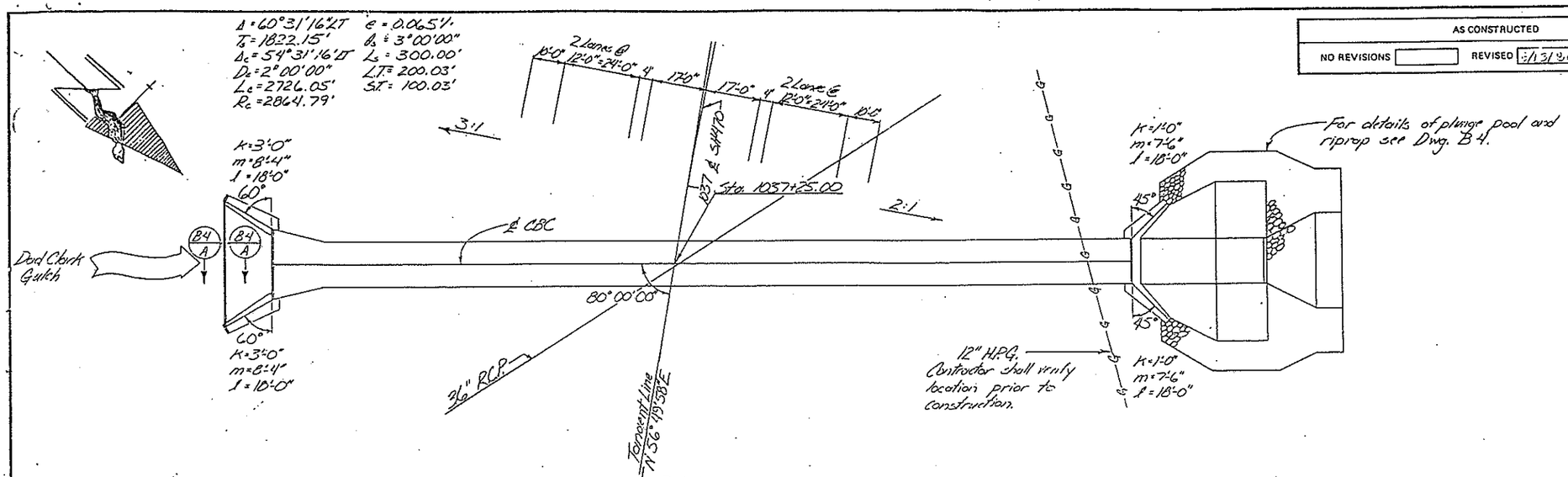
Revision Dates (Preliminary Stage Only)

AS CONSTRUCTED		
NO REVISIONS	REVISED 1/13/96	VOID

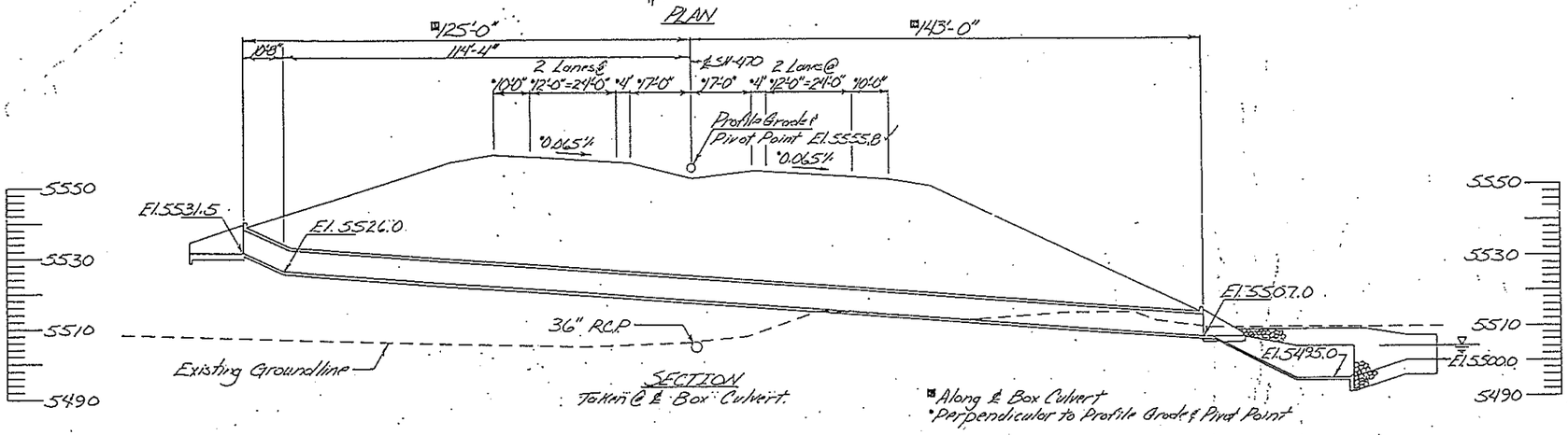
FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	50	108

REVISIONS		

$\Delta = 60°31'16''LT$
$T = 1832.15'$
$\Delta_c = 54°31'16''LT$
$D_c = 2°00'00''$
$L_c = 2726.05'$
$R_c = 2864.79'$
$e = 0.065'/'$
$\Delta_s = 3°00'00''$
$L_s = 300.00'$
$LT = 200.03'$
$ST = 100.03'$

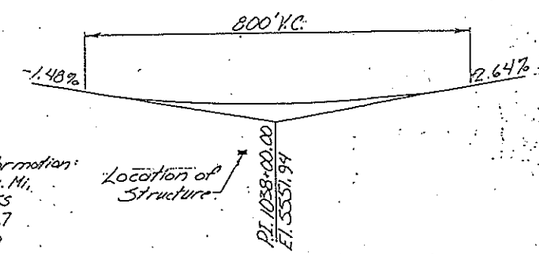


PLAN



SECTION
Taken @ ℄ Box Culvert.

■ Along ℄ Box Culvert
• Perpendicular to Profile Grade & Pivot Point



Hydraulic Information:
D.A. = 7.03 Sq. Mi.
Q_{100} = 1240 CFS
DHW = 5536.7
AHW = 5553.0

PROFILE GRADE

GENERAL NOTES

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

STRUCTURE EXCAVATION AND BACKFILL ~~SHALL BE~~ WERE IN ACCORDANCE WITH STANDARD M-206-1.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.

GRADE 60 REINFORCING STEEL IS REQUIRED.

THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS:

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS A CONCRETE	1'-0"	1'-3"	1'-8"	2'-3"	3'-0"	3'-10"	4'-10"	5'-11"

CONSTRUCTION JOINTS ~~SHALL BE~~ WERE SPACED AT 35 FT. MAXIMUM CENTERS AND ~~SHALL~~ EXTEND THROUGH THE ENTIRE CROSS SECTION OF THE BOX CULVERT.

DESIGN DATA

CURRENT AASHTO SPECIFICATIONS:

LIVE LOAD: AASHTO HS-20-44 AND INTERSTATE ALTERNATE
DEAD LOAD: ASSUMES 48 LBS. PER SQ. FT. FOR BITUMINOUS PAVEMENT

REINFORCED CONCRETE:

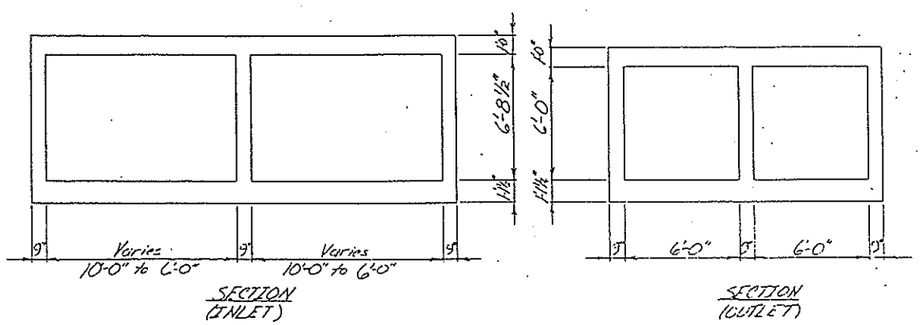
CLASS A CONCRETE: f_c = 1,200 psi, n = 9

REINFORCING STEEL: f_s = 24,000 psi

EARTH LOAD = 84 PCF
FLUID LOAD = 30 PSF

FINAL SUMMARY OF QUANTITIES

	Item No.	Description	Unit	C.B.C. Quantity	Plunge Pool Quantity
Bill #1	206	Structure Excavation	Cu. Yd.	340'	1395'
	206	Structure Backfill (Class 2)	Cu. Yd.	481'	
	206	Filter Material (Class B)	Cu. Yd.		30'
Bill #2	506	Riprap	Cu. Yd.		76'
	506	Heavy Riprap	Cu. Yd.		230'
	506	Plastic Filter Cloth	Sq. Yd.		176'
Bill #3	507	Concrete Slope and Ditch Paving (Reinf.)	Cu. Yd.	41.93 ~~44~~	
	601	Concrete Class A (Box Culvert)	Cu. Yd.	483'	
	602	Reinforcing Steel	Lbs.	44,810'	



SECTION (INLET)

SECTION (OUTLET)

BRIDGE DESCRIPTION

TWO CELL (6'-0" 6'-0" X 6'-0") CONCRETE BOX CULVERT 143'-0" LEFT END 125'-0" RIGHT END OVER DAD CLARK GULCH, 80°00'00" SKEW

DIVISION OF HIGHWAYS

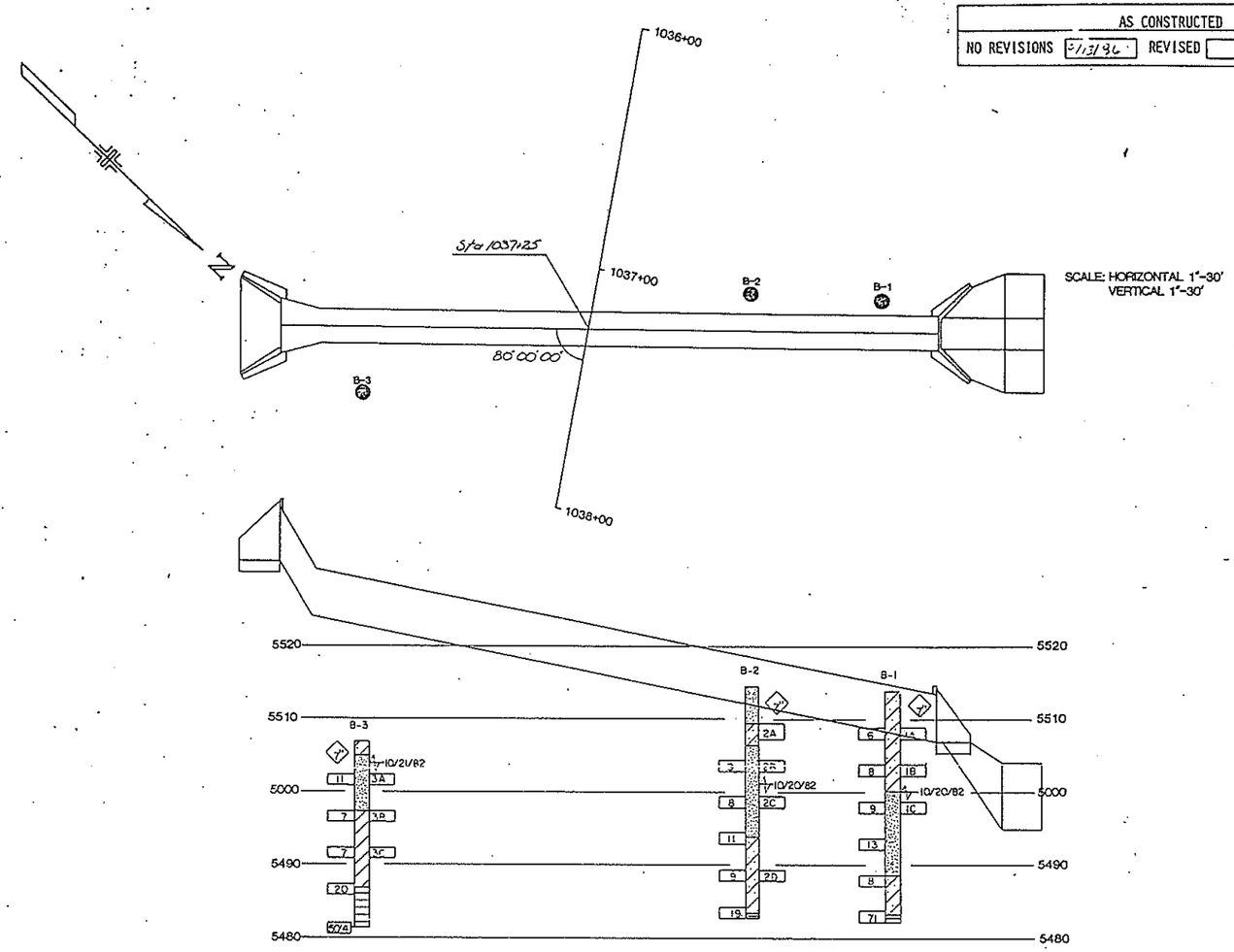
GENERAL LAYOUT

Designer D. Christensen	Structure Numbers	
Detailer D. Christensen		
Drawing Number B1	of 41	Drawings

(Preliminary Stage Only)

AS CONSTRUCTED			
NO REVISIONS	5/13/86	REVISED	VOID

FED. ROAD REG. NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	51	108



SUMMARY OF TEST RESULTS

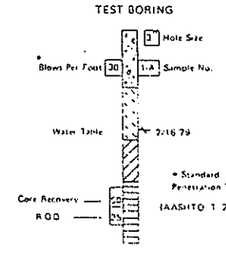
Sample No.	Depth	Classification: Corps. of Engrs. or Visual	Classification: AASHTO	Grading Analysis Percent: Gravel	Coarse Sand	Fine Sand	Silt and Clay	Atterberg Limits: Liquid Limit L_w	Plastic Limit P_w	Plastic Index I_w	Water Cont. W %	Wet Unit Weight γ P.C.F.	Unconfined Strength Q_u T.S.F.	Triaxial Shear Strength: φ	C P.S.I.	Dia. of Sample Inches
[illegible]	[illegible]0-6.5	SANDY CLAY	A-7-6(9)	8	16	24	52	43	19	24	14.3					
1B	10.0-11.5	SANDY CLAY	A-6(7)	1	9	33	57	37	19	18	15.3					
1C	15.0-16.5	[illegible]LTY GRAVELLY SAND	A-1-b(0)	18	54	17	11	NV	NP	NP	17.8					
2A	5.0-5.8	SANDY CLAY	A-6(9)	0	2	31	67	36	19	17	10.7					
2B	10.0-11.5	[illegible]LTY SANDY GRAVEL	A-1-b(0)	40	23	13	24	NV	NP	NP	9.4					
2C	15.0-16.5	[illegible]LTY GRAVELLY SAND	A-1-b(0)	16	54	17	13	NV	NP	NP	17.9					
2D	25.0-26.5	SANDY CLAY	A-7-6(16)	1	6	23	70	49	25	24	39.6					
3A	4.5-6.0	GRAVELLY SAND	A-1-b(0)	17	61	14	8	NV	NP	NP	17.0					
3B	9.5-11.0	CLAY	A-7-6(32)	1	4	16	79	63	24	39	35.1					

TYPE OF MATERIAL

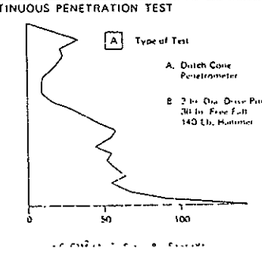
- CLAY
- SAND
- SANDY CLAY
- SHALE

LEGEND

TEST BORING



CONTINUOUS PENETRATION TEST



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

DIVISION OF HIGHWAYS

ENGINEERING GEOLOGY

DAD CLARK GULCH

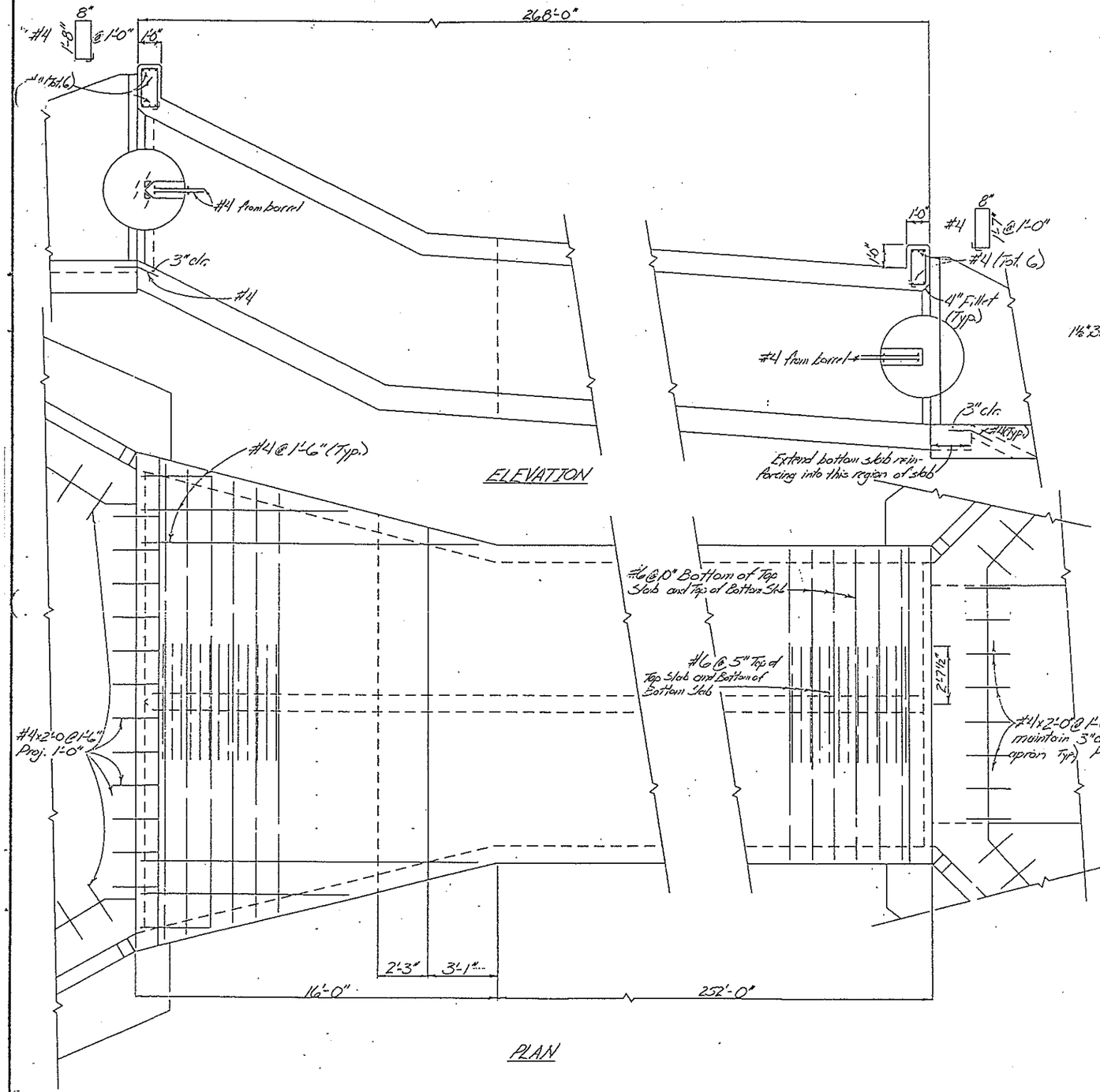
Geologist LB
Drawn by TC
Checked by JP
Date NOV. 5, 1982

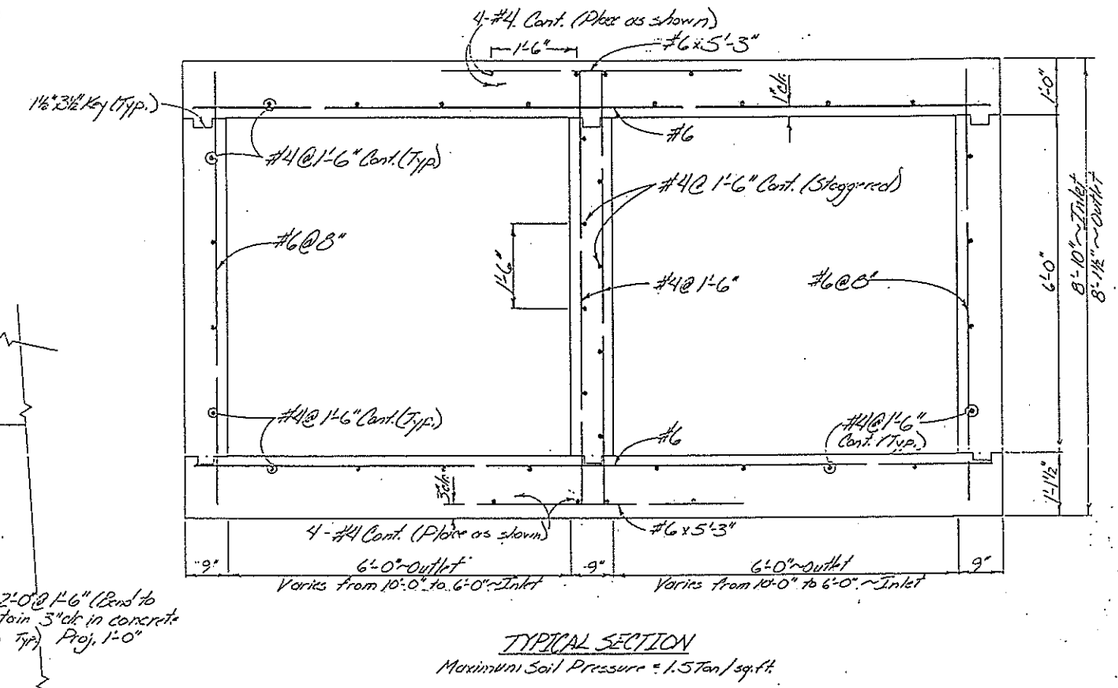
STRUCTURE NO. _____
DWG. NO. B 2 OF 4

AS CONSTRUCTED		
NO REVISIONS 3/31/16	REVISED	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	52	108

REVISIONS		





TYPICAL SECTION

Maximum Soil Pressure = 1.5 Ton/sq.ft.

DIVISION OF HIGHWAYS

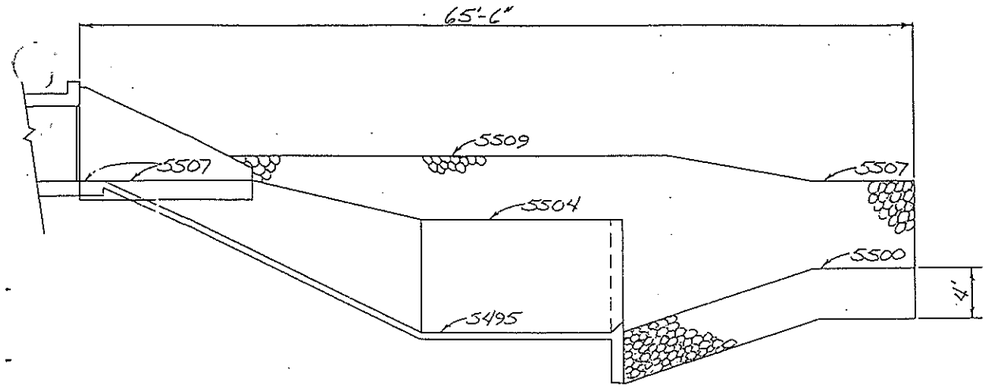
BOX CULVERT DETAILS

Designer D. Christensen		Structure Numbers	
Detailer D. Christensen			
Drawing Number B-3	of 4		Drawings

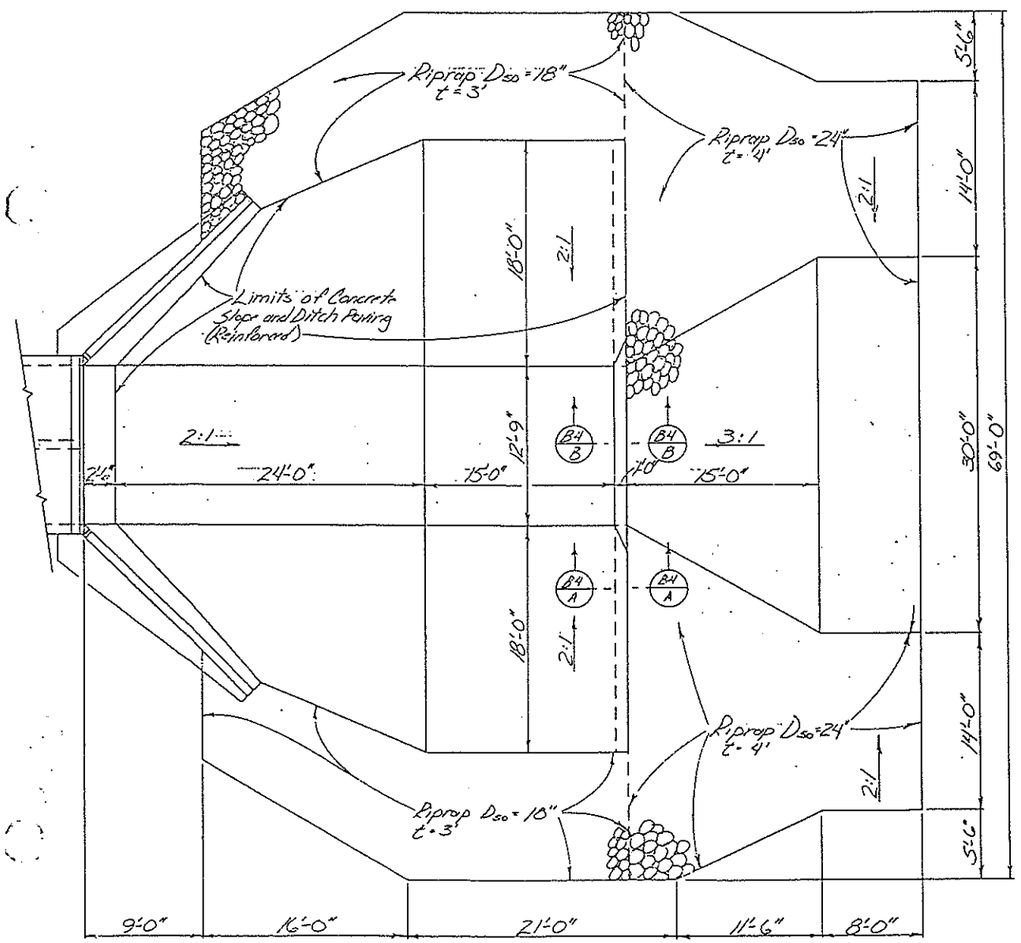
AS CONSTRUCTED			
NO REVISIONS	REVISED	VOID	

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470 1(10)	53	108

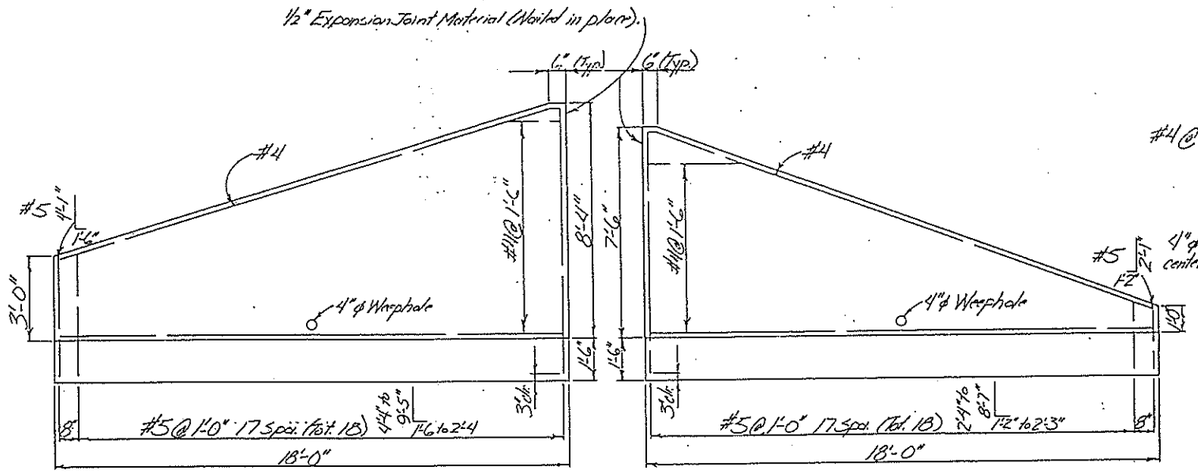
REVISIONS		



PLUNGE POOL~ELEVATION

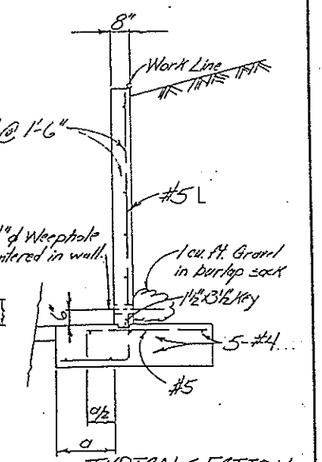


PLUNGE POOL~PLAN

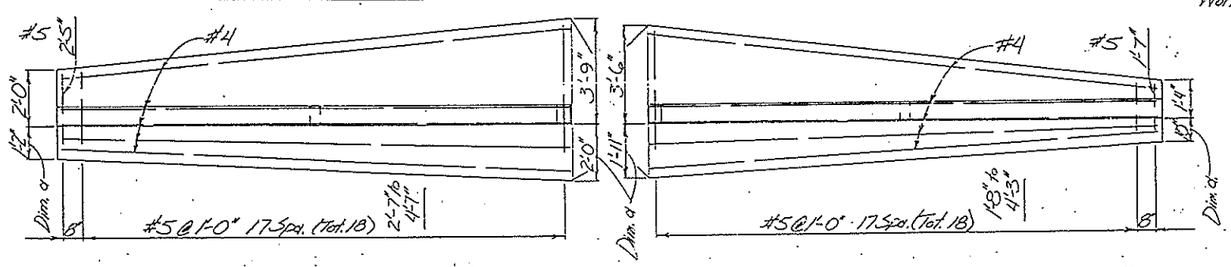


ELEVATION~INLET

ELEVATION~OUTLET

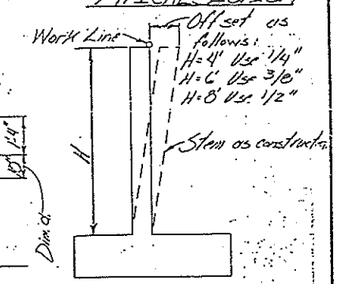


TYPICAL SECTION



PLAN~INLET

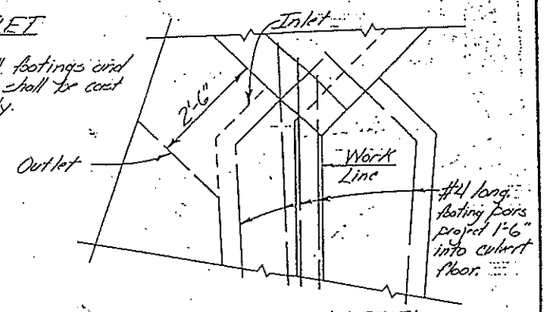
PLAN~OUTLET



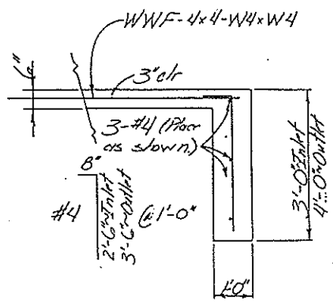
WINGWALL DETAILS

Maximum Soil Pressure=0.75 Tons/sq. ft.

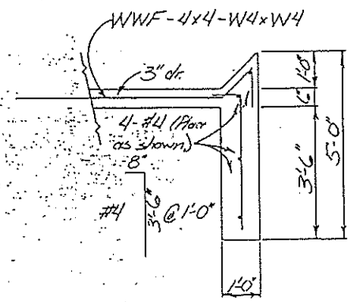
Wingwall footings and culvert floor shall be cast monolithically.



CONNECTION DETAIL



SECTION B-1/A B-4/A



SECTION B-1/B

DIVISION OF HIGHWAYS

PLUNGE POOL & WINGWALL DETAILS

Designer	L. Christensen	Structure Numbers	
Detailer	L. Christensen		
Drawing Number B 4		of 4	Drawings

Revision Dates

(Preliminary Stage Only)

AS CONSTRUCTED		
NO REVISIONS	REVISED 9/13/96	VOID

FEDERAL ROAD REGION NO	DIVISION	PROJ NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	54	108

REVISIONS		

929+99 ~ Remove portion of Rt. Reqd Inlet Type C (H=8.3) Lt. Connect Inlet to existing 24" RCP, Conc. Slope + Ditch Paving at Inlet

932+00 ~ Reqd 30"x80' RCPS, Rt. Inlet Type C (H=4.4) Rt. Connect 30" RCPS to Inlet (Sta. 931+, Rt.)

933+46 ~ Reqd 24"x160' RCPS, Rt. Inlet Type D (H=4.0) Rt. Connect 24" RCPS to Inlet Type C (Sta 932+00, Rt)

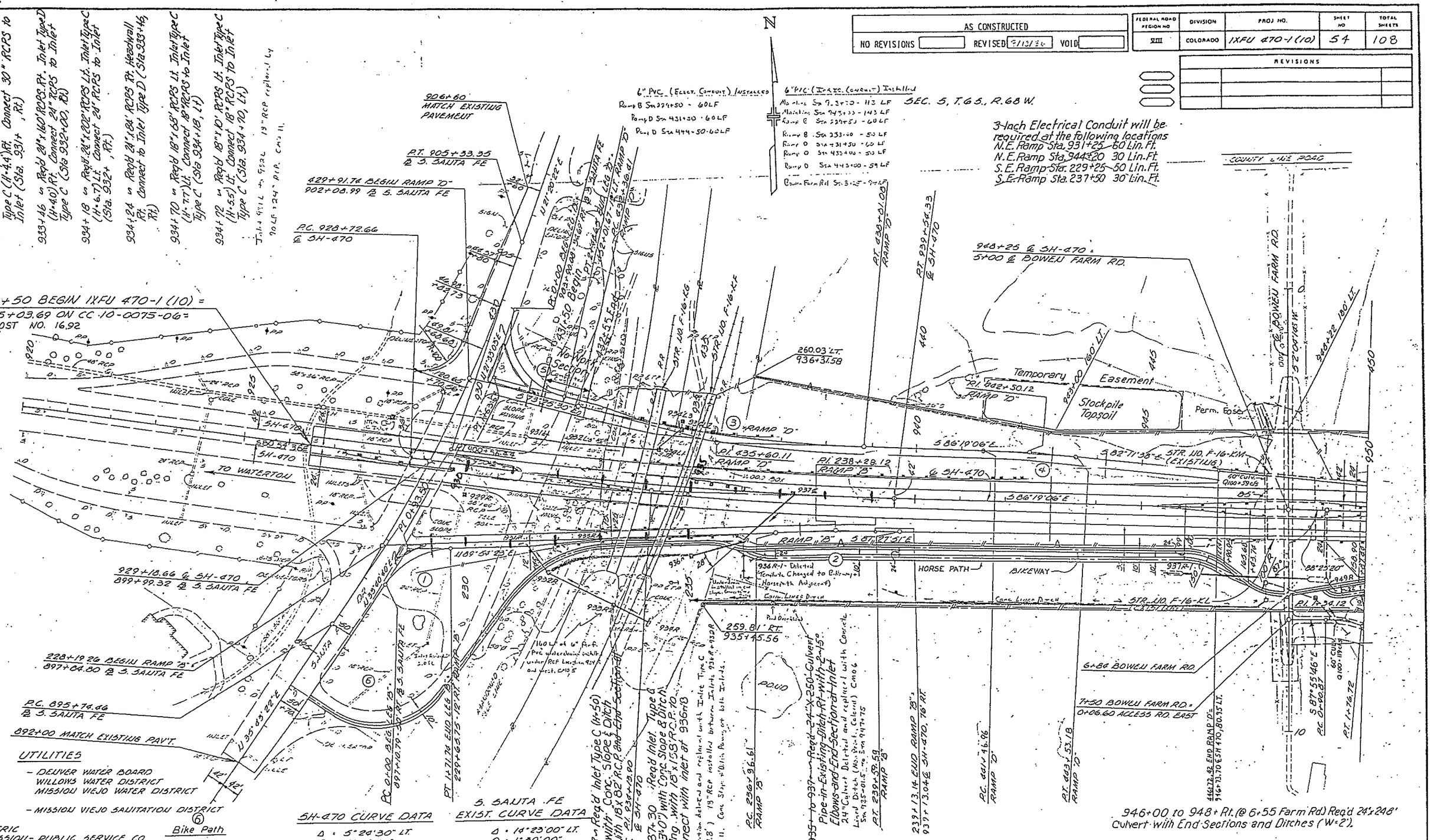
934+18 ~ Reqd 24"x202' RCPS Lt. Inlet Type C (H=6.7) Lt. Connect 24" RCPS to Inlet (Sta. 932+, Rt.)

934+24 ~ Reqd 24"x84' RCPS Rt. Headwall Rt. Connect to Inlet Type D (Sta 933+46)

934+70 ~ Reqd 18"x58' RCPS Lt. Inlet Type C (H=7.7) Lt. Connect 18" RCPS to Inlet Type C (Sta 934+18, Lt)

934+72 ~ Reqd 18"x10' RCPS Lt. Inlet Type C (H=5.5) Lt. Connect 18" RCPS to Inlet Type C (Sta. 934+70, Lt.)

Inlet 931L to 932L 19" RCP replaced by 70 LF 24" RCP, CMS 11.



UTILITIES

WATER - DENVER WATER BOARD
WILLOWS WATER DISTRICT
MISSION VIEJO WATER DISTRICT

SEWER - MISSION VIEJO SANITATION DISTRICT

GAS, ELECTRIC TRANSMISSION - PUBLIC SERVICE CO.

TELEPHONE - MOUNTAIN BELL

48 HOURS BEFORE YOU DIG
CALL FOR THE BLUE STAKES

534-6700

Denver Inter-utility Group
Gas Electric & Telephone

6 Bike Path

Δ = 87°30'
D = 32°44'26"
T = 167.53
L = 267.25
R = 175

SH-470 CURVE DATA

Δ = 5°24'30" LT.
D = 0°30'00"
T = 541.26'
L = 1081.67'
R = 11459.16'
e = RC
SSD > 600'
MDS > 70 MPH

S. SANTA FE EXIST. CURVE DATA

Δ = 14°23'00" LT.
D = 1°30'00"
T = 481.98'
L = 958.89'
R = 3819.72'
e = 0.042 ft/ft

RAMPS CURVE DATA

	1 LEG "B"	2 RAMP "B"	3 RAMP "D"	4 RAMP "D"	5 LEG "D"
Δ	54°13'43" RT.	2°37'48" RT.	12°53'36" LT.	4°07'28" RT	94°58'33" LT
D	32°44'26"	1°00'	2°00'	2°00'	38°11'50"
T	93.50'	131.52'	323.70'	103.16'	163.63'
L	171.74'	262.99'	644.67'	206.22'	248.65'
R	175.00'	5729.58'	2864.79'	2864.79'	150.00'
e	0.02 ft/ft	0.029 ft/ft	0.038 ft/ft	0.038 ft/ft	0.02 ft/ft

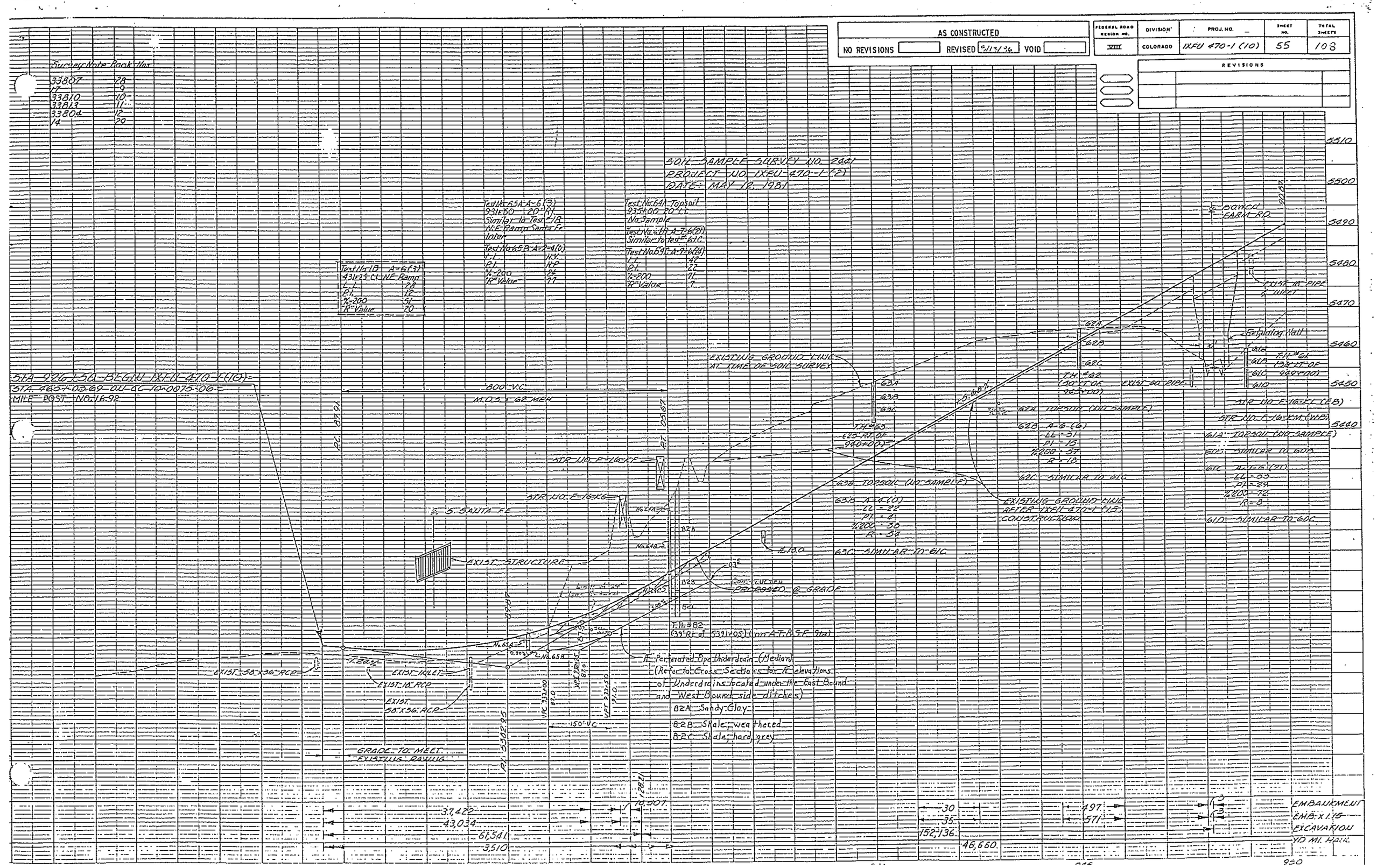
NOTES

1. FOR RAILROAD ALIGNMENT AND STRUCTURES, SEE RAILROAD PLAN & PROFILE.
2. FOR ADDITIONAL INTERCHANGE GEOMETRY, SEE GRADING PLAN

AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/76	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	55	108

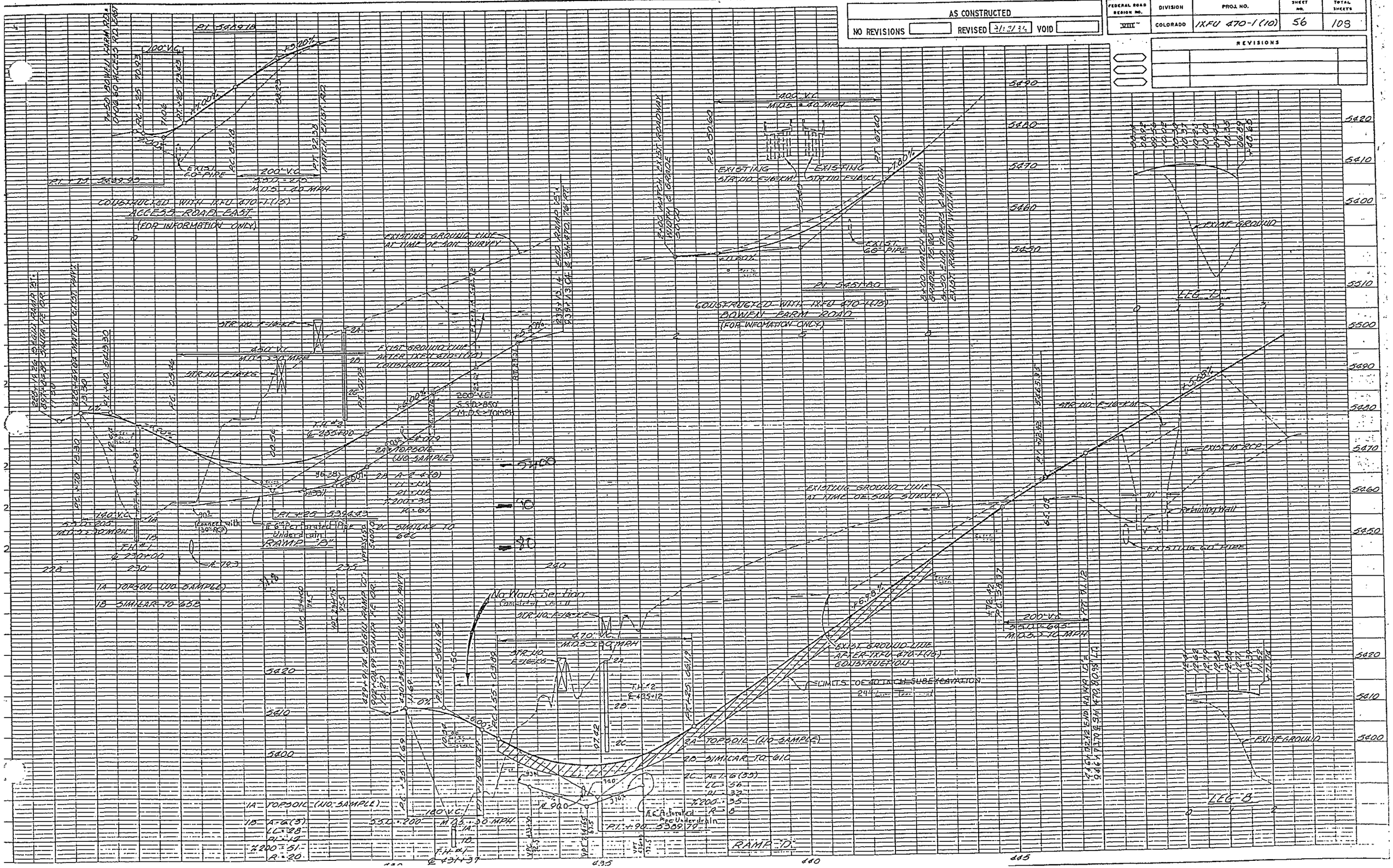
REVISIONS	



AS CONSTRUCTED		
NO REVISIONS	REVISED 3/13/3½	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	56	108

REVISIONS


PI 548+18
100' V.C.
EXIST. 60" PIPE
200' V.C.
M.D.S. = 20 MPH
CONSTRUCTED WITH IXFU 470-1(15)
ACCESS ROAD EAST
(FOR INFORMATION ONLY)
EXISTING GROUND LINE AT TIME OF SOIL SURVEY
STR. NO. F-16-XC
450' V.C.
M.D.S. = 30 MPH
STR. NO. F-16-XC
EXIST. GROUND LINE AFTER IXFU 470-1(10) CONSTRUCTION
200' V.C.
S.S.D. ≥ 850'
M.D.S. = 70 MPH
T.H. #2
℄ 235+00
TOPSOIL (NO SAMPLE)
6" Perforated Pipe Underdrain
RAMP "D"
SIMILAR TO 66B
1A TOPSOIL (NO SAMPLE)
1B SIMILAR TO 65B
No Work Section
STR. NO. F-16-XC
470' V.C.
M.D.S. = 30 MPH
STR. NO. F-16-XC
TOPSOIL (NO SAMPLE)
SIMILAR TO 61C
A-1-a(3)
LL = 28
PI = 10
K 200 = 51
R = 20
120' V.C.
M.D.S. = 30 MPH
T.H. #1
℄ 431+37
RAMP "D"
EXISTING STR. NO. F-16-KM
EXISTING STR. NO. F-16-KC
EXIST. 60" PIPE
EXISTING GROUND LINE AT TIME OF SOIL SURVEY
Retaining Wall
EXISTING 60" PIPE
200' V.C.
M.D.S. = 10 MPH
EXIST. GROUND LINE AFTER IXFU 470-1(15) CONSTRUCTION
LIMITS OF 40 INCH SUBEXCAVATION
CONSTRUCTED WITH IXFU 470-1(15)
BOWEN FARM ROAD
(FOR INFORMATION ONLY)
EXIST. GROUND
LEG "D"
LEG "B"
5490
5480
5470
5460
5450
5440
5430
5420
5410
5400
5390
5380
5370
5360
5350
5340
5330
5320
5310
5300
5290
5280
5270
5260
5250
5240
5230
5220
5210
5200
5190
5180
5170
5160
5150
5140
5130
5120
5110
5100

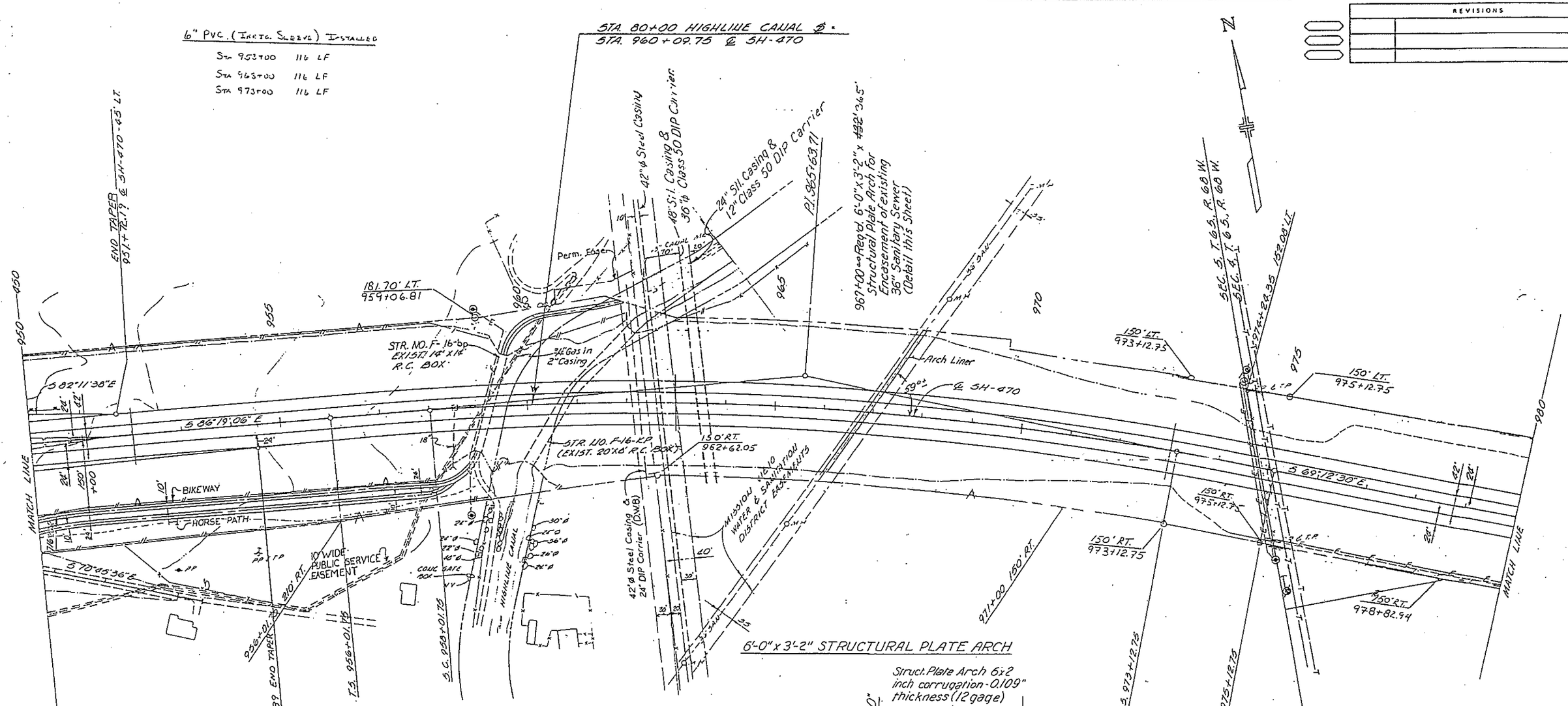
AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/96	VOID

FEDERAL ROAD REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	57	102

REVISIONS		

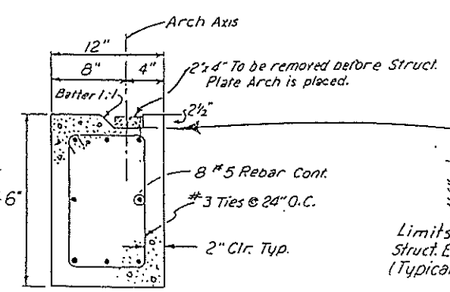
6" PVC. (IRRIG. SLEEVE) INSTALLED

STA 953+00	116 LF
STA 963+00	116 LF
STA 973+00	116 LF



SH-470 CURVE DATA

Δs = 17°06'36" Rt.	es = 1°00'
Ts = 951.96'	Ls = 200.00'
Es = 64.76'	L.T. = 133.34'
Δc = 15°06'36" Rt.	S.T. = 66.67'
Dc = 1°00	S.S.D. > 600'
Tc = 759.91'	MOS > 70 MPH
Lc = 1511.00'	
Rc = 5729.58'	
e = 0.038'/'	

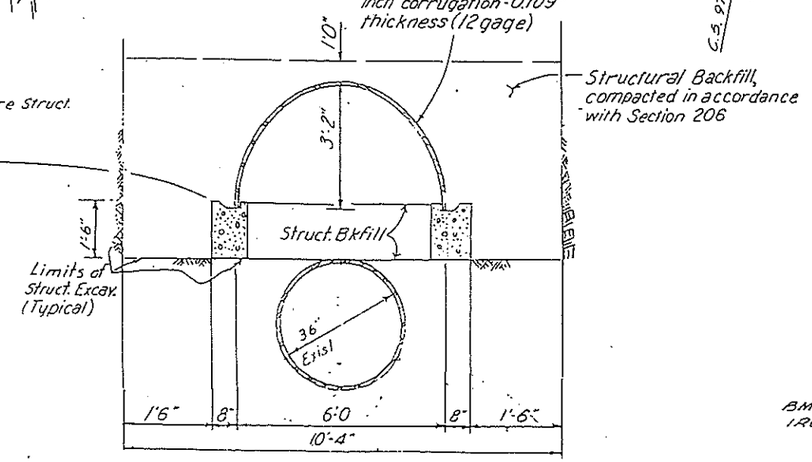


CONTINUOUS CONC. FOOTING FOR 6'-0" x 3'-2" STRUCTURAL PLATE ARCH

DETAIL

ORIGINAL SCALE 1½" = 1'-0"

6'-0" x 3'-2" STRUCTURAL PLATE ARCH

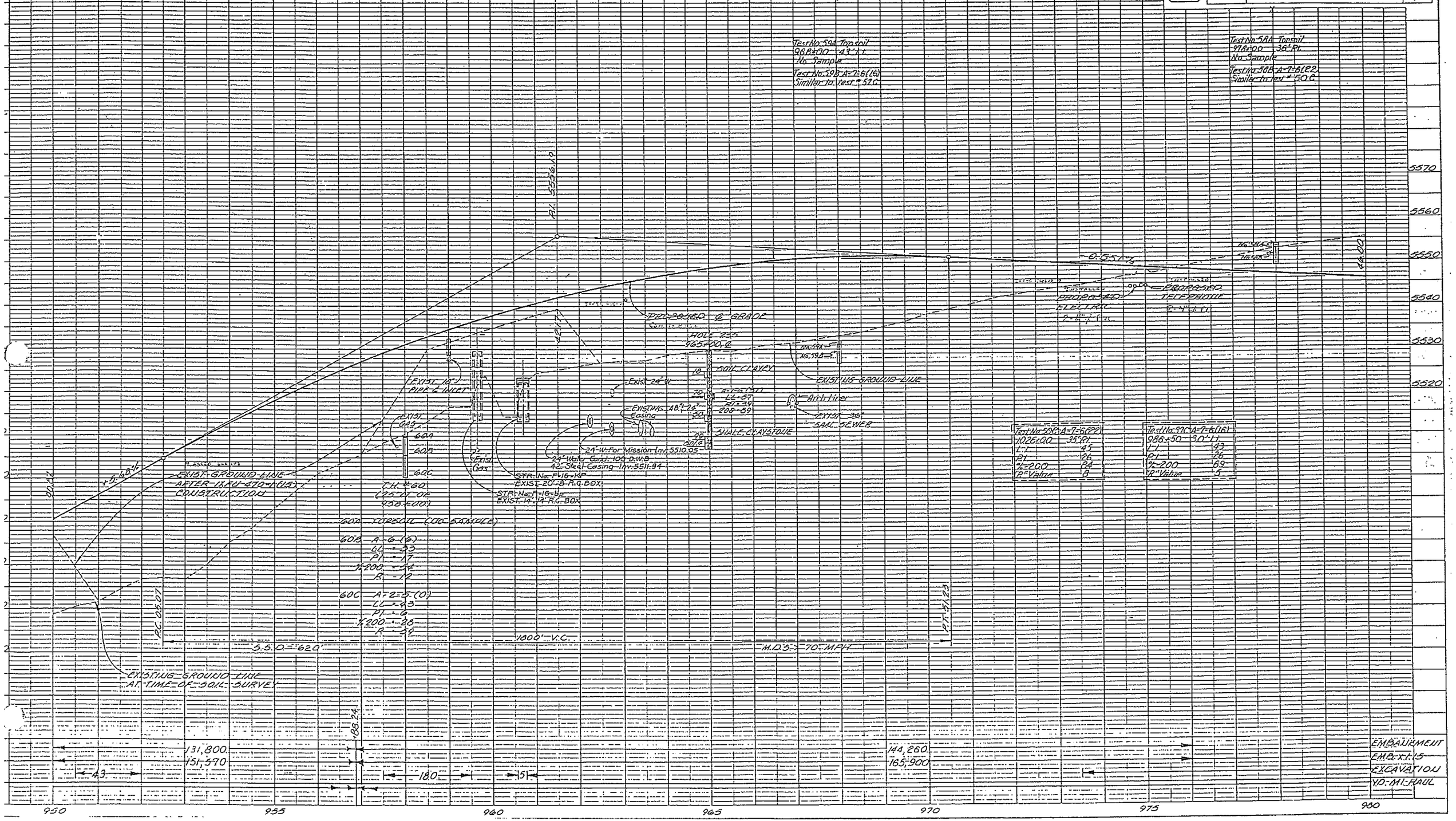


BM #38 - ELEV. 5539.60
IRON PIN 154' LT. 973+00

AS CONSTRUCTED			
NO REVISIONS		REVISED 8/12/36	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	58	108

REVISIONS		



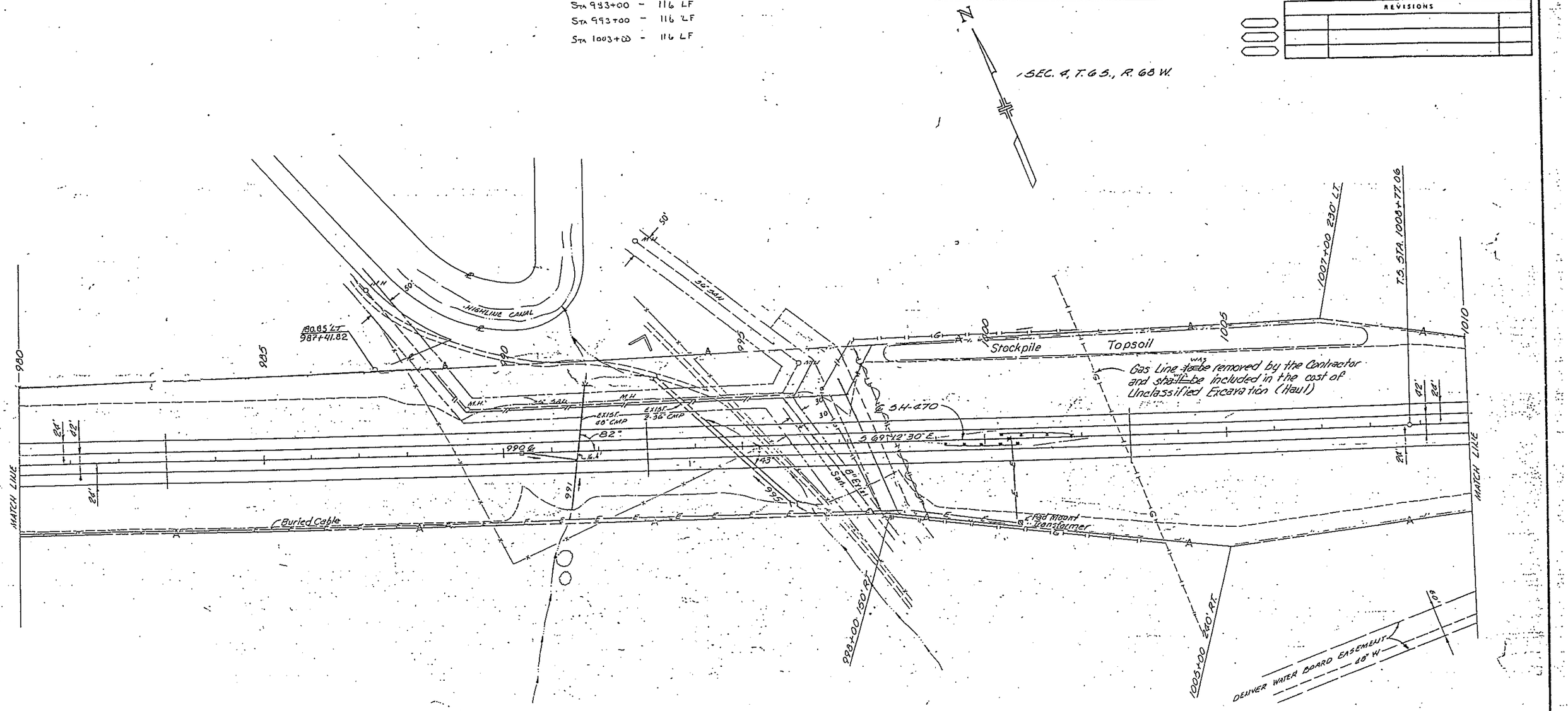
AS CONSTRUCTED				
NO REVISIONS		REVISED 8/13/86	VOID	

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	59	108

REVISIONS		

6" PVC (IRRIG. SLEEVE) INSTALLED

STA 983+00 - 116 LF
STA 993+00 - 116 LF
STA 1003+00 - 116 LF



990 ℄
990+36 - REQ'D.
INLET TYPE C (H=3'0"), IN MEDIAN
W/CONC. SLOPE & DITCH
PAVING, 18"x 14" CULVERT
& CONNECT TO 54" CULVERT

991
991+54 - REQ'D 54"x 270 RCP
W/TYPE 5 HEADWALL ~~LT.~~ RT. +
RIPRAP LT.

D.A. = 110 ACRES
Q100 = 122 CFS
D.H.W. = 5533.6
A.H.W. = 5540.0

995
994+76 - REQ'D.
2-36"x 256' CSP CULVERTS
WITH END SECTIONS RT.
& TIE TO EXIST. PIPES LT.

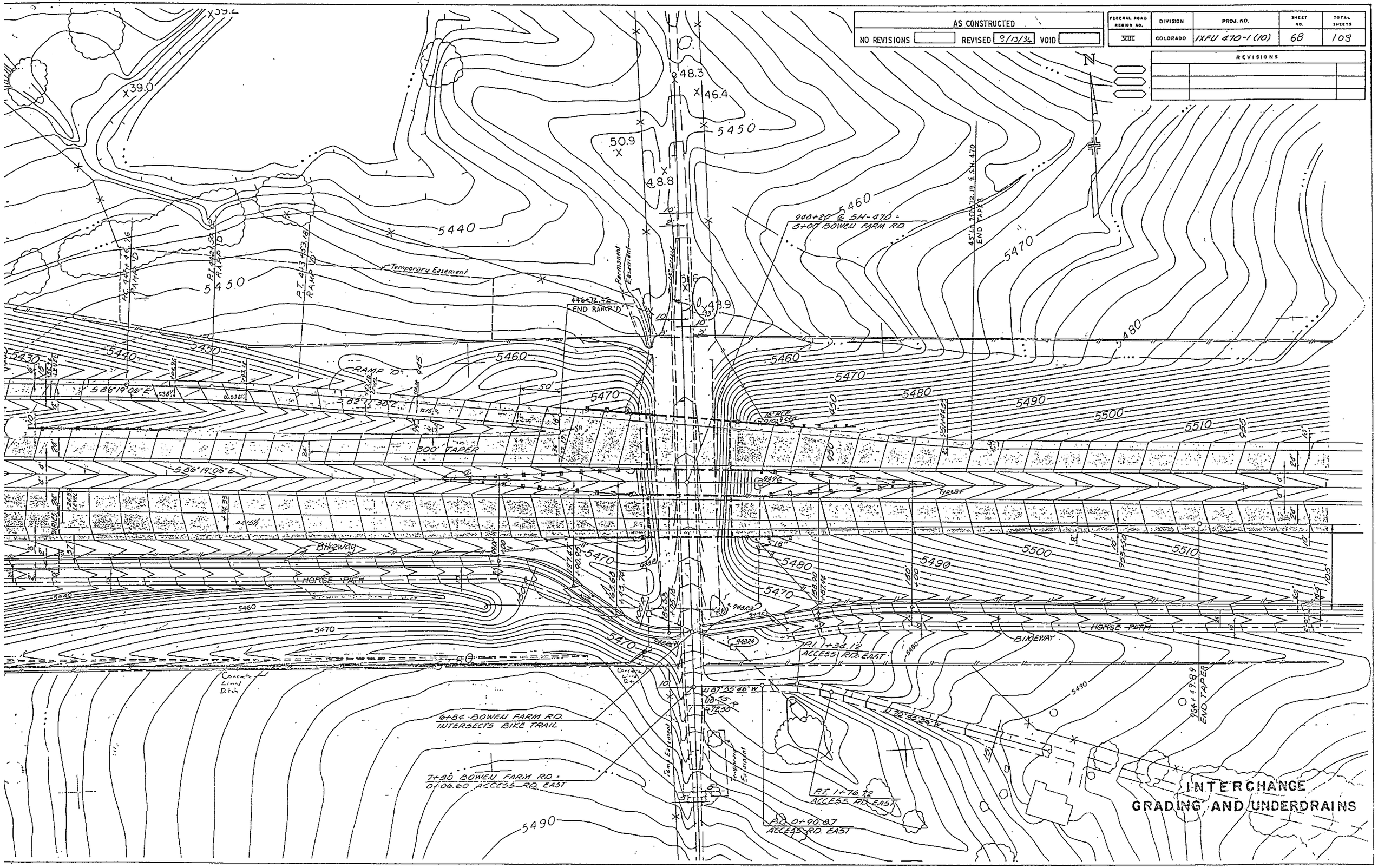
D.A. = 90 ACRES
Q100 = 105 CFS
D.H.W. = 5537.2
A.H.W. = 5540.0

997+51 ~~997+50~~ - Req'd 42"x 3.10' Welded Steel Pipe encasement for future City of Englewood Water line.

AS CONSTRUCTED		
NO REVISIONS	REVISED 9/13/76	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	68	108

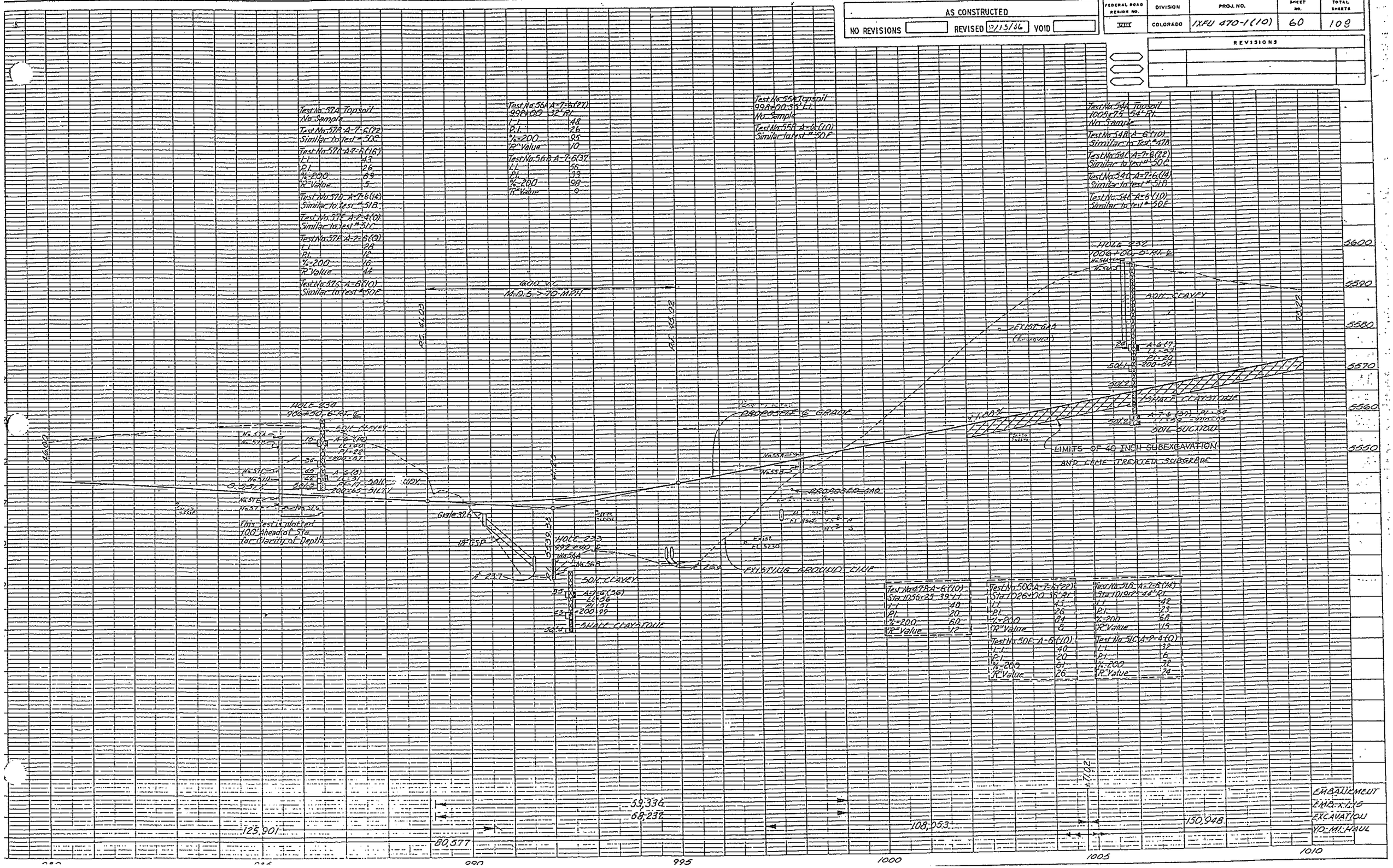
REVISIONS		



AS CONSTRUCTED		
NO REVISIONS	REVISED 12/13/86	VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	60	109

REVISIONS



Test No. 47A A-6(10)	
Sta. 1056+25 39' Lt.	
LL	40
PI	20
%-200	60
"R" Value	12

Test No. 50C A-7-6(22)	
Sta. 1026+00 35' Rt.	
LL	45
PI	26
%-200	84
"R" Value	8

Test No. 51B A-7-6(14)	
Sta. 1019+25 44' Rt.	
LL	42
PI	23
%-200	68
"R" Value	15

Test No. 50E A-6(10)	
LL	40
PI	20
%-200	61
"R" Value	26

Test No. 51C A-2-4(0)	
LL	32
PI	6
%-200	32
"R" Value	24

STATE OF COLORADO

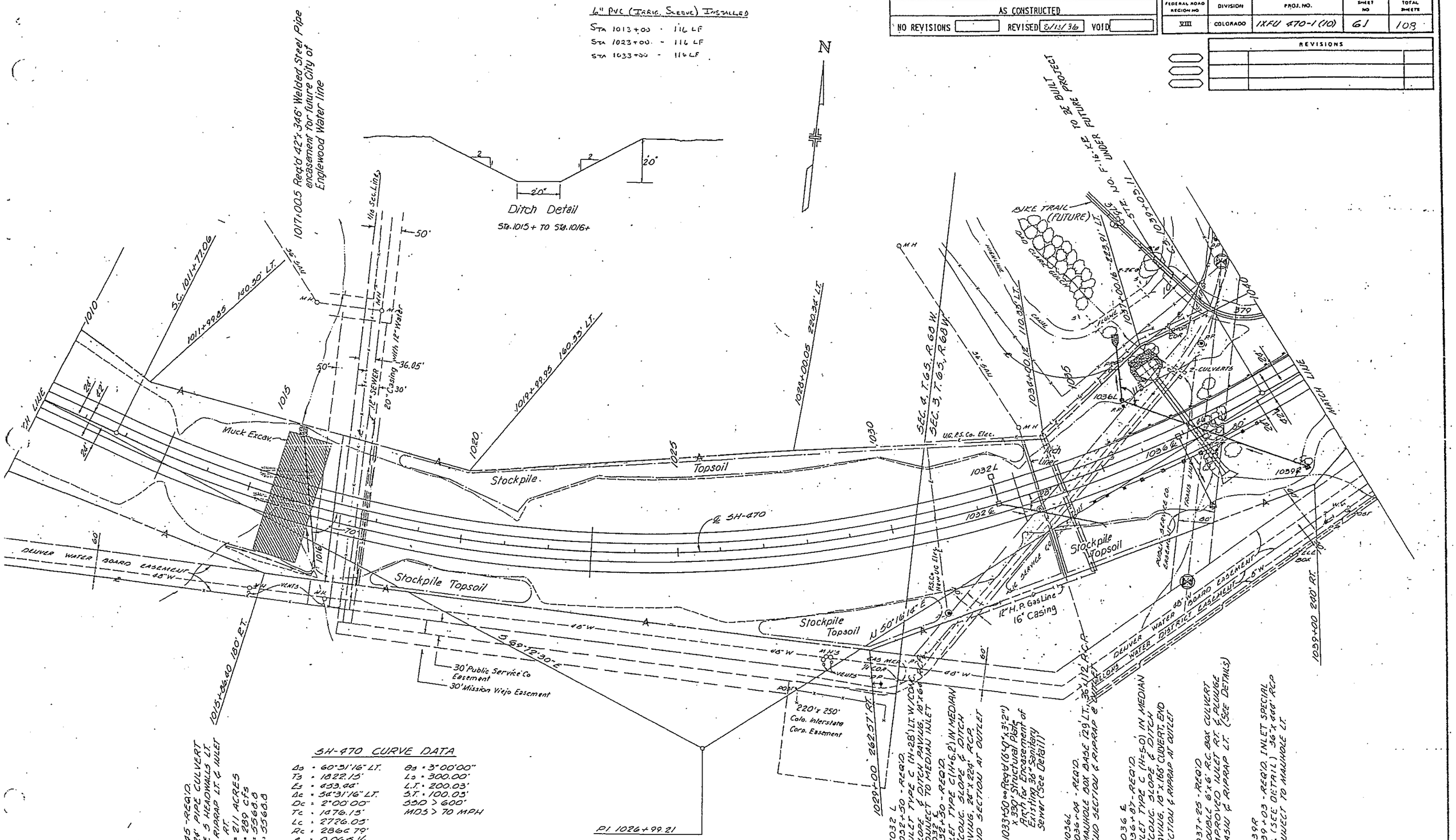
AS CONSTRUCTED		
NO REVISIONS	REVISED 8/13/36	VOID

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	61	108

REVISIONS		

6" PVC (IRRIG. SLEEVE) INSTALLED

STA 1013+00 - 116 LF
STA 1023+00 - 116 LF
STA 1033+00 - 116 LF



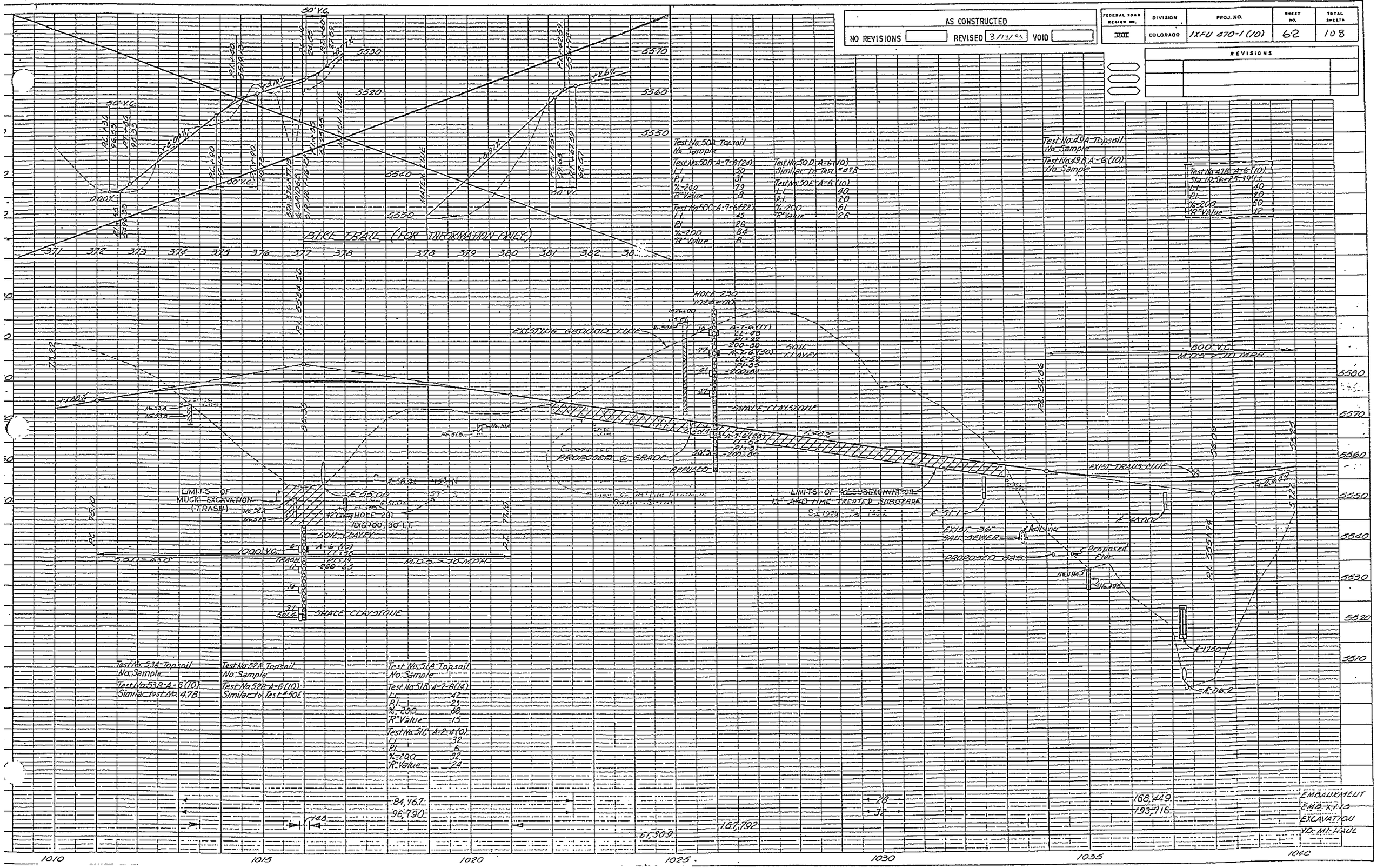
SH-470 CURVE DATA

Δs = 60°31'16" LT.	θs = 3°00'00"
Ts = 1822.15'	Ls = 300.00'
Es = 453.44'	L.T. = 200.03'
Δc = 56°31'16" LT.	S.T. = 100.03'
Dc = 2°00'00"	SSD > 600'
Tc = 1476.15'	MDS > 70 MPH
Lc = 2726.05'	
Rc = 2866.79'	
e = 0.065 ft/ft	

AS CONSTRUCTED						
NO REVISIONS		REVISED	3/13/58	VOID		

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
XIII	COLORADO	IXFU 470-1 (10)	62	108

REVISIONS		



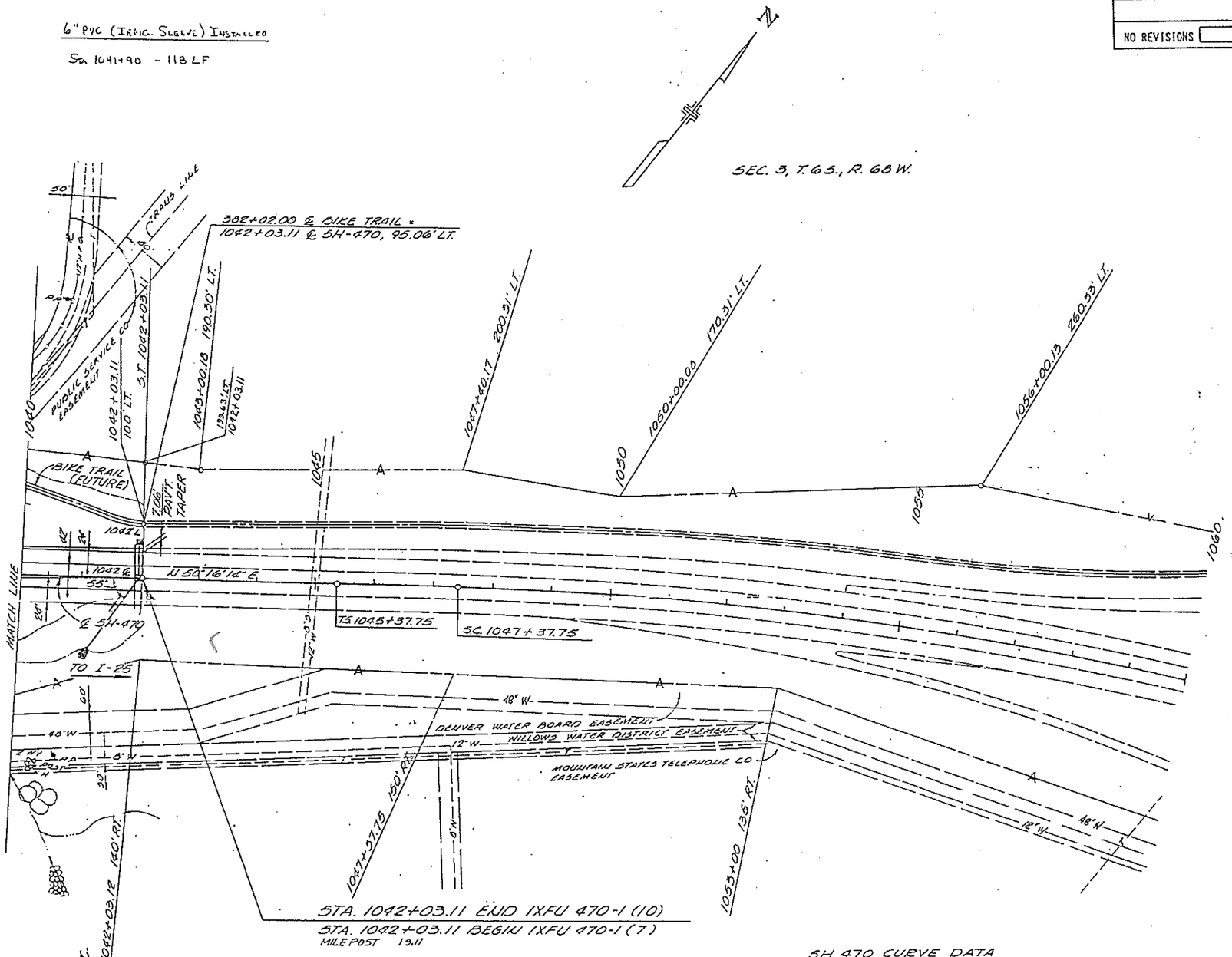
AS CONSTRUCTED			
NO REVISIONS		REVISED 8/13/96	VOID

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	63	108

REVISIONS

6" PVC (IRRIG. SLEEVE) INSTALLED

Sta 1041+90 - 118 LF



1042 L
1042+00 - REQ'D.
INLET TYPE C (H=4.5') LT. W/CONC.
SLOPE & DITCH PAVING.
18"x 68' RCP

1042 ℄
1042+00 - REQ'D. INLET
TYPE C IN MEDIAN WITH
CONC. SLOPE & DITCH
PAVING, 18"x 140' RCP,
END SECTION & RIPRAP
AT OUTLET.

BM #11 - ELEV. 5549.18
IRON PIN 203' LT. 1040+76

BM #10 - ELEV. 5562.84
IRON PIN 147' LT. 1041+55

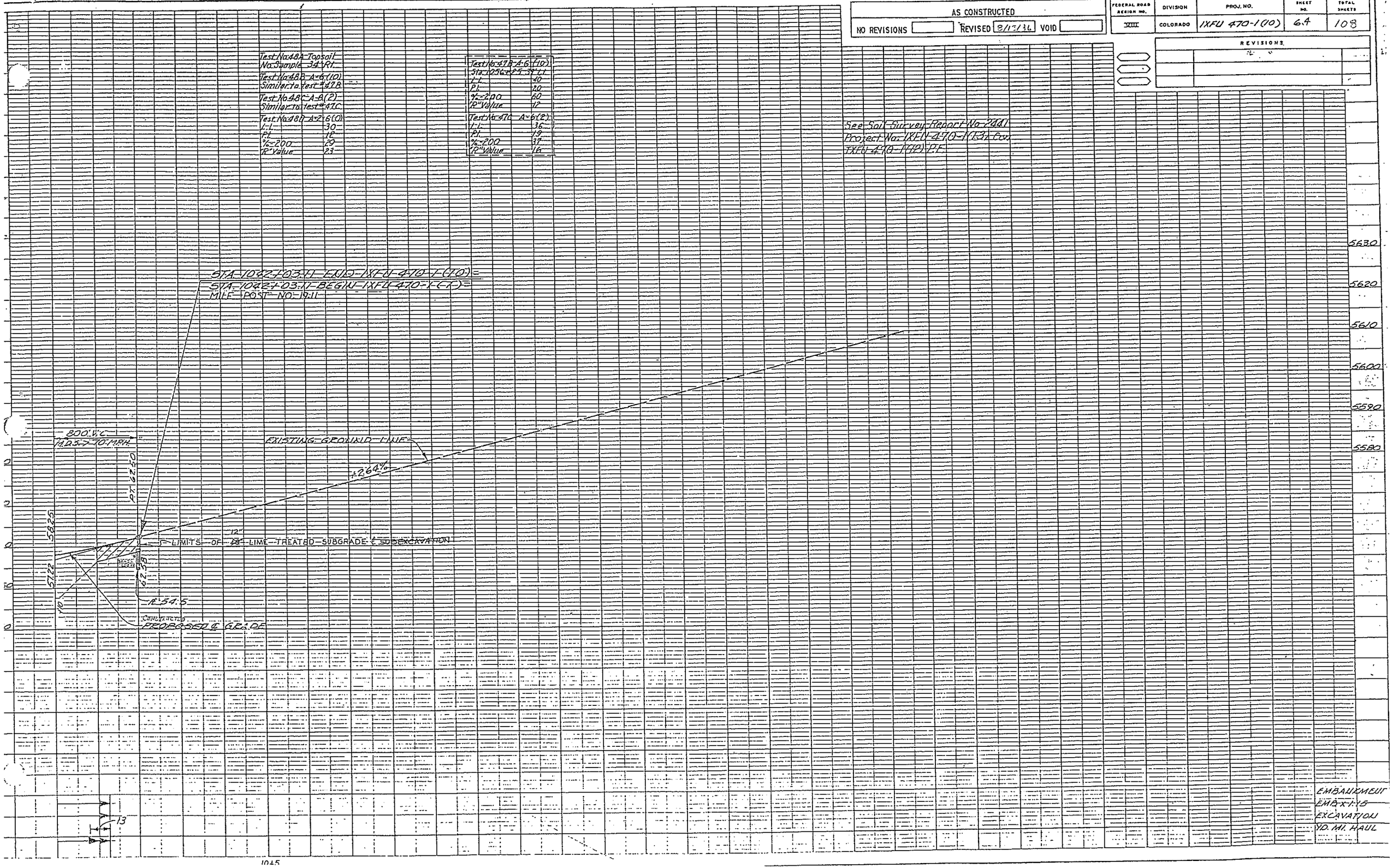
SH 470 CURVE DATA

Δs = 49°07'11" RT.
Ts = 2956.51'
Es = 622.03'
Δc = 47°17'11" RT.
Dc = 0°55'00"
Tc = 2736.37'
Lc = 5158.52'
Rc = 6250.45'
e = 0035 1/1
θs = 0°55'00"
Ls = 200.00'
L.T. = 133.34'
ST = 66.67'
SSD > 600'
MOS > 70 MPH

AS CONSTRUCTED				
NO REVISIONS	REVISED 8/13/36	VOID		

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1(10)	64	108

REVISIONS

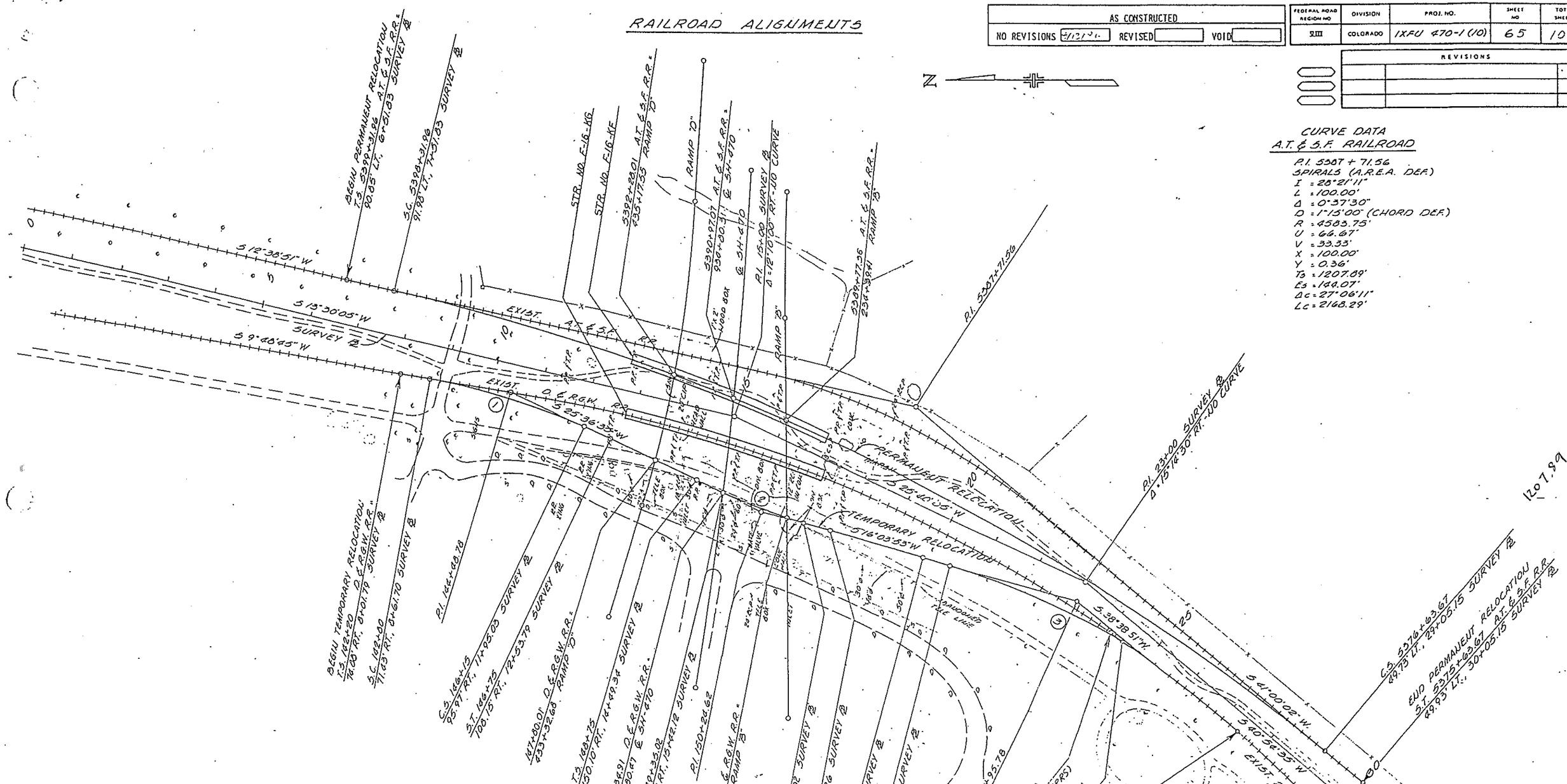


RAILROAD ALIGNMENTS

AS CONSTRUCTED		
NO REVISIONS 4/12/94	REVISED	VOID

FEDERAL ROAD REGION NO	DIVISION	PROJ. NO.	SHEET NO	TOTAL SHEETS
VIII	COLORADO	IXFU 470-1 (10)	65	108

REVISIONS		



CURVE DATA
A.T. & S.F. RAILROAD

P.I. 5387 + 71.56
SPIRALS (A.R.E.A. DEF.)
I = 28°21'11"
L = 100.00'
Δ = 0°37'30"
D = 1°15'00" (CHORD DEF.)
R = 4583.75'
U = 66.67'
V = 33.33'
X = 100.00'
Y = 0.36'
Ts = 1207.89'
Es = 144.07'
Δc = 27°06'11"
Lc = 2168.29'

CURVE DATA D. & R.G.W. RAILROAD

(1)

P.I. 148+48.78
SPIRALS (A.R.E.A. DEF.)
I = 15°47'50" RT.
L = 60.00'
Δ = 1°12'00"
D = 4°00'00" (CHORD DEF.)
R = 1432.69'
U = 60.00'
V = 30.00'
X = 60.00'
Y = 0.41'
Ts = 228.78'
Es = 13.82'
Δc = 13°23'50"
Lc = 335.00'

(2)

P.I. 150+24.62
SPIRALS (A.R.E.A. DEF.)
I = 9°32'42" LT.
L = 60.00'
Δ = 1°12'00"
D = 4°00'00" (CHORD DEF.)
R = 1432.69'
U = 60.00'
V = 30.00'
X = 60.00
Y = 0.41'
Ts = 149.62'
Es = 5.08'
Δc = 7°08'42"
Lc = 178.66'

(3)

P.I. 156+95.78
SPIRALS (A.R.E.A. DEF.)
I = 22°34'57" RT.
L = 60.00' & 300.00
Δ = 1°12'00" & 5°59'56"
D = 4°00'00" (CHORD DEF.)
R = 1432.69'
U = 60.00' & 100.01
V = 30.00' & 50.00
X = 60.00'
Y = 0.41'
Ts = 322.61 & 429.98
Es = 33.35'
Δc = 15°23'02"
Lc = 384.68

OF COLORADO

AS CONSTRUCTED			FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
NO REVISIONS 2/13/96	REVISED	VOID	VIII	COLORADO	IXFU 470-1(10)	66	108

PLATE 3 FULL CROSS SECTION