

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

PLAN AND PROFILE OF PROPOSED FEDERAL AID PROJECT NO. S0011(5) STATE HIGHWAY NO. 59 KIT CARSON COUNTY

FEDERAL ROAD DISTRICT NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO	S0011(5)	1

INDEX OF SHEETS

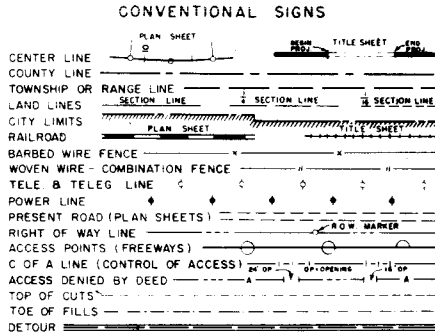
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2. Typical Section & General Notes.
3. Summary of Approximate Quantities.
4. PVI Location, Details of Asphaltic Ditch Paving, Sta 712+ & Details of Concrete Slope Paving, Sta 754+.
5. Subbase & Facing Material Plan and Tabulation of Delimiters.
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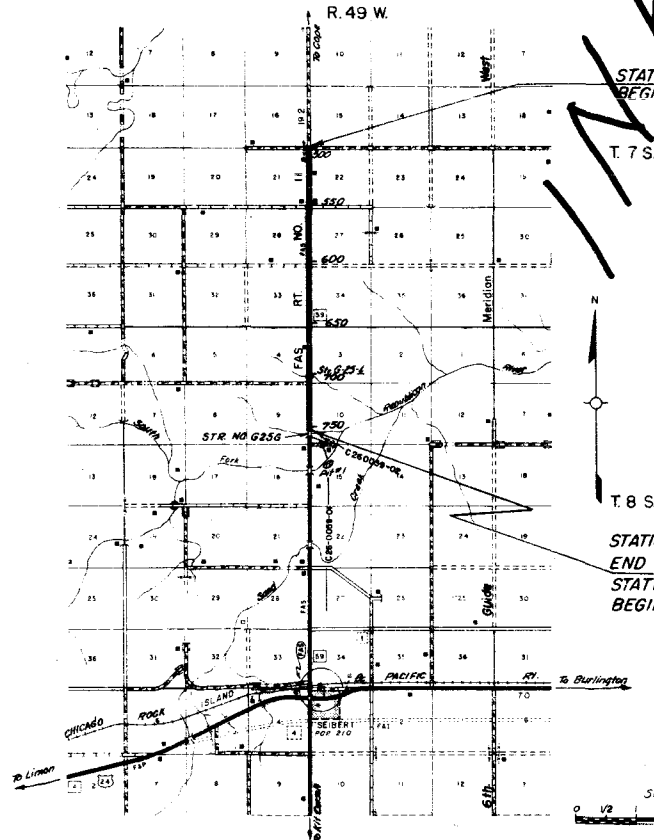
Feb. 11, 64
Sep. 24, 64
Feb. 3, 64
Feb. 3, 64
Feb. 11, 64
Oct. 27, 64
Feb. 1, 65
Feb. 1, 65



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

TABULATION OF LENGTH & DESIGN DATA

STATION	LIN. FT.
498+00 BEGIN PROJ. S0011(5)	25,657.2
754+57.2 BK-END PROJ. S0011(5)	
27+57.87 AH-BEGIN PROJ. C26-0059-02	
TOTAL	25,657.2
SUMMARY	LIN. FT. MILES
NET & GROSS LENGTH	25,657.2 4.859
DESIGN DATA	
MAX. GRADE	4.34 %
MIN. SSD VERTICAL	557'
MAX. DESIGN SPEED	60 MPH



STATION 754+57.2 BK-
END S0011(5)=
STATION 27+67.87 AH
BEGIN C26-0059-02

SEE SPECIAL PROVISIONS FOR
NOTICE TO BIDDERS

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

APPROVED: John E. Shumate 2-10-65
CHIEF ENGINEER DATE

By: L. B. Brown, Deputy Chief Engr.

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED: _____ DATE _____

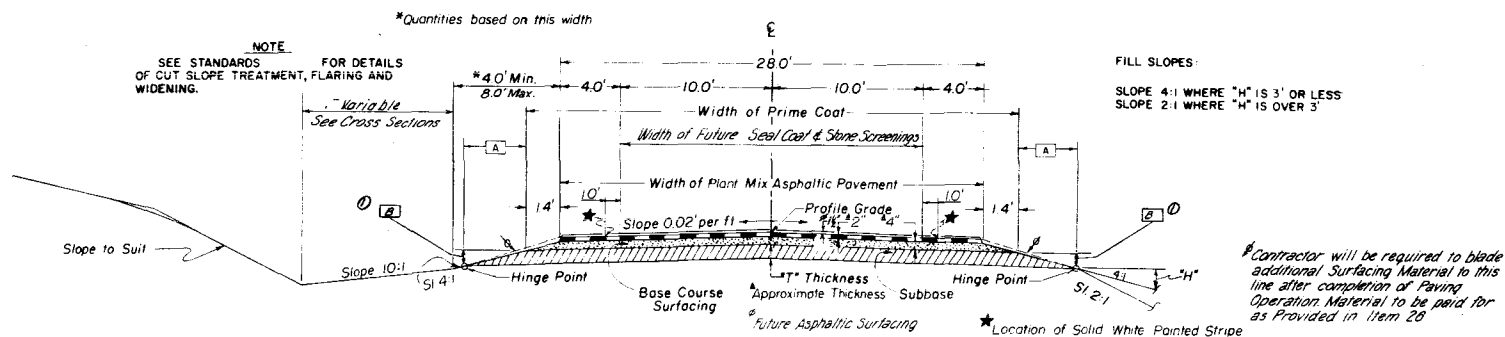
DIVISION ENGINEER

J.L.C.

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	50011 (5)	2	

① Rev. Typical Section " 3-24-65 " J.L.C.

TYPICAL SECTION



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

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

*APPROXIMATE 6" COMPACTED THICKNESS OF GRAVEL OR CRUSHED ROCK SURFACING SHALL BE PLACED IN SEPARATE COURSES AT THE FOLLOWING RATES PER 100 LIN. FT. OF ROADWAY:

ASPHALTIC PAVEMENT	32' TONS
BASE COURSE	66 TONS

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

THICKNESS OF SUBBASE, SURFACING AND ASPHALTIC PAVEMENT MATERIALS AS SHOWN ON PLANS IS APPROXIMATE ONLY. THESE MATERIALS ARE TO BE PLACED ON THE BASIS OF TONNAGES SHOWN ON PLANS.

TABLE OF SUBBASE THICKNESS

Thickness	A	B
4"	1.4'	0.4'
5"	1.8'	0.5'
7"	2.5'	0.6'
9"	3.3'	0.8'
12"	4.3'	1.1'

GENERAL NOTES

THIS PROJECT IS TO BE CONSTRUCTED IN CONFORMITY WITH THE STANDARD SPECIFICATIONS OF THE COLORADO DEPARTMENT OF HIGHWAYS, ADOPTED JANUARY 1, 1958.

ALL QUANTITIES ON PRELIMINARY PLANS ARE TO BE CONSIDERED APPROXIMATE ONLY.

ALL POLES ENCRANCHING ON CONSTRUCTION ARE TO BE MOVED BY THE OWNERS.

Thickness of Subbase, Surfacing and Asphaltic Pavement Materials as shown on plans is approximate only. These materials are to be placed on the basis of tonnages shown on plans.

CLASS "AX" CONCRETE MAY BE USED ON THIS PROJECT. FOR PRELIMINARY PLAN QUANTITIES OF ASPHALTIC ROAD MATERIALS, THE FOLLOWING RATES OF APPLICATION WERE USED.

PRIME COAT	@ 0.40 GALS. PER SQ. YD.
PAVING ASPHALT	@ 6.5 PERCENT BY WEIGHT

RATE OF APPLICATION AND GRADE OF ASPHALTIC MATERIAL SHALL BE AS DETERMINED BY THE ENGINEER AT TIME OF APPLICATION.

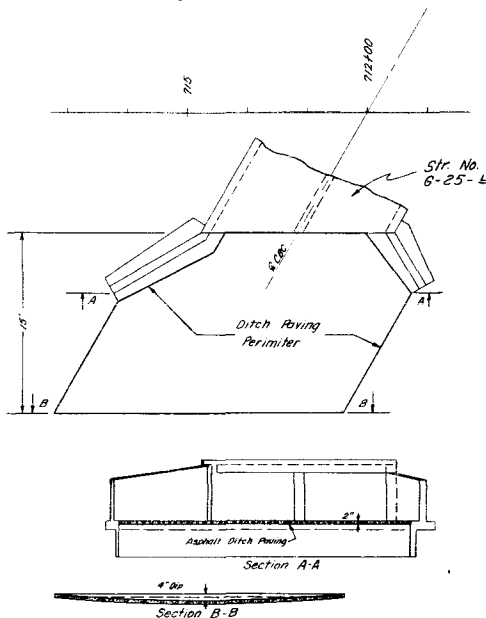
ROAD APPROACHES WHICH REQUIRE PLANT MIXED ASPHALTIC SURFACING IN THE "STRUCTURE LIST" SHALL BE PRIMED AND A 2 INCH THICKNESS OF ASPHALTIC SURFACING PLACED AS FOLLOWS:

PUBLIC APPROACHES TO BE SURFACED 50 FT. OUT FROM EDGE OF SHOULDER OR TO THE R.O.W. LINE WHICHEVER IS LESS AND ENTRANCES TO FARMS OR RESIDENCES SHALL BE SURFACED 4 FT. OUT FROM EDGE OF SHOULDER.

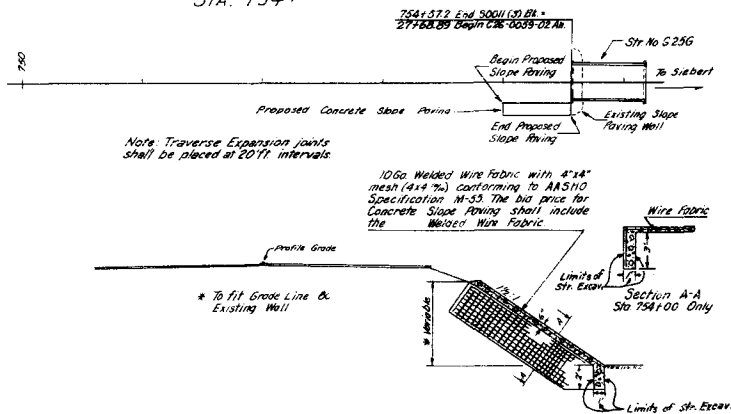
DURING CONSTRUCTION OF THIS PROJECT, TRAFFIC WILL USE THE PRESENT TRAVELED ROADWAY.

ALL U.S.C. & G.S. BENCH MARKS ARE TO BE RESET BY STATE FORCES.

DETAILS OF ASPHALTIC DITCH PAVING STA. 712+



DETAILS OF CONCRETE SLOPE & DITCH PAVING STA. 754+



FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	SD011(5)	4	

PIT NO. 1

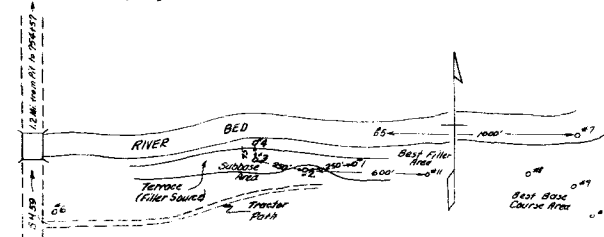
RICHARD O'NEIL
N W 1/4, SECTION 15, T8S, R49W
Subbase, Base Course & Plant Mixed Asphaltic Surfacing Material.
Quantity Available in Pit: 180,000 Cu.Yds.

TEST HOLE DATA

Sample No 3455

Test No.	From	To	Description
1	0.0'	8.0'	Coarse S & G, water at 8.0'
2	0.0'	7.0'	Fine Sand & Silt, some 3\"/>

Estimated for Stripping - 1000 Cu.Yds.



FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO	50011135	5	

It is estimated that material for Subbase, Base Course and Plant Mixed Asphaltic Surfacing for the Project is available in the vicinity of the Pit indicated in the following tabulation. Estimated quantities involved in these operations are shown below.

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

SUBBASE & SURFACING MATERIAL PLAN

STATION TO STATION	SOURCE & IR VALUE	P THICK- NESS	TONS USED			TON MILE O. H.		
			PLANT MIX	BASE COURSE	SUBBASE	PLANT MIX	BASE COURSE	SUBBASE
498+00 TO 535+00	PIT No. 1 Subbase (P.P. 63) Base Course (P.P. 80)	12"	1,824	3,762	13,338	10,068	20,765	73,620
535+00 TO 665+00		9"	3,740	7,260	18,810	14,728	28,590	74,074
665+00 TO 692+00		5"	918	1,782	2,457	2,424	4,706	6,489
692+00 TO 705+00		0"	442	858		1,000	1,941	
705+00 TO 724+00		4"	646	1,254	1,368	1,266	2,457	2,680
724+00 TO 728+00		7"	136	264	520	237	460	905
728+00 TO 754+572		4"	904	1,754	1,913	1,313	2,547	2,778
Blading Against Edge of Shoulder Pavement Correcting Irregularities From List of Structures				1,539 85 611	4,205 1237		5,776 134 2,055	20,328 4655
TOTALS			8,876	19,170	44,139	31,927	68,891	185,400

P Approximate thickness Based on design curve "B".

TABULATION OF DELINEATORS

STATION	SIDE	REQUIREMENT	TYPE I EACH	TYPE III EACH
500+23	Lt. & Rt.	Cross Culvert		2
515+00	Lt. & Rt.	Cross Culvert		2
572+00	Lt. & Rt.	Cross Culvert		2
606+38	Lt. & Rt.	Cross Culvert		2
697+30	Lt. & Rt.	Cross Culvert		2
712+00	Lt. & Rt.	CBC		2
713+45	Lt. & Rt.	Cross Culvert		2
738+50	Lt. & Rt.	Cross Culvert		2
754+50	Rt.	Bridge	4	1
TOTALS			4	17

Remove 6 Guard Posts

STRUCTURE QUANTITIES

FED. ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NO.
9	COLO.	50011(5)	6

STRUCTURE QUANTITIES

FED. ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NO.
9	COLO.	50011 (5)	7

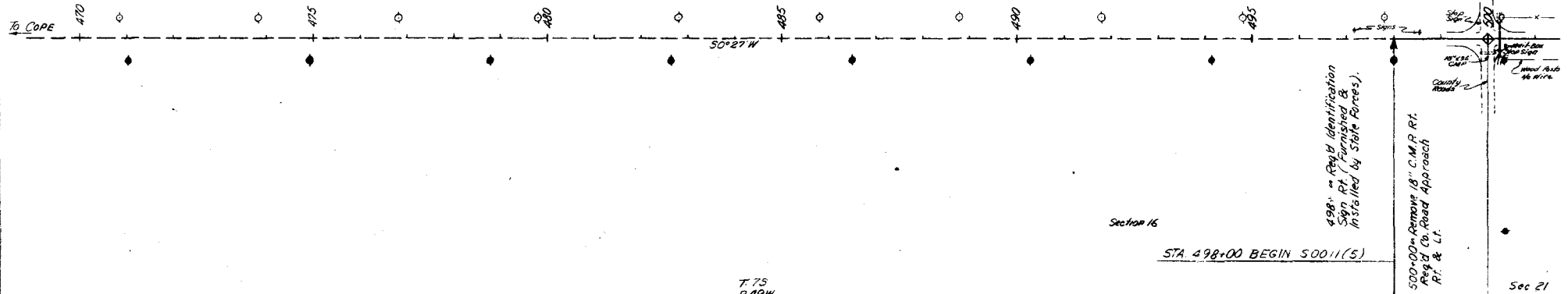
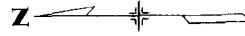
LOCATION		REMOVAL OF STRUCTURES	EXCAVATION			UNCLASSIFIED STRUCTURAL EXCAVATION	Subbase Material	STRUCTURE BACKFILL	Prime Coat	GRAVEL OR CRUSHED ROCK SURFACING	ASPHALTIC SURFACING	CONCRETE	REINFORCING STEEL	CULVERT PIPE LINEAR FEET	CORRUGATED METAL CULVERT PIPE LINEAR FEET	PLANT MIXED ASPHALTIC DITCH PAVING	CULVERT END SECTIONS	METAL APPROXS FOR C.M.P. CULVERTS	HEIGHT OF COVER "H"	MISCELLANEOUS														
			CUBIC YARDS																															
			UNCL.	EMB.	UNCL. DITCH																CUBIC YARDS	MISC.	CL. X	Gals.	TONS	TONS	CUBIC YARDS	LBS.	18" 24"	24"	Tons	24"	24"	FT.
			NO.																									CL. "A"						
679+72					9			6	33	16	8			26					1															
697+30			15	10	35			12						62			2		2															
711+44		1																																
712+00			210		40			60				5881	5918			4																		
712+10		1																																
712+50			16			58		108	55	28																								
713+45				3	34			12						58			2		3															
714+83					9			6	7	16	2			26					1															
738+50				3	38			11						56			2		4															
748+27					9			6	7	16	2			26					1															
754+00 To 754+50					10															14 Cu. Yds. Concrete Slope & Ditch Paving (Wire Mesh)														
PROJECT TOTALS		4	805	55	350	324	1237	204	1041	611	266	5881	5918	254	306	126	4	4																

Section 15

FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	S0011(5)	8	

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

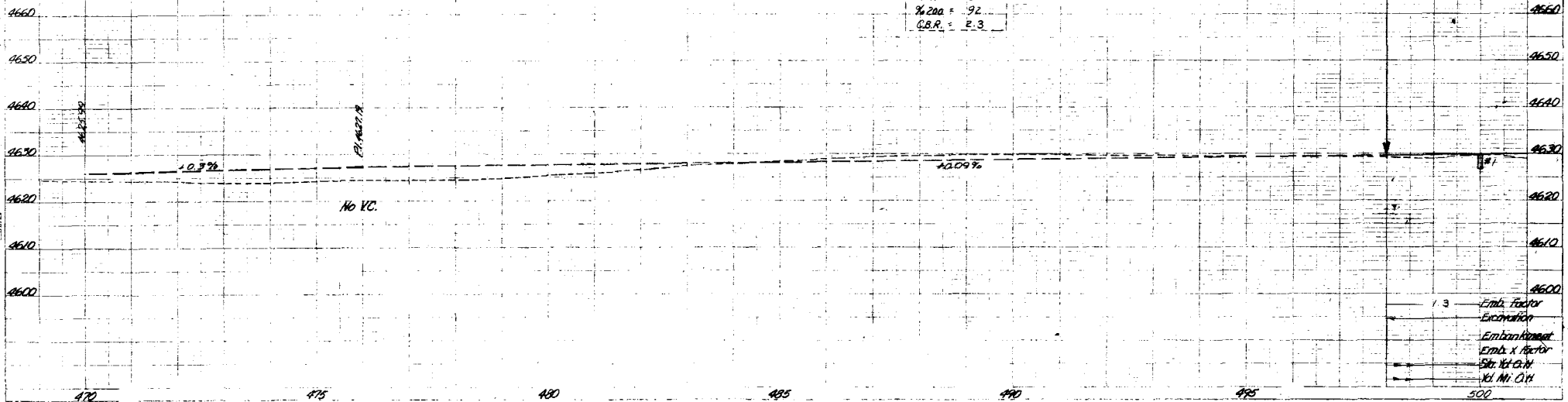
Soil data shown on the plans is obtained from best available testing laboratory information. This information is shown for convenience of the Contractor and the Department does not guarantee the accuracy of these tests. If materials not conforming to the data on plans are encountered during construction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



T. 25
R. 49W.

Test No. 1 A-7-6 (15)
Similar to #2
C.B.R. = 2.3

Test #2 A-7-6 (15)
LL = 47
PI = 124
%200 = 92
C.B.R. = 2.3



D. 7011

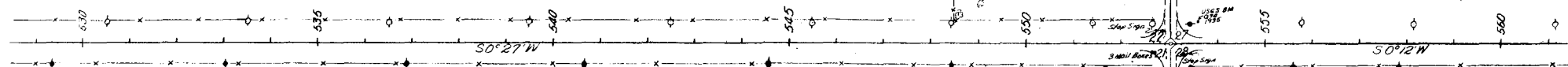
E. 1005

D. 1005

D. 1005

D. 1005

D. 1005



BM #5 4631.99
 Nail in PP 47 RT
 Sta. 533+04

BM #6 4635.75
 Nail in PP 47 RT
 Sta. 540+68

T 7 S
 R 49 W

BM #7 4642.00
 Nail in PP 48 RT
 Sta. 548+46

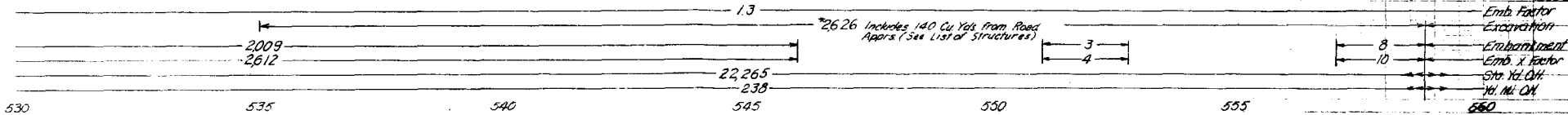
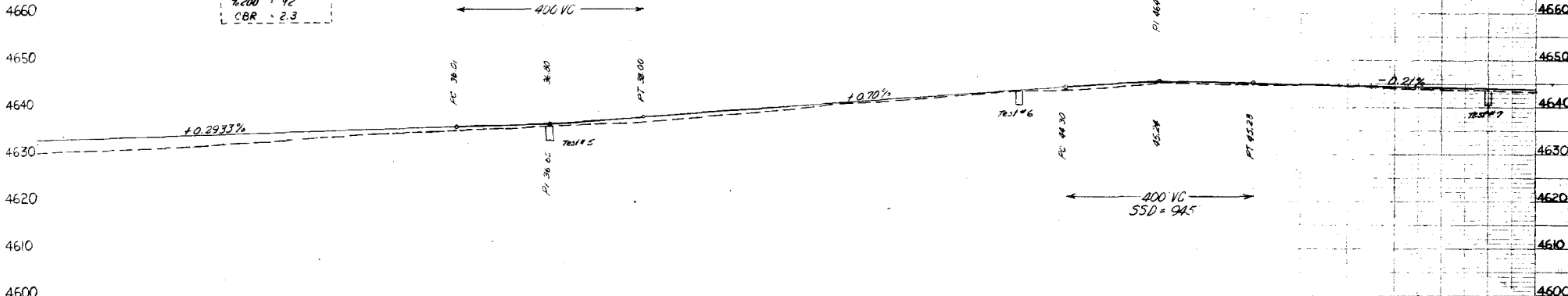
BM #8 4645.00
 Nail in PP 49 RT
 Sta. 553+58

BM #9 4643.96
 Nail in PP 49 RT
 Sta. 557+01

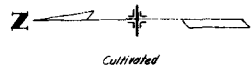
Test #5 A-7-6(15)
 Similar to #2
 CBR = 2.3

Test #6 A-7-6(15)
 Similar to #2
 CBR = 2.3

Test #7 A-6(12)
 P.I. = 39
 %200 = 88
 CBR = 2.0



Embankment
 Excavation
 Emb. x Factor
 Sta. Yd. Off.
 Yd. M. Off.

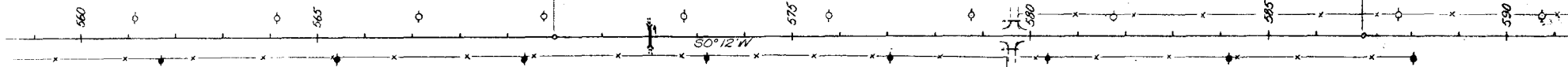


572+100 = Road 24'x52' Cross
Culvert, Ditches.

579+74 = Road 18'x26' Side
Drain & Road Approach Lt.

POT 570+00

POT 587+00



BM #10 4641.96
Nail in PP 48' Rt
Sta 565+45

BM #11 4640.27
Nail in PP 47' Rt
Sta 573+21

T. 7.5
R. 49 W.

BM #12 4644.47
Nail in PP 47' Rt
Sta 580+35

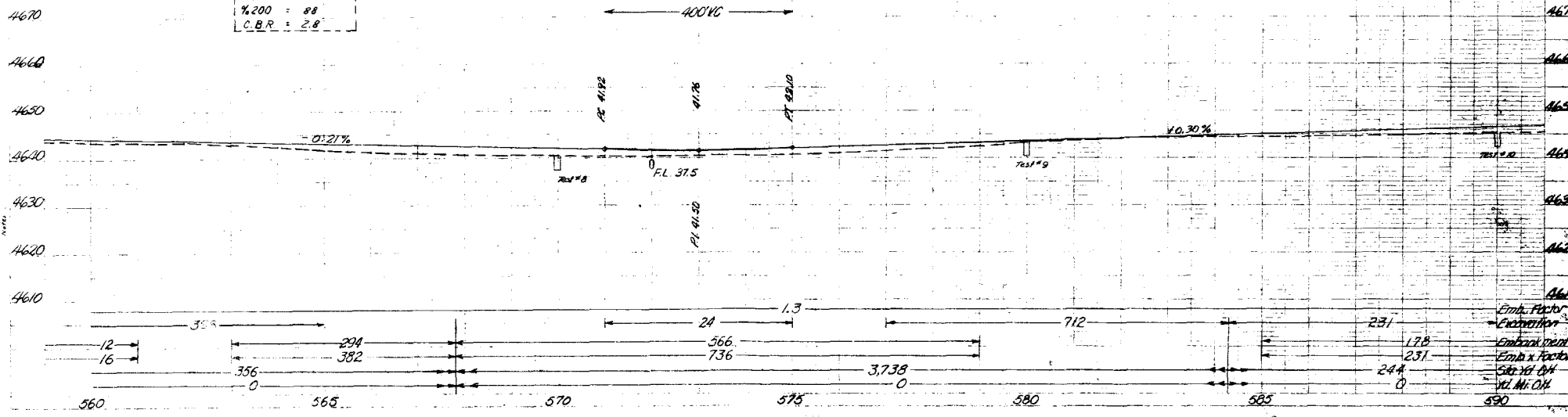
BM #13 4646.80
Nail in PP 47' Rt
Sta 588+06

Test #8 A-6(12)
Similar to #7
CBR = 2.8

Test #9 A-6(12)
Similar to #7
CBR = 2.8

Test #10 A-6(12)
Similar to #7
CBR = 2.8

Test #7 A-6(12)
L.L. = 38
P.I. = 19
%200 = 88
C.B.R. = 2.8



Emb. Factor
Culvert
Embankment
Emb. Factor
Side Slope
H.L. M. ON



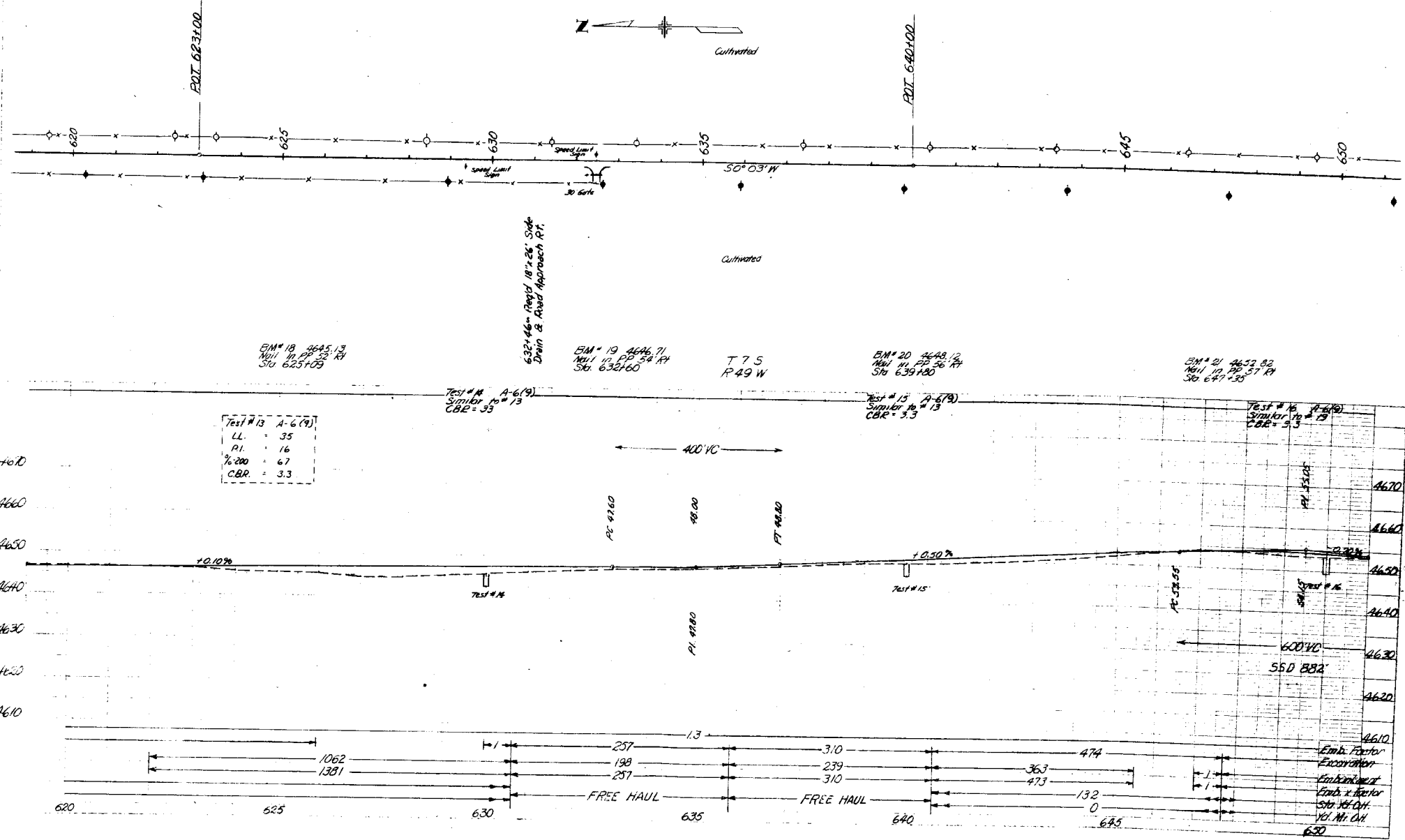
25805

25805

25805

25805

25805



Emb. Factor
Excavation
Emb. Factor
Final x Factor
Sta. 1060
Yol. M. 0.1

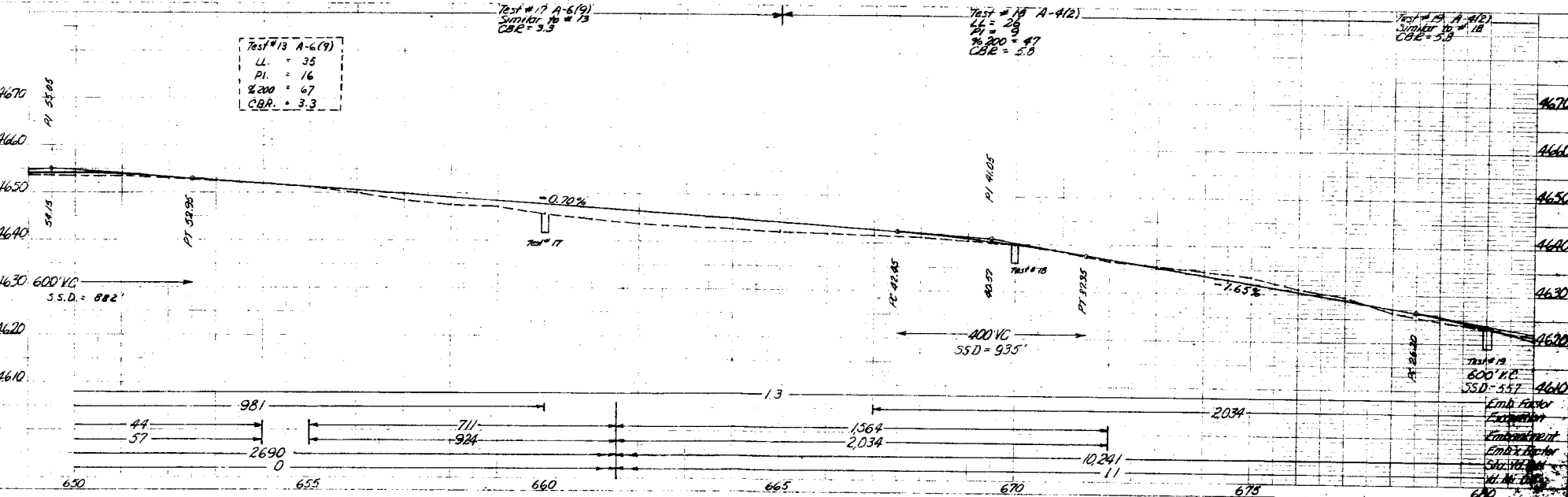
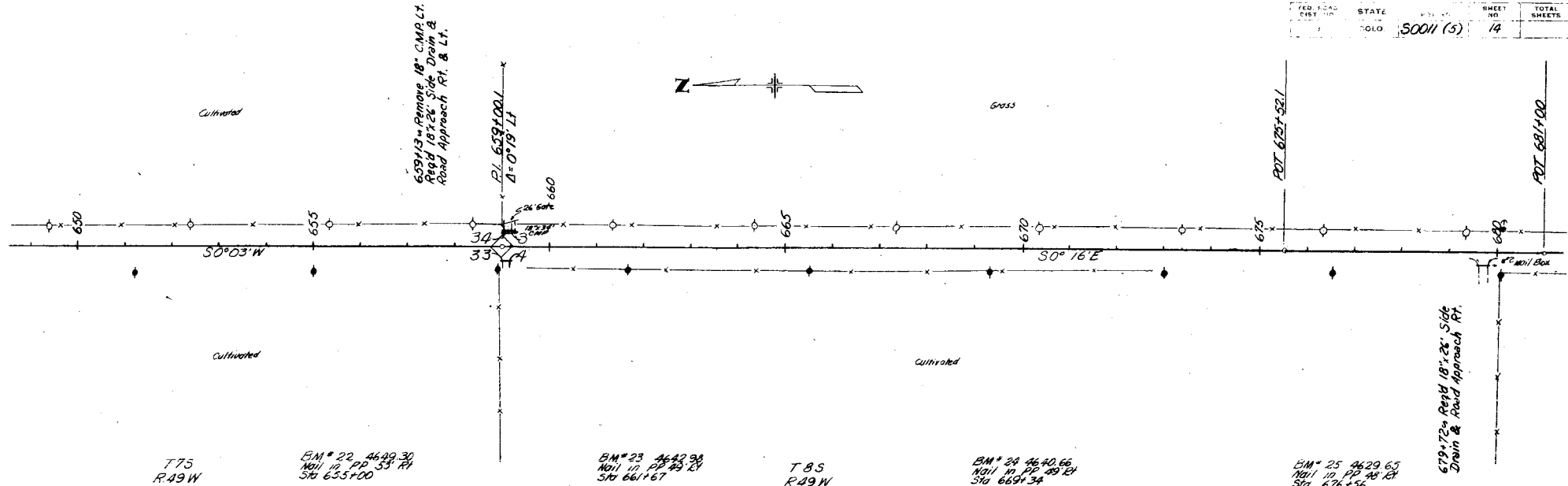
D. Ferry

2065

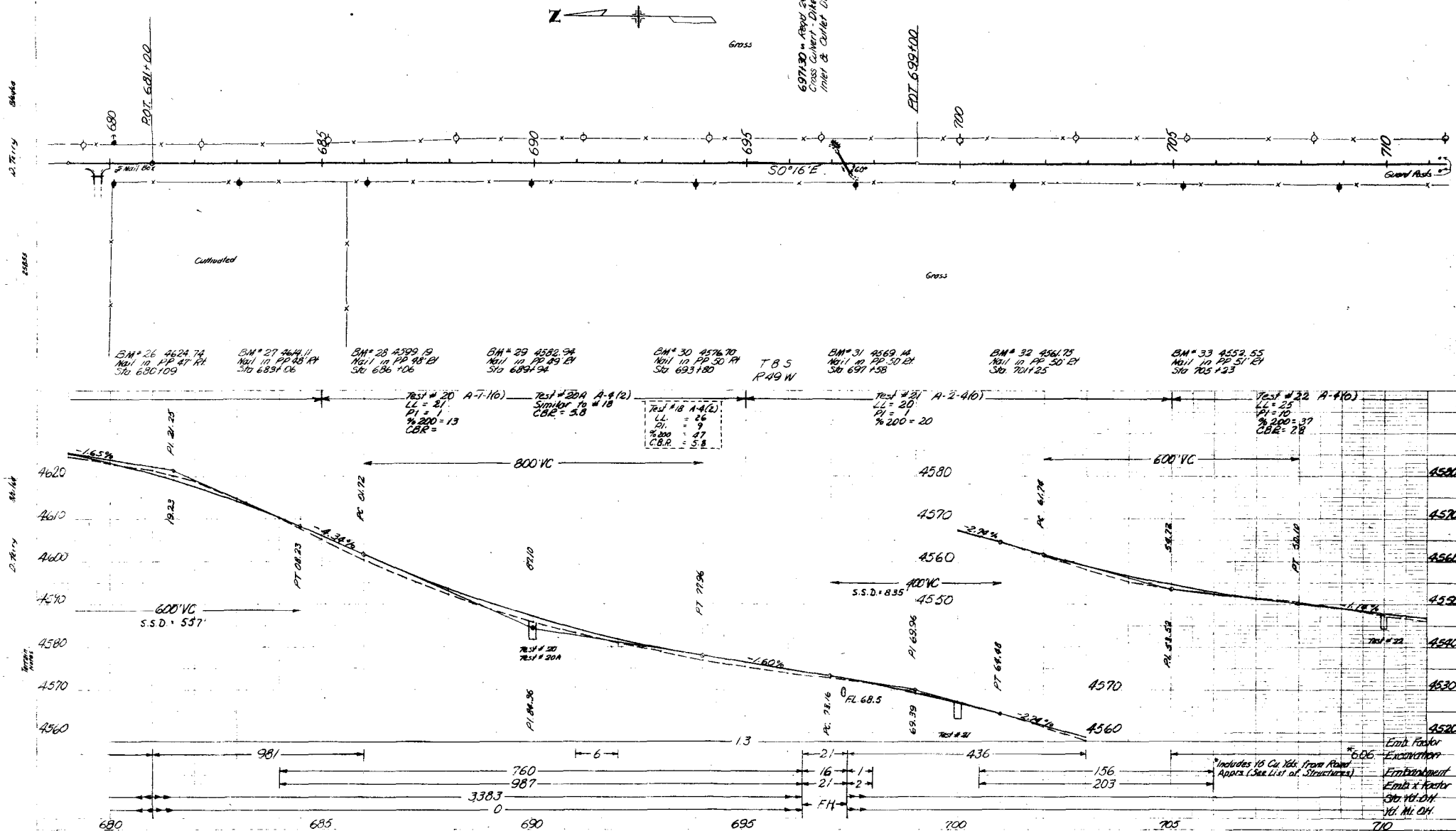
D. Ferry

2065

FED. ROAD DIST. NO.	STATE	SHEET NO.	TOTAL SHEETS
50011 (5)	MD	14	

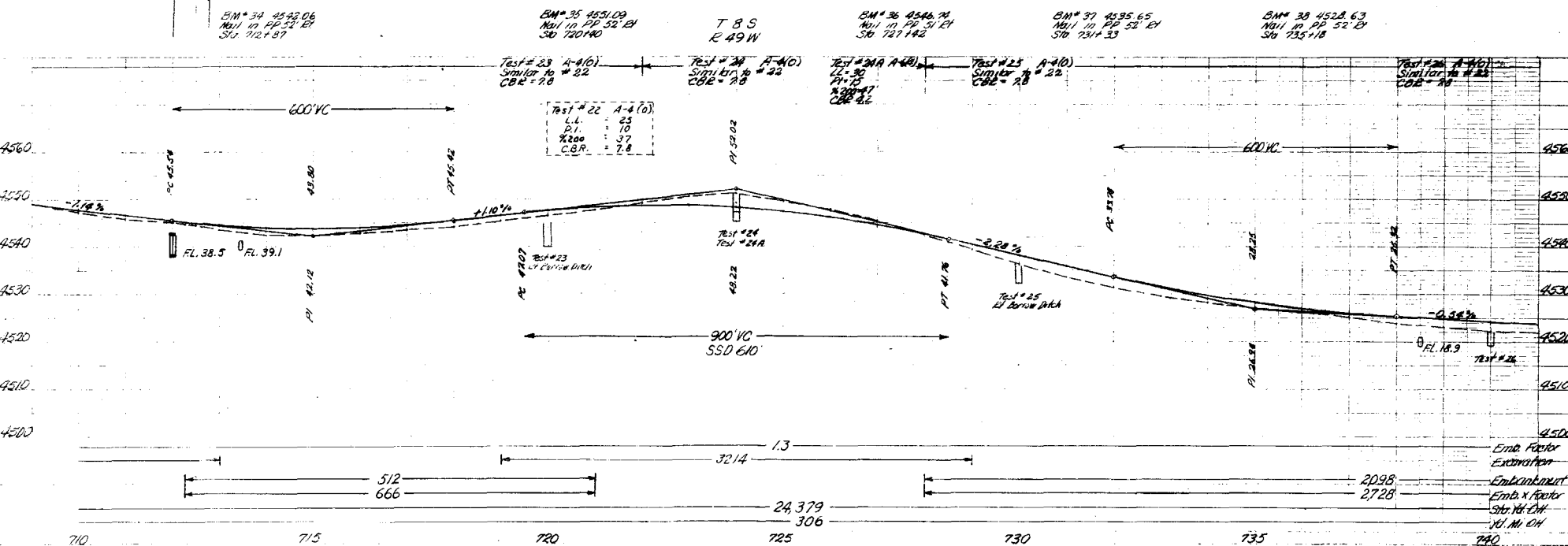
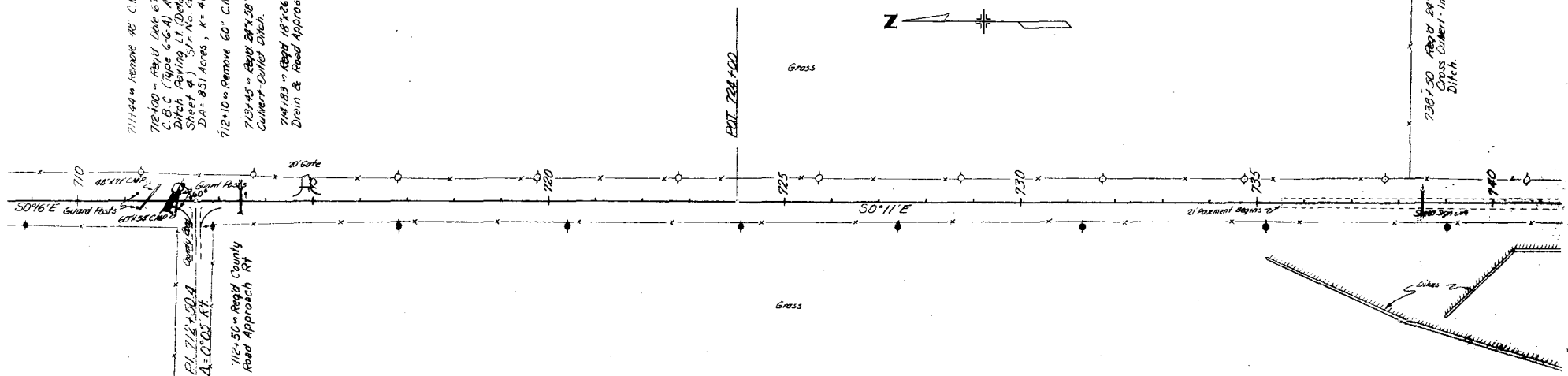


FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLORADO	50011(5)	15	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	50011(5)	16	

711+48 = Remove 48" C.M.P.
 712+00 = Rebuild Lane 6'x4'x4"
 C.B.C. (Type 6-6-A) Asphaltic
 Ditch Paving Lt. Details on
 Sheet 4. Sta. No. 67+25-4
 DA = 831 Acres, K = 40
 712+10 = Remove 60" C.M.P.
 713+43 = Abolish 24"x30" Cross
 Culvert Outlet Ditch.
 714+83 = Road 18"x26" Side
 Drain & Road Approach Lt.



FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	COLO.	50011(5)	17	

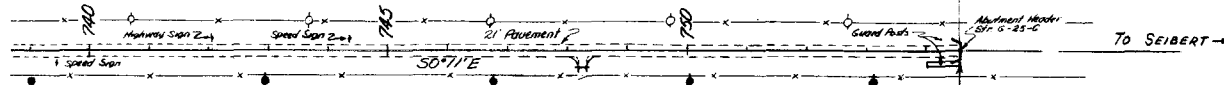


Gross

754+00 to 754+57.2 Road
Concrete Sign (aving RT
(Details on Sheet 4).

POB 754+57.2

754+00 Road Identification
Sign Lt. Furnished &
Installed by State Forces



STA 754+57.2 END PROJECT 50011(5) =
STA 27H6887 BEG. PROJECT C26-0059-02

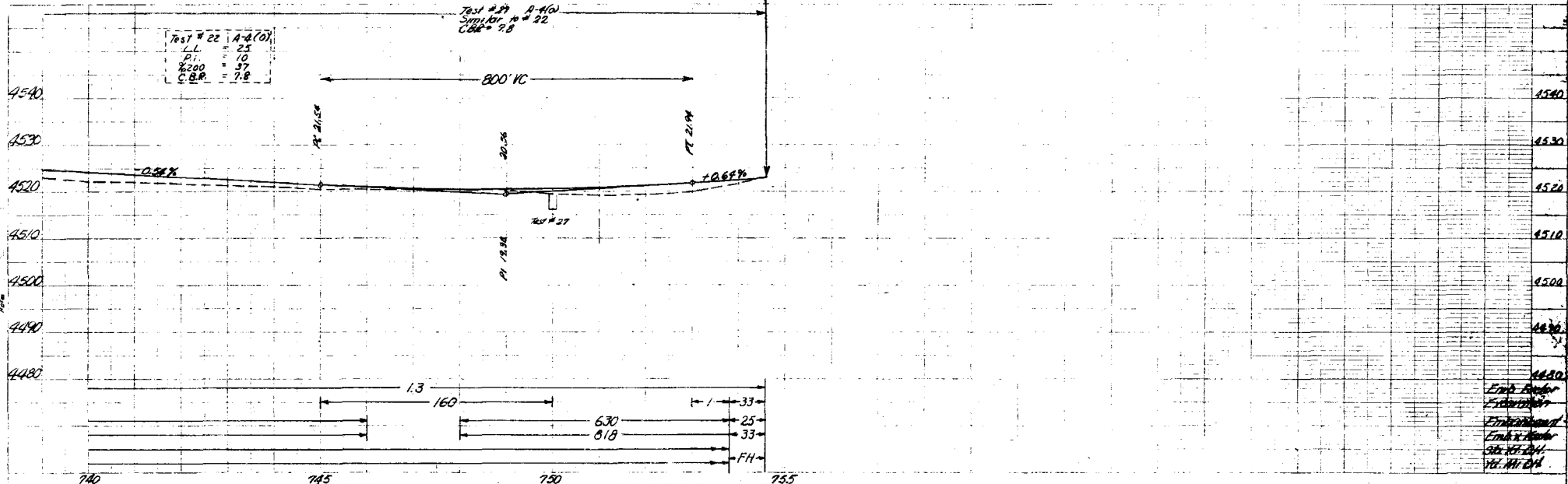
BM 39 852.55
10.1 10.40 51 RT
Sta 742+72

TBS
R49 W

BM 41 4523.90 BM 42 4524.60 BM
Cross 100 in SE corner Bridge
Sta 755+

Test # 22
Simultaneous # 22
C.B.R. = 7.8

Test # 22 4-8(0)
L = 25
D1 = 10
%200 = 37
C.B.R. = 7.8



End Road
Identification
Final Road
Sta 755+00
Sta 755+00

Excavation
Cu. Yds. Area

Embankment
Area Cu. Yds.

Excavation
Cu. Yds. Area

Embankment
Area Cu. Yds.

SECTION	DIVISION	PROJECT NO.	SHEET NO.
18	50011(5)	18	

SUMMARY OF EARTHWORK QUANTITIES

EXCAVATION

* FROM X-SECTIONS	16,800 Cu. yds.
* EST. FOR SUBSIDENCE	1,680 Cu. Yds.
* LIST OF STRUCTURES EXC.	805 Cu. Yds.
* LIST OF STRUCTURES EMB.	55 Cu. Yds.
EST. FOR CUT SLOPE TREATMENT	100 Cu. Yds.
TOTAL	19,440 Cu. Yds.

EMBANKMENT

FROM X-SECTIONS 13,234 Cu. Yds.

EMBANKMENT X FACTOR

Made from Structure List Excav	17,205 Cu. Yds.
	405 Cu. Yds.
TOTAL	16,800 Cu. Yds.

COMPACTION

* FROM EXCAVATION	19,340 Cu. Yds.
BASE OF CUTS & FILLS	42,878 Cu. Yds.
TOTAL	62,218 Cu. Yds.

STATION YARD OVERHAUL

FROM MASS DIAGRAM	84,445 Sta. Yds.
EST. FOR SUBSIDENCE	8,445 Sta. Yds.
TOTAL	92,890 Sta. Yds.

YARD MILE OVERHAUL

FROM MASS DIAGRAM	688 Yd. Mi.
EST. FOR SUBSIDENCE	69 Yd. Mi.
TOTAL	757 Yd. Mi.

UNCLASSIFIED DITCH EXCAVATION

FROM LIST OF STRUCTURES 350 Cu. Yds.

SHEET	EXCAVATION	Cu. Yds.
TOTALS	EXCAVATION	Cu. Yds.
	EMBANKMENT	Cu. Yds.

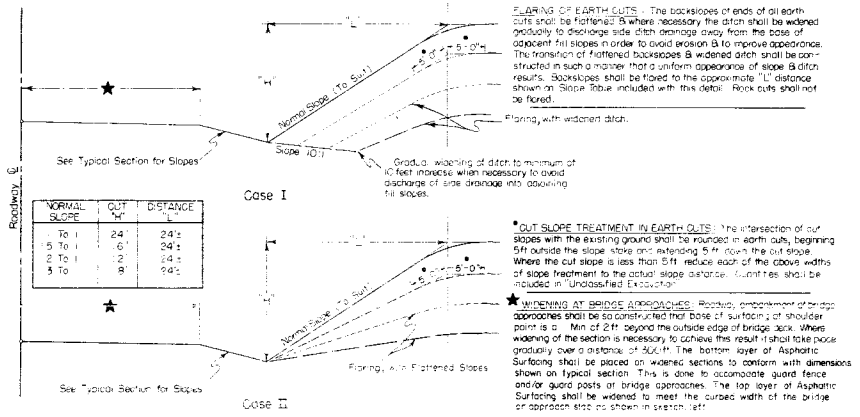
STANDARD SIDE APPROACH ROADS, FLARING, CUT SLOPE TREATMENT & WIDENING AT BRIDGES AND AT CREST OF GRADES

STANDARD M-2-A (MAY 1, 1962)

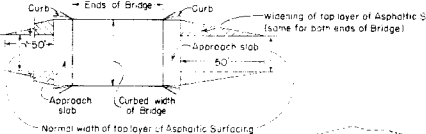
FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLD.		

REVISIONS	LEO
#22-63 Rev Bridge Approaches	
#2-3-64 DEPT. NAME	M.R.H.

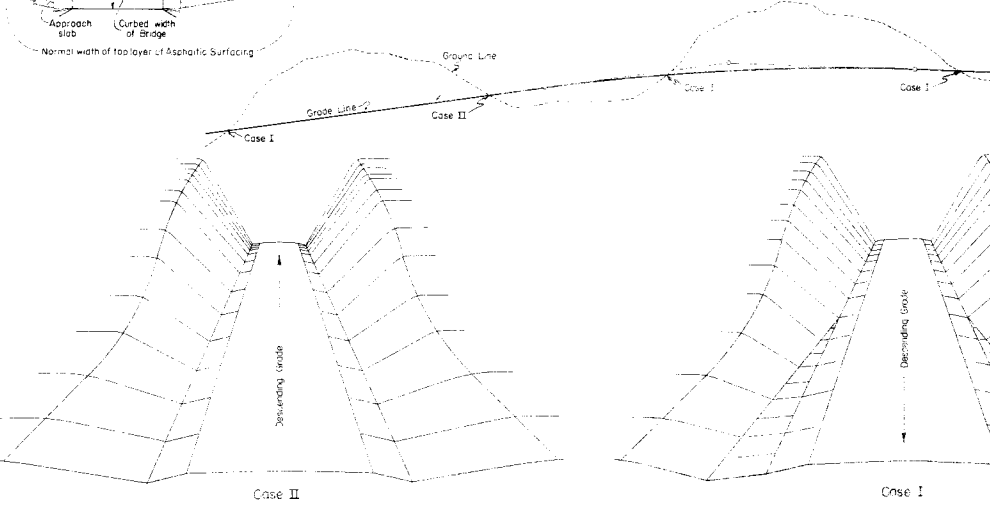
GENERAL DETAILS FOR FLARING OF EARTH CUTS, CUT SLOPE TREATMENT & WIDENING AT BRIDGES



PLAN OF WIDENING TOP LAYER OF ASPHALTIC SURFACING AT BRIDGE APPROACHES



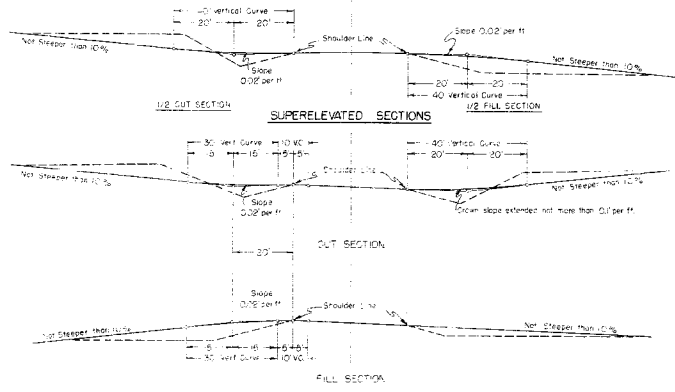
PLAN OF FLARING IN EARTH CUTS



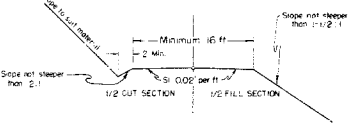
TYPICAL PLANS FOR SIDE APPROACH ROADS

Where practical Side Drains are to be placed in line with the roadway ditches.
50' Radii to be used on all intersecting roads except private approaches.
Radii may be varied to suit field conditions.

STANDARD CROWNED SECTION



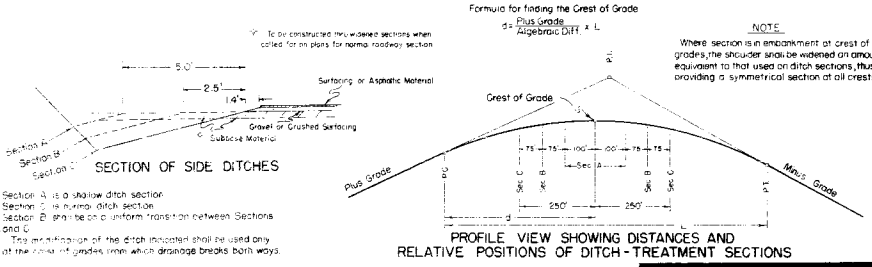
TYPICAL SECTION FOR APPROACH



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 RIGHT DISTANCE AT CREST OF GRADE IS 600 FT OR LESS)



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.
A side approach road to the Project shall be (Gravel) Surfaced with a four (4) inch thickness of (Gravel) Surfacing extending upstream to the right of way line. Estimate (Gravel) Surfacing 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 at grades will be permitted where adherence to the grades as shown would cause damage to property or create other unsatisfactory conditions. Grades less than the maximum shown are to be used wherever feasible.

DEPARTMENT OF HIGHWAYS STATE OF COLORADO

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

Designed by A. Z. Julian
Made by SUM 8484
Checked by C.R.S.
Approved by A. Z. Julian
Date: November 1, 1953

STANDARD M-5-A

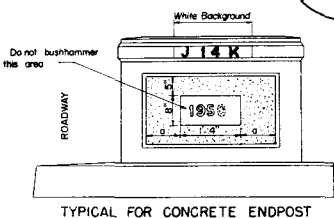
(MAY 1, 1962)

REV. 1-31-64, DEPT NAME, M.R.H.
REV. 11-17-64, GEN. NOTES, M.R.H.

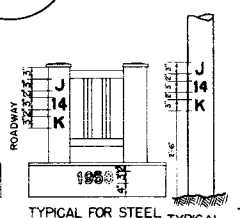
FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
1	COLD.		



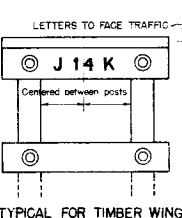
abcdefghijklmnopqrstuvwxyz



TYPICAL FOR CONCRETE ENDPOST

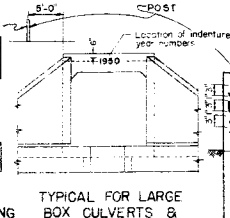


TYPICAL FOR STEEL
HANDRAIL END POST
TYPICAL FOR
SIGN POSTS



TYPICAL FOR TIMBER WING
HANDRAIL

SAMPLE BRIDGE NUMBER



TYPICAL FOR LARGE
BOX CULVERTS &
STRUCTURES WITHOUT
END POSTS

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 NUMBER LINE NECESSARY IN CONCRETE SHALL BE MINIMUM AS SHOWN INTO THE FACE OF THE ENDPOST ON THE RIGHT HAND SIDE OF EACH BRIDGE END AND INTO THE FACE OF THE STRUCTURE NUMBER AS SHOWN ON PLANS. NUMBERS TO BE MADE OF WOOD, METAL OR OTHER SUITABLE MATERIAL AND ATTACHED TO THE FORMS BEFORE CONCRETE IS PLACED. 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 AND 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 SPAN NUMBERS, THE NUMBER SHALL BE PLACED ON SIGN POSTS ON THE RIGHT HAND SIDE OF THE ROADWAY.
THE CORRECT NUMBER FOR EACH BRIDGE OR SPAN 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 15 TO 20 FEET CLEAR SPAN SHALL BE LOWER CASE LETTERS. BOX CULVERTS SHALL BE CONSIDERED AS MAJOR STRUCTURES IF FURTHER 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 THOROUGHLY DRIED, CLEANED AND PROPERLY PREPARED. THE WHITE BACKGROUND HAS BEEN SPECIFICALLY RECOMMENDED FOR THE BRIDGE NUMBER. THE BRIDGE NUMBER SHALL BE SATISFACTORILY STENCILED ON THE EXTERIOR BLACK PAINT MAINTAINED UNDER ITEM NO. 10. THE GRADES OF THE STENCILED LETTERS AND FIGURES SHALL BE CAREFULLY FILLED IN BY HAND TO MAKE SOLID FIGURES.
SUFFICIENT TIME BETWEEN SUCCESSIONAL COATS SHALL BE ALLOWED TO PERMIT THOROUGH DRYING.
THE LIMITS OF PAINTING OF STRUCTURE NUMBERS AND YEAR NUMBERS AND PLACING POSTS FOR STRUCTURE NUMBERS SHALL BE CONSIDERED SUBORDINARY WORK AND SHALL BE INCLUDED IN THE ORIGINAL CONTRACT. ITEMS WILL NOT BE PAID FOR AS A SEPARATE ITEM.
THE LENGTH TO SIGN OF STRUCTURE SHALL BE MEASURED ALONG CENTER LINE OF ROADWAY. IN CASE OF DOUBLE OR MULTIPLE BOX CULVERTS THE CENTER WALL OR WALLS SHALL BE STENCILED TWO CLEAR SPAN MEASURING FROM INSIDE OF EXTERIOR WALLS.
IN ADDITION TO THE REQUIREMENTS STATED ABOVE, STRUCTURE NUMBERS, FOR HIGHWAYS PASSING UNDER CROSSCULVERTS, ARE TO BE PLACED AT THE FOLLOWING POINTS:
(A) FOR CROSSCULVERTS OF 2 OR MORE SPANS, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF THE FIRST COLUMN OF THE RIGHT-HAND PIER.
(B) FOR SPAN STRUCTURES, THE STRUCTURE NUMBER SHALL BE STENCILED, FACING TRAFFIC, ON THE OUTSIDE FACE OF EACH END COLUMN IN THE LEFT PIER.

SAMPLE YEAR NUMBER

STRUCTURE NO.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

LETTERS AND FIGURES
FOR
STRUCTURE NUMBERS

Designed by
Made by
Checked by
Approved by
Date: 11/18/50

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

STANDARD M-6-B

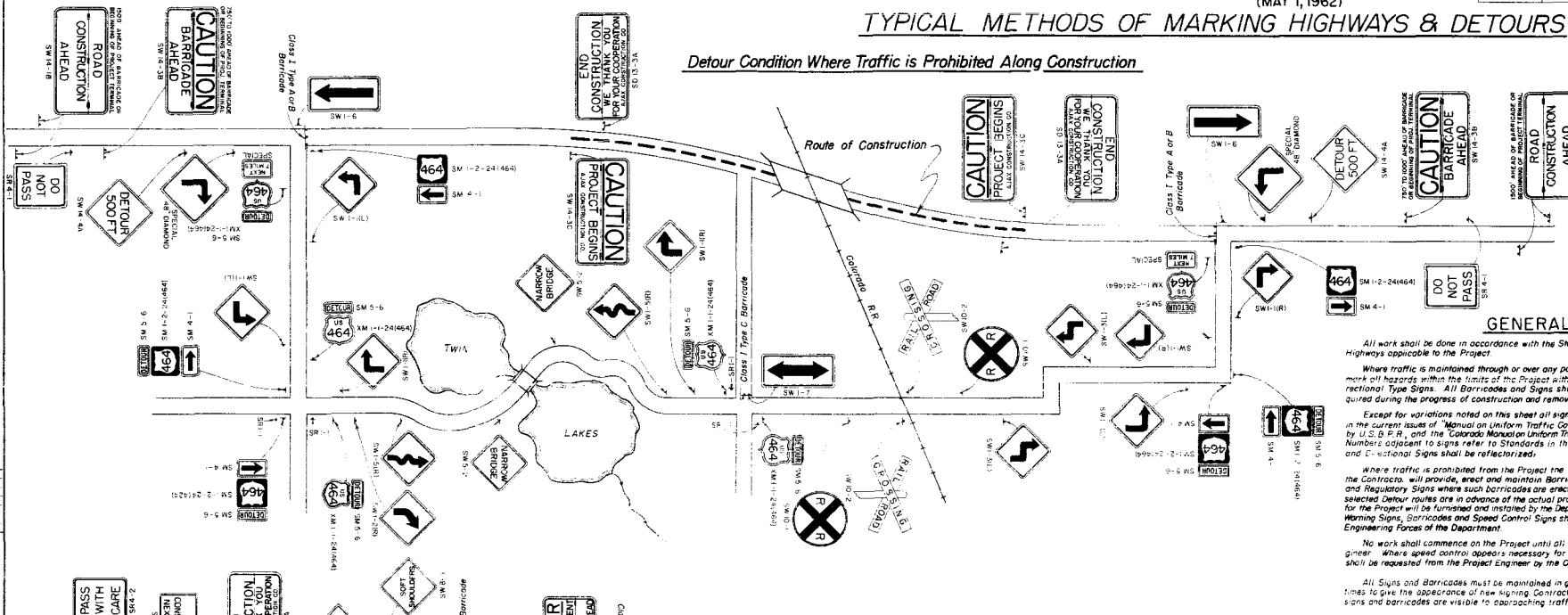
(SHEET 1 OF 2 SHEETS)

(MAY 1, 1962)

FED. ROAD DES. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	C.O.L.O.		

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 Department of Highways applicable to the Project.

Where traffic is maintained through or over any part of the Project, the Contractor will be required to mark all hazards within the limits of the Project with well maintained Barricades, Warning Signs and Directional Type Signs. All Barricades and Signs shall be moved, added to, changed or removed as required 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 outlined in the current issues of "Manual on Uniform Traffic Control Devices for Streets & Highways", issued by U.S.D.P.R., and the "Colorado Manual on Uniform Traffic Control Devices for Streets & Highways". Numbers adjacent to signs refer to Standards in the Colorado Manual. Standard Warning, Regulatory and Directional Signs shall be retrofitted.

Where traffic is prohibited from the Project the Detour will be marked by the Department except that 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 where selected Detour routes are in advance of the actual project terminal. U.S. or State Route Markers required 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 Engineer. Where speed control appears necessary for protection of the traveling public, such speed control shall be requested from the Project Engineer by the Contractor.

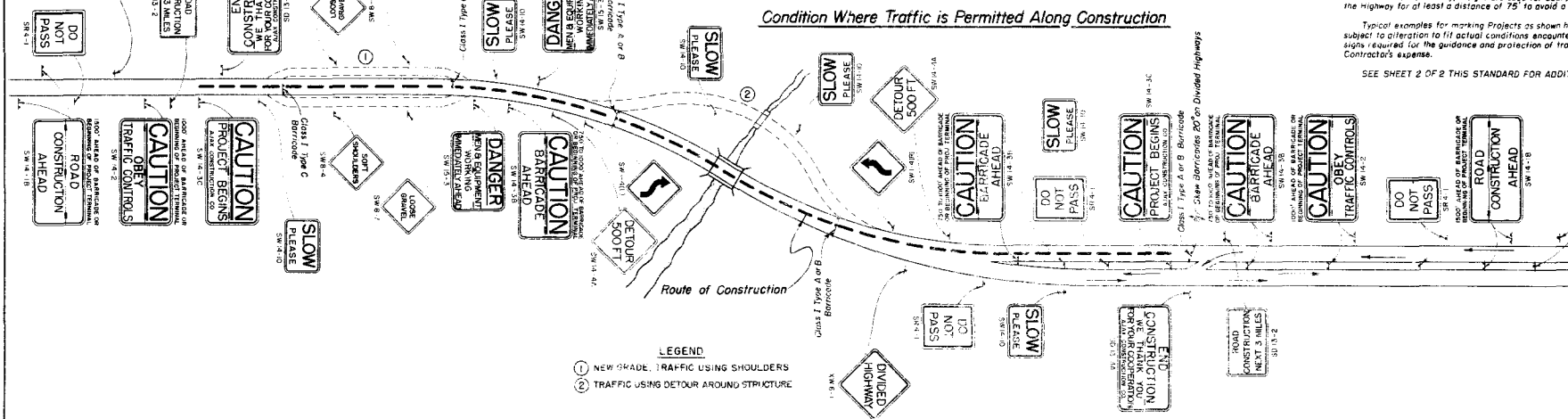
All Signs and Barricades must be maintained in good condition and kept clean and free of dirt at all times to give the appearance of new signing. Contractors and Engineers' equipment must be parked so that signs and barricades are visible to approaching traffic at all times.

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

Typical examples for marking Projects as shown hereon constitute a minimum of signs required and are 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.

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

Condition Where Traffic is Permitted Along Construction



LEGEND

- NEW GRADE, TRAFFIC USING SHOULDERS
- TRAFFIC USING DETOUR AROUND STRUCTURE

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

Construction Traffic Signs

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

STANDARD ROADWAY CONSTRUCTION TRAFFIC SIGNS

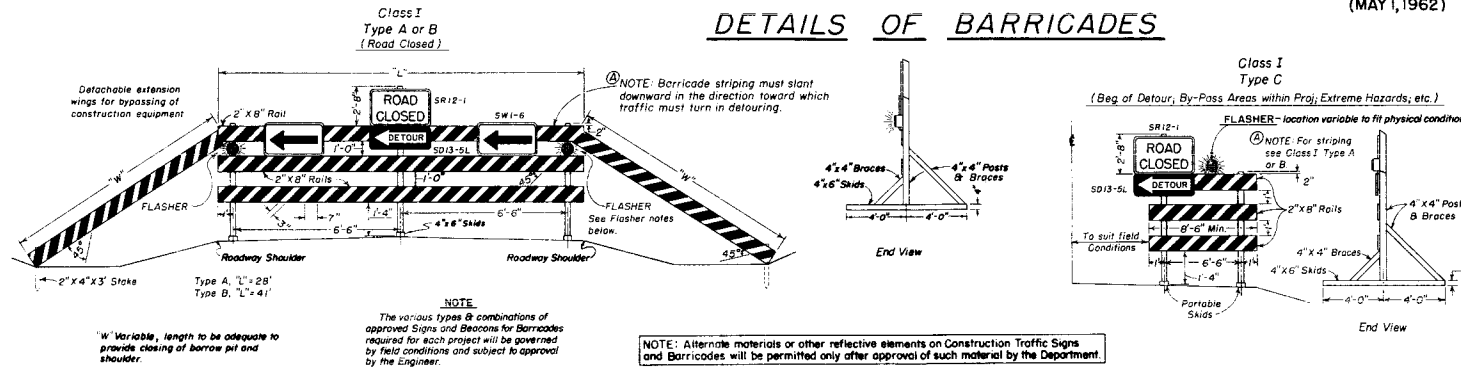
STANDARD M-6-B

(SHEET 2 OF 2 SHEETS)
(MAY 1, 1962)

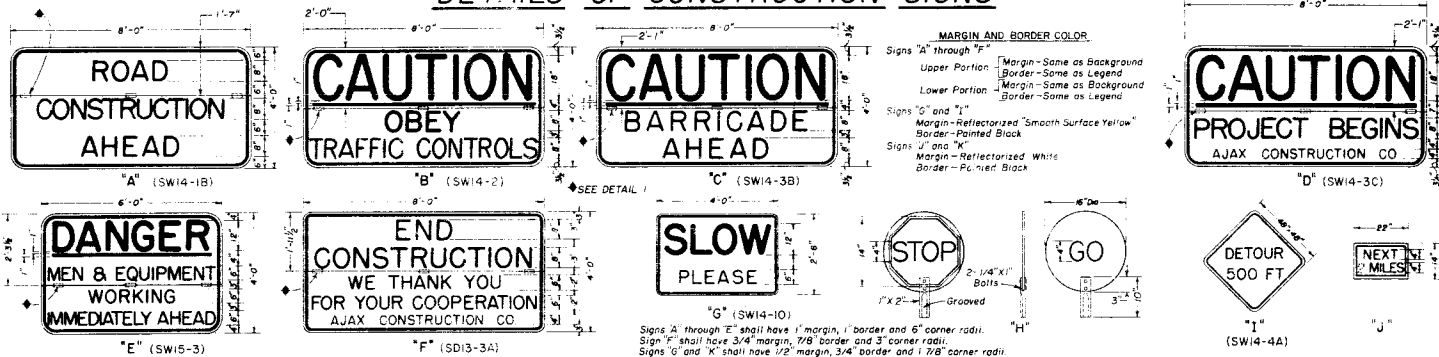
FEDERAL ROAD REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
5-16-62	Rev. Margin & Border Color	L.E.O.
1-14-63	General Rev.	L.E.O.
1-31-64	DEPT. NAME	M.R.H.
8-24-64	Flashers and Striping Notes	M.R.H.

DETAILS OF BARRICADES



DETAILS OF CONSTRUCTION SIGNS



SPECIFICATIONS

PAINT - All paint and methods of painting shall be in conformity with Item 38 of the Standard Specifications.

STRIPING - Planking and Wings on all Barricades shall be painted with Maintenance Flat Black on both sides. Reflective Strips shall then be added to the face sides. Reflective Strips shall be "Cutout Smooth Surface Yellow," of a type approved by the Department, 3" wide and spaced 7" apart as shown in the detail.

Division of traffic will be accomplished as follows:

1-Stripes for Barricades diverting traffic to the left shall start on the left hand side of the lower plank and progress up to the right with the stripes making an angle of 45 degrees with the horizontal axis of the board as shown in the detail. 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 down in both directions.

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

Planking	2" x 8"	5 S's
Posts (Barricades)	4" x 4"	5 S's
Posts (Signs)	4" x 4" or 6" x 6"	5 S's

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

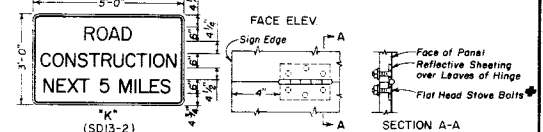
All skids, braces and posts to be painted yellow and nailed together with No. 20d nails.

Bases to be weighted where necessary to provide stability.

NOTES

- Signs "A" through "I" shall be of the hinge and fold type to facilitate the closing down of the sign when the need is not prevalent. These signs shall be hinged with 3-4 Butt Hinges (right pin) mortised into the face surface of the sign.
- The reflective sheeting used on the sign background shall be placed over the leaves of the hinges.
- Hinges shall be fastened to the sign with flat head stove bolts having a flat washer under the nut on back of sign.
- All hinges, bolts, nuts and washers to be rust resistant.
- Sign panels to be held in the open position with hooks and eyes or other approved fastening devices.
- 90° Countersunk Steel or Aluminum Lock Bolt Fasteners with Collars suitable for use on wood may be used in lieu of stove bolts.

DETAIL I



DETAILS OF SIGN AND BEACON FABRICATION AND USAGE

Construction Signs "A" through "G" and "K" shall be made of 5/8" Plywood or other material approved by the Department and as per details above.

Signs having reflectORIZED yellow or red surfaces shall be fabricated from "Flexible Reflective Sheeting" of the "Vaco-Flex" type, approved by the Department. Signs having reflectORIZED white surfaces shall be fabricated from "Flexible Reflective Sheeting" of the "Stagard" type, approved by the Department.

Construction Sign "A" - ReflectORIZED Yellow background, with painted Black lettering.

Construction Signs "B" through "D" - Top background to be reflectORIZED "Smooth Surface Red" with the legend and "I" Underline to be a White process point. Balance of lettering to be painted Black over a reflectORIZED Yellow background.

Construction Sign "E" - The word "DANGER" and the "I" Underline only are to be a White process point over a reflectORIZED "Smooth Surface Red" background. Balance of lettering to be painted Black over a reflectORIZED Yellow background.

Construction Sign "F" - The words "End Construction" and "Contractors Name" shall be painted Black over a reflectORIZED White background. Balance of lettering to be applied with a White process point over a reflectORIZED "Smooth Surface Red" background.

Construction Sign "G" - The legend to be painted Black over a reflectORIZED "Smooth Surface Yellow" background.

Flashing Warning Sign "H" - This sign shall be made of 3/8" (Min.) Plywood or other lightweight material, approved by the Department, having a painted Red background with White lettering on the "Stop" side and a painted Green background with White lettering on the "Go" side. Handle to be grooved on one side to indicate reading of sign to Flagger. This sign will be used whenever Flagger is necessary. Sign "H" shall be reflectORIZED if used to stop traffic at night.

Detour Warning Sign "I" - This sign shall be made of 3/8" (Min.) Plywood or other material suitable to the Department. Legend to be painted Black on a reflectORIZED "Smooth Surface Yellow" background.

Construction Sign "J" - This sign shall be made of 3/8" (Min.) Plywood or other suitable material. Legend to be painted Black on a reflectORIZED White background.

3 1/4" x 6" metal sides to be placed between "NEXT" - "MILES" spaced so as to accommodate appropriate sized numerals. Numerals calculated to the nearest Mile.

Construction Sign "K" - ReflectORIZED White background with painted Black lettering.

Signs "A" through "E" and "G" shall be painted on the backside with one coat of white primer and one coat of yellow enamel.

Signs "F", "I", "J" and "K" shall be given two coats of white paint on the backside.

Construction Signs shall be placed as follows:

- Sign "A" - This 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 traveled way in all cases.
- Sign "B" - This 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 traveled way in all cases.
- Sign "C" - This is the third advance warning sign in cases where barricades are used and shall be placed 750 to 1000 feet ahead of project terminal and on both sides of the traveled way in all cases.
- Sign "D" - This sign shall be placed to mark the beginning of the Project. It shall be placed singly and may be placed opposite barricade if desirable.
- Sign "E" - This sign shall be placed 500 feet ahead of the situation being advised of.
- Sign "F" - This sign shall be placed to mark the end of the Project. It shall be placed singly and may be placed opposite barricade if desirable.
- Sign "G" - This sign shall be used frequently within the limits of the Project.
- Sign "H" - This sign shall be erected at the limits of any project more than 2 miles in extent, where traffic is maintained through the job.

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

Flashers used on barricades shall be of the battery or electrical type. The lens for this type flasher shall be at least 4" in dia. The illuminating element in a flashing yellow beacon or signal shall be flashed continuously at a rate of 50 to 60 flashes per min. with the "on" time being at least 25 % of the cycle. Each element, complete, shall be of such design as to render the lens when illuminated clearly visible for 1000 ft. under all atmospheric conditions except dense fog. The color of the lens shall be in accordance with Technical Report No. 1 of the Institute of Traffic Engineers.

All material shall be sound and durable. Barricades, signs, symbols and lettering shown herein will be of good workmanship and well maintained, unless lettering will not be accepted.

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

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

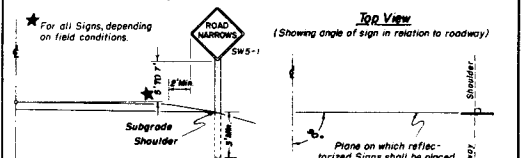
- | | |
|--|-------------|
| 1. "ROAD CONSTRUCTION AHEAD" | Minimum 4 |
| 2. "CAUTION OBEY TRAFFIC CONTROLS" | Minimum 2 |
| 3. "CAUTION BARRICADE AHEAD" | As Required |
| 4. Standard Warning, Guide B Directional Signs | As Required |
| 5. "ROAD CONSTRUCTION NEXT 5 MILES" | As Required |

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" | As Required |
| 5. "SLOW PLEASE" | As Required |
| 6. Standard Warning B Directional Signs | As Required |
| 7. Approved Directional Arrows & Regulatory Signs for Barricades | As Required |
| 8. Torches and Flares as follows: Class I Type A or B Barricade | Minimum 3 |
| Class I Type C Barricade | Minimum 1 |
| 9. Flashers - Class I Type A or B Barricade | 2 Required |
| Class I Type C Barricade | As Required |

At the request of the Contractor layouts of signs will be furnished by the Traffic Operations Section indicating the details as to letter size, symbols, spacing, etc. which are required for these signs.

Position of Signs Relative to Roadbed & Hazards



NOTE:

Warning Signs to be made of 3/8" (Min.) plywood or other material suitable to the Department and shall be reflectORIZED.

Location to be governed by field conditions.

Exact location to be stated 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.

For all signs prefaced with the letters "R", "M" or "W" refer to the "Colorado Manual on Uniform Traffic Control Devices for Streets and Highways" of current issue.

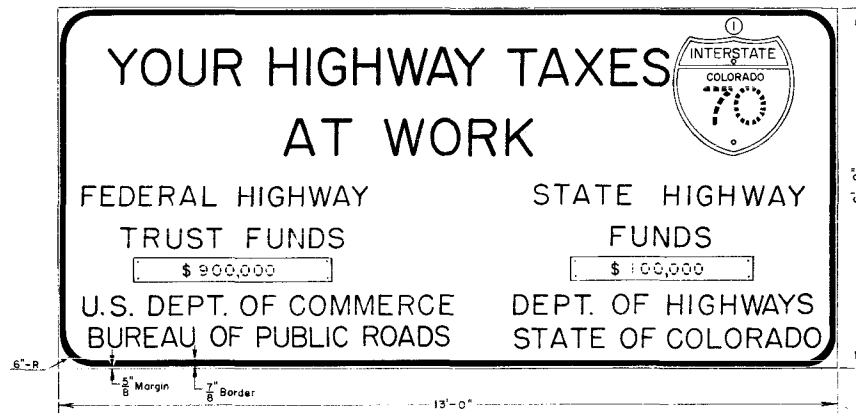
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

Construction Traffic Signs

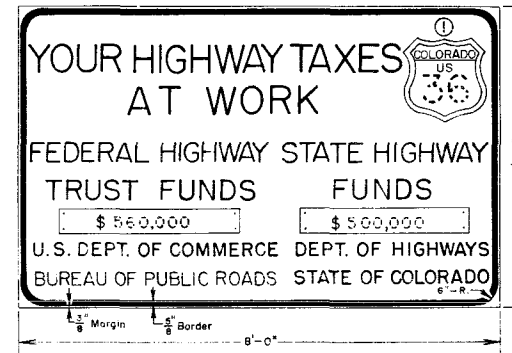
Designed by J.C.R. Approved by J.C.R.
Made by J.C.R. Engineer, Surveys & Plans
Checked by Date: July 22, 1955

STANDARD M-6-CA
(JAN. 31, 1964)

INTERSTATE SYSTEM



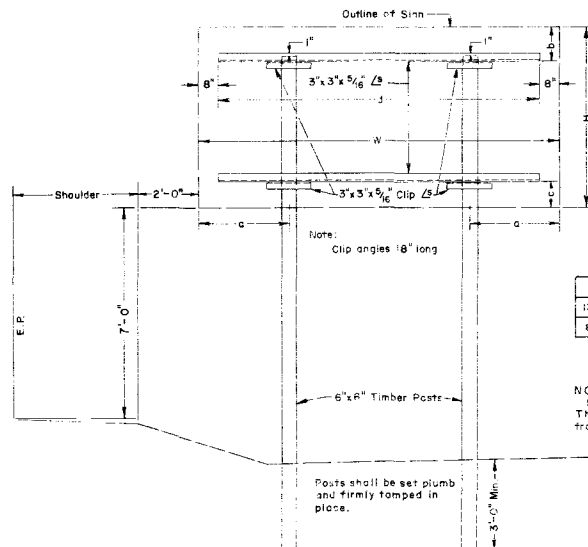
PRIMARY & SECONDARY SYSTEM



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

REVISIONS		
6-26-64	GENERAL NOTES	M.R.H.

INSTALLATION DETAIL



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

GENERAL NOTES

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

Signs shall be made of $\frac{3}{4}$ " Plywood or other material approved by the Department.

Background to be painted plain white with stencil black letters, numerals and border.

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

Posts shall be 6"X6" S4 S timber or other material approved by the Department and shall be painted white.

Signs are to be non-reflectORIZED, black legend on plain white background. Route Marker plaques to be the appropriate standard colors, non-reflectORIZED.

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

These signs will be furnished and installed by State Forces.

W	H	a	b	c	d
$13^{\circ}-0''$	$6^{\circ}-0''$	$2^{\circ}-6''$	$1^{\circ}-1\frac{1}{2}''$	$0^{\circ}-10\frac{1}{2}''$	$11^{\circ}-6''$
$8^{\circ}-0''$	$4^{\circ}-0''$	$1^{\circ}-6''$	$1^{\circ}-1\frac{1}{2}''$	$0^{\circ}-10\frac{1}{2}''$	$6^{\circ}-8''$

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

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

IDENTIFICATION SIGNS

Designed by B.F.R.	Approved by <i>J. B. Brown</i>
Made by D.J.B.	Staff Design Engr.
Checked by M.R.H.	Date: <i>2-5-64</i>

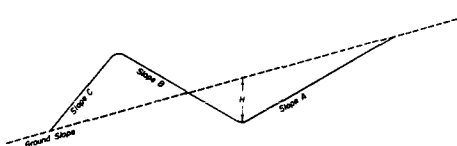
STANDARD TYPES of DITCHES and CONSTRUCTION METHODS

STANDARD M-13-A
(MAY 1, 1962)

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

DETAILS for CONTOUR INTERCEPTING DITCHES

Typical Section for Contour Intercepting Ditches



PURPOSE & USE OF THE TABLE
The primary purpose of the information for Contour and Intercepting Ditches shown on this sheet is to serve as a guide in construction and to readily arrive at yardages of excavation involved.
Foremost consideration in constructing these ditches is given first to the natural ground line slope confronted in construction, thence to the other values shown on the Typical Section.
By properly arriving at the combination of values shown on the Typical Section and in the Table for a specified condition, the number of cubic yards of excavation per 100 lin. ft. of ditch may be read under the appropriate column for this item.

Typical Construction Layouts

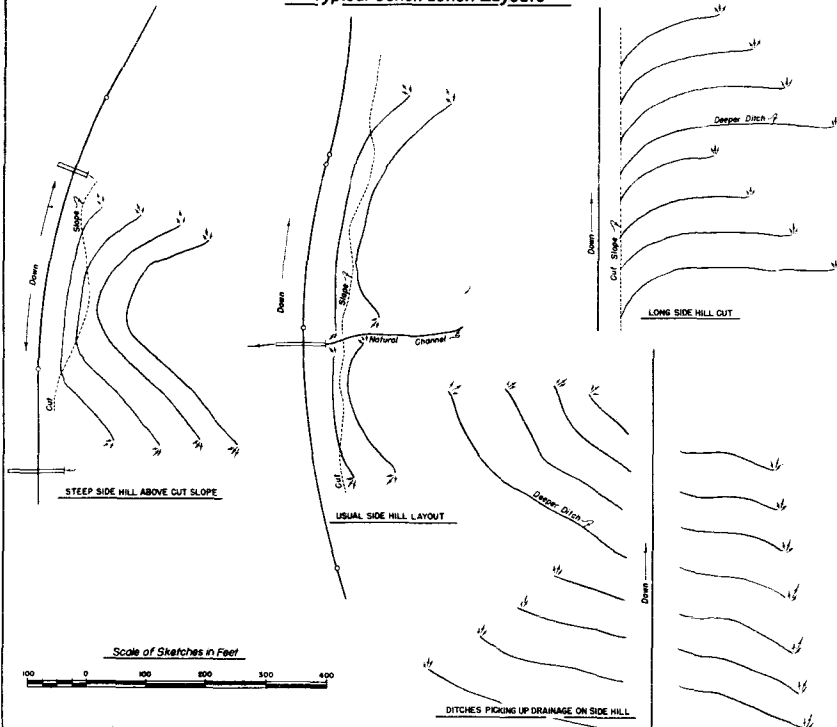
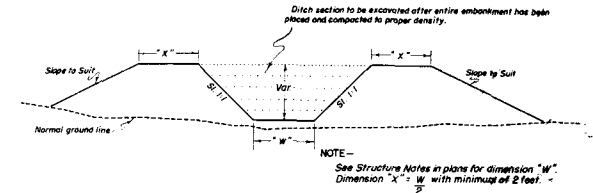


Table of Slopes and Yardages

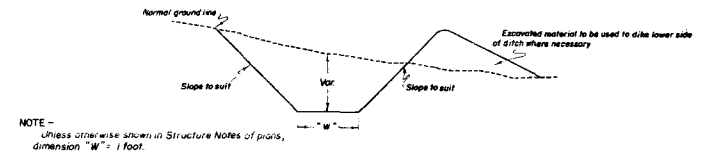
▲ SLOPES				H	Cubic Yards per 100 lin. ft. of Ditch
Ground	A	B	C		
5:1 Or Flatter	2:1	4:1	2:1	15"	16
				18"	23
				21"	32
				15"	15
				18"	22
				21"	30
				15"	14
				18"	20
				21"	27
				15"	13
	1-1/2:1	4:1	1-1/2:1	18"	19
				21"	25
				15"	12
				18"	18
				21"	25
				15"	12
				18"	17
				21"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

For Cut Sections

REVISIONS		
2-3-64	DEPT. NAME	M.R.H.

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 stated by the Engineer using the ditch section shown on plans or as ordered by the Engineer.

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

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

The following horizontal spacing of ditches is recommended:
4% to 6% Approximately 70' Centers
8% to 10% Approximately 60' Centers
20% to 4:1 Slope Approximately 55' Centers
30% to 1-1/2:1 Slope Approximately 50' Centers

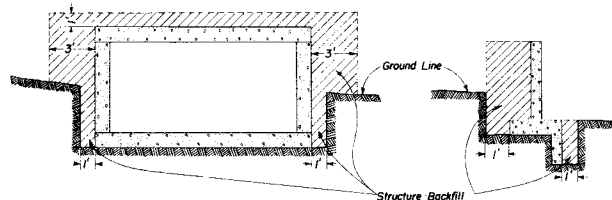
Where ditch checks are required the intervening ditch between one set of ditch checks shall not exceed a grade of 1.0%. Details of checks will be shown on plans when required.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DITCH TYPES

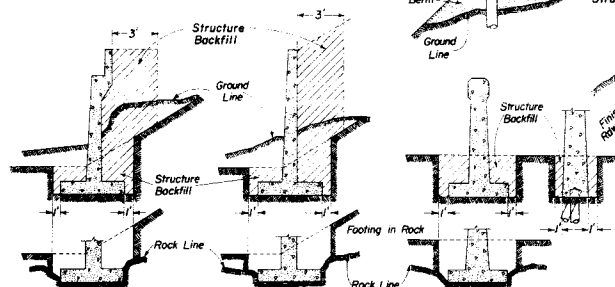
Designed by C.G.M. Approved by C.G.M.
Made by C.G.M. Engineer, Survey & Plans
Checked by Date: 3/1/62

CONCRETE BOX CULVERTS & WINGWALLS

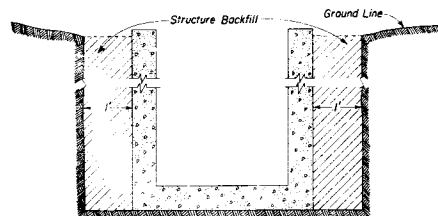


PIERS, ABUTMENTS, RETAINING WALLS ETC.

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



DROP INLETS, DIVISION BOXES, INTERCEPTING HEADWALLS ETC.

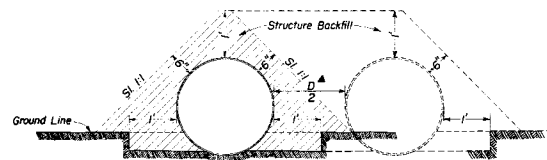


STANDARD M-16-A

(MAY 1, 1962)

FED. ROAD DIVISION NO.	DIVISION	PROJECT NO.	SHEET NO.
9	CDLO.		
REVISION			L.E.O.
5-2-63 (Rev. Backfill)			M.R.H.
1-31-64 DEPT. NAME			

CIRCULAR CONDUIT



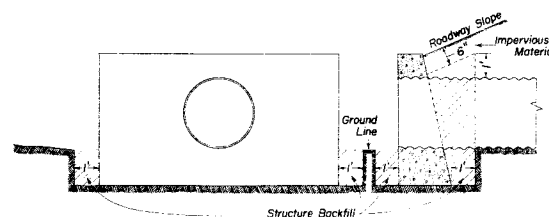
When two or more conduits are laid side by side, the distance between conduits shall be $\frac{1}{2}$ the conduit diameter but not less than 1'-0".

See Design Aid No. 16, 16a or 16b for computation of quantities.

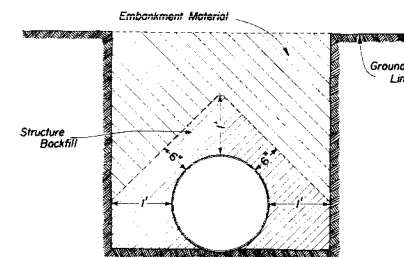
ELLIPTICAL OR ARCH CONDUIT



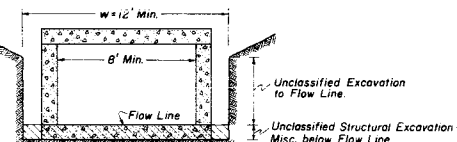
HEADWALLS AND END OF CULVERTS



SIPHONS OR CONDUIT IN TRENCH



On all structures of 8' span or over, including extensions of old structures, excavation for structures shall be classified and paid for as "Unclassified Excavation" to Flow Line and "Unclassified Structural Excavation - Misc." below the Flow Line of box.



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 Structure Backfill and compacted in accordance with Item 16 of the Standard Specifications.

For concrete box culverts located where roadway cross section is in Fill, embankment shall be built up and compacted to a point one (1) ft above flow line of box. The trench shall then be excavated as shown to accommodate construction of the box.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

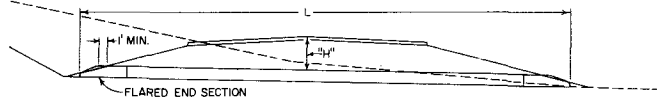
BACKFILL
AROUND STRUCTURES

Designed by H.E.P. Approved by L.E.O.
Made by D.M.E. Bridge Engineer
Checked by L.E.O. Date: May 2, 1958

METAL CULVERT WITH END SECTIONS



CONCRETE CULVERT WITH END SECTIONS

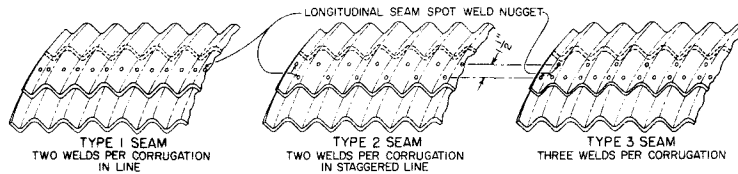


CULVERT WITHOUT END SECTIONS



H = Height of fill over top of Culvert.
L = Length of Culvert as shown on Structure List.
For Class of Concrete Pipe, see Standard M-52-A.
On Divided Highway Sections and Superelevated Sections the "H" dimension shall be the maximum depth of overfill including the pavement thickness over the top of the Culvert.

DETAILS OF SPOT WELDED LONGITUDINAL SEAM 1" X 3" CORRUGATIONS



GENERAL NOTES

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

Structural excavation and structure backfill will be paid for on the basis of the actual type of pipe used on the Project.

End Sections shall be of the same material as the Culvert.

STANDARD M-45-A

(DEC. 1, 1963)

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

REVISIONS		
2-3-64	DEPT. NAME	M.R.H.
3-12-64	BOLT OR RIVET DIMENSION	M.R.H.
4-29-64	DELETED FIELD SEAM	M.R.H.

TABLE C
HEIGHT OF FILL AND GAGE FOR
HELICALLY CORRUGATED STEEL PIPE

Diameter Inches	Height of Cover (Feet)															
	1	10	14	17	21	24	27	31	34	41	47	54	61	71	81	100
8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
12	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
21	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
24	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
30	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
36	14	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
42	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
48	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
54	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
60	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
66	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
72	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
78	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
84	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
90	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
96	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

USE
CORRUGATED METAL PIPE
OR
MULTIPLE PLATE CULVERT

TABLE A
HEIGHT OF FILL AND GAGE FOR
CORRUGATED STEEL PIPE
(RIVETED OR SPOT WELDED)

1/2" X 2 1/2" CORRUGATIONS

Diameter Inches	Height of Cover (Feet)															
	1	16	21	26	31	36	41	46	51	61	71	81	100	100	100	100
8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
12	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
21	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
24	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
30	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
36	14	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
42	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
48	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
54	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
60	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
66	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
72	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
78	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
84	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
90	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
96	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

USE
MULTIPLE PLATE
CULVERTS

TABLE B
HEIGHT OF FILL AND GAGE FOR
SPOT WELDED FABRICATED
CORRUGATED STEEL PIPE
1" X 3" CORRUGATIONS

Diameter Inches	Height of Cover (Feet)															
	1	11	16	21	26	31	36	41	46	51	61	71	81	100	100	100
8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
12	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
21	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
24	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
30	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
36	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
42	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
48	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
54	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
60	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
66	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
72	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
78	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
84	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
90	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
96	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
102	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
108	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

- ① TYPE 1 SEAM
- ② TYPE 2 SEAM
- ③ TYPE 3 SEAM

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

CULVERT PIPE

H-20 LOADING

Designed by
Made by
Checked by
Approved by
Engineer, Survey & Plans
Date: Dec. 1, 1963

SINGLE CONCRETE BOX CULVERT

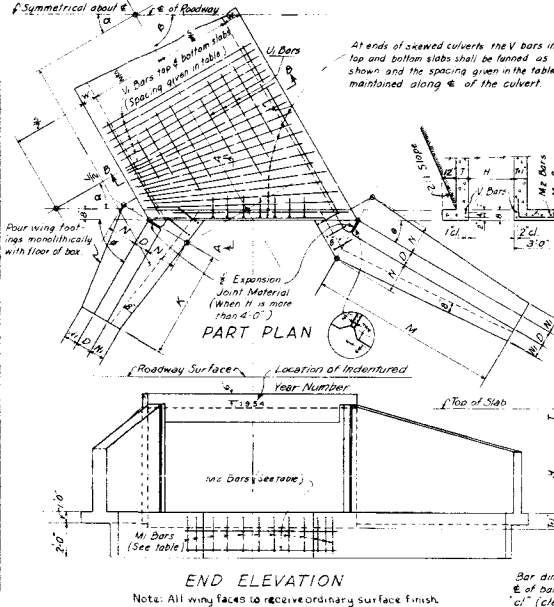
STANDARD M-46-C

(MAY 1, 1962)

RED ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Culvert	Span	Height	Wall	Bar Size	Spacing	No. Bars	Quantities for One Headwall	Quantities for Four Headwalls
ft.	ft.	ft.	ft.	in.	in.		Concrete (cu yd)	Steel (lbs)
18" 2A	3.0	2.0	8"	8"	12"	12	0.12	1.2
30" 3A	3.0	3.0	8"	8"	12"	12	0.12	1.2
20" 4A	4.0	2.0	8"	8"	12"	12	0.12	1.2
16" 5A	5.0	2.0	8"	8"	12"	12	0.12	1.2
20" 5B	5.0	3.0	8"	8"	12"	12	0.12	1.2
14" 6A	6.0	2.0	8"	8"	12"	12	0.12	1.2
20" 6B	6.0	3.0	8"	8"	12"	12	0.12	1.2
12" 7A	7.0	2.0	8"	8"	12"	12	0.12	1.2
15" 7B	7.0	3.0	8"	8"	12"	12	0.12	1.2
20" 7C	7.0	4.0	8"	8"	12"	12	0.12	1.2
10" 8A	8.0	2.0	8"	8"	12"	12	0.12	1.2
14" 8B	8.0	3.0	8"	8"	12"	12	0.12	1.2
20" 8C	8.0	4.0	8"	8"	12"	12	0.12	1.2
7" 9A	9.0	2.0	8"	8"	12"	12	0.12	1.2
14" 9B	9.0	3.0	8"	8"	12"	12	0.12	1.2
20" 9C	9.0	4.0	8"	8"	12"	12	0.12	1.2
5" 10A	10.0	2.0	8"	8"	12"	12	0.12	1.2
10" 10B	10.0	3.0	8"	8"	12"	12	0.12	1.2
16" 10C	10.0	4.0	8"	8"	12"	12	0.12	1.2
5" 11A	11.0	2.0	8"	8"	12"	12	0.12	1.2
9" 11B	11.0	3.0	8"	8"	12"	12	0.12	1.2
13" 11C	11.0	4.0	8"	8"	12"	12	0.12	1.2
5" 12A	12.0	2.0	8"	8"	12"	12	0.12	1.2
10" 12B	12.0	3.0	8"	8"	12"	12	0.12	1.2
4" 13A	13.0	2.0	8"	8"	12"	12	0.12	1.2
8" 13B	13.0	3.0	8"	8"	12"	12	0.12	1.2
4" 14A	14.0	2.0	8"	8"	12"	12	0.12	1.2
8" 14B	14.0	3.0	8"	8"	12"	12	0.12	1.2

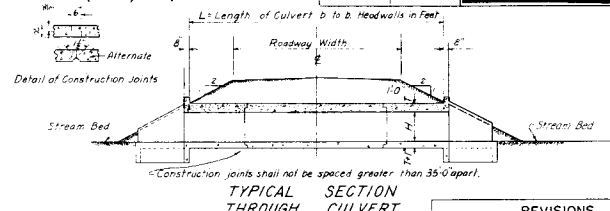


Bar List for Culvert & Headwalls (See Wingwall Standard for Wings)

Mark	Size	No. Req'd	Type	Length
V	See table I	24	I	5'-2" w/ 6"
W	See table I	24	I	H+2'-5"
U	See table I	24	I	L+1'-0"
M	See table I	24	I	3'-6"
M2	See table I	24	I	5'-2" w/ 6"

Type	Length
Strait	2'-6"
Type II	2'-6"

Possible Combinations (Span & Height)	Length
2'-2" 5'-5"	10'-7"
3'-2" 7'-4"	10'-8"
4'-2" 6'-5"	13'-7"
3'-3" 8'-4"	11'-7"
4'-3" 7'-5"	13'-6"
5'-3" 6'-6"	10'-6"
4'-4" 8'-5"	11'-9"
5'-4" 6'-7"	12'-7"
6'-4" 7'-6"	14'-6"

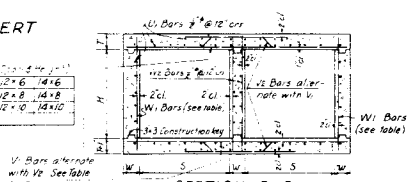
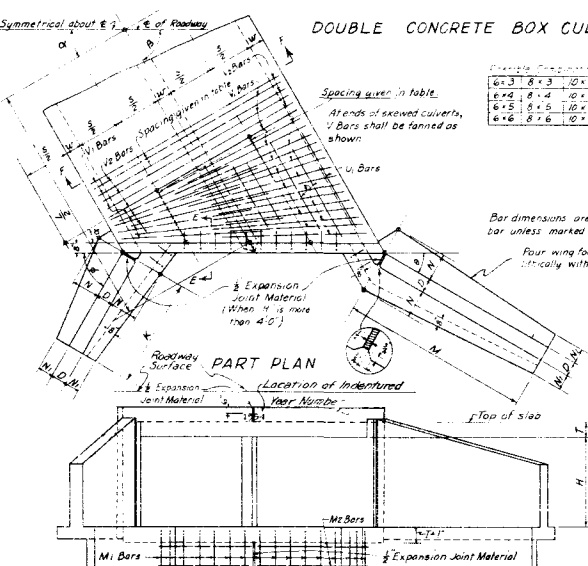


REVISIONS		
2-11-64	DEPT NAME	M R H

Note: K, M, N, and D are dimensioned on Wingwall Standard for the various heights of culverts.

Dimensions & Quantities (see Wingwall Standard for Wings)

Height of Culvert	Span	Height	Wall	Bar Size	Spacing	No. Bars	Quantities for One Headwall	Quantities for Four Headwalls
ft.	ft.	ft.	ft.	in.	in.		Concrete (cu yd)	Steel (lbs)
10" 6-6A	6.0	2.0	8"	8"	12"	12	0.12	1.2
15" 6-6B	6.0	3.0	8"	8"	12"	12	0.12	1.2
10" 6-6C	6.0	4.0	8"	8"	12"	12	0.12	1.2
10" 8-8A	8.0	2.0	8"	8"	12"	12	0.12	1.2
15" 8-8B	8.0	3.0	8"	8"	12"	12	0.12	1.2
10" 8-8C	8.0	4.0	8"	8"	12"	12	0.12	1.2
15" 10-10A	10.0	2.0	8"	8"	12"	12	0.12	1.2
10" 10-10B	10.0	3.0	8"	8"	12"	12	0.12	1.2
15" 10-10C	10.0	4.0	8"	8"	12"	12	0.12	1.2
5" 12-12A	12.0	2.0	8"	8"	12"	12	0.12	1.2
10" 12-12B	12.0	3.0	8"	8"	12"	12	0.12	1.2
15" 12-12C	12.0	4.0	8"	8"	12"	12	0.12	1.2
5" 14-14A	14.0	2.0	8"	8"	12"	12	0.12	1.2
10" 14-14B	14.0	3.0	8"	8"	12"	12	0.12	1.2



Mark	Size	No. Req'd	Type	Length
V	See table I	24	I	5'-2" w/ 6"
W	See table I	24	I	H+2'-5"
U	See table I	24	I	L+1'-0"
M	See table I	24	I	3'-6"
M2	See table I	24	I	5'-2" w/ 6"

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
SINGLE AND DOUBLE
CONCRETE BOX CULVERTS
(FROM SIZES SEE TABLE OF POSSIBLE COMBINATIONS)

Designed by WWD Approved by J. M. K. K. K.
Made by WWD Bridge Engineer
Checked by T. M. Date Aug. 30, 1954

Note: All wing faces to receive ordinary surface finish.

STANDARD M-46-E

STANDARD M-52-A

(MAY 1, 1962)

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

REVISIONS

2-3-64	DEPT. NAME	M.R.H.

APPROVED COMBINATIONS OF HEIGHT OF FILL - PROJECTION RATIO - BEDDING - CLASS

Height of Fill	Projection Ratio	Bedding	Class
12"	8'-7"	0.7	C II
	7'-10"	0.7	C III
	10'-15"	0.7	C IV
	15'-19"	0.7	B IV
	18'-29"	0.0	B V
	29'-42"	0.0	B V
15"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
18"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
21"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
24"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
27"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
30"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
33"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
36"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
42"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V
48"	8'-8"	0.7	C II
	8'-11"	0.7	C III
	11'-16"	0.7	C IV
	15'-20"	0.7	B IV
	20'-30"	0.0	B V
	30'-44"	0.0	B V
	44'-67"	-1.0	B V

Height of Fill	Projection Ratio	Bedding	Class
36"	8'-10"	0.7	C II
	10'-14"	0.7	C III
	14'-19"	0.7	C IV
	19'-23"	0.7	B IV
	23'-34"	0.0	B V
	34'-53"	0.0	B V
	53'-73"	-1.0	B V
60"	8'-11"	0.7	C II
	11'-14"	0.7	C III
	14'-20"	0.7	C IV
	20'-24"	0.7	B IV
	24'-35"	0.0	B V
	35'-53"	0.0	B V
	53'-74"	-1.0	B V
66"	8'-11"	0.7	C II
	11'-14"	0.7	C III
	14'-20"	0.7	C IV
	20'-24"	0.7	B IV
	24'-34"	0.0	B V
	34'-54"	0.0	B V
	54'-74"	-1.0	B V
72"	8'-12"	0.7	C II
	12'-15"	0.7	C III
	15'-21"	0.7	C IV
	21'-25"	0.7	B IV
	25'-35"	0.0	B V
	35'-54"	0.0	B V
	54'-74"	-1.0	B V
78"	8'-11"	0.7	C II
	11'-15"	0.7	C III
	15'-20"	0.7	C IV
	20'-25"	0.7	B IV
	25'-34"	0.0	B V
	34'-43"	-1.0	B V
84"	8'-11"	0.7	C II
	11'-15"	0.7	C III
	15'-21"	0.7	C IV
	21'-26"	0.7	B IV
	26'-35"	0.0	B V
	35'-44"	-1.0	B V
90"	8'-12"	0.7	C II
	12'-15"	0.7	C III
	15'-18"	0.7	C IV
	18'-22"	0.0	B V
	22'-25"	-1.0	B V
96"	8'-12"	0.7	C II
	12'-15"	0.7	C III
	15'-19"	0.7	C IV
	19'-23"	0.0	B V
	23'-25"	-1.0	B V
102"	8'-12"	0.7	C II
	12'-15"	0.7	C III
	15'-18"	0.7	C IV
	18'-23"	0.0	B V
	23'-25"	-1.0	B V
108"	8'-13"	0.7	C II
	13'-16"	0.7	C III
	16'-19"	0.7	C IV
	19'-23"	0.0	B V
	23'-25"	-1.0	B V

- ① Limits of measurement for Structural Excavation for Class "B" Bedding.
- ② Limits of measurement for Structural Excavation for Class "C" Bedding.

- ③ Limits of measurement for Structural Excavation for 0.0 Projection Ratio Class "B" Bedding.
- ④ Limits of measurement for Structural Excavation for -1.0 Projection Ratio Class "B" Bedding.

GENERAL NOTES

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

The Height of Fill for each culvert shall determine the bedding and class of concrete pipe to be used (See table herewith). Location, length and inside diameter of pipe, and class of pipe required shall be shown on plans.

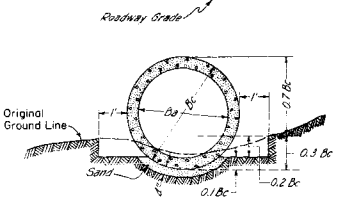
Type "B" bedding is to be used in solid rock.

Details for placement of structure backfill materials are shown elsewhere in plans.

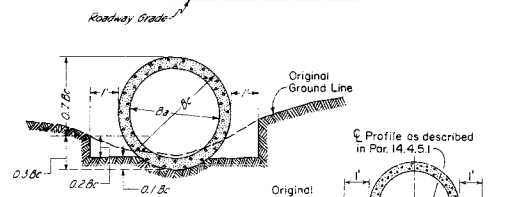
When projection ratios of 0.0 or -1.0 are used, backfilling above structure backfill material shall be made with materials excavated in order to produce the projection ratio. Cost of this backfilling is to be included in the contract unit price for Item 52.

If material does not stand with a vertical face when attempting to produce 0.0 or -1.0 projection ratios, this standard is not applicable.

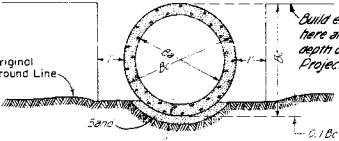
0.7 PROJECTION RATIO
"B" BEDDING



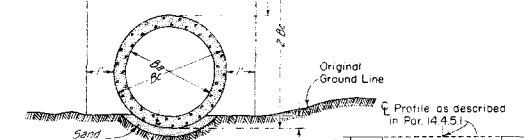
0.7 PROJECTION RATIO
"C" BEDDING



0.0 PROJECTION RATIO
"B" BEDDING



-1.0 PROJECTION RATIO
"B" BEDDING



CONCRETE OR MORTAR PIPE JOINT

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.

① Height above Top of Pipe

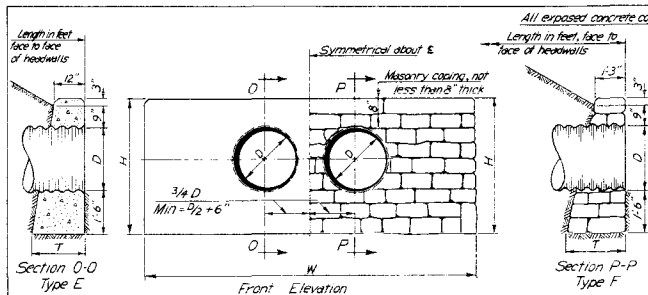
* Minimum cover with concrete pavement shall be 1.25' and with asphalt or gravel 1.75'.

Minimum cover on Side Drains shall be 1.0'

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

REINFORCED CONCRETE
PIPE

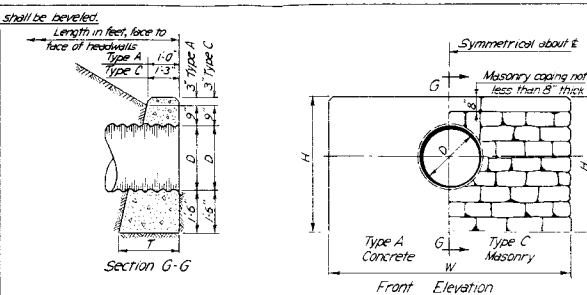
Designed by *E. J. Z. P.* Approved by *C. A. K. W. L.*
Made by *C. M. E.* Bridge Engineer
Checked by *L. E. O.* Date: *Aug. 16, 1960*



STANDARD HEADWALLS FOR DOUBLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

Type E					Both Types					Type F				
D	T	% Concrete in Two Headwalls	W	H						D	T	D	T	D
15"	1'-6"	2.4 CU YDS	7'-6"	3'-9"						3.1 CU YDS	2'-0"	15"	2'-0"	15"
18"	1'-7"	3.0 DO	8'-6"	4'-0"						2.1 DO	2'-1"	18"	2'-1"	18"
24"	1'-10"	4.4 DO	10'-6"	4'-6"						5.5 DO	2'-4"	24"	2'-4"	24"
30"	2'-0"	6.1 DO	12'-3"	5'-0"						7.5 DO	2'-6"	30"	2'-6"	30"
36"	2'-2"	8.1 DO	15'-0"	5'-6"						10.0 DO	2'-8"	36"	2'-8"	36"
42"	2'-5"	10.8 DO	17'-3"	6'-0"						12.6 DO	2'-10"	42"	2'-10"	42"
48"	2'-7"	13.6 DO	19'-6"	6'-6"						15.3 DO	3'-0"	48"	3'-0"	48"



STANDARD HEADWALLS FOR SINGLE CORRUGATED METAL PIPE CULVERTS

Table of Dimensions and Quantities

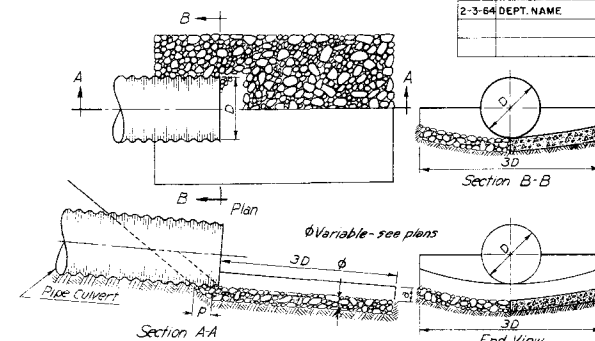
Type A					Both Types					Type C				
D	T	% Concrete in Two Headwalls	W	H						D	T	D	T	D
15"	1'-6"	1.8 CU YDS	5'-3"	3'-9"						2.2 CU YDS	2'-0"	15"	2'-0"	15"
18"	1'-7"	2.2 DO	6'-0"	4'-0"						2.8 DO	2'-1"	18"	2'-1"	18"
24"	1'-10"	3.3 DO	7'-6"	4'-6"						4.1 DO	2'-4"	24"	2'-4"	24"
30"	2'-0"	4.5 DO	9'-0"	5'-0"						5.6 DO	2'-6"	30"	2'-6"	30"
36"	2'-2"	6.0 DO	10'-6"	5'-6"						7.4 DO	2'-8"	36"	2'-8"	36"
42"	2'-5"	8.0 DO	12'-0"	6'-0"						9.2 DO	2'-10"	42"	2'-10"	42"
48"	2'-7"	10.0 DO	13'-6"	6'-6"						11.5 DO	3'-0"	48"	3'-0"	48"

STANDARD M-95-A

(MAY 1, 1962)

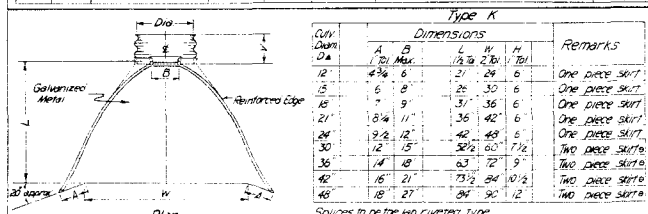
FEDERAL ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
5	COLORADO		

REVISIONS	2-3-64 DEPT. NAME	M.R.H.

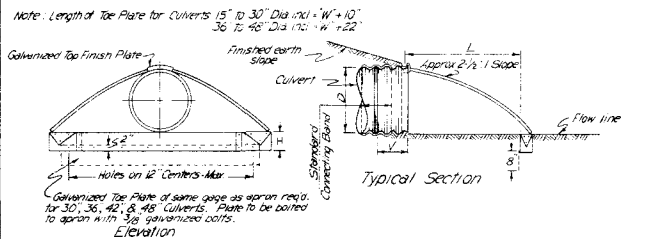


CONCRETE OR GROUTED RUBBLE APRON FOR PIPE CULVERT

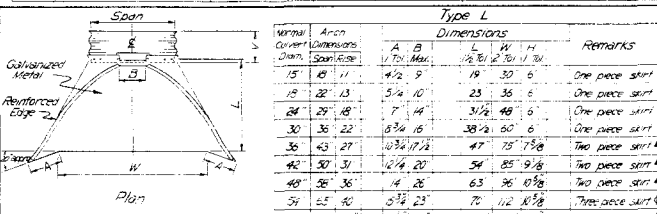
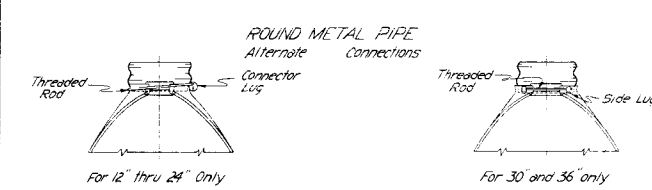
Square Yards of Slope and Pitch Paving														
Fill	D	15'	18'	24'	30'	36'	42'	48'	54'	60'	66'	72'	78'	84'
Slope	15'	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4
Pitch	15'	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4



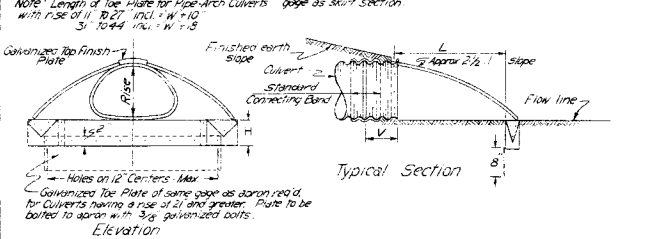
Note: Length of Toe Plate for Culverts 15" to 30" Dia incl. $W+10"$
36" to 48" Dia incl. $W+22"$



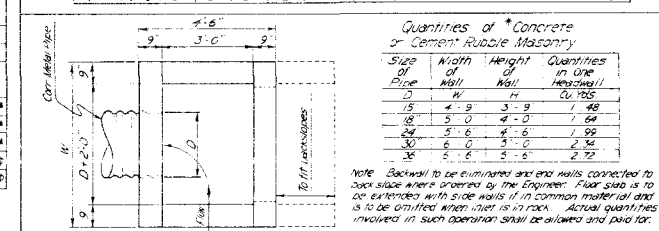
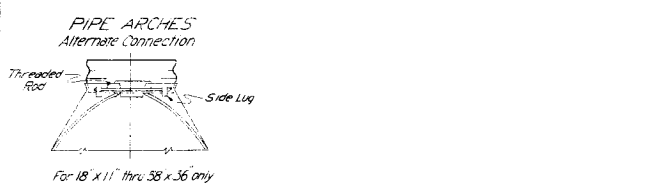
STANDARD METAL APRONS FOR CORRUGATED METAL PIPE CULVERTS TYPE K



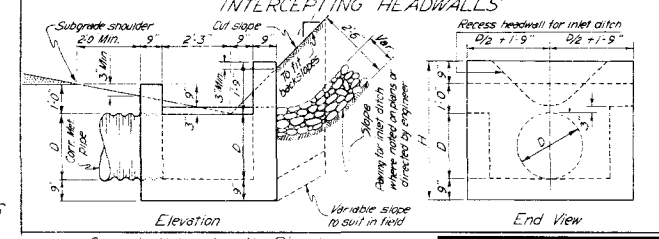
Note: Length of Toe Plate for Pipe Arch Culverts with rise of 11, 12, 21, incl. $W+10"$
31, 40, 44, incl. $W+18"$



STANDARD METAL APRONS FOR CORRUGATED METAL PIPE ARCH CULVERTS TYPE L



Note: Backfill to be eliminated and end walls connected to top 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 river is in rock. Actual quantities involved in such operation shall be allowed and paid for.



INTERCEPTING HEADWALLS

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.

When culvert is skewed, headwalls shall be placed parallel to E of roadway.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

HEADWALLS AND APRONS FOR C.M.P. CULVERTS

Designed by P.S.B. 6/61 Approved by J.E.D. 1/62
Made by H.C.R. Bridge Engineer
Checked by M.W.M. Date June 1, 1958

STANDARD M-152-A

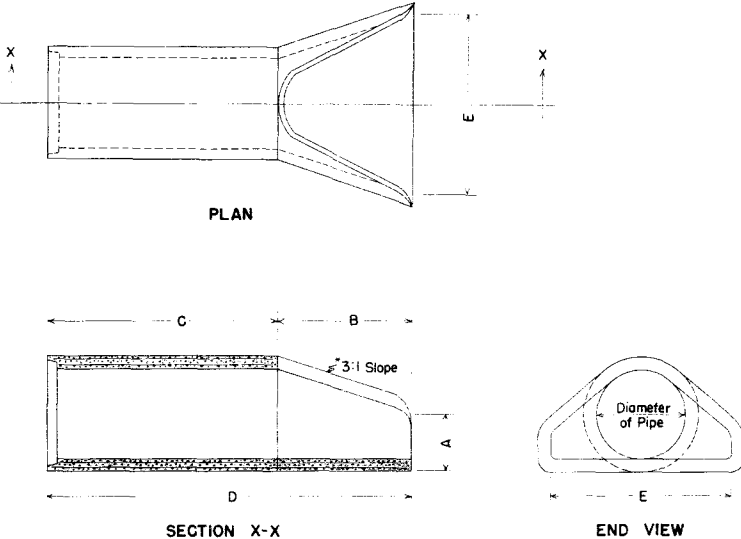
(MAY 1, 1962)

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

REVISIONS		
2-11-64	Rev. Dept Name	M.R.H.

FLARED END SECTION FOR CONCRETE PIPE

7°30' ANGLE SECTION FOR CONCRETE PIPE



DIMENSIONS FOR FLARED END SECTIONS

DIAMETER	A	B	C	D	E
12"	4"	2'-0"	4'-0 7/8"	6'-0 7/8"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
24"	9 1/2"	3'-7 1/2"	4'-6"	8'-1 1/2"	4'-0"
30"	1'-0"	4'-6"	3'-7 3/4"	8'-1 3/4"	5'-0"
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-6"	6'-0"	2'-3"	8'-3"	7'-6"
*60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"

*60" end section is based on a slope of 2:1

NOTE:
Alternate equivalent designs for flared end sections may be submitted to the Department for approval. Payment for "Flared End Sections" will be based on the lengths as shown in Column D. Any additional culvert pipe required to provide the lengths as shown in Column D will be included in the unit price bid for "Flared End Sections" of the several sizes.

DIMENSIONS FOR 7°30' ANGLE SECTIONS

DIAMETER OF PIPE	LENGTH ON OUTSIDE OF PIPE				AVERAGE LAYING LENGTH ON C.
	A	B	C	D	
12"	4 1/2"	4 1/2"	3 1/2"	3 1/2"	8"
15"	5 1/2"	5 1/8"	4 1/4"	3 7/8"	9 3/8"
18"	3 1/2"	6 1/2"	2"	5"	8 1/2"
24"	4"	6 1/2"	2"	4 9/16"	8 1/2"
30"	4 1/2"	7"	2"	4 1/2"	9"
36"	4 7/8"	8 7/16"	2"	5 7/16"	10 7/16"
42"	5"	9 1/2"	2 7/8"	6 1/8"	12 1/8"
48"	5 1/2"	11"	3 7/16"	7 7/16"	14 7/16"
54"	6 1/8"	12 7/8"	4"	8"	16 7/8"
60"	6 7/8"	14"	4 7/8"	9 1/4"	18 7/8"

A, B, C and D apply to Tongue and Groove type of Joint only and can be varied for other types of Joints.

GENERAL NOTES

Joints other than Tongue and Groove may be used for Flared End Sections, 7°30' Angle but all joints for any one pipe structure must be uniform.

Concrete, wall thickness and reinforcing steel in Flared End Sections and 7°30' Angle Sections must conform with the requirements of the pipe with which they are used.

Flared end sections are to be furnished with tongue or groove, and/or bell or spigot as required, in order that joints may be laid with the bell or groove end upstream.

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
CONCRETE END
AND ANGLE
SECTIONS

Designed by R.S.M. Approved by J.M.K.
Made by J.M.K.
Checked by R.S.M. Date: January 14, 1949

STANDARD M-192-AA

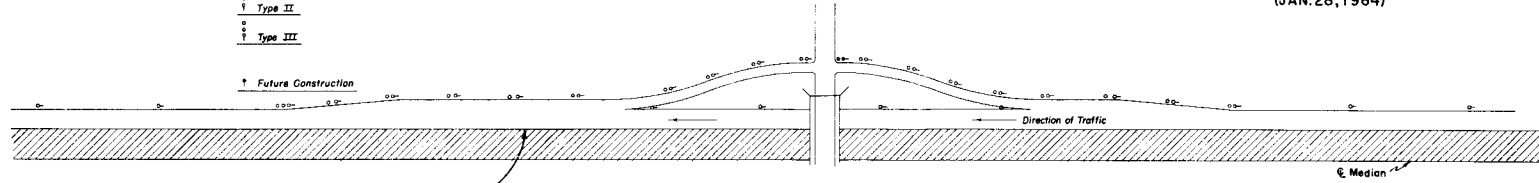
(SHEET 1 OF 2 SHEETS)

(JAN. 28, 1964)

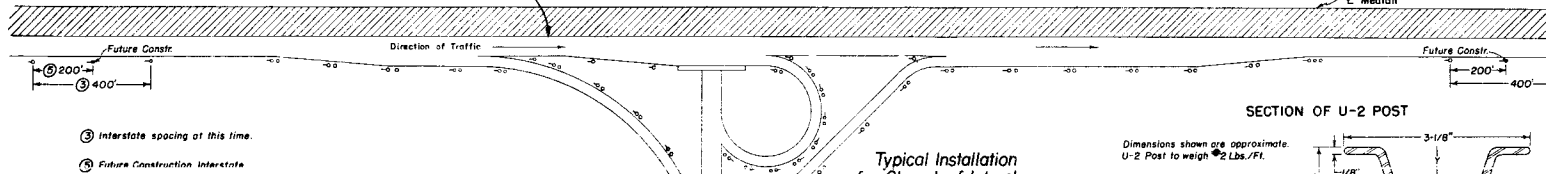
FED. ROAD DIST. NO.	DIVISION	PROJECT NO.	SHEET NO.
9	COLORADO		

REVISIONS		
10-27-64	Delete (2), (4) B Tangent spacing	M.R.H.

Type I
Type II
Type III



EDGE OF PAVED SHOULDER Typical Installation for Diamond Interchange.



Interstate spacing at this time.
Future Construction Interstate

Typical Installation for Cloverleaf Interchange.

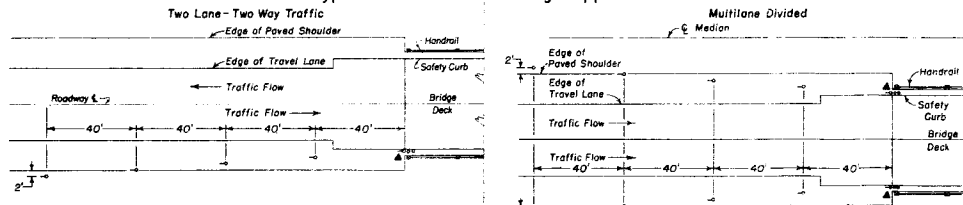
SPACING FOR DELINEATOR POSTS ON HORIZONTAL CURVES

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

$S_s = 2 \sqrt{R-50}$ 1-ST. SPACE = 1.85 2-ND. SPACE = 3.5 3-RD. SPACE = 6.5
NO SPACES TO EXCEED 200 FT.

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

Typical Installation at Bridge Approaches

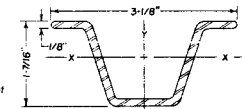


Where curb to curb width of bridge is equal to or greater than roadway width plus usable shoulder width, use this delineator only and omit all others.
Note: Where guard rail is present, place delineators outside of guard rail and at height which will permit clear view of all three Delineator buttons.

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

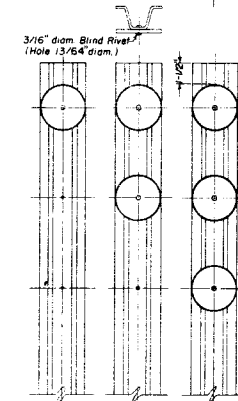
SECTION OF U-2 POST

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



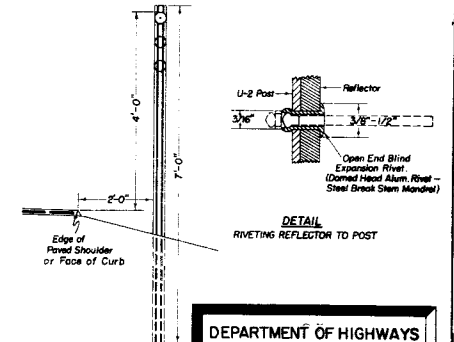
Alternate post acceptable if section modulus is at least 0.200 in.³ about X-X axis or at least 0.250 in.³ about Y-Y axis.

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



TYPE I 1-3\"/>

Min. 3 holes in all posts required as shown.



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DELINEATORS

Designed by CKM
Made by WNC
Checked by LEO
Approved by [Signature]
Engineer, Surveys
Date: October 19, 1962

STANDARD M-192-AA

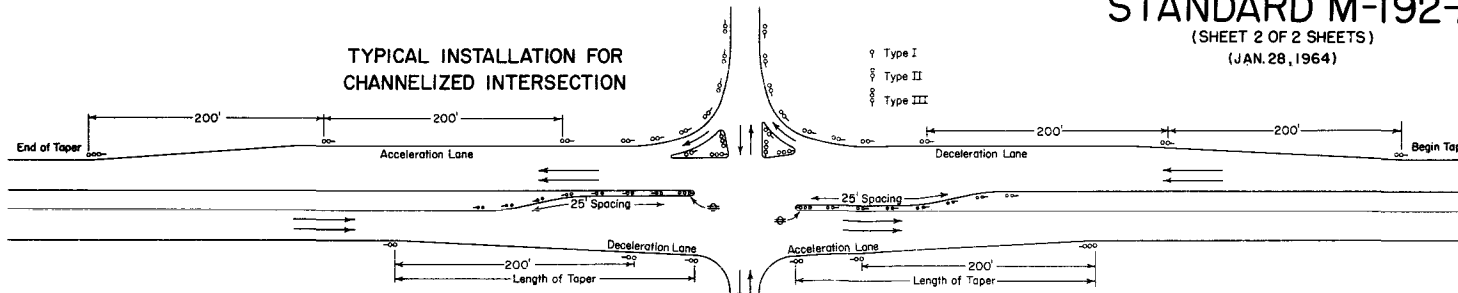
(SHEET 2 OF 2 SHEETS)

(JAN. 28, 1964)

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

REVISIONS		
10-27-64	Add note B culvert marking	M.R.H.

TYPICAL INSTALLATION FOR CHANNELIZED INTERSECTION



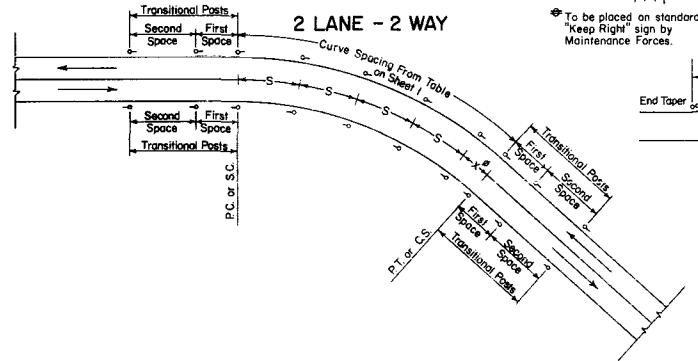
GENERAL NOTES

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

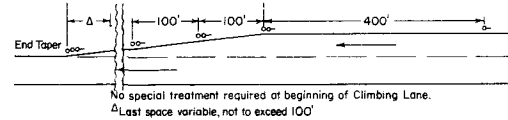
For additional General Notes, see Sheet 1 of this Standard.

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

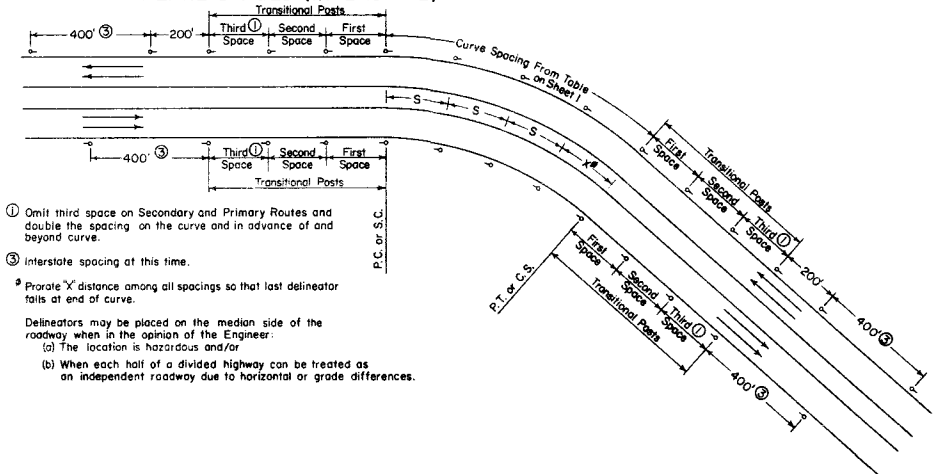
2 LANE - 2 WAY



TYPICAL INSTALLATION FOR CLIMBING LANE TRANSITION



4 LANE DIVIDED (INTERSTATE)



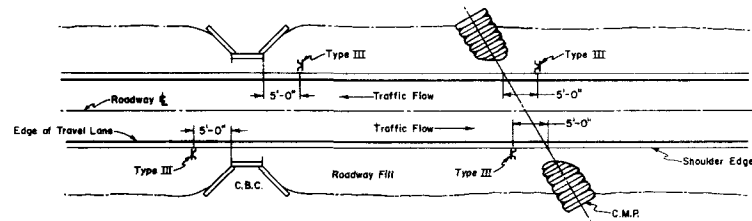
- ① Omit third space on Secondary and Primary Routes and double the spacing on the curve and in advance of and beyond curve.
- ③ Interstate spacing at this time.

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

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

- (a) The location is hazardous and/or
- (b) When each half of a divided highway can be treated as an independent roadway due to horizontal or grade differences.

DELINEATOR PLACEMENT AT ISOLATED MINOR STRUCTURES



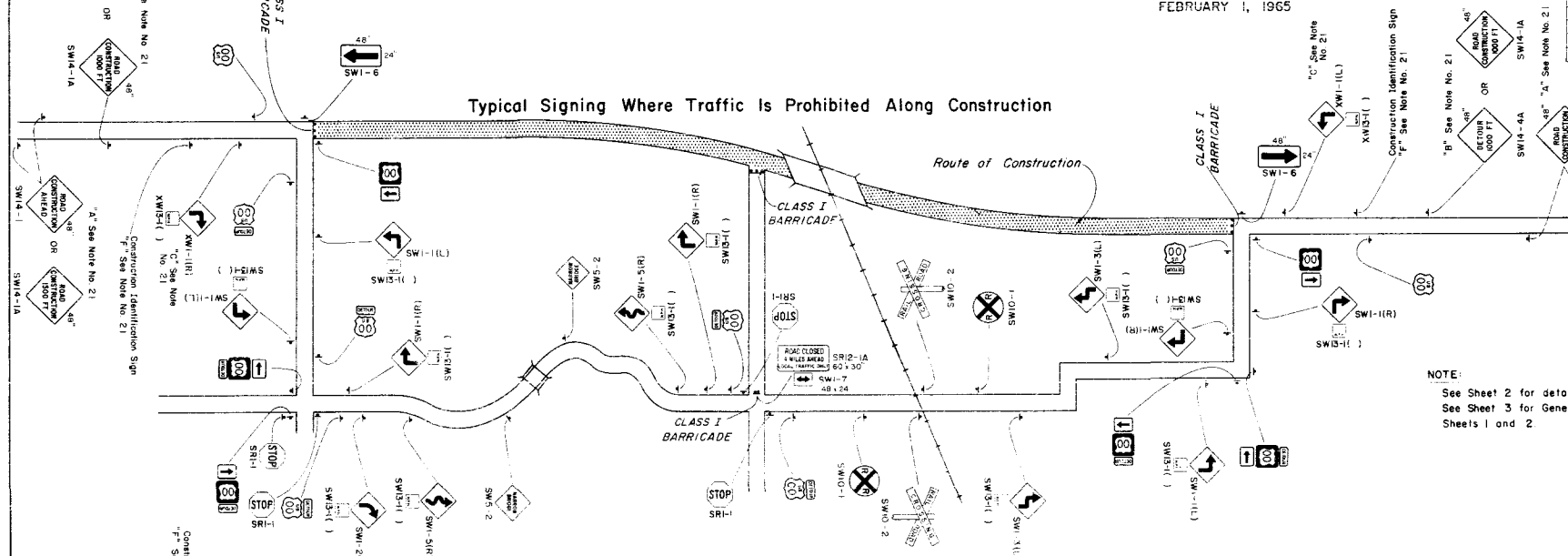
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

DELINEATORS

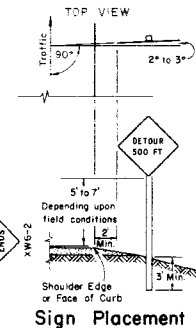
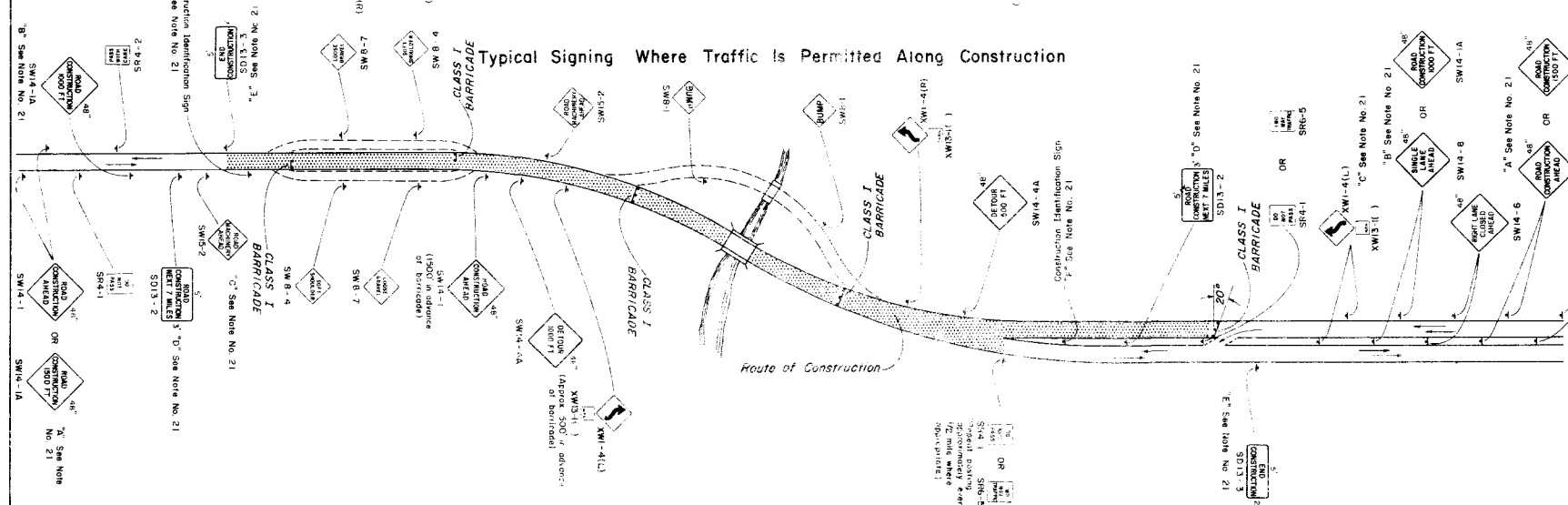
Designed by C.K.M. Approved by [Signature]
Made by T.E.F. Engineer, Surveys & Plans
Checked by L.E.O. [Signature] 10/1/64

FEBRUARY 1, 1965

REVISIONS		



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



DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TRAFFIC SIGNING
FOR HIGHWAY
CONSTRUCTION

Designed By: D.R.W.	Approved By: <i>[Signature]</i>
Made By: J.L.S.	Date: Feb. 1, 1965
Checked By: J.S.	

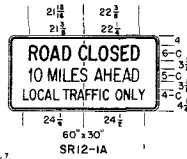
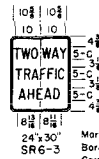
STANDARD M-6-BA

(SHEET 2 OF 3 SHEETS)

FEBRUARY 1, 1965

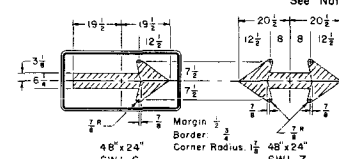
REGULATORY SIGNS

See Note No. 9



WARNING SIGNS

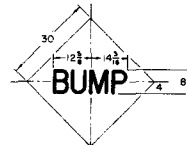
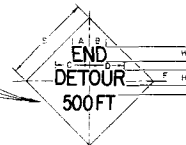
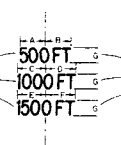
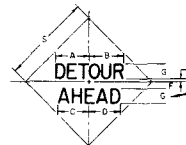
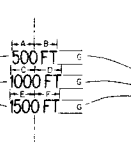
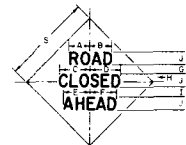
See Note No. 10



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

WARNING SIGNS

See Note No. 10



SW14-3	SW14-5A	SW14-5	SW14-4	SW14-4A	SW14-4B
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
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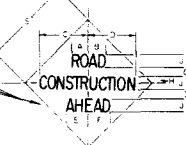
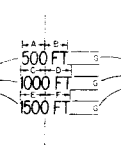
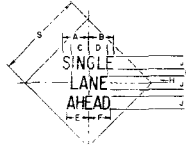
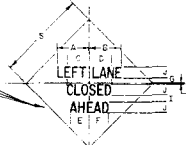
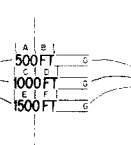
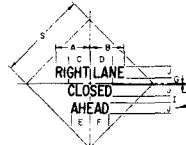
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1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-3	SW14-5A	SW14-5	SW14-4	SW14-4A	SW14-4B
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-3	SW14-5A	SW14-5	SW14-4	SW14-4A	SW14-4B
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-3	SW14-5A	SW14-5	SW14-4	SW14-4A	SW14-4B
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-3	SW14-5A	SW14-5	SW14-4	SW14-4A	SW14-4B
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"



SW14-6	SW14-6A	SW14-7	SW14-7A	SW14-7B	SW14-1
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
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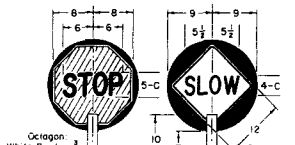
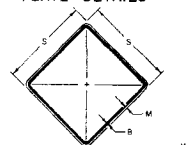
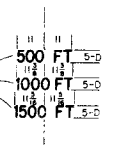
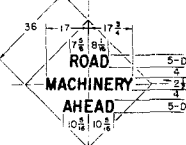
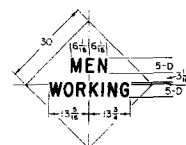
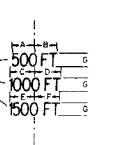
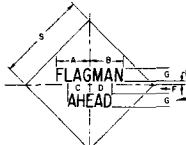
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1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-6	SW14-6A	SW14-7	SW14-7A	SW14-7B	SW14-1
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-6	SW14-6A	SW14-7	SW14-7A	SW14-7B	SW14-1
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"

SW14-6	SW14-6A	SW14-7	SW14-7A	SW14-7B	SW14-1
48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"	48" x 30"
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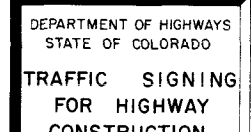
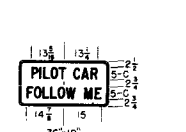
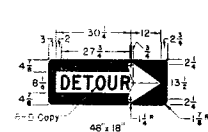
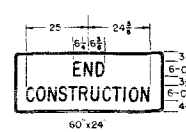
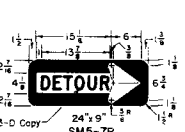
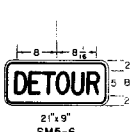
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1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"



NOTES:
SEE SHEET 1 FOR TYPICAL SIGNING AND SIGN PLACEMENT.
SEE SHEET 3 FOR GENERAL NOTES APPLICABLE TO SHEETS 1 AND 2.
ALL DIMENSIONS THAT ARE NOT LABELED ARE IN INCHES.

GUIDE SIGNS

See Note No. 11



Designed By: DRW
Made By: H.O.D.
Checked By: J.B.
Date: Feb 1, 1965

STANDARD M-6-BA

(SHEET 3 OF 3 SHEETS)

FEBRUARY 1, 1965

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

GENERAL NOTES

- All work shall be done in accordance with: (a) the Standard Specifications of the Department of Highways applicable to the Project, and (b) the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the Department of Highways.
- Where traffic is maintained through or over any part of the Project the Contractor will be required to mark all hazards within the limits of the Project (including connecting roads) with well-maintained Barricades, Warning, and Guide Signs. All Barricades and Signs shall be moved, added to, changed or removed as required during the progress of construction and removed entirely when the Project is completed.
- Where traffic is prohibited from the Project the Detour will be marked by the Department except that the Contractor shall provide, erect and maintain Barricades, complete, (when required) at the ends of the Project, and at the Detour and connecting roads. All U. S. or State Route Markers required for the Project will be furnished and installed by the Department. The location and positioning of Warning Signs, Barricades, and Regulatory Signs shall be as recommended by the appropriate District Engineering Forces of the Department.
- Work on the Project shall not be started until all required signs are in place and approved by the Engineer. Where speed control appears necessary such speed control shall be requested from the Engineer by the Contractor. Control of speed through a construction zone may be achieved by Advisory Speed plates in conjunction with Warning Signs (SW13-1 for use with 30" Warning Signs and XW13-1 for use with 36" and 48" Warning Signs). The Advisory Speed plate is to be posted only at those locations where the safe speed is lower than the imposed Regulatory speed limit.
- All Signs and Barricades shall be placed for best visibility and legibility, maintained in good condition and kept clean and free of dirt at all times. Contractor's and Engineer's vehicles and equipment must be parked so that signs and barricades are visible to approaching traffic at all times.
- Where two identical signs are used for dual posting they are to be staggered on the two sides of the roadway for a minimum distance of 75' to avoid a tunneling effect.
- Examples for marking Projects, as shown on Sheet 1, are typical of signs required and are subject to alteration to fit actual conditions encountered in the field. Locations for control devices are to be staked by the Engineer. In all cases Warning signs are to be placed well in advance of the hazard, the distance depending on topography and existing approach speeds. Additional markings and any special signs required for the guidance and protection of traffic will be placed as required on the Project at the Contractor's expense.
- Desirable sizes for signs are shown on Sheet 1 of this Standard. Where warranted larger or smaller signs shall be used. Detailed dimensions for signs normally used in connection with construction are shown on Sheet 2 of this Standard. For information on standard roadway signs not detailed on this Standard see the "Manual on Uniform Traffic Control Devices for all Classes of Streets and Highways" published by the Department of Highways.
- Signs with the prefix "R" in the sign code are Regulatory signs and as such impose legal compulsions or restrictions on drivers and should only be used as authorized by the Engineer.
- Signs with the prefix "W" in the sign code are Warning signs and are used to alert traffic to existing or potentially hazardous conditions.
- Signs with the prefix "D" or "M" in the sign code are Guide signs. Those with the prefix "D" convey general information and those with the prefix "M" are used for marking the traffic route.
- All signs shall be reflectorized unless otherwise specified on plans. Regulatory and Guide signs (unless otherwise specified) shall have a screen processed black legend and border on a white flexible reflective sheeting, non-exposed lens background. The back side of Regulatory and Guide signs shall be painted with two coats of "Exterior Sign White Paint." Warning signs shall have a screen processed black legend and border on a highway yellow flexible reflective sheeting, non-exposed lens background. The back side of Warning signs shall be painted with two coats of "Federal Yellow Synthetic Sign Enamel."
- All paint and methods of painting shall conform with Item 38 of the Standard Specifications.
- Posts for regulatory, warning, and guide signs will normally be 4" x 4" or 6" x 6" and shall conform to the Standard Specifications for Miscellaneous Untreated Timber S4S. Timber shall conform to Construction grade Paragraph 123B or 125B of Standard No. 15 Grading & Dressing Rules for West Coast Douglas Fir (1956) or Dense Structural 5B and LL Structural 5B Paragraph 264 or 285 of 1956 Grading Rules for Southern Pine. Posts shall be painted with one coat of "White Primer for Wood" and one coat of "Outside White Paint."
- Sign panels furnished by the Contractor for use only during construction may be fabricated from plywood, aluminum, steel or other suitable material but shall be stable and durable enough to meet other requirements of this Standard.
- All material shall be sound and durable. Barricades, signs, symbols, and lettering shall be of good workmanship. Uneven lettering will not be accepted.
- Alternate methods of processing signs or the substitution of symbols or other reflecting elements for painted symbols will be permitted only after approval by the Department.
- Torches and Lanterns shall be either of the fuel-burning or battery-powered type approved by the Department. Particular care shall be taken to protect all signs and barricades from smoke and smudge.
- Barricades, Flashing Beacons and Flashers - Refer to appropriate "M" Standard (Timber Barricades) for details.
- Flagman Sign - This sign shall have a black painted background on both sides to form a contrast for the octagonal Stop sign and the diamond Warning sign. The "STOP" sign shall be fabricated by reverse screen process using transparent red paint on smooth surface silver reflective sheeting. The "SLOW" side of the Flagman Sign shall be black process paint on smooth surface yellow reflective sheeting. Handle to be grooved on one side to indicate reading of sign to Flagman.
- Sign "A": This is the first advance warning sign and shall be placed 1,500 feet ahead of Barricade or project terminal. Postings are required on both sides of the roadway on divided highways. Dual posting is required where warranted on two-lane, two-way highways.
Sign "B": This is the second advance warning sign and shall be placed 1,000 feet ahead of barricade or project terminal. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
Sign "C": This is the third advance warning sign in cases where barricades are used and shall be placed 500 to 750 feet ahead of barricade or potentially hazardous condition. Postings are required on both sides of the roadway on divided highways and singly on two-lane, two-way highways.
Sign "D": SD13-2 - This sign shall be placed to mark the beginning of a Project of more than 2 miles in extent, where traffic is maintained through the project. It shall be placed singly and near the beginning of construction.
Sign "E": SD13-3 - This sign shall be placed to mark the end of the Project. It shall be placed singly and may be placed opposite barricade if desirable.
Sign "F": Construction identification signs shall be furnished and installed by the Department on all Federal-Aid and Forest Highway Projects where actual construction is in progress and visible to highway users. These signs should be located so as not to obscure or detract from the effectiveness of other official signs. Where two or more projects are contiguous the appropriate data may be included in one set of signs. Refer to appropriate "M" Standard (Identification Signs) for sign details.
Signs A through F shall be furnished, installed and maintained by the Department.

SPECIAL NOTE: Requirements of this Standard are optional to those of Standard M-6-B through 12-31-65. Following that date Standard M-6-B will be obsolete.

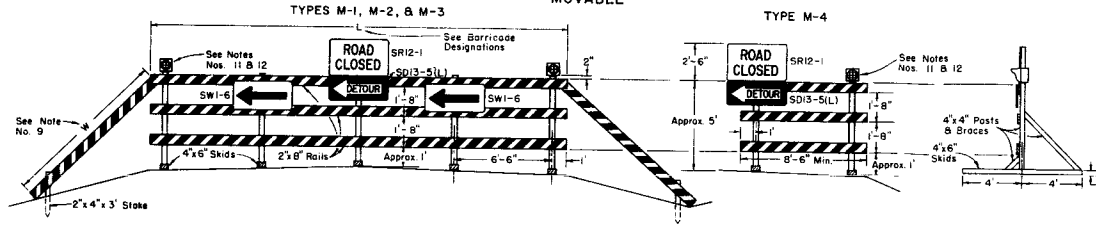
DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TRAFFIC SIGNING
FOR HIGHWAY
CONSTRUCTION

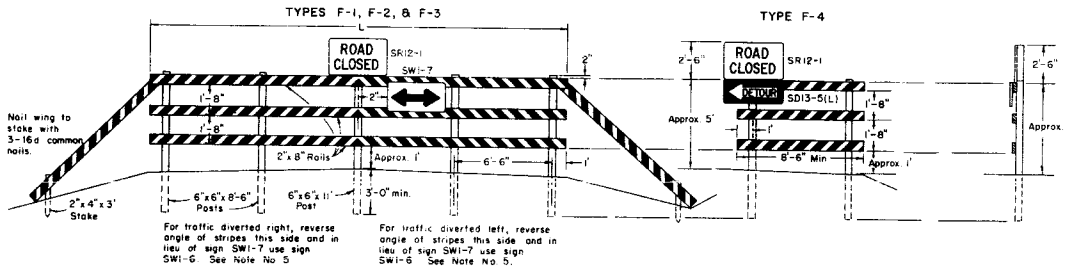
Designed By D.R.W.
Made By J.L.S.
Checked By J.B.
Approved By *[Signature]*
Date *FEB 1 1965*

CLASS I BARRICADES (3 RAILS)

MOVABLE

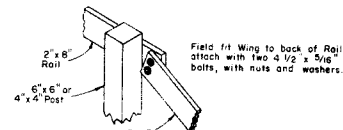
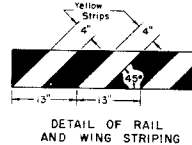
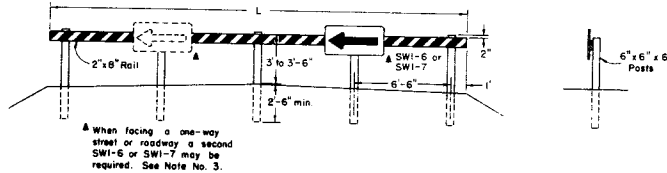


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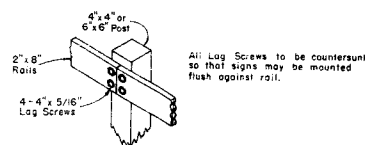


CLASS II BARRICADE (1 RAIL)

FIXED
TYPE F-6



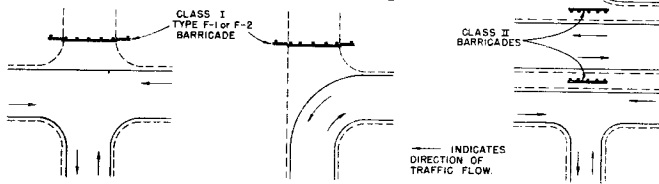
REAR VIEW OF BARRICADE
SHOWING WING ATTACHED
(See Note No. 9)



METHOD OF ATTACHING PLANKING
TO POSTS AT JOINTS

SITUATION A

SITUATION B



STANDARD M-142-AA

FEBRUARY 1, 1965

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

REVISIONS	

GENERAL NOTES

- All work shall be done in accordance with the Standard Specifications of the Colorado Department of Highways applicable to the Project.
- All signs and sign materials shall conform to the standards set forth in the "Manual on Uniform Traffic Control Devices for all classes of Streets and Highways" published by the Department of Highways and this standard.
- The various types and combinations of approved Signs and Beacons for Barricades required for each project shall be governed by field conditions and subject to approval by the Engineer. All traffic controls shall be placed for best visibility and legibility and maintained in good condition at all times. Oversighting is to be avoided.
- All paint and methods of painting shall be in conformity with Item 38 of the Standard Specifications. All skids, braces, and posts shall be painted with 2 coats of "Exterior Black Paint." Planking and wings on all barricades shall be painted with 2 coats of "Exterior Black Paint" on all sides before adding reflective strips. Reflective strips shall be "cut from smooth surface yellow reflective sheeting" of a type approved by the Department.
- Each barricade rail shall be striped on the face side only with reflective yellow strips slanting downward at a 45° angle toward the side to which traffic is to turn or pass. See "DETAIL OF RAIL AND WING STRIPING."
- When fixed barricades are designated on plans as a bid item the portion of the posts below ground line shall either be dipped in or painted with hot creosote oil. The portion of the post above ground line shall be painted with 2 coats of "Exterior Black Paint."
- All skids, braces, and posts shall be nailed together with No. 20d nails. All screws, bolts, nuts, and washers shall be galvanized or cadmium plated. Skids (bases) of movable barricades shall be weighted where necessary to provide stability.
- All timber used shall conform to the Standard Specifications for Miscellaneous Untreated Timber S4S. Timber shall conform to Construction grade Paragraph 1238 or 1258 of Standard No. 15 Grading & Dressing Rule for West Coast Douglas Fir (1956) or Dense Structural 5B and LL Structural 5B Paragraph 284 or 285 of 1956 Grading Rules for Southern Pine.
- Detachable extension wings for bypassing of construction equipment are permitted. "W" is variable, length shall be adequate to provide closing of borrow pit and/or shoulder as required.
- Alternate materials or other reflective elements on Traffic signs or Barricades will be permitted only after approval of such material by the Department in writing.
- A Flashing Beacon for use on Barricades is a section of a standard traffic signal head or a similar-type device having a yellow lens in the face, which is illuminated by intermittent flashes. Where commercial power is not available, the beacon may be adapted to operate from storage batteries. Each signal unit lens shall have a visible diameter of not less than 8 inches. Each unit complete shall be of such design as to render the lens when illuminated clearly visible to traffic facing the signal at all distances up to 1000 feet under all atmospheric conditions except dense fog. The color of the yellow lens for caution shall be in accordance with Technical Report No. 1 of the Institute of Traffic Engineers. All beacon flashers shall be equipped with filters for suppression of radio interference. The illuminating element in a flashing yellow beacon shall be flashed at a rate of not less than 50 times nor more than 60 times per minute. The illuminated period of each flash shall be not less than half and not more than two-thirds of the total cycle. The use of Flashing Beacons will be governed by field conditions. Flashing Beacons when warranted generally should be operated continuously throughout the 24 hours of the day. Warrant for Flashing Beacons may be found in Sec. 3G of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).
- Flashers are portable, power-operated, lens-directed, enclosed lights, illuminated by rapid intermittent flashes of short duration. Flashers may be used in connection with barricades when approved by the Engineer. An array of flashers on a job will be governed by Sec. 5D of the "Manual on Uniform Traffic Control Devices for Streets and Highways" published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision). The color of the light emitted by a flasher shall be yellow.
- Flashing Beacons and Flashers, when used, shall be positioned above the top rail of the barricades to produce the most effective results.
- Barricades used as "Traffic Controls for Highway Construction" are not to be paid for separately.
- Class I or Class II fixed barricades will be paid for separately when designated on plans as bid item.
- For additional general information on control of traffic through work areas refer to the "Manual on Uniform Traffic Control Devices for Streets and Highway", Part II, published by the U.S. Department of Commerce, Bureau of Public Roads, June, 1961 (or latest revision).

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

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO

TIMBER
BARRICADES

Designed By: D.R.W.
Made By: J.L.S.
Checked By: J.B.
Date: Feb. 1, 1965