

STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
IOWA	5	1977	1	7
PROJECT NUMBER				
OS-000L(33)--85-24				
R.O.W. PROJECT NUMBER				

IOWA  
DEPARTMENT OF TRANSPORTATION  
Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE  
SECONDARY ROAD SYSTEM  
CRAWFORD COUNTY

125' X 24' CONTINUOUS CONCRETE SLAB BRIDGE  
PROJECT NO. OS-000L(33)--85-24

INDEX OF SHEETS

SHEET NO.	ITEM
1	TITLE SHEET, INCLUDING ESTIMATE OF QUANTITIES, CONVENTIONAL SIGNS, MILEAGE SUMMARY, LOCATION MAP, REMOVALS, AND TYPICAL CROSS SECTION.
2	PLAN AND PROFILE SHEET
3	BRIDGE DETAILS AND DESIGN CRITERIA
4	STANDARD RF-5
5	STANDARD RF-30-A
6	STANDARD RF-30-B
7	STANDARD RF-32
8-13	CROSS SECTIONS CAN BE OBTAINED AT COUNTY ENGINEERS OFFICE.

MILEAGE SUMMARY

STA. 26+00 TO STA. 45+00	1900.0 FT.	0.360 MI.
DEDUCT BRIDGE STA 37+075	127.5 FT.	0.024 MI.
TOTAL NET MILEAGE	1772.5 FT.	0.336 MI.

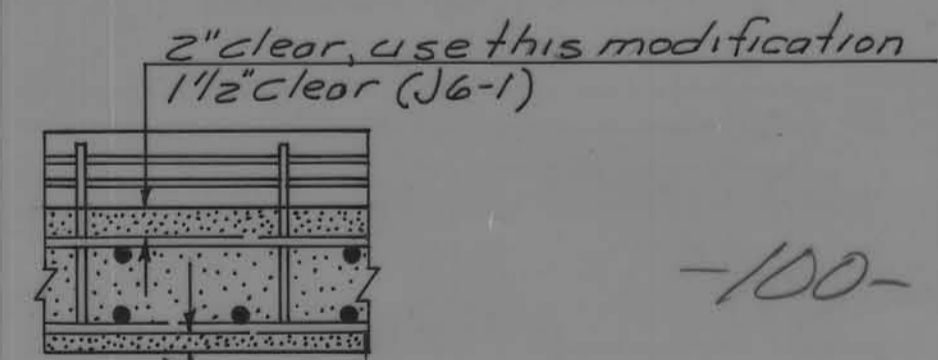
REMOVALS

REMOVALS INCLUDE DISPOSITION OF:  
40' X 18' PONY TRUSS BRIDGE  
38' X 16' I-BEAM APPROACH  
16' X 16' I-BEAM APPROACH  
24" X 24" C.M.P.

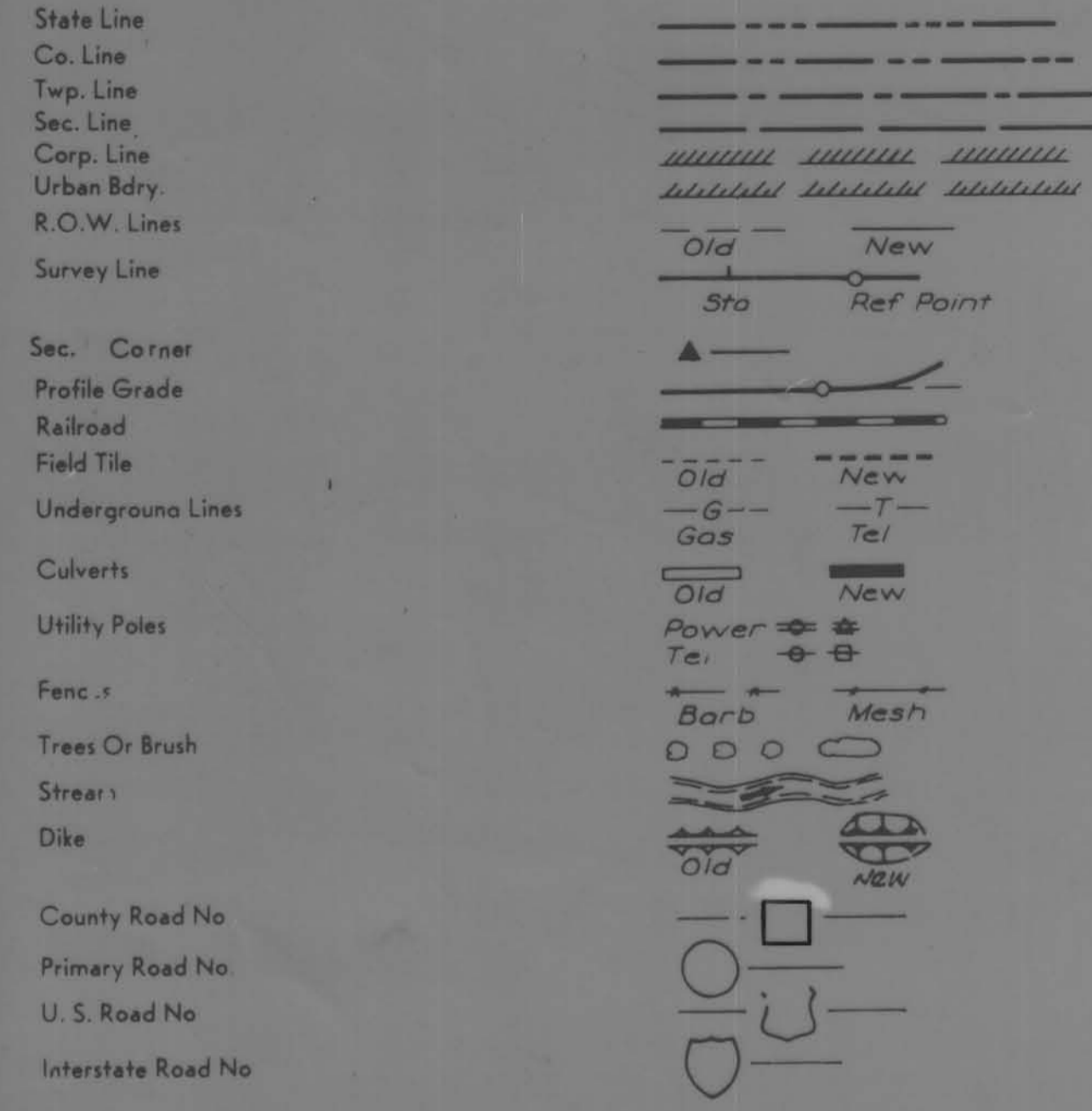
IOWA STATE HIGHWAY COMMISSION STANDARDS REQUIRED (MAY BE OBTAINED AT BRIDGE DESIGN SERVICES)		
STANDARD	ISSUED	REVISED
① J6-1	JUNE 1957	12-7-76
② J6-2	JUNE 1957	12-7-76
J6-3	AUGUST 1967	12-7-76
PIOA	JUNE 1959	1-24-77

modifications to above standards  
① Dimension "T" = 1'-6", Structural Conc. (Class D) = +5.2 cu. yds.  
Dimension "D" = 2'-1 13/16", Floor Drain Weight = +6 Lbs.  
Reinforcing; Curb Anchors Length = 5'-0" weight = 1,273 lb (+221 lb)

② Dimension "A" = 1'-6 3/8"  
Dimension "B" = 2'-2 3/16"



CONVENTIONAL SIGNS

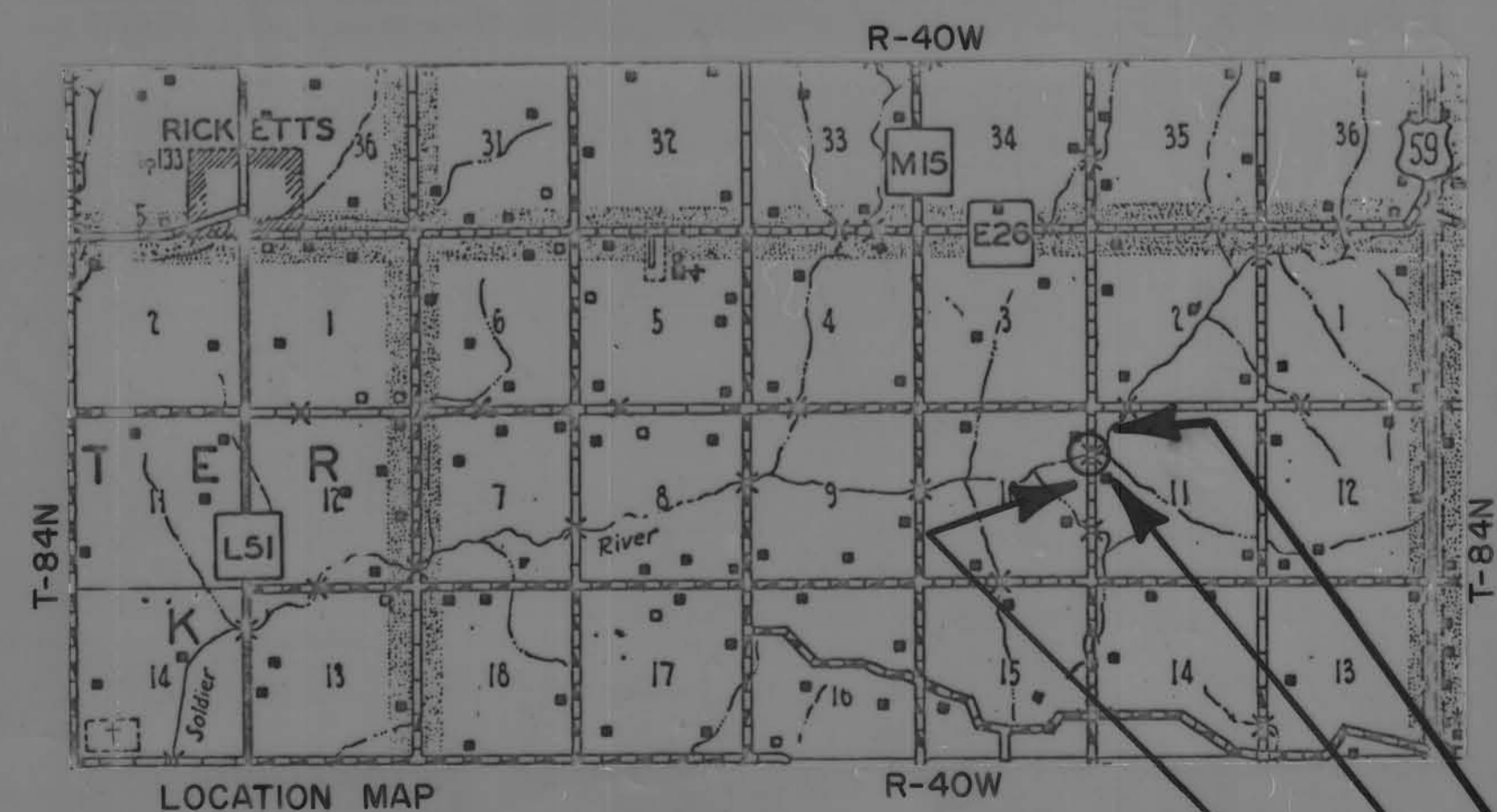
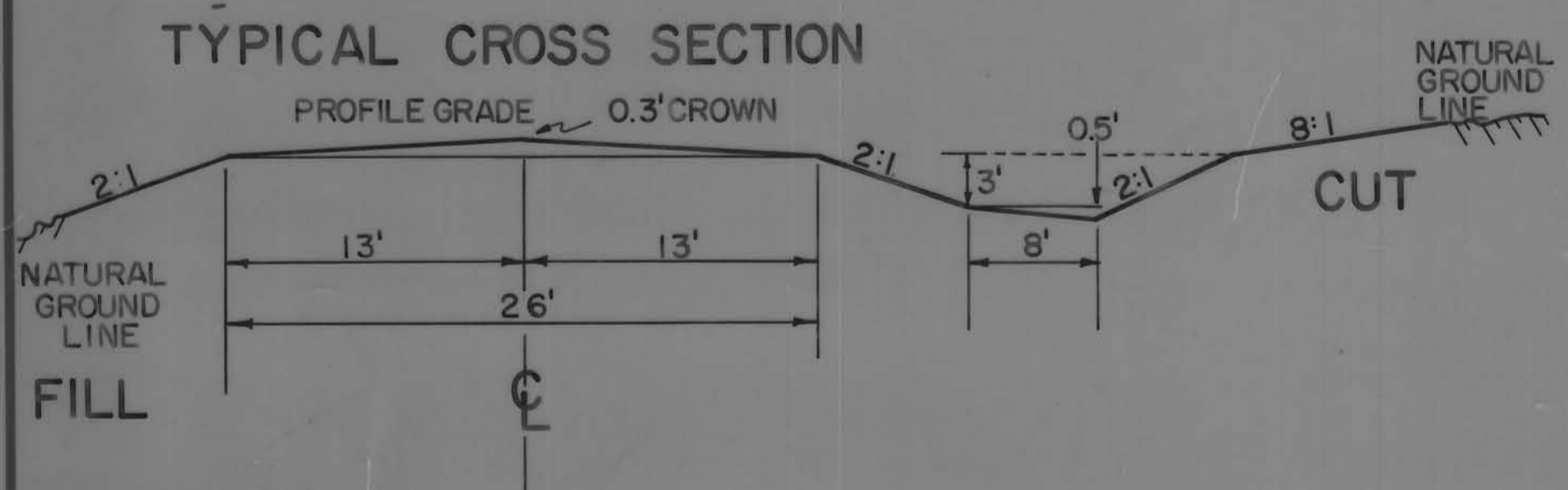


SCALES: AS NOTED

IOWA STATE HIGHWAY COMMISSION STANDARD SPECIFICATIONS SERIES 1972 PLUS CURRENT SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION--HIGHWAY DIVISION SHALL APPLY TO WORK ON THIS PROJECT.

DESIGN NO. 1877 CRAWFORD COUNTY SECTIONS 10/11	SECONDARY ROAD OVER EAST SOLDIER RIVER T-84N R-40W	STA. 37+075 HANOVER TWP	
DESIGN FOR 125' X 24' CONTINUOUS CONCRETE SLAB BRIDGE			
ESTIMATED QUANTITIES			
ITEM NO.	ITEM	UNIT	TOTAL
1	CONCRETE, STRUCTURAL	CU. YDS.	219.2
2	STEEL, REINFORCING	LBS.	47,706
3	HANDRAIL, ALUMINUM	LN. FT.	254.7
4	CREOSOTED PILES 16 @ 40'	LN. FT.	640
5	STEEL BEARING PILING FURNISH 12 @ 65'	LN. FT.	780
	HP 12 X 53 DRIVE 12 @ 65'	LN. FT.	780
	ENCASE 12 @ 23'	LN. FT.	276
6	REVTMENT, CLASS D-RIP RAP	TONS	914
7	CULVERT, CORR. METAL ROADWAY PIPE 30" DIA.	LN. FT.	50
8	APRON, METAL 30" DIA. RF-5	NO.	2
9	CULVERT, CORR. METAL ENTRANCE PIPE 24" DIA.	LN. FT.	32
10	EXCAVATION, CLASS 10, ROADWAY AND BORROW	CU. YDS.	8764
11	EXCAVATION, CLASS 10, CHANNEL	CU. YDS.	844
12	EXCAVATION, CLASS 20	CU. YDS.	58
13	EXCAVATION, CLASS 20 FOR ROADWAY PIPE CULVERT	CU. YDS.	20
14	TOPSOIL, STRIP, SALVAGE, AND SPREADING	CU. YDS.	960
15	CLEARING & GRUBBING	% SCH.	\$80.00
16	REMOVAL OF EXISTING STRUCTURES	L.S.	LUMP SUM

IN LETTING OF MAY 24, 1977



- ITEM NO.
- 1 THE FLOOR, CURBS AND WING POSTS (188.4 CU. YDS.) ARE TO BE CLASS "D" CONCRETE THE REMAINDER (30.8 CU. YDS.) ARE TO BE CLASS "C" CONCRETE.
  - 7 (4' OF 30" C.M.P.) LENGTH "M" SHALL BE CONSIDERED AN INTEGRAL PART OF THE APRON, AND SHALL NOT BE MEASURED OR PAID FOR AS CULVERT PIPE, BUT SHALL BE CONSIDERED INCIDENTAL TO THE ITEM OF "METAL APRON." SEE STANDARD RF-5.
  - 10 TYPE "A" COMPACTION WILL BE REQUIRED. NO OVERHAUL ALLOWED.
  - 13 ON ALL BORROW BEYOND THE 40' R.O.W. SALVAGE TOPSOIL 8" AND RESPREAD AFTER GRADING IS COMPLETED.
  - 12 TOTAL INCLUDES 20 CU. YDS. OF CLASS 20 EXCAVATION FOR CORR. METAL ROADWAY PIPE CULVERT.
- NOTE: DESIGN CRITERIA  
DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH A.A.S.H.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES SERIES 1953: CONCRETE IN ACCORDANCE WITH SECTION 1.5.1, f'c = 3000 psi REINFORCING IN ACCORDANCE WITH SECTION 1.5.1, f's = 20000 psi

APPROVED

*Don H. Jensen*

*LeRoy A. Hansson*

*Louis J. Muhlman*

*Martin Spiegel*

*Charles J. Smith*

BOARD OF SUPERVISORS

DISTRICT LOCAL SYSTEMS ENGINEER  
IOWA DEPT. OF TRANSPORTATION  
HIGHWAY DIVISION

APPROVED \_\_\_\_\_ DATE \_\_\_\_\_

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED UNDER MY SUPERVISION AND THAT ENGINEERING DECISIONS WITH REGARD TO THE DESIGN WERE MADE BY ME OR BY OTHER DULY REGISTERED PROFESSIONAL ENGINEERS UNDER THE LAWS OF THE STATE OF IOWA.

*H. Dale Wright* 1-14-77  
IOWA REGISTRATION NUMBER 5798 DATE

DEPARTMENT OF TRANSPORTATION  
IOWA  
Highway Division

APPROVED *H. Dale Wright* 4/22/77  
DEPUTY CHIEF ENGINEER DATE

U.S. DEPT. TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
APPROVED

DIVISION ENGINEER DATE

STA. 45+00 END OF PROJECT  
STA. 37+075 @ 125' X 24' CONTINUOUS CONCRETE SLAB BRIDGE  
STA. 26+00 BEGIN PROJECT

1971 TRAFFIC COUNT 22 V.P.D.



DATE: \_\_\_\_\_  
 BY: \_\_\_\_\_  
 SURVEYED: \_\_\_\_\_  
 PLAN NOTE BOOK No. \_\_\_\_\_  
 ALIGNMENT CHECKED: \_\_\_\_\_  
 BT. OF WAY CHECKED: \_\_\_\_\_

DATE: \_\_\_\_\_  
 BY: \_\_\_\_\_  
 SURVEYED: \_\_\_\_\_  
 PROFILE NOTE BOOK No. \_\_\_\_\_  
 GRADES AND STRUCTURE NOTATIONS CHECKED: \_\_\_\_\_

HANOVER TO WNSHIP T-84N R-40W SEC. 10

Sta. 30+26 @ 24" X 24' C.M.P. D.A. = 10 Ac.  
 Contractor to remove, furnish and place 30" X 50' C.M.P. 2-RF-5 metal Pipe Aprons.  
 LT = 33.8' RT = 28.8'  
 FL = 1315.5 RL = 1319.0  
 Class 20 = 20 cu. yds.  
 C = 0.87

Sta. 36+18 Field Ent. Lt. Contr. to remove.  
 At sta. 32+00, furnish and place 24" X 32' C.M.P. 24' Top, Slope to ends of pipe.

Sta. 43+18 Farm Ent. Lt. 30" X 24' C.M.P. C.I.A.C.

(4' of 30" C.M.P.) Length "M" Shall be Considered an Integral Part of the Apron, and Shall not be measured or Paid for as Culvert Pipe but Shall be Considered incidental to the Item of "Metal Apron". See Standard R.F.-5.

Gordon L. Nahnsen Lot 1

Marlan Harm Helen S. Kastner, Life Estate

Sta. 26+40 Farm Ent. Rt. 24" X 26' C.M.P. U.A.C.

Sta. 37+19.7 @ 40' X 16' Pony Truss Bridge with 38' X 16' and 16' X 16' I-Beam Approaches. Wood piling and wood plank floor. Contractor to remove. The I-Beams are to be salvaged (match marking not necessary) and stockpiled neatly within 300 feet of site as directed by the County Engineer. The remainder is to be wasted.

It shall be the contractors responsibility to provide waste areas or disposal sites for excess material which is not desirable to be incorporated in the work involved on this project. No payment for overhaul will be allowed for material hauled to these sites.

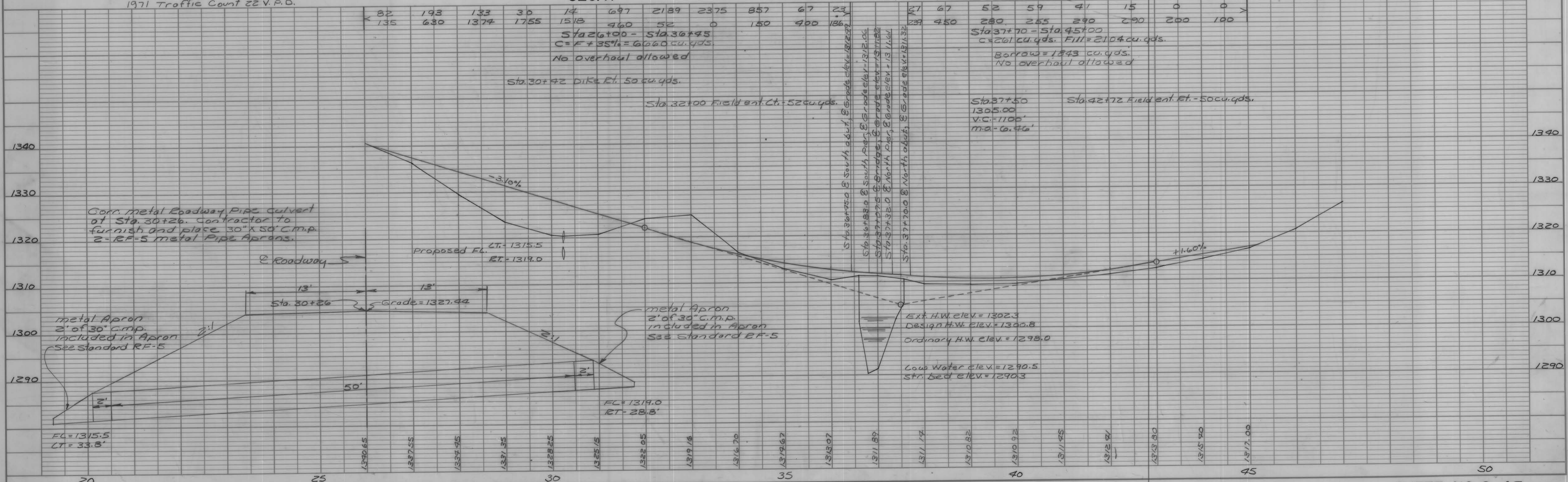
Sta. 37+07.5 @ Contr. to Construct 125' X 24' Continuous Concrete Slab Bridge.

STA. 45+00 E.O.P.

1971 Traffic Count 22 V.P.O.

SEC. II

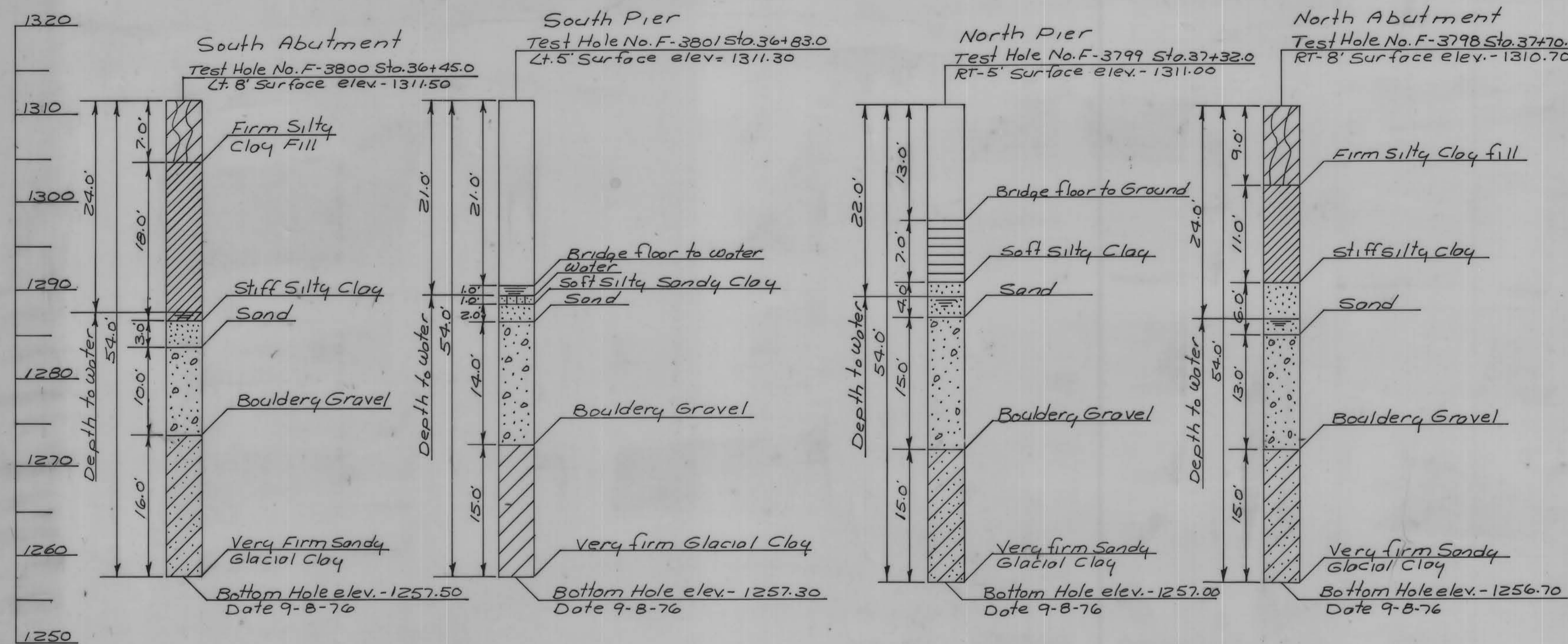
BM#1 SPIKE IN FENCE POST 30' RT. STA. 39+80 ELEV. = 1308.47





3.m. #1 Spk in fence Post 30' Rt. Sta. 39+80 Elev. - 1308.47

Hydraulic Data:  
 D.A. = 12.0 Sq. mi.  
 Des. Discharge  $Q_{50} = 3934$  c.f.s.  
 Slope = 15.84 ft/mi.  
 15'-85° Slope = 24.20 ft/mi.  
 Design H.W. = 1300.8  
 Area below Design H.W. = 594 Sq. ft.  
 W.P. = 90 ft.  
 Velocity = 7.17 f.p.s.  
 $Q$  below Design H.W. = 4259 c.f.s.



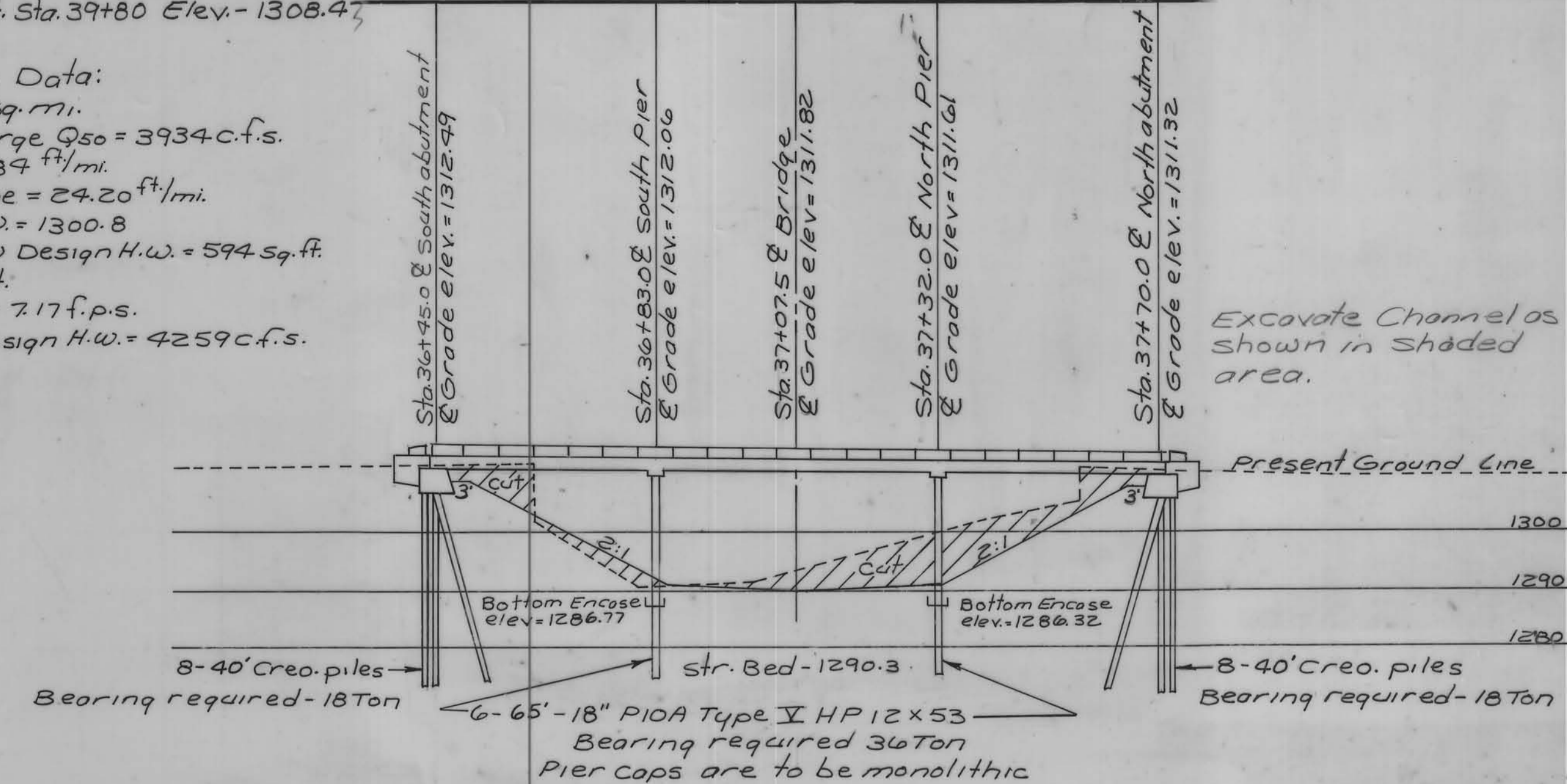
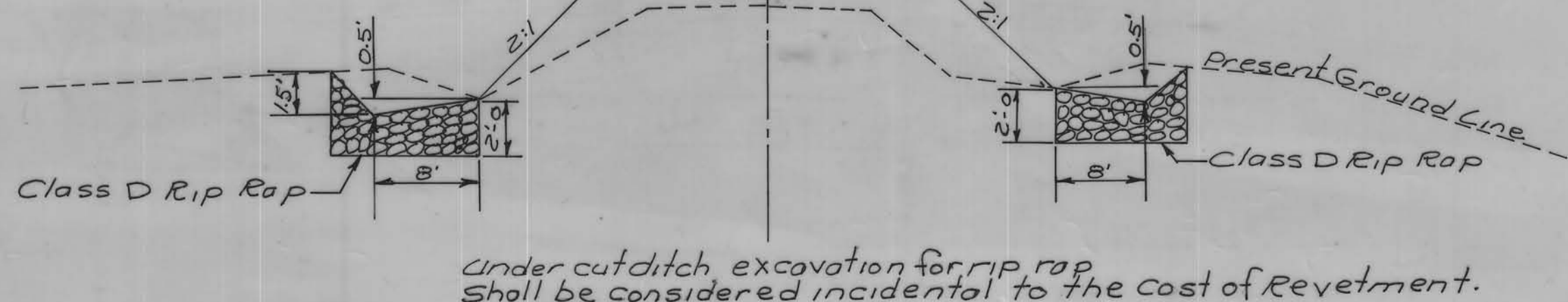
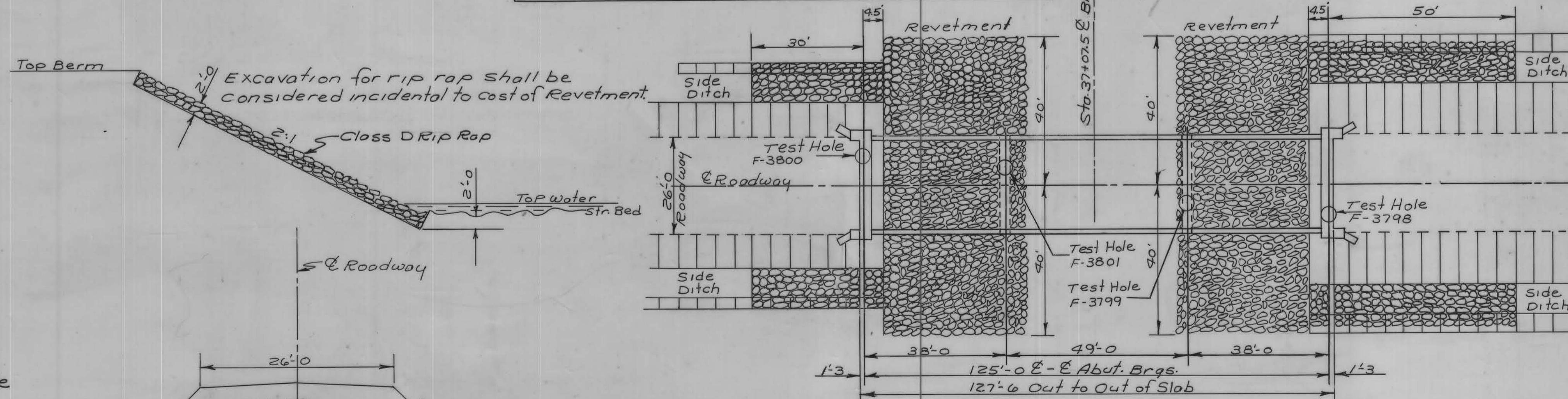
**SOUNDING DATA**

Estimate of Quantities 125'-0" x 24'-0" Continuous Concrete Slab Bridge				
Item	Unit	Abutments	Superstructure	Totals
*Concrete, structural	cu. yds.	31.6	187.6	219.2
Steel Reinforcing	Lbs.	2,366	45,340	47,706
Handrail, Aluminum	Lin. Ft.		254.7	254.7
Creosoted Piles 16 @ 40'	Lin. Ft.	640		640
Steel Bearing	Furnish 12 @ 65'		780	780
Piling	Drive 12 @ 65'		780	780
HP 12 x 53	Encase 12 @ 23'		276	276
Excavation, Class 10 Channel	cu. yds.			844
Excavation, Class 20	cu. yds.	58		58
Revetment, Class D Rip Rap	Tons			914
Clearing & Grubbing	% Sch.			\$ 80.00
Removal of Existing Structure	Cump Sum			Cump Sum

\* The floor, curbs and wing Posts (188.4 cu. yds) are to be Class "D" Concrete  
 The remainder (30.8 cu. yds. are to be class "C" concrete.

Class 10 Channel excavation and berm construction shall be completed 40' each side of  $\mathcal{C}$  of roadway prior to construction of bridge.

Contractor shall cooperate with utilities in regards to their respective lines.



Sta. 36+45.0  $\mathcal{E}$  S. abut.  
 Top abut. elev. = 1310.96  
 Bottom abut. elev. = 1306.96  
 Piling cut off = 1308.96  
 Berm elev. = 1309.0

Sta. 36+83.0  $\mathcal{E}$  S. pier  
 Bottom cap elev. = 1309.77  
 Piling cut off = 1310.56

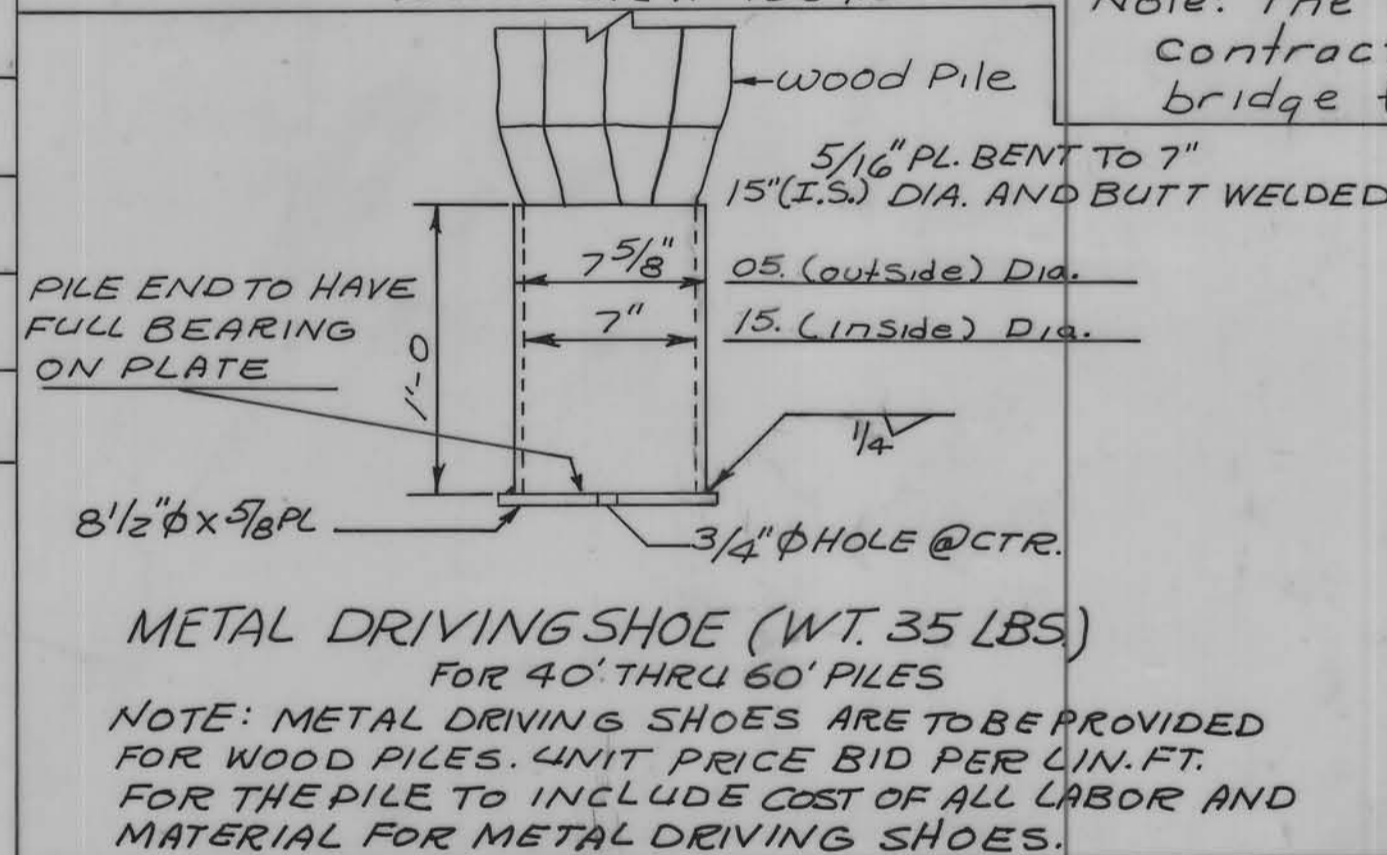
Sta. 37+32.0  $\mathcal{E}$  N. Pier  
 Bottom cap elev. = 1309.32  
 Piling cut off = 1310.11

Sta. 37+70  $\mathcal{E}$  N. abut.  
 Top abut. elev. = 1309.79  
 Bottom abut. elev. = 1305.79  
 Piling cut off = 1307.79  
 Berm elev. = 1307.8

Note: The County will supply the contractor with the necessary bridge floor elevations.

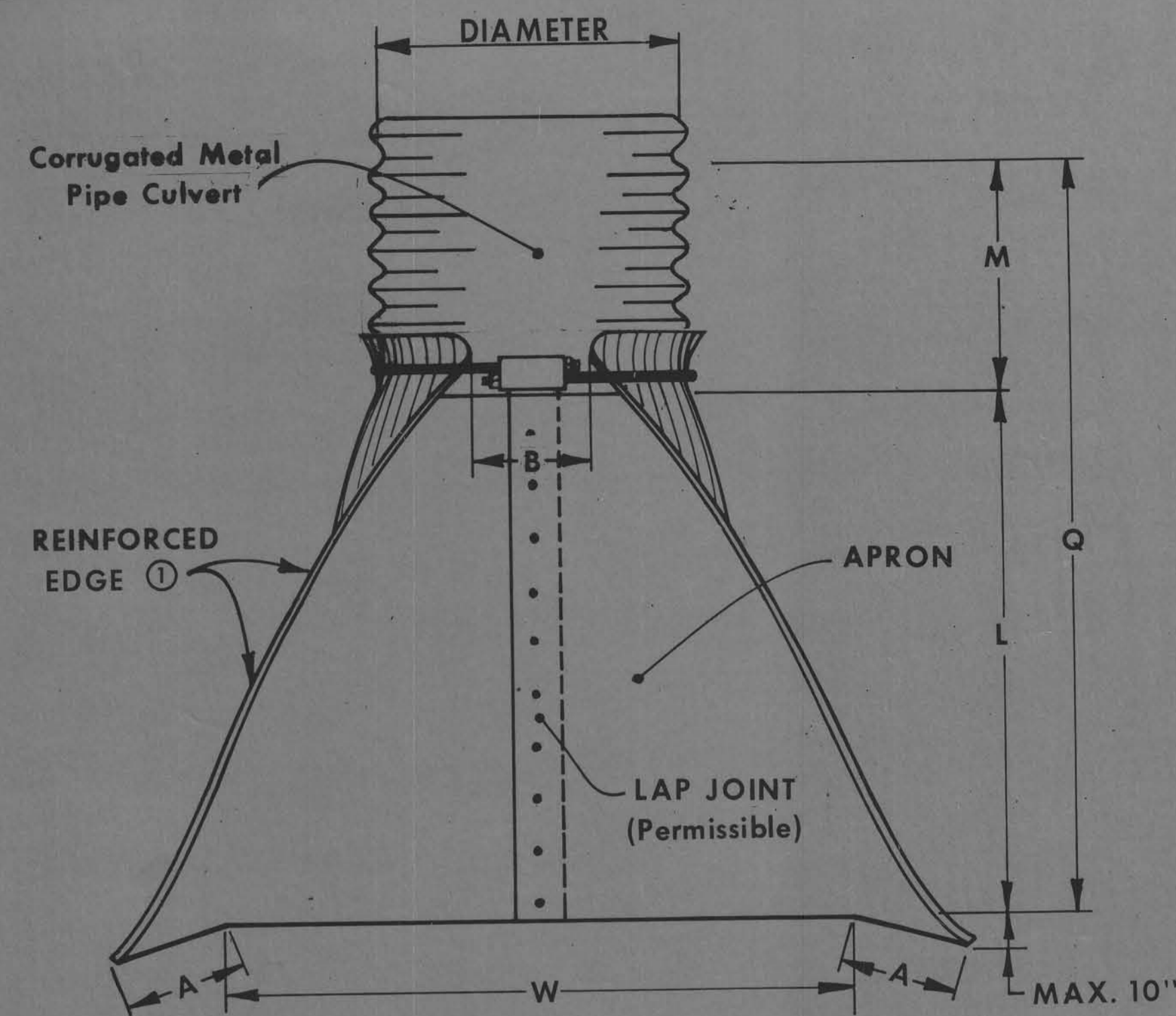
H = 19.5'

H 15 Loading



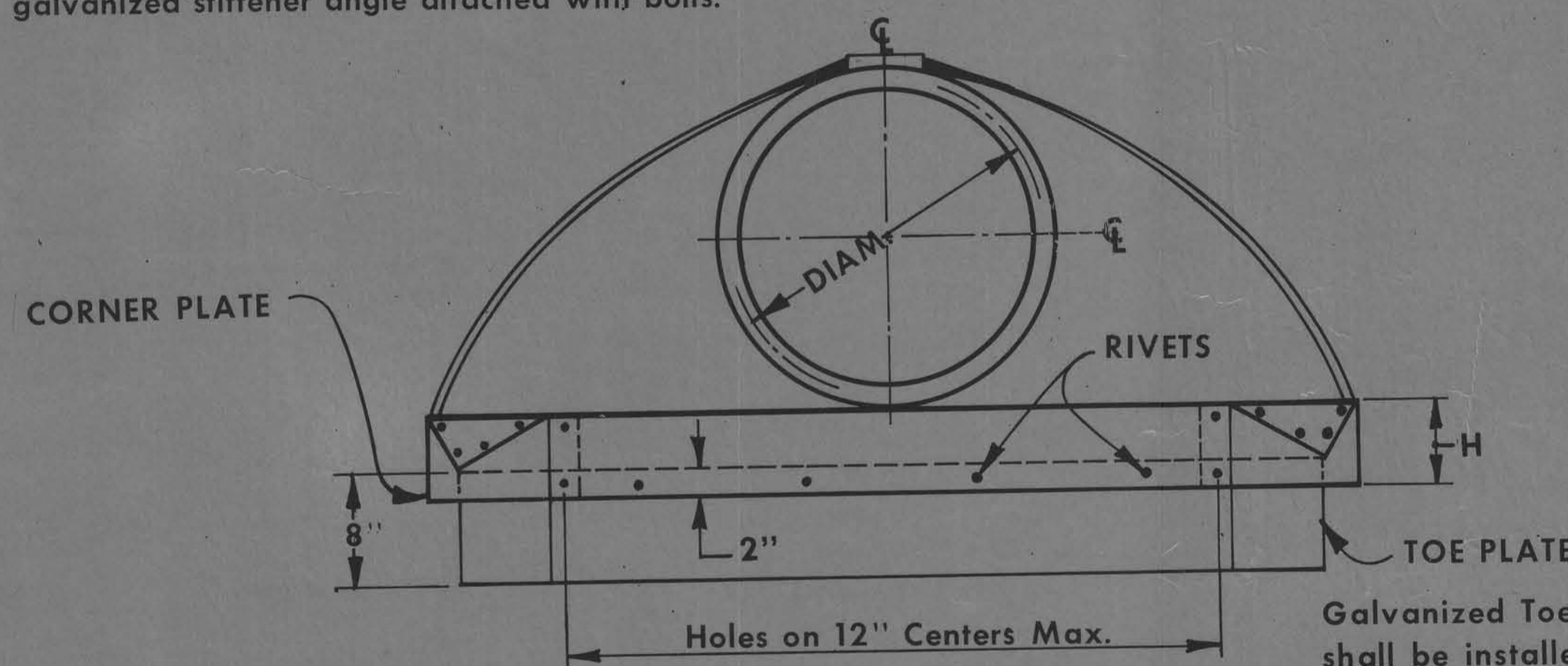
**DESIGN FOR**  
 125'-0" x 24'-0" CONTINUOUS CONCRETE SLAB BRIDGE  
 CONCRETE STUB ABUTMENTS PILE BENT PIERS  
 STA. 37+07.5 PROJECT NO. OS-000L(33)--85-24  
 CRAWFORD COUNTY  
 LOCATED BETWEEN SEC'S 10-11 HANOVER TOWNSHIP  
 T-84N, R-40W OVER EAST SOLDIER RIVER.





PLAN

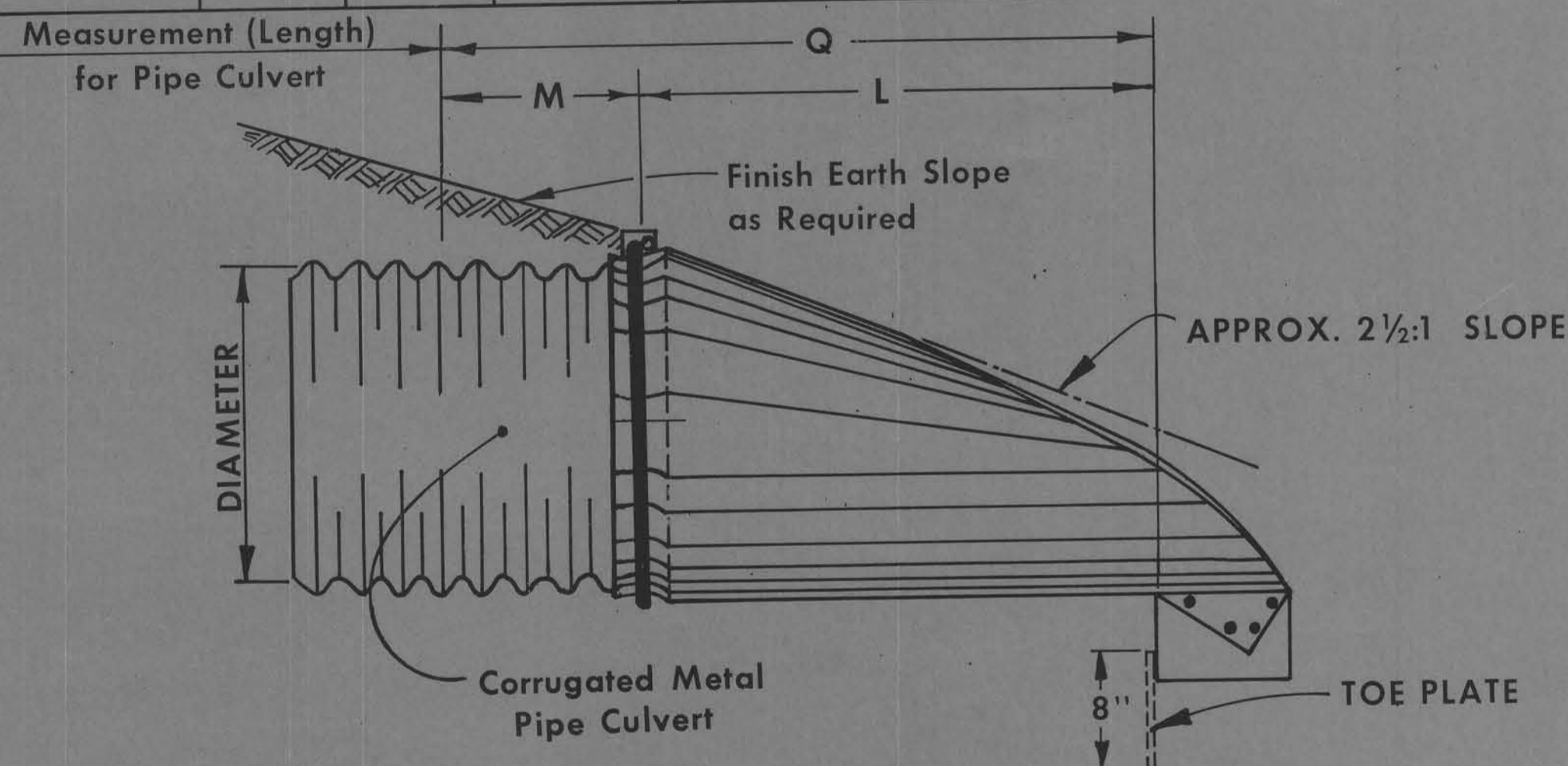
① On sizes 60" and larger the reinforced edge should be supplemented with a galvanized stiffener angle attached with bolts.



END VIEW

Galvanized Toe Plate (Same gage metal as apron) shall be installed on all aprons 24" diameter and larger.

PIPE DIAM.	DIMENSIONS						
	A 1" ±	B MAX.	H 1" ±	L 1 1/2" ±	W 2" ±	M*	Q
12"	4 3/4"	6"	6"	21"	24"	48"	69"
15"	6"	8"	6"	26"	30"	48"	74"
18"	7"	9"	6"	31"	36"	48"	79"
21"	8 1/4"	11"	6"	36"	42"	48"	84"
24"	9 1/2"	12"	6"	42"	48"	36"	78"
30"	12"	15"	7 1/2"	52 1/2"	60"	24"	76 1/2"
36"	14"	18"	9"	63"	72"	48"	111"
42"	16"	21"	10 1/2"	73 1/2"	84"	48"	121 1/2"
48"	18"	27"	12"	84"	90"	36"	120"
54"	18"	30"	12"	84"	102"	36"	120"
60"	18"	33"	12"	87"	114"	36"	123"
66"	18"	36"	12"	87"	120"	36"	123"
72"	18"	39"	12"	87"	126"	36"	123"
78"	18"	42"	12"	87"	132"	36"	123"
84"	18"	45"	12"	87"	138"	36"	123"



SIDE VIEW

GENERAL NOTES:

Metal pipe aprons and hardware shall be constructed of galvanized steel in conformance with the requirements of current standard specifications for Corrugated Metal Culverts and essentially as indicated hereon. Refer to appropriate other standard road plans as well as project plans for additional details of individual culvert installations. Alternate design details may be submitted to the engineer for approval.

Apron may be attached to culvert pipe as follows:

- A. If normal culvert is of circumferential corrugation type:
  1. Use an approved bolt or clamp to fasten apron directly to culvert.
  2. If apron is fabricated with "M" dimension of annular corrugated pipe as an integral part of apron, use a standard connecting band to fasten the two pieces together.
- B. If normal culvert is of helical corrugation type:
  1. Use an approved sizing ring securely fastened to inside diameter of apron to connect to the culvert pipe using special dimple band connector.
  2. If the apron is fabricated with "M" dimension of annular pipe as an integral part of apron, connect the two with a dimple band.
  3. "Dimple" bands shall be approved by the engineer.

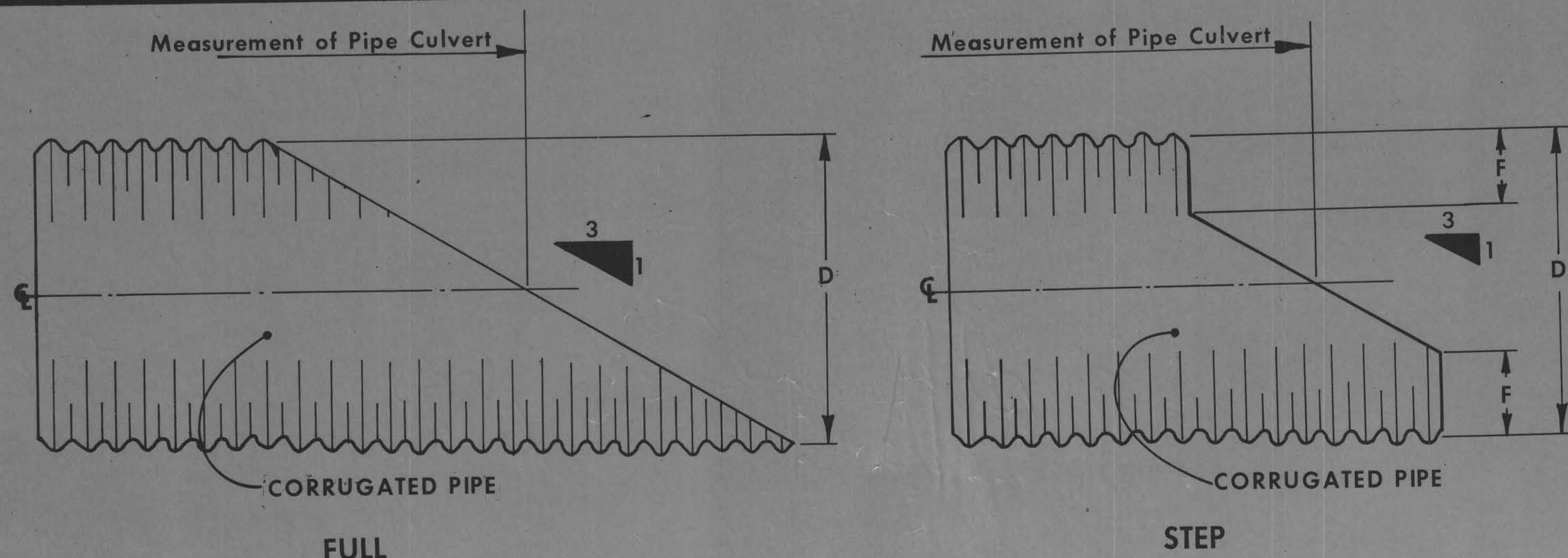
Any damage to Spelter Coat resulting from installation of culvert shall be repaired as directed by the engineer.

Price bid for "Metal Aprons" shall be considered full compensation for fabrication and installation of metal aprons as indicated hereon.

\* SPECIAL NOTE:

Corrugated metal pipe of length "M" (See table of Dimensions) shall be furnished and installed in addition to specified length of corrugated metal pipe culvert. This length "M" shall be considered an integral part of the Apron and shall not be measured or paid for as culvert pipe but shall be considered incidental to the item of "Metal Aprons". Dimension "Q" shall be considered the "Length" of the apron.

Where the corrugated metal apron is to be used with bituminous coated corrugated metal pipe culverts, the pipe portion (Dimension "M") of this apron shall be bituminous coated, same as the culvert.



BEVELED ENDS FOR CORRUGATED METAL PIPE

BEVEL 3:1	
D	F
54"	3"
60"	6"
66"	9"
72"	12"
78"	15"
84"	18"

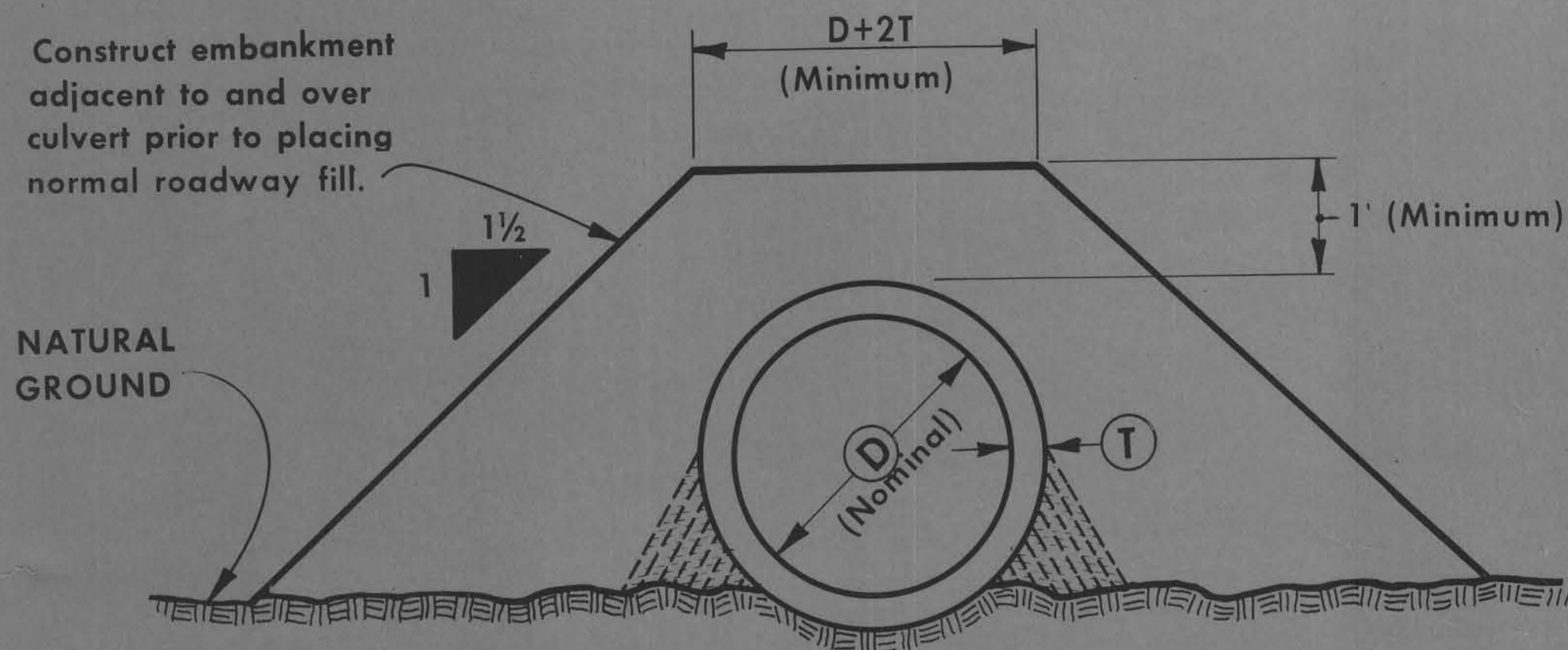
NOTE:

When specifically required as part of detail project plans, ends of pipe culverts may be provided with beveled ends as shown. Either Full Bevel or Step Bevel may be used unless one type is specified. Unless specified otherwise the slope of the bevel shall be 3:1.

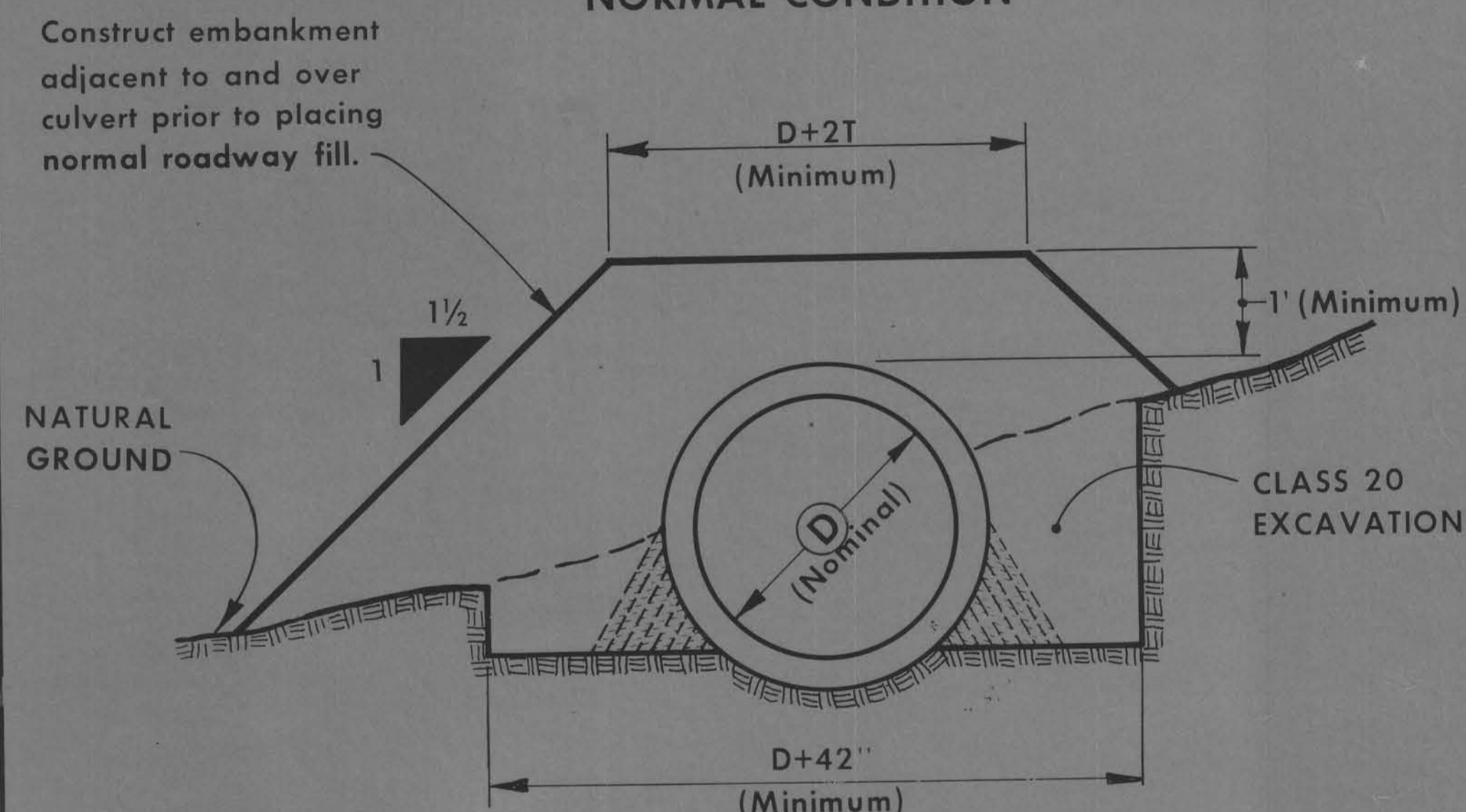
Beveled ends will not be paid for separately but when required shall be considered incidental to the price bid for the culvert.

ADD PIPE DIAMETERS 66" THRU 84" LAST REVISION	NO.	DATE	 <b>Highway Division</b> <b>STANDARD ROAD PLAN</b> <b>RF-5</b>
	3	1-9-76	
	RECOMMENDED	DATE	
APPROVED	DATE	DATE	DATE
DEPUTY CHIEF ENGINEER DEPARTMENT OF TRANSPORTATION IOWA			ASST. ROAD DESIGN ENGINEER ROAD DESIGN ENGINEER DEPUTY CHIEF ENGINEER
<b>METAL PIPE APRONS AND BEVELED ENDS</b>			

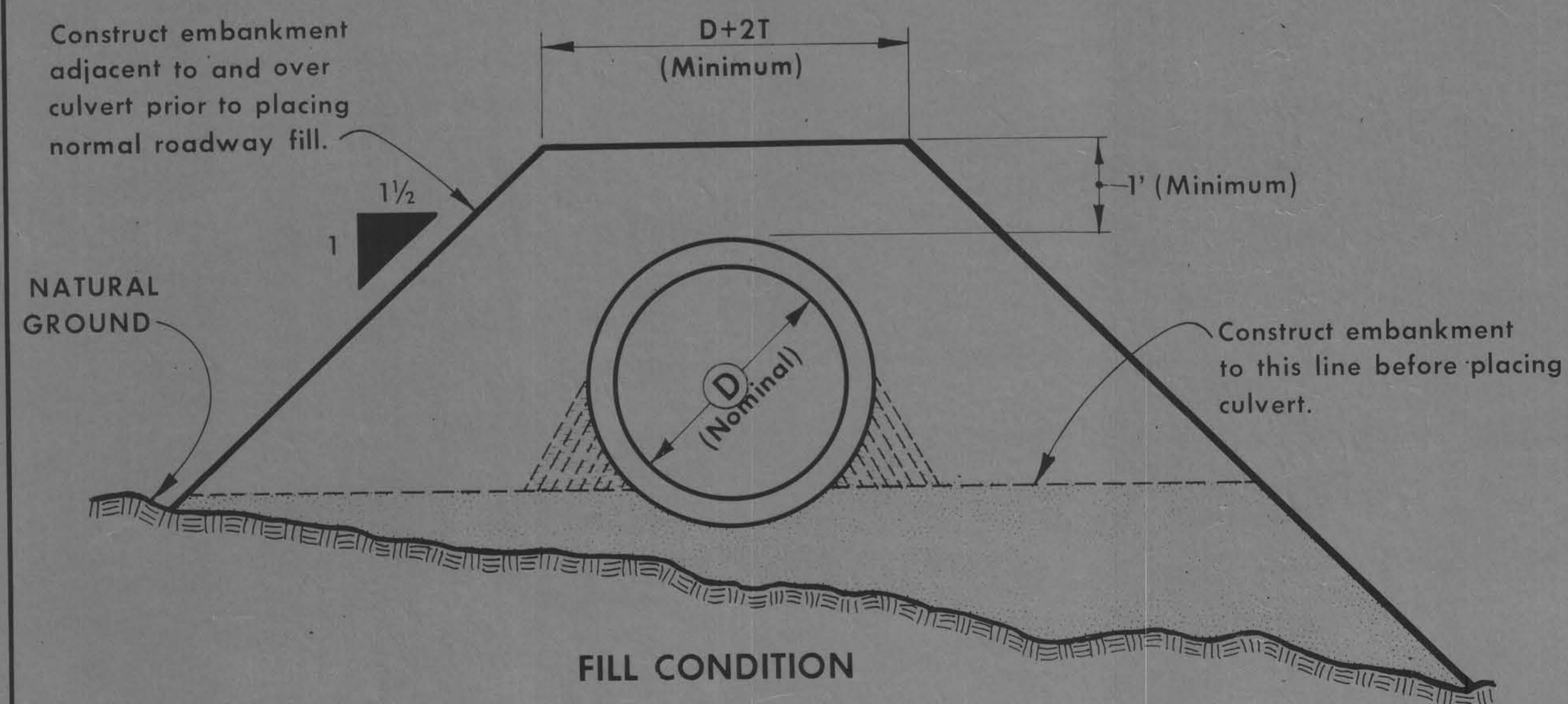




**NORMAL CONDITION**

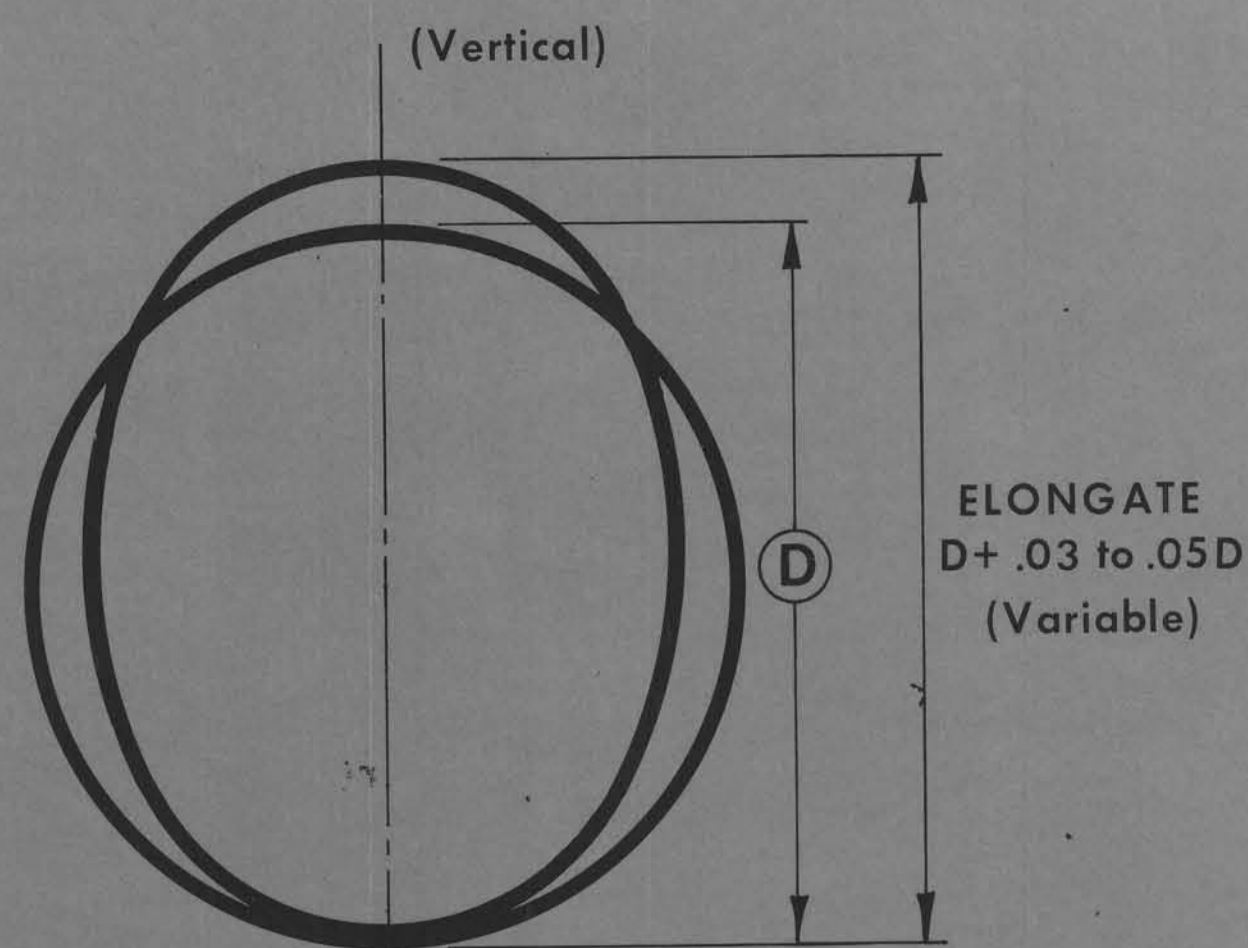


**CUT CONDITION**



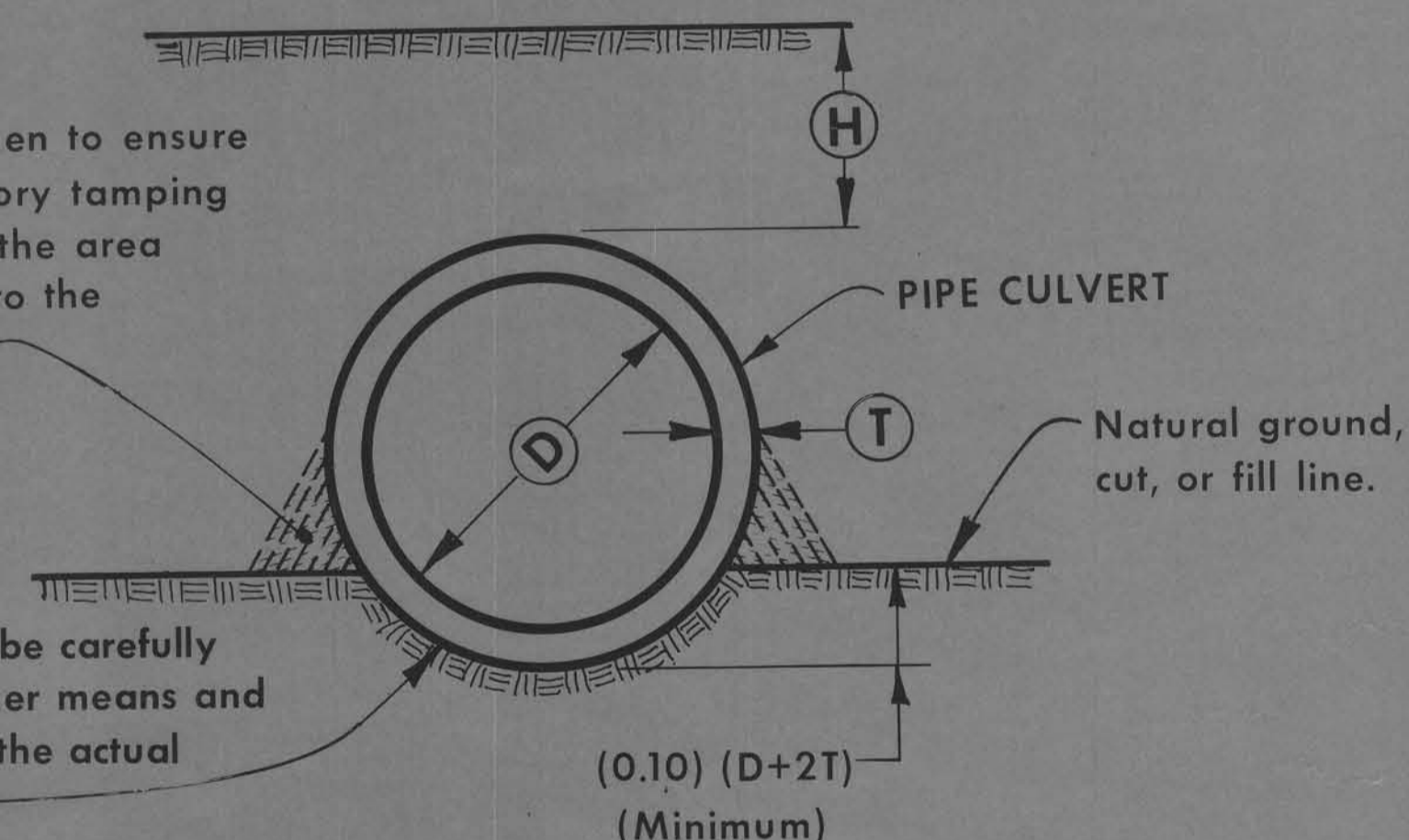
**FILL CONDITION**

**TYPICAL DETAILS FOR BACKFILLING OF ROADWAY PIPE CULVERTS**



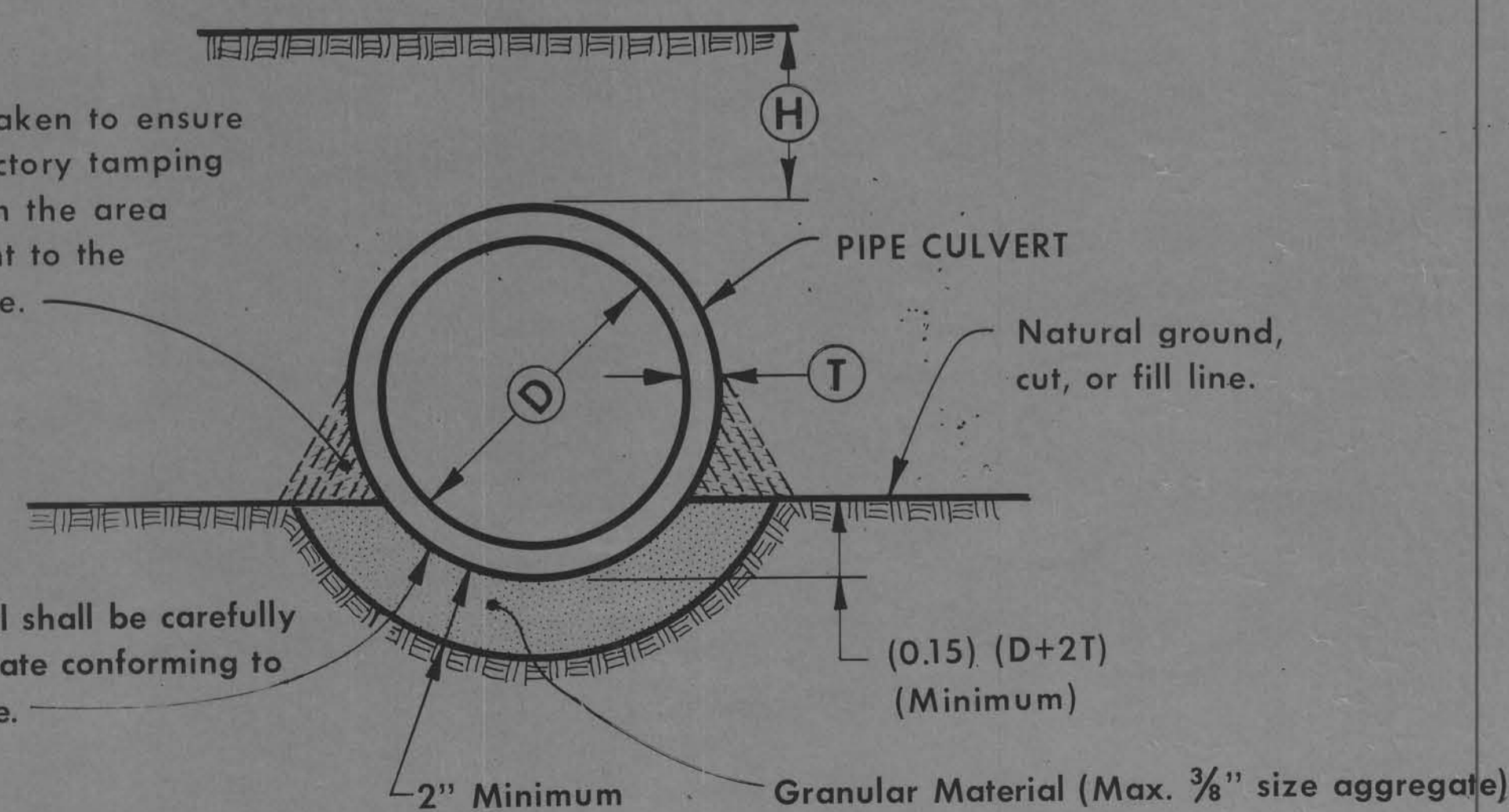
**TYPICAL SECTION ELONGATED PIPE**

Extra care shall be taken to ensure complete and satisfactory tamping of backfill material in the area immediately adjacent to the lower portion of pipe.



**DETAILS FOR CLASS 'C' BEDDING**

Extra care shall be taken to ensure complete and satisfactory tamping of backfill material in the area immediately adjacent to the lower portion of pipe.



**DETAILS FOR CLASS 'B' BEDDING**

The granular material shall be carefully shaped with a template conforming to the shape of the pipe.

**GENERAL NOTES:**

Pipe culverts shall be of the kind and classification specified on detail project plans. All materials and methods of construction shall conform to current standard specifications. Any construction features not covered by specifications shall be at the direction of the engineer.

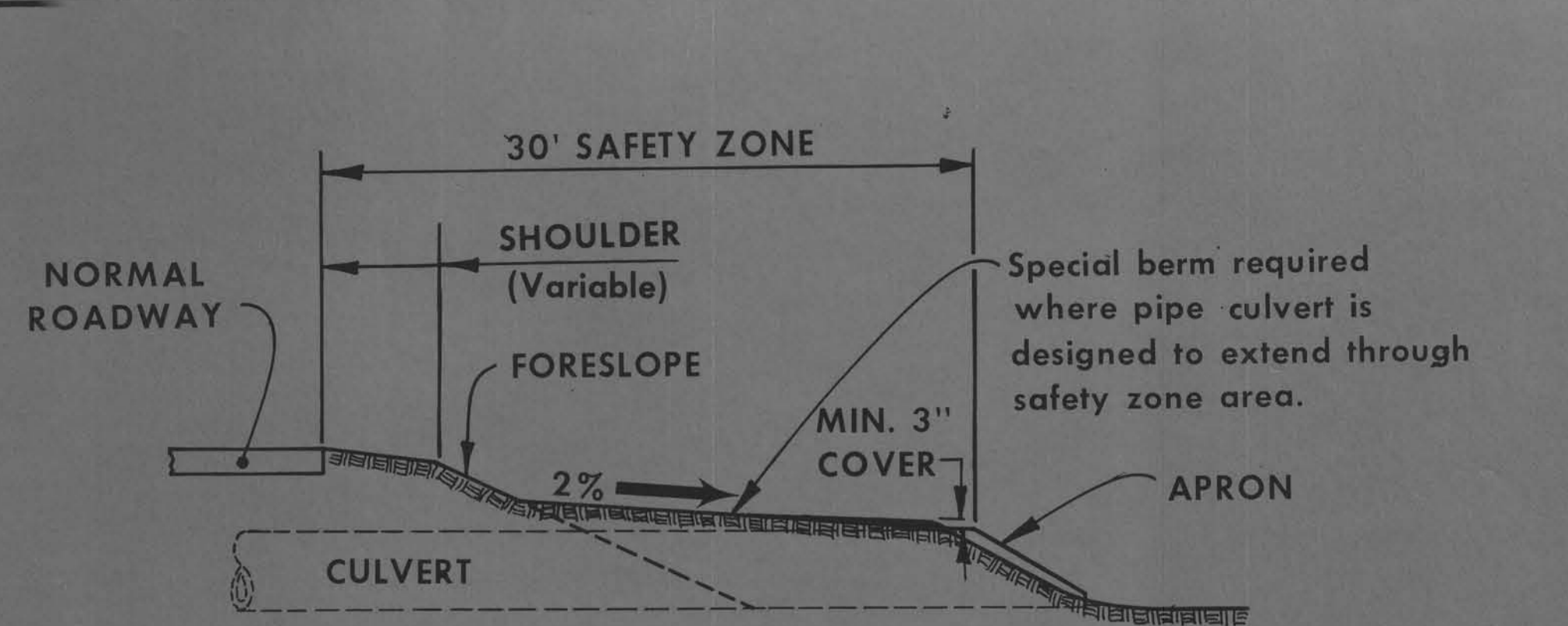
Where a corrugated metal pipe culvert requiring elongation is to be installed, such elongation is to be accomplished by means approved by the engineer. Elongation may be developed either as part of shop fabrication or field installation unless directed otherwise by the engineer. Other details of installation for elongated pipe shall be the same as for round pipe unless otherwise directed by the engineer.

The minimum and maximum allowable cover for pipe culverts shall be as shown on the appropriate Standard Road Plans for the particular kind of culvert, as follows;

- RF-31 Depth of Cover Tables for Concrete Pipe Culverts
- RF-32 Depth of Cover Tables for Corrugated Metal Pipe Culverts (1,2,3)
- RF-33 Depth of Cover Tables for Corrugated Metal Pipe Culverts (4,5,6,7)

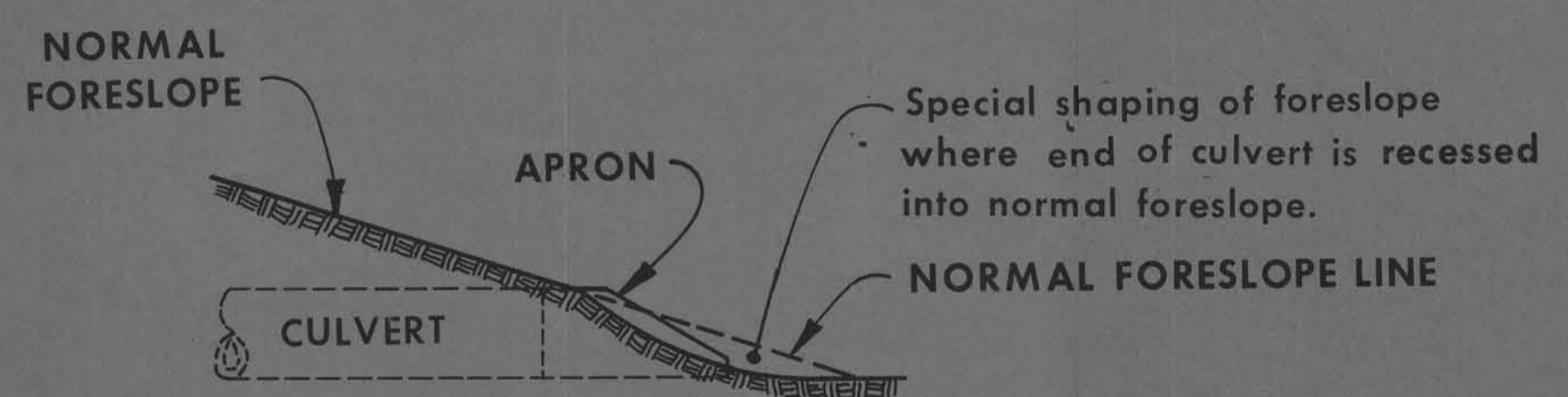
Add Template requirement to note.	7-16-76	DATE	 <b>Highway Division</b>	<b>STANDARD ROAD PLAN</b>	<b>RF-30A</b>	
	2	NO.				<i>John C. Hooker</i> 7-14-76 ASS. ROAD DESIGN ENGINEER DATE
	RECOMMENDED	<i>A. P. McCampbell</i> 7-13-76 ROAD DESIGN ENGINEER DATE				
	APPROVED	<i>W. J. [unclear]</i> 7-13-76 DEPUTY CHIEF ENGINEER DATE				
<b>PIPE CULVERT INSTALLATION DETAILS (BEDDING AND BACKFILL)</b>						



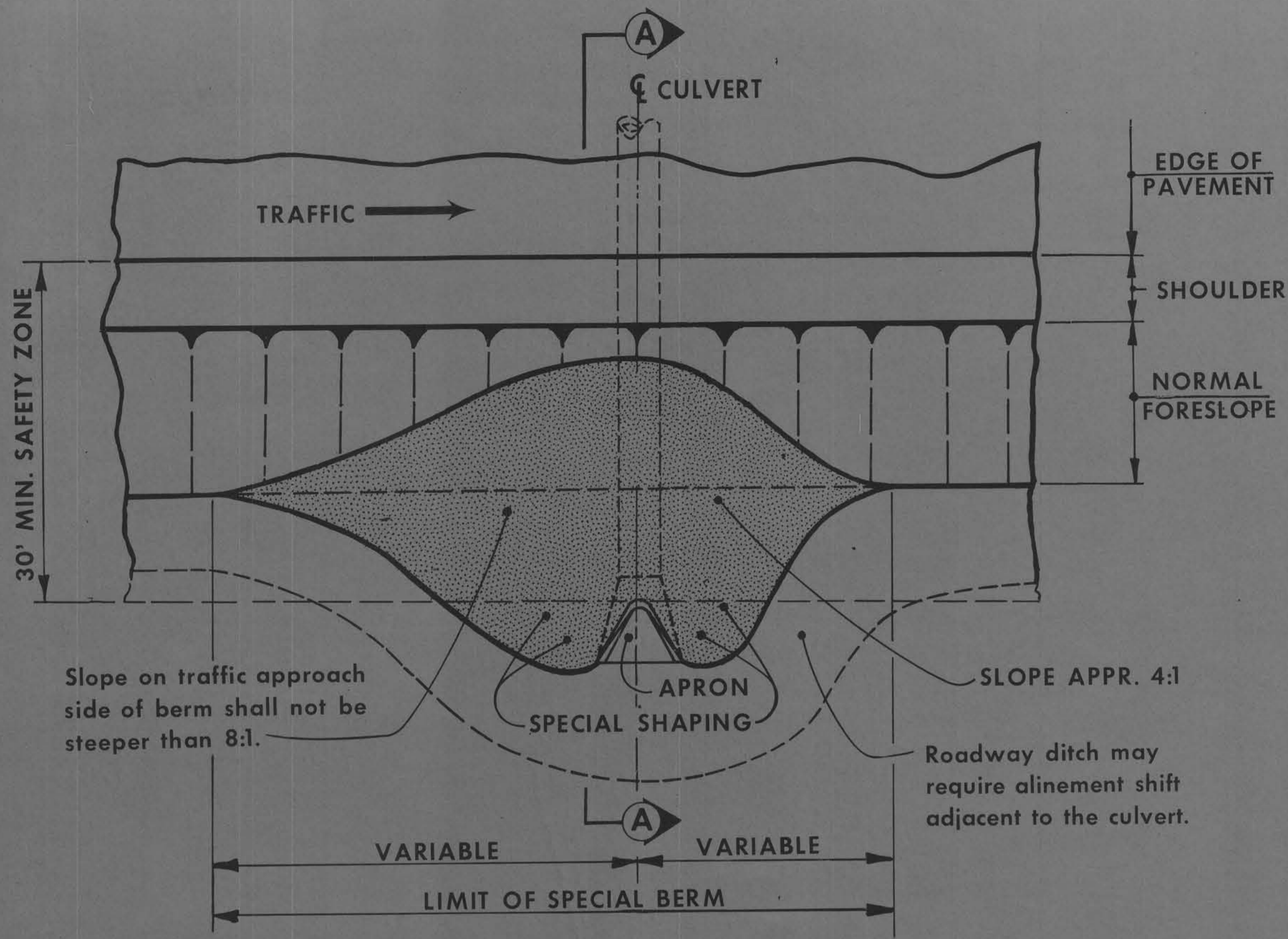


NOTE:  
Normal procedure for culvert design shall provide for a minimum distance of 30' from edge of pavement to apron or headwall.

SECTION A-A



DETAIL OF SHAPING OF EARTH FORESLOPE AT CULVERT END



TYPICAL INSTALLATION PLAN WHERE SPECIAL BERM IS REQUIRED

GENERAL NOTES:

Pipe culverts shall be of the kind and classification specified on detail project plans. All materials and methods of construction shall conform to current Iowa State Highway Commission Standard Specifications. Any construction features not covered by specification shall be at the direction of the engineer.

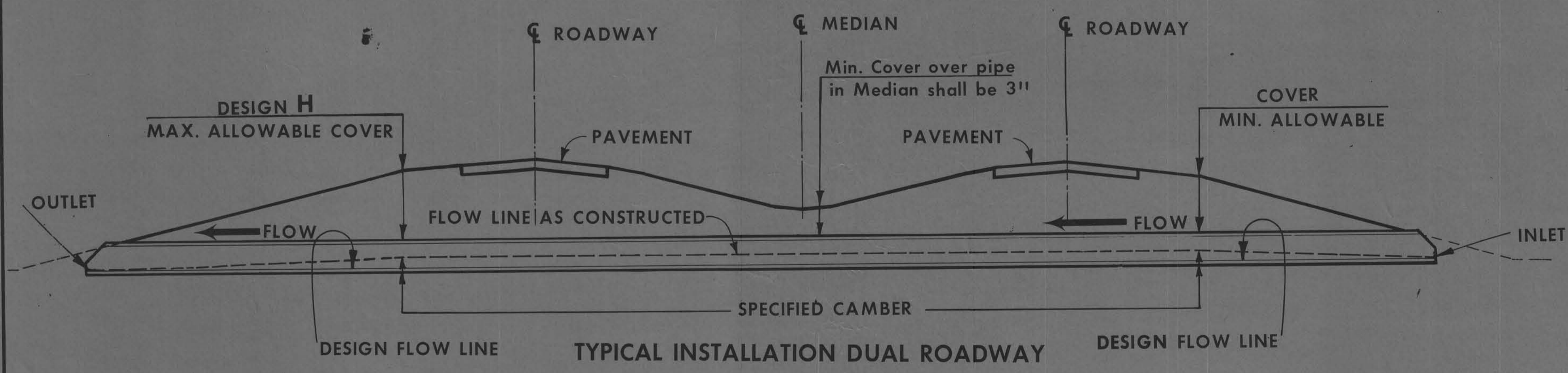
The minimum and maximum allowable cover for pipe culverts shall be as shown on the appropriate Standard Road Plans for the particular kind of culvert, as follows;

- RF-31 Depth of Cover Tables for Concrete Pipe Culverts
- RF-32 Depth of Cover Tables for Corrugated Metal Pipe Culverts (1,2,3)
- RF-33 Depth of Cover Tables for Corrugated Metal Pipe Culverts (4,5,6,7)

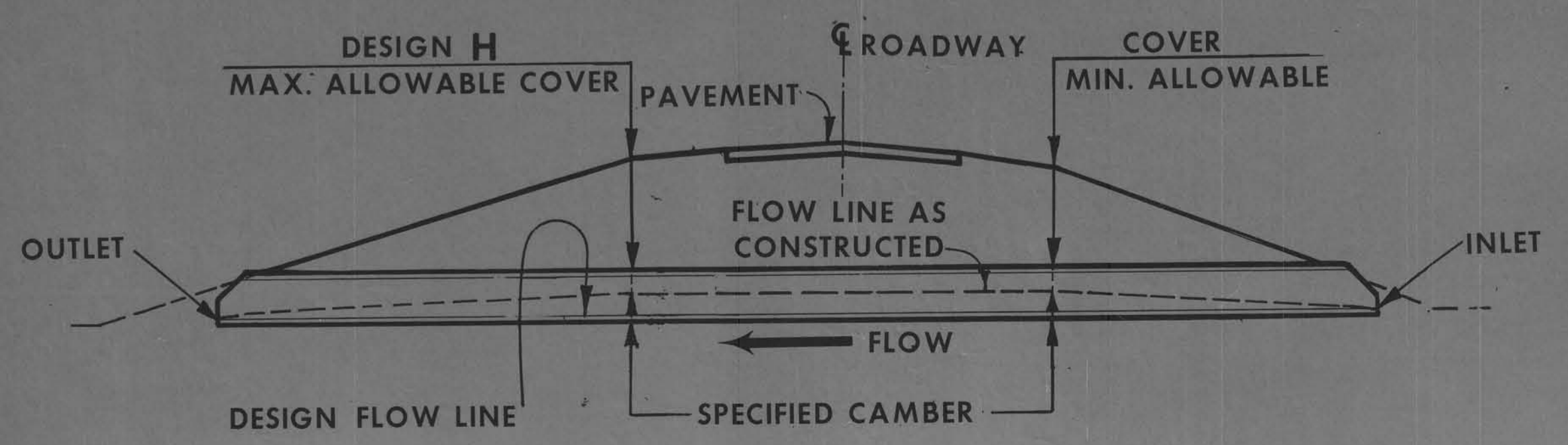
Camber is the dimension above a straight line between inlet elevation and outlet elevation. Some Settlement of structure is usually anticipated so as to result in the design flow line between inlet and outlet. Camber is developed uniformly from inlet and outlet to a point beneath the outside shoulder lines of the roadway and is uniform between those points, as indicated hereon

Normal construction procedure shall be to install pipe culverts with "Normal" camber as indicated hereon. Where so specified on project plans, camber exceeding the normal may be used. Camber up to the maximum shown for the various pipe sizes may be used where yielding soil conditions require the provision of more than normal camber.

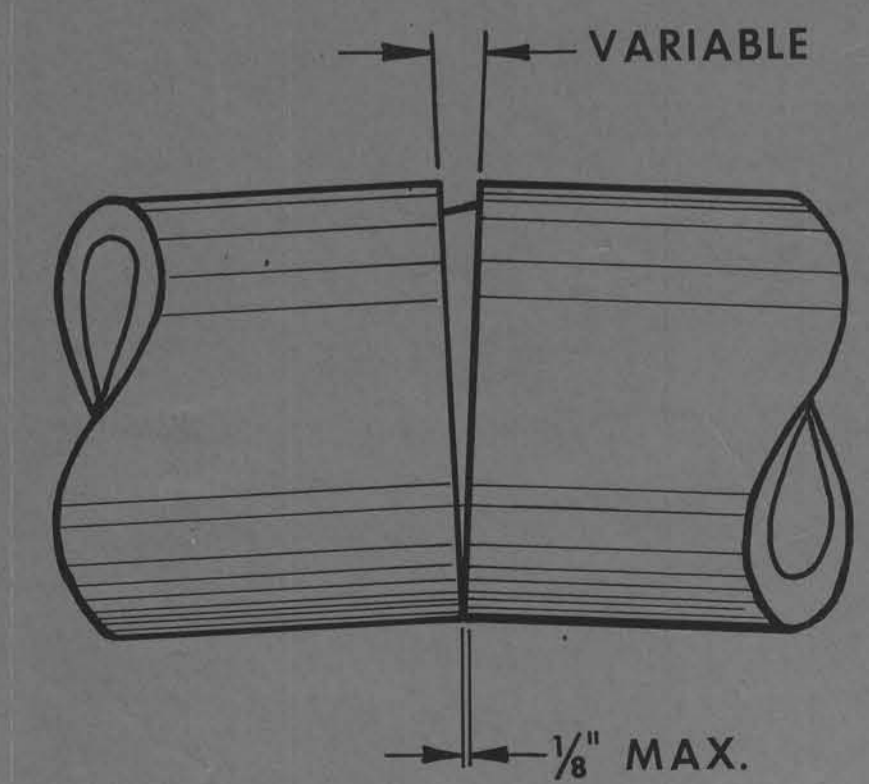
Details shown hereon illustrate certain construction requirements for installation of roadway pipe culverts. Refer to tabular listing of culverts and other installation details in project plans, and appropriate other Standard Road Plans for additional requirements.



TYPICAL INSTALLATION DUAL ROADWAY



TYPICAL INSTALLATION SINGLE ROADWAY



Camber for concrete pipe is accomplished by placing pipe sections tight at the bottom of the joint with opening at top of joint variable as directed by the Engineer.

Camber for corrugated metal pipe shall be accomplished as directed by the engineer.

TYPICAL JOINT IN CAMBERED PIPE

ALLOWABLE CAMBER TABLES

DESIGN COVER H FEET	NORMAL CAMBER	PIPE SIZE D	MAX. CAMBER FEET
5	0.08'	24"	1.1
10	0.17'	30"	1.2
15	0.25'	36"	1.3
20	0.33'	42"	1.4
25	0.42'	48"	1.5
30	0.50'	60"	1.6
35	0.58'	84"	1.7

NEW ISSUE	3-10-72	Date	<b>IOWA HIGHWAY COMMISSION</b>	
		No.	STANDARD ROAD PLAN <b>RF-30B</b>	
		Recommended	<i>John C. Hockley</i>	3-6-72
		Approved	<i>R. P. McLaughlin</i>	3-8-72
			<i>R. Bowen</i>	3/8/72
			Deputy Chief Engineer	Date
<b>PIPE CULVERT INSTALLATION DETAILS</b>				
<b>(COVER AND CAMBER)</b>				



ALUMINUM ROUND PIPE

STEEL ROUND PIPE

STEEL ROUND PIPE

① 2 2/3" x 1/2" CORRUGATIONS

DIAM. OF PIPE D (INCHES)	MIN. COVER ABOVE PIPE (INCHES)	(H) MAXIMUM ALLOWABLE COVER-FEET									
		(0.060")		(0.075)		(0.105")		(0.135")		(0.164")	
		Round	Elong	Round	Elong	Round	Elong	Round	Elong	Round	Elong
12	12	38	—	38	—	—	—	—	—	—	—
15	12	29	—	30	—	—	—	—	—	—	—
18	12	21	—	23	—	—	—	—	—	—	—
24	12	14	—	16	—	—	—	—	—	—	—
30	12	—	—	13	26	14	28	—	—	—	—
36	12	—	—	12	23	12	24	—	—	—	—
42	18	—	—	—	—	11	22	12	23	—	—
48	18	—	—	—	—	11	22	11	22	—	—
54	18	—	—	—	—	11	21	11	21	—	—
60	18	—	—	—	—	—	—	11	21	11	21
66	18	—	—	—	—	—	—	—	—	10	20
72	18	—	—	—	—	—	—	—	—	10	20

② 3" x 1" CORRUGATIONS

DIAM. OF PIPE D (INCHES)	MIN. COVER ABOVE PIPE (INCHES)	(H) MAXIMUM ALLOWABLE COVER-FEET									
		16 GA. (0.064")		14 GA. (0.079")		12 GA. (0.109")		10 GA. (0.138")		8 GA. (0.168")	
		Round	Elong	Round	Elong	Round	Elong	Round	Elong	Round	Elong
36	12	27	40	31	50	40	74	—	—	—	—
42	12	21	34	23	42	29	58	—	—	—	—
48	12	17	30	19	37	23	46	—	—	—	—
54	12	15	27	16	32	19	38	—	—	—	—
60	12	13	24	15	29	16	33	—	—	—	—
66	12	13	22	13	27	15	30	—	—	—	—
72	12	12	20	12	25	14	27	—	—	—	—
78	12	12	18	12	23	13	26	—	—	—	—
84	12	—	—	12	21	12	24	13	26	—	—
90	12	—	—	—	—	12	24	12	35	13	26
96	12	—	—	—	—	11	23	12	24	12	25
102	24	—	—	—	—	—	—	12	23	12	24
108	24	—	—	—	—	—	—	—	—	12	23
114	24	—	—	—	—	—	—	—	—	11	23
120	24	—	—	—	—	—	—	—	—	11	20

③ 2 2/3" x 1/2" CORRUGATIONS

DIAM. OF PIPE D (INCHES)	MIN. COVER ABOVE PIPE (INCHES)	(H) MAXIMUM ALLOWABLE COVER-FEET									
		16 GA. (0.064")		14 GA. (0.079")		12 GA. (0.109")		10 GA. (0.138")		8 GA. (0.168")	
		Round	Elong	Round	Elong	Round	Elong	Round	Elong	Round	Elong
12	12	70	—	76	—	—	—	—	—	—	—
15	12	56	—	61	—	—	—	—	—	—	—
18	12	40	—	48	—	64	—	—	—	—	—
24	12	23	—	26	—	33	—	—	—	—	—
30	12	—	—	18	30	22	43	25	51	—	—
36	12	—	—	15	25	17	33	19	38	—	—
42	12	—	—	—	—	14	28	16	31	17	34
48	12	—	—	—	—	13	25	14	27	15	29
54	12	—	—	—	—	12	24	13	25	13	26
60	12	—	—	—	—	—	—	12	23	12	25
66	12	—	—	—	—	—	—	11	22	12	23
72	12	—	—	—	—	—	—	11	17	11	21
78	12	—	—	—	—	—	—	—	—	11	17
84	12	—	—	—	—	—	—	—	—	11	13

GENERAL NOTES:

The maximum allowable cover values indicated hereon for the various kind of pipe culvert installations, are design values based on current ISHC construction specifications (Class "C" Bedding) and other normal conditions.

Contractor may furnish the type of corrugated culvert he chooses so long as the selection conforms to the limits shown only on charts ② or ③. The use of Aluminum Pipe (Chart ①) will be allowed only when specified in contract documents.

Refer to tabulation of culvert installations and other detail project plans as well as appropriate other Standard Road Plans for additional information regarding individual culvert installations.

For culverts shown in Elongated Column, the installation shall be made in accordance with current I.S.H.C. Specifications. Min. Allowable Cover for Roadway Culverts H=2.0.

DESIGN CRITERIA:

These height of cover tables have been prepared from data in the "AASHTO Standard Specifications for Highway Bridges". Section 8 with exceptions only as stated

W=unit weight of Soil= 120 lbs. per cu. ft.

CIRCULAR CORRUGATED METAL PIPE

- (A) Seam Strength
- (B) Handling and Installation Strength
- (C) Failure of conduit wall (buckling)
- (D) Deflection or Flattening

K= Soil Stiffness Factor= 0.55


E= Modulus of passive earth pressure= 400 psi per inch.

SPECIAL NOTE

Special installations may be designed to exceed indicated maximum allowable cover by specific modification of on one or more of the following conditions:

1. Bedding Class
2. Pipe Strength ( including special design pipe )
3. Type of backfill or cover material
4. Compaction requirements for backfill or cover material
5. Controlled trench width

Where site conditions favor such modifications significant economy may result from special design installations and these should be considered. Special designs shall specify particular modifications of construction requirements or design criteria as applicable. Necessary modifications of normal requirements will not ordinarily be paid for separately but will be included in the price bid for that culvert pipe.

Change General Notes	NO.	1	DATE	6-8-73
	RECOMMENDED			<b>Highway Division</b> STANDARD ROAD PLAN <b>RF-32</b>
	APPROVED	John C. Hocker ASS'T. ROAD DESIGN ENGINEER		12-1-71
	LAST REVISION	R. P. McLaughlin ROAD DESIGN ENGINEER		12-1-71
		R. P. McLaughlin DEPUTY CHIEF ENGINEER		12-2-71
DEPTH OF COVER TABLES FOR CORRUGATED METAL PIPE				