MINNESOTA DEPARTMENT OF TRANSPORTATION

THE COUNTY OF OLMSTED

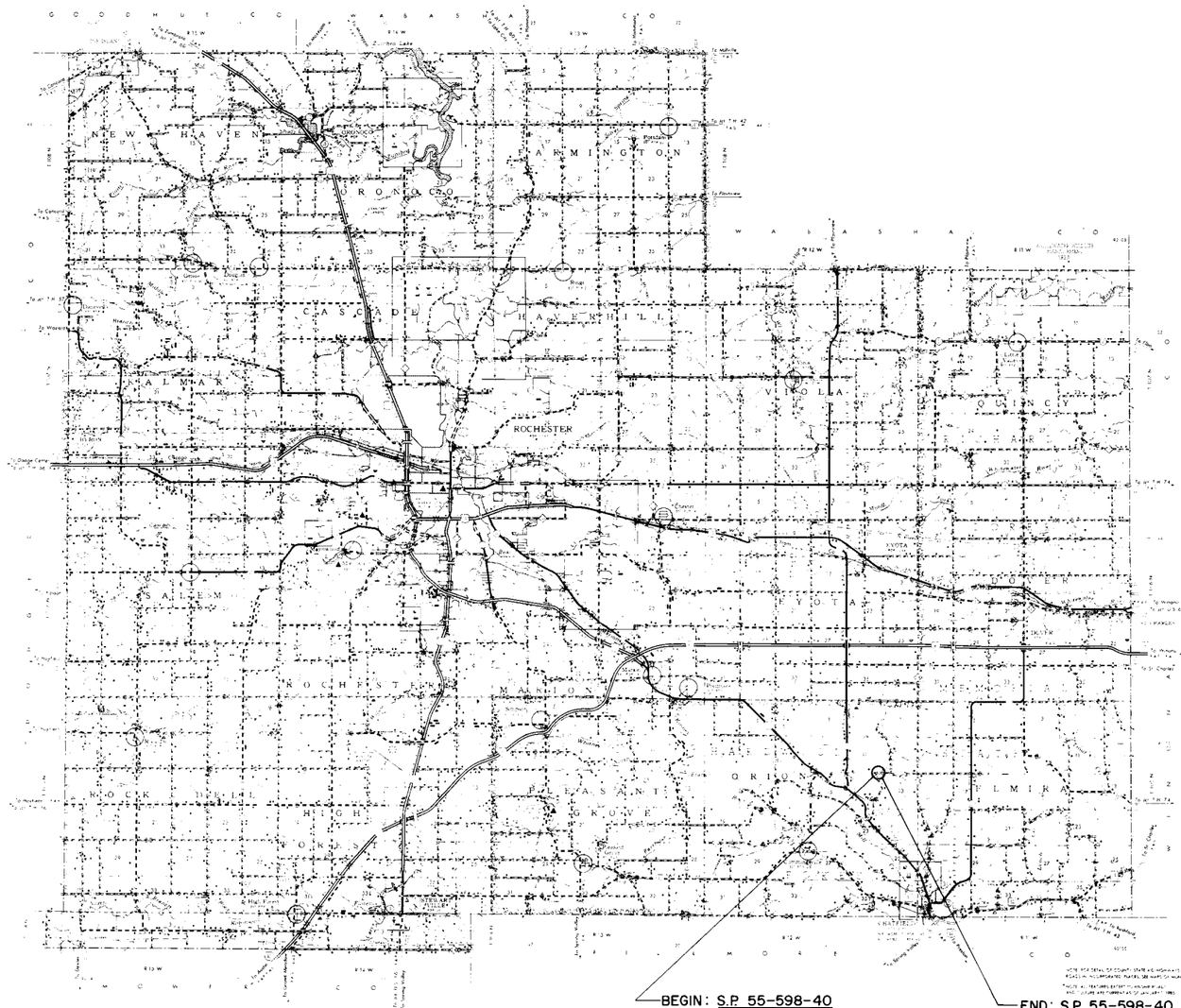
CONSTRUCTION PLAN FOR 3 LINES OF 10 X 8 PRECAST CONCRETE BOX CULVERT

LOCATED ON CO. RD. 137 AT MILL CREEK 4 MI. N.W. OF CHATFIELD **(GEOGRAPHIC DESCRIPTION)**

FROM 597.63' W. OF S.E. COR. SEC. 11 T105N-R12W **TO** S.E. COR. SEC. 11 T105N-R12W **(LEGAL DESCRIPTION)**

STATE PROJ. NO.			
GROSS LENGTH	FEET		MILES
BRIDGES-LENGTH	FEET		MILES
EXCEPTIONS-LENGTH	FEET		MILES
NET LENGTH	FEET		MILES

STATE PROJ. NO. 55-598-40			
GROSS LENGTH	597.63 FEET	0.1132	MILES
BRIDGES-LENGTH	0 FEET	0	MILES
EXCEPTIONS-LENGTH	0 FEET	0	MILES
NET LENGTH	597.63 FEET	0.1132	MILES



BEGIN: S.P. 55-598-40
STA. 18+00.00
BRIDGE NO. 9696

END: S.P. 55-598-40
STA. 23+97.63

PLANS SYMBOLS

STATE LINE
COUNTY LINE
TOWNSHIP OR RANGE LINE
SECTION LINE
QUARTER LINE
SIXTEENTH LINE
RIGHT OF WAY LINE
PRESENT RIGHT OF WAY LINE
CONTROL OF ACCESS LINE
PROPERTY LINE (Except Land Lines)
VACATED PLATTED PROPERTY
CORPORATE OR CITY LIMITS
TRUNK HIGHWAY CENTER LINE
RETAINING WALL
RAILROAD
RAILROAD RIGHT OF WAY LINE
RIVER OR CREEK
DRY RUN
DRAINAGE DITCH
DRAIN TILE
CULVERT
DROP INLET
GUARD RAIL
BARBED WIRE FENCE
WOVEN WIRE FENCE
CHAIN LINK FENCE
RAILROAD SNOW FENCE
STONE WALL OR FENCE
HEDGE
RAILROAD CROSSING SIGN
RAILROAD CROSSING BELL
ELECTRIC WARNING SIGN
CROSSING GATE
MEANDER CORNER
SPRINGS
MARSH
TIMBER
ORCHARD
BRUSH
NURSERY
CATCH BASIN
FIRE HYDRANT
CATTLE GUARD
OVERPASS (Highway Over)
UNDERPASS (Highway Under)
BRIDGE
BUILDING (One Story Frame)
F. FRAME C. CONCRETE
S. STONE T. TILE
B. BRICK ST. STUCCO
IRON PIPE OR ROD
MONUMENT (STONE, CONCRETE OR METAL)
WOODEN HUB
GRAVEL PIT
SAND PIT
BORROW PIT
ROCK QUARRY
SLOPE EASEMENT

UTILITIES SYMBOLS

POWER POLE LINE
TELEPHONE OR TELEGRAPH POLE LINE
JOINT TELEPHONE AND POWER ON POWER POLES
ON TELEPHONE POLES
ANCHOR
STEEL TOWER
STREET LIGHT
PEDESTAL TELEPHONE CABLE TERMINAL
GAS MAIN
WATER MAIN
CONDUIT
TELEPHONE CABLE IN CONDUIT
ELECTRICAL CABLE IN CONDUIT
TELEPHONE MANHOLE
ELECTRIC MANHOLE
BURIED TELEPHONE CABLE
BURIED ELECTRICAL CABLE
AERIAL TELEPHONE CABLE
SEWER (SANITARY OR STORM)
SEWER MANHOLE

SCALES

PLAN ..... 100' HORIZ. & VERT.
PROFILE ..... 100' HORIZ. & 10' VERT.
INDEX MAP ..... 10,560'
CROSS SECTIONS ..... 10' HORIZ. & VERT.

ALRENSON, MPLS 55405
72765

MINN. PROJ. NO. BROS 9055 (017)
~~FED. PROJ. NO.~~ CBP 0093 (067)

GOVERNING SPECIFICATIONS

THE 1988 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION 'STANDARD SPECIFICATIONS FOR CONSTRUCTION' AS AMENDED BY THE JANUARY 2, 1991 SUPPLEMENTAL SPECIFICATION SHALL GOVERN.

INDEX

SHEET	1	TITLE SHEET
SHEET	2	QUANTITY & TYPICAL SECTIONS
SHEET	3	TRAFFIC CONTROL PLAN
SHEET	4-5	BRIDGE SHEETS
SHEET	6	CROSS SECTIONS
SHEET	7-9	BARREL AND END SECTION DETAILS

DESIGN DESIGNATION

R
ADT (Current Year) = 104 (1991)
ADT (Future Year) = 187 (2011)
DHV (Design Hr. Vol.) =
D (Directional Distr.) = %
T (Heavy Commercial) = %
SOIL FACTOR 130
SHOULDER WIDTH 4'

ΣN18 (20)
Design Speed 55 MPH
Based on STOPPING Sight Distance
Height of eye 3.5' Height of object 0.5'
Design Speed not achieved at:

STA.	TO STA.	MPH
STA.	TO STA.	MPH
STA.	TO STA.	MPH

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATE 4/17/91 REG. NO. 16397 ENGR. Michael J. Julian

COUNTY OLMSTED

Recommended for Approval _____ 4-18 1991
DISTRICT STATE AID ENGINEER

Recommended for Approval _____ 5/1 19 91
STATE-AID PLANS AND SPECS ENGINEER

Approved 5/1 19 91 _____
STATE AID ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED
_____ _____
DIVISION ADMINISTRATOR DATE

~~STATE AID PROJ. NO.~~
STATE PROJ. NO. 55-598-40 **SHEET NO.** 1 **OF** 9 **SHEETS**

ESTIMATED QUANTITIES

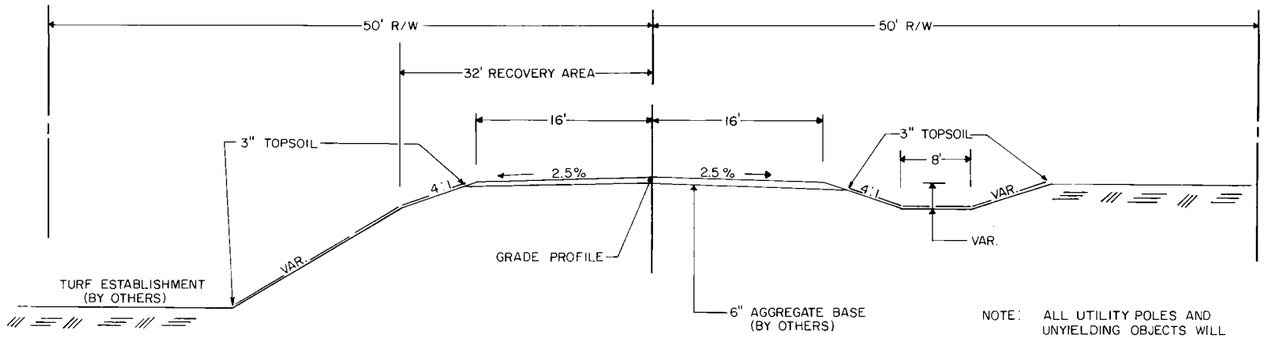
	SPECIFICATION NO.	ITEM	UNIT	PARTICIPATING RURAL	NON PARTICIPATING RURAL	TOTAL ESTIMATED QUANTITIES
	2101.502	CLEARING	TREE		20	20
	2101.507	GRUBBING	TREE		18	18
①	2105.515	UNCLASSIFIED EXCAVATION	CU. YD		2366	2366(P)
	2412.511	10'x8' P.C. BOX CULV. (2' OVERFILL)	LIN. FT.	234		234
④	2412.512	10'x8' P.C. BOX CULV. END SECTION	EACH	6		6
②	2442.501	REMOVE OLD BRIDGE	LUMP SUM		1	1
	2451.507	GRANULAR BEDDING (CV)	CU. YD.	153		153(P)
③	2511.501	RANDOM RIPRAP CLASS III	CU. YD	128		128
	0563.601	TRAFFIC CONTROL	LUMP SUM		1	1

STANDARD PLATES

THE FOLLOWING STANDARD PLATES, APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION, SHALL APPLY ON THIS PROJECT.

PLATE NO	DESCRIPTION
0005 A	SPECIFICATION REFERENCE TO STANDARD PLATES
3007 B	SHEAR REINFORCEMENT FOR PRECAST DRAINAGE STRUCTURES
3145 E	CONCRETE PIPE TIES (EYE BOLT TIES)
8000 I	STANDARD BARRICADES
9000 B	APPROACHES AND ENTRANCES

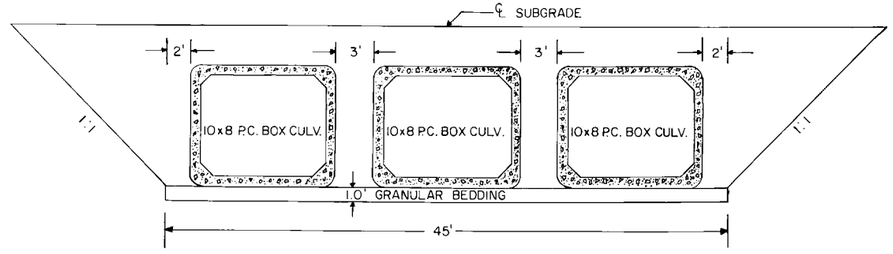
TYPICAL SECTION



18+00 TO STA. 23+97.63

NOTE: ALL UTILITY POLES AND UNYIELDING OBJECTS WILL BE RELOCATED OUTSIDE THE RECOVERY AREA BY OTHERS.

BEDDING DETAIL



① UNCLASSIFIED EXCAVATION INCLUDES 367 CU. YDS. OF TOPSOIL IN AREAS AS SHOWN IN THE CROSS-SECTIONS. TOPSOIL SHALL BE SALVAGED AND PLACED ON THE FINISHED SLOPES AND DITCH BOTTOMS.

② BRIDGE NO. L-6194

③ PLACE RIPRAP ON 9" GRANULAR FILTER OR GEOTEXTILE FILTER MATERIAL. WHICH SHALL BE CONSIDERED INCIDENTAL AND NO DIRECT COMPENSATION WILL BE MADE THEREFORE.

④ TYPE III C

NOTE: CULVERT EXCAVATION WILL BE CONSIDERED INCIDENTAL AND WILL BE INCLUDED FOR PAYMENT UNDER UNIT PRICE FOR ITEM NO. 2412.511 AND ITEM NO. 2412.512.

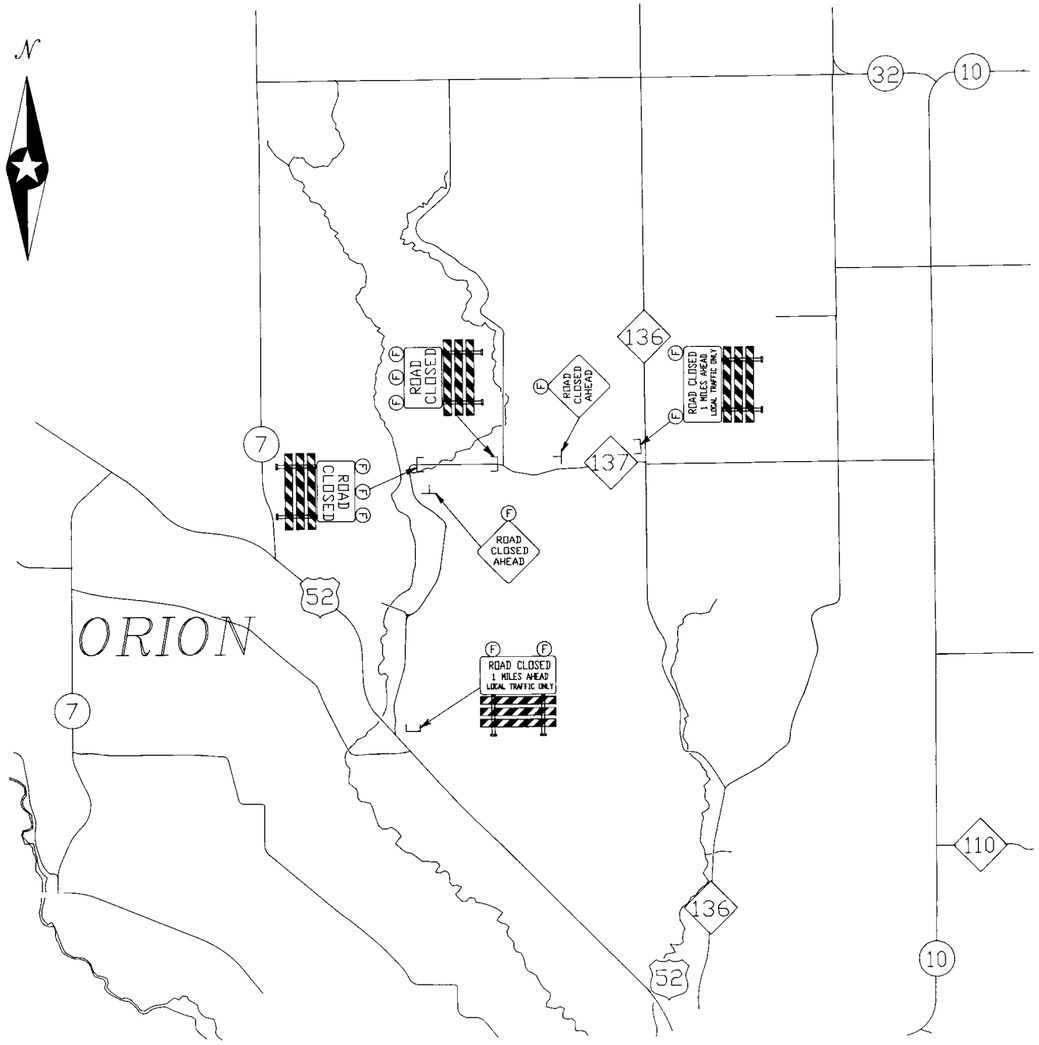
NOTE: CULVERT TO BE BACKFILLED WITH EXCESS EXCAVATION.

NOTE: ALL DIMENSIONS AND SLOPES SHOWN ON TYPICAL SECTIONS ARE APPROXIMATE.

~~S.A.P.~~

State Proj. No. 55-598-40

ALBINSON INC. MINNEAPOLIS, MINN.



ESTIMATE OF TRAFFIC CONTROL DEVICES									
DEVICE	NUMBER	SIZE	COLOR	QUANTITY	DEVICE	NUMBER	SIZE	COLOR	QUANTITY
ROAD CLOSED	R11-2	48 x 30	BLK/WH	2		TYPE III	MIN. 6'	OR & BLK	8
ROAD CLOSED MILES AHEAD LOCAL TRAFFIC ONLY	R11-3	60 x 30	BLK/WH	2		TYPE A	FLASHING LAMP	AMBER	12
ROAD CLOSED AHEAD	W20-3	48 x 48	BLK/OR	2					

TRAFFIC CONTROL LEGEND

⊥ POST OR STAND MOUNTED SIGN

⊔ TYPE III BARRICADE

Ⓕ TYPE "A" AMBER FLASHING LAMP

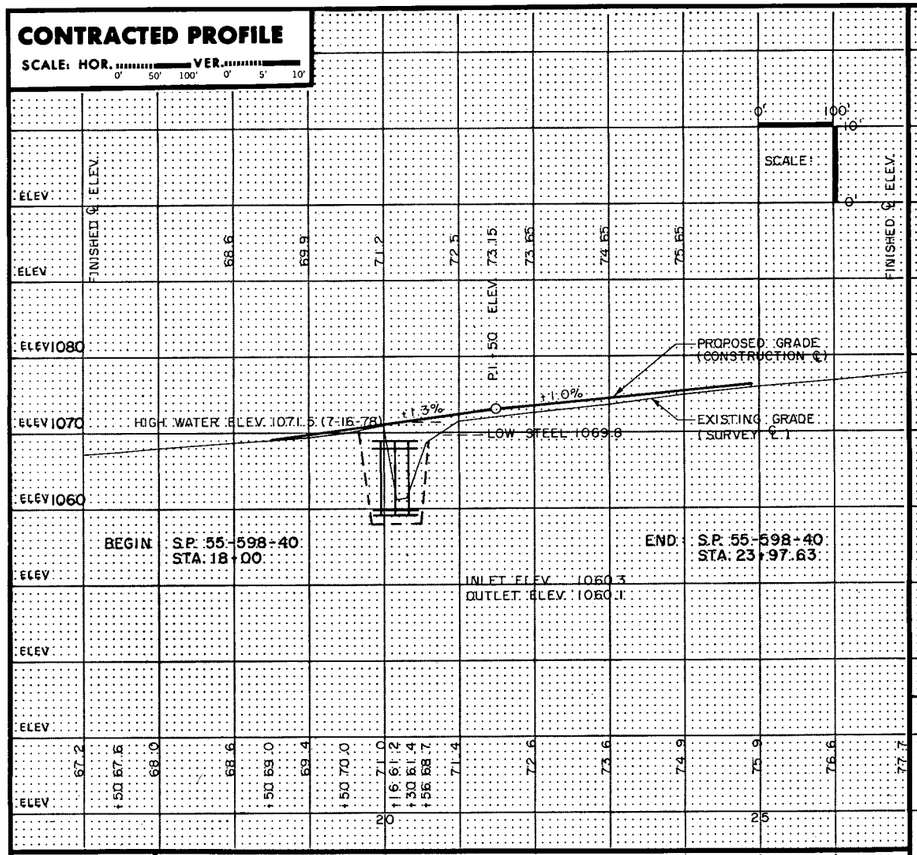
TRAFFIC CONTROL NOTES

1. TRAFFIC CONTROL LAYOUT NOT TO SCALE ALL DISTANCES ARE APPROXIMATE.
2. THE LOCATION OF SIGNS AND DEVICES WILL BE STAKED BY THE ENGINEER IN THE FEILD.
3. OLMSTED COUNTY WILL BE RESPONSIBLE FOR THE ADVANCED TRAFFIC SIGNING ON THIS PROJECT.
4. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES INCLUDING APPENDIX B DATED MARCH 1990.
5. CONSTRUCTION ZONE SIGNING, WITHIN THE CLOSURE, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL INCLUDE, BUT NOT LIMITED TO SAFTEY FENCE, CONES, FLASHERS, AND WARNING SIGNS.

TRAFFIC CONTROL PLAN

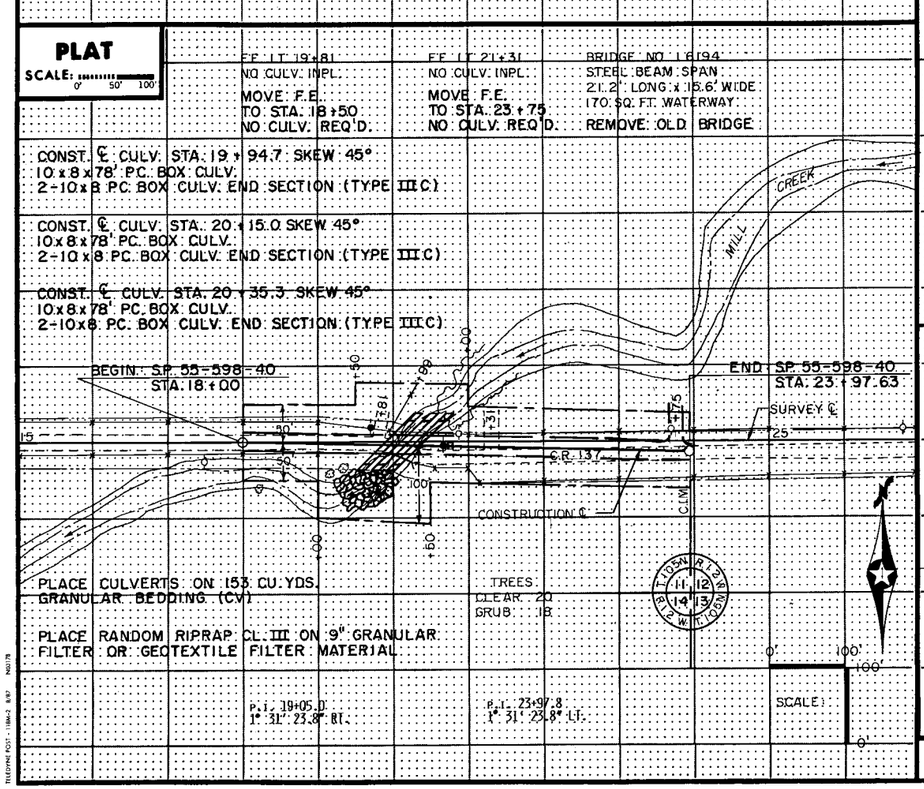
CONTRACTED PROFILE

SCALE: HOR. 0' 50' 100' VER. 0' 5' 10'



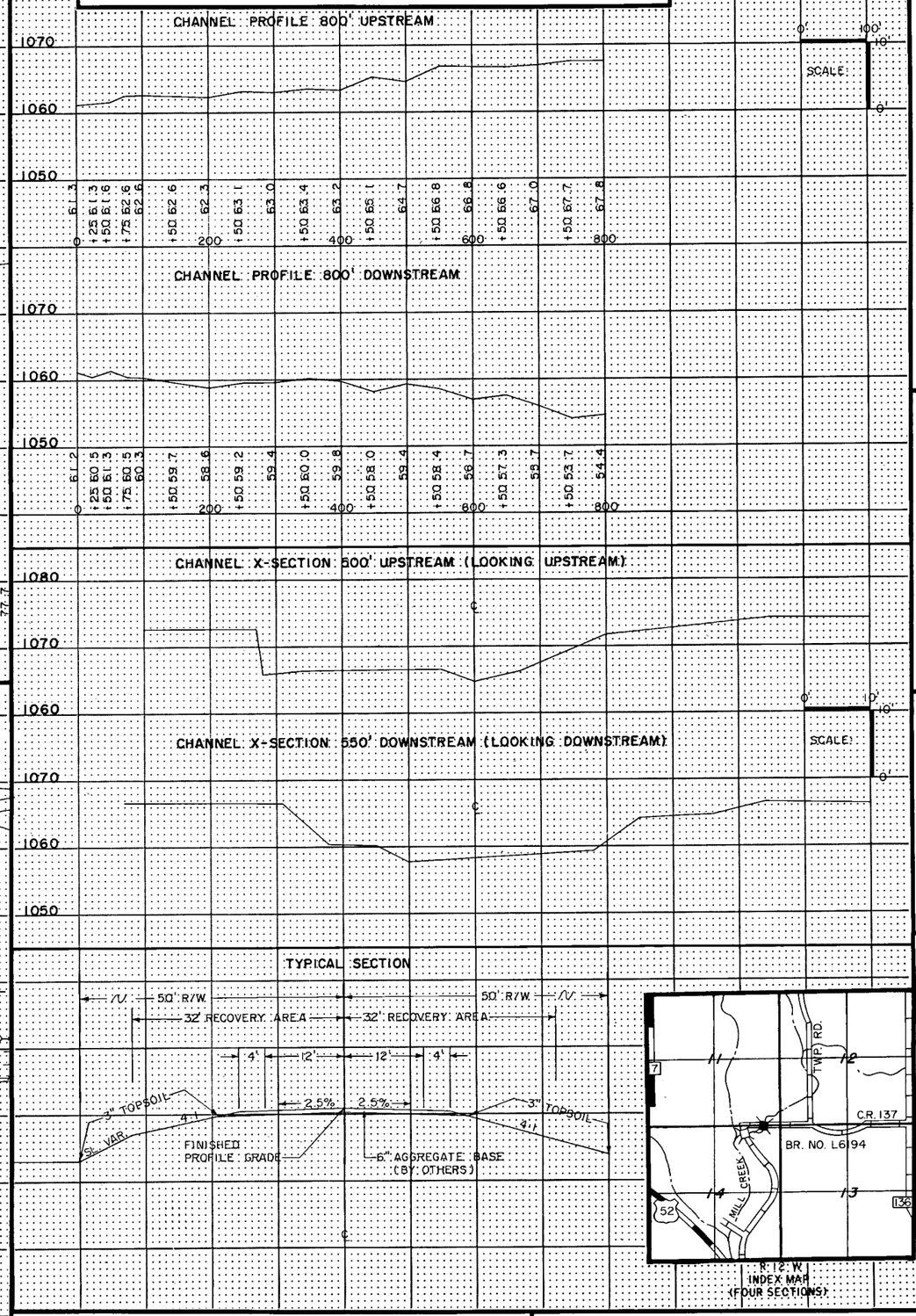
PLAT

SCALE: 0' 50' 100'



TYPICAL SECTIONS & PERTINENT DATA

SCALES AS SHOWN



Fed. Proj. No.

LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

1. Special Features: Waterfalls, dams, floods, ice, debris, sliding banks, recreational boating.
2. Other bridges or culverts over the same stream (particularly structures which carry high water without overflow of roadway) :Given location, type, length, height above high water, cross-sectional area etc.
3. Apparent highwater elevation..... Obtained from.....
4. Other data: Approx. velocity of water at time of survey.....

HYDRAULIC ENGINEERS RECOMMENDATION

DATE 10/19/89

Stream or ditch designation MILL CREEK
Drainage area 7.4 SQ. MI.
Max. flood on record UNKNOWN Design flood (10 yr. freq.) 1100 C.F.S.
Max. observed highwater elevation 1071.5 Design highwater elevation 1069.3
Design mean velocity through structure 4.6 F.P.S. OUTLET
Low superstructure at or above elevation
Flowline elevation 1060.3 INL. Skew angle 45°
Waterway area req'd. below elevation ..... = ...Sq. Ft. at Rt. angles to channel

In the interest of flood plain zoning the regional flood (100 yr. freq.) is 2440 C.F.S. at stage NONE and mean velocity of 5.9 F.P.S. with Ft. swellhead. The above recommendation will provide a structure of adequate waterway to pass the regional flood within criteria established by the Dept. of Natural Resources.

FOUNDATION ENGINEERS RECOMMENDATION

DATE .....

Bridge survey sheets made from: SURVEY CONDUCTED BY OLMSTED COUNTY

Bench mark elevation 1072.94 (M.S.L. 1929 Adj.)
Location: SPK IN P.P. 6' LT. STA. 20+85

MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE SURVEY

AT MILE POINT 1.6 ON C.R. 137 (T.H., C.S.A.H., C.R. etc.)
PROPOSED BRIDGE LOCATED 1.6 MILES NORTH OF JCT. T.H. 52
SEC. 14 TWP 105N R 12W
TOWNSHIP ORION COUNTY OLMSTED
BRIDGE NO. 96976

Area No. Job No. State Proj. No. 55-598-40 Sheet No. 4 of 9 Sheets

Fed. Proj. No.

INLET
RANDOM RIPRAP CLASS III
20' L. x 3' W. x 1.5' D. (4) = 13 CU. YDS.

OUTLET
RANDOM RIPRAP CLASS III
28.3' L. x 65' W. x 1.5' D. = 102 CU. YDS.
20' L. x 3' W. x 1.5' D. (4) = 13 CU. YDS.

GRANULAR BEDDING

GRANULAR BEDDING
92'x45'x1.0' = 153 CU. YDS.

CONSTRUCTION ℄

SURVEY ℄

BEGIN: SP 55-598-40
STA. 18+00

END: SP 55-598-40
STA. 23+97.63

19+94.7
20+15.0
20+35.3

45°

3'

50' R/W
75' R/W
33'
16'

40'
65'
25'

℄ PROFILE
20' LT.
20' RT.

PROPOSED ℄ GRADE ELEVATION

PROPOSED ℄ GRADE

1.5:1

1.0' GRANULAR BEDDING

63'

INLET ELEV. 1060.3
OUTLET ELEV. 1060.1

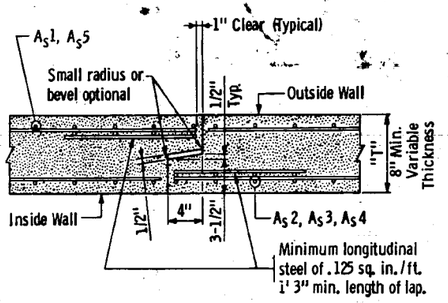
SCALE: 0' 10' 10' 0'

BORINGS SHOWN I TAKEN WITH
STD 140 LB HAMMER
30 INCH DROP
2 INCH O.D. SAMPLER

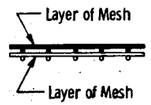
BRIDGE SURVEY PLAN AND PROFILE	DES:	DR:	APPROVED:	Bridge No. 96976
State Proj. No. 55-598-40	CHK:	CHK:	Sheet No. 5 of 9 Sheets	

19 20

Fed. Proj. No.

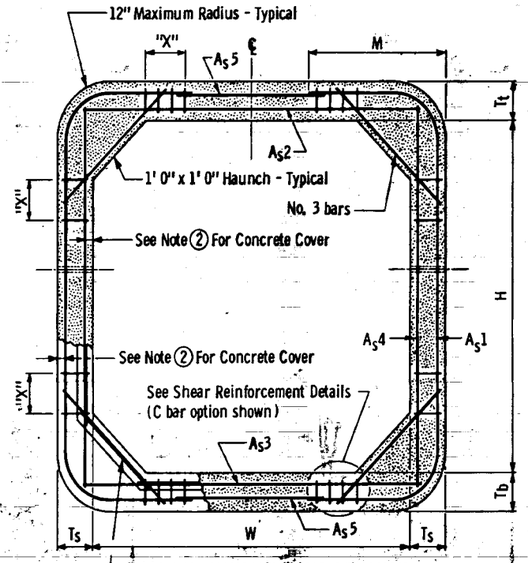


TONGUE AND GROOVE JOINT DETAIL

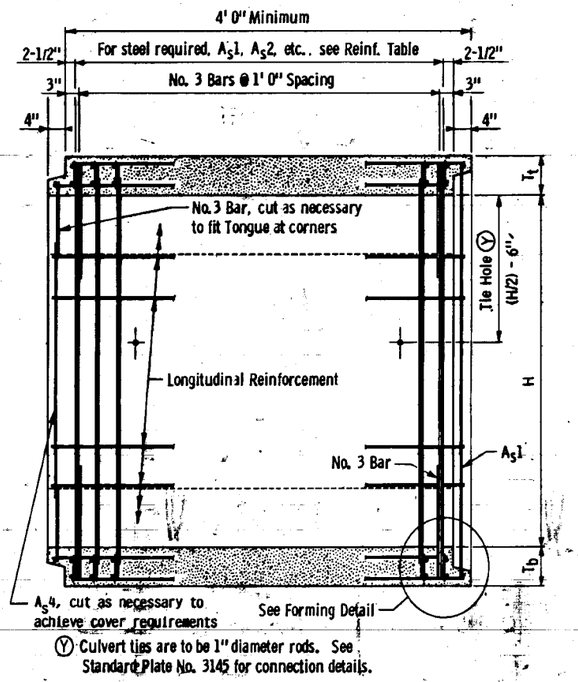


FABRIC LAYER DETAIL

When more than one layer of steel fabric is used to obtain the required reinforcement areas, the wires of the steel fabric shall be placed as shown



TRANSVERSE BARREL SECTION
(Bar Reinforcement Option Shown)

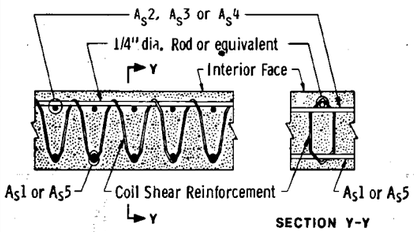


Ⓨ Culvert ties are to be 1" diameter rods. See Standard Plate No. 3145 for connection details.
All holes in the barrels are to be approved by the engineer.

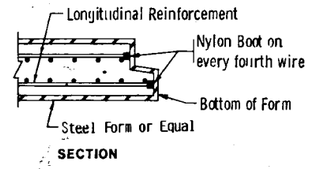
LONGITUDINAL BARREL SECTION
(Bar Reinforcement Option Shown)

SHEAR REINFORCEMENT DETAIL
C BAR OPTION
C Bars shall have 135° Min. and 180° Max. hooks

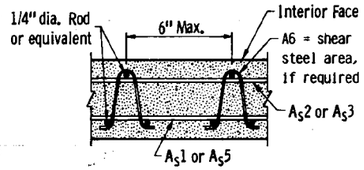
V BAR DETAIL



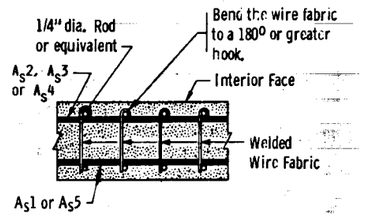
SHEAR REINFORCEMENT DETAIL
COIL OPTION



FORMING DETAIL



SHEAR REINFORCEMENT DETAIL
V BAR OPTION



SHEAR REINFORCEMENT DETAIL
J BAR OPTION

DIMENSION TABLE

Dimensions	Height of Overfill Ⓕ 2				
"W" (in Ft.)	10				
"H" (in Ft.)	8				
Tt (in inches)	9				
Tb (in inches)	10				
Ts (in inches)	8				
"M" (in inches)	29				
Weight (lbs./Ft.)	4470				

REINFORCEMENT TABLE

Reinforcement △	Height of Overfill Ⓕ 2 *Area	Length								
A_S1	0.512	13'4"								
A_S2	0.872	10'3"								
A_S3	0.797	10'3"								
A_S4	0.192	8'3"								
A_S5	0.192	8'0"								

* Square inches per lineal foot of barrel.
△ Areas shown are based on Fy = 65,000 P.S.I.
Increase area 8% for Fy = 60,000 when reinforcement bars are used in part or total.

SHEAR REINFORCEMENT TABLE

Ⓕ Height of Overfill	Shear Reinforcement Requirements ◇ Top of Culvert **Area	Top of Culvert Maximum Spacing	Top of Culvert "X" (in inches)	Bottom of Culvert **Area	Bottom of Culvert Maximum Spacing	Bottom of Culvert "X" (in inches)	Side of Culvert **Area	Side of Culvert Maximum Spacing	Side of Culvert "X" (in inches)
2	0.06	3.5"	3.5"						

◇ When shear reinforcement is needed, a minimum shear steel of 0.06 sq. in. per sq. ft. shall be used.
** Square inches per linear foot of barrel.
"X" = Distance from end of haunch.

NOTES:

CONSTRUCTION

1. The steel fabric, shear reinforcement and reinforcement bars used shall conform to applicable requirements of AASHTO M 259.
2. 1-1/2" min. and 2" max. concrete cover on all reinforcement, including the shear reinforcement, except for tongue and groove detail.
3. One of the following combinations of steel reinforcement may be used:
   (a) 1 or 2 layers of mesh or
   (b) 1 layer of mesh and 1 layer of reinforcement bars or
   (c) 1 layer of reinforcement bars.
   The reinforcement shall be developed in accordance with applicable parts of sections 8.21 thru 8.33 of the AASHTO "Standard Specifications for Highway Bridges".
4. Longitudinal reinforcement parallel to the axis of the culvert shall have a min. of 0.06 square inches per peripheral foot on all faces of the barrel, except in tongue and groove.
5. The max. shear reinforcement spacing in the longitudinal direction shall be 6 inches.
6. The transverse steel areas in each face shall be a minimum of 0.192 sq. in. per linear feet of barrel.
7. The maximum size of reinforcement bars shall be No. 6. The maximum mesh size shall be 1/2" dia. per layer (maximum of 2 layers).
8. The spacing center to center of the circumferential wires shall not be less than 2 inches nor more than 4 inches. The spacing center to center of the longitudinal wires shall not be more than 8 inches.
9. Welding will not be allowed on reinforcement bars or steel fabric, except that the original welding required to manufacture wire fabric is acceptable.
10. When reinforcement is cut, additional reinforcement shall be added on both sides of the cut member to replace or exceed the cut steel.
11. Barrel sections which are cast with a draft in the forms shall be laid with the narrowest part of the section downstream.

BASIS OF DESIGN

A. The design shall be in accordance with 1989 and Interim AASHTO Design Specifications.
B. Live loads are based on HS25 or Military Loading as designated in FHWA PPM 20-4 Section 4C.
C. Maximum allowable Design Stresses
   F'c = 5,000 P.S.I., N = 6
   Fy = 60,000 P.S.I. reinforcement bars
   Fy = 65,000 P.S.I. steel fabric
D. Load factor design according to AASHTO standard specification Group X = 1.3 $[B_D D + B_L (L+I) + B_E E_V + B_E E_L]$ shall be used where B_D = 1.00, B_E = 1.00, B_L = 2.09 E_V = Vertical earth pressure and E_L = Lateral earth pressure. The following values have been used for this structure:
   Unit Soil Weight 130 lbs. per cu. ft.
   Maximum lateral Pressure Coefficient 50% of soil weight
   Minimum lateral Pressure Coefficient 25% of soil weight
E. Concrete shall be Mix No. 3W36 with no calcium chloride allowed.
F. Minimum overfill shall be two (2) feet, unless a reinforced concrete slab is placed over barrels.

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNED.....

DATE..... REG. NO. .....

TRUNK HIGHWAY NO.
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE NO.

IDENTIFICATION NO. 113

PRECAST CONCRETE BOX CULVERT

SEC. 14 T 105 N R 12 W
ORION TOWNSHIP OLMSTED COUNTY
APPROVED

BRIDGE ENGINEER

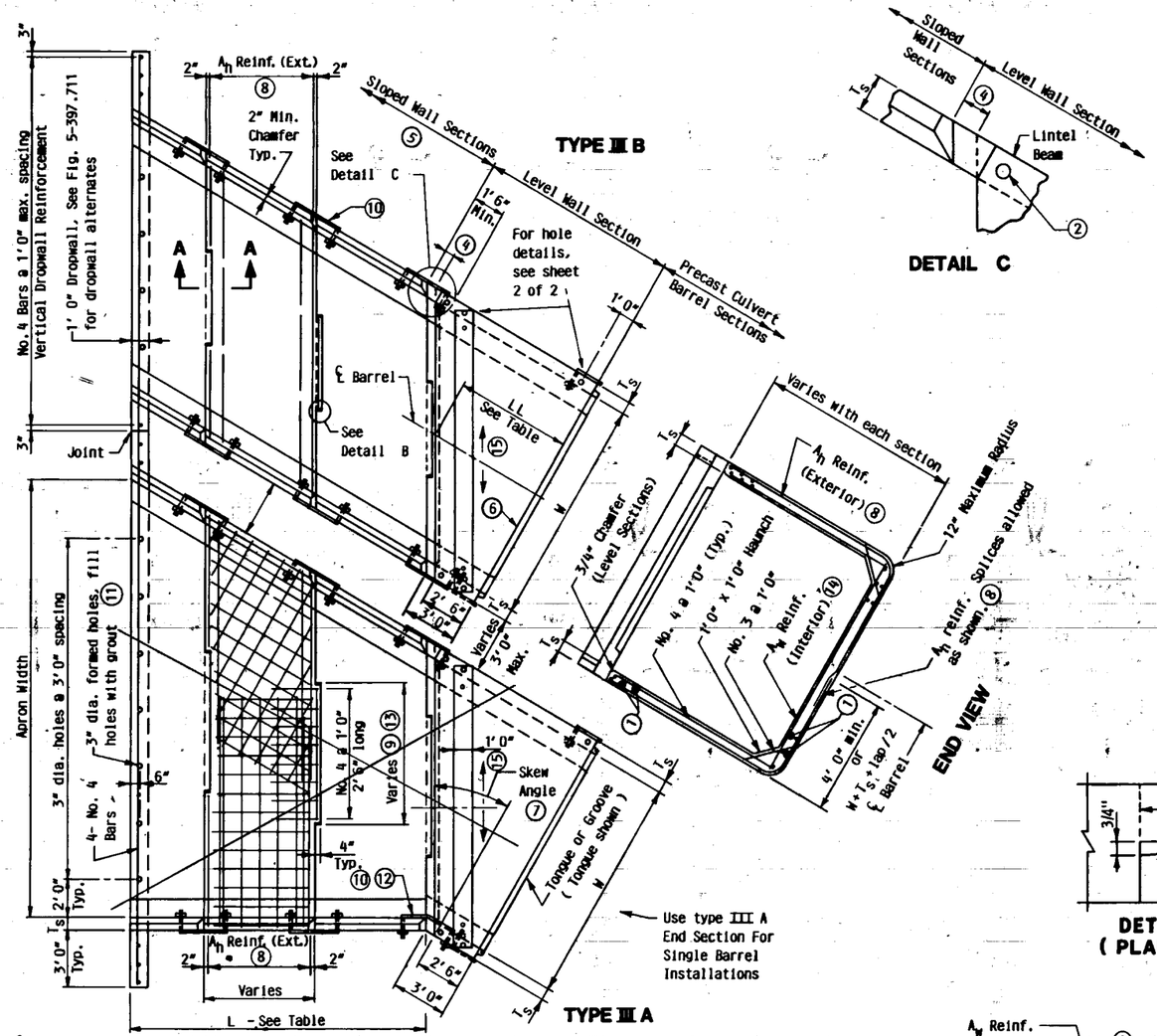
DES.	DR.
CHK.	CHK.

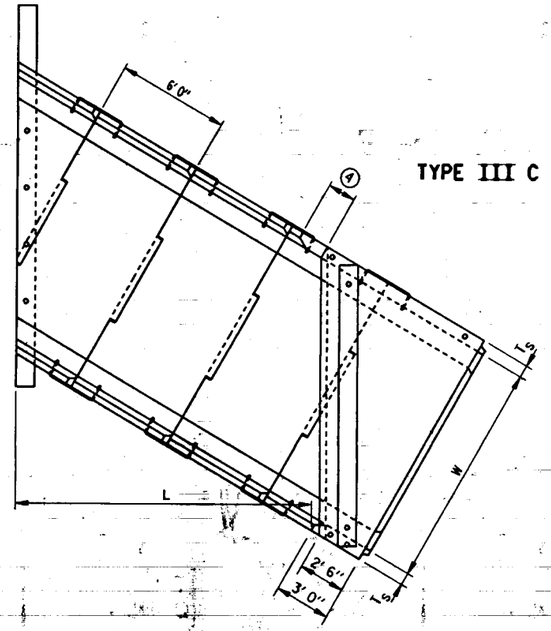
FIG. 5-397.701
Approved: November 3, 1987

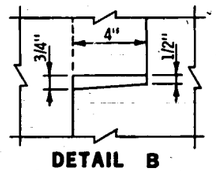
BARREL DETAILS

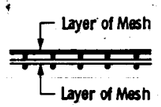
State Proj. No. 55-598-40

Sheet No. 7 of 9 Sheets



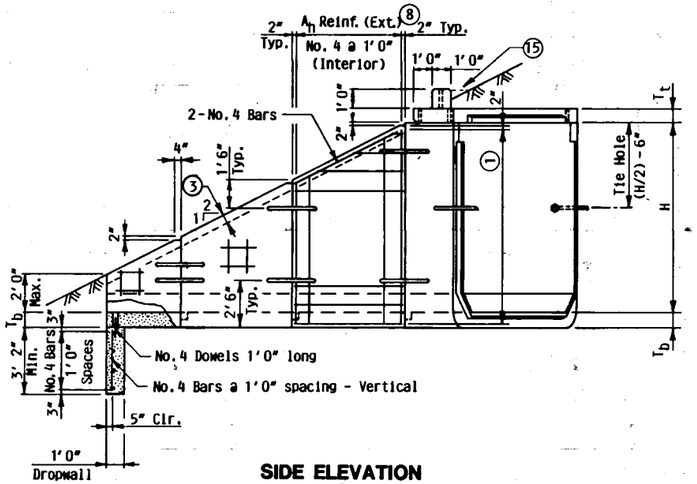


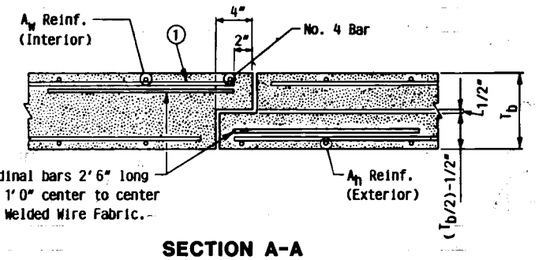


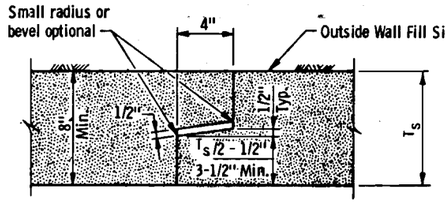


FABRIC LAYER DETAIL

When more than one layer of steel fabric is used to obtain the required reinforcement areas, the wire of the steel fabric shall be placed as shown in the Fabric Layer Detail.







L TABLE (14)

CULVERT HEIGHT H	END SECTIONS L
4 ft.	4 ft.
5 ft.	6 ft.
6 ft.	8 ft.
7 ft.	10 ft.
8 ft.	12 ft.
9 ft.	14 ft.
10 ft.	16 ft.
12 ft.	20 ft.

LL TABLE

WIDTH W	SKEW ANGLE 15°	30°	45°
8 ft.	3'9"	5'2-3/8"	
10 ft.	4'8-1/4"	5'9-1/4"	8'2"
12 ft.	4'3-7/16"	6'4-3/16"	
14 ft.	4'6-11/16"	6'11-1/8"	
16 ft.	4'9-7/8"	7'6-1/16"	
18 ft.	5'1-1/8"	8'1"	
20 ft.	5'4-5/16"	8'7-15/16"	

NOTES:

The steel reinforcement shall conform to the applicable requirements of AASHTO M259. The reinforcement shall be Grade 60 or better.

The maximum size of reinforcing bars shall be No. 6. The maximum mesh size shall be 1/2" dia. (1 or 2 layers).

Finish all vertical edges of concrete with 3/4" chamfer or radius unless otherwise noted.

Dropwall shall be concrete Mix 1A43, 3Y43 or 3W36.

Precast Concrete Sections shall be Mix 3W36 with no calcium chloride allowed.

Limits for excavation for dropwall to be approximately the same as dropwall dimensions.

1-1/2" minimum and 2" maximum concrete cover on all reinforcement (Typical for inside and outside walls).

Culverts to be constructed as per Spec. 2411 except as noted.

See " Precast Concrete Box Culvert" Standard Sheet 7 No. 5-397.701 for additional reinforcement requirements such as laps and splice requirements.

One of the following combinations of steel reinforcement may be used:

(a) 1 or 2 layers of mesh or
(b) 1 layer of mesh and 1 layer of reinforcement bars or
(c) 1 layer of reinforcement bars.

8.16.8.2 of 1983 and Interim

If (b) or (c) are used, service load stresses shall be used in culvert design. The reinforcement shall be developed in accordance with applicable parts of 8.21 to 8.33.6,2 of 1983 AASHTO "Standard Specifications for Highway Bridges".

(1) Longitudinal reinforcement parallel to side walls of end sections shall have a minimum of 0.06 sq. in. per ft. on all faces.

(2) 1" dia. x 1' 0" long steel dowel. 2" dia. hole in the top of the level wall section. Fill hole to top of lintel beam with an approved grout, see Note 11.

(3) See Embankment Protection for Box Culverts, sheet 5.

(4) Variable. 6" minimum to 2' 0" maximum.

(5) Number of sections varies with "H" dimensions.

(6) Check the location to determine whether a tongue or a groove is used.

(7) For a ℄ of culvert skew angle of 22-1/2° to 37-1/2°, use a 30° skew end section. For 7-1/2° to 22-1/2°, use a 15° skew end section.

(8) See sheet 2 of 2 for A_h and A_w reinforcement tables.

(9) See Section A-A for additional reinforcement.

(10) Culvert ties are to be 1" dia. rods. See Standard Plate No. 3145 for details.

(11) Grout shall consist of 1 part cement and 2 parts sand. Use Type 1A air entrained Portland Cement. Grout mix shall have a maximum slump of 4".

(12) Two ties are required at angled wall joint connections. Bend ties to fit angle. No tongue or groove required.

(13) Apron widths up to 12 ft.=5' 0" tongue & 5' 1" groove. Apron widths over 12 ft.=8' 0" tongue & 8' 1" groove. Center tongue & groove on ℄ of each apron joint. Use same size tongue & groove in each apron assembly.

(14) Based on 2' 0" height at end of wingwall sections.

(15) Slope ground from center of barrel towards sides.

Approved: November 3, 1987

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FIG. 5-397.710 (1 of 2)

TITLE: 10x8 P.C. BOX CULV. 45° SKEW
PRECAST CONC. END SECTIONS · TYPE III
SKEWED SINGLE OR MULTI-BARREL

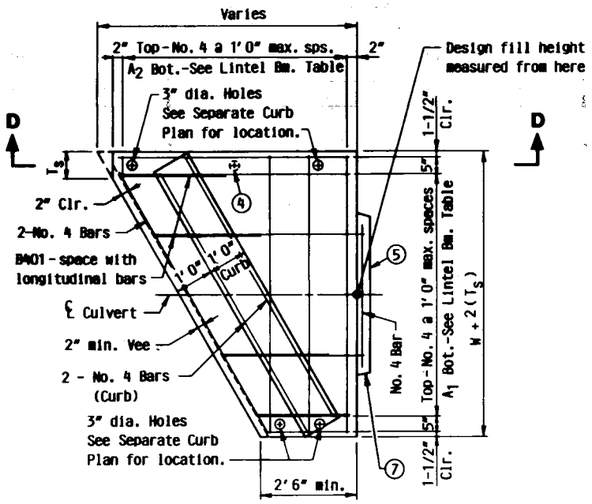
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CHK: | CHK:

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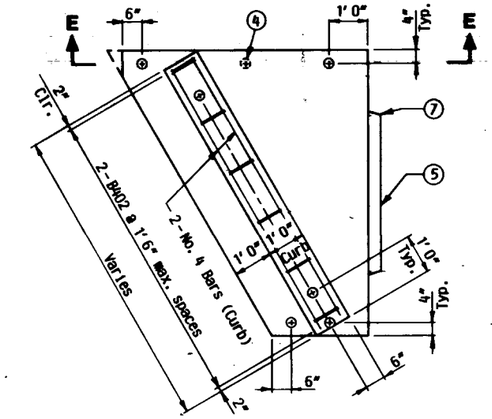
Bridge No. 96976

A_w REINFORCEMENT TABLE ②

HEIGHT OF EACH END SECT.	MAXIMUM APRON WIDTH OF EACH SECTION AT THE RESPECTIVE HEIGHT														
	8' 0" - 11' 0"	12' 0"	13' 0"	14' 0"	15' 0"	16' 0"	17' 0"	18' 0"	19' 0"	20' 0"	21' 0"	22' 0"	23' 0"	24' 0"	25' 0"
2' 0"	No.4 a 1'0"	———	———	———	———	———	———	No.4 a 10"	No.4 a 9"	No.4 a 8"	No.4 a 7"	No.5 a 11"	No.5 a 10"	No.5 a 9"	No.5 a 8-1/2"
4' 0"	No. 4 @ 1' 0"	———	———	———	———	———	→	No. 4 @ 10"	No.5 @ 11-1/2"	No. 5 @ 10"	No. 5 @ 9"	No. 5 @ 8"	No. 6 @ 10"	No. 6 @ 9-1/2"	No. 6 @ 8-1/2"
5' 0"	No. 4 @ 1' 0"	———	———	→	No. 4 @ 11"	No. 4 @ 9-1/2"	No. 4 @ 8"	No. 5 @ 11"	No. 5 @ 9-1/2"	No. 5 @ 8-1/2"	No. 6 @ 10-1/2"	No. 6 @ 9-1/2"	No. 6 @ 9"	No. 6 @ 8"	No. 6 @ 7-1/2"
6' 0"	No. 4 @ 1' 0"	———	———	→	No. 4 @ 10-1/2"	No. 4 @ 9"	No. 5 @ 1' 0"	No. 5 @ 10"	No. 5 @ 9"	No. 5 @ 8"	No. 6 @ 10"	No. 6 @ 9"	No. 6 @ 8"		
7' 0"	No. 4 @ 1' 0"	———	→	No. 4 @ 11-1/2"	No. 4 @ 9-1/2"	No. 4 @ 8"	No. 5 @ 10-1/2"	No. 5 @ 9-1/2"	No. 5 @ 8-1/2"	No. 6 @ 11"	No. 6 @ 10"	No. 6 @ 9"	No. 6 @ 8"		
8' 0"	No. 4 @ 1' 0"	———	→	No. 4 @ 11"	No. 4 @ 9"	No. 5 @ 1' 0"	No. 5 @ 10-1/2"	No. 5 @ 9"	No. 5 @ 8"	No. 6 @ 10-1/2"	No. 6 @ 9-1/2"				
10' 0"	No. 4 @ 1' 0"	———	→	No. 4 @ 10"	No. 4 @ 8"	No. 5 @ 11"	No. 5 @ 9-1/2"	No. 5 @ 8-1/2"	No. 6 @ 10-1/2"						
12' 0"	No. 4 @ 1' 0"	No. 4 @ 11"	No. 4 @ 9"	No. 5 @ 11-1/2"	No. 5 @ 10"	No. 5 @ 8-1/2"									
14' 0"	No.4 a 1'0"	No.4 a 9"	No.4 a 7"	No.5 a 9-1/2"	No.5 a 8"	No.5 a 7-1/2"									



PLAN OF LINTEL BEAM



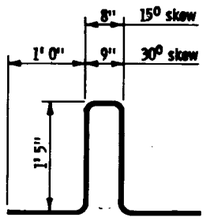
PLAN OF LINTEL BEAM

See Integral Curb Plan for
lintel beam reinforcement

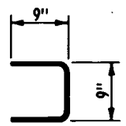
A_h REINFORCEMENT TABLE

HEIGHT H	A_h
8 ft. or less	No. 4 @ 1' 0"
10 ft.	No. 5 @ 8"
12 ft.	No. 6 @ 6"
14 ft.	No.7 a 5"
16 ft.	No.8 a 4-1/2"

NOTE: H is the highest vertical dimension of each section shown.



B401



B402

NOTES:

Curb is required and may be cast monolithically or cast separately.

① 1" dia. x 1' 0" long steel dowel. 2" dia. hole in the top of the level wall section. 3" dia. hole in the lintel beam. Fill the hole to the top of the lintel beam with an approved grout.

② Use the largest steel area from the table across each individual section.

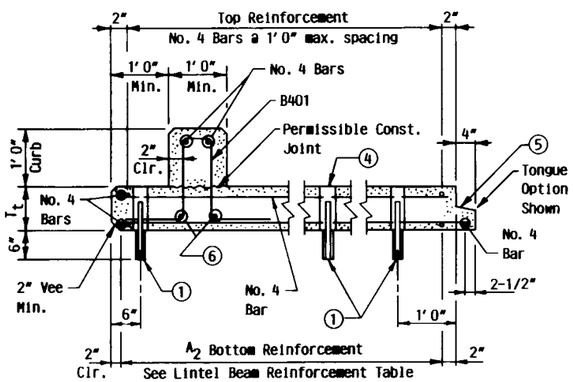
③ 1" dia. x 1' 0" long steel dowel. 2" dia. hole in the top of the lintel beam. 3" dia. hole in the curb. Fill the hole to the top of the curb with an approved grout.

④ Cast an additional 3" hole at midpoint of beam when side of lintel beam is over 6 ft.

⑤ Check the location to determine whether a tongue or a groove is used.

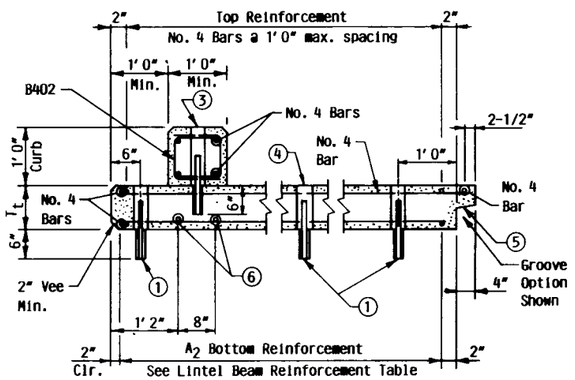
⑥ For spans under 10' use No.8 bars. For spans of 10' to 14' use No.9 bars. For spans over 14' to 18' use No.10 bars. For spans over 18' to 20' use No.11 bars, or equal.

⑦ Tongue and groove to terminate at culvert radius.



SECTION D-D

(With Integral Curb)



SECTION E-E

(With Separate Curb)

LINTEL BEAM REINFORCEMENT TABLE

W CULVERT WIDTH	4 Ft. DESIGN FILL HEIGHT			2 Ft. DESIGN FILL HEIGHT		
	T_t	BOTTOM REINFORCEMENT A_1	BOTTOM REINFORCEMENT A_2	T_t	BOTTOM REINFORCEMENT A_1	BOTTOM REINFORCEMENT A_2
Under 6'	9"	No.4 a 1' 2"	No.4 a 9-1/2"	9"	No.4 a 1'6"	No.4 a 1' 4"
6'+ to 8'	9"	No.4 a 8"	No.5 a 8"	9"	No.4 a 1' 1"	No.4 a 9"
8'+ to 10'	9"	No.5 a 8"	No.6 a 7-1/2"	9"	No.4 a 9"	No.4 a 6"
10'+ to 12'	9"	No.5 a 6"	No.6 a 6"	9"	No.5 a 9"	No.5 a 6"
12'+ to 14'	10"	No.5 a 5"	No.6 a 5"	9"	No.5 a 7-1/2"	No.5 a 5"
14'+ to 16'	11"	No.6 a 6"	No.7 a 5-1/2"	9"	No.5 a 6"	No.6 a 5-1/2"
16'+ to 18'	12"	No.6 a 5-1/2"	No.7 a 5"	10"	No.5 a 5-1/2"	No.6 a 5"
18'+ to 20'	13"	No.6 a 5"	No.8 a 6"	10"	No.6 a 6"	No.7 a 5-1/2"

NOTE: Maximum bar spacing given, reduce as necessary.

FIG. 5-397.710 (2 of 2)
Approved: November 3, 1987

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TITLE:	DES:	DR:	APPROVED:	Bridge No.
PRECAST CONC. END SECTIONS - TYPE III	CHK:	CHK:		96976
SKEWED SINGLE OR MULTI-BARREL	Sheet No. 9 of 9 Sheets			