MINNESOTA DEPARTMENT OF TRANSPORTATION

THE COUNTY OF OLMSTED

CONSTRUCTION PLAN FOR BRIDGE NO. 1626 REPLACEMENT & GRADING

LOCATED ON C.R. 142 **BETWEEN** C.S.A.H. 10 **AND** 0.7 MILES EAST (GEOGRAPHIC DESCRIPTION)

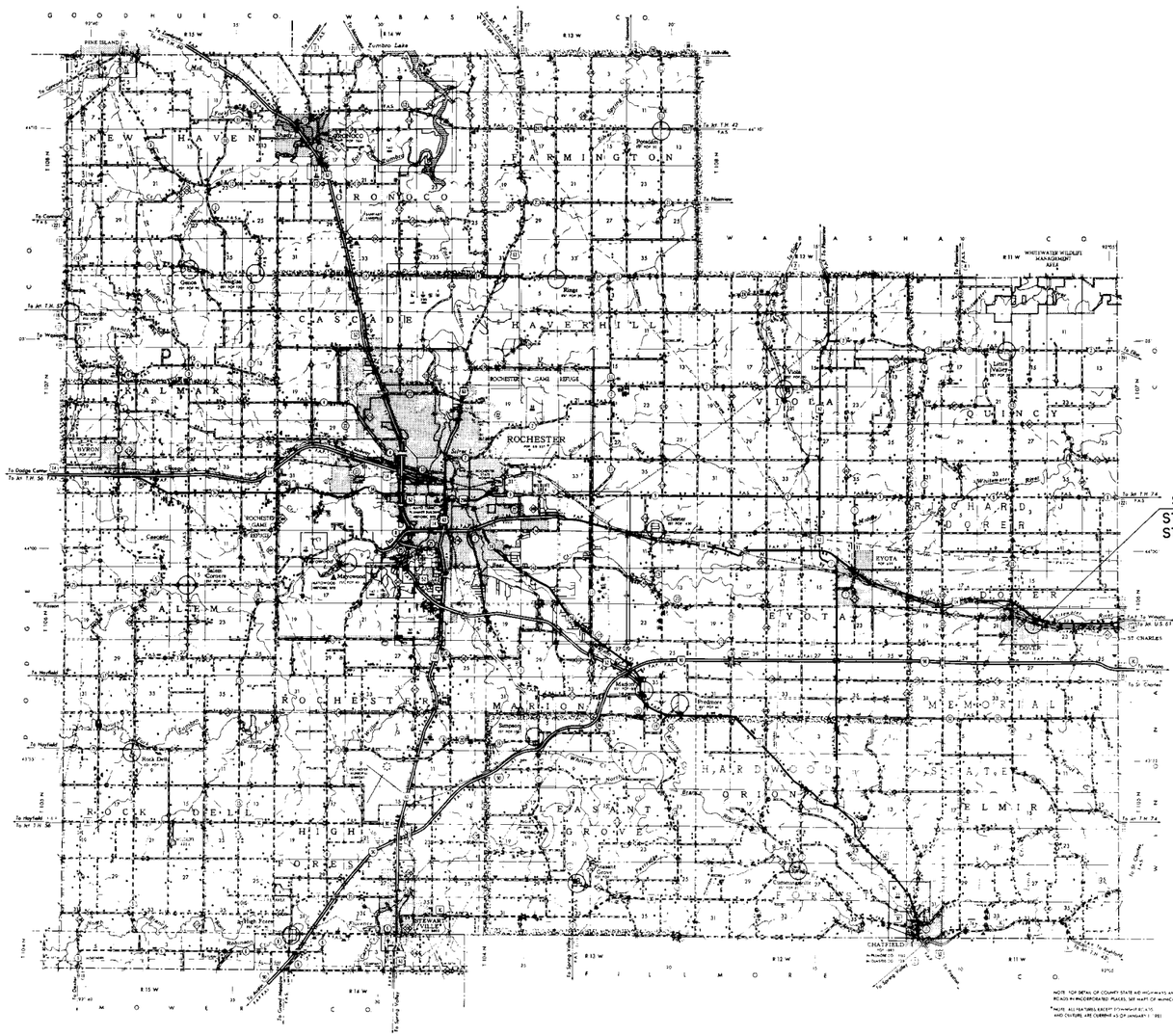
FROM APPROX. 2212.5' WESTERLY OF E. LINE SEC. 22 T. 107 N. R. 14 W. **TO** APPROX. 1612.5' WESTERLY OF E. LINE SEC. 22 T. 107 N. R. 14 W. (LEGAL DESCRIPTION)

STATE PROJ. NO. .....

GROSS LENGTH	FEET		MILES
BRIDGES-LENGTH	FEET		MILES
EXCEPTIONS-LENGTH	FEET		MILES
NET LENGTH	FEET		MILES

~~**STATE PROJ. NO.**~~ S.A.P. 55-598-30

GROSS LENGTH	600	FEET 0.114	MILES
BRIDGES-LENGTH	0	FEET 0	MILES
EXCEPTIONS-LENGTH	0	FEET 0	MILES
NET LENGTH	600	FEET 0.114	MILES



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
ELECTRIC CABLE IN CONDUIT
TELEPHONE MANHOLE
ELECTRIC MANHOLE
BURIED TELEPHONE CABLE
BURIED ELECTRIC CABLE
AERIAL TELEPHONE CABLE
SEWER, (SANITARY OR STORM)
SEWER MANHOLE

SCALES

PLAN ..... 100 FEET
PROFILE ..... 100 FEET HORIZ. & 10 FEET VERT.
INDEX MAP ..... 10,560 FEET
GENERAL LAYOUT ..... 10 FEET

MINN. PROJ. NO. .....

SPECIFICATIONS REFERENCE

The 1983 Edition of the Minnesota Department of Transportation "Standard Specifications For Highway Construction" Shall Govern.

INDEX

SHEET NO. 1	TITLE SHEET
SHEET NO. 2	QUANTITIES
SHEET NO. 3	X-SECTIONS
SHEET NO. 4 & 5	BRIDGE SURVEY SHEETS
SHEET NO. 6 & 7	PRECAST BOX CULVERT DETAILS

DESIGN DESIGNATION

R .....

ΣN18(20) .....

ADT (Current Year)	=	246
ADT (Future Year)	=	443
DHV (Design Hr. Vol.)	=	
D (Directional Distr.)	=	%
T (Heavy Commercial)	=	%
SOIL FACTOR		130

Design Speed 55 MPH
Based on STOPPING Sight Distance
Height of eye 3.75' 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 5-15-84 REG. NO. 10219 ENGR. [signature]

COUNTY Olmsted

Recommended for Approval ..... 19 .....
DISTRICT STATE AID ENGINEER

Recommended for Approval [signature] 6-16 1984
STATE AID PLANS AND SPECS ENGINEER

Approved ..... 19 .....
STATE AID ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED

....
DIVISION ADMINISTRATOR DATE

STATE AID PROJ. NO. 55-598-30
~~**STATE PROJ. NO.**~~ **SHEET NO.** 1 **OF** 7 **SHEETS**

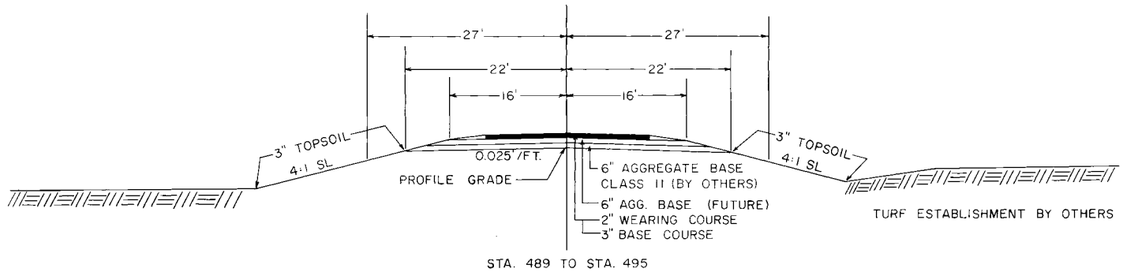
STATE AID TITLE SHEET ALHINSON APR 5 1984S

ESTIMATED QUANTITIES

SPECIFICATION NO.	ITEM	UNIT	NON-PARTICIPATING	PARTICIPATING	TOTAL ESTIMATED QUANTITIES
2105.511	COMMON CHANNEL EXCAVATION (P)	CU. YD.		92	92
2105.523	COMMON BORROW (CV)	CU. YD.	1985		1985
2442.501	REMOVE OLD BRIDGE	LUMP SUM	1		1
2451.507	GRANULAR BEDDING (CV) (P)	CU. YD.		70	70
2501.511	24" C.S. PIPE CULVERT	LIN. FT.	28		28
2501.515	24" G.S. PIPE APRONS	EACH	2		2
0501.605	104 P.C. CONC. BOX CULVERT (2' OVERFILL)	LIN. FT.		116	116
0501.606	104 P.C. CONC. BOX CULVERT END SECTIONS (8')	EACH		4	4
2511.501	RANDOM RIPRAP, CLASS III	CU. YD.		144	144
2511.511	GRANULAR FILTER	CU. YD.		52	52

TYPICAL SECTION

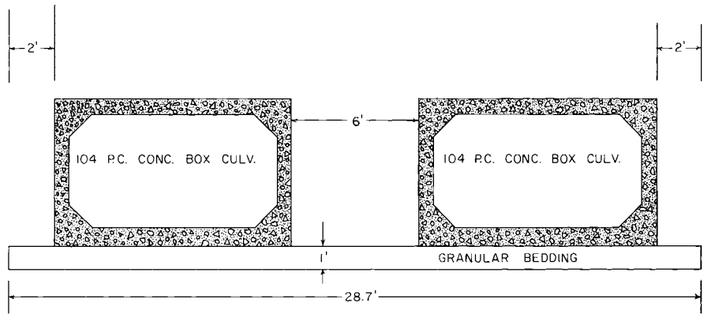
(NOT DRAWN TO SCALE)



STA. 489 TO STA. 495

CULVERT BEDDING DETAIL

(NOT DRAWN TO SCALE)



STANDARD PLATES

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

PLATE NO	DESCRIPTION
0004 A	SPECIFICATION REFERENCE TO STANDARD PLATES
3040 F	CORRUGATED METAL PIPE CULVERT
3123 H	METAL APRON FOR C.M. PIPE
3124 B	METAL APRON CONNECTION
3145 C	CONCRETE PIPE JOINT TIES. EYE BOLT TIE.
3221 C	CORRUGATED STEEL PIPE COUPLING BAND
8000 H	STANDARD BARRICADES
9000 B	APPROACHES AND ENTRANCES

NOTE: TIMBER WEIR CONSTRUCTION WILL BE CONSIDERED INCIDENTAL AND WILL BE INCLUDED FOR PAYMENT UNDER UNIT PRICE FOR "BOX CULVERT".

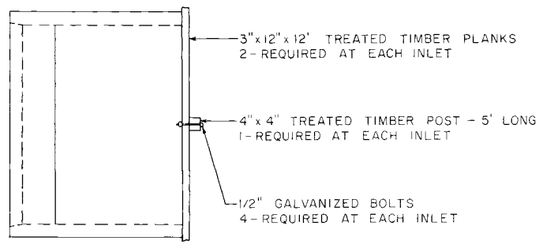
NOTE: REINFORCED CONCRETE BOX CULVERT EXCAVATION WILL BE CONSIDERED INCIDENTAL, AND WILL BE INCLUDED FOR PAYMENT UNDER UNIT PRICE FOR "BOX CULVERT".

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

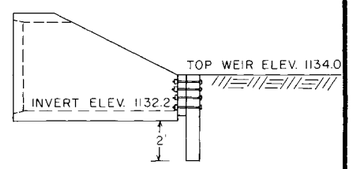
TIMBER WEIR CONSTRUCTION AT INLET OF 104 P.C. CONC. BOX CULV. END SECTION

(NOT DRAWN TO SCALE)

TOP VIEW



SIDE VIEW

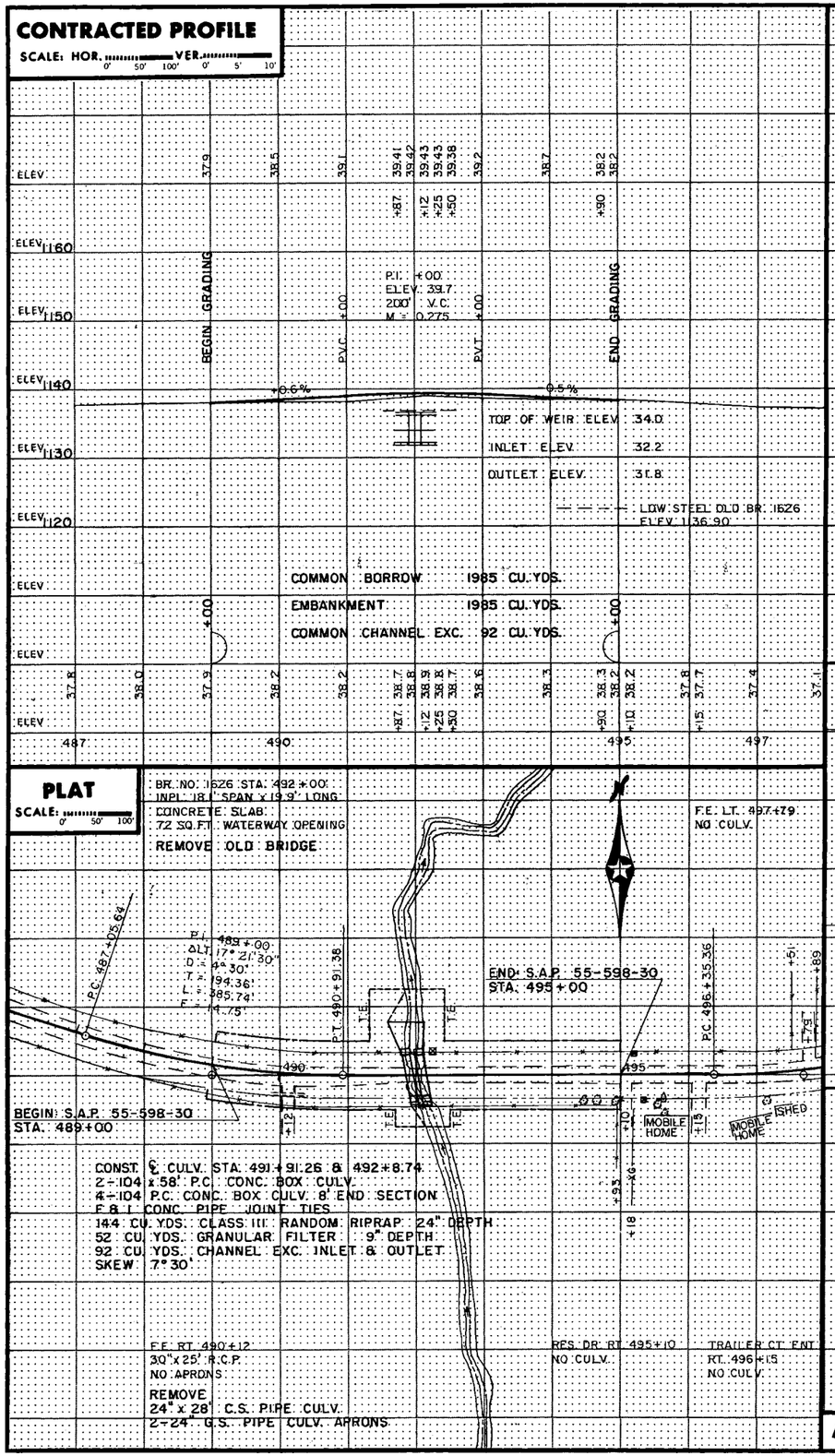


S. A. P. 55-598-30

~~State Proj. No.~~

CONTRACTED PROFILE

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

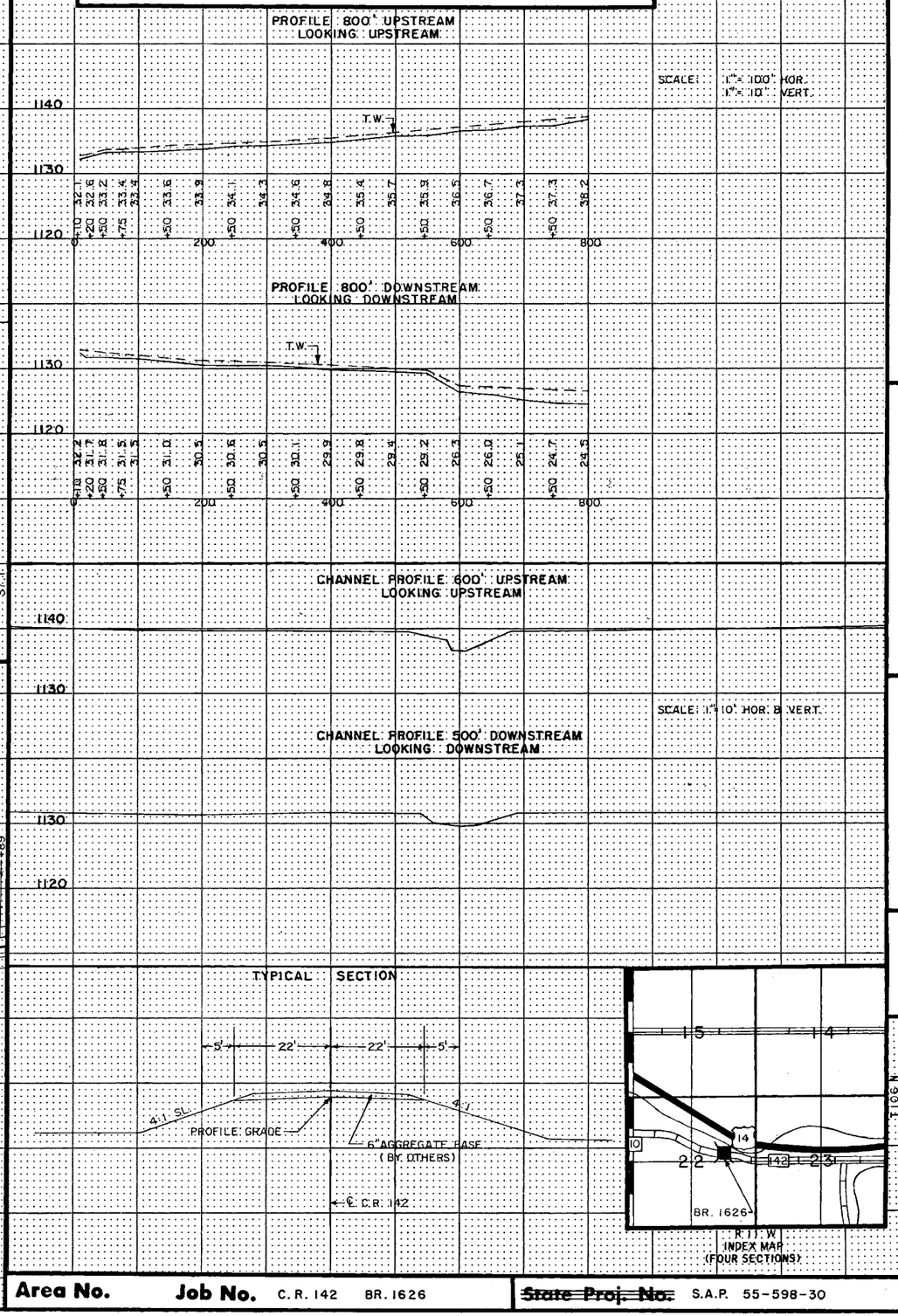


PLAT

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 1-25-84

Stream or ditch designation UNNAMED
Drainage area 0.75 SQ. MI.
Max. flood on record..... Design flood (25 yr. freq.) 420 C.F.S.
Max. observed highwater elevation UNKNOWN Design highwater elevation 1136.6
Design mean velocity through structure 5.5 F.P.S. 0.4 FT. STAGE INC.
Low superstructure at or above elevation .....
Flowline elevation 1132.0 Skew angle 7°30'
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 670 C.F.S. at stage 1138.5 and mean velocity of 8.8 F.P.S. with 1.5 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: BRIDGE SURVEY CONDUCTED BY OLMSTED COUNTY

Bench mark elevation 1138.90 (M.S.L. 1929 Adj.)
Location: X ON SE. WINGWALL BR. 1626

MINNESOTA
DEPARTMENT OF TRANSPORTATION

BRIDGE SURVEY

AT MILE POINT 5.64 ON C.R. 142 (T.H., C.S.A.H., C.R. etc.)
PROPOSED BRIDGE LOCATED 0.7 MILES E. OF JCT. C.S.A.H. 10
SEC. 22 TWP. 106 R. 11W
TOWNSHIP DOVER COUNTY OLMSTED
BRIDGE NO. 1626

Area No. | Job No. C.R. 142 BR. 1626 | ~~State Proj. No.~~ S.A.P. 55-598-30 | Sheet No. 4 of 7 Sheets

Fed. Proj. No.

RANDOM RIPRAP CL. III 24" DEPTH
GRANULAR FILTER 9" DEPTH

RANDOM RIPRAP CL. III 18" DEPTH
GRANULAR FILTER 9" DEPTH

491+32 T.E.

492+42 T.E.

TEMPORARY CONST. EASEMENT 125'

SCALE: 0 10'

P.T. 490+91.38

491+00

492+00

493+00

50'

22'

22'

50'

82°30'

+91.26

6'

+8.74

491+70 T.E.

492+50 T.E.

25'

SCALE: 0 10' 10' 0

1170
1160
1150
1140
1130
1120
1110
1100
1090
1080

℄ PROFILE
PROFILE 20' LT.
PROFILE 20' RT.

1:1 SL.

1:1 SL.

GRANULAR BEDDING

TOP OF WEIR ELEV. 34.0
INLET ELEV. 32.2
OUTLET ELEV. 31.8

38.2 491

38.7 +87

38.8 492

38.9 +12

38.8 +25

38.7 +50

38.6 493

DRAWINGS SHOWN [ ] TAKEN FROM
350 LB HAMMER
30 INCH DROP
2 INCH O.D. SAMPLER

BRIDGE SURVEY PLAN AND PROFILE

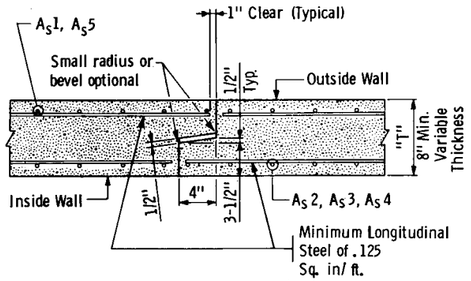
DES: DR: APPROVED:
CHK: CHK:

S.A.P. 55-598-30

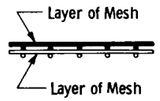
Sheet No. 5 of 7 Sheets

Bridge No. 1626

OLMSTED COUNTY C.R. 142 BR. 1626

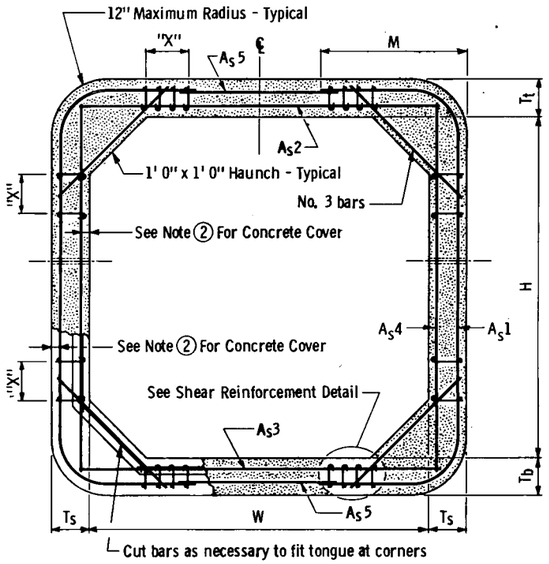


TONGUE AND GROOVE JOINT DETAIL

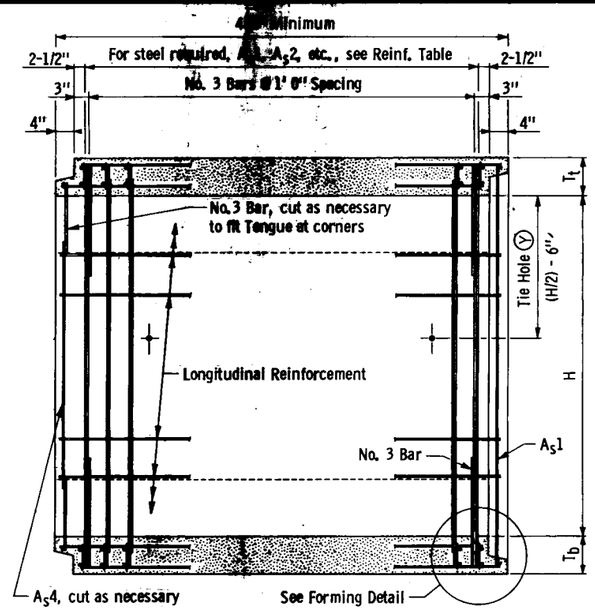


FABRIC LAYER DETAIL

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 in the Fabric Layer Detail.



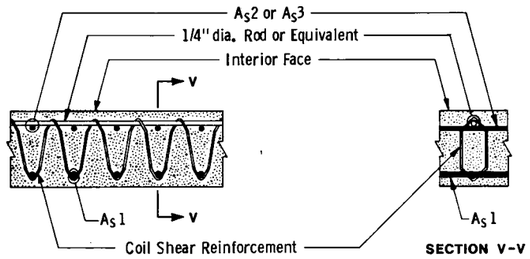
TRANSVERSE BARREL SECTION
(Bar Reinforcement Option Shown)



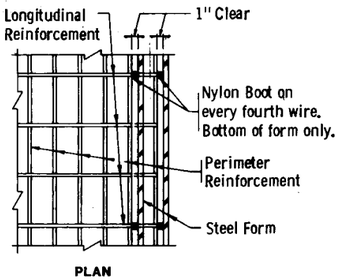
Ⓨ Culvert ties are to be 1" diameter rods. See Standard Plate No. 3145 for connection details.
All holes in the barrels are to be approved by the engineer.

LONGITUDINAL BARREL SECTION
(Bar Reinforcement Option Shown)

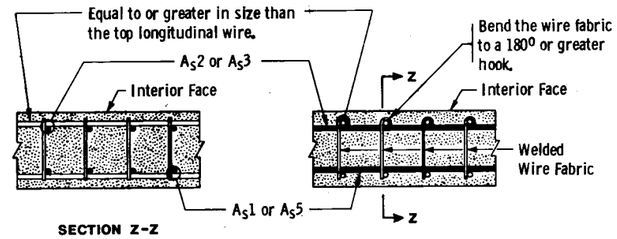
SHEAR REINFORCEMENT DETAIL
C BAR OPTION
C Bars shall have 135° Min. and 180° Max. hooks



SHEAR REINFORCEMENT DETAIL
COIL OPTION



FORMING DETAIL



SHEAR REINFORCEMENT DETAIL
J BAR OPTION

DIMENSION TABLE

Dimensions	Height of Overfill Ⓕ 2'				
"W" (in Ft.)	10				
"H" (in Ft.)	4				
T_t (in inches)	9				
T_b (in inches)	10				
T_S (in inches)	8				
"M" (in inches)	29				
Weight (lbs./Ft.)	3670				

REINFORCEMENT TABLE

Reinforcement	Height of Overfill Ⓕ 2'						2'	
	*Area	Length	*Area	Length	*Area	Length	*Area	Length
A_S1	.548	9'-4"					.506	9'-4"
A_S2	.679	10'-3"					.679	10'-3"
A_S3	.625	10'-3"					.577	10'-3"
A_S4	.192	4'-3"					.192	4'-3"
A_S5	.192	8'-0"					.192	8'-0"
	①						②	

* Square inches per lineal foot of barrel
① f_y = 60,000 psi ② f_y = 65,000 psi

SHEAR REINFORCEMENT TABLE

Ⓕ Height of Overfill	None Required — Shear Reinforcement Requirements ☆								
	Top of Culvert			Bottom of Culvert			Side of Culvert		
	**Area	Maximum Spacing	"X" (in inches)	**Area	Maximum Spacing	"X" (in inches)	**Area	Maximum Spacing	"X" (in inches)

☆ When shear reinforcement requirements are minimal, a minimum of 0.06 sq. in. per sq. ft. of shear steel shall be used.
** Square inches per linear foot of barrel per line of shear reinforcement.
"X" = Distance from end of haunch.

NOTES:

REINFORCEMENT

1. The steel fabric, shear reinforcement and reinforcement bars used shall conform to the applicable requirements of AASHTO M 259. The reinforcing shall be Grade 60.
2. 1-1/2" min. and 2" max. concrete cover on all reinforcement, including the shear reinforcement, (Typical for inside and outside walls). Except for tongue & 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.
   If (b) or (c) are used 1.5.37 (B) of the 1977 and Interim AASHTO "Standard Specifications for Highway Bridges" shall be reviewed. The reinforcement shall be developed in accordance with applicable parts of 1.5.13-.22 of the 1977 & Interim 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 & Groove.
5. The anchorage of the shear reinforcement shall be in accordance with 1.5.21 of the 1977 and Interim AASHTO "Standard Specifications for Highway Bridges".
6. The max. shear reinforcement spacing in the longitudinal direction shall be 6 inches.
7. The transverse steel areas in each face shall be a minimum of 0.192 sq. in. per linear feet of barrel.
8. The steel fabric shall have a minimum lap of the spacing of the cross wires plus 2".
9. The max. size of reinforcement bars shall be No. 6. The max. mesh size shall be 1/2" dia. (1 or 2 layers).
10. 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.
11. Welding will not be allowed on reinforcement bars or steel fabric, except that the original welding required to manufacture wire fabric is acceptable.
12. When reinf. bars are used, service stress must be checked according to AASHTO 1.5.39
13. When reinforcement bars are cut, additional reinforcement shall be added on both sides of the cut member to replace or exceed the steel area removed.

BASIS OF DESIGN

A. The design shall be in accordance with applicable 1977 & Interim AASHTO Specs. & the following criteria.
B. Ultimate strength design shall be according to 1977 & Interim AASHTO "Standard Specifications for Highway Bridges" using $U=1.3\ [B_DD+B_L(L+I)+B_EE_V+B_EE_L]$ where B_D = 1.0, B_E = 1.0, B_L = 1.67, E_V = vertical earth load and E_L = lateral earth pressure. Lateral pressure coefficients shall range from. .16 to 1.0.
C. Live Load is based on HS20 or Military Loading with impact and distribution in accordance with 1977 & interim AASHTO "Standard Specifications for Highway Bridges".
D. Yield design strength of reinforcement is limited to 60,000 psi. Service stresses are checked according to 1.5.37 (B) of the 1977 and Interim AASHTO "Standard Specifications for Highway Bridges". — See Reinforcement Table
E. Concrete shall be mix No. 3w46 with no calcium chloride allowed.
F. Minimum overfill shall be two (2) feet.

TOLERANCES

See AASHTO M 259, except for concrete cover over reinforcement.
Barrel sections which are cast with a draft in the forms shall be laid with the narrowest part of the section downstream.

Fed. Proj. No.

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. .....

_____ HIGHWAY NO.
MINNESOTA
DEPARTMENT OF TRANSPORTATION

Bridge No.

IDENTIFICATION NO. 113

PRECAST CONCRETE BOX CULVERT

SEC. 22 T 106 N R 11 W
DOVER TOWNSHIP OLMSTED COUNTY
APPROVED:

BRIDGE ENGINEER DIRECTOR, ENGINEERING SERVICES

DES.	DR.	
CHK.	CHK.	

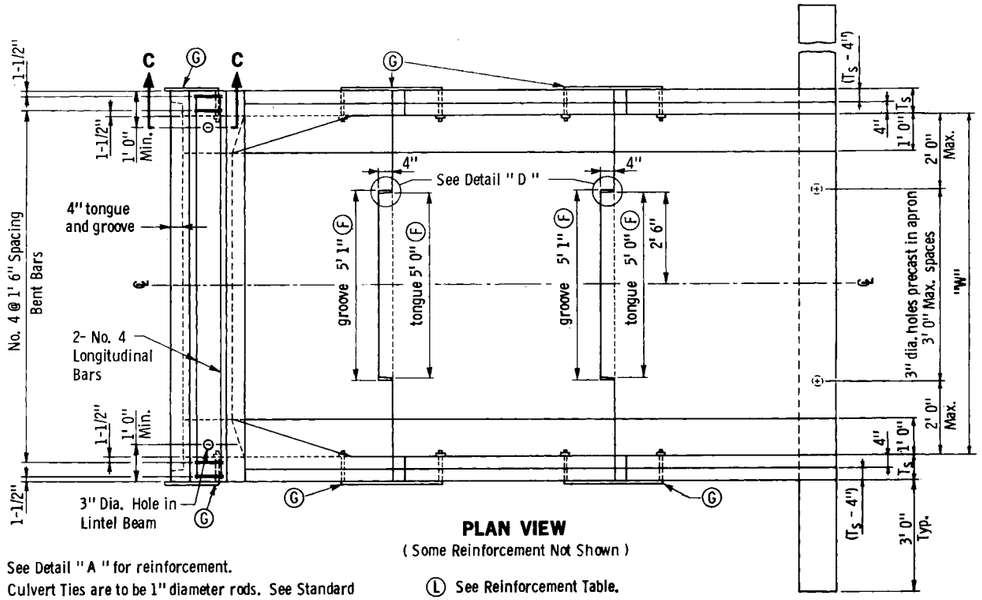
FIG. 5-397.701
Approved: April 26, 1982

BARREL DETAILS

~~State Proj. No.~~ S.A.P. 55-598-30

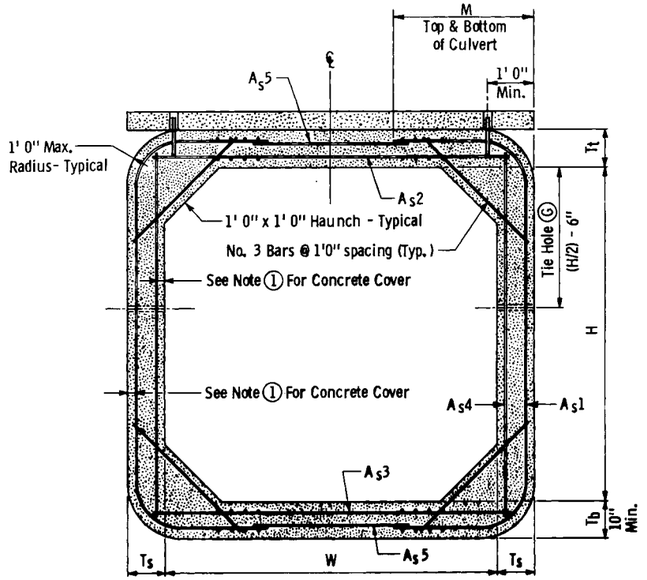
Sheet No. 6 of 7 Sheets

Fed. Proj. No.



PLAN VIEW
(Some Reinforcement Not Shown)

Ⓛ See Reinforcement Table.

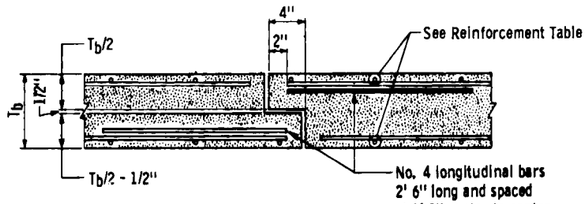


SECTION Y-Y

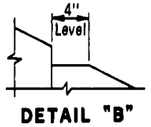
NOTES:

1. See " Precast Concrete Box Culvert " Standard Sheet No. 5-397.701, for design and reinforcement requirements. Except as noted.
2. 1-1/2" minimum and 2" maximum concrete cover on all reinforcement, including the shear reinforcement. (Typical for inside and outside walls.)
3. Concrete shall be mix No. 3W46 with no calcium chloride allowed, except as noted.
4. Dropwall shall be Concrete Mix No. 1A43 or 3Y43.

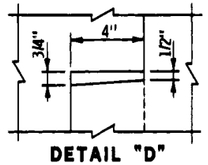
Ⓕ See Detail " A " for reinforcement.
Ⓖ Culvert Ties are to be 1" diameter rods. See Standard Plate No. 3145 for connection details.
Ⓗ 2' 4" for the Tongue End (includes the 4" tongue).
Ⓙ Grout shall consist of 1 part cement and 2 parts sand. Use Type 1A air entrained Portland Cement. Grout mix. shall have a maximum slump of 4".
Ⓚ 1" diameter by 1' 0" long steel dowel. 2" diameter hole in the top of the wingwall. Fill hole to top of Lintel Beam with an approved grout.



DETAIL "A"

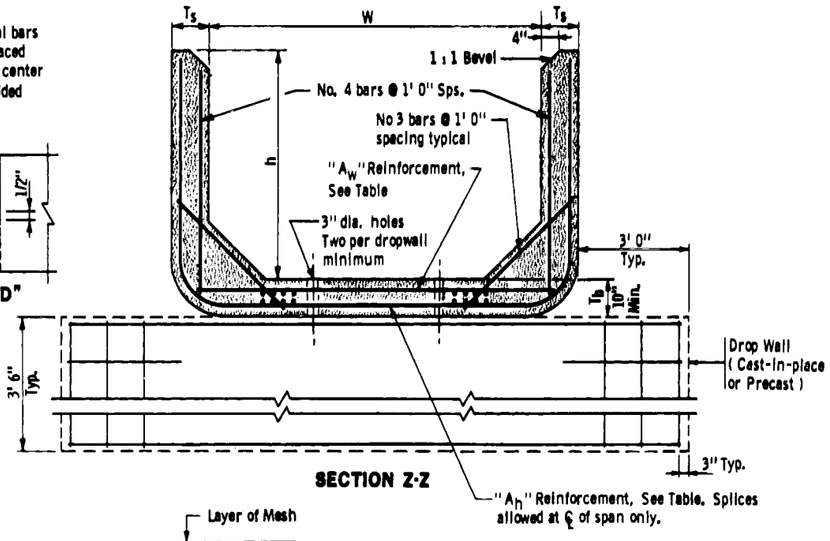


DETAIL "B"

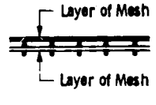


DETAIL "D"

SIDE ELEVATION



SECTION Z-Z



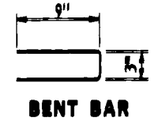
FABRIC LAYER DETAIL

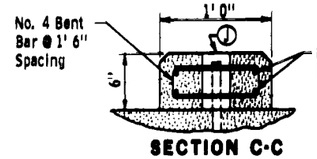
When more than one layer of steel fabric is used to obtain the required reinforcement areas, the wire of the steel fabric shall be placed as shown in the Fabric Layer Detail.

REINFORCEMENT TABLE			
WIDTH W	"Aw" (Interior)	HEIGHT h	"Ah" (Exterior)
8 ft. or less	No. 4 @ 1' 0"	8 ft. or less	No. 4 @ 1' 0"
10 ft.	No. 4 @ 1' 0"	10 ft.	No. 5 @ 1' 0"
12 ft.	No. 4 @ 9"	12 ft.	No. 6 @ 1' 0"
14 ft.	No. 4 @ 7-1/2"	14 ft.	No. 7 @ 1' 0"
16 ft.	No. 5 @ 8"	16 ft.	No. 7 @ 9"

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

WEIGHT CHART	
Section	Weight
1	20,240 Lbs.
2	— Lbs.
3	— Lbs.





SECTION C-C

TABLE OF DIMENSIONS FOR SLOPED END SECTIONS															
Size H=	Size W=	L	M	S	X	Y	Z	Tt	Tb	Ts	As1	As2	As3	As4	As5	
4'	10'	8'	29"	2	—	—	1' 9"	9"	10"	8"	.548	.679	.625	.192	.192	(1)
											.506	.679	.577	.192	.192	(2)

(1) f_y = 60,000 psi , (2) f_y = 65,000 psi

FIG. 5-397.702
Revised: Dec. 2, 1982 Approved: April 26, 1982

PRECAST CONCRETE END SECTIONS
TYPE I - SINGLE OR MULTI-BARREL
FOR SKEWS UP TO 7-1/2°

DES: DR: APPROVED:
CHK: CHK:

Sheet No. 7 of 7 Sheets

~~Bridge No.~~
S.A.P. 55-598-30

B.S.S.P.