MARYLAND TRANSPORTATION AUTHORITY

HB 2396-000-007

THOMAS J. HATEM MEMORIAL BRIDGE
US 40 OVER THE SUSQUEHANNA RIVER

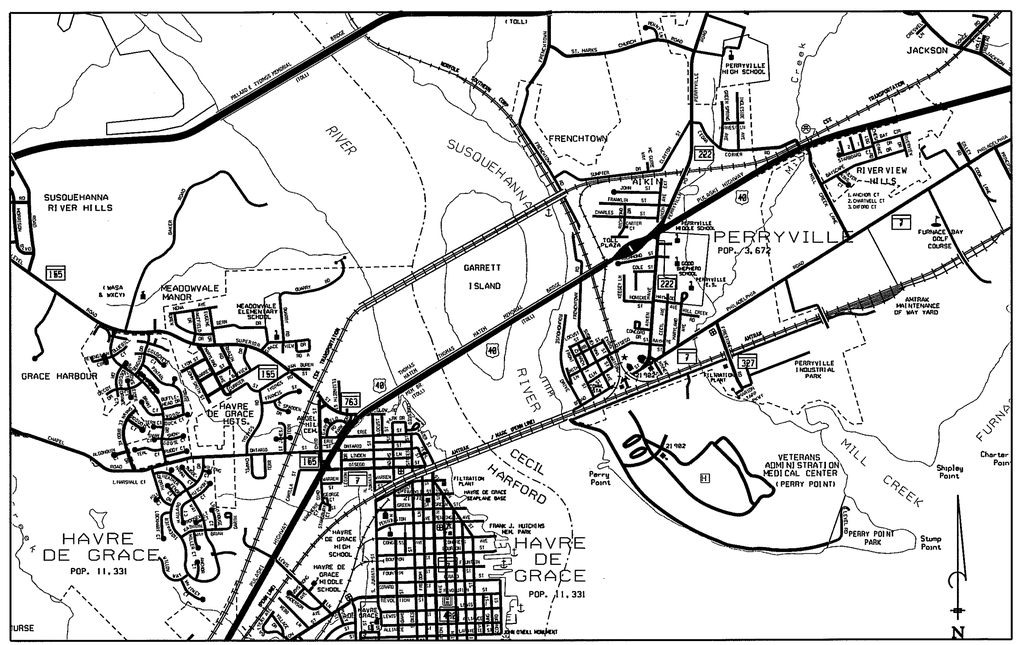
CLEANING AND PAINTING AT HATEM BRIDGE

HARFORD AND CECIL COUNTIES

CONTRACT NO. HB 2396-000-007

FOR THE CONVENIENCE AND INFORMATION OF BIDDERS, PRINTS OF PLANS OF THE PERTINENT EXISTING STRUCTURE ARE INCLUDED WITH THIS CONTRACT. NO RESPONSIBILITY FOR THEIR ACCURACY OR COMPLETENESS IS ASSUMED BY THE MARYLAND TRANSPORTATION AUTHORITY. DIMENSIONS, DETAILS, ETC. SHOWN MAY NOT BE AS BUILT.

INCLUDED FOR YOUR USE ARE SHEET NOS. 1-37 OF 37 OF CONTRACT H 232-4-437, AND SHEET NOS. 1-18 OF 18 OF TFA 2-1250-20.



LOCATION MAP
SCALE: 1"=2000'

SPECIFICATIONS

The Specifications for all work on this project shall be State Highway Administration's Standard Specifications entitled "Standard Specifications for Construction And Materials," dated July 2008, and all additions and/or revisions thereto; and other Specifications in the Special Provisions.

STANDARDS

Standards for this contract will be those of the State Highway Administration. It will be the responsibility of the Contractor that the Standards in his possession are the latest S.H.A. Standards as of the date of advertisement.

EROSION AND SEDIMENT CONTROL

Erosion and Sediment control measures shall be applied to all erodible materials exposed by any activity on the project. Erosion and sediment control measures shall be coordinated with the construction at permanent drainage facilities such as pipes, culverts, headwalls, ditch paving, flumes, etc. which shall be constructed prior to or as soon as practicable after the grading operation is begun. The Contractor shall also comply with all provisions of Section 308 of the Specifications.

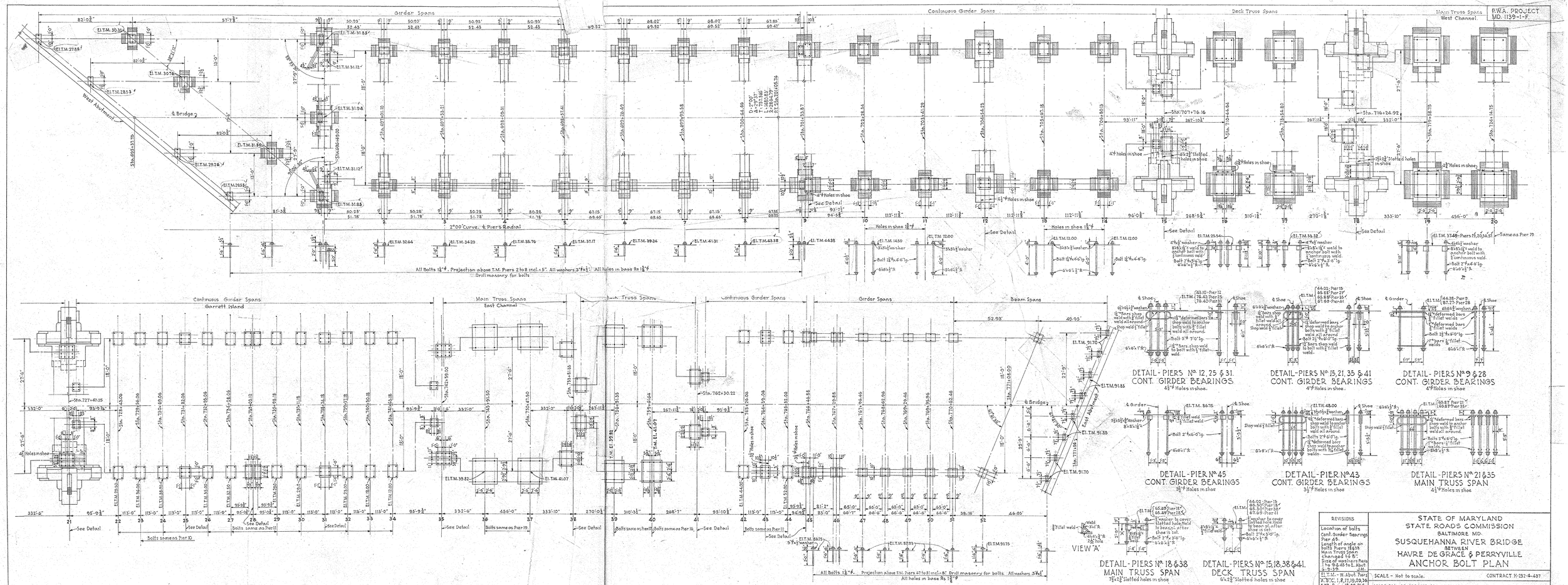
EROSION AND SEDIMENT CONTROL CERTIFICATION

"We hereby certify that any clearing, grading, construction and/or development will be done pursuant to this plan and that any responsible personnel involved in the construction project will have a certificate of attendance at a Maryland Department of the Environment approved training program for the control of sediment and erosion before beginning this project."

MARYLAND TRANSPORTATION AUTHORITY		
	RECOMMENDED FOR APPROVAL DIRECTOR, ENGINEERING DIVISION	10/4/10 DATE
	APPROVED CHIEF ENGINEER, OFFICE OF ENGINEERING AND CONSTRUCTION	10/7/10 DATE
	APPROVED Randolph P. Brown, for EXECUTIVE SECRETARY	10/25/10 DATE

SHEET 1 OF 1

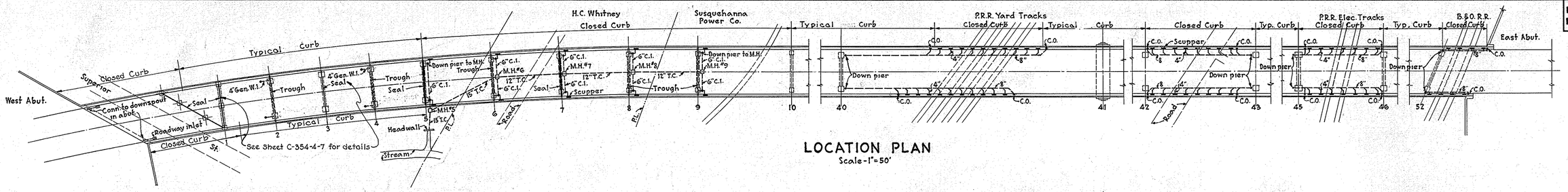
P.W.A. PROJECT MD. 1159-1-F.



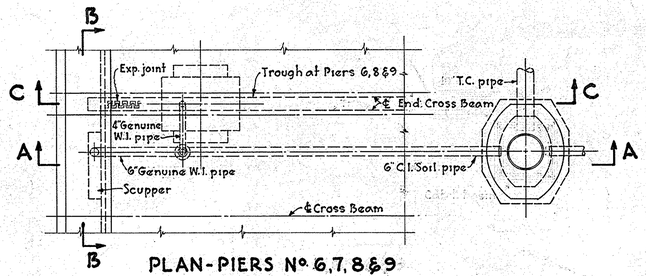
Note:
Measure all dimensions shown in horizontal plane.
Anchor bolts to be set before concrete is poured unless otherwise noted.
All material Carbon Steel - Structural Grade.

REVISIONS	
Location of bolts Cont. Girder Bearings Pier 45. Length of angle on bolts Piers 18 & 38 Main Truss Span changed to 8". Size of washers Pier 1 to 9 & 45 to E. Abut. 6-2-39. J.M.	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE ANCHOR BOLT PLAN
E.T.M. - W. Abut. Piers A, B, C, 1, 2, 17, 19, 20, 36 & 37. Piers 18, 38, 39 & 35 Main Span bearings. 7-19-39. J.M.	SCALE - Not to scale. CONTRACT H-232-4-437
	MADE BY - J.E. GREINER CO. J.M. TRACED BY - CHECKED BY - W. Date - 5-5-1939
	SHEET 37-A

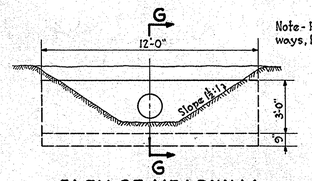
P.W.A. PROJECT
MD. 1139-1-F



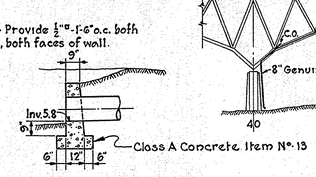
LOCATION PLAN
Scale - 1" = 50'



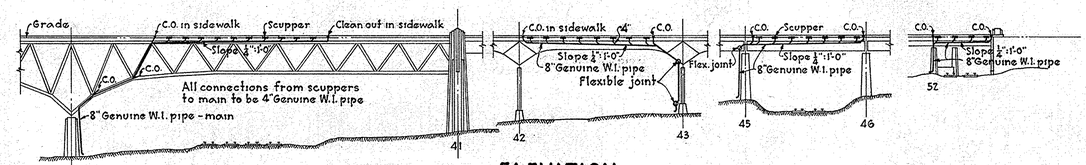
PLAN - PIERS No. 6, 7, 8 & 9
Scale - 1/4" = 1'-0"



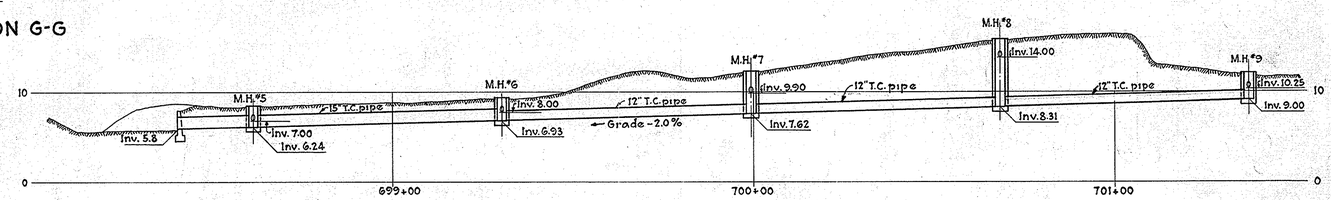
ELEV. OF HEADWALL



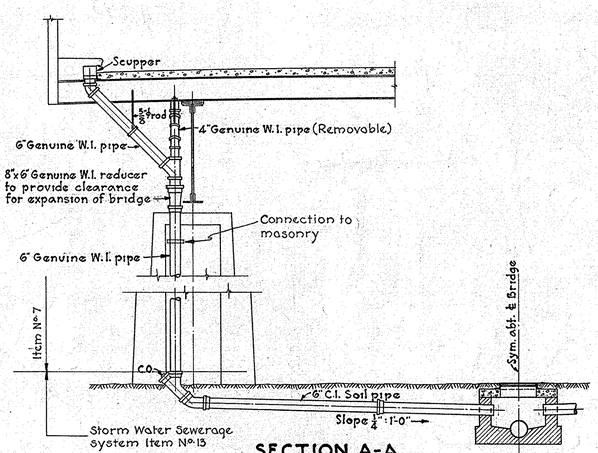
SECTION G-G



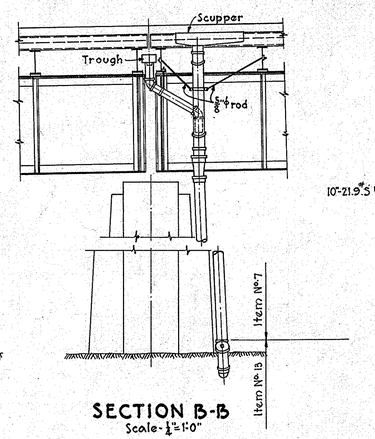
ELEVATION
Scale - 1" = 50'



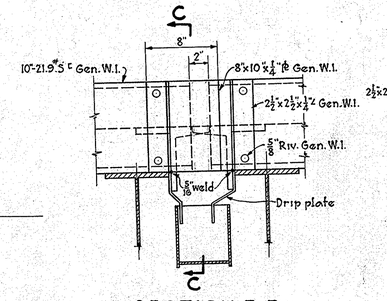
PROFILE OF STORM SEWER - PIER No. 9 TO PIER No. 5
Scale - Vert. 1" = 8'
Hor. 1" = 20'



SECTION A-A
Scale - 1/4" = 1'-0"

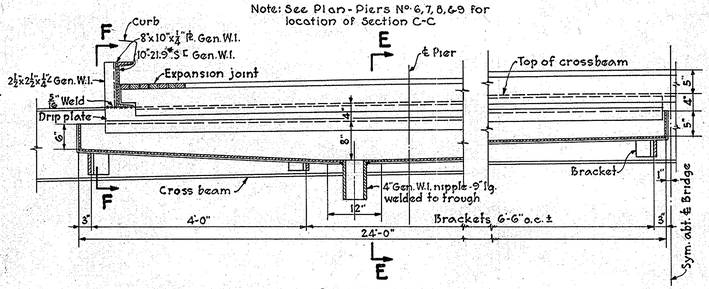


SECTION B-B
Scale - 1/4" = 1'-0"

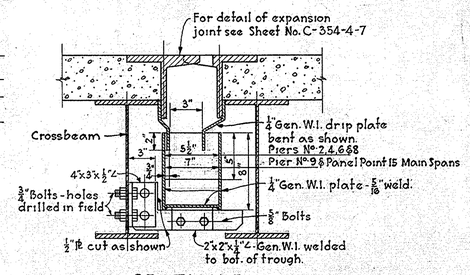


SECTION F-F
Scale - 1½" = 1'-0"

Note: See Plan - Piers No. 6, 7, 8, & 9 for location of Section C-C

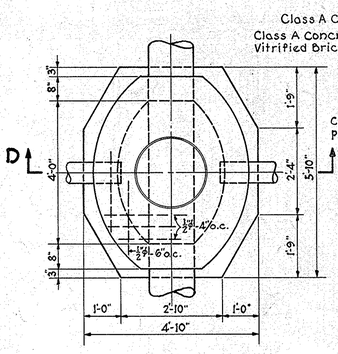


SECTION C-C
Scale - 3/4" = 1'-0"

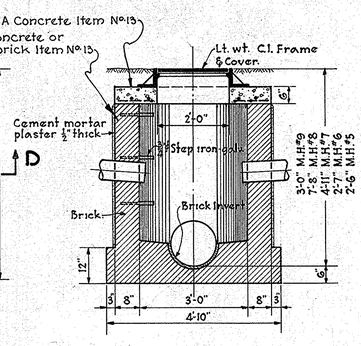


SECTION E-E
Scale - 1½" = 1'-0"

Notes: Vitrified Clay Pipe - See S.R.C. Specs.
Caulked Lead Joints for 6" C.I. Soil Pipe.
All Genuine W.I. Pipe to be standard weight.



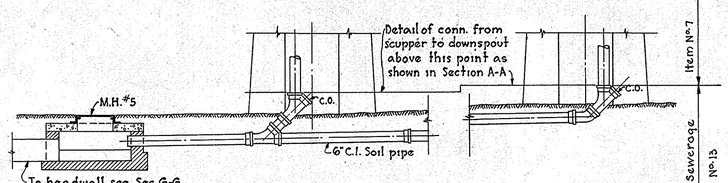
PLAN



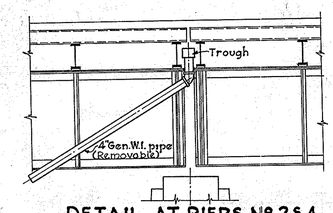
SECTION D-D

Item No. 13

DETAILS - M.H. #5, 6, 7, 8 & 9
Scale - 1/2" = 1'-0"



DETAIL AT PIER No. 5
Scale - 1/4" = 1'-0"



DETAIL AT PIERS No. 2 & 4
Scale - 1/4" = 1'-0"

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
DRAINAGE DETAILS

SCALE - AS NOTED. CONTRACT H-232-4-437

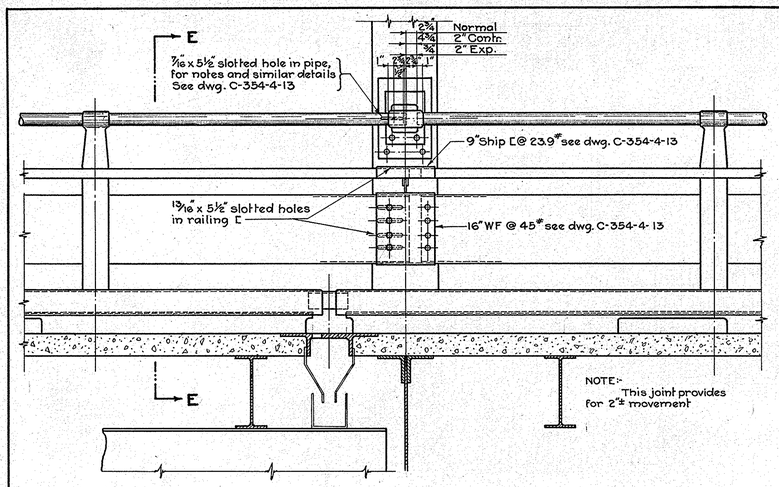
MADE BY J.E. GREINER CO. J.M.
TRACED BY J.M.
CHECKED BY H.
APPROVED
BRIDGE ENGINEER
APRIL 11, 1939

APPROVED
CHIEF ENGINEER
4/11/39

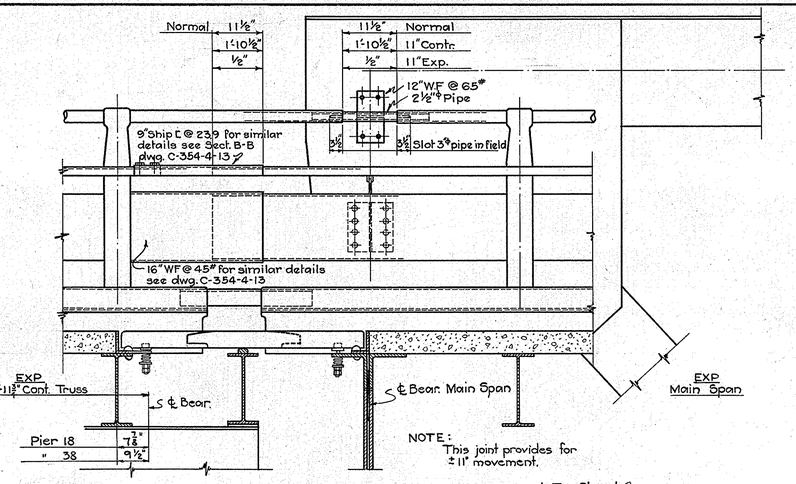
SHEET No. 36 OF 37
C-354-4-36

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

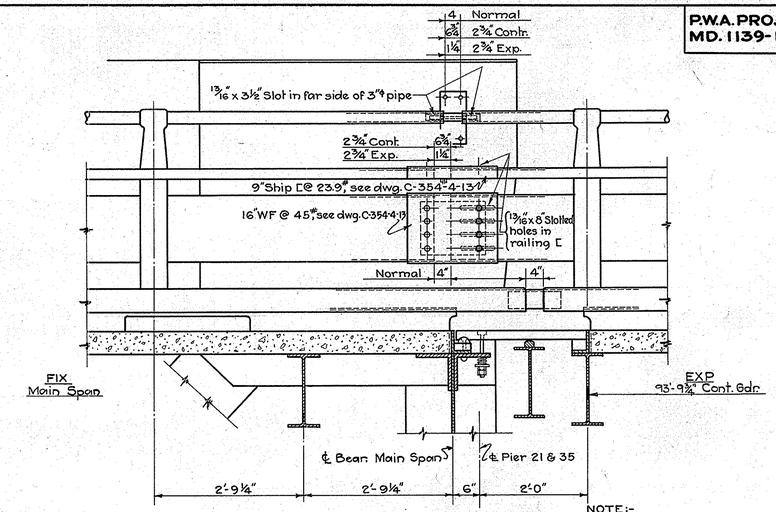
P.W.A. PROJECT
MD. 1139-1-F



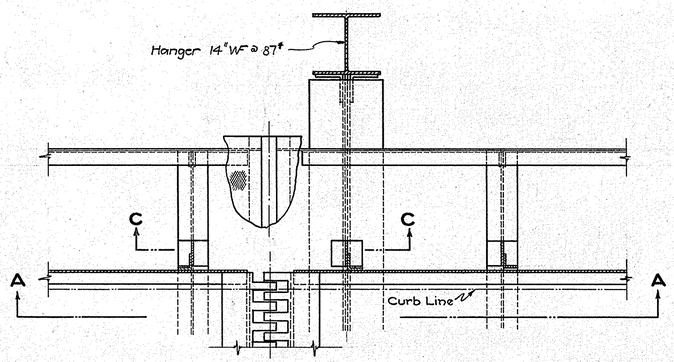
ELEVATION A-A
Scale:- ¾"=1'-0"



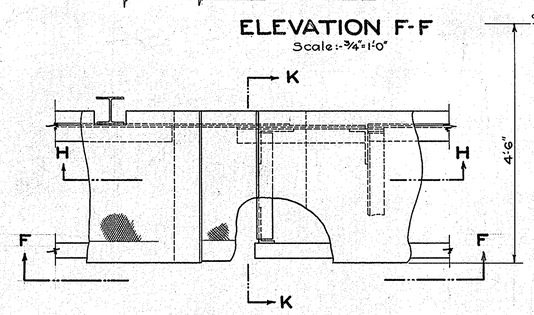
ELEVATION F-F
Scale:- ¾"=1'-0"



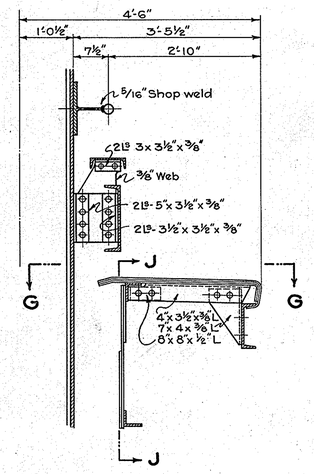
ELEVATION
Scale:- ¾"=1'-0"



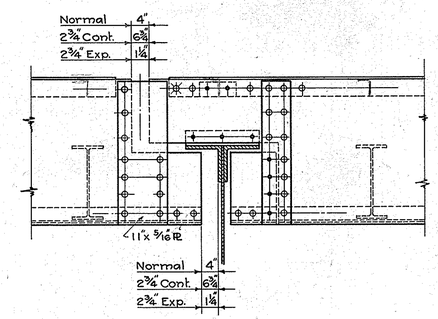
SECTION B-B
Scale:- ¾"=1'-0"



SECTION G-G
Scale:- ¾"=1'-0"

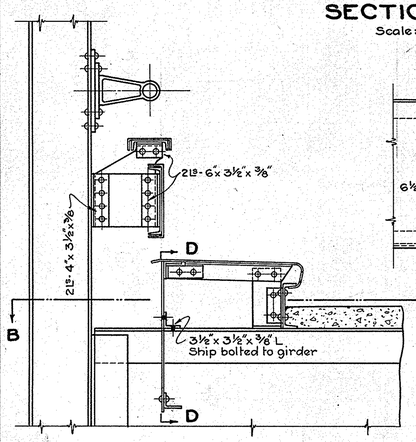


SECTION K-K
Scale:- ¾"=1'-0"

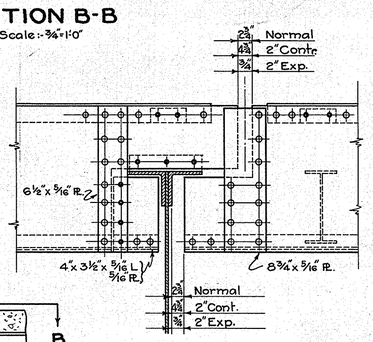


SECTION
Scale:- ¾"=1'-0"

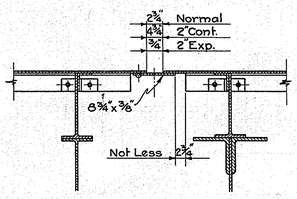
PIERS 21 & 35



SECTION E-E
Scale:- ¾"=1'-0"

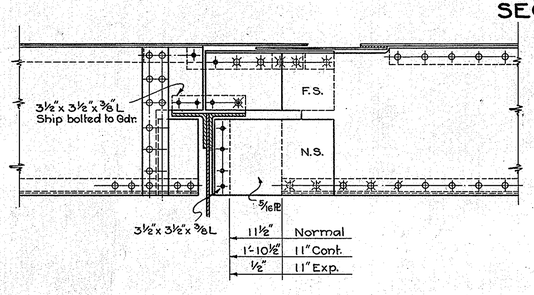


SECTION D-D
Scale:- ¾"=1'-0"



SECTION C-C
Scale:- ¾"=1'-0"

PANEL POINT 15



SECTION J-J
Scale:- ¾"=1'-0"

PIER 18
(Pier 38 similar)

NOTES:
See Sheet C-354-4-1 for General Notes.
" " C-354-4-7 " Details of Sdwlk. Handrail.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
MAIN SPANS-SDWK. & RAILING EXP. DETAILS

SCALE :- ¾"=1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO. M.C.C. APPROVED
TRACED BY " " " J.M.R.
CHECKED BY " " " H.C.
APPROVED 4/11/39
CHIEF ENGINEER
BRIDGE ENGINEER

APRIL 11, 1939

SHEET No. 35 OF 37
C-354-4-35

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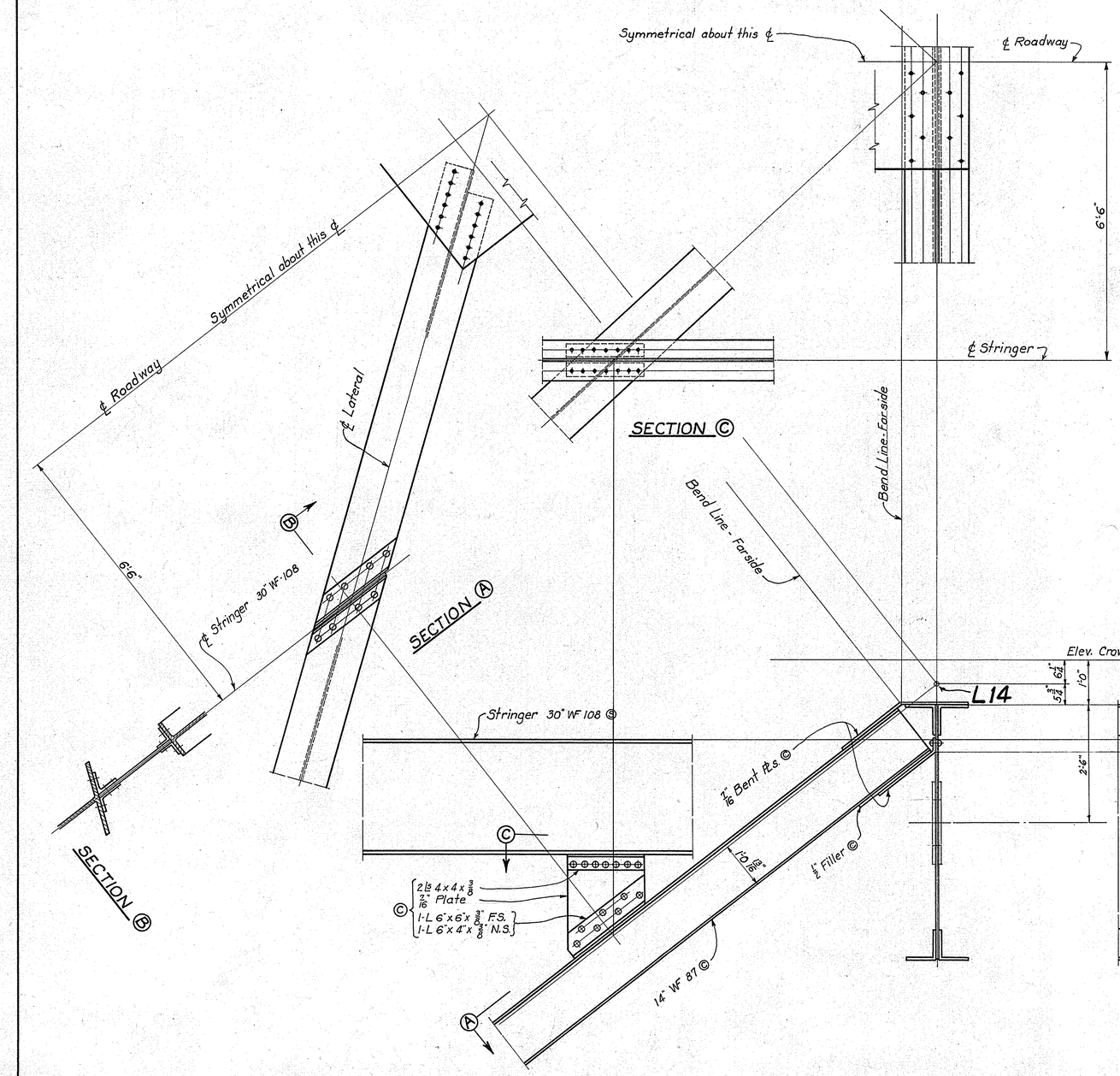
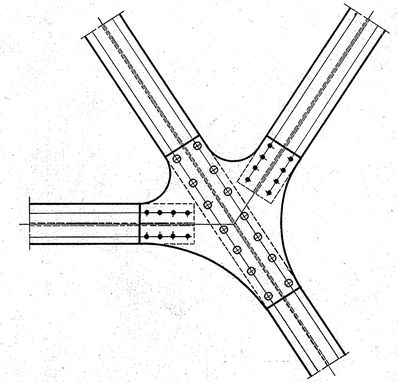
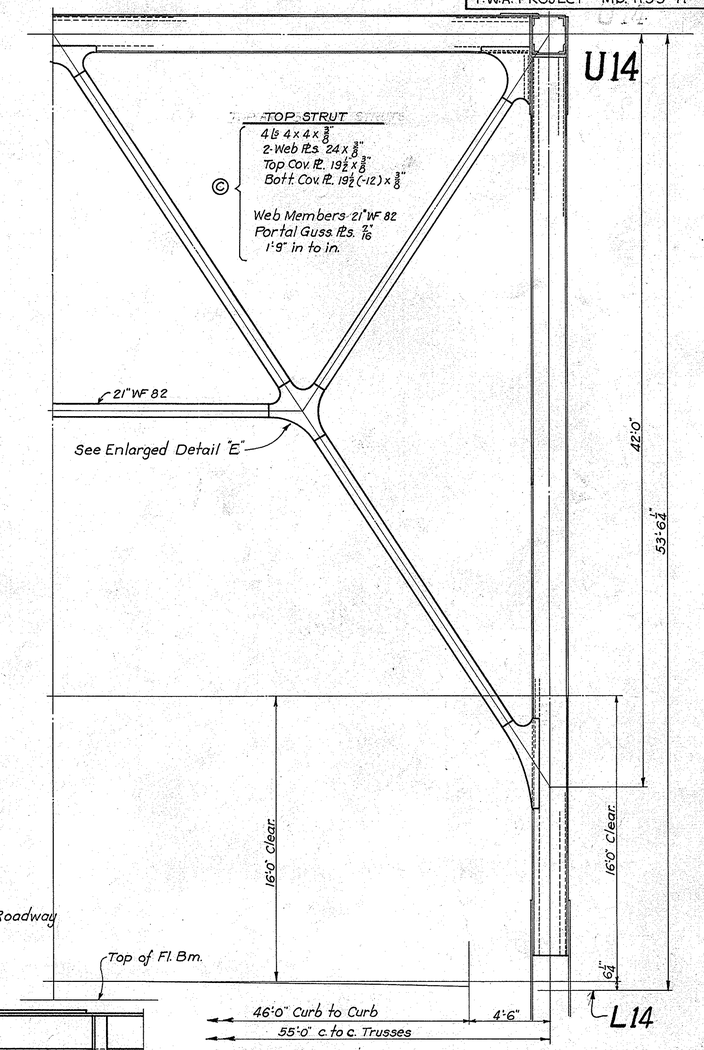
K & E CO., N.Y.





ENLARGED DETAIL "E"



HALF CROSS SECTION AT PANEL POINT 14

ALL MATERIAL SAME AS FOR PANEL POINT 12.

FLOOR BEAM

Ⓢ 4 Ls 8" x 8" x 5/8"
Web Pl. 66" x 3/8"
Stiff Ls at Stringer Points 5" x 3 1/2" x 7/16"
Ⓒ Int. Stiff Ls 5" x 3 1/2" x 3/8"
All Stiff Ls on Fills.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS
① Provisions for utility conduits removed 5/16/39 E.A.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - SPECIAL BRACING DETAILS

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
TRACED BY J.E. GREINER CO.
CHECKED BY J.E. GREINER CO.
APPROVED BRIDGE ENGINEER
APPROVED CHIEF ENGINEER 4/11/39

APRIL 11, 1939

SHEET NO. 34 OF 37
C-354-4-34

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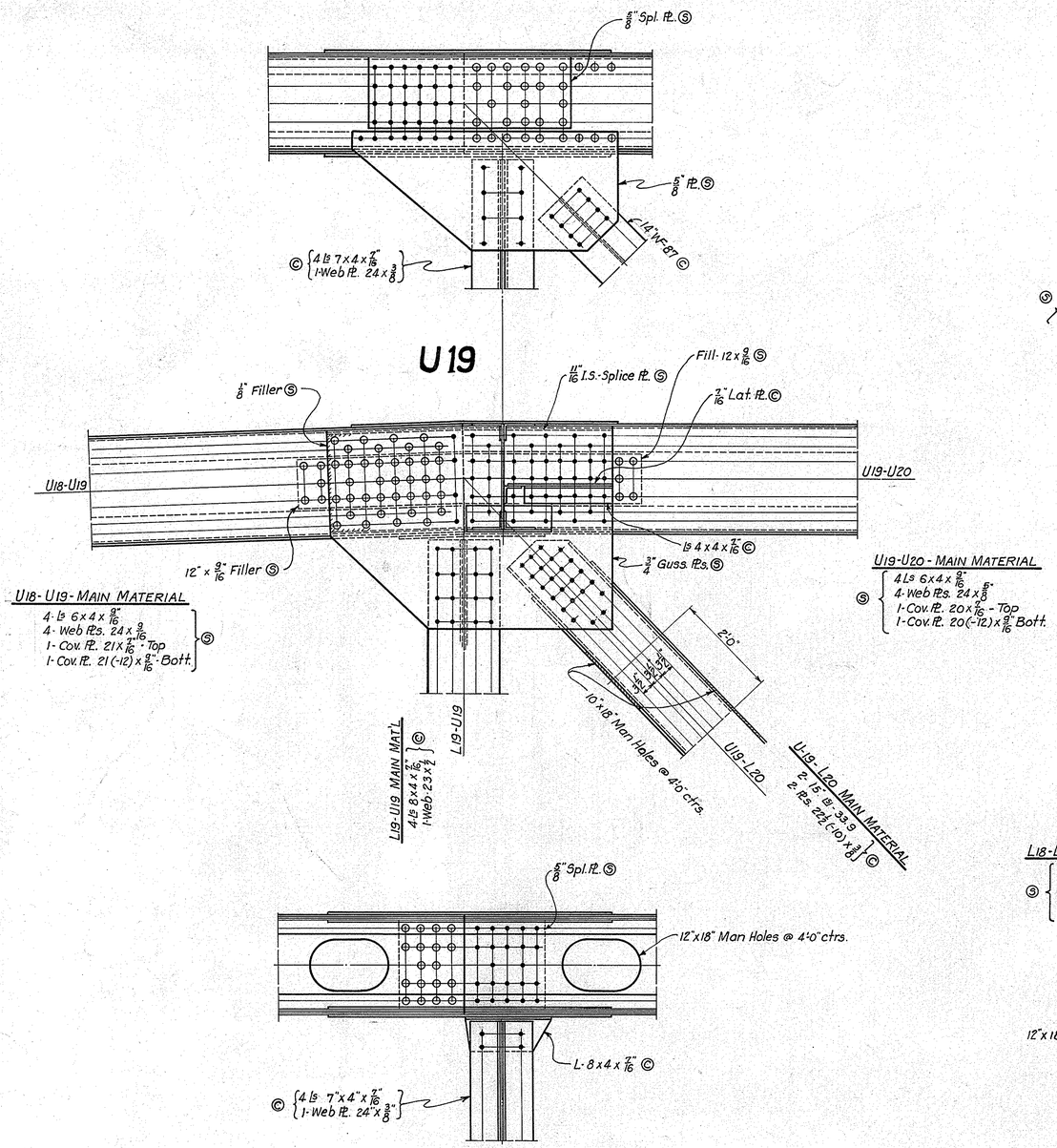
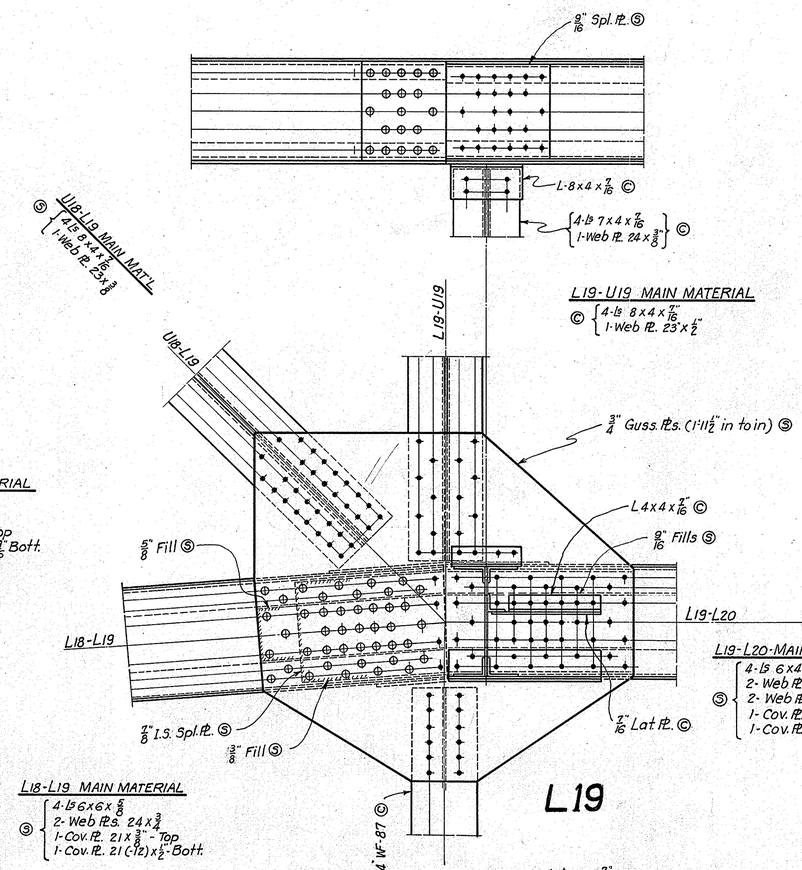
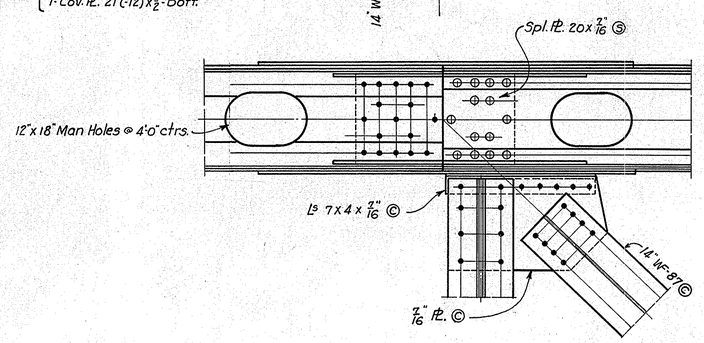
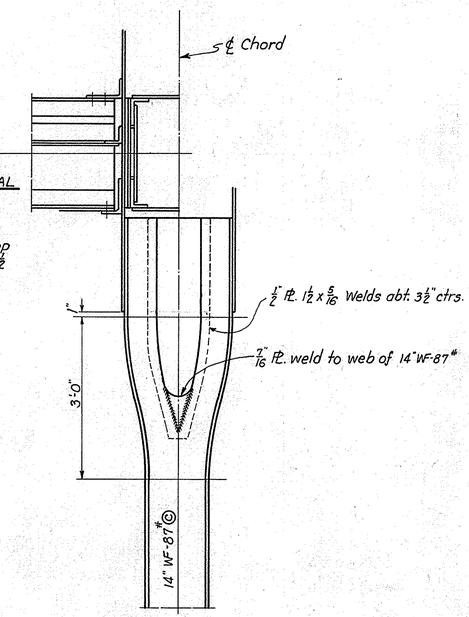
P.W.A. PROJECT
MD. 1139-1-F









J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT DETAILS U19 & L19

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J. E. GREINER CO.
TRACED BY J. E. GREINER CO.
CHECKED BY J. E. GREINER CO.
APPROVED BRIDGE ENGINEER
APRIL 11, 1939

APPROVED CHIEF ENGINEER
4/11/39

SHEET No. 33 OF 37
C-354-4-33

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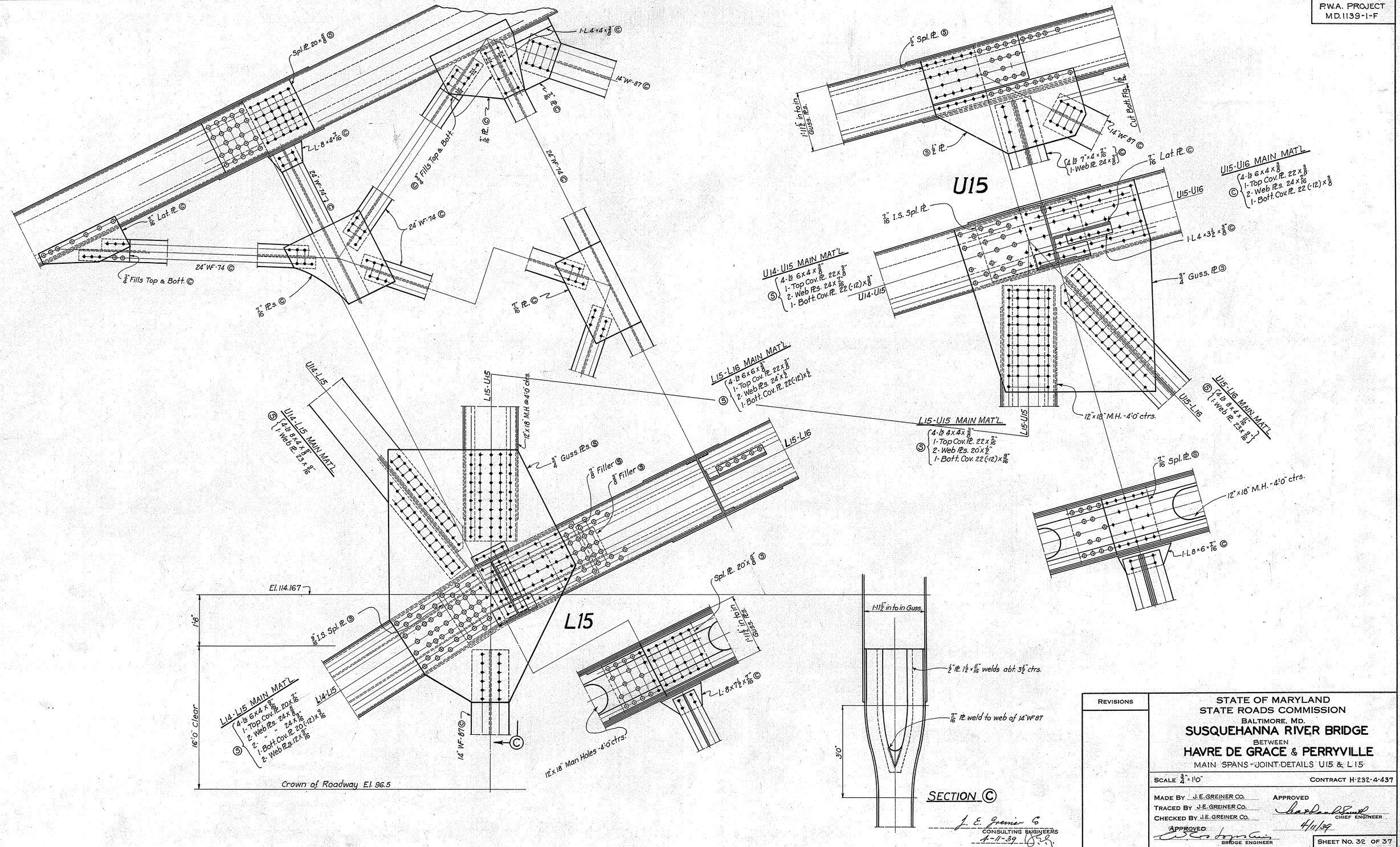
P.W.A. PROJECT
MD.1139-1-F



REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT DETAILS U15 & L15

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
TRACED BY J.E. GREINER CO.
CHECKED BY J.E. GREINER CO.
APPROVED J. E. Greiner Co. CONSULTING ENGINEERS 4-11-39

APPROVED CHIEF ENGINEER 4/11/39
BRIDGE ENGINEER

APRIL 11, 1939

SHEET No. 32 OF 37
C-354-4-32

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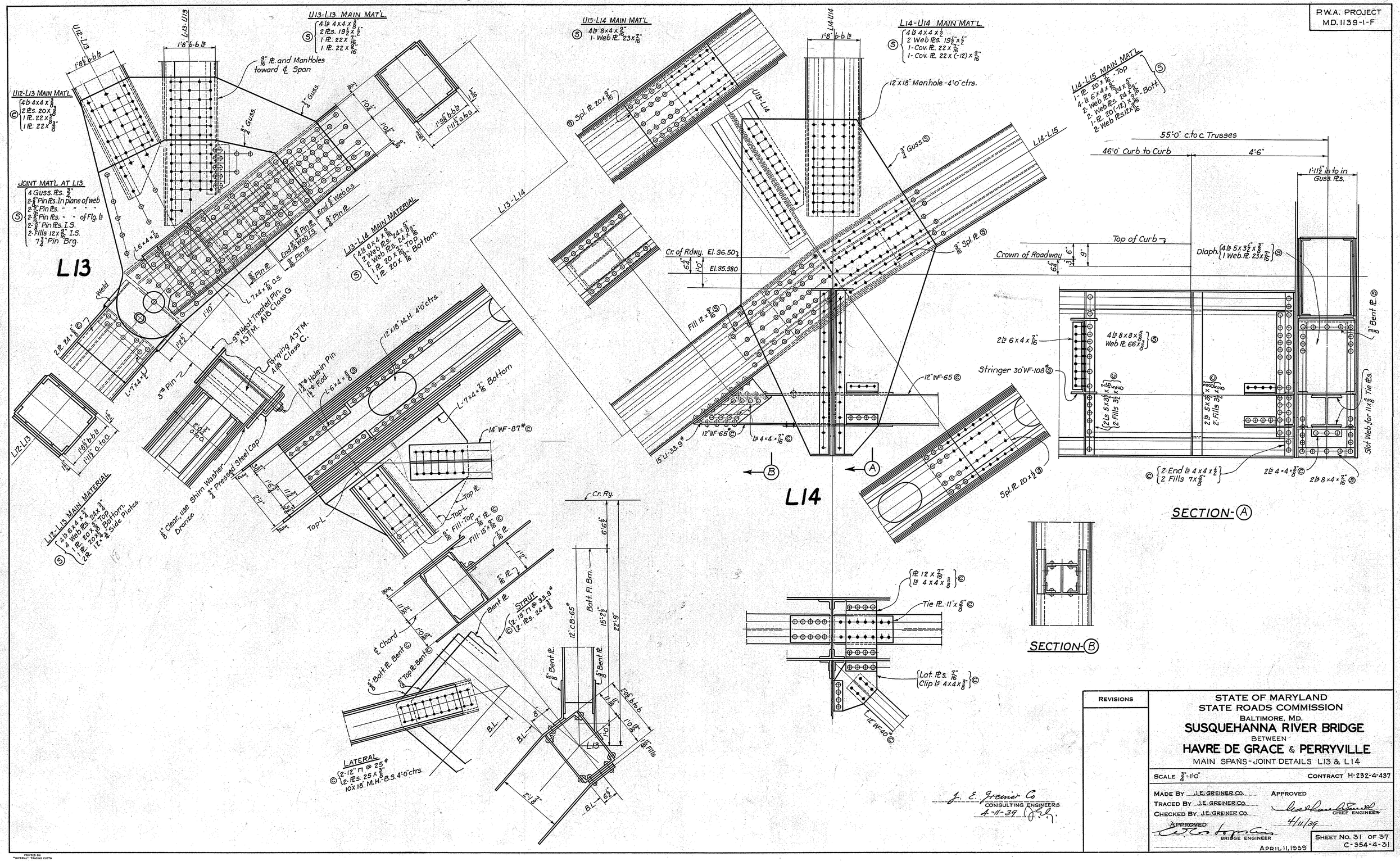
K & E CO. N.Y.

P.W.A. PROJECT
MD. 1139-1-F



J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT DETAILS L13 & L14

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
TRACED BY J.E. GREINER CO.
CHECKED BY J.E. GREINER CO.
APPROVED BRIDGE ENGINEER
APPROVED CHIEF ENGINEER 4/11/39
APRIL 11, 1939

SHEET NO. 31 OF 37
C-354-4-31

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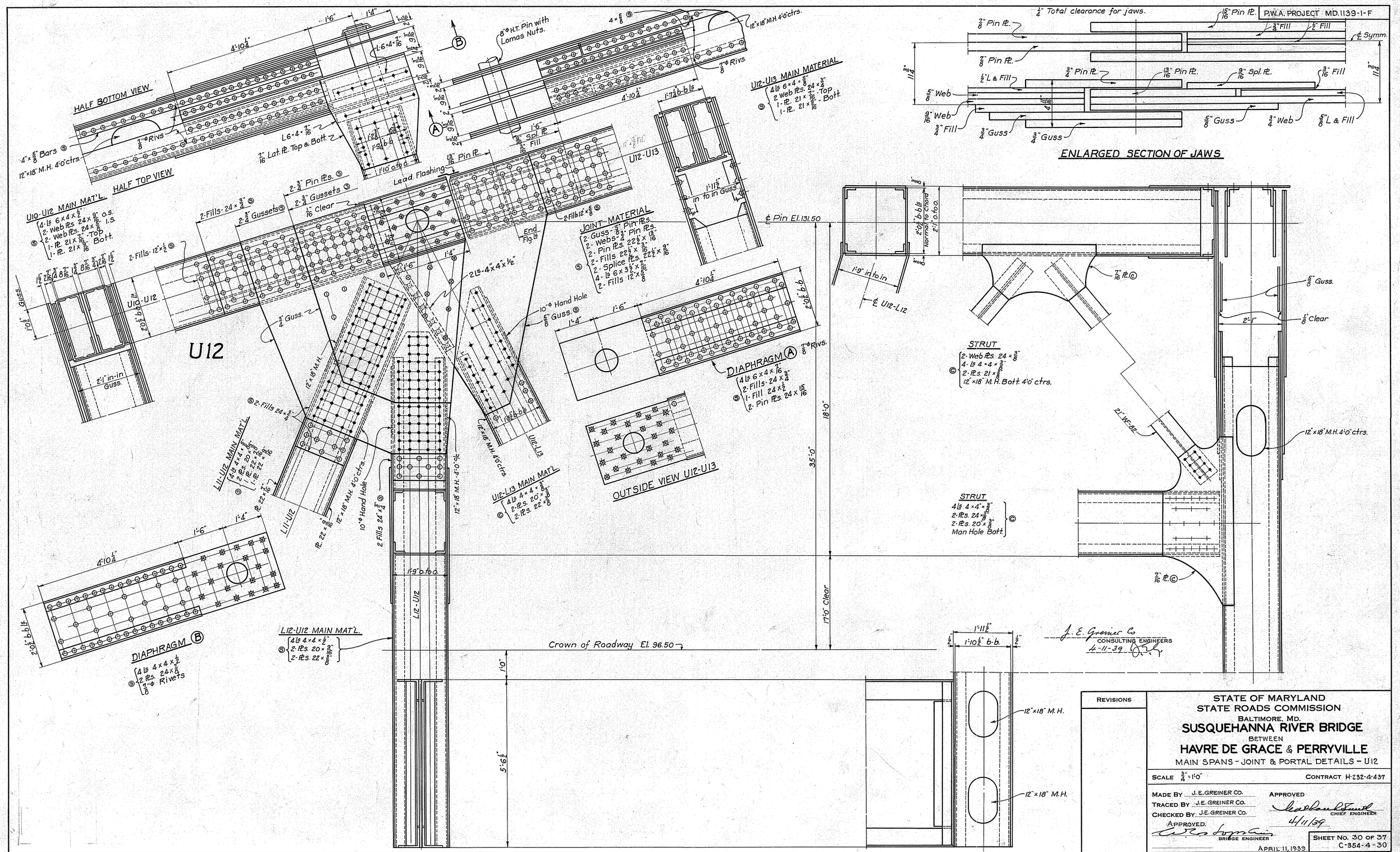
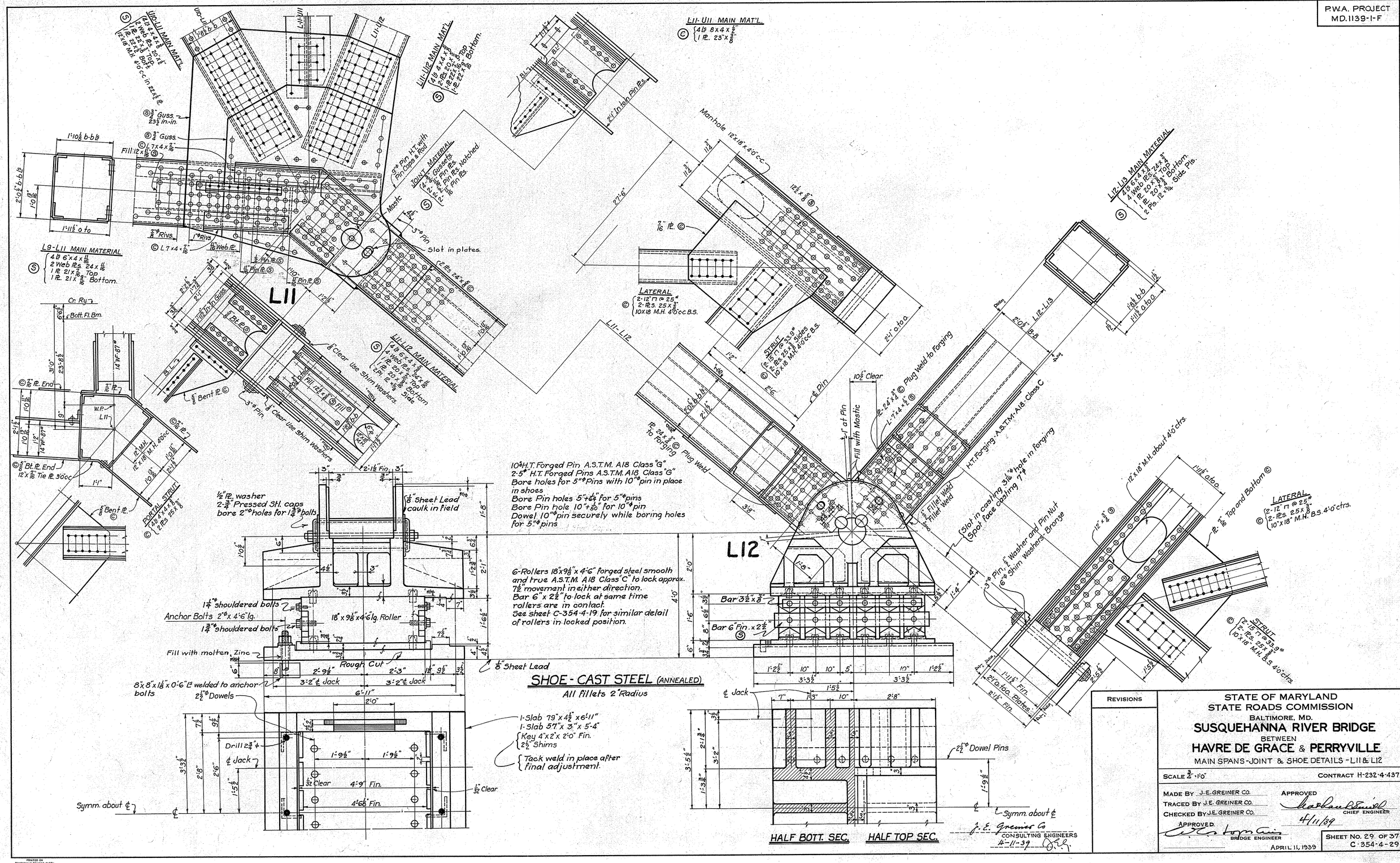

P.W.A. PROJECT MD.1139-1-F
HALF BOTTOM VIEW
HALF TOP VIEW
U10-U12 MAIN MAT'L.
U12-U13 MAIN MATERIAL
JOINT MATERIAL
DIAPHRAGM (A)
OUTSIDE VIEW U12-U13
U12-L13 MAIN MAT'L.
L11-U12 MAIN MAT'L.
DIAPHRAGM (B)
L12-U12 MAIN MAT'L.
U12
U12-L12
U12-L13
L12-U12
Lead Flashing
Crown of Roadway El. 96.50
℄ Pin El. 131.50
℄ U12-L12
ENLARGED SECTION OF JAWS
STRUT
STRUT
J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39
REVISIONS
STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
MAIN SPANS - JOINT & PORTAL DETAILS - U12
SCALE 3/4" = 1'-0"
CONTRACT H-232-4-437
MADE BY J. E. GREINER CO.
TRACED BY J. E. GREINER CO.
CHECKED BY J. E. GREINER CO.
APPROVED
CHIEF ENGINEER
4/11/39
APPROVED
BRIDGE ENGINEER
APRIL 11, 1939
SHEET NO. 30 OF 37
C-354-4-30

P.W.A. PROJECT
MD.1139-1-F



10" H.T. Forged Pin A.S.T.M. A18 Class "G"
2-5" H.T. Forged Pins A.S.T.M. A18 Class "G"
Bore holes for 5"φ Pins with 10"φ pin in place in shoes
Bore Pin holes 5"+1/64" for 5"φ pins
Bore Pin hole 10"+1/50" for 10"φ pin
Dowel 10"φ pin securely while boring holes for 5"φ pins

6-Rollers 18"x9⅛"x4'-6" forged steel smooth and true A.S.T.M. A18 Class "C" to lock approx. 7½" movement in either direction.
Bar 6" x 2½" to lock at same time rollers are in contact.
See sheet C-354-4-19 for similar detail of rollers in locked position.

SHOE - CAST STEEL (ANNEALED)

All fillets 2" Radius

1-Slab 79" x 4½" x 6'-11"
1-Slab 57" x 3" x 5'-4"
{ Key 4" x 2" x 2'-0" Fin.
{ 2½" Shims
{ Tack weld in place after final adjustment.

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT & SHOE DETAILS - L11 & L12

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
TRACED BY J.E. GREINER CO.
CHECKED BY J.E. GREINER CO.
APPROVED J.E. Greiner Co. CONSULTING ENGINEERS 4-11-39
APPROVED CHIEF ENGINEER 4/11/39
BRIDGE ENGINEER
APRIL 11, 1939

SHEET No. 29 OF 37
C-354-4-29

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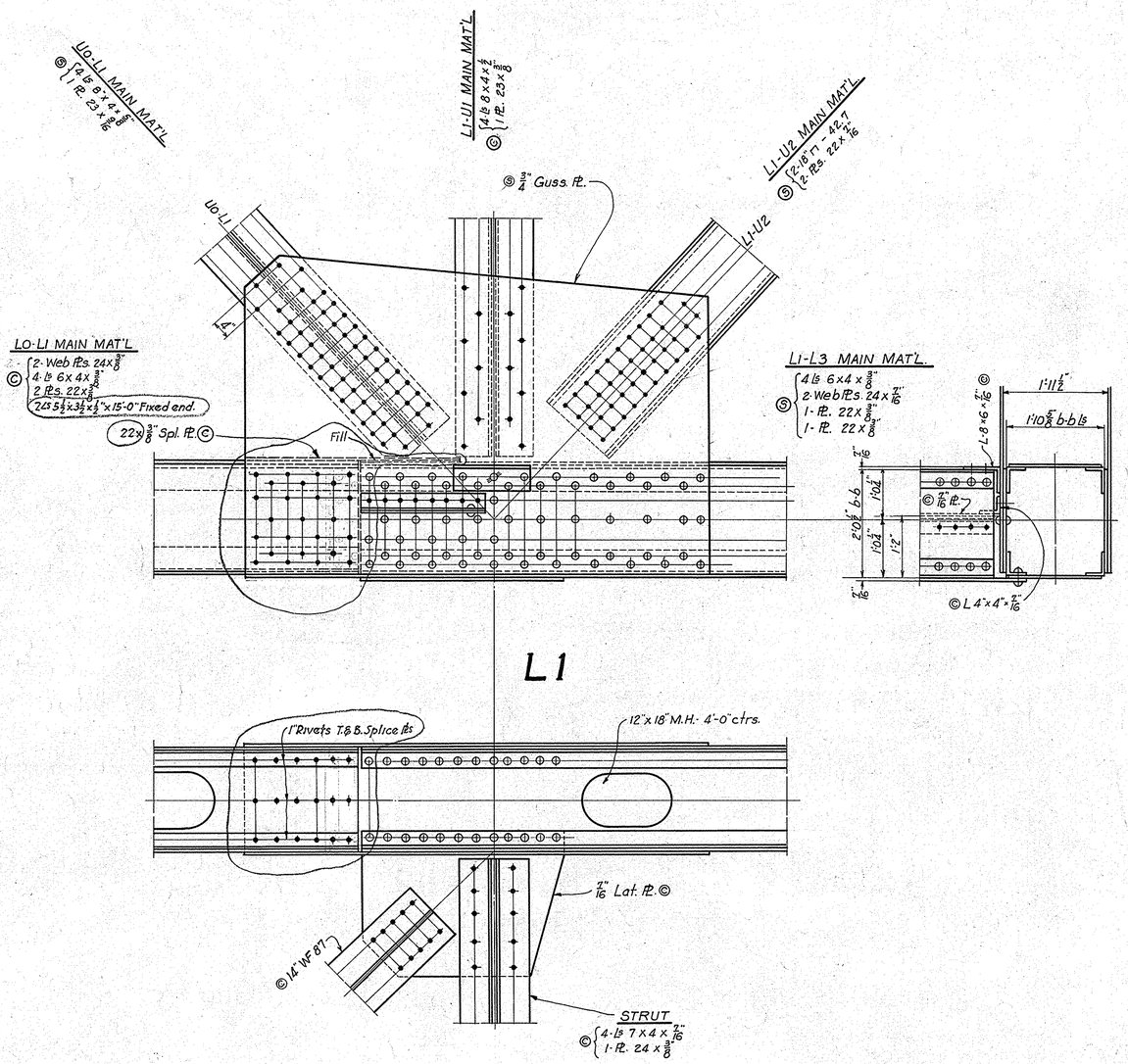

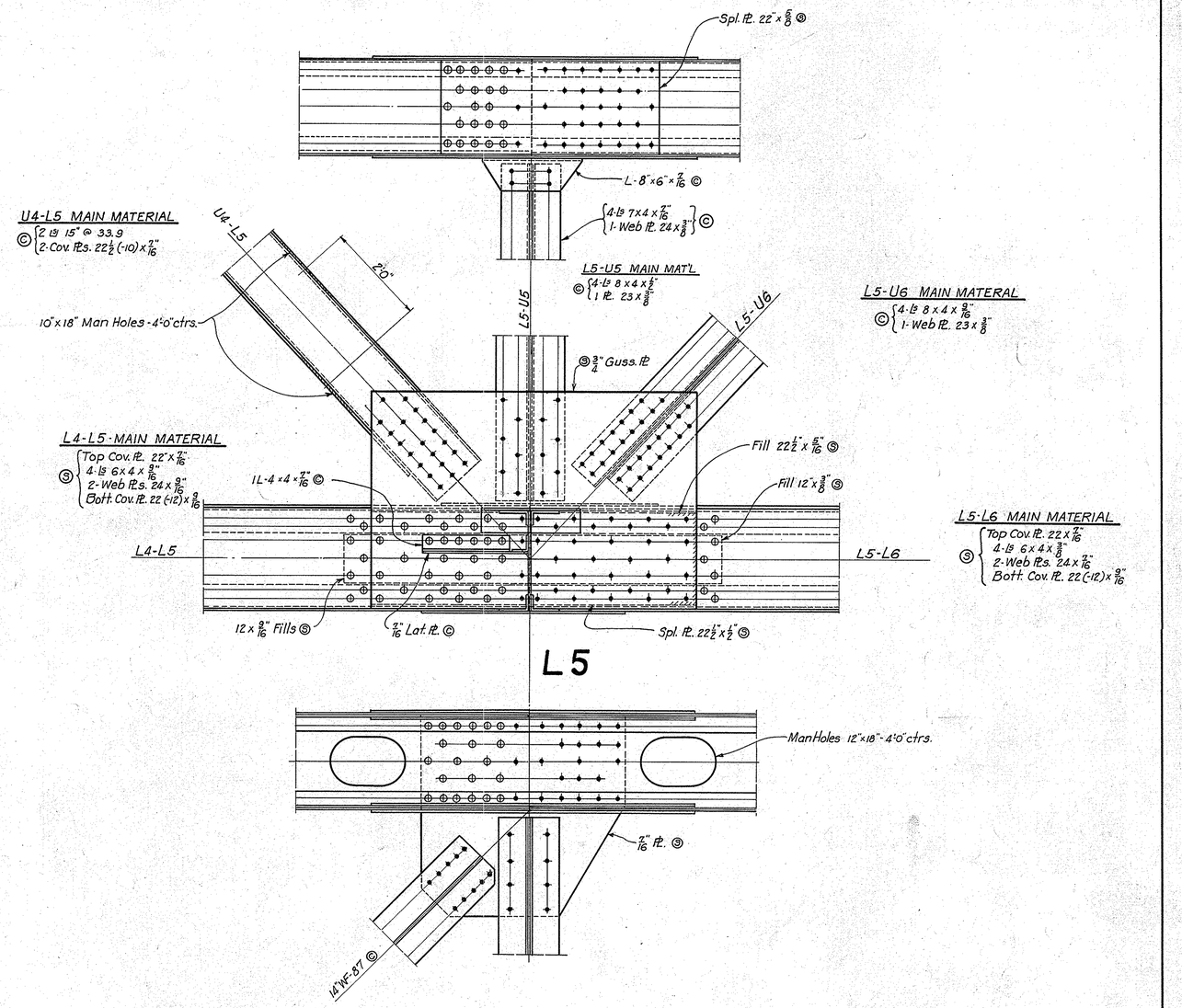

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

REVISIONS
Splice at Joint L1. 5-17-39. J.M.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT DETAILS L1 & L5

SCALE 3/4" = 1'0" — CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
TRACED BY J.E. GREINER CO.
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APPROVED — CHIEF ENGINEER
4/11/39
APRIL 11, 1939

SHEET No. 28 OF 37
C-354-4-26

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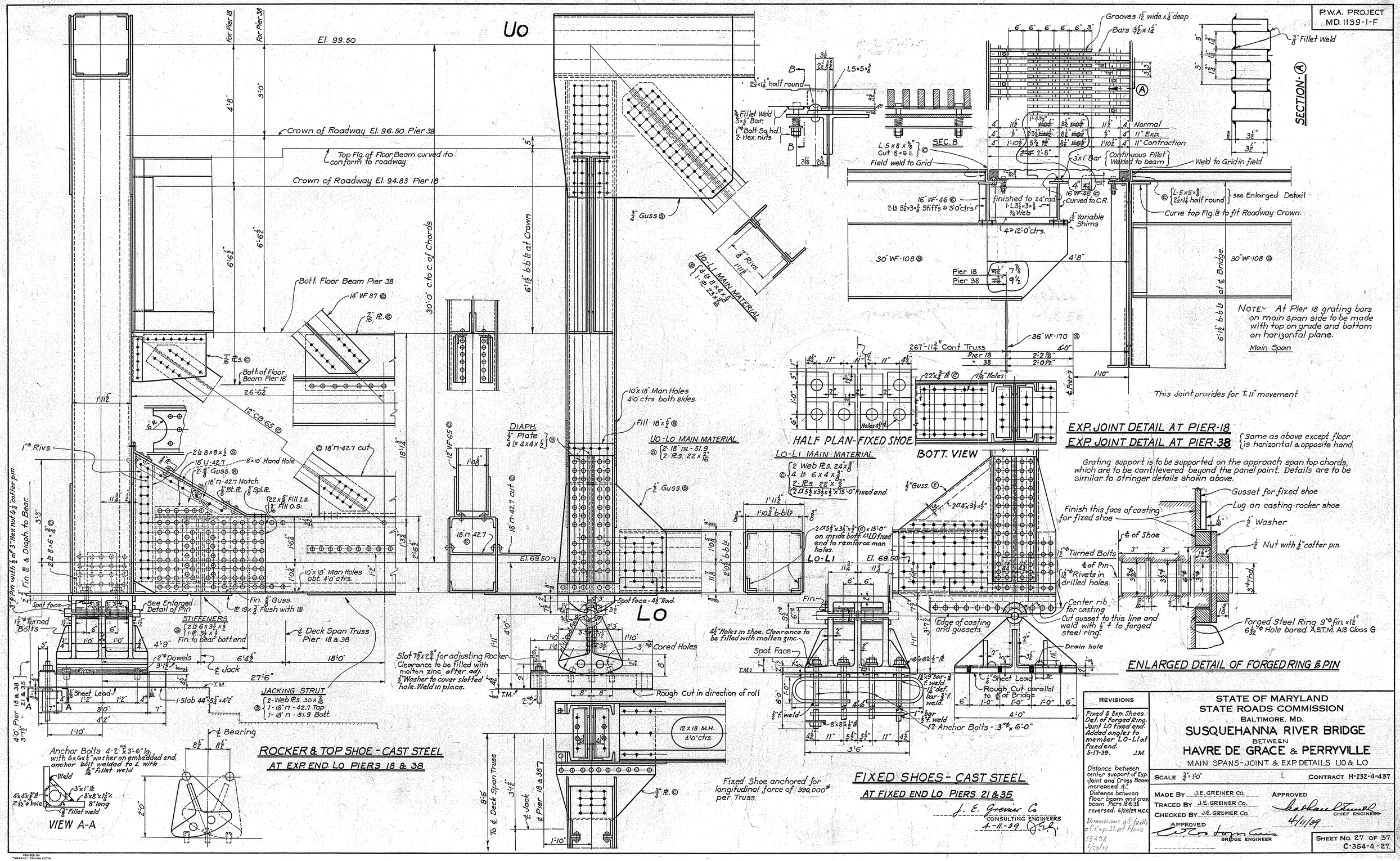
MD. 1139-1-F



REVISIONS
Fixed & Exp. Shoes. Def. of Forged Ring. Joint LO fixed end. Added angles to member LO-L1 at fixed end. 5-17-39. J.M.
Distance between center support of Exp. Joint and Cross Beam increased 4". Distance between floor beam and cross beam Piers 18 & 38 reversed. 6/28/39 H.C.C.
Dimensions of ℄ of Bearing of Exp. Shoe at Piers 18 & 38 6/28/39

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STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - JOINT & EXP. DETAILS LO & LO

SCALE ¾" = 1'-0" | CONTRACT H-232-A-437

MADE BY J. E. GREINER CO.
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APPROVED — BRIDGE ENGINEER
APPROVED — CHIEF ENGINEER 4/11/39

SHEET No. 27 OF 37
C-354-A-27.

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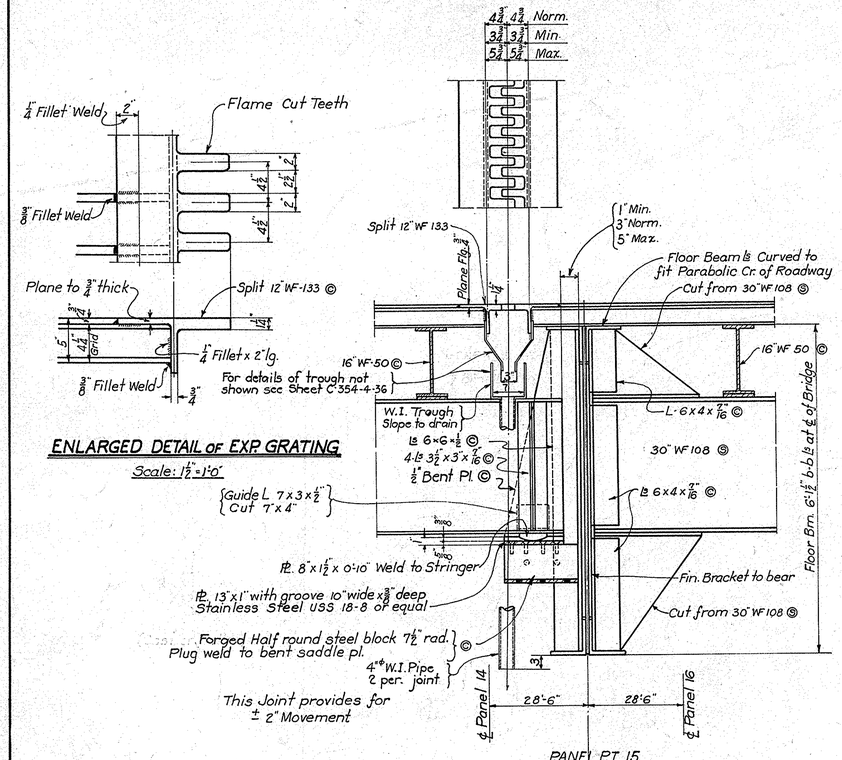
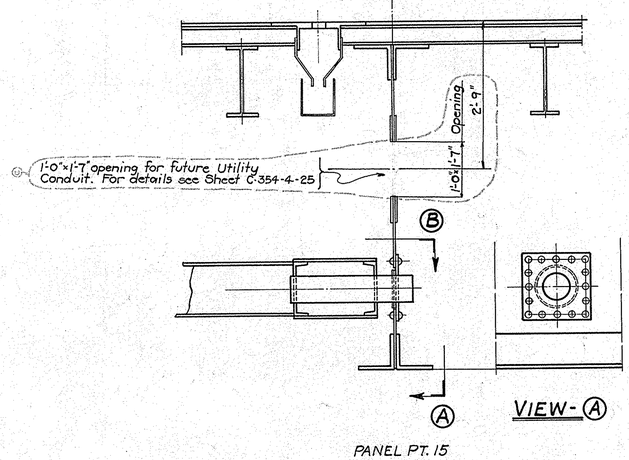
MD. 1139-1-F



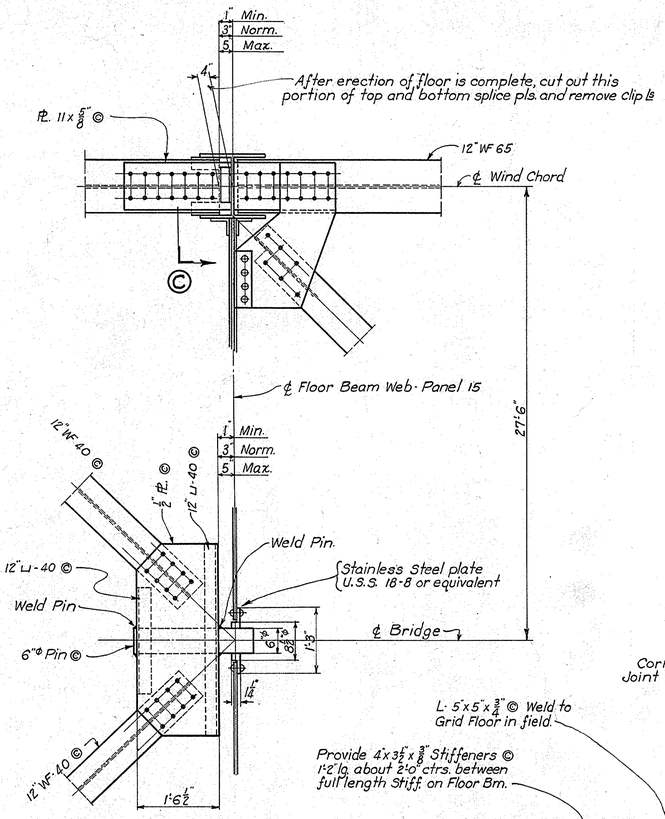
ENLARGED DETAIL OF EXP. GRATING

Scale: 1 1/2" = 1'-0"

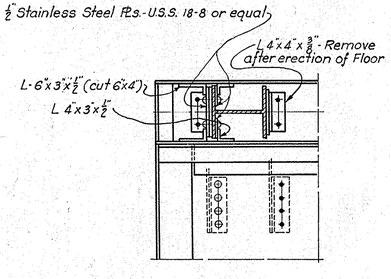


PANEL PT. 15

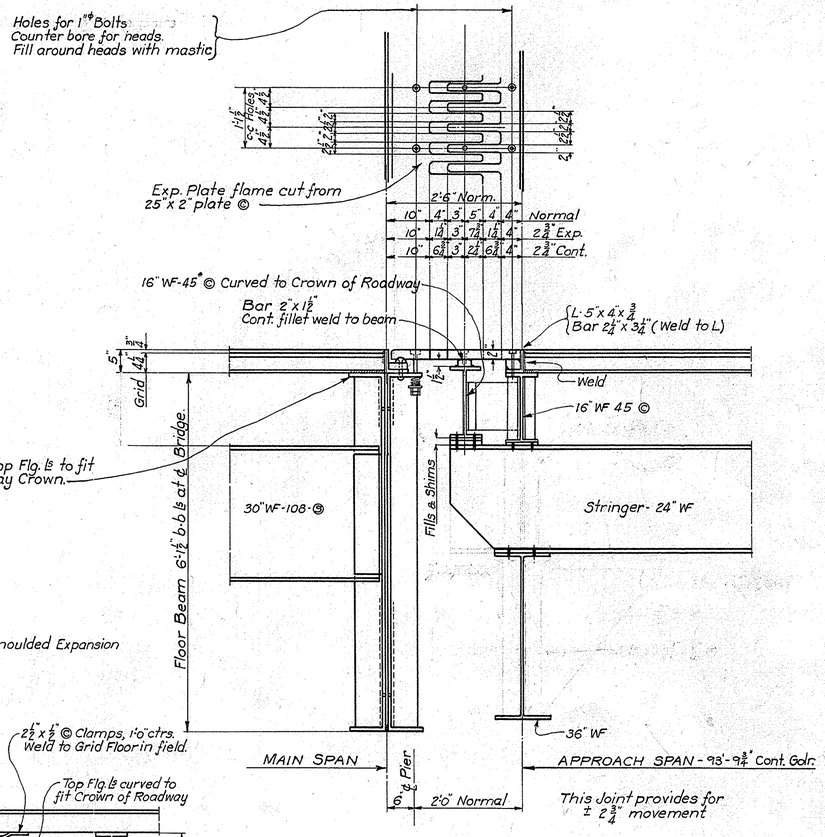
SECTION THRU FLOOR BM. AT ℄ BRIDGE



SECTION Ⓑ



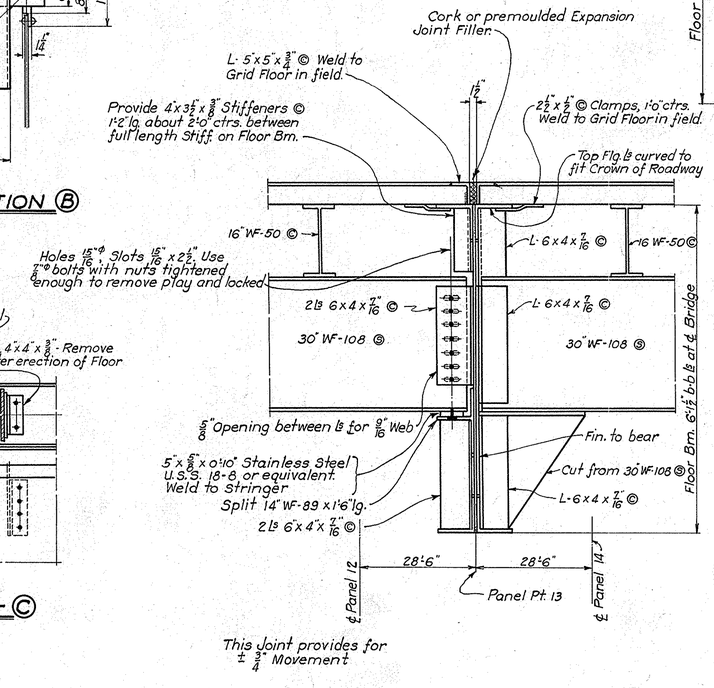
SECTION-©



EXP. JOINT DETAIL AT PIER - 21

EXP. JOINT DETAIL AT PIER - 35 {Same as above except opposite hand

Grating support is to be supported on the approach span top chords which are to be cantilevered beyond the panel point. Details are to be similar to stringer details shown above. For details of Grating not shown see Sheet No. 13.



EXPANSION DETAILS FOR FLOOR SLAB & STRINGERS AT PANEL 13

Panel 13' opposite hand.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

EXPANSION DETAILS FOR FLOOR SLAB, STRINGERS, LATERALS & WIND CHORD AT PANEL 15

Panel 15' opposite hand.

REVISIONS
⓪ Provisions for utility conduits removed. 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - EXP. JOINT DETAILS

SCALE 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.
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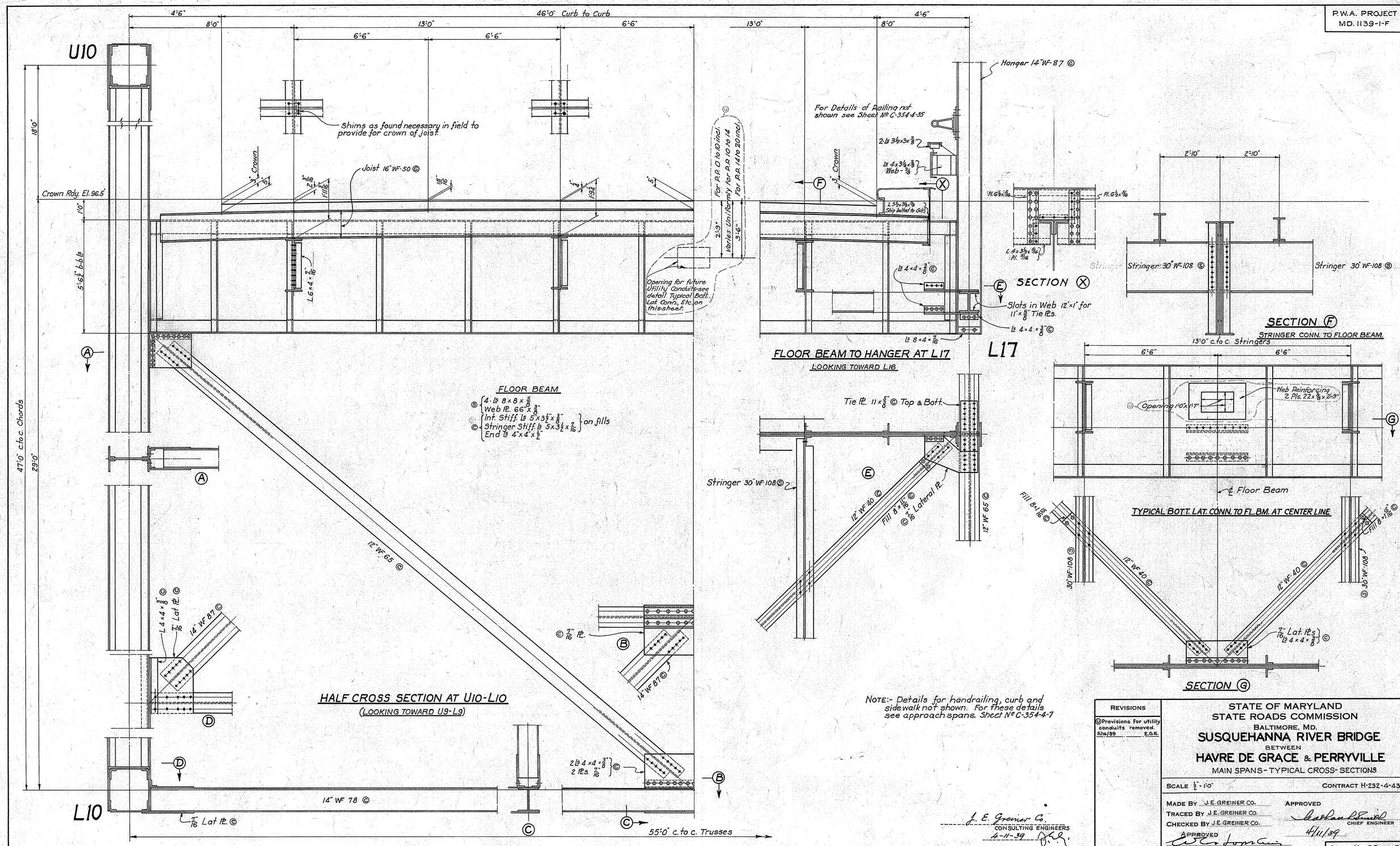
4/11/39

APRIL 11, 1939

SHEET No. 26 OF 37
C-354-4-26

P.W.A. PROJECT
MD. 1139-1-F



NOTE:- Details for handrailing, curb and sidewalk not shown. For these details see approach spans. Sheet No. C-354-4-7

J. E. Greiner Co.
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REVISIONS
① Provisions for utility conduits removed. 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - TYPICAL CROSS-SECTIONS

SCALE 1/2" = 1'-0" CONTRACT H-232-4-437

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SHEET No. 25 OF 37
C-354-4-25

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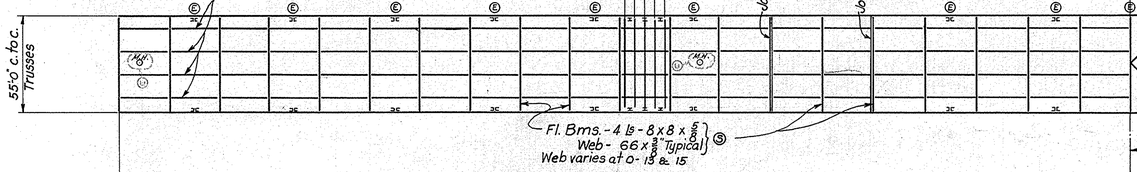
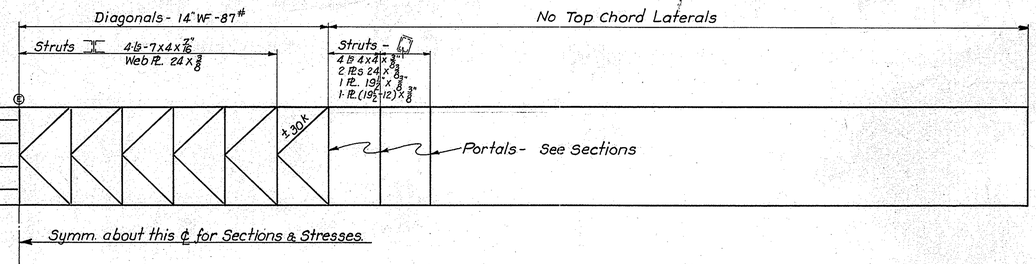
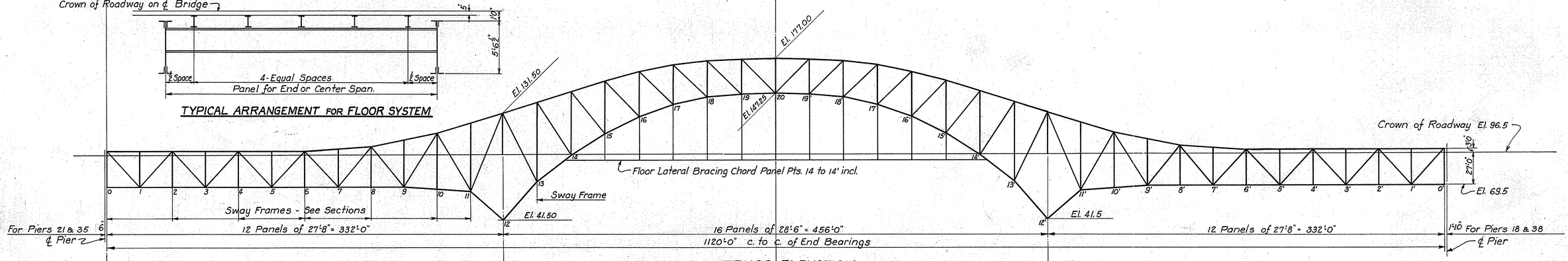


HALF PLAN-FLOOR SYSTEM



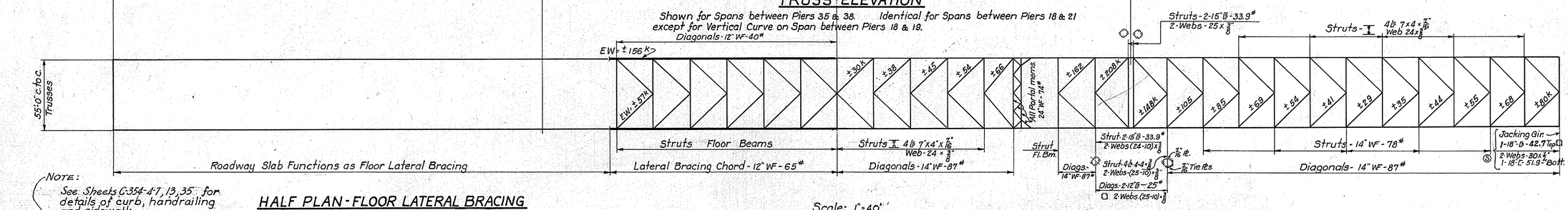
HALF PLAN-TOPCHORD LATERAL BRACING

TYPICAL ARRANGEMENT FOR FLOOR SYSTEM



TRUSS ELEVATION

Shown for Spans between Piers 35 & 38. Identical for Spans between Piers 18 & 21 except for Vertical Curve on Span between Piers 18 & 19.

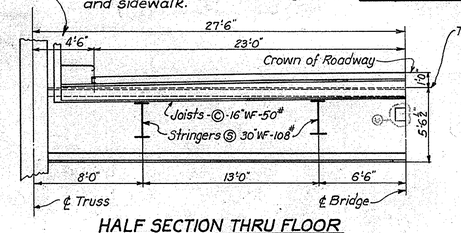


HALF PLAN-FLOOR LATERAL BRACING

Scale: 1"=40'

HALF PLAN-BOTTOM CHORD LATERAL BRACING

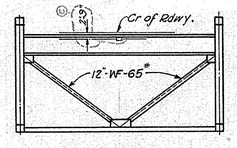
NOTE:
See Sheets C-354-4-7, 13, 35 for details of curb, handrailing and sidewalk.



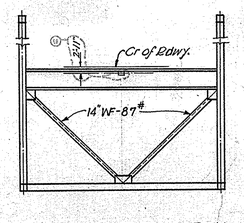
HALF SECTION THRU FLOOR

Scale: 3/16" = 1'-0"

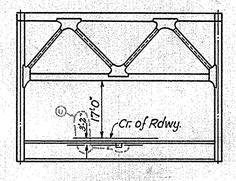
FLOOR BEAM			STRINGER		JOIST	
LOAD	MAX. SHEAR	MAX. MOM.	MAX. SHEAR	MAX. MOM.	MAX. REACTION	MAX. MOM.
Dead	80.0 k	1150 k-ft.	20.0 k	150 k-ft.	8.0 k	12.0 k-ft.
Live	70.0 k	1020	38.0	300	40.0 k	77.0
Impact	20.0 k	280	12.0	100	15.0 k	28.0
TOTAL	170.0 k	2450 k-ft.	70.0 k	550 k-ft.	63.0 k	117.0 k-ft.
Ⓢ Net Section Reqd. = 19.8"			Ⓢ SMR = 275.0		Ⓒ SMR = 78.0	
Section Furn: Gross Net 2 Ls 8x8x 5/8 - 19.22 16.72 1/8-Web-66x 3/8 - 3.09 Total = 19.81			Ⓢ 30" WF - 108		Ⓒ 16-WF - 50.	
			SMF = 299		SMF = 80.7	



SWAY FRAMES-PANEL PTS. 0-2-4-6-8 & 10.



SWAY FRAME-PANEL PT. 11

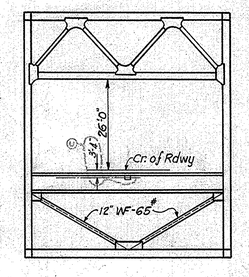


PORTAL-PANEL-PT. 12

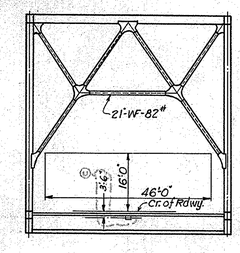
MATERIAL FOR PORTALS-PTS. 12-13 & 14.

Struts { 4-Ls 4x4x 3/8; 2-Web Pls. 24x 3/8; 1-Cov. Pl. 19 1/2 x 3/8; 1-Cov. Pl. 19 1/2-(12)x 3/8 }

Diags. 21" WF-82#



PORTAL & SWAY BRACING-PANEL PT. 13



PORTAL PANEL PT. 14

NOTE:- All material medium carbon steel unless otherwise noted. Shop & field rivets for bracing and floor System - 7/8"φ except floor beam connections - 1"φ

See Sheet No. C-354-4-1 For General Notes

Ⓜ 8" indicate Man Holes for details see sheet No. C-354-4-11

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS
Ⓜ Provisions for utility conduits removed 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS-GENERAL PLAN AND ELEVATION

SCALE 1/4"=1'-0", 1"=20' & 1"=40' CONTRACT H-232-4-437

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APRIL 11, 1939

SHEET No. 24 OF 37
C-354-4-24

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MD. 1139-1-F

TOP CHORDS

MEMBER	STRESSES 1 D	1 Lu	1 Lc	2 D+L	3 ERECTION	4 30# W	DESIGN STRESS	L ft.	r in.	L/r	ALLOW. k/a"	REQ'D. AREA	AREA FURN. EFF. GR.	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	EFF. GR. OR NET	TOTAL GROSS AREA
U12-U13	+1075	+304	+56	+1435	+1254 W=45	±34	+1435	29.89			24.0	59.8 N		59.62	S	4-Pls 6x4x5/8 1-Pl. 21x5/16 1-Pl.(21-12)x9/16 2-Pls. 24x3/4	23.44 9.19 11.81 36.00	18.12 8.31 3.94 29.25	80.44
U13-U14	+827	+251	+65	+1143	+1195 W=20	107	+1143	29.89			24.0	47.6 N		47.50	S	4-Pls 6x4x1/2 1-Pl. 22x5/16 1-Pl.(22-12)x9/16 2-Pls. 24x1/2	19.00 9.63 12.38 24.00	14.75 8.75 4.50 19.50	65.01
U14-U15	+478	+303	+72	+853	+1056 W=26	149	+853	29.89			24.0	35.5 N		38.80	S	4Pls 6x4x3/8 1Pl. 22x3/8 1Pl.(22-12)x3/8 2Pls. 24x7/16	14.44 8.25 8.25 21.00	11.24 7.50 3.00 17.06	51.94
U15-U16	+62 (+43)	+349 -313	+75 -90	+486 -360	W=25	197	+666 -540	29.57	9.7	37	18.0 14.7	37.0 N 36.7 G	44.32	38.80	C	4Pls 6x4x3/8 1Pl. 22x3/8 1-Pl.(22-12)x3/8 2-Pls. 24x7/16	14.44 8.25 8.25 21.00	14.44 7.31 3.75 18.82	51.94
U16-U17	-353 (-247)	-459 +389	-131 +76	-943 +218	+577 W=19	243	-1052 +827	29.05	9.7	36	19.6 24.0	53.7 G 43.7 N	56.70		S	4Pls 6x4x3/8 1Pl. 22x7/16 1Pl.(22-12)x9/16 2Pls. 24x7/16	14.44 9.63 12.38 27.00	14.44 9.63 5.63 27.00	63.45
U17-U18	-705 (-494)	-578 +417	-165 +72	-1448		275	-1448	28.70	9.7	36	19.6	73.9 G	73.69		S	4Pls 6x4x5/8 1Pl. 21x7/16 1Pl.(21-12)x9/16 2Pls. 24x3/4	23.44 9.19 11.81 36.00	23.44 9.19 5.06 36.00	80.44
U18-U19	-924	-644	-184	-1752		277	-1752	28.52	9.4	36	19.6	89.4 G	89.49		S	4Pls 6x4x9/16 1Pl. 21x7/16 1Pl.(21-12)x9/16 4Pls. 24x3/8	21.24 9.19 11.81 54.00	21.24 9.19 5.06 54.00	96.24
U19-U20	-999	-666	-191	-1856		266	-1856	28.50	9.1	38	19.6	94.7 G	94.49		S	4Pls 6x4x3/8 1Pl. 20x7/16 1Pl.(20-12)x9/16 4Pls. 24x3/8	21.24 8.75 11.25 60.00	21.24 8.75 4.50 60.00	101.24

DIAGONALS

MEMBER	STRESSES 1 D	1 Lu	1 Lc	2 D+L	3 ERECTION	4 30# W	DESIGN STRESS	L ft.	r in.	L/r	ALLOW. k/a"	REQ'D. AREA	AREA FURN. EFF. GR.	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	EFF. GR. OR NET	TOTAL GROSS AREA
U12-L13	+183 (+128)	+136 -102	+50 -35	+369 -9	-145 W=167	±110	+373	64.40	8.8	81	18.0	20.8 N		30.37	C	4Pls 4x4x3/8 2Pls. 20x3/8 1Pl. 22x3/8 1Pl.(22-12)x3/8	11.44 15.00 8.25 8.25	8.25 11.62 7.50 3.00	42.94
U13-L14	+440	+194	+76	+710	+106 W=116	±130	+710	52.87	3.3	192	24.0	29.6 N		30.13	S	4Pls 8x4x9/16 1Pl. 23x7/16	25.72 10.06	20.94 9.19	35.78
U14-L15	+530	+212	+89	+831			+831	45.40	3.3	165	24.0	34.6 N		34.94	S	4Pls 8x4x5/8 1Pl. 23x9/16	28.44 12.94	23.13 11.81	41.38
U15-L16	+576	+216	+97	+889			+889	41.52	3.3	151	24.0	37.0 N		37.09	S	4Pls 8x4x11/16 1Pl. 23x9/16	31.12 12.94	25.28 11.81	44.06
U16-L17	+570	+208	+103	+881			+881	39.92	3.3		24.0	36.8 N		37.09	S	4Pls 8x4x11/16 1Pl. 23x9/16	31.12 12.94	25.28 11.81	44.06
U17-L18	+492	+189	+99	+780			+780	39.63	3.3		24.0	32.5 N		32.75	S	4Pls 8x4x9/16 1Pl. 23x9/16	25.72 12.94	20.94 11.81	38.66
U18-L19	+317	+164	+82	+563			+563	40.57	3.3		24.0	23.5 N		24.40	S	4Pls 8x4x7/16 1Pl. 23x3/8	20.24 8.63	16.52 7.88	28.87
U19-L20	+107 (+75)	+135 -110	+64 -54	+306 -89			+351 -124	40.84	6.7	74	18.0 12.9	19.5 N 19.6 G	29.18	23.19	C	2-15" [s @ 33.9# 2 Pls.(22½-10)x3/8	19.80 16.88	(Net) 15.33 7.86	36.68

BOTTOM CHORDS

MEMBER	STRESSES 1 D	1 Lu	1 Lc	2 D+L	3 ERECTION	4 30# W	DESIGN STRESS	L ft.	r in.	L/r	ALLOW. k/a"	REQ'D. AREA	AREA FURN. EFF. GR.	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	EFF. GR. OR NET	TOTAL GROSS AREA
L12-L13	-1671	-472	-65	-2208	-1709 W=301	±142	-2208	43.04	9.0	58	18.5	119.4 G	118.26		S	4-Pls. 6x4x3/8 1-Pl. 20x5/8 1-Pl.(20-12)3/4 4-Pls. 24x3/4 *2-Pls. 12x3/4	27.76 12.50 15.00 72.00 18.00	27.76 12.50 6.00 72.00 18.00	145.26
L13-L14	-1300	-367	-68	-1735	-1517 W=273	98	-1735	36.14	9.2	47	19.0	91.3 G	91.49		S	4Pls 6x4x7/16 1Pl. 20x7/16 1Pl.(20-12)x9/16 2Pls. 24x5/8 2Pls. 24x9/16	21.24 8.75 11.25 30.00 27.00	21.24 8.75 4.50 30.00 27.00	98.24
L14-L15	-935	-284	-73	-1292	-1351 W=130	200	Direct " -935 Bending M=9600	33.81	T2.2 10.0	40.5	19.4		104.99		S	4Pls 6x4x9/16 1Pl. 20x7/16 1Pl.(20-12)x9/16 2Pls. 24x5/8 2Pls. 24x9/16 2Pls. 12x7/16	21.24 8.75 11.25 30.00 27.00 13.50	21.24 8.75 4.50 30.00 27.00 13.50	111.74
L15-L16	-508	-323	-76	-907	-1124 W=95	275	-907	31.82	9.7	40	19.5	46.5 G	51.25		S	4Pls 6x6x3/8 1Pl. 22x3/8 1Pl.(22-12)x1/2 2Pls. 24x1/2	17.44 8.25 11.00 24.00	15.94 7.31 5.00 23.00	60.69
L16-L17	-64 (-45)	-357 +320	-77 +92	-498 +367	-857 W=64	343	-682 +651	30.24	9.7	38	14.7 18.0	46.4 G 30.6 N	49.75		C	4Pls 6x4x3/8 1Pl. 22x3/8 1Pl.(22-12)x1/2 2Pls. 24x1/2	14.44 8.25 11.00 24.00	14.44 7.31 5.00 23.00	57.69
L17-L18	+355 (+248)	+461 -390	+132 -76	+948 -218	-579 W=36	401	+1057	29.14	9.7	36	24.0	44.0 N		43.99	S	4Pls 6x4x3/8 1Pl. 22x7/16 1Pl.(22-12)x9/16 2Pls. 24x1/2	14.44 9.63 12.38 24.00	11.24 8.75 4.50 19.50	60.45
L18-L19	+702 (+491)	+575 -415	+164 -72	+1441		438	+1441	28.57			24.0	60.0 N		60.51	S	4Pls 6x6x3/8 1Pl. 21x3/8 1Pl.(21-12)x1/2 2Pls. 24x3/4	28.44 7.88 10.50 36.00	20.63 7.13 3.50 29.25	82.82
L19-L20	+923	+643	+184	+1750		443	+1750	28.50			24.0	72.9 N		72.50	S	4Pls 6x4x9/16 1Pl. 20x3/8 1Pl.(20-12)x1/2 2Pls. 24x3/4 2Pls 24x7/16	21.24 7.50 10.00 36.00 21.00	16.44 6.75 3.00 29.25 17.06	95.74

* Added due to bending

VERTICALS

MEMBER	STRESSES 1 D	1 Lu	1 Lc	2 D+L	3 ERECTION	4 30# W	DESIGN STRESS	L ft.	r in.	L/r	ALLOW. k/a"	REQ'D. AREA	AREA FURN. EFF. GR.	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	EFF. GR. OR NET	TOTAL GROSS AREA
U13-L13	-486 -580	-196 -228	-77 -83	-759 -891	Above Fl. Below Fl.	±132	-759 -891	44.00 22.75	8.6 8.6	61 32	18.2 19.8	41.7 G 45.0 G	46.20		S	4Pls 4x4x3/8 2 Pls. 19½x½ 1 Pl. 22x7/16 1 Pl.(22-12)x9/16	13.44 19.50 9.63 12.38	11.44 19.50 9.63 5.63	52.95
U14-L14	-554	-207	-87	-848	-236 W=9	88	-848	53.52	8.7	74	17.2	49.3 G	49.76		S	4Pls 4x4x½ 2 Pls. 19½x½ 1 Pl. 22x7/16 1 Pl.(22-12)x9/16	15.00 19.50 9.63 12.38	15.00 19.50 9.63 5.63	56.51
U15-L15	-576	-192	-87	-855	-337 W=2		-855	44.33	8.7	61	18.2	47.0 G	46.70		S	4Pls 4x4x3/8 2 Pls. 20x½ 1 Pl. 22x7/16 1 Pl.(22-12)x9/16	11.44 20.00 9.63 12.38	11.44 20.00 9.63 5.63	53.45
U16-L16	-509	-169	-78	-756	-377 W=9		-756	38.06	7.6	60	18.3	41.3 G	40.86		S	2-18" [s @ 51.9 2-Pls.(22-10)x7/16	30.36 19.26	30.36 10.50	49.62
U17-L17	-381	-144	-64	-589	-353 W=12		-589	33.58	3.4	118	12.3	47.9 G	48.14		S	4Pls 8x4x3/4 1 Pl. 23x5/8	33.76 14.38	33.76 14.38	48.14
U18-L18	-204 (-143)	-116 +69	-44 +43	-364	-298 W=8		-364	30.90	3.6	106	10.4	35.0 G	39.94		C	4Pls 8x4x5/8 1 Pl. 23x½	28.44 11.50	28.44 11.50	39.94
U19-L19	-84 (-59)	-95 +85	-37 +149	-216 +75			-254 +183	30.00	3.2	112	9.8 18.0	26.3 G 10.2 N	26.93		C	4Pls 8x4x7/16 1 Pl. 23x½	20.24 11.50	15.43 11.50	31.74
U20-L20	+11 +7	+23 -15	+10 -3	+44 -11			+50 -17	29.75	3.4	105	18.0 10.4	2.8 N 1.7 G	22.37	24.40	C	4Pls 8x4x7/16 1 Pl. 23x3/8	20.24 8.63	(E.F.G) 15.43 6.94	28.87

DEAD PANEL LOADS
KIPS PER TRUSS

PANEL PT.	SPECIAL DETAILS	CONSTANT LOAD	FLOOR STEEL	BRACINGS	TRUSS	TOTAL
13	2	66	20	26	57	171
14	2	66	20	19	42	149
15	3	66	20	19	36	144
16	4	66	20	18	31	139
17	5	66	20	18	29	138
18	6	66	20	18	29	139
19	6	66	20	18	31	141
20	6	66	20	18	32	142

Special Details include expansion joint at p.p. 13, special bracing details at p.p. 14 and hangers p.ps. 15 to 20 incl.

AVERAGE DEAD LOADS P.PS. 13-20 INCL.

Roadway Slab	2120
Railing, Curb, Sidewalk etc.	180
Floor-beams, Stringers and Joists	682
Bracing	678
Hangers	136
Trusses	1268
Total	5064
or	144 kips per Panel.

Lateral 30# Wind - Average per lin. ft. of bridge - 850#
Live Load (including effect of impact)
Uniform/lin. ft/Truss ..... 1.28 kips
Concentrated - For Moment ..... 64.4 kips/Truss.
For Shear ..... 93.0 kips/Truss.

LOADING COMBINATIONS

Dead + Live	at - 100%	Normal Unit Stress.
Dead + 30# Lat. Wind	at - 100%	Normal Unit Stress.
Dead + Live + 15# Lat. Wind	at - 125%	Normal Unit Stress.
Erection Dead + 30# Lat. Wind	at - 135%	Normal Unit Stress.

MAXIMUM & MINIMUM VERTICAL REACTIONS - R2 - KIPS PER TRUSS

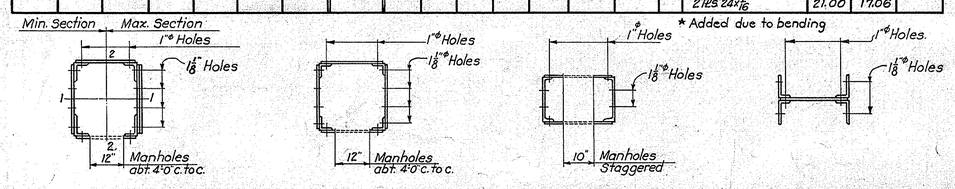
LOADING	LEEWARD TRUSS	WINDWARD TRUSS
Dead Load (30# Fl.)	+2280	
Dead Load (65# Fl.)		+2000
Live Load.	+750	-60
30# Lat. Wind.	+510	-510
15# (or Min.) Lat. Wind	+270	-270
Lat. Wind on L.L.	+60	-60
D.L. + L.L.	+3030	+1940
D.L. + 30# Lat. Wind.	+2790	+1490
D.L. + L.L. + 15# W. + L.L.W.	+3360	+1610
Erection.	+1590	+1590
30# Erection Wind.	+430	-430
Erection + E.W.	+2020	+1160

LATERAL WIND REACTIONS PER PIER FOR R2

30# W	15# W. (or Min.)	L.L. Wind
±410	±220	±50

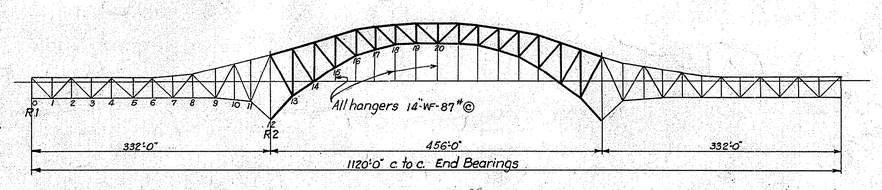
NOTE:- No Longitudinal Reactions at this point except for friction on rollers and possibly during erection if shoe is temporarily fixed. Erection Reactions are for 90 ton traveler at p.p. 19 and wind on center span.

All stitch rivets for truss members - 7/8"φ
All shop and field rivets for truss joints - 1"φ



TOP & BOTTOM CHORDS — DIAGONAL 12-13, VERTICALS 13-14 & 15 — DIAGONAL 19-20, VERTICAL -16 — DIAGONALS 13-14 to 18 & 19 INCL., VERTICALS 17-18 & 19

TYPICAL SECTIONS - 23½" IN TO IN OF GUSSETS



NOTE:- All sections controlled by combined dead + live load stress except Chord L14-L15.
Principal erection and erection wind stresses are shown for 90-Ton traveler at p.p. 19 and all steel in place except roadway steel grid.
Principal stresses are shown for 30# Lat. Wind to indicate their magnitude.
Combined stresses for a 15# Lat. Wind were investigated but do not in any case require additional section.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
MAIN SPANS - STRESS SHEET

SCALE ½"=1'-0" & 1"=100' — CONTRACT H-232-4-437

MADE BY J. E. GREINER CO. — APPROVED — CHIEF ENGINEER 4/11/39
TRACED BY J. E. GREINER CO.
CHECKED BY J. E. GREINER CO.
APPROVED — BRIDGE ENGINEER
APRIL 11, 1939

SHEET No. 23 OF 37
C-354-4-23

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

P.W.A. PROJECT MD. 1139-1-F

TOP CHORDS

Member	Stresses 1 D	Lu	Lc	2 D+L	3 Erection	4 30# W	Design Stress	L ft.	r in.	L/r	Allow. k/□"	Req'd. Area	Area Furn. Eff. Gr.	Area Furn. Net	Material	Section Furnished	Full Gross Area	Eff. Gr. or Net	Total Gross Area
U0-U2	-322	-155	-77	-554		±36	-554	27.67	9.8	34	14.8	37.4 G	48.50		C	4 Ls 6×4×3/8 1 Pl. 22×3/8 1 Pl. (22÷12)×3/8 2 Pls. 24×1/2	14.44 8.25 8.25 24.00	14.44 7.31 3.75 23.00	54.94
U2-U4	-647	-367	-126	-1140		94	-1140	27.67	9.7	34	19.7	57.9 G	58.98		S	4 Ls 6×4×7/16 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×9/16	16.72 9.63 12.38 27.00	16.72 9.63 5.63 27.00	65.73
U4-U6	-538	-448	-151	-1137		126	-1137	27.67	9.7	34	19.7	57.7 G	58.98		S	4 Ls 6×4×7/16 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×9/16	16.72 9.63 12.38 27.00	16.72 9.63 5.63 27.00	65.73
U6-U8	+5 (+3)	+319 -376	+71 -122	+395 -495	+930 W=50	123	(3) +980	27.67	9.7	34	24.3	40.3 N	52.70	43.99	C	4 Ls 6×4×3/8 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×1/2	14.44 9.63 12.38 24.00	11.24 8.75 4.50 19.50	60.45
U8-U10	+764	+338	+75	+1177	+1370 W=52	97	+1177	28.23			24.0	49.0 N		48.93	S	4 Ls 6×6×3/8 1-Pl. 22×7/16 1-Pl. (22÷12)×9/16 2-Pls. 24×9/16	17.44 9.63 12.38 27.00	13.74 8.75 4.50 21.94	66.45
U10-U12	+1317	+372	+64	+1753	+1516 W=16	76	+1753	28.94			24.0	73.0 N		73.31	S	4 Ls 6×4×1/2 1 Pl. 21×7/16 1 Pl. (21÷12)×9/16 2 Pls. 24×9/16 2 Pls. 24×5/8	19.00 9.19 11.81 27.00 30.00	14.75 8.31 3.94 21.94 24.37	97.00

BOTTOM CHORDS

Member	Stresses 1 D	Lu	Lc	2 D+L	3 Erection	4 30# W	Design Stress	L ft.	r in.	L/r	Allow. k/□"	Req'd. Area	Area Furn. Eff. Gr.	Area Furn. Net	Material	Section Furnished	Full Gross Area	Eff. Gr. or Net	Total Gross Area
L0-L1			Nominal				±238*	27.67	9.7	34	14.8 18.0	16.1 G 13.2 N	40.50	36.36	C	4 Ls 6×4×3/8 1 Pl. 22×3/8 1 Pl. (22-12)×3/8 2 Pls. 24×3/8 (*)	14.44 8.25 8.25 18.00	11.24 7.50 3.00 14.62	48.94
L1-L3	+539	+278	+95	+912		±168	+912	27.67			24.0	38.0 N		38.80	S	4 Ls 6×4×3/8 1 Pl. 22×3/8 1 Pl. (22÷12)×3/8 2 Pls. 24×7/16	14.44 8.25 8.25 21.00	11.24 7.50 3.00 17.06	51.94
L3-L5	+648	+424	+144	+1216		267	+1216	27.67			24.0	50.7 N		51.63	S	4 Ls 6×4×9/16 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×9/16	21.24 9.63 12.38 27.00	16.44 8.75 4.50 21.94	70.25
L5-L7	+321 (+225)	+440 -290	+146 -64	+907 -129	-680 W=314	297	+972	27.67			24.0	40.5 N		41.55	S	4 Ls 6×4×3/8 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×7/16	14.44 9.63 12.38 21.00	11.24 8.75 4.50 17.06	57.45
L7-L9	-390 (-273)	-344 +289	-76 +90	-810 +106	-1196 W=412	261	(3) -1608	27.67	9.7	34.0	26.6	60.5 G	61.26		S	4 Ls 6×4×1/2 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16 2 Pls. 24×9/16	19.00 9.63 12.38 27.00	19.00 9.63 5.63 27.00	68.01
L9-L11	-1049	-309	-68	-1426	-1432 W=479	201	-1426	27.74	9.7	34.0	19.7	72.4 G	72.85		S	4 Ls 6×4×11/16 1 Pl. 21×7/16 1 Pl. (21÷12)×9/16 2 Pls. 24×11/16	25.60 9.19 11.81 33.00	25.60 9.19 5.06 33.00	79.60
L11-L12	-1464	-414	-57	-1935	-1498 W=375	192	-1935	36.63	9.0	49.0	19.0	101.8 G	102.69		S	4 Ls 6×4×5/8 1 Pl. 20×7/16 1 Pl. (20-12)×9/16 4 Pls 24×11/16 *2 Pls. 12×5/8	23.44 8.75 11.25 66.00 15.00	23.44 8.75 4.50 66.00 15.00	124.44

* Stress due to 30# Long. Wind.

* Added due to bending

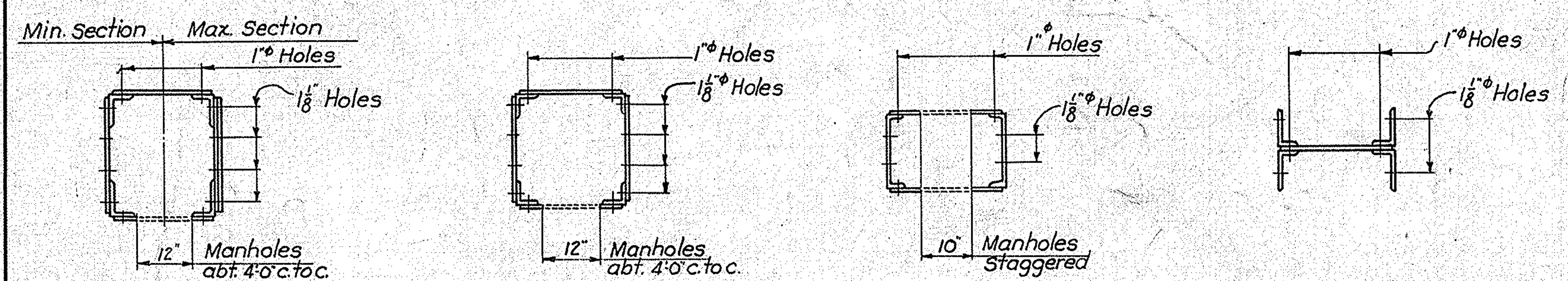
*{Add 2 L 5½"×3½"×½"×15'-0" Fixed Ends
See Sheets № C-354-4-27 & C-354-4-28}

DIAGONALS

Member	Stresses 1 D	Lu	Lc	2 D+L	3 Erection	4 30# W	Design Stress	L ft.	r in.	L/r	Allow. k/□"	Req'd. Area	Area Furn. Eff. Gr.	Area Furn. Net	Material	Section Furnished	Full Gross Area	Eff. Gr. or Net	Total Gross Area
U0-L1	+475	+228	+114	+817		±53	+817	40.81	3.3		24.0	34.0 N		34.94	S	4 Ls 8×4×5/8 1 Pl. 23×9/16	28.44 12.94	23.13 11.81	41.38
L1-U2	-319	-183	-102	-604		54	-604	40.81	7.7	64	18.0	33.6 G	35.46		S	2-18" [@ 42.7# 2-Pls. (22÷10)×7/16	24.96 19.26	24.96 10.50	44.22
U2-L3	+160	+143	+89	+392	-126 W=11	53	+392	40.81	3.3	149	18.0	21.8 N		24.40	C	4 Ls 8×4×7/16 1 Pl. 23×3/8	20.24 8.63	16.52 7.88	28.87
L3-U4	-1	-108 +95	-77 +37	-186 +132	+206 W=11	48	-252 +198	40.81	6.7	73	12.9 18.0	19.5 G 11.0 N	30.74		C	2-15" [@ 33.9 2-Pls. (22½÷10)×7/16	19.80 19.68	19.80 10.94	39.48
U4-L5	-161 (-113)	-113 +78	-50 +64	-324 +29	-289 W=11	47	-339	40.81	6.7	73	12.9	26.3 G	30.74		C	2-15" [@ 33.9 2 Pls. (22½÷10)×7/16	19.80 19.68	19.80 10.94	39.48
L5-U6	+320	+137	+62	+519		66	+519	40.81	3.3		18.0	28.8 N		28.82	C	4 Ls 8×4×9/16 1-Pl. 23×3/8	25.72 8.63	20.94 7.88	34.35
U6-L7	-480	-156	-89	-725		88	-725	40.81	7.6	64	18.0	40.3 G	40.86		S	2-18" [@ 51.9 2-Pls. (22÷10)×7/16	30.36 19.26	30.36 10.50	49.62
L7-U8	+608	+187	+98	+893		111	+893	43.64	3.3	158	24.0	37.2 N		37.09	S	4 Ls 8×4×11/16 1 Pl. 23×9/16	31.12 12.94	25.28 11.81	44.06
U8-L9	-567	-193	-110	-870		130	-870	43.64	8.7	60	18.3	47.5 G	48.50		S	4 Ls 4×4×7/16 2 Pls. 20×1/2 1 Pl. 22×7/16 1 Pl. (22÷12)×9/16	13.24 20.00 9.63 12.38	13.24 20.00 9.63 5.63	55.25
L9-U10	+568	+221	+113	+902		154	+902	52.83	3.4	186	24.0	37.6 N		37.56	S	4 Ls 8×4×5/8 1 Pl. 23×11/16	28.44 15.81	23.13 14.43	44.25
U10-L11	-432	-200	-93	-725		144	-725	56.27	8.8	77	16.9	42.8 G	43.75		S	4 Ls 4×4×3/8 2 Pls. 20×1/2 1 Pl. 22×3/8 1 Pl. (22÷12)×1/2	11.44 20.00 8.25 11.00	11.44 20.00 7.31 5.00	50.69
L11-U12	-394	-201	-69	-664	-820 W=342	142	(3) -1162	71.56	8.8	98	20.0	58.1 G	58.70		S	4 Ls 4×4×5/8 2 Pls. 20×5/8 1 Pl. 22×7/16 1 Pl. (22-12)×9/16	18.44 25.00 9.63 12.38	18.44 25.00 9.63 5.63	65.45

VERTICALS

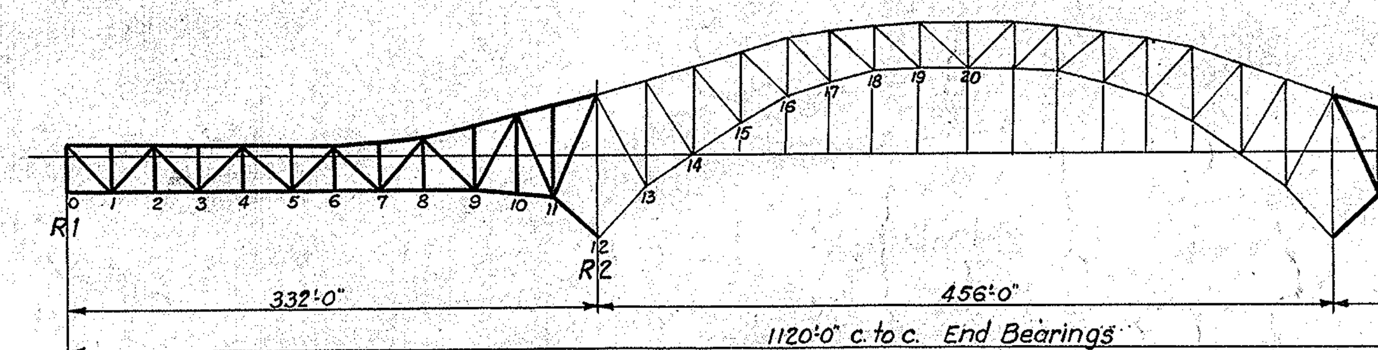
Member	Stresses 1 D	Lu	Lc	2 D+L	3 Erection	4 30# W	Design Stress	L ft.	r in.	L/r	Allow. k/□"	Req'd. Area	Area Furn. Eff. Gr.	Area Furn. Net	Material	Section Furnished	Full Gross Area	Eff. Gr. or Net	Total Gross Area
U0-L0	-430	-186	-93	-709			-709	30.00	7.6	48	19.0	37.3 G	40.86		S	2-18" [@ 51.9 2-Pls. (22÷10)×7/16	30.36 19.26	30.36 10.50	49.62
U1-L1 3-5-7 9 & U11-L11	-107	—	-90	-197			-197	30.50	3.4	108	10.2	19.3 G	25.94		C	4 Ls 8×4×1/2 1 Pl. 23×3/8	23.00 8.63	19.00 6.94	31.63
U2-L2 4-6-8 & U10-L10	+106	—	+90	+196			+196	30.00 To 47.00	2.8		18.0	10.9 N		22.68	C	4 Ls 7×4×7/16 1-Pl. 23×3/8	18.52 8.63	14.80 7.88	27.15
U12-M12	+100		+90	+190	+767 W=447		(3) +1214	90.00	8.7	124	32.4	37.6 N		38.69	S	4 Ls 4×4×1/2 2-Pls. 20×9/16 1-Pl. 22×3/8 1-Pl. (22-12)×3/8	15.00 22.50 8.25 8.25	10.75 17.44 7.50 3.00	54.00



TOP & BOTTOM CHORDS — DIAGONALS 8-9, 10-11 & 11-12, VERTICAL-12 — DIAGONALS-1-2, 3-4, 4-5 & 6-7, VERTICAL-0 — DIAGONALS 0-1, 2-3, 5-6, 7-8 & 9-10, VERTICALS - 1 TO 11 INCL.

TYPICAL SECTIONS - 23½" IN TO IN OF GUSSETS

NOTE:-
All sections controlled by combined dead + live load stress except for members noted (3) in design stress column for which erection stresses determine sections.
Principal erection and erection wind stresses are shown for 90-Ton traveler at p.p. 19 and all steel in place except roadway steel grid.
Principal stresses are shown for 30# Lat. Wind to indicate their magnitude.
Combined stresses for a 15# Lat. Wind were investigated but do not in any case require additional section.



DEAD PANEL LOADS
KIPS PER TRUSS

Panel Pt.	Special Details	Constant Load	Floor Steel	Bracing	Truss	Total
0	7	32	14	11	16	80
1	–	64	20	7	24	115
2	–	64	20	9	24	117
3	–	64	20	7	26	117
4	–	64	20	9	26	119
5	–	64	20	7	26	117
6	–	64	20	9	25	118
7	–	64	20	7	26	117
8	–	64	20	9	27	120
9	–	64	20	7	30	121
10	–	64	20	9	34	127
11	–	64	20	13	47	144
U12	–	65	20	14	38	137
L12	40	–	–	13	20	73
12	40	65	20	27	58	210

Special details include expansion dam at 0 and shoe at L12.

AVERAGE DEAD LOADS - P.P.'S 1-11 INCL.

Roadway Slab 2120
Railing, Curb, Sidewalk etc. 180
Floor Beams, Stringers & Joists 692
Bracing 306
Truss 1035
Total .... 4333 #/ft.
or 120 kips per Panel.

Lateral 30# Wind - Average per lin. ft. of bridge - 850#
Live Load (including effect of impact)
Uniform / lin. ft. / Truss .... 1.28 kips.
Concentrated - For Moment .... 64.4 kips / Truss.
For Shear .... 93.0 kips / Truss.

LOADING COMBINATIONS

Dead + Live .... at - 100% Normal Unit Stress.
Dead + 30# Lat. Wind .... at - 100% Normal Unit Stress.
Dead + Live + 15# Lat. Wind .... at - 125% Normal Unit Stress.
Erection Dead + 30# Lat. Wind .... at - 135% Normal Unit Stress.

MAXIMUM AND MINIMUM VERTICAL REACTIONS - R1 - KIPS PER TRUSS

Loading	Leeward Truss	Windward Truss
Dead Load (90# Fl.)	+470	
Dead Load (65# Fl.)		+410
Live Load	+280	– 70
30# - Lat. Wind	+ 50	– 50
15# (or Min.) Lat. Wind	+ 30	– 30
Lat. Wind on L.-L.	+ 10	– 10
D.L. + L.L.	+750	+340
D.L. + 30# Lat. Wind.	+520	+360
D.L. + L.L. + 15# W + L.L. W	+790	+300
Erection	+ 60	+ 60
30# Erection Wind.	– 10	– 60
Erection + E.W.	+ 50 (A)	0 (B)

LATERAL WIND REACTIONS PER PIER FOR R1

30# W	15# W (or Min.)	L.L. Wind
±120k	±65k	±15k

LONGITUDINAL REACTIONS PER TRUSS FOR R1

30# W	15# W (or Min.)	L.L. Wind
±240k	±130k	±30k
Traction = ±80k		

ERECTION REACTIONS
(A) Trav. at p.p. 19 - 30# W. on Center Span.
(B) Trav. at p.p. 19 - 30# W. on End Span.

All stitch rivets for truss members - ⅞"φ
All shop and field rivets for truss joints - 1"φ

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

REVISIONS
Add angles to member L0-L1 at fixed ends. 5-18-39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

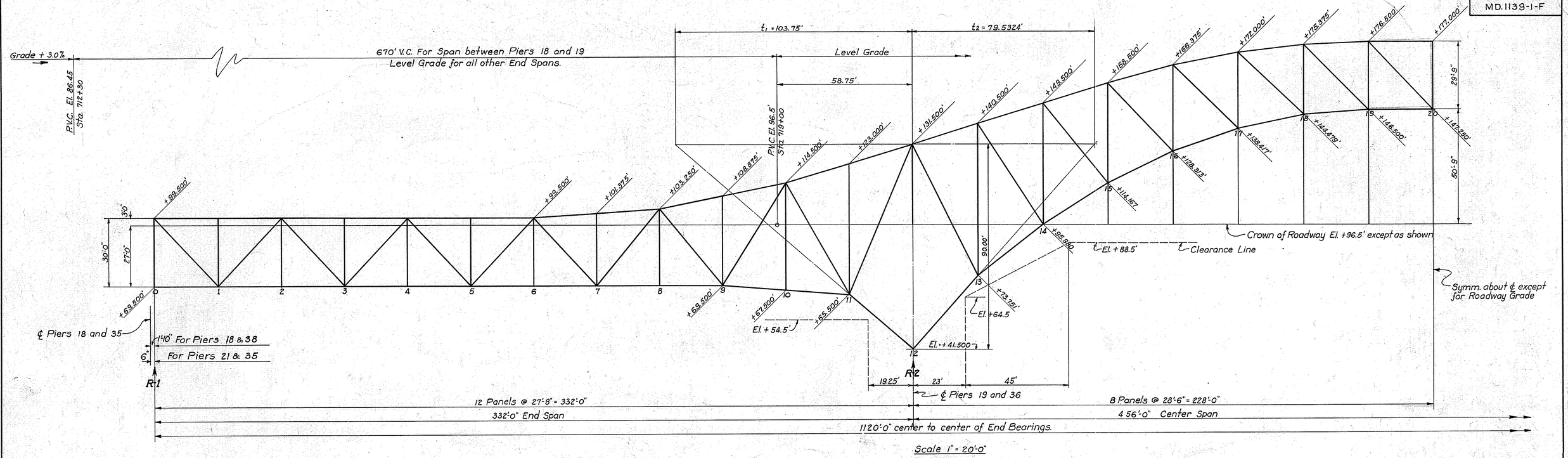
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
MAIN SPANS - STRESS SHEET

SCALE ½" = 1'-0", 1" = 100'
CONTRACT H-232-4-437

MADE BY J. E. GREINER CO.
TRACED BY J. E. GREINER CO.
CHECKED BY J. E. GREINER CO.
APPROVED. [signature] BRIDGE ENGINEER
APPROVED [signature] CHIEF ENGINEER 4/11/39
APRIL 11, 1939
SHEET NO. 22 OF 37
C-354-4-22

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

P.W.A. PROJECT
MD.1139-1-F



Panel Pts.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Truss Height	30.000	30.000	30.000	30.000	30.000	30.000	30.000	31.875	33.750	39.375	47.000	57.500	90.000	66.749	53.520	44.333	38.062	33.583	30.896	30.000	29.750

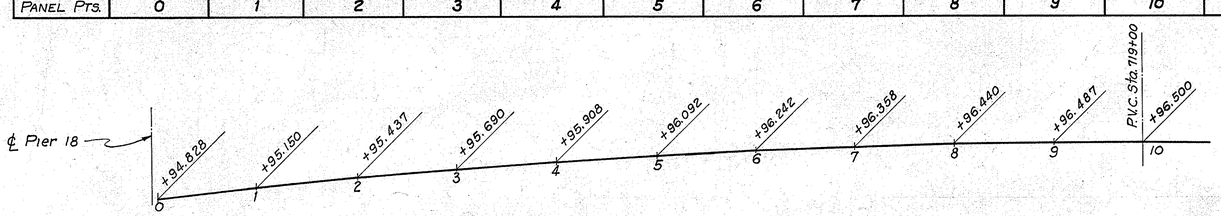
Top Chords	U_0-U_2	U_2-U_4	U_4-U_6	U_6-U_8	U_8-U_{10}	$U_{10}-U_{12}$	$U_{12}-U_{13}$	$U_{13}-U_{14}$	$U_{14}-U_{15}$	$U_{15}-U_{16}$	$U_{16}-U_{17}$	$U_{17}-U_{18}$	$U_{18}-U_{19}$	$U_{19}-U_{20}$
Length	55.333	55.333	55.333	55.460	56.465	57.886	29.887	29.887	29.887	29.568	29.050	28.699	28.522	28.504
Secant	1.0	1.0	1.0	1.00229	1.02046	1.04613	1.04867	1.04867	1.04867	1.03747	1.01929	1.00699	1.00078	1.00014
Vert. Height	0.0	0.0	0.0	3.750	11.250	17.000	9.000	9.000	9.000	7.875	5.625	3.375	1.125	0.500
Tangent	0.0	0.0	0.0	0.06777	0.20331	0.30722	0.31578	0.31578	0.31578	0.27631	0.19736	0.11842	0.03947	0.01754

Bottom Chords	L_0-L_1	L_1-L_3	L_3-L_5	L_5-L_7	L_7-L_9	L_9-L_{11}	$L_{11}-L_{12}$	$L_{12}-L_{13}$	$L_{13}-L_{14}$	$L_{14}-L_{15}$	$L_{15}-L_{16}$	$L_{16}-L_{17}$	$L_{17}-L_{18}$	$L_{18}-L_{19}$	$L_{19}-L_{20}$
Length	27.667	55.333	55.333	55.333	55.333	55.478	36.626	43.039	36.144	33.809	31.818	30.238	29.138	28.572	28.510
Secant	1.0	1.0	1.0	1.0	1.0	1.00261	1.32382	1.51014	1.26820	1.18627	1.11642	1.06098	1.02237	1.00251	1.00035
Vert. Height	0.0	0.0	0.0	0.0	0.0	4.000	24.000	32.251	22.229	18.187	14.146	10.104	6.062	2.021	0.750
Tangent	0.0	0.0	0.0	0.0	0.0	0.07228	0.86746	1.13161	0.77996	0.63814	0.49635	0.35452	0.21270	0.07091	0.02632

Symm. about ℄

Diagonals-Length	40.810	40.810	40.810	40.810	40.810	40.810	40.810	43.640	43.640	52.825	56.271	71.564	64.399	52.861	45.395	41.515	39.924	39.626	40.571	40.839
Vert. Height	30.000	30.000	30.000	30.000	30.000	30.000	30.000	33.750	33.750	45.000	49.000	66.000	57.749	44.520	35.333	30.187	27.958	27.521	28.875	29.250
Vert. Secant	1.36033	1.36033	1.36033	1.36033	1.36033	1.36033	1.36033	1.29305	1.29305	1.17388	1.14839	1.08430	1.11515	1.18734	1.28476	1.37531	1.42799	1.43985	1.40506	1.39621

Panel Pts.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20



CROWN ELEVATIONS ON VERTICAL CURVE BETWEEN PIERS 18 & 19

VERTICAL SCALE 1" = 2'-0"

NOTE:-

Geometric Figure shown applies to two groups of 3-Spans each between Piers 18 & 21 and 35 & 38 respectively. Truss outline identical for two groups. Roadway grade is level with crown at Elevation +96.5' except on Span between Piers 18 and 19 for which vertical curve is shown. For this Span the truss elevation is the same as for other End Spans but Floor System is to be lowered to conform to elevations shown for vertical curve.

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE

BETWEEN

HAVRE DE GRACE & PERRYVILLE

MAIN SPANS - GEOMETRIC FIGURE

Scale 1" = 20' Contract H-232-4-437

Made by J.E. GREINER CO.
Traced by J.E. GREINER CO.
Checked by J.E. GREINER CO.
Approved — Bridge Engineer
Approved — Chief Engineer 4/11/39

April 11, 1939

Sheet No. 21 of 37
C-354-4-21

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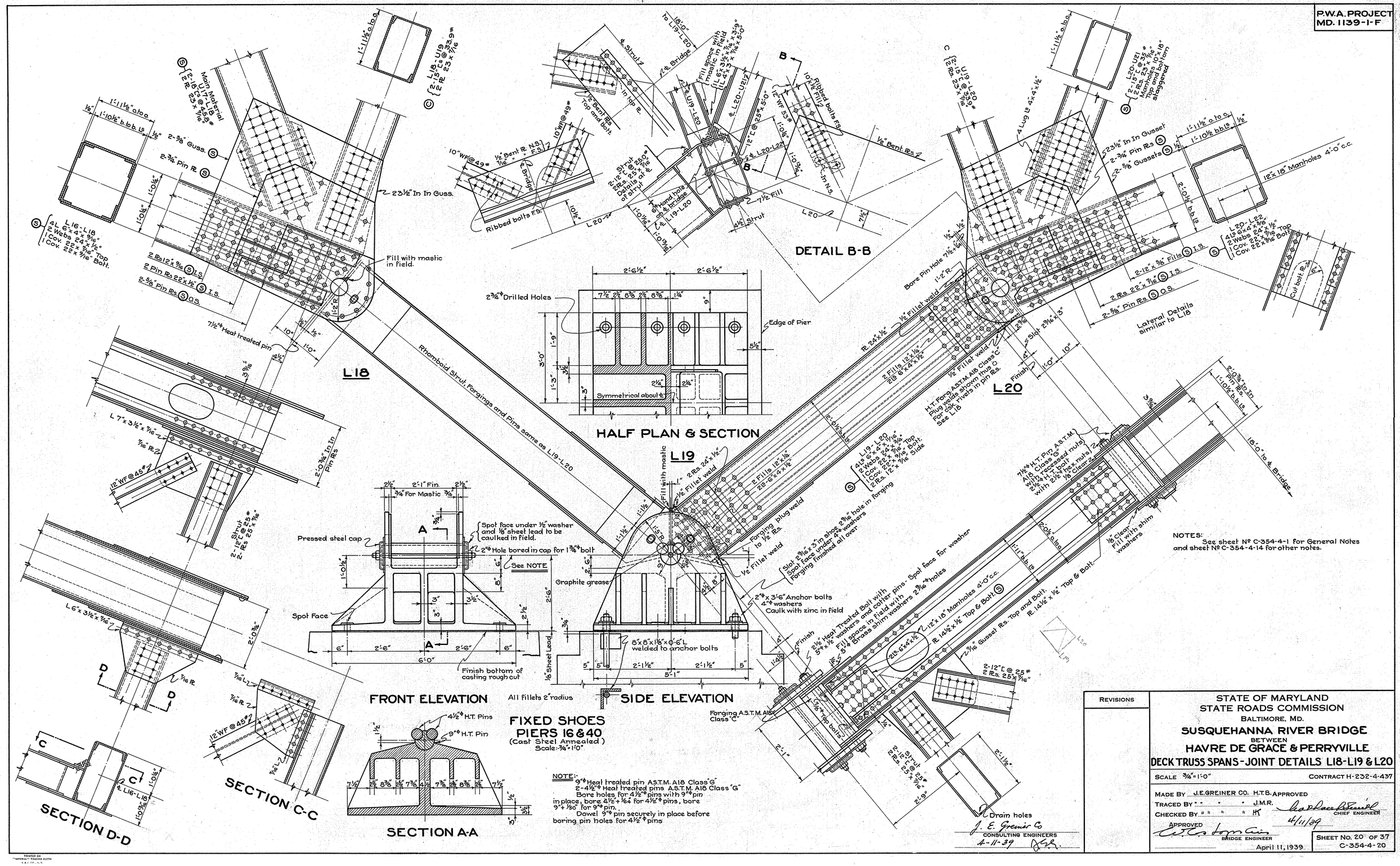

REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE DECK TRUSS SPANS - JOINT DETAILS L18-L19 & L20
	SCALE 3/4" = 1'-0" — CONTRACT H-232-4-437
	MADE BY J.E. GREINER CO. H.T.B. APPROVED TRACED BY " " " J.M.R. CHECKED BY " " " H.T. APPROVED — BRIDGE ENGINEER — CHIEF ENGINEER April 11, 1939 — 4/11/39
	SHEET No. 20 OF 37 C-354-4-20

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

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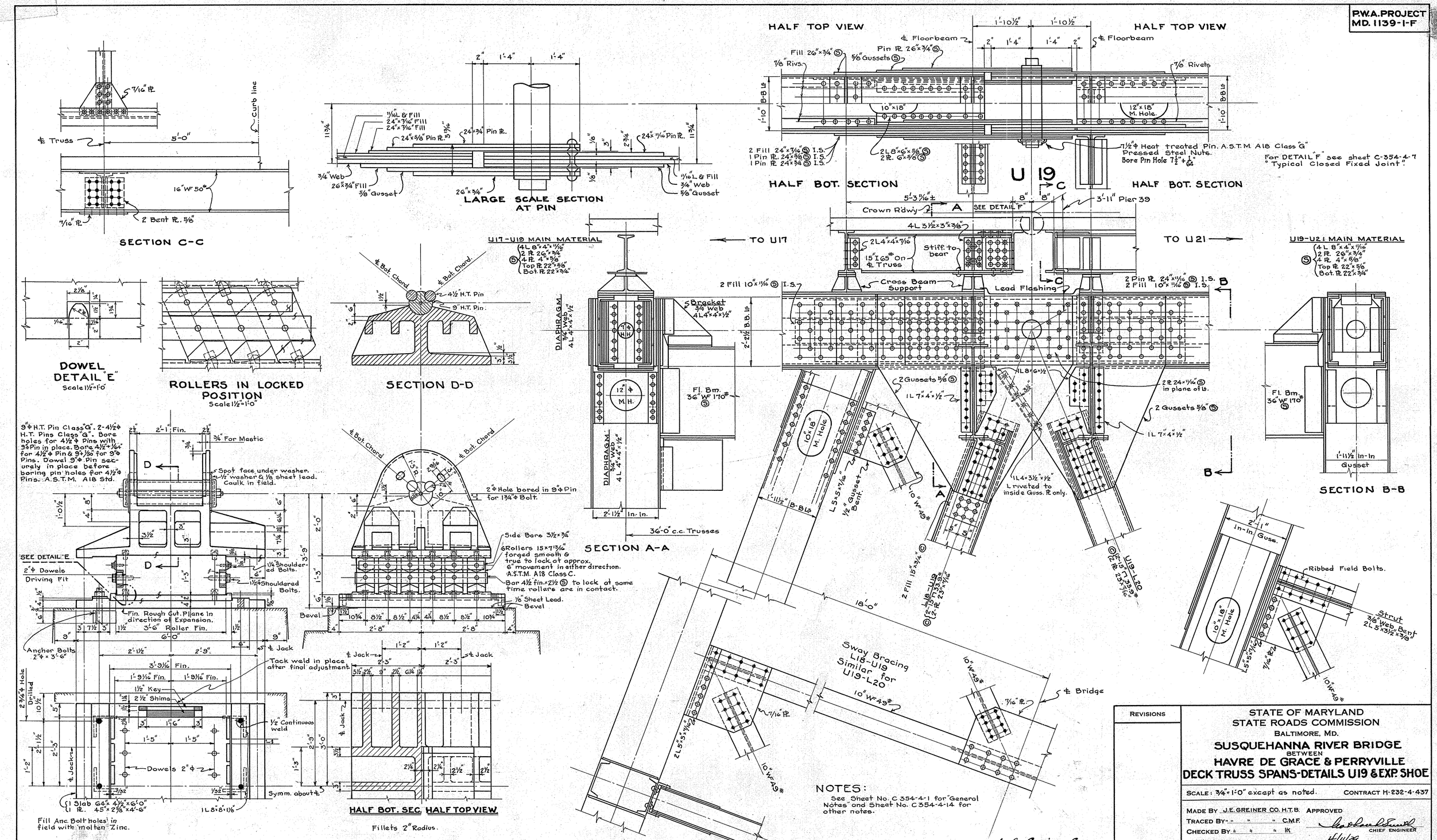

REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE DECK TRUSS SPANS-DETAILS U19 & EXP. SHOE
	SCALE: 3/4"=1'-0" except as noted. CONTRACT H-232-4-437
	MADE BY J.E. GREINER CO. H.T.B. APPROVED TRACED BY " " " C.M.F. CHECKED BY " " " HK APPROVED CHIEF ENGINEER BRIDGE ENGINEER APRIL 11, 1939
	SHEET No. 19 OF 37 C-354-4-19

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

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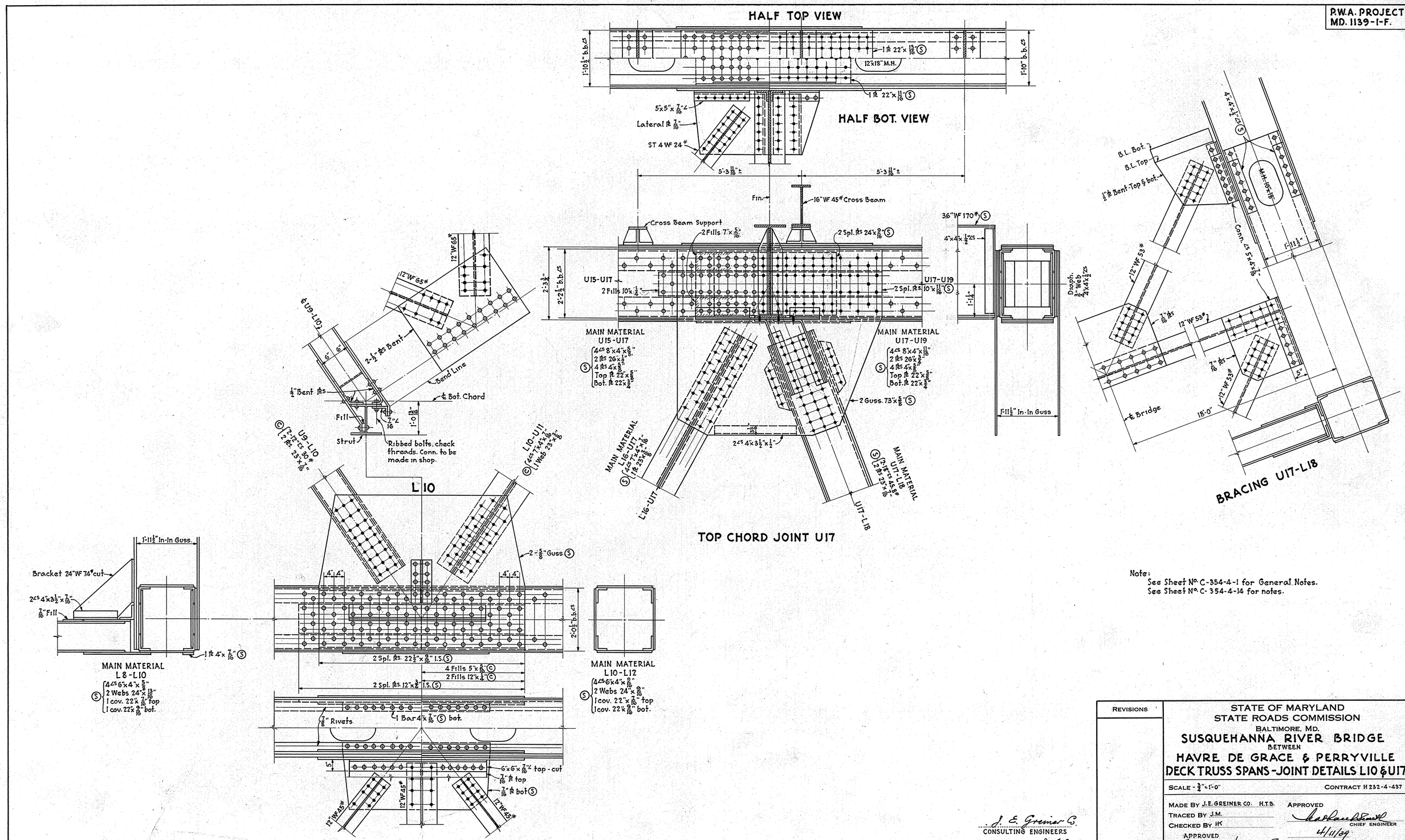

Note:
See Sheet No. C-354-4-1 for General Notes.
See Sheet No. C-354-4-14 for notes.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE DECK TRUSS SPANS - JOINT DETAILS L10 & U17
	SCALE - 3/4" = 1'-0" CONTRACT H 232-4-437
	MADE BY J.E. GREINER CO. H.T.B. APPROVED TRACED BY J.M. CHECKED BY H.K. CHIEF ENGINEER 4/11/39 APPROVED BRIDGE ENGINEER April 11, 1939. SHEET No. 18 OF 37 C-354-4-18

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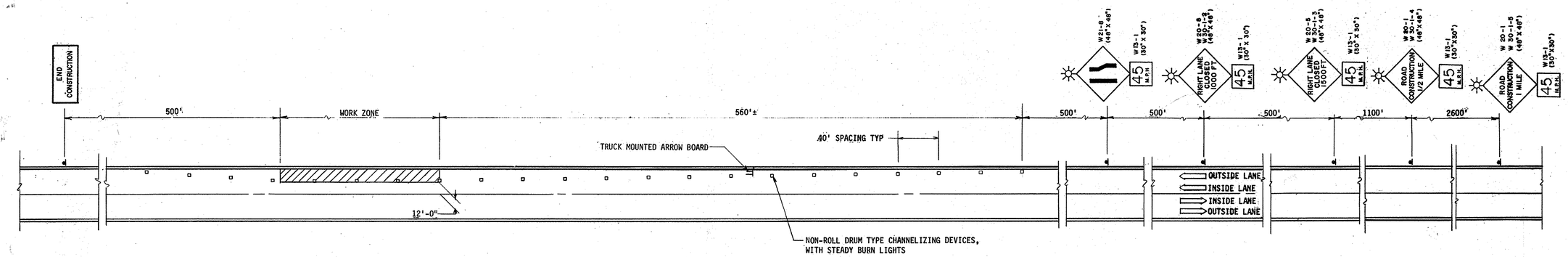
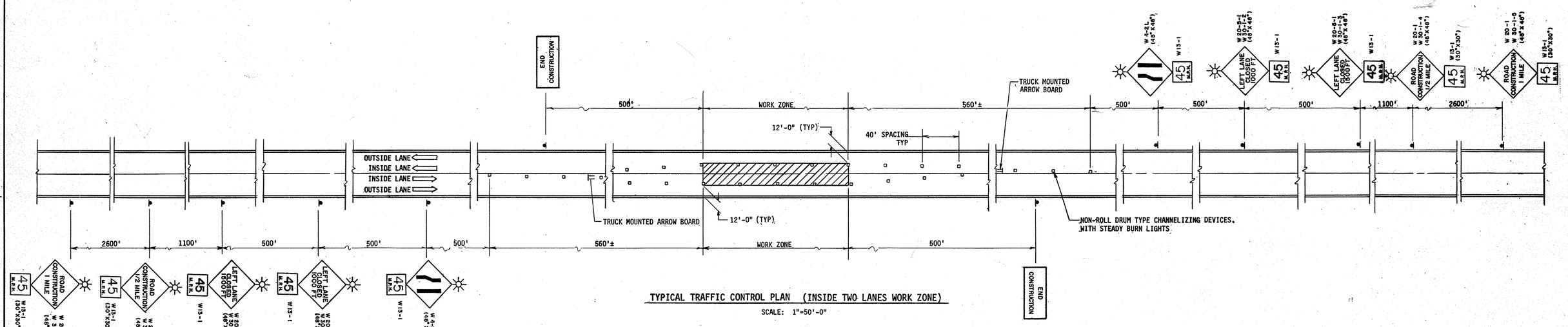
K&E BALTIMORE 19 1253



TYPICAL TRAFFIC CONTROL PLAN (OUTSIDE LANE WORK ZONE)

SCALE: 1"=50'-0"



TYPICAL TRAFFIC CONTROL PLAN (INSIDE TWO LANES WORK ZONE)

SCALE: 1"=50'-0"

CONSTRUCTION STAGING

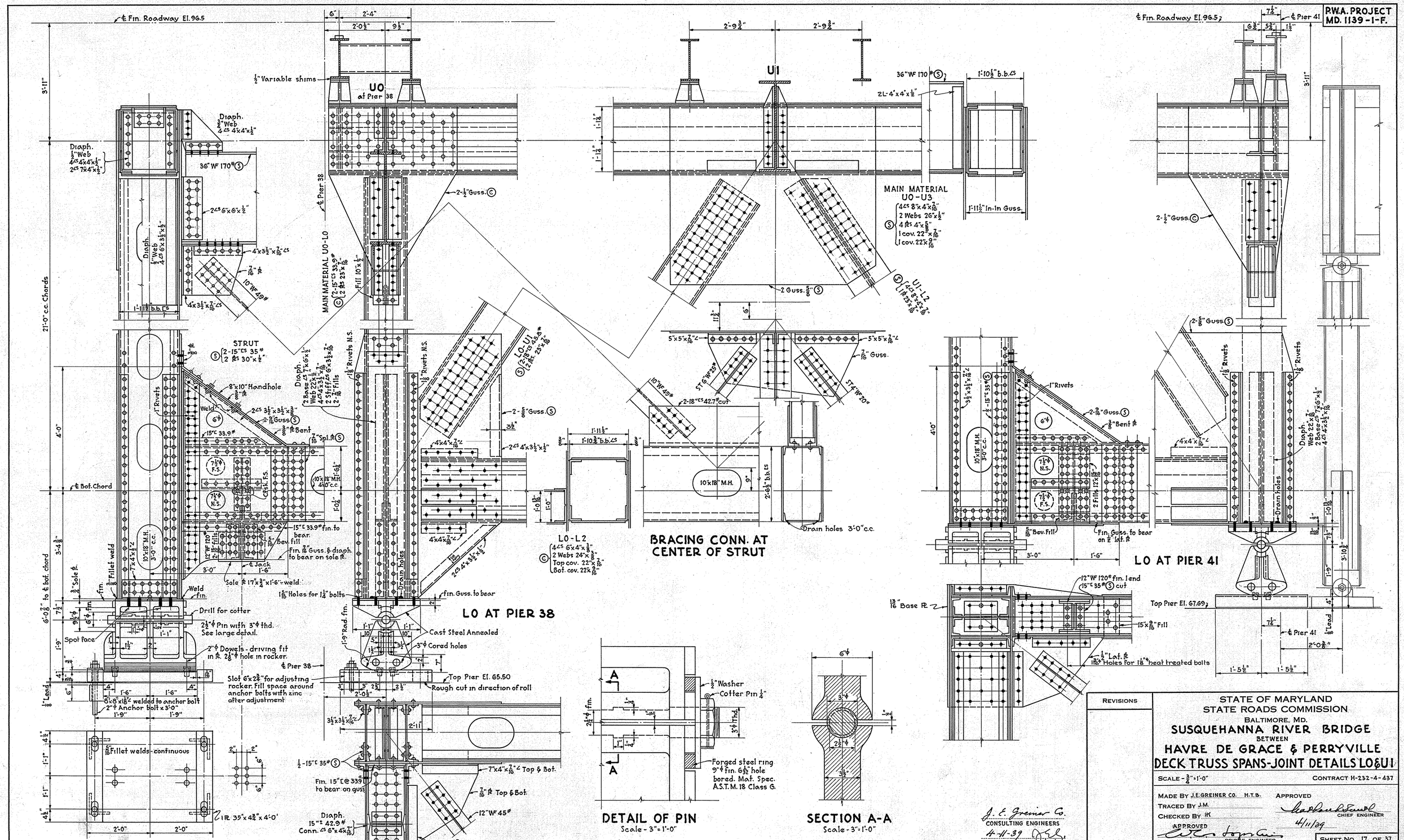
THE REHABILITATION WORK SHALL EITHER BE CONDUCTED IN THE WESTERLY DIRECTION IN THE WESTBOUND ROADWAY BEGINNING AT SPAN 51 OR IN THE EASTERLY DIRECTION IN THE EASTBOUND ROADWAY BEGINNING AT THE WEST ABUTMENT.

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO.1.
2. ALL LANES, TAPERS AND TRANSITIONS WILL BE STRIPED WITH TEMPORARY PAVEMENT MARKING TAPE. NO PAINT STRIPING WILL BE USED WITHOUT THE APPROVAL OF THE ENGINEER.
3. FOR LIMITATIONS ON THE WORK ZONES SEE NOTES ON THE PERTINENT DRAWINGS SHOWING THE STRENGTHENING DETAIL.

REVISIONS	MARYLAND TRANSPORTATION AUTHORITY SUSQUEHANNA RIVER BRIDGE - REHABILITATION TRAFFIC CONTROL PLANS CONT. NO. TFA 2-1250-20 SHEET NO. 18 OF 18 DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F.



J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
DECK TRUSS SPANS-JOINT DETAILS L0 & U1

SCALE - ¾" = 1'-0" | CONTRACT H-232-4-437

MADE BY J.E. GREINER CO. H.T.B. | APPROVED
TRACED BY J.M.
CHECKED BY HK
APPROVED — BRIDGE ENGINEER
CHIEF ENGINEER 4/11/39

April 11, 1939

SHEET No. 17 OF 37
C-354-4-17

PRINTED ON "IMPERIAL" TRACING CLOTH
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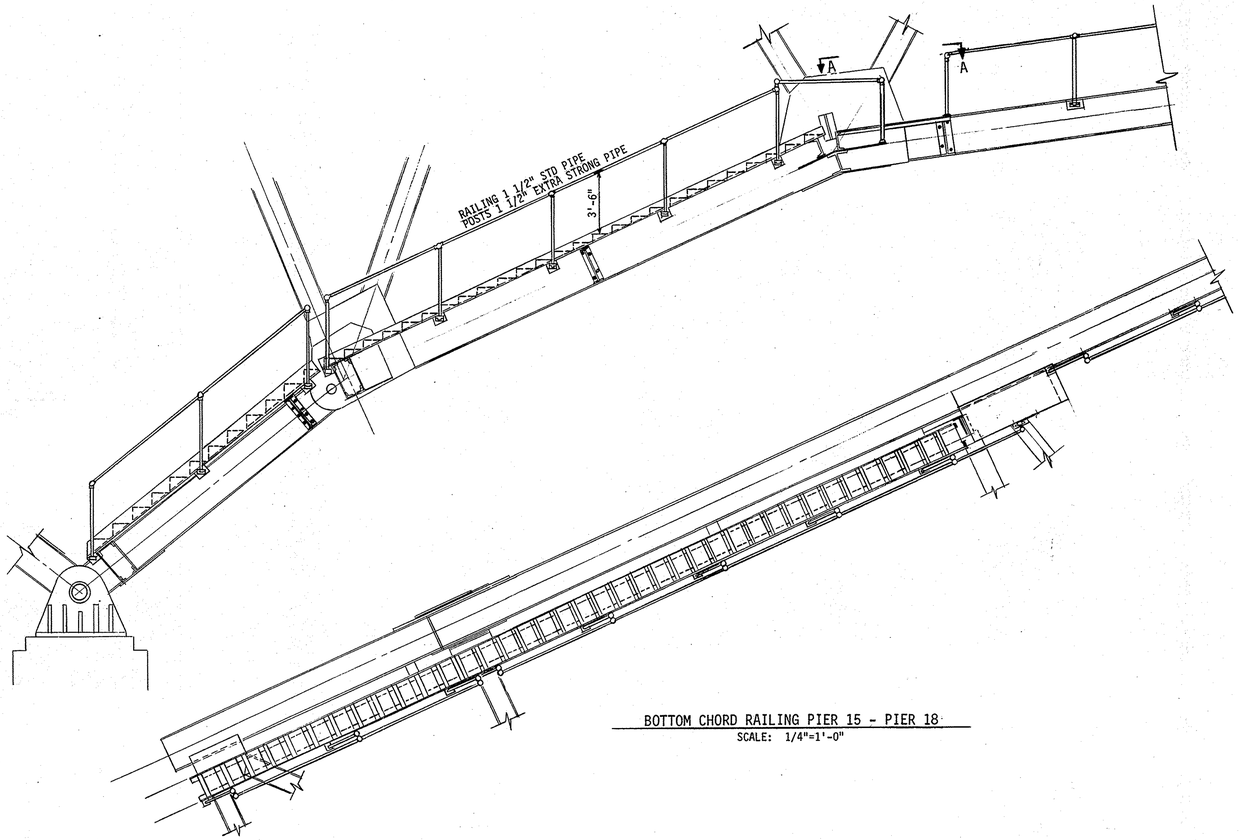
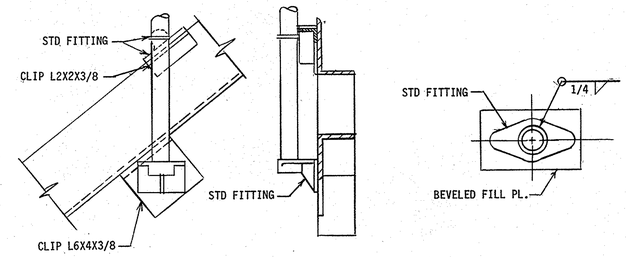
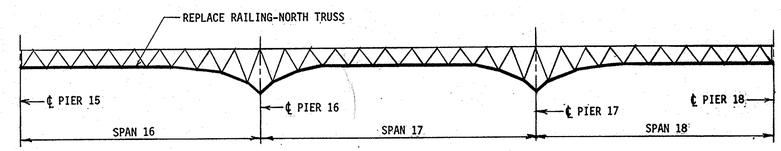


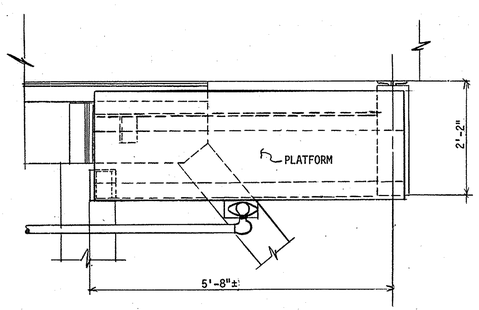
BOTTOM CHORD RAILING PIER 15 - PIER 18
SCALE: 1/4"=1'-0"



RAILING CONNECTIONS



LOCATION DIAGRAM



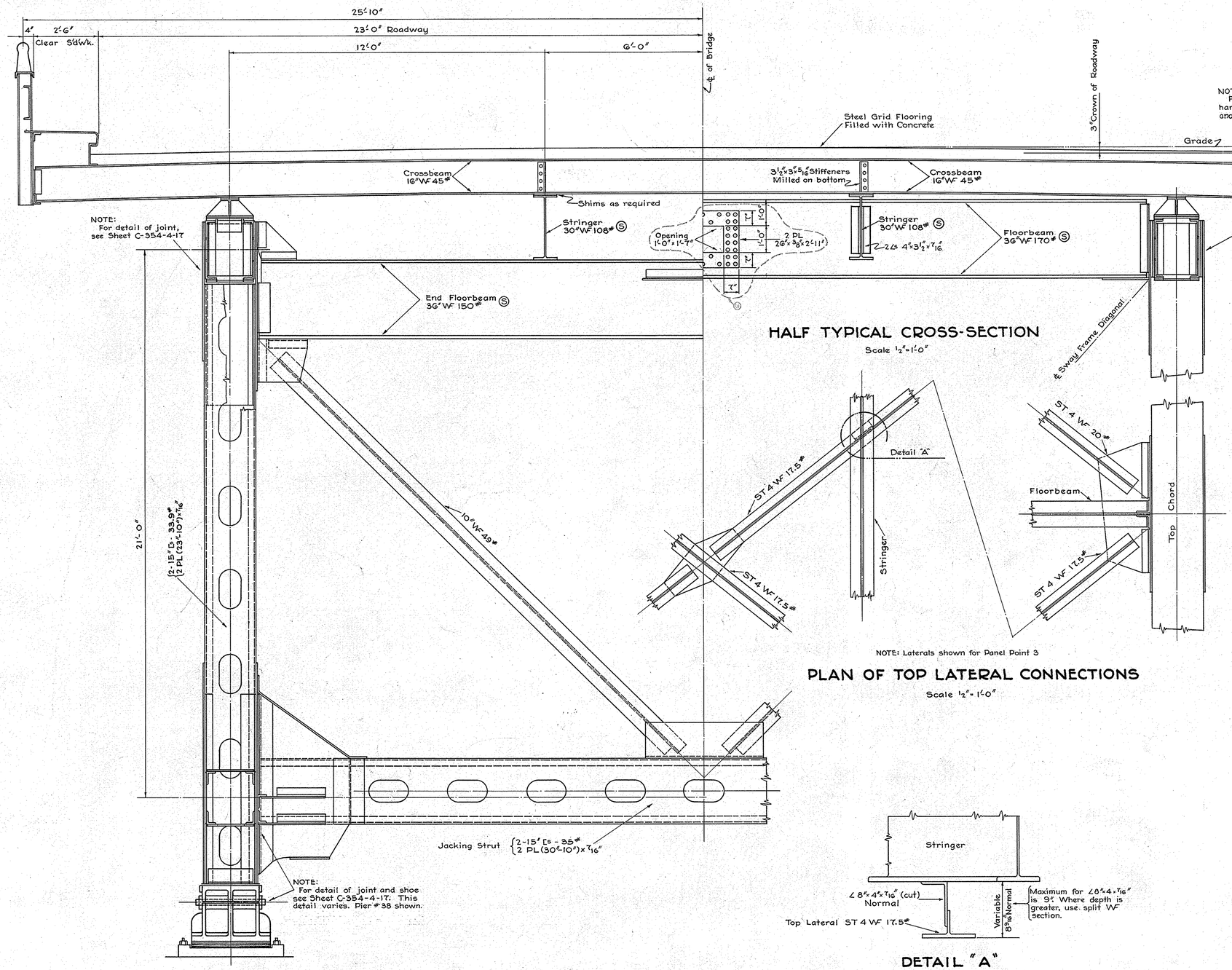
SECTION A-A
SCALE: 3/4"=1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1
2. USE FIELD DIMENSIONS FOR FABRICATION.
3. EXISTING FITTINGS ARE TO BE REUSED. ANY MISSING OR LOOSE FITTINGS ARE TO BE REPLACED.
4. EXISTING STRUCTURAL STEEL IS SILICON STEEL.
5. NO HEAT TO BE APPLIED ON SILICON STEEL.

REVISIONS	MARYLAND TRANSPORTATION AUTHORITY **SUSQUEHANNA RIVER BRIDGE - REHABILITATION** STAIRWAYS & WALKWAYS STRENGTHENING CONT. NO. TFA 2-1250-20 SHEET NO. 17 OF 18 DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F



NOTE:
For detail of joint, see Sheet C-354-4-17

NOTE:
For detail of joint see Sheet C-354-4-17.

NOTE:
For detail of sidewalk and handrailing, see Sheet C-354-4-7. and C-354-4-13

NOTE:
For detail of joint and shoe see Sheet C-354-4-17. This detail varies. Pier #38 shown.

HALF TYPICAL CROSS-SECTION

Scale ½"=1'-0"

HALF CROSS-SECTION OF TRUSS AT END PANEL

Scale ½"=1'-0"

NOTE: Laterals shown for Panel Point 3

PLAN OF TOP LATERAL CONNECTIONS

Scale ½"=1'-0"

DETAIL OF BOLSTER

Scale 1½"=1'-0"

DETAIL "A"

TOP LATERAL CONNECTION TO STRINGER

Scale 1½"=1'-0"

NOTES:
See Sheet No. C-354-4-1 for General Notes.
See Sheet No. C-354-4-13 for Roadway Exp. Joint Details.
See Sheet No. C-354-4-35 for Sdwk., Handrail and Fascia Exp. Joint Detail.
See Sheet No. C-354-4-36 & 37 for Drainage Details.

REVISIONS
① Provisions for utility conduits removed. 5/16/39 E.O.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
DECK TRUSS SPANS-TYPICAL CROSS SECTIONS

SCALE - AS NOTED — CONTRACT H-232-4-437

MADE BY J.E. GREINER CO. A.K. — APPROVED
TRACED BY J.E. GREINER CO. A.K. — CHIEF ENGINEER
CHECKED BY HK
APPROVED 4/11/39
BRIDGE ENGINEER
APRIL 11, 1939

SHEET No. 16 OF 37
C-354-4-16

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

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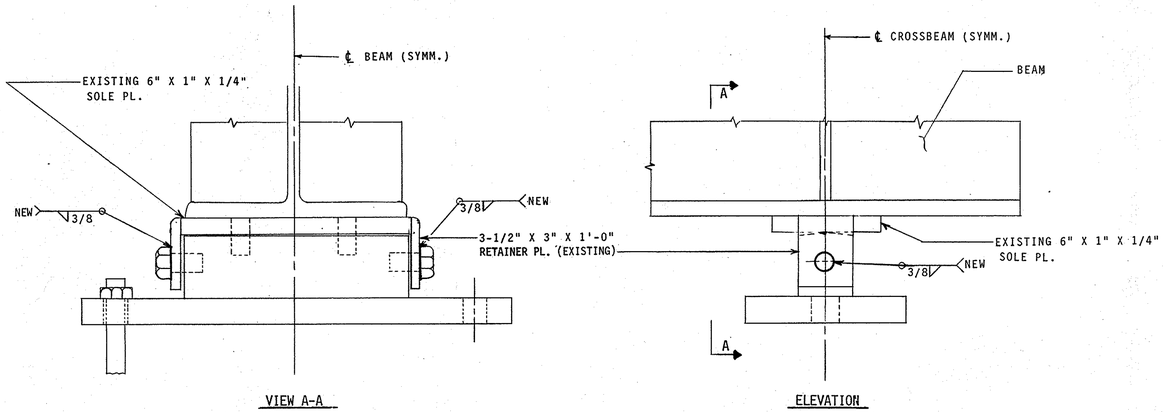
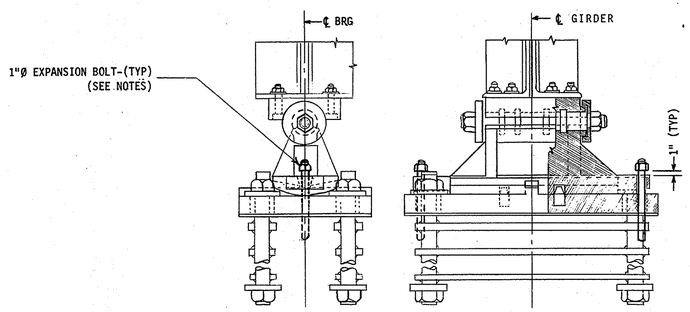


TYPICAL BEARING EAST AND WEST ABUTMENT (FIXED)
SCALE: 3" = 1'-0"

SUMMARY OF STRENGTHENING - THIS SHEET		
LOCATION	MEMBER	NO. OF MEMBERS
EAST ABUTMENT	FIXED BEARING REPAIR	8
WEST ABUTMENT	FIXED BEARING REPAIR	8
PIER 28	EXPANSION BEARING REPAIR	4



TYPICAL BEARING PIER 28
SCALE: 1" = 1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. REMOVE ALL EXISTING RETAINING LUG WELD MATERIAL AT THE EAST AND WEST ABUTMENTS PRIOR TO REPLACING WITH NEW FILLET WELDS.
3. PIER 28 1" Ø BOLT REPLACEMENT:
   A. REMOVE STUD TO BE REPLACED AND CLEAN OPEN HOLE.
   B. DRILL 1" Ø HOLE THROUGH MASONRY PLATE AND 4 INCHES INTO CONCRETE.
   C. FIT HOLE WITH 1" Ø EXPANSION BOLT TO BE TIGHTENED SUFFICIENTLY TO OBTAIN EXPANSION, BUT LEAVING A 1" SPACE FROM BOLT HEAD TO ROCKER BEARING AS SHOWN.
4. WORK ON THE BEARINGS SHALL BE CARRIED OUT WHEN ONE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED UNDER THE LANE CLOSED. THE WORK ZONE SHALL COVER THE SPAN THE BEARING IS IN.

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
BEARING REPAIRS

CONT. NO. TFA 2-1250-20 SHEET NO. 16 OF 18
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD-1139-1-F

WEB MEMBERS

MEMBER	STRESSES 1 DEAD	2 LIVE	3 30# WIND	DESIGN STRESS	L ft.	r in.	L/r	ALLOW k/□"	REQ'D AREA	AREA FURN. EFF. GROSS	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	NET AREA
U0-L0	-52	-53	-28 +28	-105	21.0	6.46	38.9	-14.62	7.18-G.	31.18		C	2-15⊏ 33.9# = 19.80 2 Pls(23-10)x 7/16 = 20.12	39.92	
L0-U1	-434	-299 +54		-733	25.3	7.44	40.8	-19.43	37.7-G.	38.14		S	2-18⊏ 45.8# = 26.76 2 Pls(23-10)x 7/16 = 20.12	46.88	
U1-L2	+348	+250 -54		+598	25.3			+24.0	24.9-N.		25.38	S	4∠s 8x4x 7/16 = 20.24 1WPl 23x 7/16 = 10.06	30.30	16.30 9.08 25.38
L2-U3	-327	-250 +54	-9 +9	-577	25.3	6.43	47.1	-19.11	30.2-G	31.18		S	2-15⊏ 33.9# = 19.80 2 Pls(23-10)x 7/16 = 20.12	39.92	
U3-L4	+210	+195 -66		+405	25.3			+18.0	22.5-N.		23.62	C	4∠s 7x4x 7/16 = 18.48 1WPl 23x 7/16 = 10.06	28.54	14.54 9.08 23.62
L4-U5	-191	-195 +66		-386	25.3	5.12	59.5	-13.75	28.1-G.	28.96		C	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
U5-L6	+73	+147 -93		+241 -63	25.3	2.77	110.	+18.0	13.4-N.		20.32	C	4∠s 7x4x 3/8 = 15.92 1WPl 23x 3/8 = 8.63	24.55	12.54 7.78 20.32
L6-U7	-49	-147 +93	-9 +9	-226 +89	25.3	5.29	57.4	-13.86	16.3-G.	28.96		C	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
U7-L8	-73	-126 +105		-226 +81	25.3	5.29	57.4	-13.86	16.3-G.	28.96		C	2-12⊏ 30# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
L8-U9	+94	+126 -105		+240 -59	25.3	2.77	110.	+18.0	13.3-N.		20.32	C	4∠s 7x4x 3/8 = 15.92 1WPl 23x 3/8 = 8.63	24.55	12.54 7.78 20.32
U9-L10	-215	-166 +69	-9 +9	-381	25.3	5.34	56.8	-13.89	27.5-G	28.96		C	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
L10-U11	+238	+166 -69		+404	25.3			+18.0	22.4-N.		22.32	C	4∠s 7x4x 7/16 = 18.48 1WPl 23x 3/8 = 8.62	27.10	14.54 7.78 22.32
U11-L12	-353	-213 +40		-566	25.3	6.47	46.9	-19.11	29.6-G.	31.18		S	2-15⊏ 33.9# = 19.80 2 Pls(23-10)x 7/16 = 20.12	39.92	
L12-U13	+381	+219 -25		+600	25.3			+24.0	25.0-N.	30.30	25.38	S	4∠s 8x4x 7/16 = 20.24 1WPl 23x 7/16 = 10.06	30.30	16.30 9.08 25.38
U13-L14	-489	-271 +11	-9 +9	-760	26.3	6.02	52.5	-18.79	40.5-G.	40.66		S	2-15⊏ 50.0# = 29.28 2 Pls(23-10)x 7/16 = 20.12	49.40	
L14-U15	+448	+256 -8		+704	26.3			+24.0	29.3-N.		29.74	S	4∠s 8x4x 9/16 = 25.72 1WPl 23x 7/16 = 10.06	35.78	20.66 9.08 29.74
U15-L16	-541	-306 +8		-847	29.6	7.53	47.2	-19.10	44.1-G.	44.98		S	2-18⊏ 51.9# = 30.36 2 Pls(23-10)x 9/16 = 25.88	56.24	
L16-U17	+274	+261 -107		+535	29.6			+24.0	22.3-N.		22.32	S	4∠s 7x4x 7/16 = 18.48 1WPl 23x 3/8 = 8.62	27.10	14.54 7.78 22.32
U17-L18	-364	-294 +94		-658	40.0	7.45	64.3	-17.99	36.6-G.	38.14		S	2-18⊏ 45.8# = 26.76 2 Pls(23-10)x 7/16 = 20.12	46.88	
L18-U19	-32	-160 +145		-254 +185	40.0	6.46	74.3	-12.88	19.7-G. 10.3-N.	31.18		C	2-15⊏ 33.9# = 19.80 2 Pls(23-10)x 7/16 = 20.12	39.92	
U19-L20	-114	-173 +135		-315 +83	40.0	6.46	74.3	-12.88	24.5-G 4.6-N	31.18		C	2-15⊏ 33.9# = 19.80 2 Pls(23-10)x 7/16 = 20.12	39.92	
L20-U21	-243	-289 +126		-532	40.0	6.28	76.4	-16.99	31.3-G.	31.84		S	2-15⊏ 35.0# = 20.46 2 Pl (23-10)x 7/16 = 20.12	40.58	
U21-L22	+145	+258 -141		+423 -59	29.4	3.22	110.	+18.0	23.5-N.		25.38	C	4∠s 8x4x 7/16 = 20.24 1WPl 23x 7/16 = 10.06	30.30	16.30 9.08 25.38
L22-U23	-420	-318 +66		-738	29.4	6.02	58.7	-18.39	40.2-G.	40.66		S	2-15⊏ 50.0# = 29.28 2 Pls(23-10)x 7/16 = 20.12	49.40	
U23-L24	+323	+268 -69		+591	25.9			+24.0	24.6-N.		24.91	S	4∠s 7x4x 7/16 = 18.48 1WPl 23x 1/2 = 11.50	29.98	14.54 10.37 24.91
L24-U25	-382	-286 +60	-9 +9	-668	25.9	7.53	41.1	-19.41	34.4-G	36.34		S	2-18⊏ 42.7# = 24.96 2 Pls(23-10)x 7/16 = 20.12	45.08	
U25-L26	+274	+233 -65		+507	24.4			+24.0	21.1-N.		22.32	S	4∠s 7x4x 7/16 = 18.48 1WPl 23x 3/8 = 8.62	27.10	14.54 7.78 22.32
L26-U27	-267	-223 +72		-490	24.4	5.16	56.6	-18.53	26.4-G.	28.96		S	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
U27-L28	+151	+175 -99		+326	24.4			+18.0	18.1-N		18.85	C	4∠s 6x4x 3/8 = 14.44 1WPl 23x 3/8 = 8.63	23.07	11.06 7.79 18.85
L28-U29	-130	-175 +99	-9 +9	-308 +12	24.4	5.29	55.4	-13.96	22.1-G	28.96		C	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	
U29-L30	+10	+133 -133		+206 -189	24.4	5.29	55.4	+18.0 -13.96	11.5-N 13.6-G	28.96	21.29	C	2-12⊏ 30.0# = 17.58 2 Pls(23-10)x 7/16 = 20.12	37.70	11.88 9.41 21.29

TOP CHORD

MEMBER	STRESSES 1 DEAD	2 LIVE	3 M_ac/r^2 ★	4 30# WIND	DESIGN STRESS	L ft.	r in.	L/r	ALLOW k/□"	REQ'D AREA	AREA FURN. EFF. GROSS	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	NET AREA
U0-U1	0	0	-448	0	-448	14.1	9.68	17.5	-20.22	22.1-G.	71.50		S	4∠s 8x4x 7/16 = 20.24 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	78.25	
U1-U3	-436	-267 +55	-670	-46	-1373	28.2	9.68	35.0	-19.68	69.8-G.	71.50		S	4∠s 8x4x 7/16 = 20.24 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl. 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	78.25	
U3-U5	-736	-466 +110	-705	-66	-1907	28.2	9.62	35.0	-19.68	97.1-G.	98.13		S	4∠s 8x4x 11/16 = 31.12 2WPl 26x 11/16 = 35.76 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl (22-12)x 3/4" = 16.50	107.13	
U5-U7	-883	-590 +165	-775	-77	-2248	28.2	9.64	35.0	-19.68	114.4-G.	115.64		S	4∠s 8x4x 3/4 = 33.76 4WPls 26x 1/2 = 52.00 4Flg Pls 4x 5/8 = 10.00 1CPl 21x 5/8 = 13.13 1CPl(21-12)x 3/4 = 15.75	124.64	
U7-U9	-869	-639 +220	-775	-80	-2283	28.2	9.64	35.0	-19.68	116.1-G.	115.64		S	4∠s 8x4x 3/4" = 33.76 4WPls 26x 1/2 = 52.00 4Flg Pls 4x 5/8 = 10.00 1CPl 21x 5/8 = 13.13 1CPl (21-12)-3/4 = 15.75	124.64	
U9-U11	-697	-622 +275	-711	-80	-2030	28.2	9.64	35.0	-19.68	103.1-G.	104.01		S	4∠s 8x4x 3/4 = 33.76 2WPls 26x 3/4 = 39.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	113.01	
U11-U13	-368	-531 +330	-662 +645	-73 +58	-1597 +753	28.2	9.70	34.8	-19.69	81.2-G.	82.97		S	4∠s 8x4x 9/16 = 25.72 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	91.97	
U13-U15	+106	+364 -345	+656 -672	+33 -58	+1262 -1079	28.2	9.68	35.0	+24.0 -19.68	52.7-N. 54.8-G	71.50	57.01	S	4∠s 8x4x 7/16 = 20.24 2WPl 26x 1/2 = 26.00 4Flg Pl 4x 5/8 = 10.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	78.25	16.30 21.50 7.19 7.66 4.36
U15-U17	+604	+357 -102	+632	0 -33	+1593	28.2			+24.0	66.4-N.	85.47	68.04	S	4∠s 8x4x 5/8 = 28.22 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	94.47	22.60 21.50 7.19 10.94 5.81
U17-U19	+861	+375 -33	+666	0	+1902	28.2			+24.0	79.3-N.	101.37	81.13	S	4∠s 8x4x 11/16 = 31.12 2WPls 26x 3/4 = 39.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	110.37	24.94 32.25 7.19 10.94 5.81
U19-U21	+890	+375 -20	+666	0	+1931	28.2			+24.0	80.5-N.	101.37	81.13	S	4∠s 8x4x 11/16 = 31.12 2WPls 26x 3/4 = 39.00 4Flg. Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	110.37	24.94 32.25 7.19 10.94 5.81
U21-U23	+736	+364 -71	+637	0 -35	+1737	28.2			+24.0	72.4-N.	91.01	72.45	S	4∠s 8x4x 3/4 = 33.76 2WPls 26x 1/2 = 26.00 4Flg Pl 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	100.01	27.01 21.50 7.19 10.94 5.81
U23-U25	+359	+418 -328	+658 -666	+35 -62	+1474 -782	28.2	9.71	34.8	+24.0 -19.68	61.5-N.	76.98	61.37	S	4∠s 8x4x 9/16 = 25.72 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	83.73	20.66 21.50 7.19 7.66 4.36
U25-U27	-5	-547 +443	-691 +683	-80 +62	-1463 +1342	28.2	9.75	34.7	-19.69 +24.0	74.3-G. 56.0-N.	74.26	59.20	S	4∠s 8x4x 1/2 = 23.00 2WPls 26x 1/2 = 26.00 4Flg Pls 4x 5/8 = 10.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	81.01	18.50 21.49 7.19 7.66 4.36
U27-U29	-246	-659 +430	-698 +666	-88 +80	-1732 +1053	28.2	9.59	35.3	-19.67 +24.0	88.2-G 43.9-N	88.95	70.96	S	4∠s 8x4x 5/8" = 28.44 2WPls 26x 9/16 = 29.26 4Flg. Pls. 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	97.95	22.82 24.20 7.19 10.94 5.81
U29-U31	-326	-693 +418	-715 +682	-88 +88	-1829 +967	28.2	9.61	35.2	-19.67	93.0-G	94.87	75.76	S	4∠s 8x4x 11/16 = 31.12 2WPls 26x 5/8 = 32.50 4Flg. Pls 4x 5/8 = 10.00 1CPl 22x 5/8 = 13.75 1CPl(22-12)x 3/4 = 16.50	103.87	24.94 26.88 7.19 10.94 5.81

★ $M_a = 75\% \left[\frac{M_1}{1 \mp \frac{Sl^2}{10EI}}\right]$, where M_1 = Moment due to gravity loads on member; S = Axial stress in member; l = Length.

BOTTOM CHORD

MEMBER	STRESSES 1 DEAD	2 LIVE	3 30# WIND	DESIGN STRESS	L ft.	r in.	L/r	ALLOW k/□"	REQ'D AREA	AREA FURN. EFF. GR. AREA	AREA FURN. NET	MATERIAL	SECTION FURNISHED	FULL GROSS AREA	NET AREA
L0-L2	+242	+149 -28	0 -35	+391	28.2			+18.0	21.7-N.	47.66	37.66	C	4∠s 6x4x 3/8 = 14.44 2WPls 24x 3/8 = 18.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	54.45	11.02 14.62 7.66 4.36 37.66
L2-L4	+618	+390 -83	+35 -64	+1008	28.2			+24.0	42.0-N.	53.70	42.58	S	4∠s 6x4x 3/8 = 14.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	60.45	11.06 19.50 7.66 4.36 42.58
L4-L6	+842	+558 -138	+64 -79	+1400	28.2			+24.0	58.3-N.	73.86	58.26	S	4∠s 6x4x 11/16 = 25.60 2WPls 24x 11/16 = 33.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	80.61	19.42 26.82 7.66 4.36 58.26
L6-L8	+911	+649 -193	+79 -88	+1560	28.2			+24.0	65.0-N.	82.86	65.56	S	4∠s 6x4x 11/16 = 25.60 4WPls 24x 7/16 = 42.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	89.61	19.42 34.12 7.66 4.36 65.56
L8-L10	+817	+660 -248	+83 -88	+1477	28.2			+24.0	61.6-N.	77.70	61.53	S	4∠s 6x4x 5/8 = 23.44 2WPls 24x 13/16 = 39.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	84.45	17.82 31.69 7.66 4.36 61.53
L10-L12	+564	+607 -303	+73 -83	+1171	28.2			+24.0	48.8-N.	63.50	50.14	S	4∠s 6x4x 9/16 = 21.24 2WPls 24x 9/16 = 27.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	70.25	16.18 21.94 7.66 4.36 50.14
L12-L14	+156	+459 -347	+48 -73	+734 -357	28.2	9.66	35.0	+18.0 -14.77	40.8-G.	53.70	42.58	C	4∠s 6x4x 3/8 = 14.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	60.45	11.06 19.50 7.66 4.36 42.58
L14-L16	-349	-362 +233	+18 -48	-711	28.4	9.62	35.5	-14.75	48.2-G.	53.70		C	4∠s 6x4x 3/8 = 14.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	60.45	
L16-L18	-792	-365 +40	-95 +44	-1157	30.4	9.65	37.7	-19.56	59.2-G	60.50		S	4∠s 6x4x 9/16 = 21.24 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	67.25	
L18-L19	-1099	-458 +35	Axial -196 ★ M_bc/r^2 +449	-1744*	18.2	9.43	23.2	-20.14	86.6-G	87.36		S	4∠s 6x4x 11/16 = 25.60 2WPls 24x 3/4 = 36.00 2WPls 12x 7/16 = 10.50 1CPl 22x 7/16 = 9.63 1CPl (22-12)x 9/16 = 12.38	94.11	
L19-L20	-1099	-458 +35	Axial -196 ★ M_bc/r^2 +460	-1755*	18.2	9.43	23.2	-20.14	87.1-G.	87.36		S	4∠s 6x4x 11/16 = 25.60 2WPls 24x 3/4 = 36.00 2WPls 12x 7/16 = 10.50 1CPl 22x 7/16 = 9.63 1CPl (22-12)x 9/16 = 12.38	94.11	
L20-L22	-873	-364 +75	-94 +41	-1237	30.5	9.68	37.7	-19.55	63.3-G.	62.70		S	4∠s 6x4x 5/8 = 23.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	69.45	
L22-L24	-539	-393 +208	+13 -50	-932	28.5	9.65	35.5	-14.75	63.2-G	62.70		C	4∠s 6x4x 5/8 = 23.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	69.45	
L24-L26	-152	-430 +459	+50 -72	-759 +530	28.3	9.62	35.2	-14.76 +18.0	51.4-G. 29.4-N.	53.70	42.58	C	4∠s 6x4x 3/8 = 14.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	60.45	11.06 19.50 7.66 4.36 42.58
L26-L28	+159	+635 -437	+72 -89	+957 -489	28.2	9.80	34.5	+24.0 -19.70	39.8-N. 24.9-G.	53.70	42.58	S	4∠s 6x4x 3/8 = 14.44 2WPls 24x 1/2 = 24.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	60.45	11.06 19.50 7.66 4.36 42.58
L28-L30	+320	+713 -414	+89 -92	+1128 -285	28.2			+24.0	47.0-N.	58.98	46.74	S	4∠s 6x4x 7/16 = 16.72 2WPls 24x 9/16 = 27.00 1CPl 22x 7/16 = 9.63 1CPl(22-12)x 9/16 = 12.38	65.73	12.78 21.94 7.66 4.36 46.74

★ M_b = Lateral Shear (30# Wind) x distance from ℄ Strut to ℄ Pin. * Indicates DL+30# Wind (Axial & Bending) governs design.

DEAD PANEL LOADS KIPS PER TRUSS

PANEL PT.	SPECIAL DETAILS	CONST. LOAD	FLOOR STEEL	BRACING	TRUSS	TOTAL
0	9	17	8	6	12	52
1		50	10	1	11	72
2				6	11	17
3		66	13	3	15	97
4				4	12	16
5		66	13	1	18	98
6				6	14	20
7		66	13	3	19	101
8				4	14	18
9		66	13	3	18	100
10				6	13	19
11		66	13	1	16	96
12				4	12	16
13		66	13	3	15	97
14				6	12	18
15		66	13	2	16	97
16				4	13	17
17		66	13	3	18	100
18				11	17	28
U19	2	66	13	8	23	112
L19				9	9	18
19	2	66	13	17	32	130
20				11	17	28
21		66	13	3	18	100
22				4	13	17
23		66	13	2	16	97
24				6	12	18
25		66	13	3	14	96
26				4	11	15
27		66	13	1	15	95
28				6	11	17
29		66	13	3	16	98
30				4	12	16

Special Details includes expansion dam at U0 and additional floor details at U19.

MAXIMUM AND MINIMUM VERTICAL REACTIONS - KIPS PER TRUSS

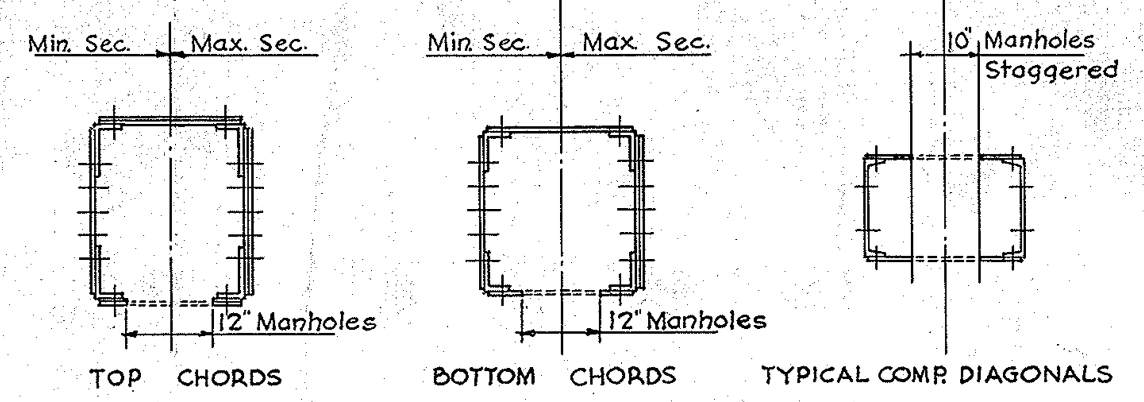
LOADING	LEEWARD TRUSS R1	LEEWARD TRUSS R2	WINDWARD TRUSS R1	WINDWARD TRUSS R2
Dead Load (90# Fl)	+410	+1367		
Dead Load (65# Fl)			+351	+1172
Live Load	+264	+618	-45	-48
30# Lat. Wind	+32	+248	-32	-248
15# (or Min.) Lat. Wind	+17	+13,3	-17	-133
Lat. W. on L.L.	+23	+56	-23	-56
D.L.+L.L.	+674	+1,985	+306	+1,124
D.L.+30# Lat. W.	+442	+1,615	+319	+924
D.L.+L.L.+15# W.+L.L.W.	+714	+2,174	+266	+983

LATERAL WIND REACTIONS PER PIER

30# W R1	30# W R2	15# W (or Min.) R1	15# W (or Min.) R2	L.L. Wind R1	L.L. Wind R2
±87	±223	±47	±120	±27	±35

LONGITUDINAL REACTIONS PER TRUSS FOR R2

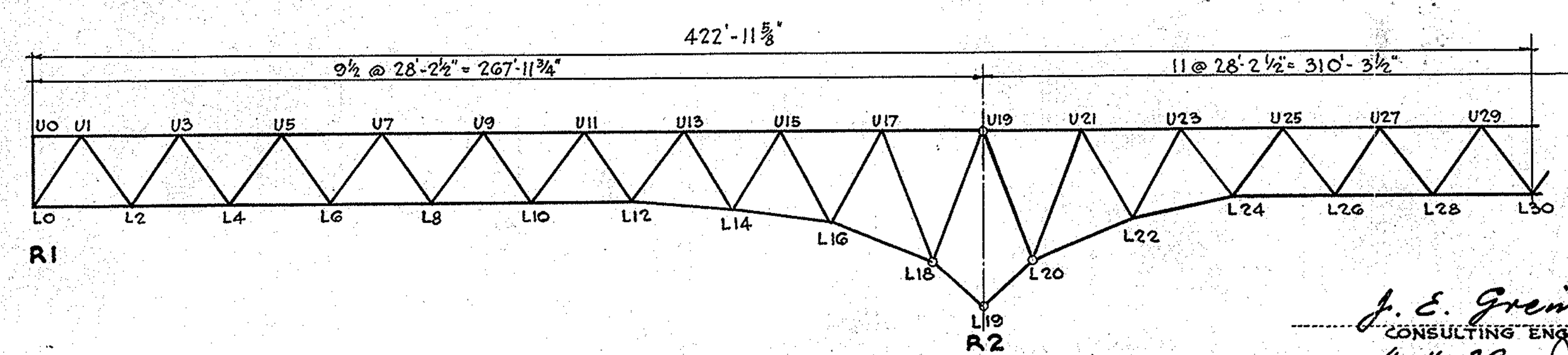
30# W	15# W (or Min.)	L.L. Wind
± 138	± 69	± 22



TOP CHORDS   BOTTOM CHORDS   TYPICAL COMP. DIAGONALS   TYPICAL TENSION DIAGONALS

NOTE:
All rivets in joints and splices 1"ϕ except as noted on details; stitch rivets 7/8"ϕ.

TYPICAL SECTIONS 23½ IN. TO IN. OF GUSSETS



AVERAGE DEAD LOAD OF FLOOR SYSTEM PER LINEAR FOOT OF TRUSS

Roadway Slab	2093
Railing, Curb, Sidewalk, etc.	220
Floor Beams, Stringers & Crossbeams	480
Total	2793#/Lin.ft. of Truss

Lateral 30# Wind - Average per lin. ft. of bridge .... 650#
Live Load - Uniform/lin. ft./Truss .... 1.43 Kips
Concentrated - (Including effect of impact of all L.L.) For Moment .... 64.4 Kips/Truss
Concentrated - (Including effect of impact of all L.L.) For Shear .... 93.0 Kips/Truss
[2 LIVE] - Includes: Rdwy live load + Impact + Sdwk live load.

LOADING COMBINATIONS

Dead + Live	at 100% Normal Unit Stress
Dead + 30# Lat. Wind	at 100% Normal Unit Stress
Dead + Live + 15# Lat. Wind	at 125% Normal Unit Stress

NOTE: All top chord sections controlled by combined dead + live load stress + bending stress, all bottom chord and web sections controlled by dead + live load stress except as noted. Principal Stresses are shown for 30# Lat. Wind to indicate their magnitude.
Combined Stresses for a 15# Lat. Wind were investigated but do not, in any case, require additional section.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39 [signature]

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
DECK TRUSS SPANS-STRESS SHEET

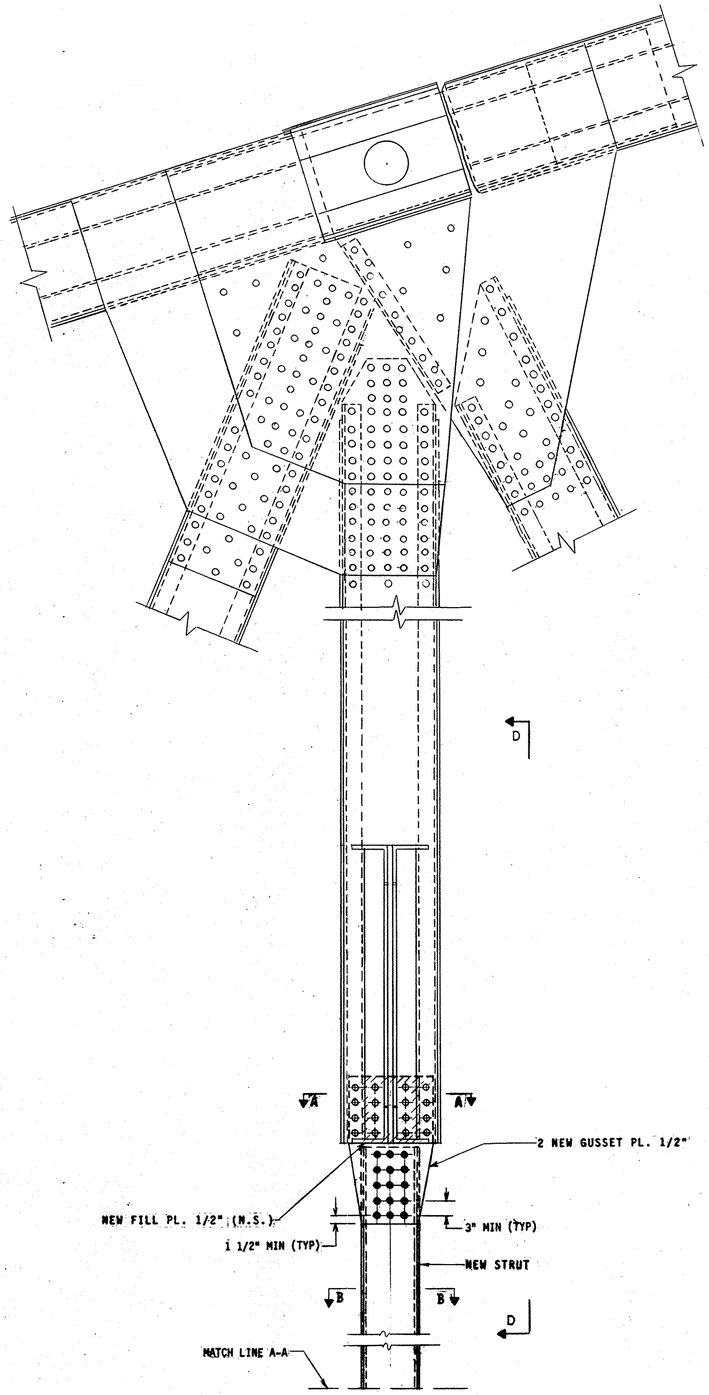
SCALE: CONTRACT H-232-4-437

MADE BY J.E. GREINER CO.-M.C.C.   APPROVED
TRACED BY C.H.M.   [signature] CHIEF ENGINEER
CHECKED BY HK   4/11/39
APPROVED [signature] BRIDGE ENGINEER
APRIL 11, 1939

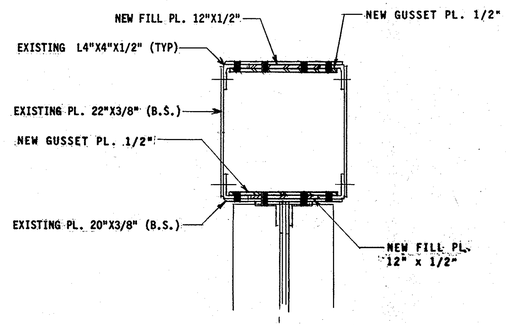
SHEET NO. 15 OF 37
C-354-4-15

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

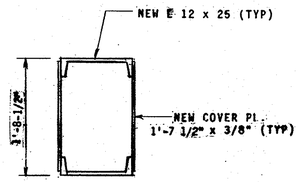
K&E BALTIMORE 19 1253



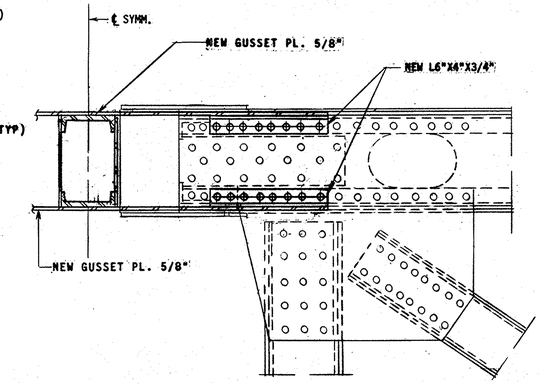
ELEVATION U12 TO RDWY CONNECTION
SCALE: 3/4" = 1'-0"



SECTION A-A
SCALE: 1" = 1'-0"



SECTION B-B
SCALE: 1"=1'-0"

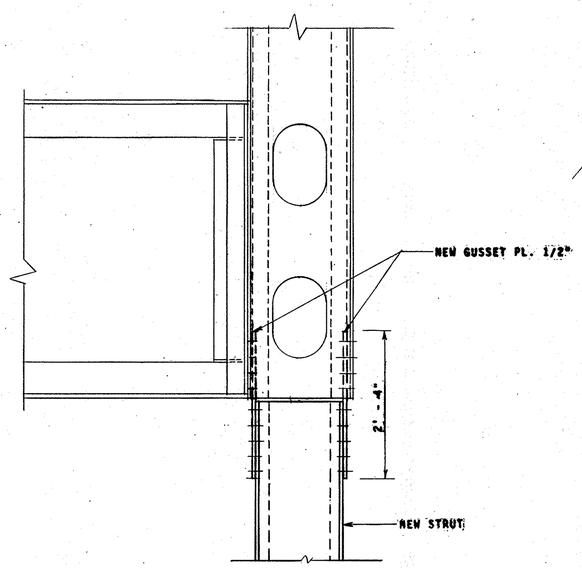


SECTION C-C
SCALE: 3/4" = 1'-0"

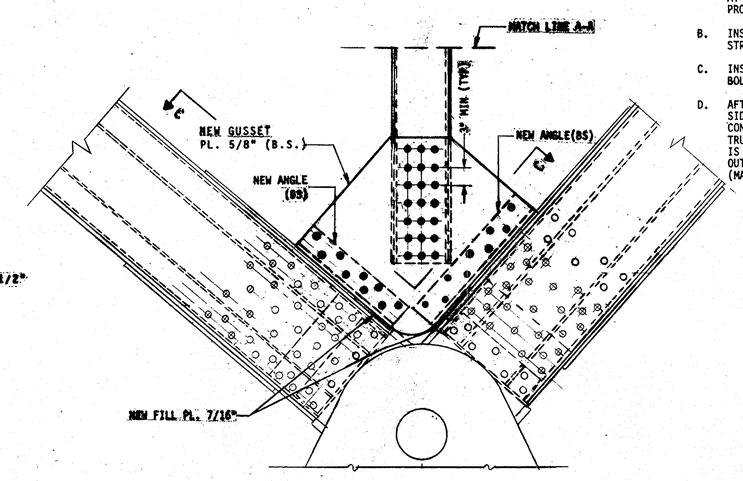
SUMMARY OF STRENGTHENING - THIS SHEET		
PIER	MEMBER	NO. OF MEMBERS
19 & 20	RHOMBOID STRUT	4
36 & 37	RHOMBOID STRUT	4

NOTES

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. THE PROCEDURE FOR INSTALLATION OF THE NEW VERTICAL STRUTS SHALL BE AS FOLLOWS:
   - A. AT THE ROADWAY/FLOORBEAM CONNECTION, REMOVE RIVET HEADS AS NECESSARY TO PLACE NEW GUSSET PLATES, AND SECURE RIVET HEADS AND SHANKS. CLEAN SURFACES TO RECEIVE NEW PLATE. INSTALL NEW GUSSET PLATES, REPLACING RIVETS ONE AT A TIME WITH HIGH STRENGTH BOLTS. TORQUE BOLTS IN PROPER SEQUENCE.
   - B. INSTALL NEW CONNECTION AT L12 TO RECEIVE NEW VERTICAL STRUT.
   - C. INSTALL NEW VERTICAL STRUT WITH ONLY THE TOP CONNECTION BOLTED.
   - D. AFTER THE VERTICAL STRUTS HAVE BEEN INSTALLED ON BOTH SIDES OF THE TRUSSES PER 3-A THRU 3-C; THE BOTTOM CONNECTIONS SHALL BE MADE AT THE SAME TIME ON BOTH TRUSSES. THESE CONNECTIONS ARE TO BE MADE WHEN THERE IS LITTLE OR NO WIND AND THERE IS NO TRAFFIC ON THE OUTSIDE LANES FOR THE LENGTH OF CONTINUOUS ARCH TRUSS (MAIN) SPANS.



VIEW D-D
SCALE: 3/4" = 1'-0"



ELEVATION L12
SCALE: 3/4" = 1'-0"

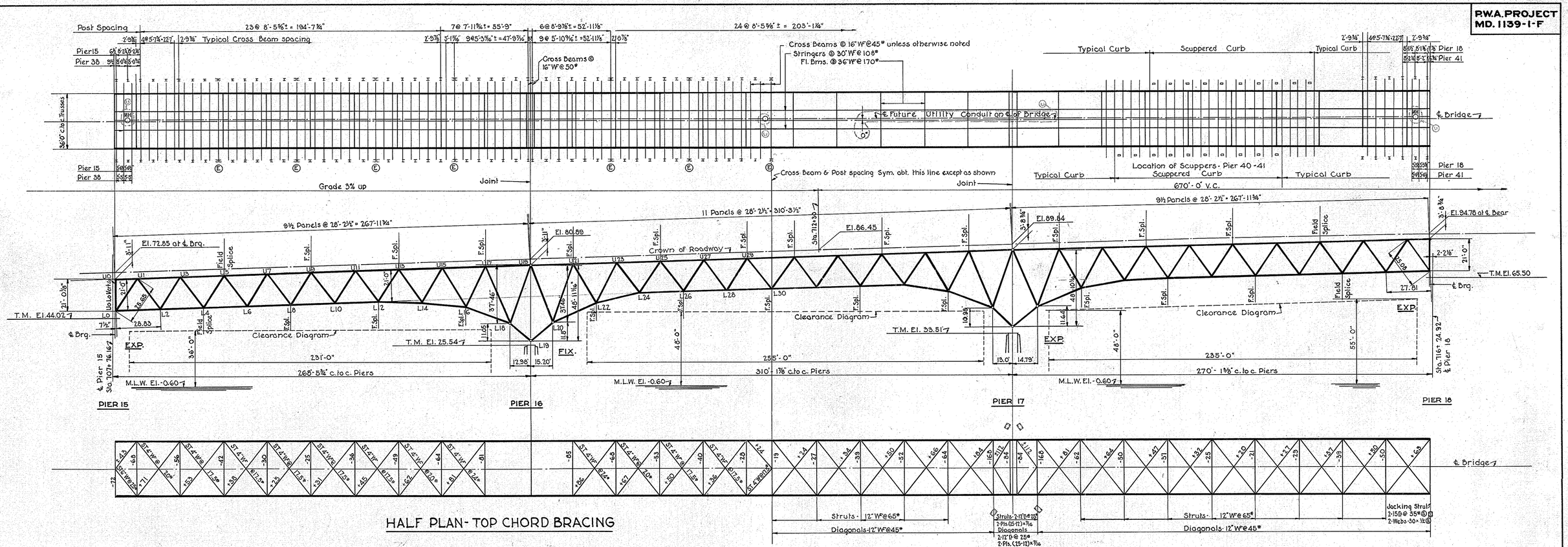
○ EXISTING RIVETS
⊕ EXISTING RIVETS TO BE REPLACED WITH 7/8" ø H.S. BOLTS
● NEW 7/8" ø H.S. BOLTS

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 19-21, 36-38 (MAIN SPANS)
RHOMBOID STRENGTHENING

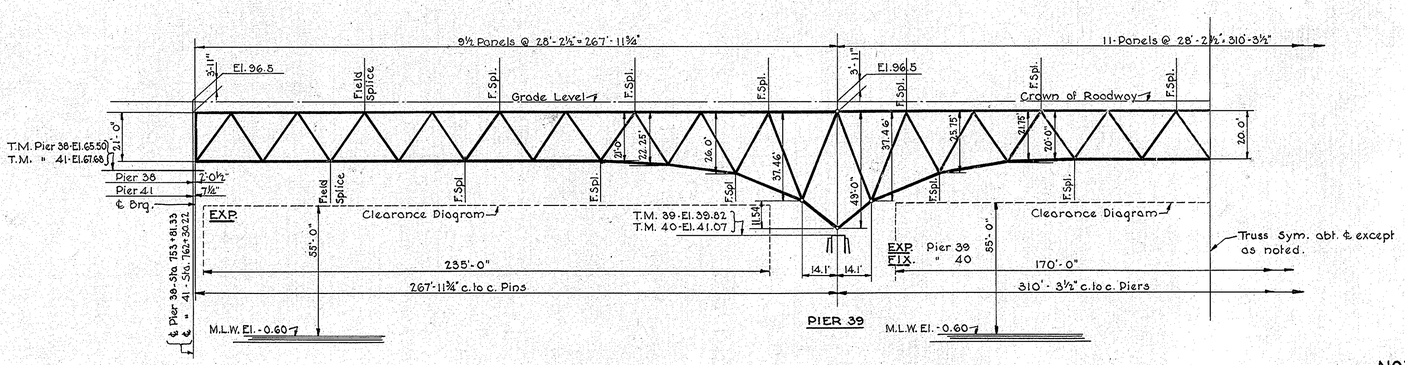
CONT. NO. TFA 2-1250-20 SHEET NO. 15 OF 18
DESIGNED BY RAP DRAWN BY DCF

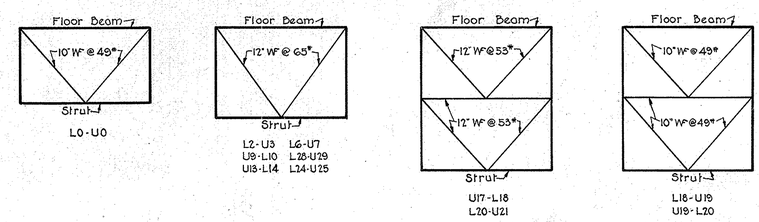
P.W.A. PROJECT
MD. 1139-1-F



HALF PLAN - TOP CHORD BRACING

HALF PLAN - BOTTOM CHORD BRACING





SWAY FRAMES

TYPICAL FLOOR BEAM			END FLOOR BEAM		RHOMBOID FLOOR BEAM		STRINGER	
LOAD	MAX. SHEAR	MAX. MOM.	MAX. SHEAR	MAX. MOM.	MAX. SHEAR	MAX. MOM.	MAX. SHEAR	MAX. MOM.
Dead	40600#	476400 ft#	14300#	163000 ft#	19600#	227000 ft#	18300#	129200 ft#
Live	41000	491000	42000	503000	43800	525000	49500	312000
Imp.	11300	135700	14900	179000	14300	172000	16500	104000
TOTAL	93900#	1103100 ft#	71200#	845000 ft#	77700#	924000 ft#	84300#	545200 ft#
ⓢ SM_R = 551"³			ⓢ SM_R = 423"³		ⓢ SM_R = 462"³		ⓒ SM_R = 272.6"³	
ⓢ 36" WF @ 170#			ⓢ 36" WF @ 150#		ⓢ 36" WF @ 150#		ⓒ 30" WF @ 108#	
SM_F = 579.1"³			SM_F = 502.9"³		SM_F = 502.9"³		SM_F = 299.2"³	

For Cross Beams see sheet Nº C-354-4-4

NOTES:

See Sheet Nº C-354-4-1 for General Notes

Ⓜ Indicate Man Holes for details see sheet Nº C-354-4-11

For Cross Section of Roadway see sheet Nº C-354-4-16

All structural parts shall be adequately drained by providing sufficient drain holes at points where water can accumulate. Closed pockets which can not be effectively drained shall be filled with an approved waterproof material.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS
ⓑ Provisions for utility conduits removed 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
DECK TRUSS SPANS - STRESS SHEET

SCALE :- 1" = 20' & 1" = 30' CONTRACT H-232-4-437

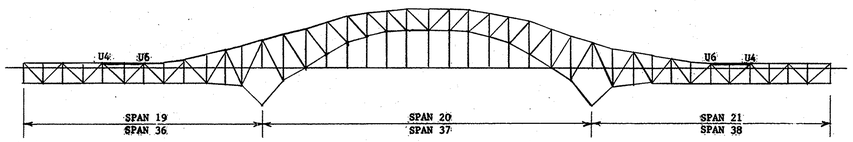
MADE BY J.E. GREINER CO. M.C.C. APPROVED
TRACED BY " " " J.H.T.
CHECKED BY " " " H.
APPROVED
CHIEF ENGINEER
BRIDGE ENGINEER
4/11/39

APRIL 11, 1939

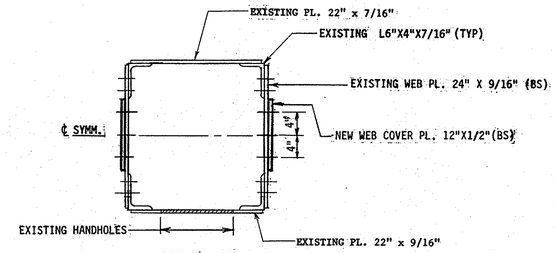
SHEET No. 14 OF 37
C-354-4-14

PRINTED ON "IMPERIAL" TRACING CLOTH
K. & E. CO., N.Y.

K&E BALTIMORE 19 1253

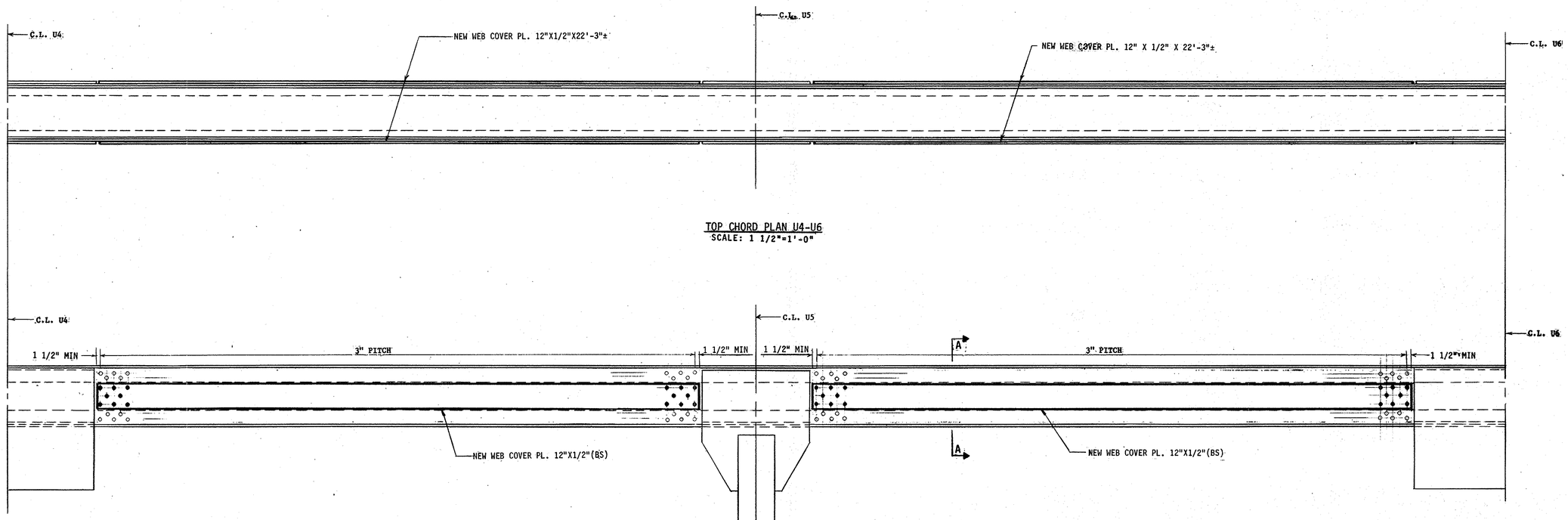


LOCATION DIAGRAM



SECTION A-A
SCALE: 1" = 1'-0"

SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
19	TRUSS UPPER CHORD	2
21	TRUSS UPPER CHORD	2
36	TRUSS UPPER CHORD	2
38	TRUSS UPPER CHORD	2



TOP CHORD PLAN U4-U6
SCALE: 1 1/2"=1'-0"

ELEVATION U4-U6
SCALE: 1/2"=1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. WORK ON THE CHORD SHALL BE CARRIED OUT WHEN ONE OUTSIDE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED ON THE SIDE CLOSED. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS BEING PERFORMED.

LEGEND

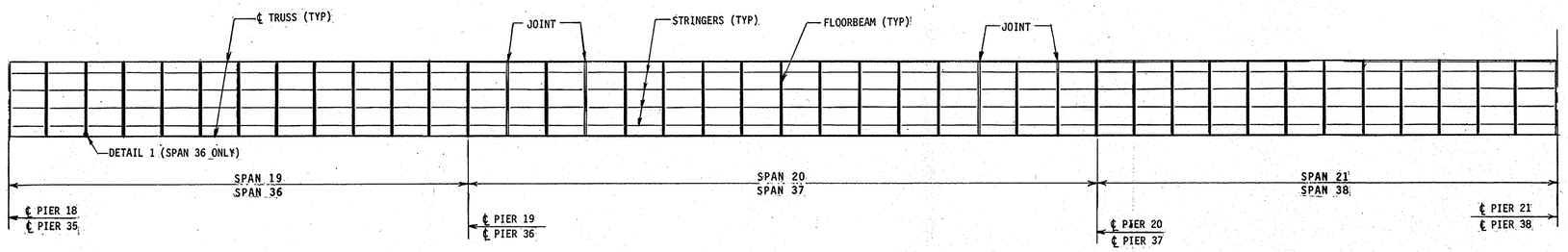
○ EXISTING RIVETS
⊕ EXISTING RIVETS TO BE REPLACED WITH 7/8" ø H.S. BOLTS
● NEW 7/8" ø H.S. BOLTS

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 19-21, 36-38 (MAIN SPANS)
TRUSS UPPER CHORD STRENGTHENING

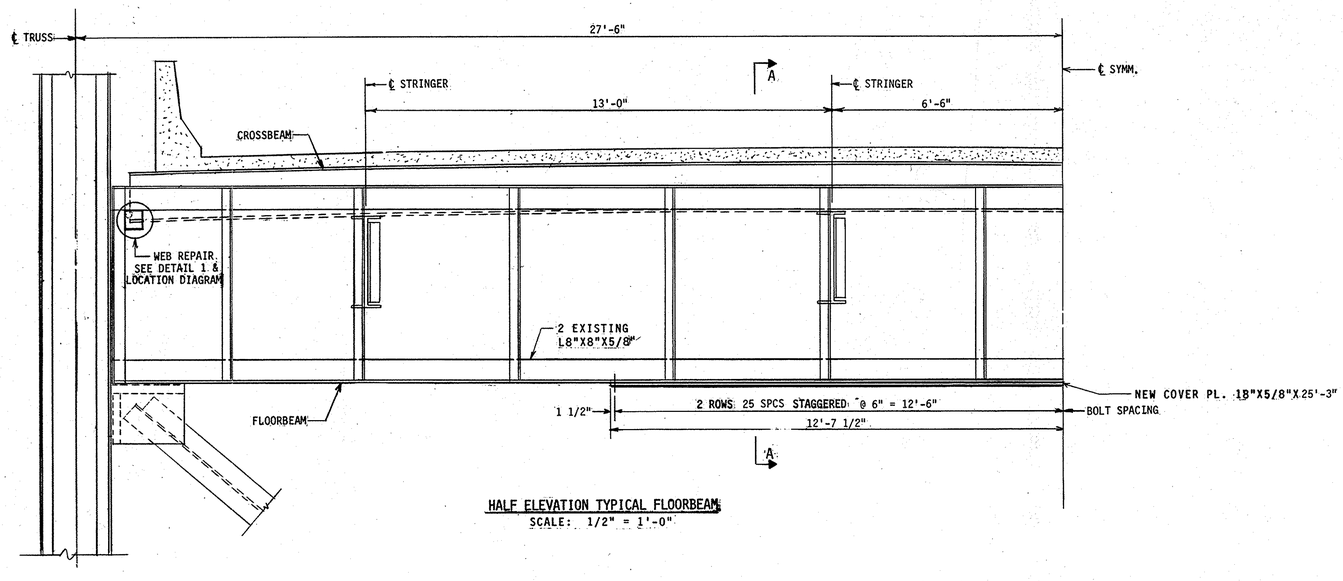
CONT. NO. TFA 2-1250-20 SHEET NO. 14 OF 18
DESIGNED BY RAP DRAWN BY DCF

K&E BALTIMORE 19 1253

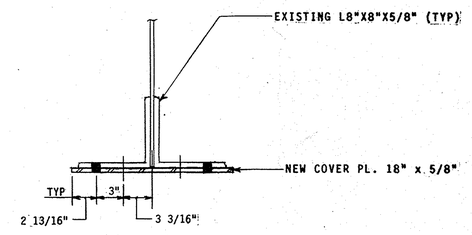


LOCATION DIAGRAM

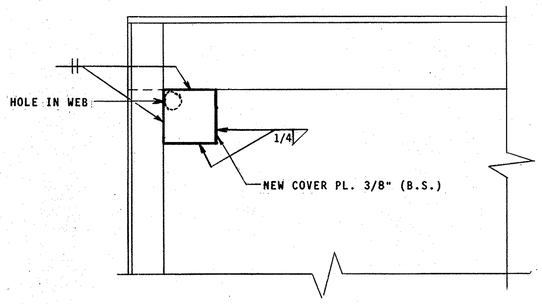
SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
19 TO 21	FLOORBEAM	35
36 TO 38	FLOORBEAM	35
36	FLOORBEAM WEB	1



HALF ELEVATION TYPICAL FLOORBEAM
SCALE: 1/2" = 1'-0"



SECTION A-A
SCALE: 1½" = 1'-0"



DETAIL 1
SCALE: 1-1/2" = 1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. EXISTING HOLES IN WEB SHALL BE CLEANED OF ALL RUST AND DEBRIS AND APPROVED BY THE ENGINEER PRIOR TO COVER PLATE INSTALLATION. SPECIAL CARE IS TO BE TAKEN IN WELDING TO THE SILICON STEEL. ALL WELDS SHALL BE APPROVED BY ENGINEER.
4. WORK ON THE FLOORBEAMS SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL BE TWICE THE FLOORBEAM SPACING IN LENGTH, AND CENTERED ON THE FLOORBEAM BEING WORKED ON.

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION

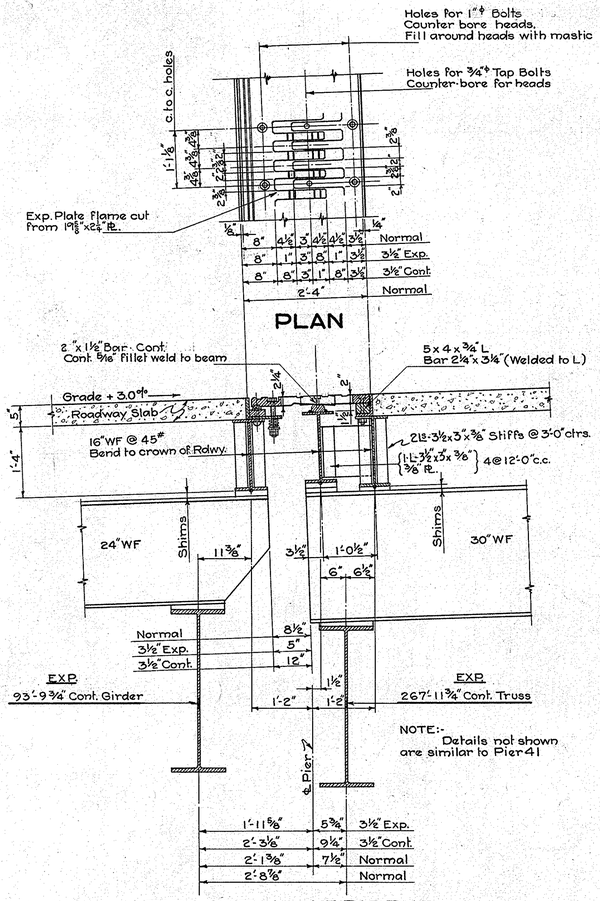
SPANS 19-21, 36-38 (MAIN SPANS)

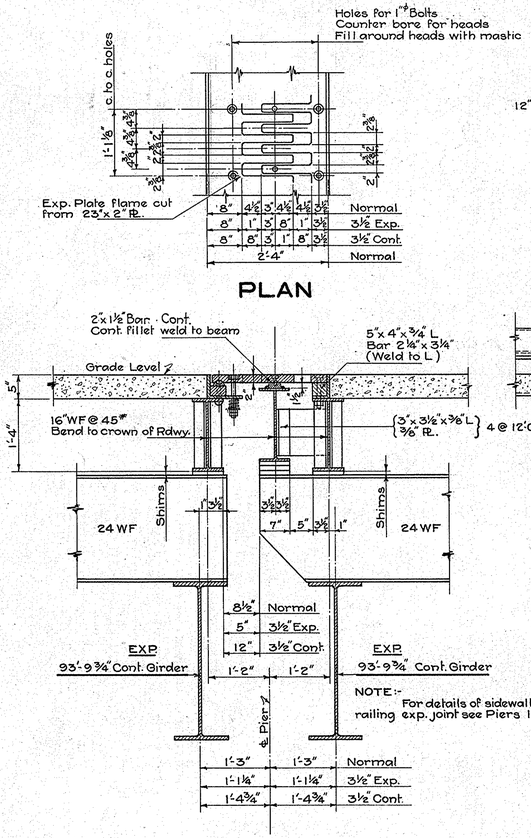
FLOORBEAM STRENGTHENING

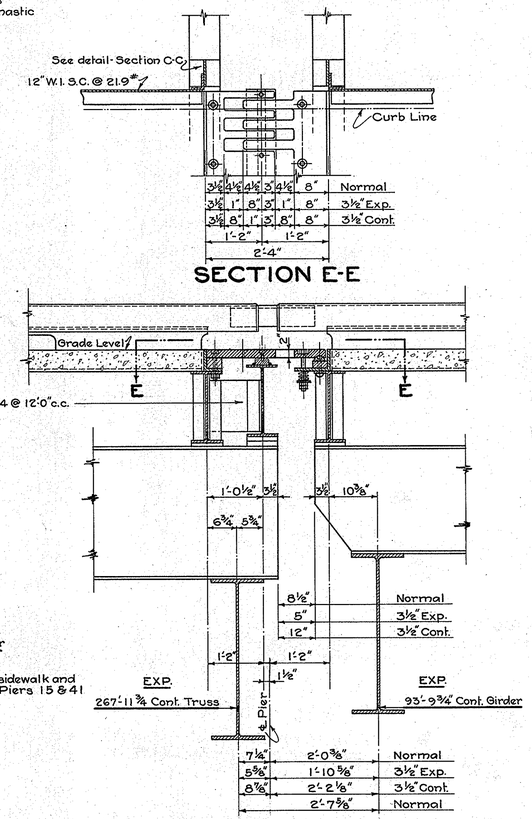
CONT. NO. TFA 2-1250-20 SHEET NO. 13 OF 18

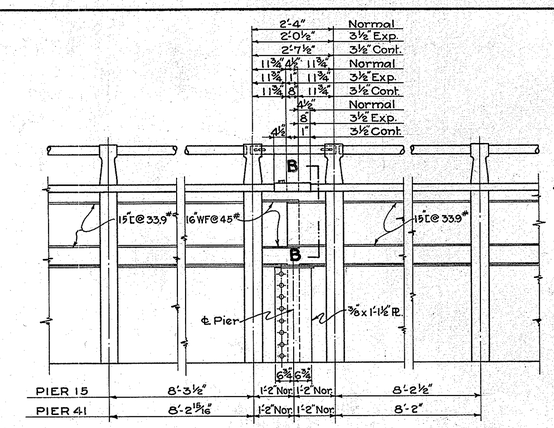
DESIGNED BY RAP DRAWN BY DCF

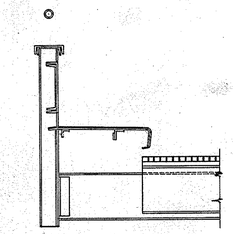
P.W.A. PROJECT
MD. 1139-1-F



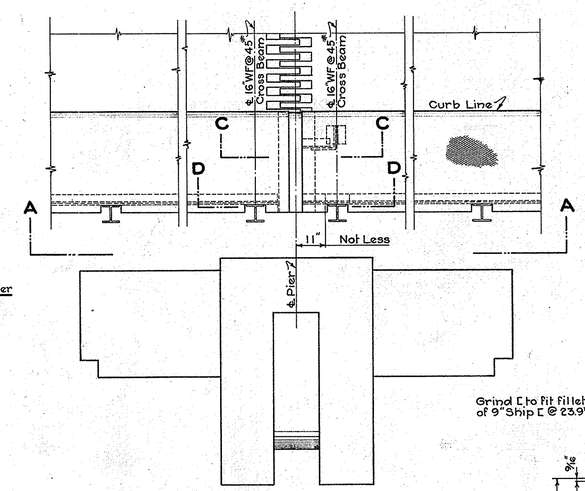




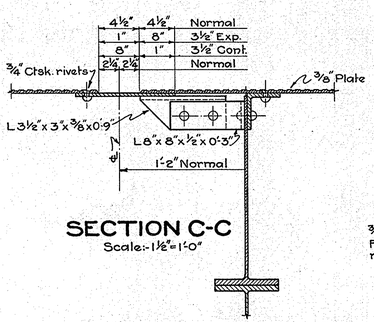




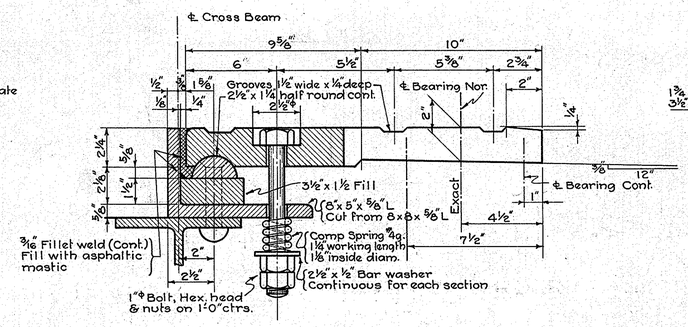
SECT. AT EXP. JOINT
Scale:- ½"=1'-0"



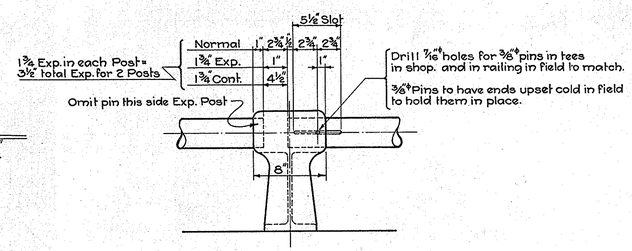
PLAN AT PIER 15 & 41
Scale:- ½"=1'-0"



SECTION C-C
Scale:- 1½"=1'-0"



DETAIL OF EXP. PLATE FOR GIRDER SPANS - PIER 15
Piers 28 & 41 Similar
Scale:- 1½"=1'-0"



DETAIL OF EXPANSION POSTS
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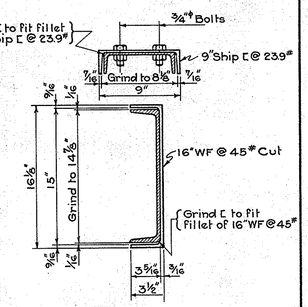
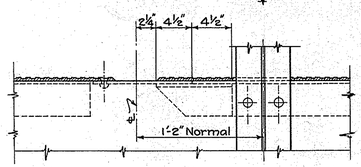
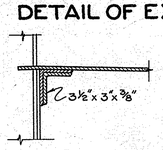


SECTION B-B
Scale:- 1½"=1'-0"



SECTION D-D
Scale:- 1½"=1'-0"



NOTES:
See Sheet C-354-4-1 for General Notes.
" " C-354-4-7 " Details of Sdwlk Handrail.

J. E. Greiner Co
CONSULTING ENGINEER'S
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE

CONT. GIRDER SPANS - EXP. JOINTS

SCALE As Noted — CONTRACT H-232-4-437

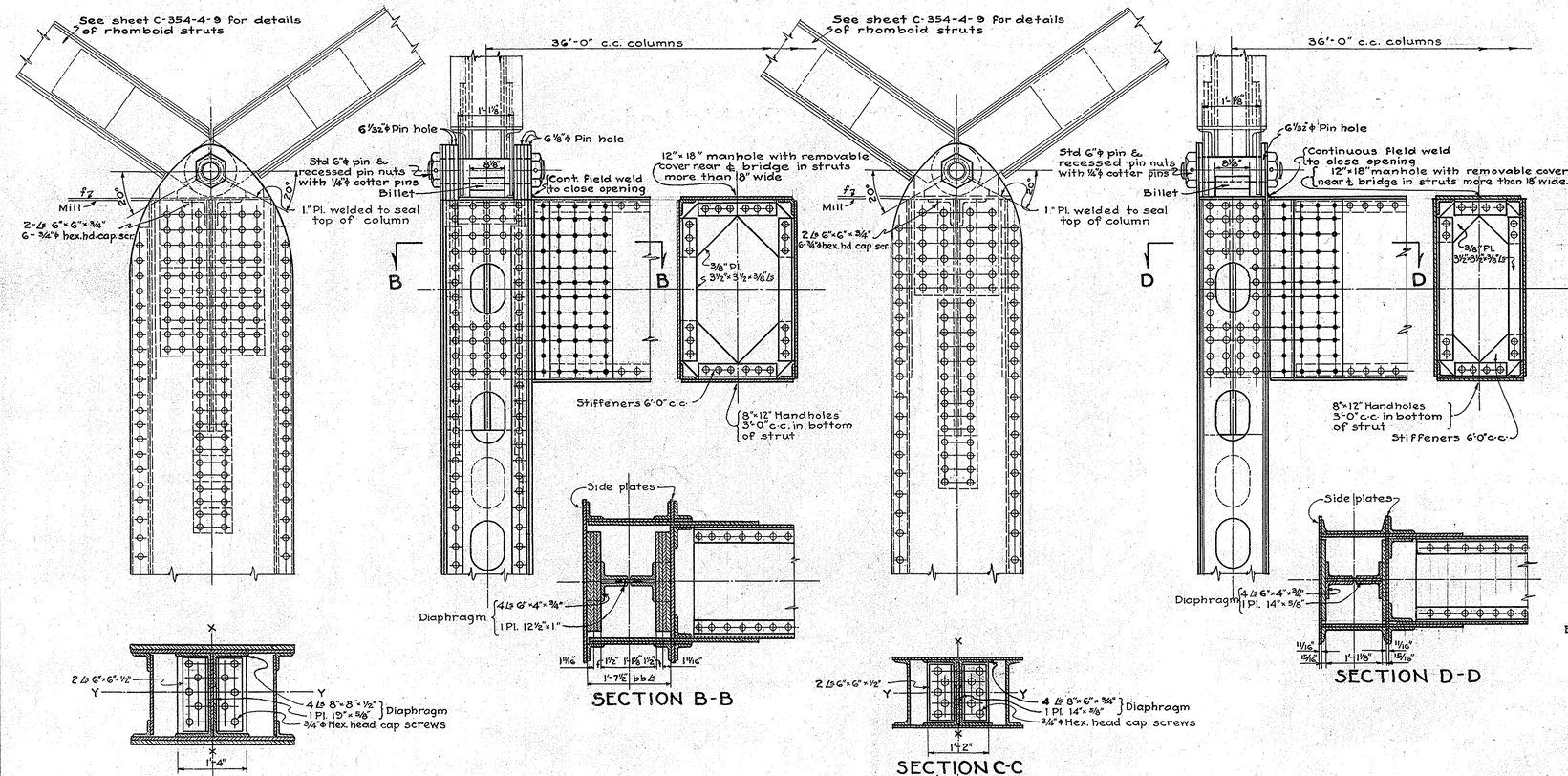
MADE BY J.E. GREINER CO. M.C.C. APPROVED
TRACED BY " " " J.M.R.
CHECKED BY " " " H.K.
APPROVED — BRIDGE ENGINEER — CHIEF ENGINEER
4/11/39

APRIL 11, 1939

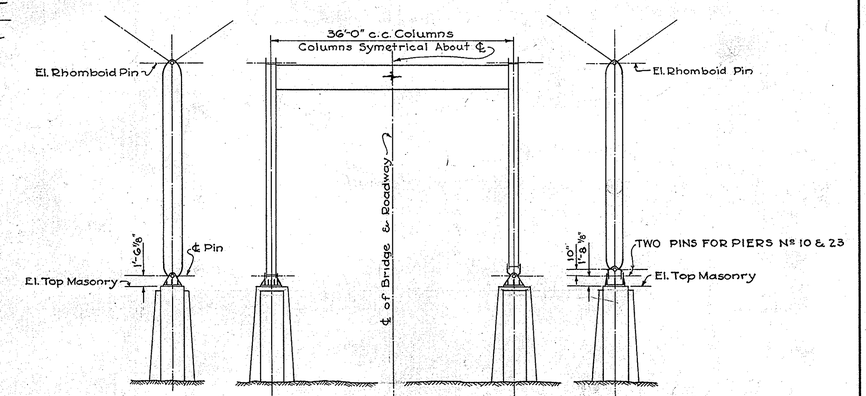
SHEET No. 13 OF 37
C-354-4-13

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

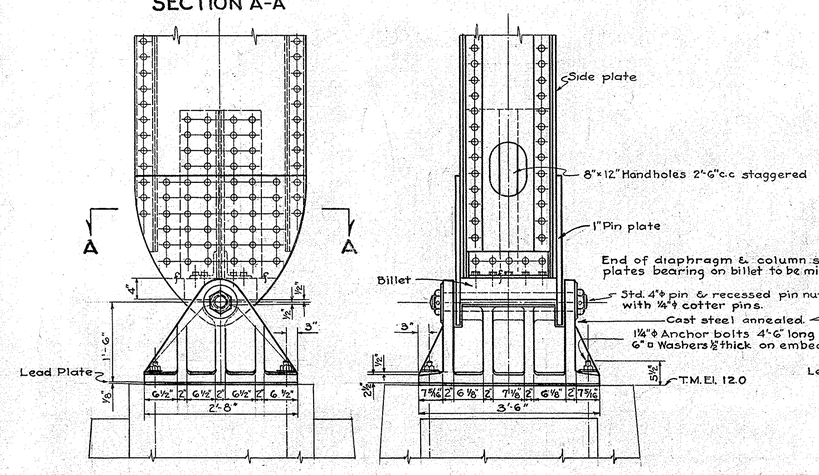
P.W.A. PROJECT
MD. 1139-1-F



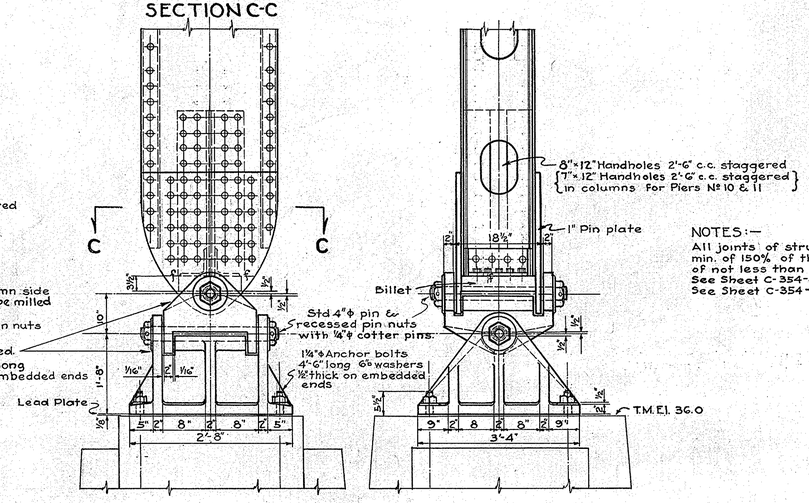
PIER Nº	EL. RHOMBOID PIN	EL. TOP MASONRY	L/R. X-X	L/R. Y-Y	COLUMN LOADING DL.	COLUMN LOADING LL+I	COLUMN LOADING TOTAL	LATERAL DEFLECTION DL+30%W	MOMENTS STRUT	MOMENTS LOWER PIN	COLUMN SECTION	STRUT SECTION
10	+36.73	+14.5	31	40	430K	308K	738K	.50"	1585'K	—	2 Pl. 24"×5/8" 2-12" B @ 35#	2 Pl. 34"×3/8" 2-15" B @ 33.9#
11	+40.71	+12.0	43	56	415	315	730	.50	1509	1509'K	2 Pl. 24"×5/8" 2-12" B @ 35#	2 Pl. 34"×3/8" 2-15" B @ 33.9#
13	+47.49	+12.0	46	57	418	315	733	.50	1750	1750	2 Pl. 28"×5/8" 2-15" B @ 40#	2 Pl. 36"×3/8" 2-18" B @ 42.7#
14	+50.28	+12.0	49	62	435	308	743	.50	1470	1470	2 Pl. 28"×3/8" 2-15" B @ 40#	2 Pl. 36"×3/8" 2-18" B @ 42.7#
22	+76.83	+29.5	58	76	439	308	747	1.25	2550	2550	2 Pl. 30"×11/16" 2-15" B @ 40#	2 Pl. 20"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
23	+77.42	+36.0	49	64	421	315	736	1.75	2530	—	2 Pl. 30"×11/16" 2-15" B @ 40#	2 Pl. 20"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
24	+77.42	+36.0	54	67	420	315	735	1.00	2460	2460	2 Pl. 28"×3/8" 2-15" B @ 40#	2 Pl. 36"×3/8" 2-18" B @ 42.7#
26	+77.42	+35.0	48	62	424	315	739	.50	1915	1915	2 Pl. 32"×3/4" 2 Pl. 16"×1/2" 4 Lb 4"×4"×1/2"	2 Pl. 20"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
27	+76.83	+32.5	50	65	440	308	748	.50	1735	1735	2 Pl. 32"×3/4" 2 Pl. 16"×1/2" 4 Lb 4"×4"×1/2"	2 Pl. 20"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
29	+76.83	+29.0	52	64	441	308	749	.50	1770	1770	2 Pl. 34"×3/4" 2-18" B @ 45.8#	2 Pl. 22"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
30	+77.42	+29.0	52	65	426	315	741	.50	1720	1720	2 Pl. 34"×3/4" 2-18" B @ 45.8#	2 Pl. 22"×3/8" 2 Pl. 42"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
32	+77.42	+23.0	55	80	430	315	745	1.00	2600	2600	2 Pl. 36"×13/16" 2 Pl. 16"×1/2" 4 Lb 4"×4"×1/2"	2 Pl. 24"×3/8" 2 Pl. 48"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
33	+77.42	+18.0	60	87	432	315	747	1.75	3755	3755	2 Pl. 36"×13/16" 2 Pl. 16"×1/2" 4 Lb 4"×4"×1/2"	2 Pl. 24"×3/8" 2 Pl. 48"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
34	+76.83	+12.0	62	82	454	308	762	1.25	3144	3144	2 Pl. 38"×7/8" 2 Pl. 19"×9/16" 4 Lb 4"×4"×1/2"	2 Pl. 26"×3/8" 2 Pl. 48"×3/8" 4 Lb 3 1/2"×3 1/2"×3/8"
42	+76.83	+44.0	46	55	432	308	740	.10	306	306	2 Pl. 24"×9/16" 2-15" B @ 40#	2 Pl. 30"×3/8" 2-15" B @ 33.9#
44	+76.83	+52.0	35	41	430	308	738	.10	571	571	2 Pl. 24"×9/16" 2-15" B @ 40#	2 Pl. 30"×3/8" 2-15" B @ 33.9#



TYPICAL FRAMES



PIER Nº 34 SHOWN, PIERS Nº 11-13-14-22-24-26-27-29-30-32-33-42-44 SIMILAR.



PIER Nº 23 SHOWN, PIER Nº 10 SIMILAR.

TYPICAL DETAILS

NOTES:—
All joints of strut & columns to be developed for a min. of 150% of the moment at joint but for a moment of not less than 2000 in.k.
See Sheet C-354-4-9 for rhomboid details.
See Sheet C-354-4-1 for general notes.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
CONT. GIRDERS SPANS-FLEXIBLE FRAMES

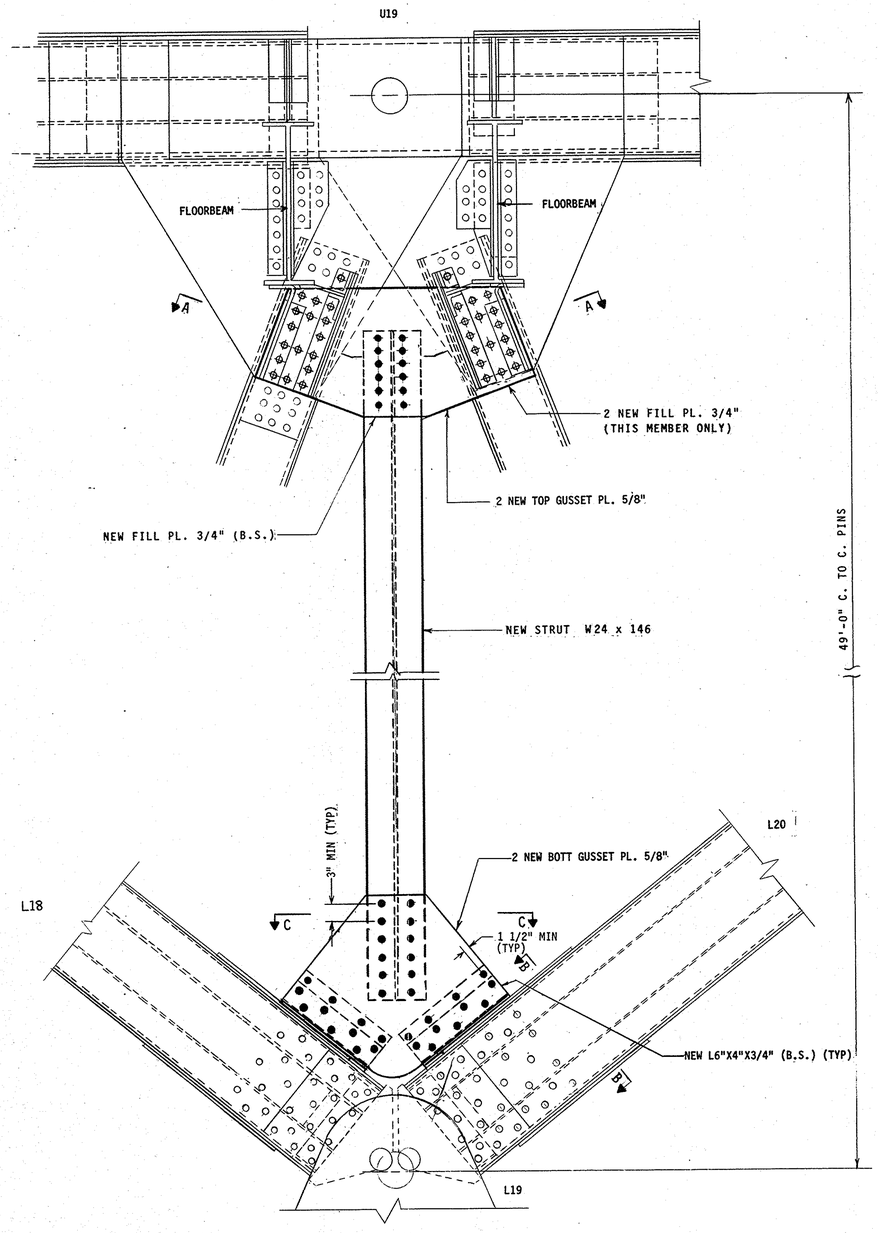
SCALE - 3/4" = 1'-0" CONTRACT H-232-4-437

MADE BY J.E. GREINER CO. E.G.R.
TRACED BY J.E. GREINER CO. E.G.R.
CHECKED BY " " " HK
APPROVED W. E. Thomas BRIDGE ENGINEER
APPROVED Charles E. Stewart CHIEF ENGINEER
4/11/39
April 11, 1939

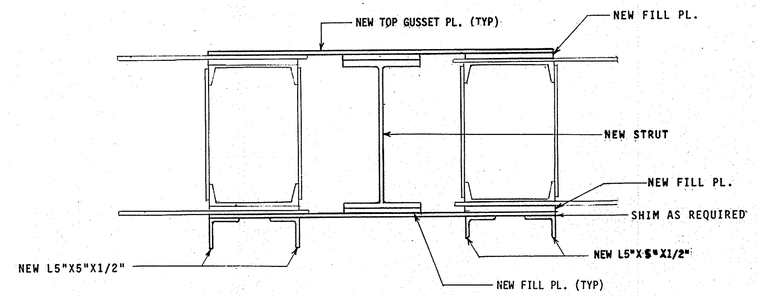
SHEET No. 12 OF 37
C-354-4-12

PRINTED ON "HARRIS" TRACING CLOTH
K & E CO., N.Y.

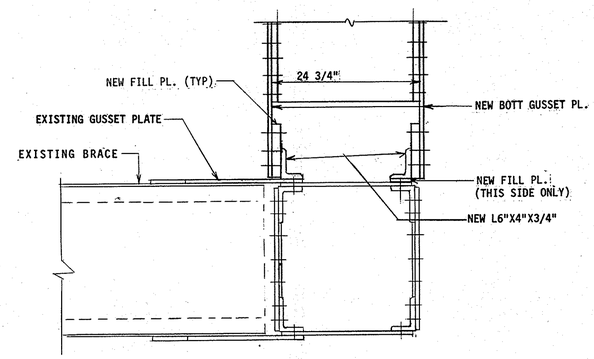
K&E BALTIMORE 19 1253



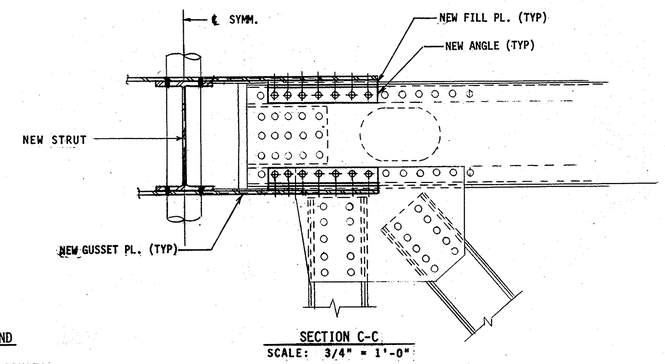
NEW STRUT ELEVATION
SCALE: 3/4" = 1'-0"



SECTION A-A
SCALE: 1" = 1'-0"



SECTION B-B
SCALE: 1" = 1'-0"



SECTION C-C
SCALE: 3/4" = 1'-0"

LEGEND

○ EXISTING RIVETS

⊕ EXISTING RIVETS TO BE REPLACED WITH 7/8" Ø H.S. BOLTS

● NEW 7/8" Ø H.S. BOLTS

SUMMARY OF STRENGTHENING - THIS SHEET		
PIER	MEMBER	NO. OF MEMBERS
16 & 17	RHOMBOID STRUT	4
39 & 40	RHOMBOID STRUT	4

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. THE PROCEDURE FOR INSTALLATION OF NEW VERTICAL STRUT SHALL BE AS FOLLOWS:

   A. PLACE TEMPORARY HORIZONTAL STRUTS BETWEEN MEMBERS L18-U19 AND U19-L20 AS CLOSE TO U19 AS PRACTICAL TO PREVENT POSSIBLE MOVEMENT OR TWISTING.

   B. ON THE OUTSIDE GUSSET AT U19, REMOVE RIVET HEADS AS NECESSARY TO PLACE NEW GUSSET PLATE, AND SECURE RIVET HEADS AND SHANKS. CLEAN SURFACES TO RECEIVE NEW PLATE. INSTALL NEW GUSSET PLATE, REPLACING RIVETS ONE AT A TIME WITH HIGH STRENGTH BOLTS. TORQUE BOLTS IN PROPER SEQUENCE.

   C. PLACING THE NEW INSIDE GUSSET AT U19 IS COMPLICATED BY THE TWO SWAY FRAMES ON MEMBERS L18-U19 AND U19-L20. THE FOLLOWING PROCEDURE IS SUGGESTED:

   - REMOVE RIVETS CONNECTING GUSSET ON SWAY FRAME TO BOTTOM OF TWO FLOOR BEAMS.
   - COMPLETELY REMOVE THE 5x5x7/16 ANGLES CONNECTING THE SWAY FRAME GUSSETS TO DIAGONAL MEMBERS L18-U19 AND U19-L20.
   - TRIM SWAY FRAME GUSSETS AS MAY BE REQUIRED TO PLACE THE NEW 5/8 INCH TOP GUSSET.
   - REMOVE REMAINING RIVET HEADS AS REQUIRED TO INSTALL NEW 5/8 INCH TOP GUSSET. SECURE REMAINING RIVET HEADS AND SHANKS. CLEAN SURFACES TO RECEIVE NEW GUSSET PLATE.
   - INSTALL NEW GUSSET PLATE, REPLACING RIVETS WITH HIGH STRENGTH BOLTS ONE AT A TIME, TORQUEING IN PROPER SEQUENCE. RIVETS FOR CONNECTIONS TO LATERAL SWAY FRAMES ARE NOT TO BE REPLACED AT THIS TIME.
   - INSTALL NEW ANGLES 5x5x1/2 (OR APPROPRIATE SIZE) WITH HOLES TO MATCH HOLES IN SWAY FRAME GUSSET AND THE MAIN DIAGONAL MEMBERS. MAKE ALL CONNECTS USING HIGH STRENGTH BOLTS.

   D. REMOVE TEMPORARY HORIZONTAL STRUTS PLACED IN A.

   E. INSTALL NEW CONNECTION AT L19 TO RECEIVE NEW VERTICAL STRUT.

   F. INSTALL NEW VERTICAL STRUT WITH ONLY THE TOP CONNECTION BOLTED.

   G. AFTER THE VERTICAL STRUTS HAVE BEEN INSTALLED ON BOTH SIDES OF THE TRUSSES PER A THRU F; THE BOTTOM CONNECTIONS SHALL BE MADE AT THE SAME TIME ON BOTH TRUSSES. THESE CONNECTIONS ARE TO BE MADE WHEN THERE IS LITTLE OR NO WIND AND THERE IS NO TRAFFIC ON THE OUTSIDE LANES FOR THE LENGTH OF THE CONTINUOUS DECK TRUSS SPANS.
3. OVERSIZED HOLES MAY BE USED IN THE NEW MATERIAL TO FACILITATE INSTALLATION. HOWEVER, OVERSIZED HOLES SHALL NOT BE MADE IN THE EXISTING MATERIAL.
4. THE CONTRACTOR SHALL SUBMIT HIS PROCEDURE FOR RHOMBOID STRENGTHENING FOR APPROVAL.
5. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.

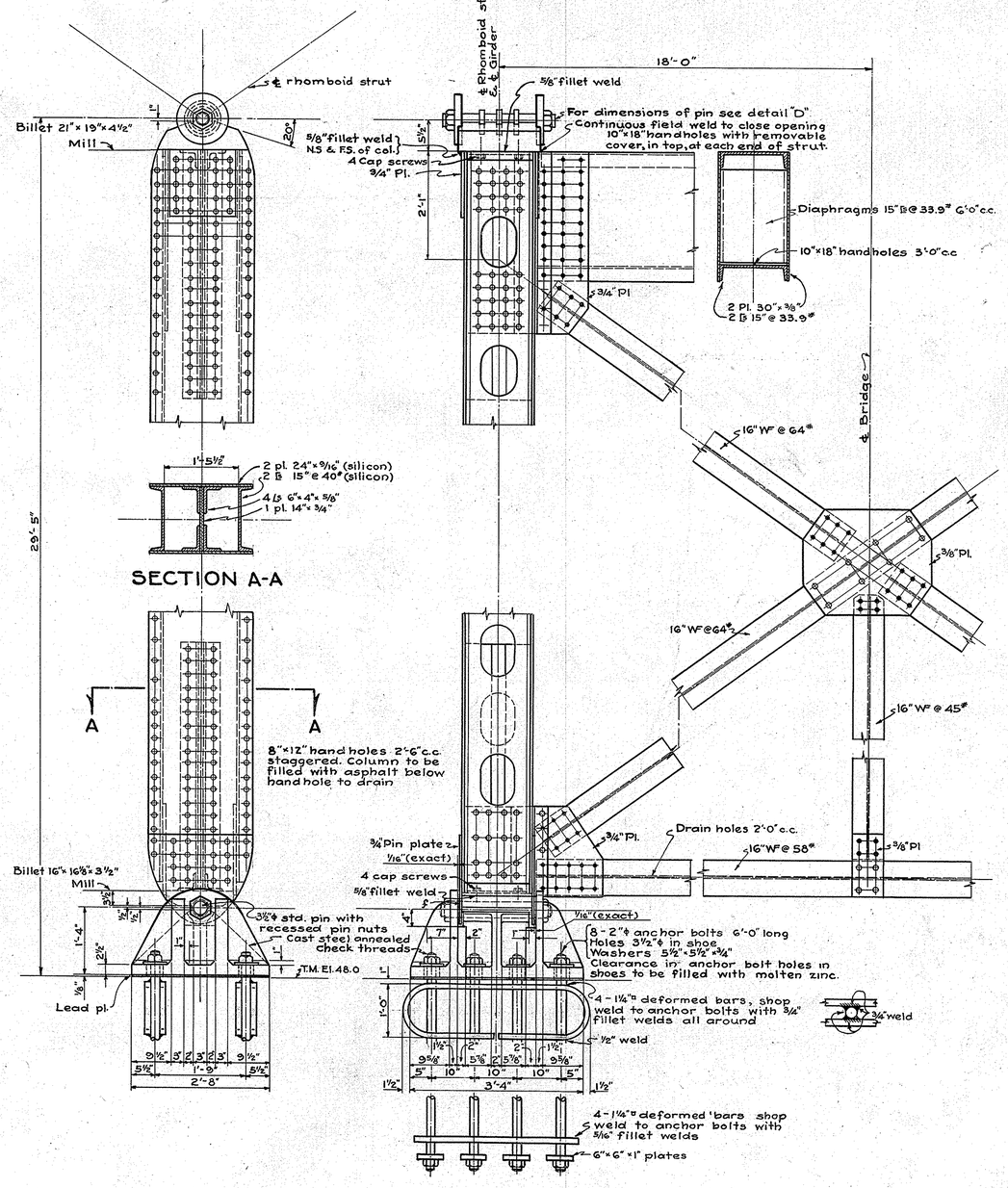
REVISIONS

MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 16-18, 39-41 (DECK TRUSS SPANS)
RHOMBOID STRENGTHENING

CONT. NO. TFA 2-1250-20 SHEET NO. 12 OF 18
DESIGNED BY RAP DRAWN BY DCF

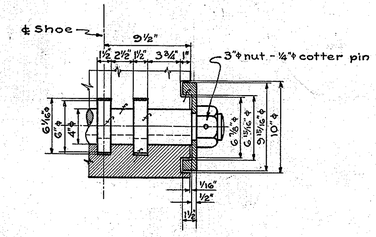
P.W.A. PROJECT
MD. - 1139-1-F



BENT FOR PIER No 43

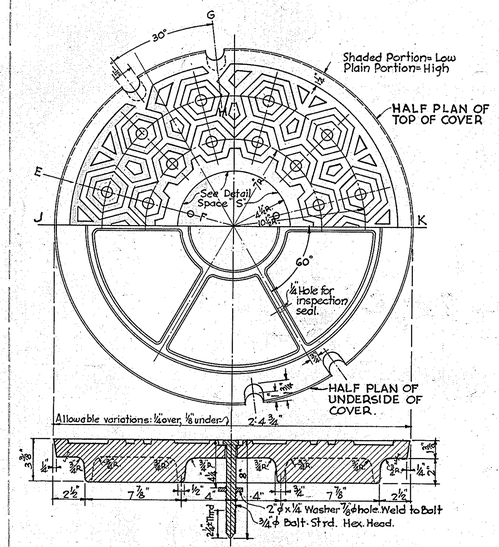
Scale: 3/4" = 1'-0"

All steel carbon except as noted.

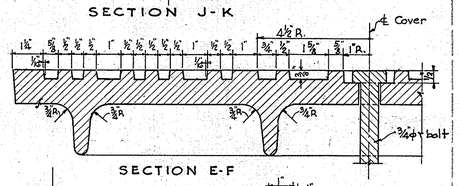


PIN DETAIL "D"

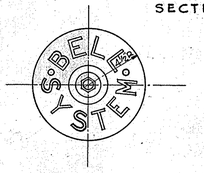
Scale: 1½" = 1'-0"



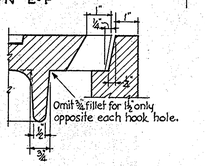
SECTION J-K



SECTION E-F



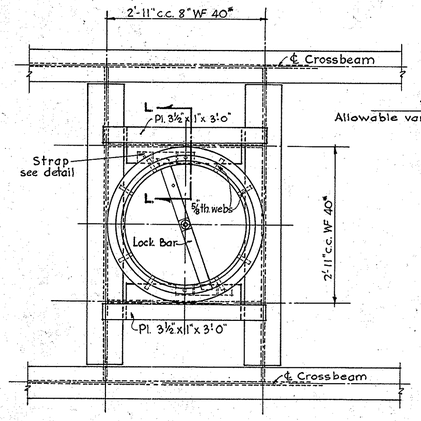
DETAIL OF SPACE "S"



SECTION G-H

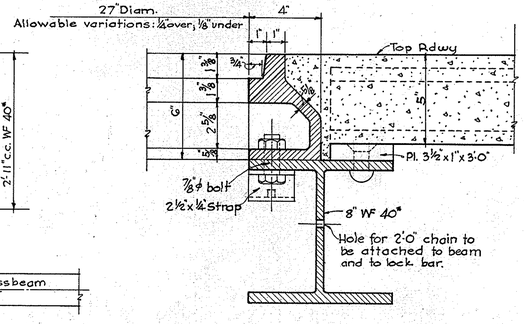
DETAILS OF MAN-HOLE COVER

No Scale



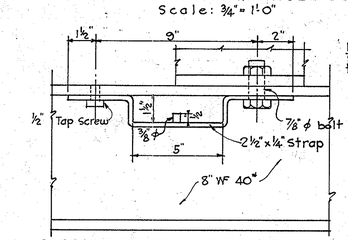
FRAMING PLAN FOR MANHOLE SUPPORT

Scale: 3/4" = 1'-0"



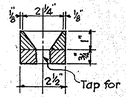
SECTION L-L

Scale: 3" = 1'-0"



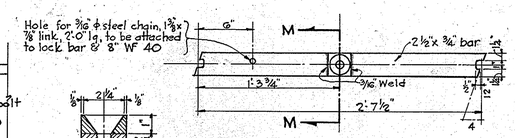
DETAIL OF STRAP TO SUPPORT LOCK BAR

Scale: 3" = 1'-0"



SECTION M-M

Scale: 3" = 1'-0"



LOCK BAR FOR M.H. COVER

Scale: 1½" = 1'-0"

DETAILS OF MAN-HOLE FRAME & SUPPORT

NOTE:
See Sheet C-354-4-8 for Continuous Girder Strees Sheet.
See Sheet C-354-4-1 for general notes.

REVISIONS
(1) Provisions for utility conduits removed. 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
CONT. GIRDER SPANS - BENTS & MISC. DETAILS

SCALE AS SHOWN — CONTRACT

MADE BY J.E. GREINER CO. E.G.R. — APPROVED
TRACED BY J.E. GREINER CO. E.G.R.
CHECKED BY " " " — CHIEF ENGINEER
APPROVED: — BRIDGE ENGINEER — 4/11/39

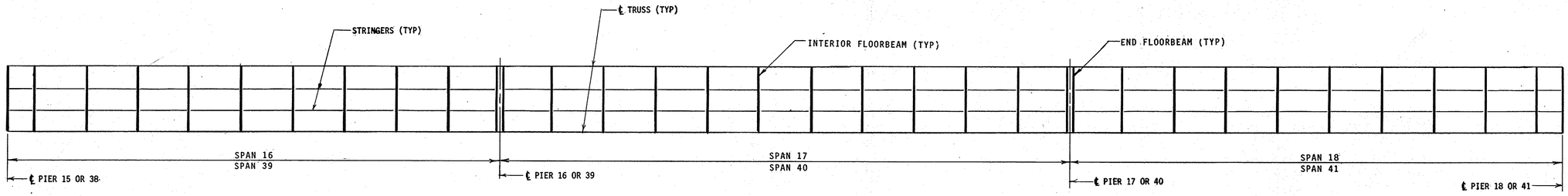
J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

APRIL 11, 1939

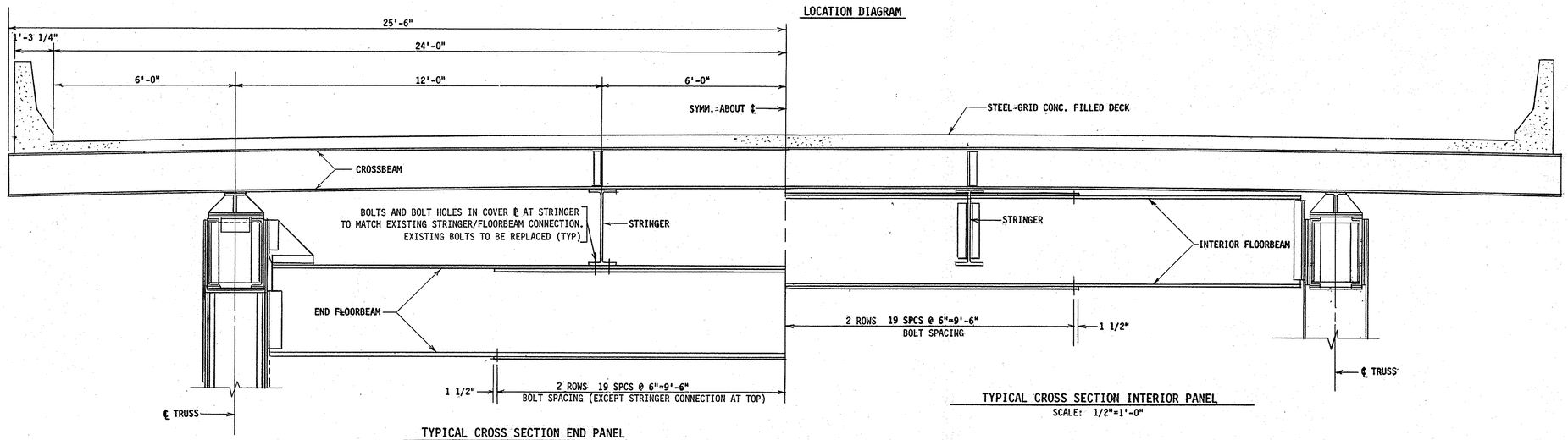
SHEET No. 11 OF 37
C-354-4-11

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N. Y.

K&E BALTIMORE 19 1253

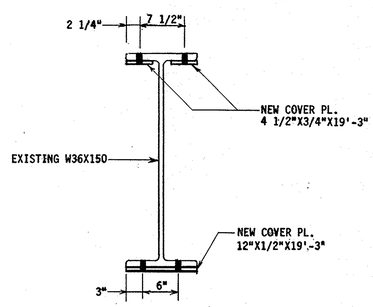


LOCATION DIAGRAM

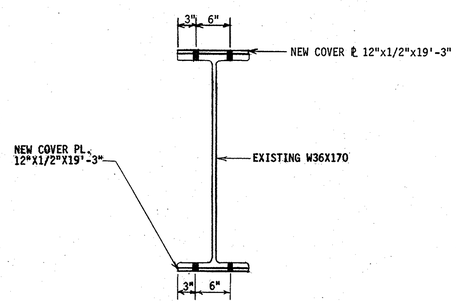


TYPICAL CROSS SECTION END PANEL
SCALE: 1/2"=1'-0"

TYPICAL CROSS SECTION INTERIOR PANEL
SCALE: 1/2"=1'-0"



END FLOORBEAM SECTION
SCALE: 1" = 1'-0"



INTERIOR FLOORBEAM SECTION
SCALE: 1" = 1'-0"

SUMMARY OF STRENGTHENING - THIS SHEET

SPAN	MEMBER	NO. OF MEMBERS
16 TO 18	END FLOORBEAM	6
16 TO 18	INTERIOR FLOORBEAM	28
39 TO 41	END FLOORBEAM	6
39 TO 41	INTERIOR FLOORBEAM	28

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. WORK ON THE FLOORBEAMS SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL BE TWICE THE FLOORBEAM SPACING IN LENGTH, AND CENTERED ON THE FLOORBEAM BEING WORKED ON.

REVISIONS

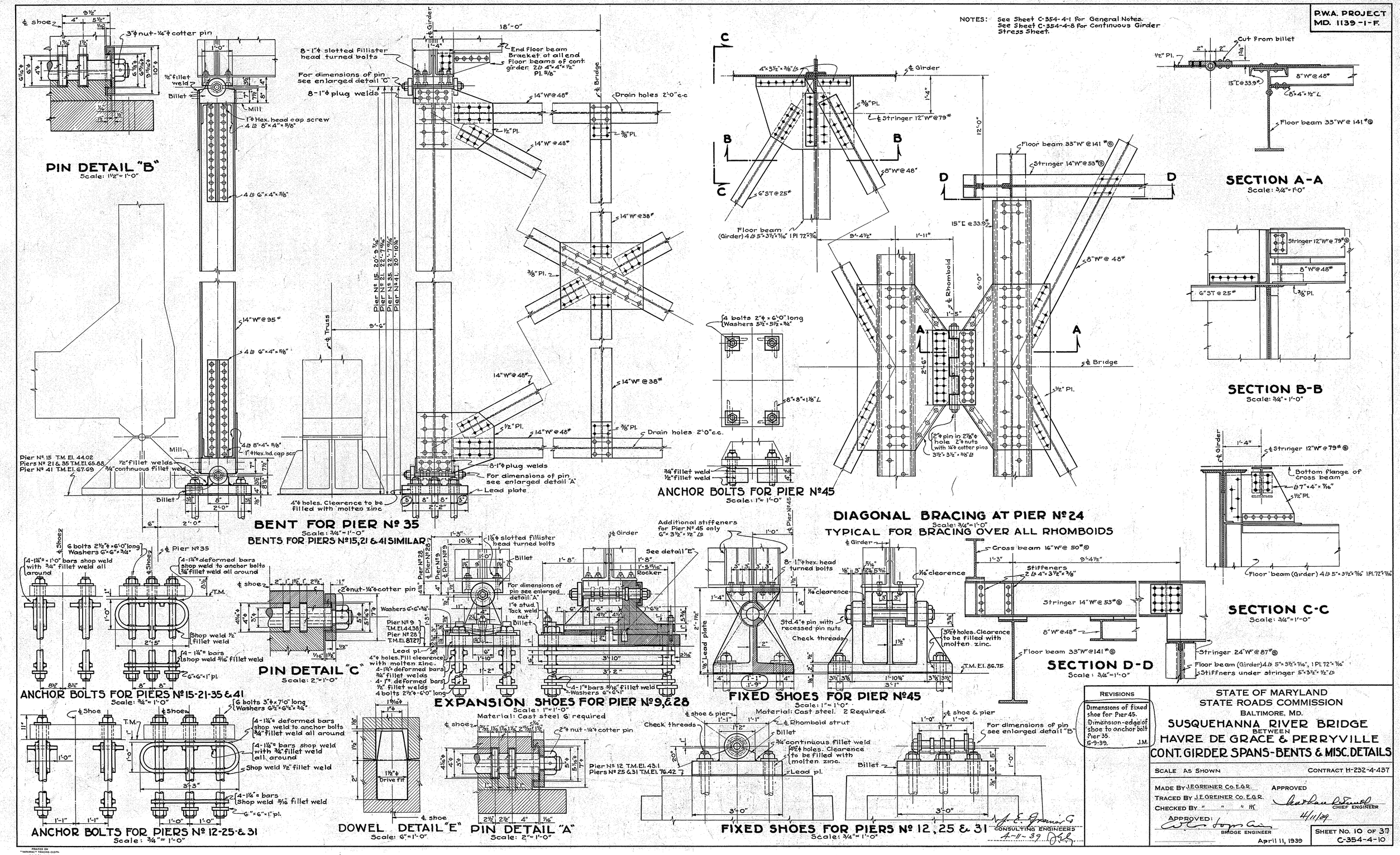
MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 16-18,39-41 (DECK TRUSS SPANS)
FLOORBEAM STRENGTHENING

CONT. NO. TFA 2-1250-20 SHEET NO. 11 OF 18
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F.

NOTES: See Sheet C-354-4-1 for General Notes.
See Sheet C-354-4-8 for Continuous Girder Stress Sheet.



REVISIONS

Dimensions of fixed shoe for Pier 45.
Dimension-edge of shoe to anchor bolt Pier 35.
6-9-39. J.M.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE

CONT. GIRDER SPANS-BENTS & MISC. DETAILS

SCALE AS SHOWN — CONTRACT H-232-4-437

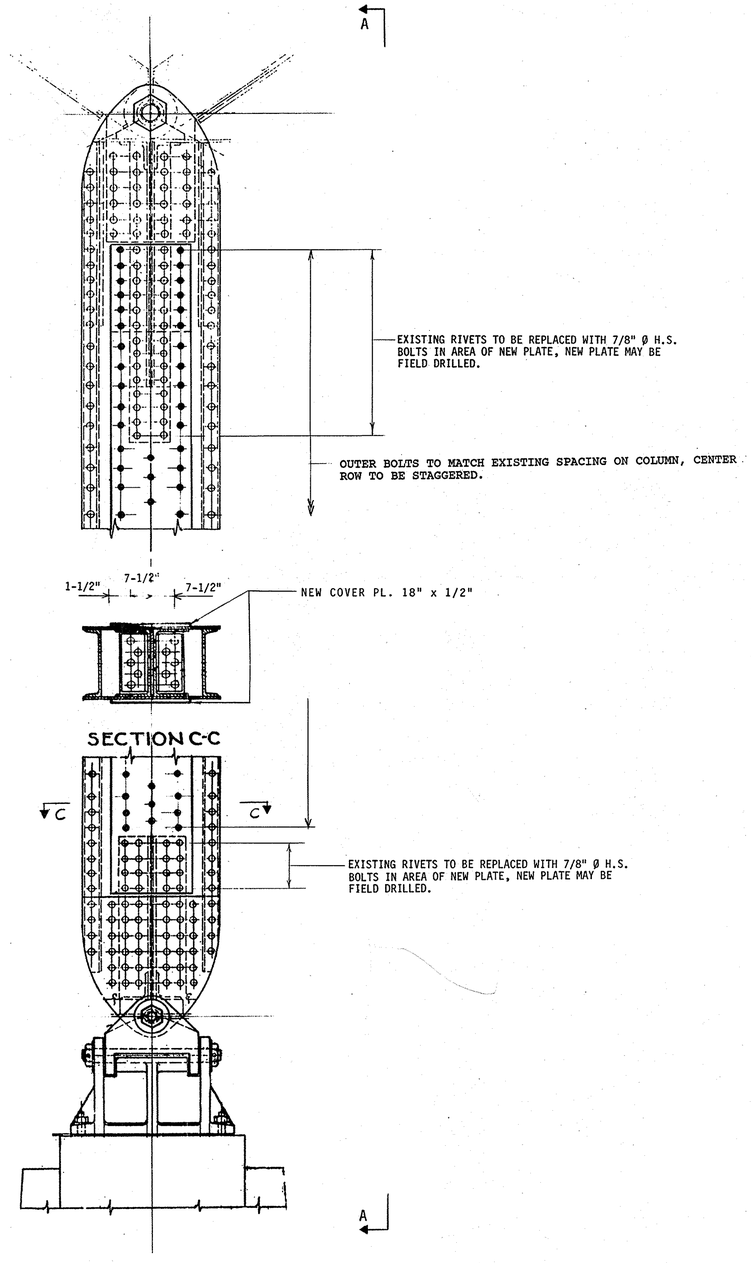
MADE BY J.E. GREINER CO. E.G.R.
TRACED BY J.E. GREINER CO. E.G.R.
CHECKED BY " " " H.K.
APPROVED: BRIDGE ENGINEER
APPROVED: CHIEF ENGINEER
April 11, 1939

CONSULTING ENGINEERS
4-11-39

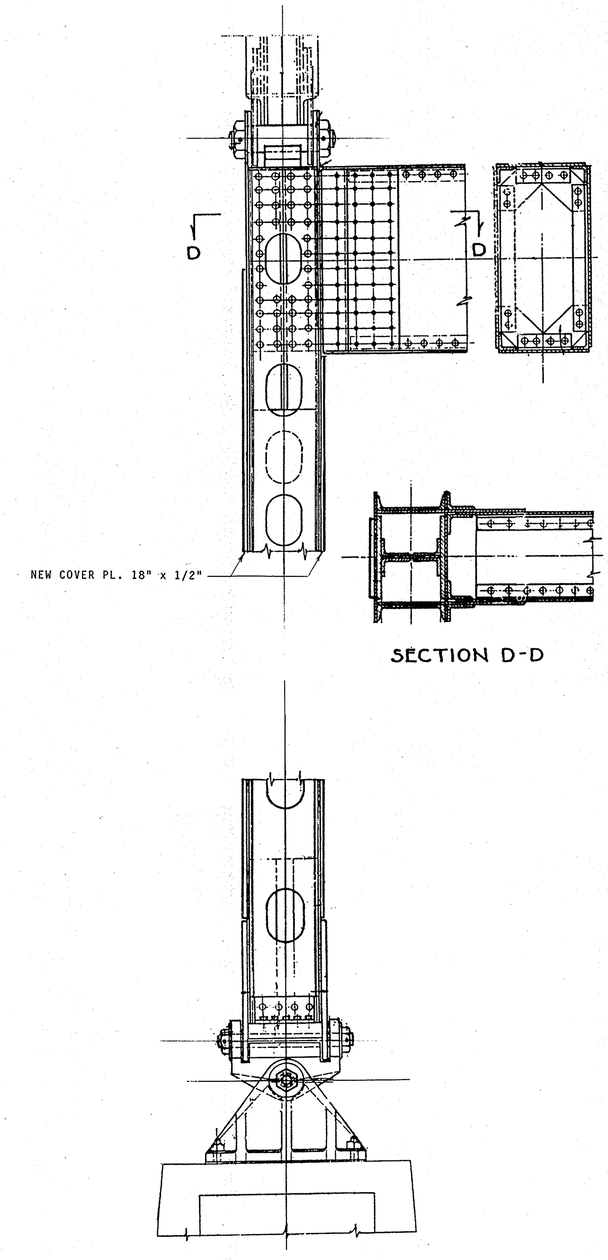
SHEET No. 10 OF 37
C-354-4-10

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

K&E BALTIMORE 19 1253



ELEVATION PIER 23
(NORTH AND SOUTH COLUMN REPAIRS SAME)
SCALE: 3/4"=1'-0"



VIEW A-A
SCALE: 3/4"=1'-0"

SUMMARY OF STRENGTHENING - THIS SHEET		
PIER	MEMBER	NO. OF MEMBERS
23	COLUMN	2

NOTES:

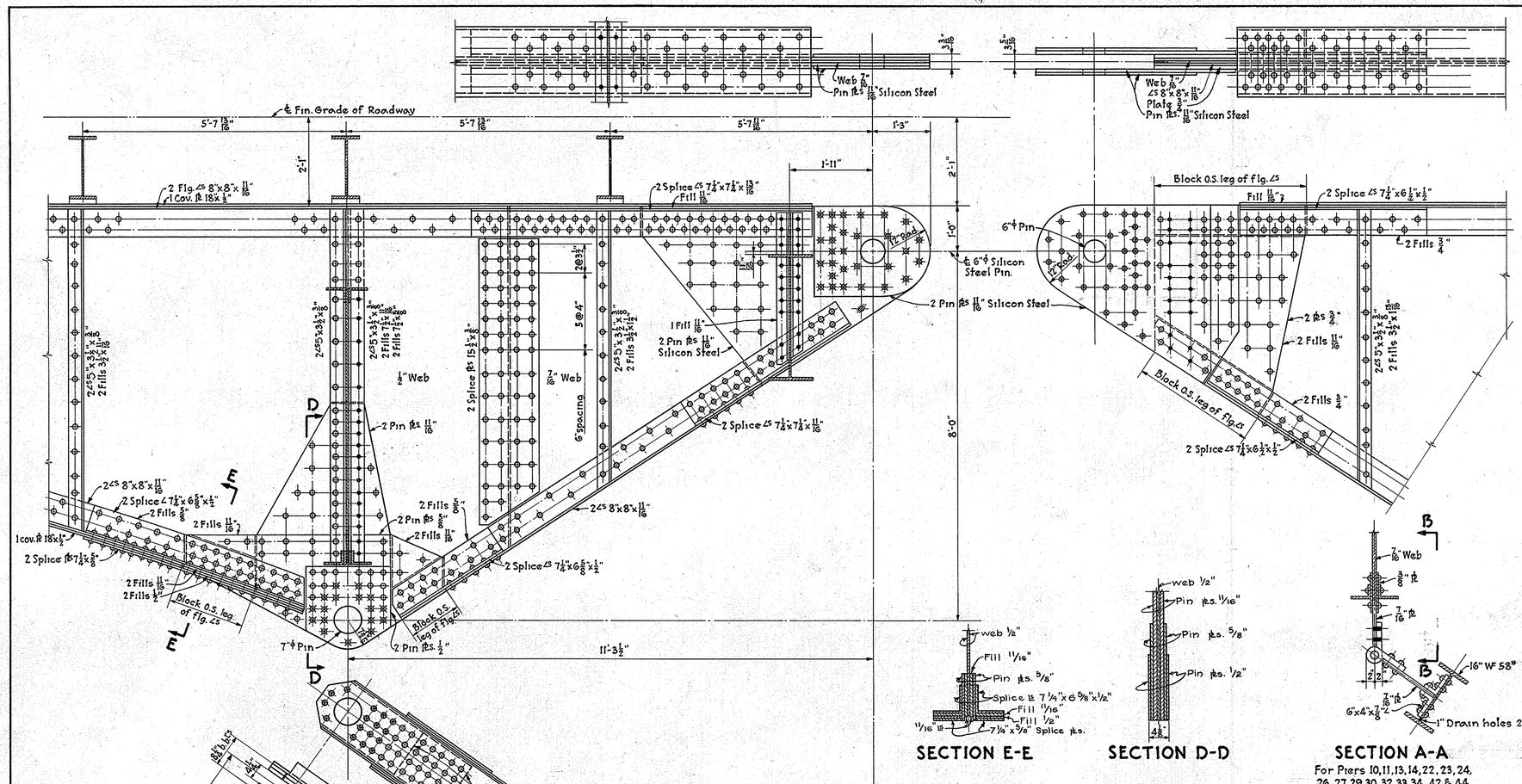
1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS ASTM A-7 DESIGNATION. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. WORK ON THE COLUMNS SHALL BE CARRIED OUT WHEN ONE OUTSIDE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED ON THE SIDE CLOSED. THE WORK ZONE SHALL COVER SPAN 23 AND SPAN 24.

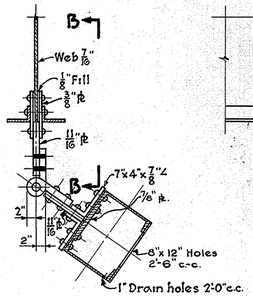
REVISIONS

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
PIER 23 - COLUMN STRENGTHENING

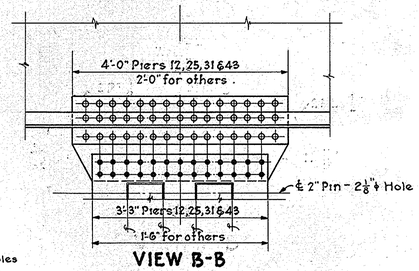
CONT. NO. TFA 2-1250-20 SHEET NO. 10 OF 18
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F

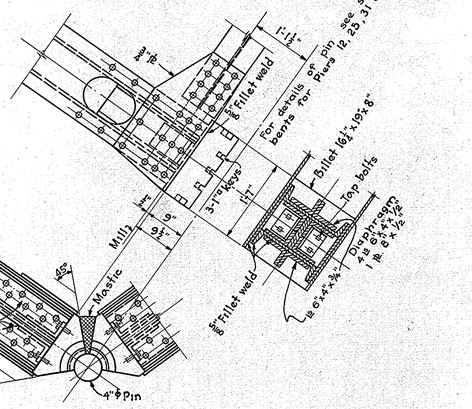




SECTION A-A
For Piers 12,25,31 & 43



VIEW B-B

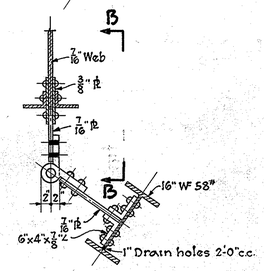


DETAIL OF RHOMBOID STRUTS
FOR PIERS No. 12,25,31, & 43

For details not shown see details of Rhomboid Struts for Piers 10,11,13,14,22,23,24,26,27,29,30,32, 33,34,42 & 44.

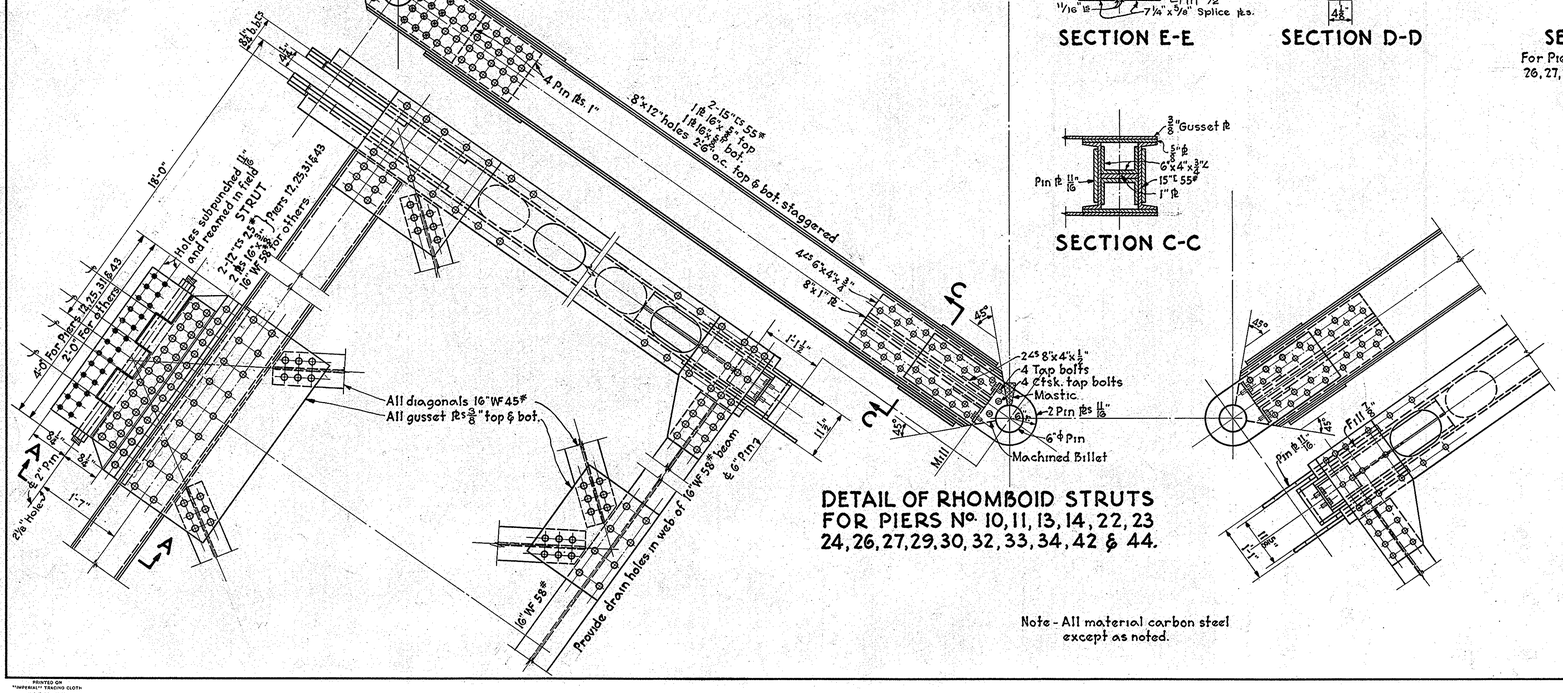
SECTION E-E

SECTION D-D



SECTION A-A
For Piers 10,11,13,14,22,23,24, 26,27,29,30,32,33,34,42 & 44.

SECTION C-C



DETAIL OF RHOMBOID STRUTS
FOR PIERS No. 10,11,13,14,22,23
24,26,27,29,30,32,33,34,42 & 44.

Note - All material carbon steel except as noted.

NOTES

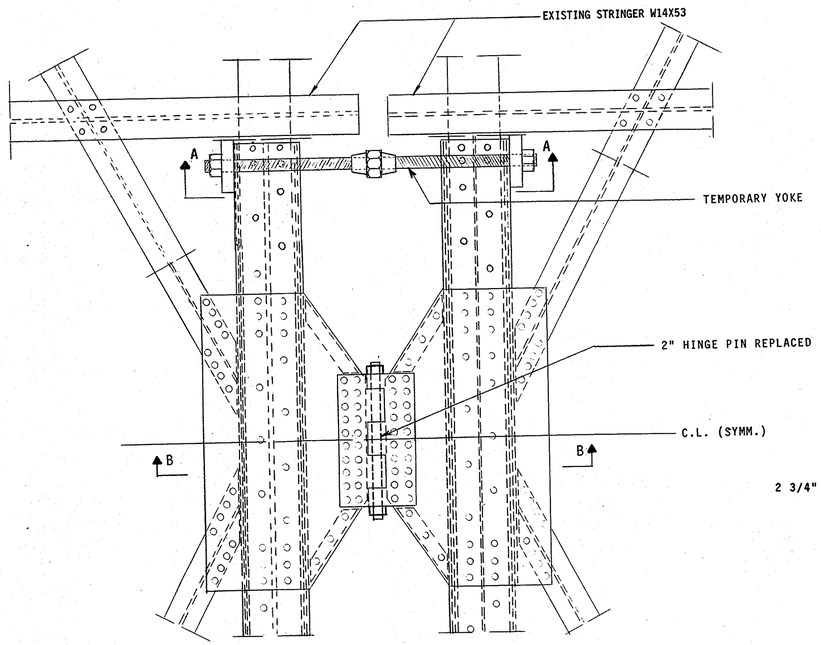
See Sheet C-354-4-1 for General Notes
See Sheet C-354-4-4 for Cross Section of Girder Span.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

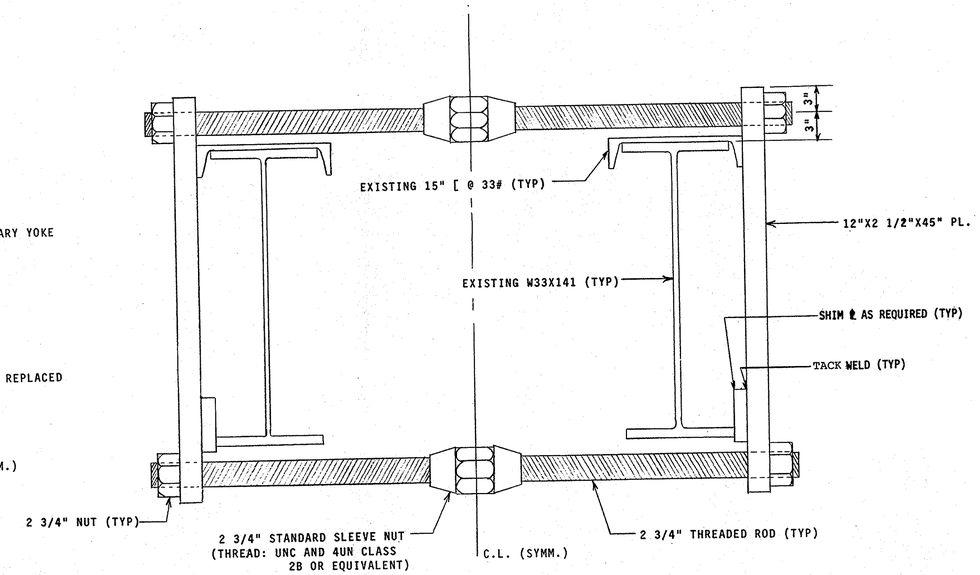
REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE CONT. GIRDER SPANS - RHOMBOID DETAILS
	SCALE: 3/4" = 1'-0 — CONTRACT H-232-4-437
	MADE BY J.E. GREINER CO. P.G.R.-J.M. APPROVED TRACED BY J.M. CHECKED BY HK APPROVED — BRIDGE ENGINEER — APRIL 11, 1939 CHIEF ENGINEER — 4/11/39
	SHEET No. 9 OF 37 C-354-4-9

PRINTED ON "IMPERIAL" TRACING CLOTH K & E (CO., N.Y.)

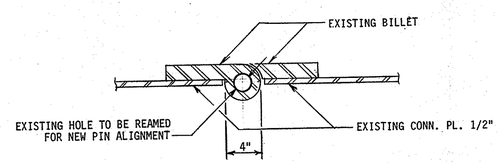
K&E BALTIMORE 19 1253



TYPICAL PLAN VIEW - HINGE PIN REPLACEMENT
SCALE: 3/4"=1'-0"



SECTION A-A
SCALE: 1 1/2"=1'-0"



SECTION B-B
SCALE: 1 1/2"=1'0"

SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
10 TO 15	UPPER ℄ HINGE PIN	5
22 TO 35	UPPER ℄ HINGE PIN	12
42 TO 45	UPPER ℄ HINGE PIN	3

NOTES:

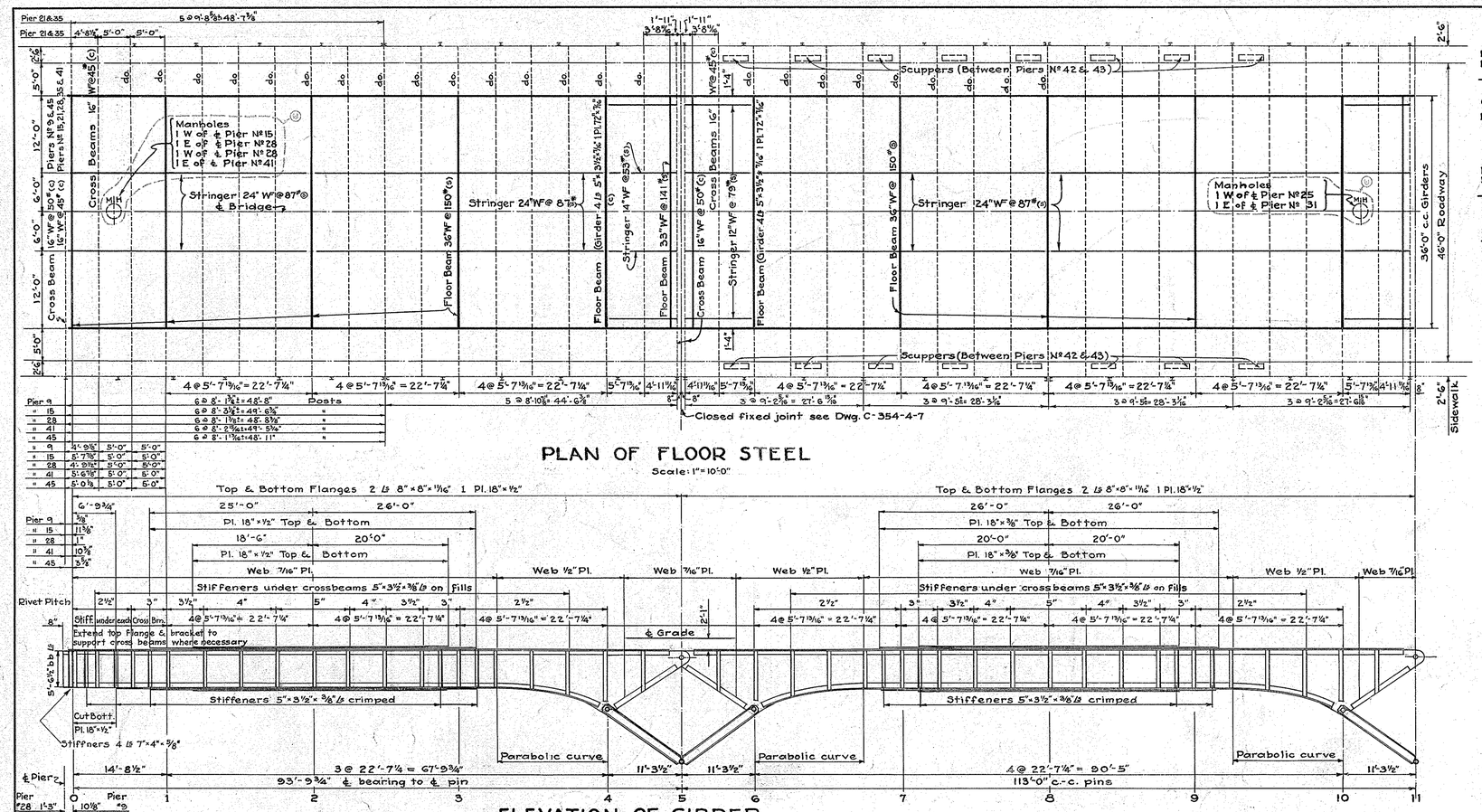
1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS ASTM A-7 DESIGNATION. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. THE PROCEDURE FOR INSTALLATION OF THE NEW HINGE PIN SHALL BE AS FOLLOWS:
   - A. PLACEMENT OF TEMPORARY YOKE SUPPORT:
     1. EACH YOKE SUPPORT SHALL BE PLACED, AS SHOWN, DIRECTLY ADJACENT TO EXISTING STRINGER.
     2. YOKE SUPPORT SHALL BE TIGHTENED A SUFFICIENT AMOUNT TO INHIBIT MOVEMENT OF FLOORBEAMS WHEN HINGE PIN IS REMOVED.
     3. ASSEMBLY SHALL BE INSPECTED AND APPROVED BY THE ENGINEER PRIOR TO HINGE PIN REMOVAL.
   - B. REPLACEMENT OF HINGE PIN:
     1. PROCEDURE FOR THE REMOVAL OF THE EXISTING PIN SHALL IN NO WAY DAMAGE OR ALTER THE EXISTING HINGE OR ADJACENT STRUCTURE.
     2. PRIOR TO THE PLACEMENT OF THE NEW PIN, THE HINGE MUST BE INSPECTED AND APPROVED BY THE ENGINEER.
     3. HOLE IS TO BE REAMED AND A NEW 2" Ø PIN INSERTED WITH H.D. HEX NUYS TIGHTENED ON EACH END AND 1/4" Ø COTTER PINS.
   - C. YOKE ASSEMBLY SHALL BE REMOVED AND USED AT EACH HINGE PIN REPLACEMENT LOCATION.
   - D. ANY PIN REMOVED IN A WORK SHIFT SHALL BE REPLACED WITH A NEW PIN, AND THE YOKE ASSEMBLY REMOVED, IN THE SAME SHIFT.
   - E. THE CONTRACTOR SHALL SUBMIT HIS PROCEDURE FOR PIN REPLACEMENT FOR APPROVAL.

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 10-15,22-35,42-45 (CONT. GIRDER SPANS)
UPPER CENTERLINE HINGE PIN REPAIR

CONT. NO. TFA-2-1250-20 SHEET NO. 9 OF 18
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F

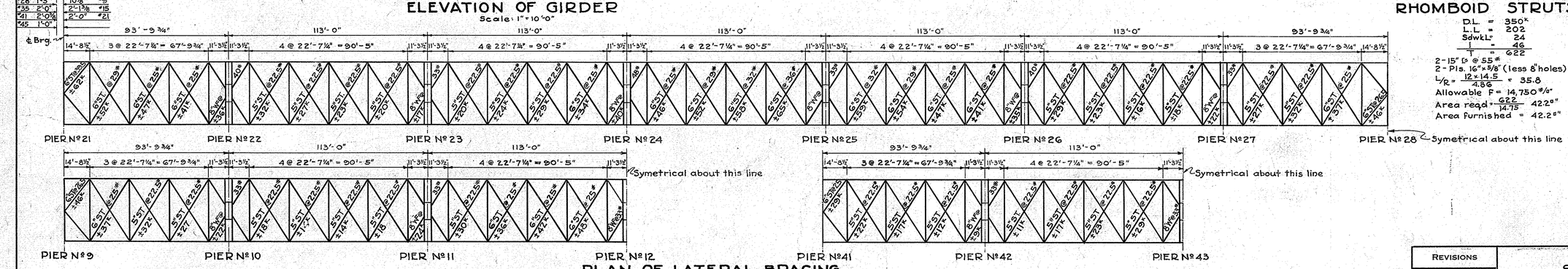


PLAN OF FLOOR STEEL

Scale: 1" = 10'-0"

ELEVATION OF GIRDER

Scale: 1" = 10'-0"



PLAN OF LATERAL BRACING

Scale: 1" = 30'-0"

CROSS BEAM

	Moment	Shear
D.L.	8.0'^k	4.2^k
L.L.	73.5	32.0
I	26.6	11.7
T	108.3	47.9

@ 12/15000 = 72.3 SM. reqd.
16" W @ 45# (c) 72.4 SM. furn.

CROSS BEAM AT CENTER OF RHOMBOID

	Moment	Shear
D.L.	12.0'^k	4.2^k
L.L.	72.0	32.0
Sdwk. L.	5.8	
I	28.6	11.7
T	118.4	47.9

@ 12/15000 = 79.2 SM. reqd
16" W @ 50# (c) 80.7 SM. furn.

STRINGER

	Moment	Shear
D.L.	76'^k	14.1^k
L.L.	248	48.0
I	84	16.4
T	408	78.5

@ 12/24000 = 204 SM. reqd
24" W @ 87 (s) 204.3 SM. furn.

STRINGER OVER RHOMBOID

	Moment	Shear
D.L.	13.9'^k	5.8^k
L.L.	101.5	47.6
Sdwk. L.		1.3
I	37.8	18.2
T	153.2	72.9

@ 12/24000 = 77 SM. reqd.
14" W @ 53# (s) 77.8 SM. furn.
Stringer next to girder
12" W @ 79# (s) 107.1 S.M. furn.

INTERIOR FLOOR BEAM AT RHOMBOID.

	Moment	Shear
D.L.	253'^k	22^k
L.L.	460	40
I	154	12
T	887	74

@ 12/16400×10.7 = 9.2" reqd.
1/8 web 72"×7/16" = 3.9"
2 Ls 5"×3½"×7/16"−4h" = 5.3"
Total 9.2" furn.
Shear @ 11000 = 6.7" reqd.
Web 72"×7/16" 31.5" furn.
Stiffeners Ls 5"×3½"×3/8" 6'-0" c.c. crimped.
Stiffeners under stringers Ls 5"×3½"×½" on Fills.

END FLOOR BEAM & INTERIOR FLOOR BEAM.

	Moment	Shear
D.L.	365'^k	35^k
L.L.	460	40
I	141	12
T	1006	87

@ 12/24000 = 503 S.M. reqd.
36" W @ 150# (s) 502.9 SM. furn.

END FLOOR BEAM OVER RHOMBOID

	Moment	Shear
D.L.	114'^k	15^k
L.L.	500	81
I	186	30
T	800	126

@ 12/22200 = 432 SM. reqd.
33" W @ 141# (s) = 446.8 SM. furn.

GIRDER DESIGN DATA

MOMENTS

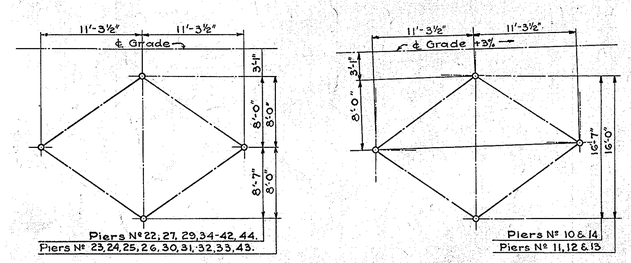
PANEL POINT	DEAD LOAD	LIVE LOAD + IMPACT	DESIGN MOMENT
1	+ 1328'^k	+ 1533'^k	+ 2861'^k
2	+ 1901	+ 2594	+ 4495
3	+ 696	+ 2089	+ 3111*
4	− 2286	− 1910	− 4196
5	− 4444	− 3136	− 7580
6	− 2444	− 2032	− 4476
7	+ 222	+ 2191	+ 2949*
8	+ 1111	+ 2925	+ 4053*

* Moment increased due to reversal.
Note: Flanges at P.P. Nº 1, 3, 4, 6 & 7 - 6 holes out
Flanges at P.P. Nº 2 & 8 - 4 holes out.

GROSS SHEARS

PANEL POINT	DEAD LOAD	LIVE LOAD + IMPACT	DESIGN SHEAR
0	+ 123^k	+ 155^k	+ 278^k
1	+ 65	+ 119	+ 184
2	− 14	− 68	− 100*
3	− 93	− 114	− 207
4	− 171	− 169	− 340
6	+ 157	+ 175	+ 332
7	+ 79	+ 121	+ 200
8	± 0	− 76	− 95*

* Shear increased due to reversal.



RHOMBOID STRUTS

D.L. = 350^k
L.L. = 202
Sdwk L. = 24
I = 46
T = 622

2 - 15" ▷ @ 55#
2 - Pls. 16"×5/8" (less 8" holes)
L/R = 12×14.5 / 4.86 = 35.8
Allowable P = 14,750#/□"
Area reqd = 622 / 14.75 = 42.2□"
Area furnished = 42.2□"

NOTES:
See sheet C-354-4-1 for general notes.
See sheet C-354-4-4 for cross section of cont. girder spans.
See sheet C-354-4-9 for rhomboid details.
See sheet C-354-4-10 for connections of lateral bracing.
Connections of lateral bracing to develope not less than 50% of tensile strength of members except as otherwise shown in details.
See sheet C-354-4-35 for details of scuppers.
See sheet C-354-4-36 for drainage details.
See sheet C-354-4-7, C-354-4-13, C-354-4-26, & C-354-4-35 for details of Expansion Joints.
See sheet C-354-4-11 for details of manholes

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS
① Provisions for utility conduits removed. 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
CONT. GIRDER SPANS - STRESS SHEET

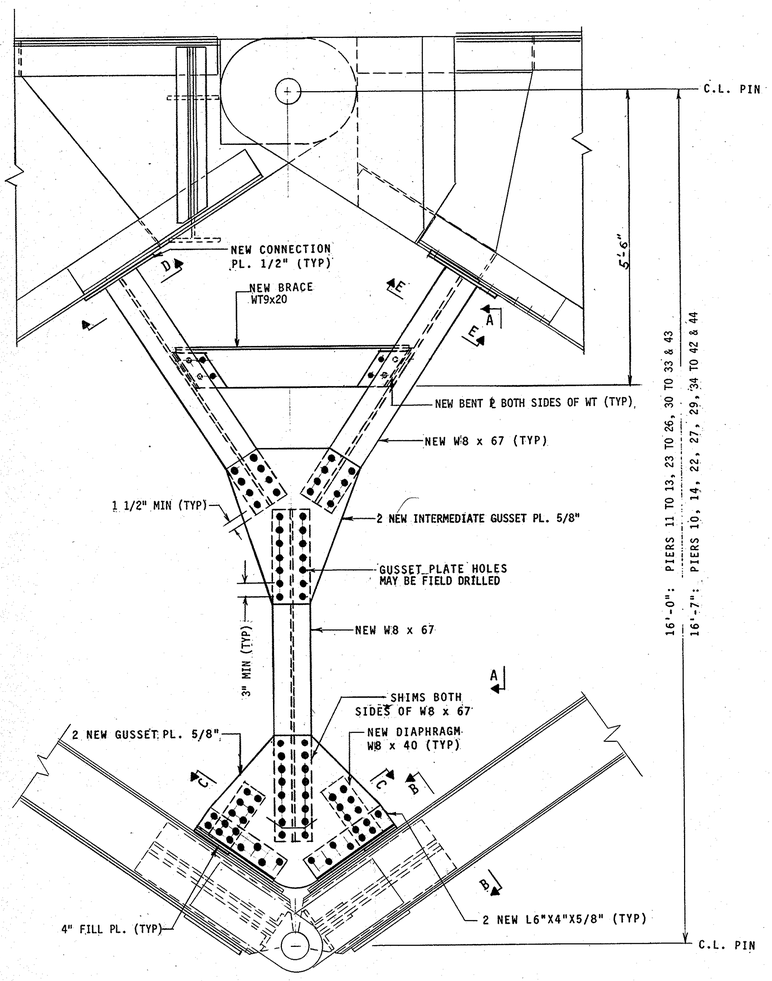
SCALE As Noted — CONTRACT H-232-4-437

MADE BY J.E. GREINER CO E.G.R. APPROVED
TRACED BY " " " E.G.R.
CHECKED BY " " " HK
APPROVED — CHIEF ENGINEER
4/11/39
BRIDGE ENGINEER
April 11, 1939

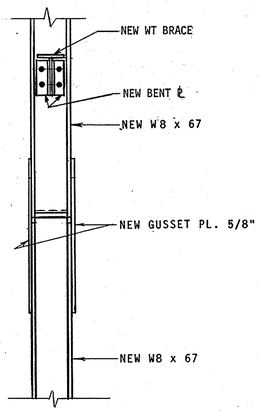
SHEET No. 8 OF 37
C-354-4-8

PRINTED ON "IMPERIAL" TRACING CLOTH EAST CO., N.Y.

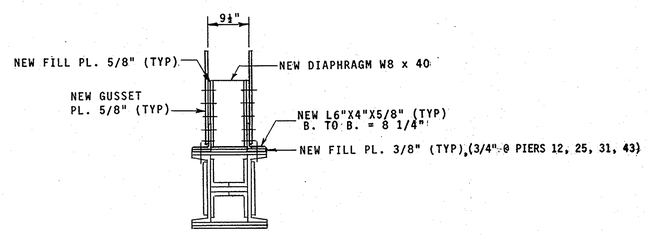
K&E BALTIMORE 19 1253



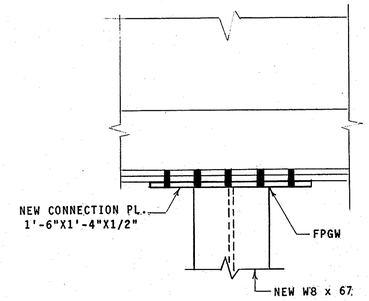
NEW STRUT ELEVATION
SCALE: 3/4" = 1'-0"



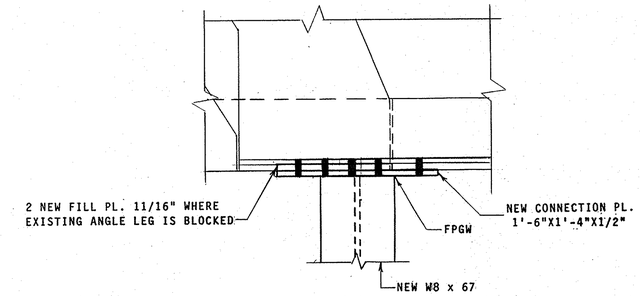
VIEW A-A
SCALE: 3/4" = 1'-0"



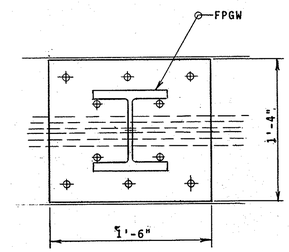
SECTION B-B
SCALE: 3/4" = 1'-0"



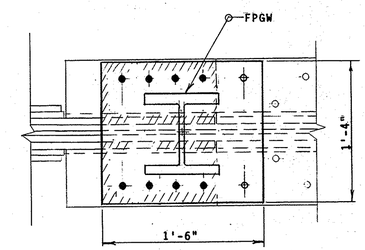
ELEVATION



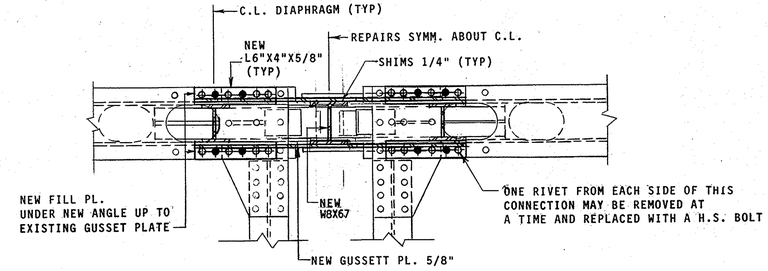
ELEVATION



SECTION D-D
SCALE: 1½" = 1'-0"



SECTION E-E
SCALE: 1½" = 1'-0"



SECTION C-C
SCALE: 3/4" = 1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS ASTM A-7 DESIGNATION. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. THE PROCEDURE FOR INSTALLATION OF NEW VERTICAL STRUT AND YOKE SHALL BE AS FOLLOWS:
   A. INSTALL CONNECTION PLATES AT THE BOTTOM FLANGE OF THE GIRDER ALONG WITH THE DIAGONAL YOKE MEMBERS AND HORIZONTAL BRACING MEMBER.
   B. CONNECT THE INTERMEDIATE GUSSET PLATES TO THE YOKE MEMBERS INSTALLED IN ITEM A.
   C. INSTALL THE GUSSET PLATES ADJACENT TO THE BOTTOM PIN.
   D. CONNECT THE VERTICAL STRUT MEMBER TO THE GUSSET PLATES ADJACENT TO THE BOTTOM PIN. HOLES IN THE STRUT TO MAKE THE CONNECTION SHALL BE REAMED AS REQUIRED, SUBJECT TO THE RESTRICTION THAT THE NUMBER SHALL BE AS SHOWN. THE FINAL CONNECTION AT THE INTERMEDIATE GUSSET PLATES ARE TO BE MADE AT THE SAME TIME FOR BOTH SIDES OF THE BRIDGE.
4. OVERSIZED HOLES MAY BE USED IN THE NEW MATERIAL TO FACILITATE INSTALLATION. HOWEVER, OVERSIZED HOLES SHALL NOT BE MADE IN THE EXISTING MATERIAL.
5. IN ORDER TO MAINTAIN THE INTEGRITY OF THE STRUCTURE, PROCEDURES 3C AND 3D SHALL BE CARRIED OUT WHEN THERE IS LITTLE OR NO WIND AND WHEN ONE OUTSIDE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED ON THE SIDE CLOSED. THE WORK ZONE SHALL BE THE LENGTH OF THE CONTINUOUS GIRDER SPANS. ALSO, ANY RIVET WITH A HEAD REMOVED IN A WORK SHIFT SHALL BE REPLACED WITH A HIGH STRENGTH BOLT IN THE SAME SHIFT.
6. THE CONTRACTOR SHALL SUBMIT HIS PROCEDURE FOR RHOMBOID STRENGTHENING FOR APPROVAL.

SUMMARY OF STRENGTHENING - THIS SHEET

PIER	MEMBER	NO. OF MEMBERS
10 TO 14	RHOMBOID STRUT ASSEMBLY	10
22 TO 27	RHOMBOID STRUT ASSEMBLY	12
29 TO 34	RHOMBOID STRUT ASSEMBLY	12
42 TO 44	RHOMBOID STRUT ASSEMBLY	6

LEGEND

○ EXISTING RIVETS

⊕ EXISTING RIVETS TO BE REPLACED WITH 7/8" Ø H.S. BOLTS

● NEW 7/8 Ø H.S. BOLTS

FPGW-FULL PENETRATION GROOVE WELD

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION

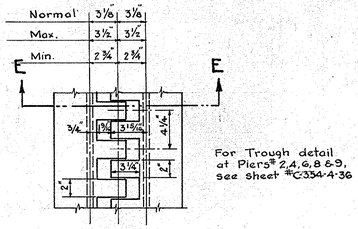
SPANS 10-15,22-35,42-45 (CONT. GIRDER SPANS)

RHOMBOID STRENGTHENING

CONT. NO. TFA 2-1250-20 SHEET NO. 8 OF 18

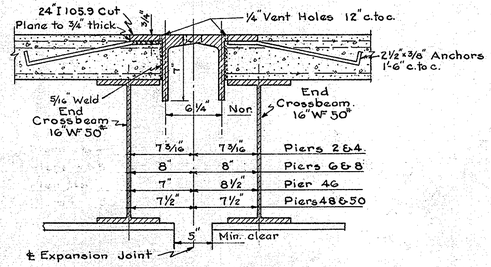
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F

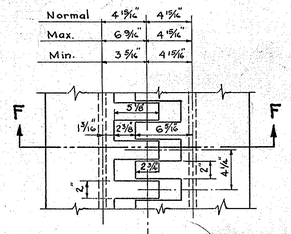


PLAN

(This joint provides for 1½" movement)

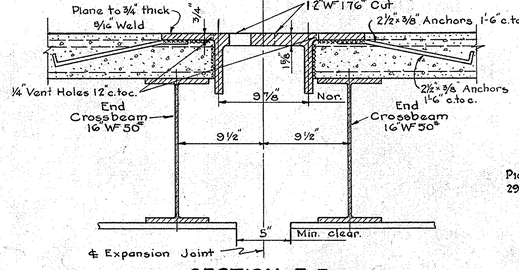


SECTION E-E
TYPICAL EXP. JOINT
(For Girder Spans only)
Scale 1½" = 1'-0"

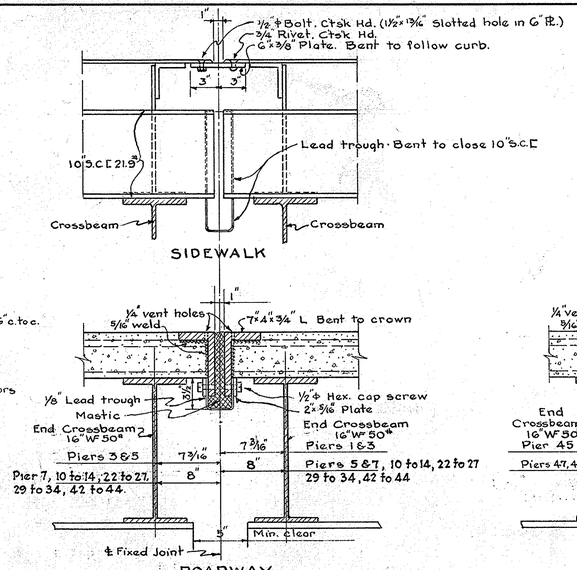


PLAN

(This joint provides for ¾" movement)

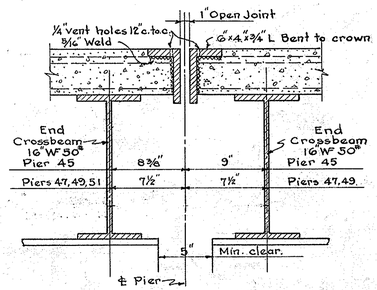


SECTION F-F
EXPANSION JOINT - PIER 9.
(for Girder Span only)
Scale 1½" = 1'-0"

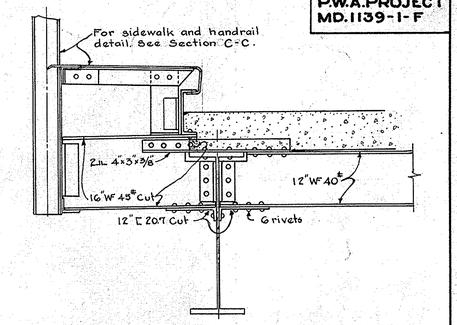


ROADWAY
TYPICAL CLOSED FIXED JT.
(for Girder Spans only)
Scale 1½" = 1'-0"

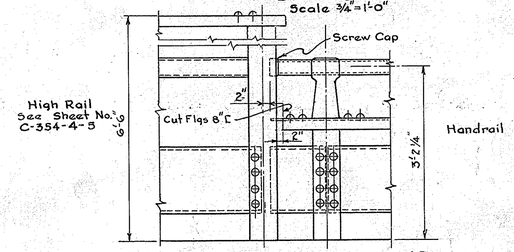
Note: See Sheet C-354-4-1 for General Notes.



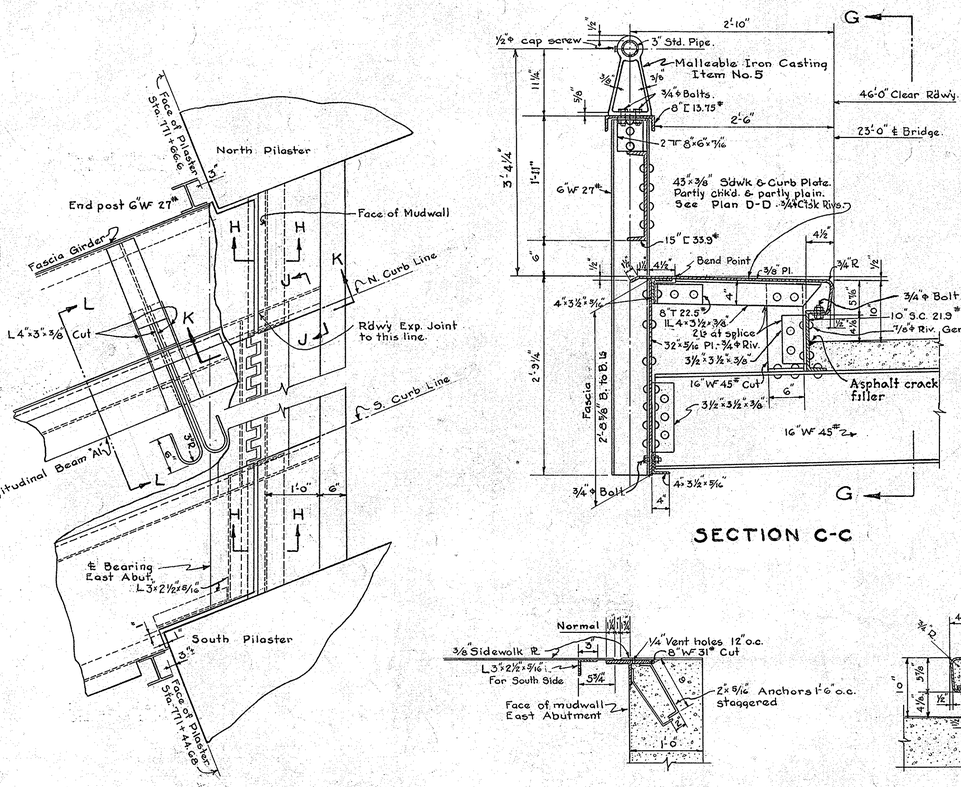
TYPICAL OPEN FIXED JT.
(for Girder Span only)
Scale 1½" = 1'-0"



TYPICAL SIDEWALK BRACKET
FOR BEAM SPANS
Scale ¾" = 1'-0"



DETAIL OF RAIL AT PIERS 45 & 46
Scale ¾" = 1'-0"



SECTION C-C

SECTION G-G

SECTION A-A

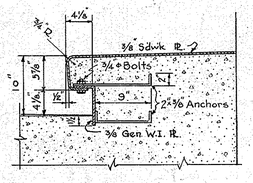
TYPICAL SIDEWALK EXPANSION AT POINTS INDICATED Ⓔ ON PLANS.

PLAN D-D.

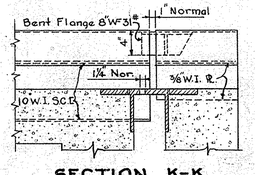
SECTION B-B.

DETAIL OF HANDRAIL & SIDEWALK
Scale 1" = 1'-0"

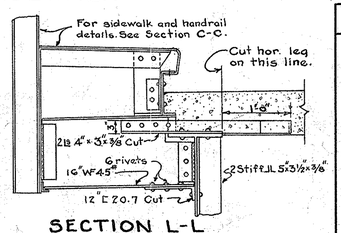
SECTION H-H
Scale 1" = 1'-0"



SECTION J-J
Scale 1" = 1'-0"



SECTION K-K
Scale 1" = 1'-0"



SECTION L-L
Scale ¾" = 1'-0"

SIDEWALK & CURB DETAILS
AT EAST ABUTMENT
Scale ¾" = 1'-0"

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
MISCELLANEOUS DETAILS

SCALE - AS NOTED — CONTRACT H-232-4-437

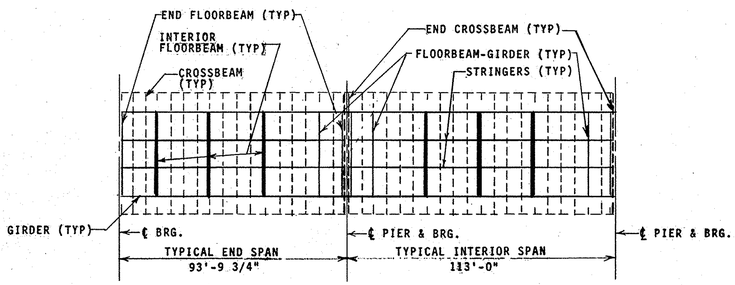
MADE BY J.E. GREINER CO. C.M.F. APPROVED
TRACED BY C.M.F.
CHECKED BY H.K.
APPROVED — CHIEF ENGINEER
4/11/39
BRIDGE ENGINEER
J. E. Greiner Co. CONSULTING ENGINEERS 4-11-39

SHEET No. 7 OF 37
C-354-4-7

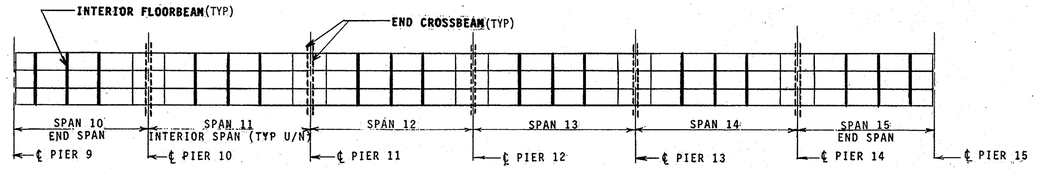
APRIL 11, 1939

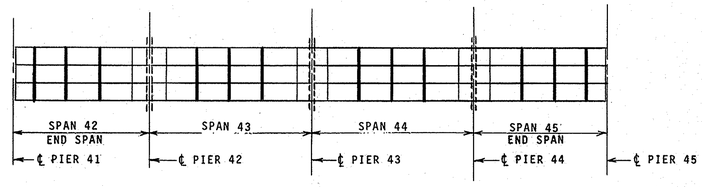
PRINTED ON "IMPERIALITY" TRACING CLOTH K & E CO., N. Y.

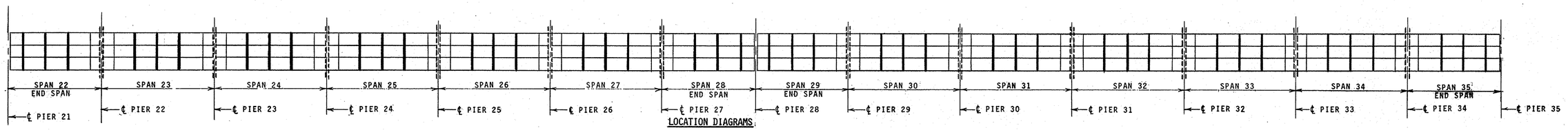
K&E BALTIMORE 19 1253



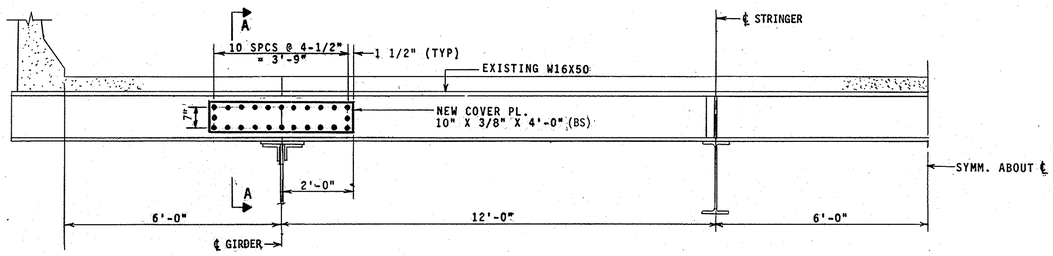
TYPICAL FRAMING PLAN
SCALE: 1"=30'-0"







LOCATION DIAGRAMS

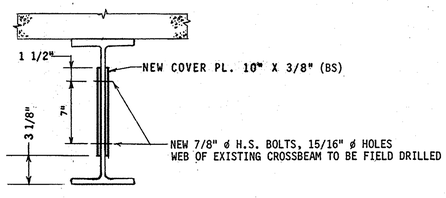


HALF ELEVATION END CROSSBEAMS
SCALE: 1/2"-1'-0"

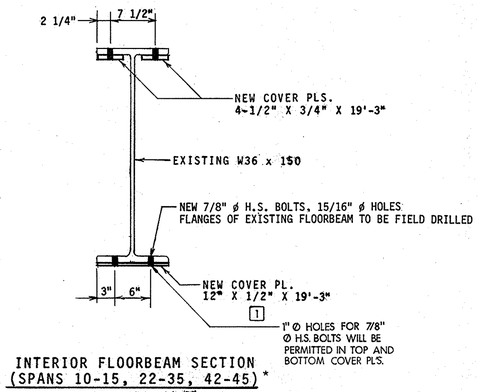
SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
10 TO 15	INTERIOR FLOORBEAM	18
10 TO 15	END CROSSBEAM	10
22 TO 35	INTERIOR FLOORBEAM	42
22 TO 35	END CROSSBEAM	24
42 TO 45	INTERIOR FLOORBEAM	12
42 TO 45	END CROSSBEAM	6

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. FOR TYPICAL CROSS SECTION SEE SHEET NO. 5.
3. WORK ON THE FLOORBEAM SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS PERFORMED.
4. WORK ON THE CROSSBEAMS SHALL BE CARRIES OUT WHEN ONE OUTSIDE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED ON THE SIDE CLOSED. THE WORK ZONE SHALL INCLUDE THE SPANS IN WHICH THE WORK IS PERFORMED.
5. EXISTING STRUCTURAL STEEL FOR INTERIOR FLOORBEAMS IS SILICON STEEL. NEW STRUCTURAL STEEL FOR INTERIOR FLOORBEAMS SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
6. EXISTING STRUCTURAL STEEL FOR END CROSSBEAMS IS ASTM A-7 DESIGNATION. NEW STRUCTURAL STEEL FOR END CROSSBEAMS SHALL CONFORM TO ASTM A-36 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.



SECTION A-A
SCALE: 1½" = 1'-0"



INTERIOR FLOORBEAM SECTION
(SPANS 10-15, 22-35, 42-45) *
SCALE: 1" = 1'-0"

*FOR TYPICAL CROSS SECTION SEE SHEET NO. 5

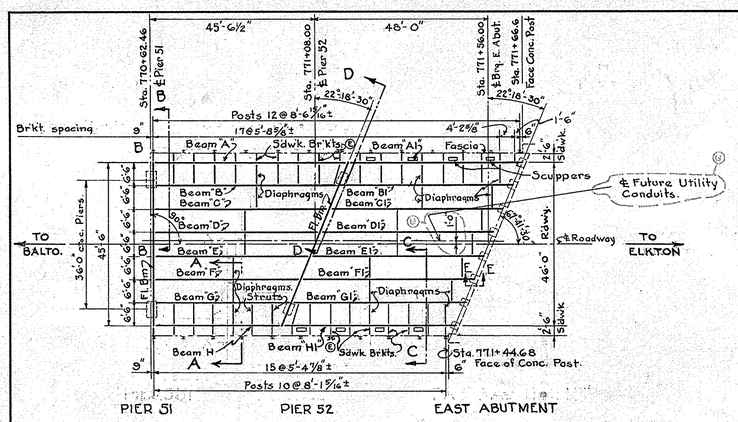
REVISIONS
1 7/7/87 CHANGED BOLT HOLE SIZE

MARYLAND TRANSPORTATION AUTHORITY

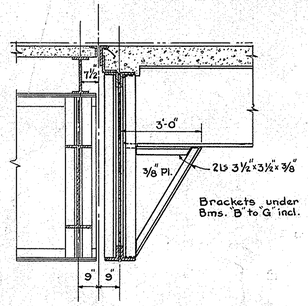
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 10-15,22-35,42-45 (CONT. GIRDER SPANS)
FLOORBEAM & CROSSBEAM STRENGTHENING

CONT. NO. TFA 2-1250-20 SHEET NO. 7 OF 18
DESIGNED BY RAP DRAWN BY DCF

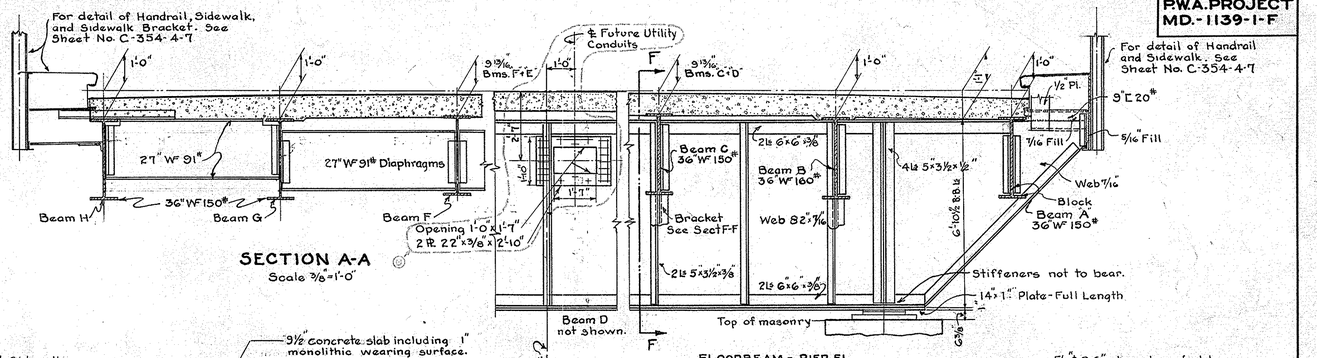
P.W.A. PROJECT
MD.-1139-1-F



PLAN
Scale 1" = 20'

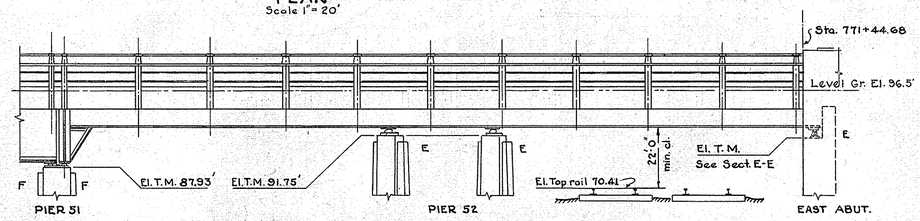


SECTION F-F
Scale 3/8" = 1'-0"

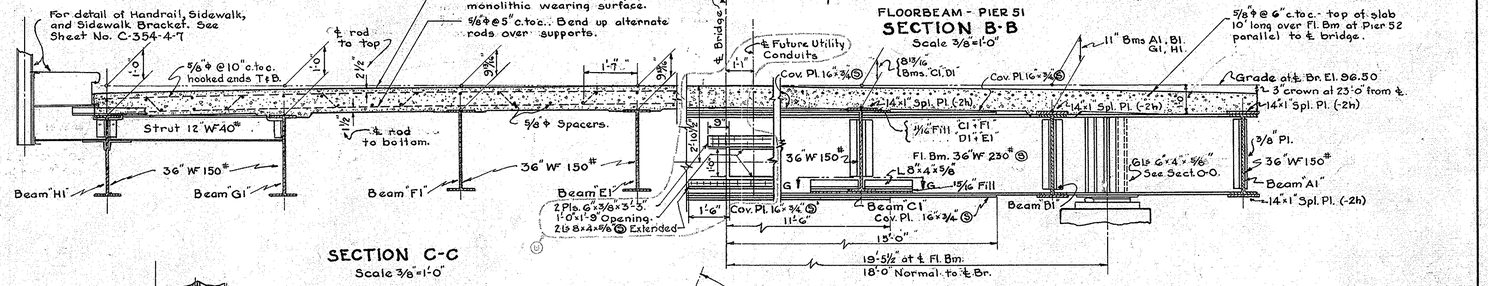


SECTION A-A
Scale 3/8" = 1'-0"

FLOORBEAM - PIER 51
SECTION B-B
Scale 3/8" = 1'-0"



ELEVATION
Scale 1/8" = 1'-0"



SECTION C-C
Scale 3/8" = 1'-0"

FLOORBEAM - PIER 52.
SECTION D-D
Scale 3/8" = 1'-0"

EXTERIOR BEAM "A"	Shear	Moment
D.L.	29100	391000
L.L.(Rdwy)	17200	196500
Imp.	4800	54600
L.L.(Sdwk)	8300	112000
Total	59400#	754300 '#

@ 12/18000 = 502 "³ S.M. req'd.
Use 36" WF 150# S.M. 502.9 furn. ©

INTERIOR BEAM "B"	Shear	Moment
D.L.	30000	385000
L.L.	29700	331000
Imp.	8400	93800
Total	68,100#	809,800 '#

@ 12/18000 = 540 S.M. req'd.
Use 36" WF 160# S.M. 541 "³ furn. ©

INTERIOR BEAM "C"	Shear	Moment
D.L.	27400	336000
L.L.	29000	311000
Imp.	8300	90000
Total	64,700 #	737,000 '#

@ 12/18000 = 490 "³ S.M. req'd.
Use 36" WF 150# S.M. 502.9 furn. ©
Same section for Bms. D, E, F, G, H.

EXTERIOR BEAM "A1"	Shear	Moment
D.L.	25800	310000
L.L.(Rdwy)	16100	172500
Imp.	4650	49800
L.L.(Sdwk)	7400	88800
Total	53950 #	621,100 '#

@ 12/18000 = 413 "³ S.M. req'd.
Use 36" WF 150# S.M. 502.9 furn. ©
Same section for "H1".

INTERIOR BEAM "B1"	Shear	Moment
D.L.	27000	324000
L.L.	28600	307000
Imp.	8250	89000
Total	63,850 #	720,000 '#

@ 12/18000 = 480 "³ S.M. Req'd.
Use 36" WF 150# S.M. 502.9 furn. ©
Same section for B1 to G1 incl.

FLOOR BEAM at PIER 51	Shear	Moment	Max. React.
D.L.	82900	530000	112000
L.L.(Rdwy)	79200	699000	79200
Imp.	22900	204300	22900
L.L.(Sdwk)	—	—	6900
Total	185000 #	1,429300 '#	221,000

Shear @ 11000 = 16.8" Req'd.
Web 82"×7/16" = 35.9" " Furn.
End Rivet Pitch = 4¼" ©
End Stiff. 4 Ls 5"×3½"×½" ©
Inter. Stiff. 2 Ls 5"×3½"×3/8" @ 3'-4" Crimped ©

@ 12/(18000×79.22) = 12.00" Req'd
1/8" Web 82"×7/16" = 4.50"
2 Ls 6"×6"×3/8" (-2h) = 7.91"
12.41" Furn. ©

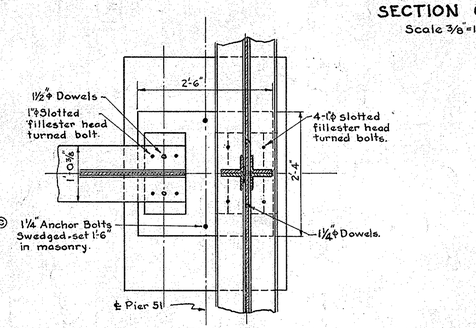
Reinf. Bott. Flange with 14"×1" Cov. Pl. F.L. to resist temp. Forces. ©

FLOOR BEAM at PIER 52.	Shear	Moment	Max. React.
D.L.	212000	1494000	282000
L.L.(Rdwy)	101200	990000	101200
Imp.	23000	228000	23000
L.L.(Sdwk)	—	—	14500
Total	336,200 #	2,712,000 '#	420,700 #

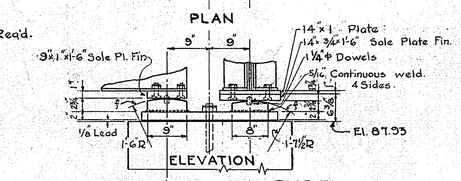
Shear @ 14000 = 24.0" Req'd.
Web 35.88×.765 = 27.4" " Furn.
End Rivet Pitch = 5"
End Stiff. 6 Ls 6"×4"×5/8"
@ 12/24000 = 1356 "³ S.M. Req'd.

Section	Gross I	Net I
(36" WF 230#	14986.4	12911.4
© I.C.P. 16"×¾" - 30'-0" T&B.	8050.0	7050.0
(I.C.P. 16"×¾" - 23'-0" "	8700.0	7650.0
	27611.4	27611.4

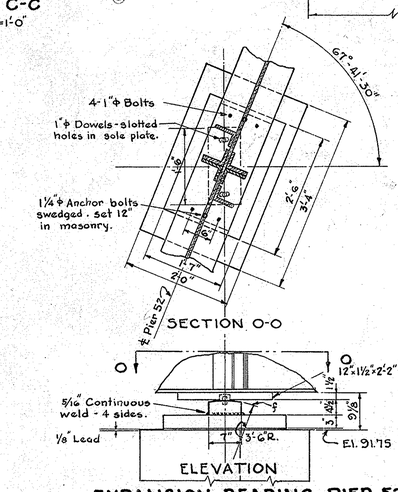
27611.4 / 19.44 = 1420 S.M. furn.



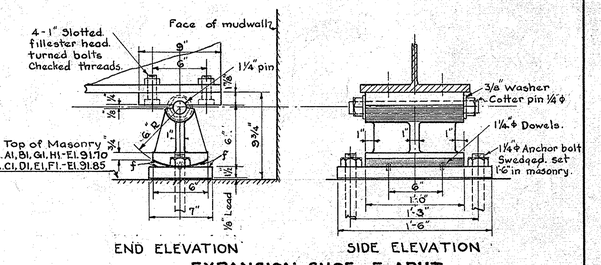
PLAN



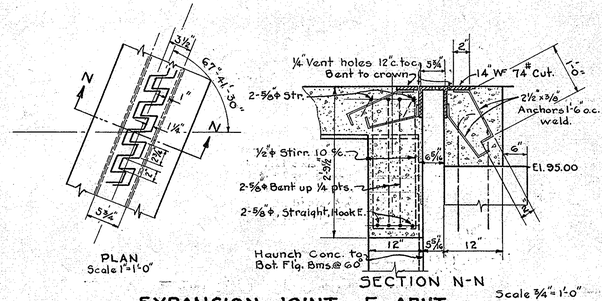
FIXED BEARING - PIER 51
Scale 3/4" = 1'-0"
2 Required



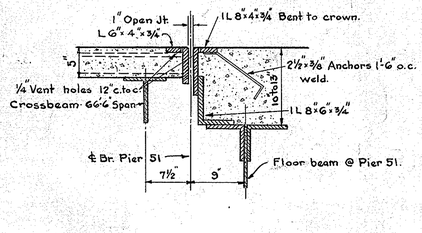
EXPANSION BEARING - PIER 52.
Scale 3/4" = 1'-0"
2 Required



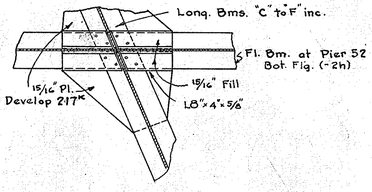
EXPANSION SHOE E. ABUT.
SECTION E-E
Scale 1½" = 1'-0"
8 Required
Material - Cast Steel Annealed
Item No. 3



EXPANSION JOINT - E. ABUT.
(This joint provides for 1" movement)



FIXED JOINT - PIER 51.
Scale 1" = 1'-0"



SECTION G-G.
Scale 1/2" = 1'-0"

NOTES

See Sheet No. C-354-4-1 for "General Notes."
See Sheet No. C-354-4-3 for details of inserts along ℄ conduits.
Typical curb from Pier #51 to Pier #52. Closed curb from Pier #52 to East Abutment. See Sheets Nos. C-354-4-36 & C-354-4-37 for drainage details.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

REVISIONS	
1 Provisions for utility conduits removed 5/16/39	E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
BEAM SPANS BETWEEN PIER #51 & E. ABUT.

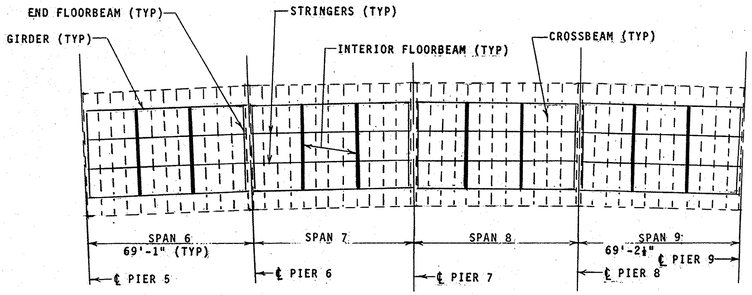
SCALE - As Noted. CONTRACT H-232-4-437

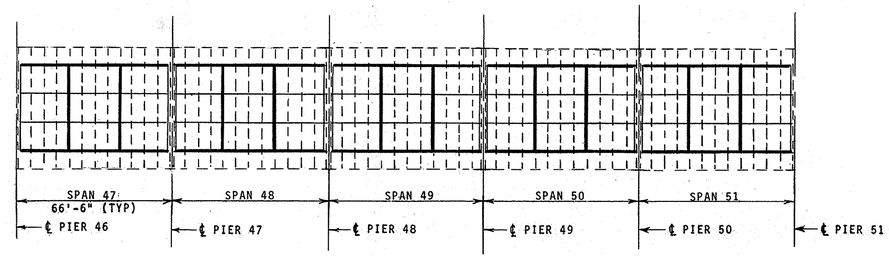
MADE BY J. E. GREINER CO. C.M.F. APPROVED
TRACED BY C.M.F.
CHECKED BY HK
APPROVED
CHIEF ENGINEER
4/11/39
BRIDGE ENGINEER
APRIL 11, 1939

SHEET NO. 6 OF 37
C-354-4-6

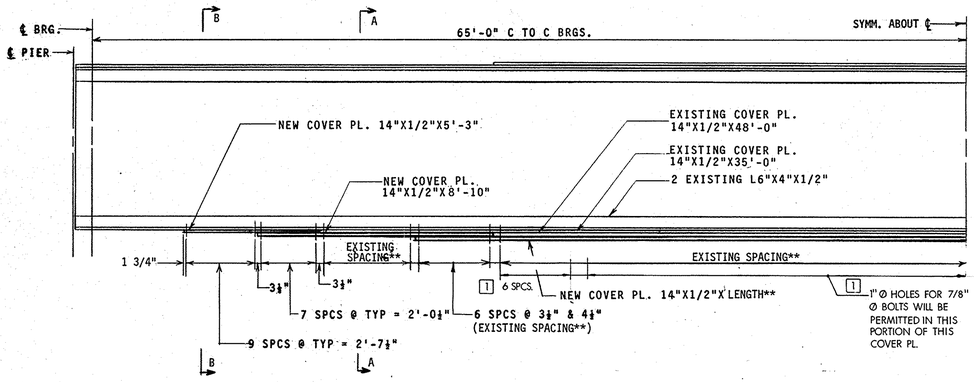
PRINTED ON "IMPERMANENT TRACING CLOTH" E.K.T.CO., N.Y.

K&E BALTIMORE 19 1253





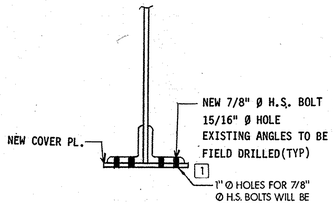
LOCATION DIAGRAMS



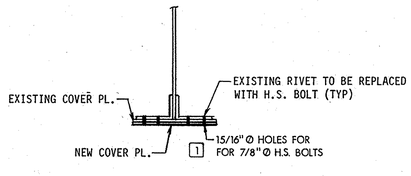
HALF ELEVATION SPANS 47, 48, 49, 50, 51 GIRDERS
SCALE: 3/8"=1'-0"

**TO BE DETERMINED BY CONTRACTOR

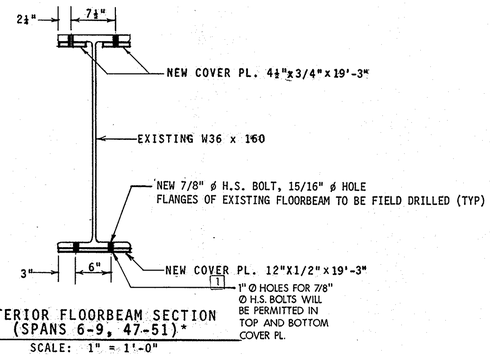
SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
6 TO 9	INTERIOR FLOORBEAM	8
47 TO 51	INTERIOR FLOORBEAM	10
47 TO 51	GIRDER	10



SECTION B-B
SCALE: 1" = 1'-0"

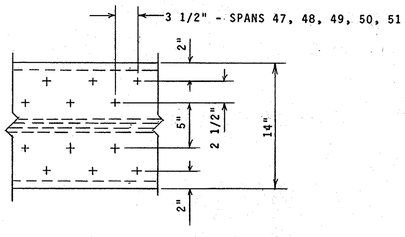


SECTION A-A
SCALE: 1"=1'-0"



INTERIOR FLOORBEAM SECTION (SPANS 6-9, 47-51)*
SCALE: 1" = 1'-0"

*FOR TYPICAL CROSS SECTION SEE SHEET NO. 5



TYPICAL BOLT SPACING IN AREAS WITHOUT EXISTING RIVETS
N.T.S.

NOTES:

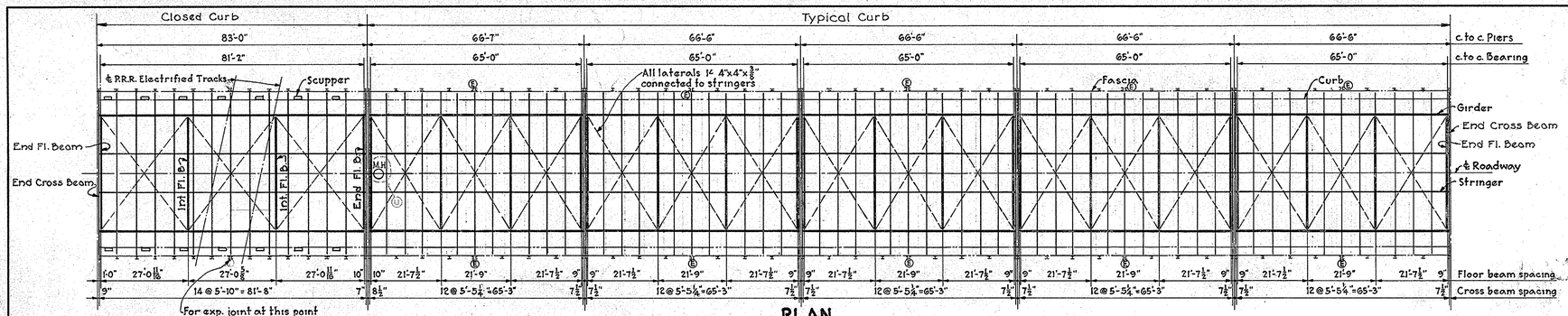
1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. FOR TYPICAL CROSS SECTION SEE SHEET NO. 5.
4. WORK ON THE FLOORBEAMS SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS PERFORMED
5. WORK ON THE GIRDERS SHALL BE CARRIED OUT WHEN TWO LANES ARE CLOSED TO TRAFFIC. THESE LANES SHALL BE THE OUTSIDE LANE OVER THE GIRDER BEING WORKED ON AND THE INSIDE LANE OF THE OPPOSITE DIRECTION OF TRAFFIC. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS PERFORMED.

REVISIONS
1 7/7/87 CHANGED BOLT HOLE SIZE

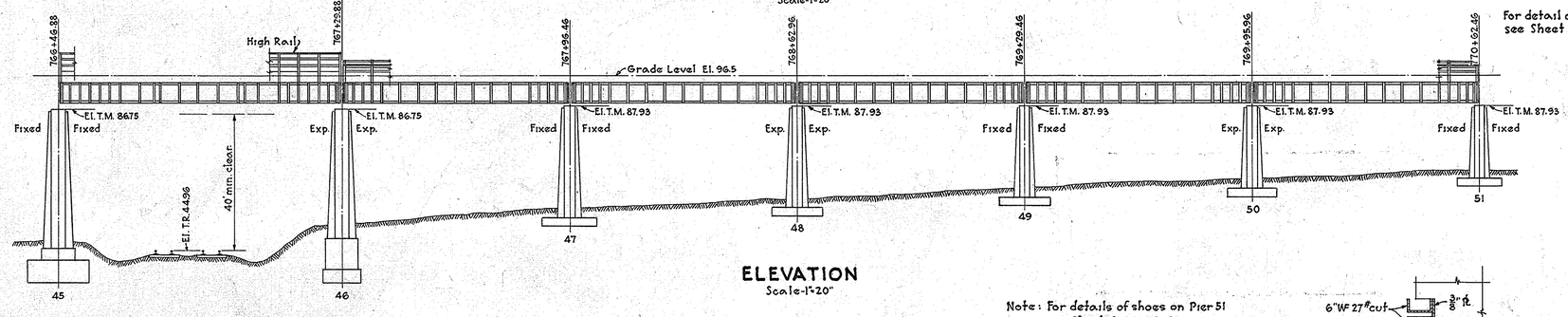
MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS 6-9, 47-51 (SIMPLE GIRDER SPANS)
GIRDER AND FLOORBEAM STRENGTHENING

CONT. NO. TFA 2-1250-20 SHEET NO. 6 OF 18
DESIGNED BY RAP DRAWN BY DCF

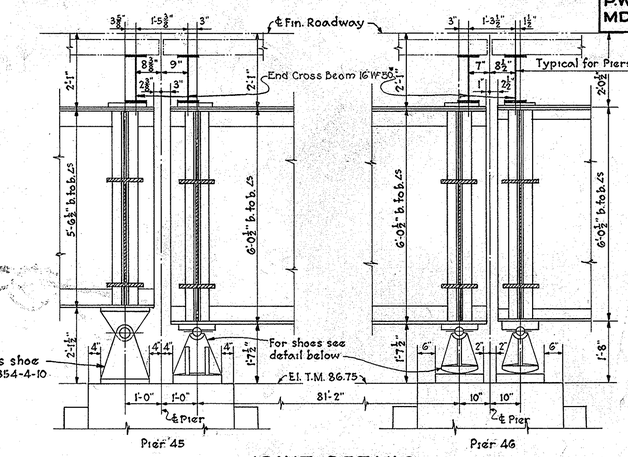
P.W.A. PROJECT
MD. 1139-1-F



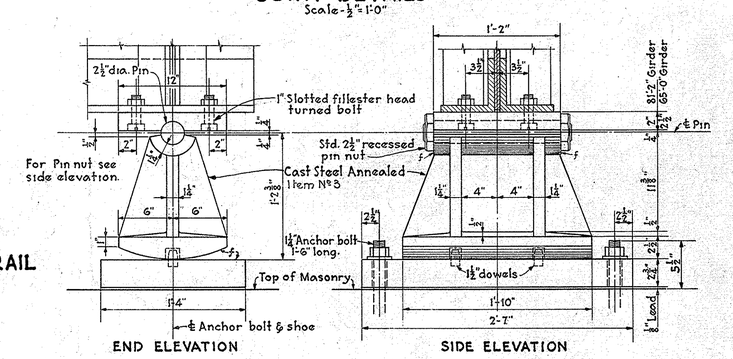
PLAN
Scale-1"=20'



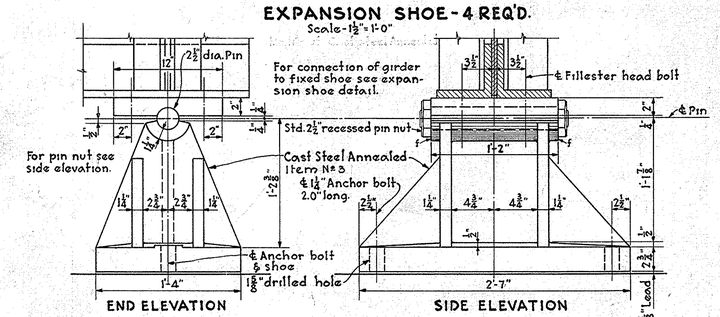
ELEVATION
Scale-1"=20'



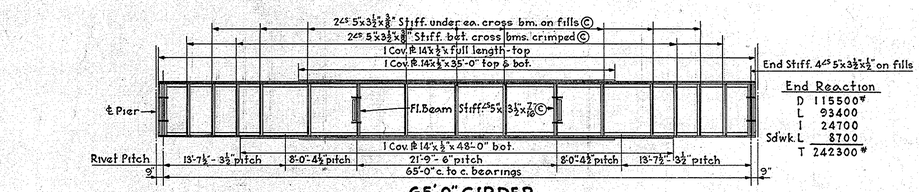
JOINT DETAILS
Scale-½"=1'-0"



EXPANSION SHOE - 4 REQ'D.
Scale-1½"=1'-0"

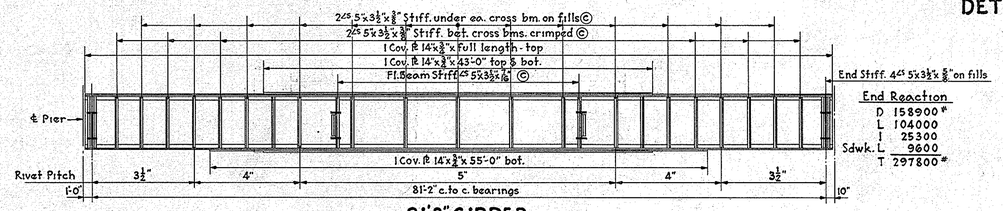


FIXED SHOE - 2 REQ'D.
Scale-1½"=1'-0"



End Reaction	
D	115500#
L	93400
I	24700
Sdwk. L	8700
T	242300#

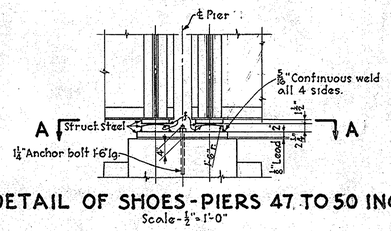
65'-0" GIRDER
Scale-⅛"=1'-0"



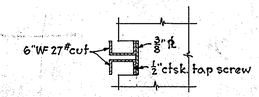
End Reaction	
D	158900#
L	104000
I	25300
Sdwk. L	9600
T	297800#

81'-2" GIRDER
Scale-⅛"=1'-0"

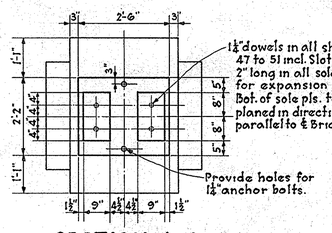
Note: For details of shoes on Pier 51 see Sheet C-354-4-6



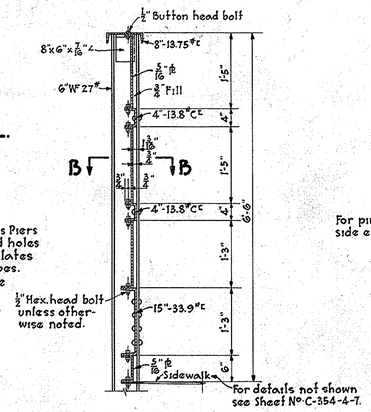
DETAIL OF SHOES - PIERS 47 TO 50 INCL.
Scale-½"=1'-0"



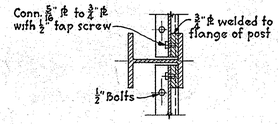
DET. OF EXP. JOINT - HIGH RAIL
Scale-¾"=1'-0"



SECTION A-A
Scale-½"=1'-0"



DETAIL OF HIGH RAIL OVER ELECTRIFIED TRACKS
Scale-¾"=1'-0"



SECTION B-B
Scale-1½"=1'-0"

66'-6" GIRDER SPANS

STRINGER

	Shear	Moment
D	12100#	52000'#
L	48000	237000
I	16400	81000
T	76500#	370000'#

@ 12/24000 = 185 S.M. req.
Use 24" WF 80# S.M. 185.8 furn. (S)

END FLOOR BEAM

	Shear	Moment
D	14500#	169000'#
L	40800	490000
I	13900	167000
T	69200#	826000'#

@ 12/24000 = 413 S.M. req.
Use 36" WF 150# S.M. 502.9 furn. (S)

INT. FLOOR BEAM

	Shear	Moment
D	33100#	390000'#
L	40900	491000
I	12200	147000
T	86200#	1028000'#

@ 12/24000 = 514 S.M. req.
Use 36" WF 160# S.M. 541 furn. (S)

GIRDER

	Shear	Moment
D	101000#	1816000'#
L	77900	1118000
I	20600	296000
Sdwk. L	8700	134000
T	208200#	3364000'#

@ 12/24000 x 72 = 23.4" req.
⅛" Web 72" x 7/16" = 3.94"
2 Ls 6"x4"x½" - 2h = 7.50" (S)
2 Cov. PLs 14"x½" - 2h = 12.00"
23.44" furn.
Shear @ 14000 = 14.87" req.
Web 72" x 7/16" = 31.50" furn.

End Cross Beam 16" WF 50#
Cross Beam 16" WF 45#

83'-0" GIRDER SPAN

STRINGER

	Shear	Moment
D	20800#	90000'#
L	49200	299000
I	16200	98600
T	86200#	487600'#

@ 12/24000 = 244 S.M. req.
Use 27" WF 98# S.M. 255.3 furn. (S)

END FLOOR BEAM

	Shear	Moment
D	20700#	240000'#
L	42000	504000
I	13800	166000
T	76500#	910000'#

@ 12/24000 = 455 S.M. req.
Use 36" WF 150# S.M. 502.9 furn. (S)

INT. FLOOR BEAM

	Shear	Moment
D	45200#	531400'#
L	40900	490000
I	11400	137000
T	97500#	1158400'#

@ 12/24000 = 579 S.M. req.
Use 36" WF 170# S.M. 579.1 furn. (S)

GIRDER

	Shear	Moment
D	137100#	3080000'#
L	86700	1605000
I	21100	390000
Sdwk. L	9600	193000
T	254500#	5268000'#

@ 12/24000 x 72 = 36.6" req.
⅛" Web 72" x 7/16" = 3.94"
2 Ls 6"x6"x⅜" - 2h = 15.96"
2 Cov. PLs 14"x⅝" - 2h = 18.00" (S)
37.90" furn.
Shear @ 14000 = 18.20" req.
Web 72" x 7/16" = 31.50" furn.

End Cross Beam 16" WF 50#
Cross Beam 16" WF 45#

NOTES

See Sheet No. C-354-4-1 for General Notes
See Sheet No. C-354-4-4 for cross section of girder spans.
See Sheet No. C-354-4-7 for details of sidewalk and hand rail and details of roadway expansion & fixed joints.
See Sheets No. C-354-4-36 and C-354-4-37 for drainage details.
Stringers, preferably, should be continuous over four supports; if splice is made, full moment and shear to be developed.
Ⓜ Indicate Man Hole for details see sheet No. C-354-4-11.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-1-39

REVISIONS	
(3) Provisions for utility conduits removed. 5/16/39	E.G.D.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
66' & 83' GIRDER SPANS

SCALE - AS NOTED
CONTRACT H-232-4-437

MADE BY J.E. GREINER CO. J.M.
TRACED BY J.M.
CHECKED BY HK
APPROVED
BRIDGE ENGINEER
APPROVED
CHIEF ENGINEER
4/11/29

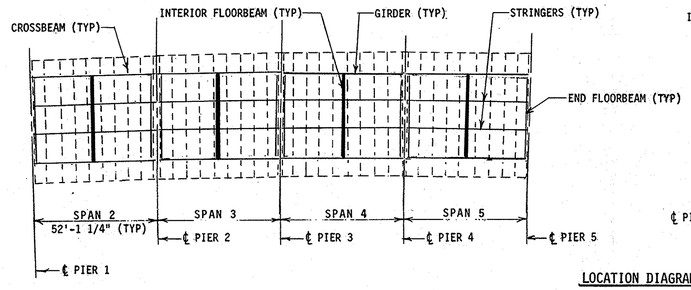
APRIL 11, 1939

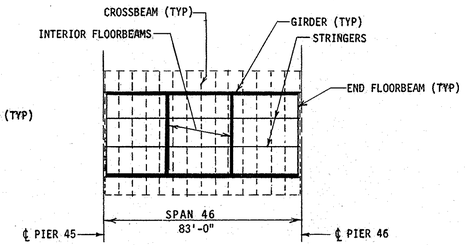
SHEET NO. 5 OF 37
C-354-4-5

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

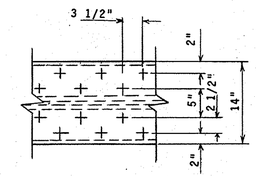
K&E BALTIMORE 19 1253

SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
2 TO 5	INTERIOR FLOORBEAM	4
46	INTERIOR FLOORBEAM	2
46	GIRDER	2

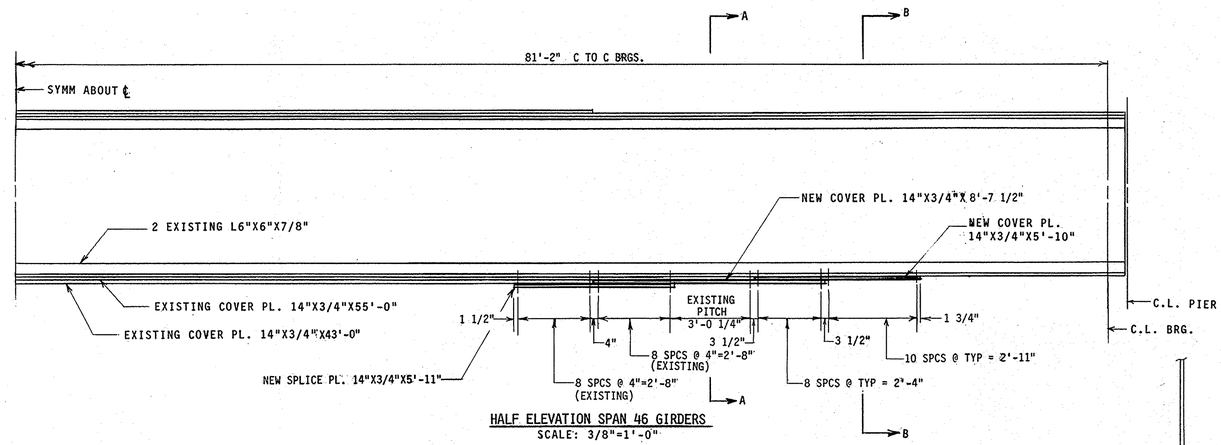




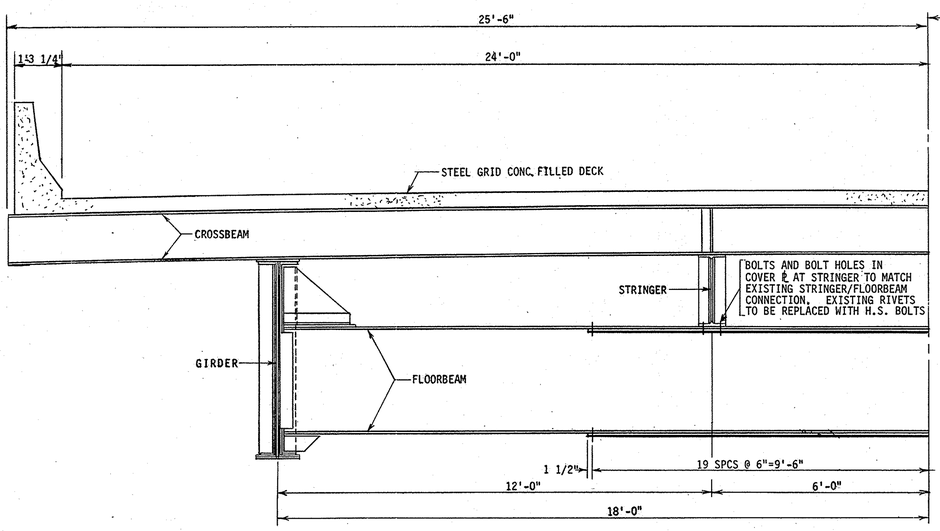
LOCATION DIAGRAMS



TYPICAL BOLT SPACING IN AREAS WITHOUT EXISTING RIVETS

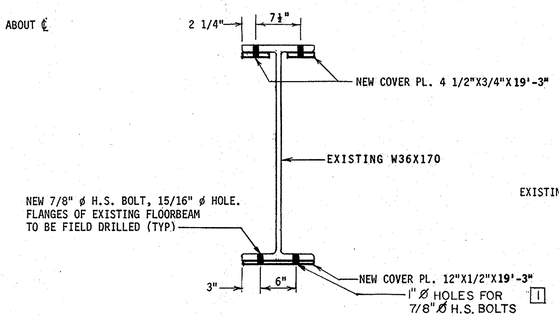


HALF ELEVATION SPAN 46 GIRDERS
SCALE: 3/8"=1'-0"



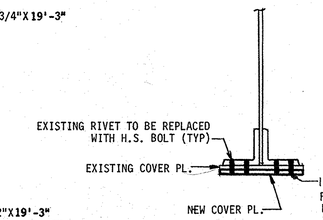
BOLT SPACING
TOP & BOTT, EXCEPT STRINGER CONNECTION AT TOP

TYPICAL CROSS SECTION (SPANS 2 TO 15, 22 TO 35, 42 TO 51)
SCALE: 1/2"=1'-0"

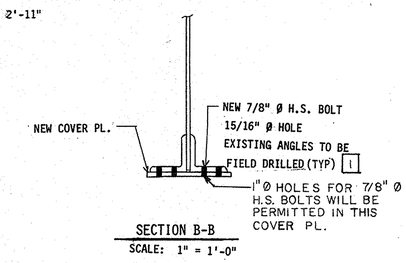


INTERIOR FLOORBEAM SECTION (SPANS 2-5, 46)*
SCALE: 1"=1'-0"

* FOR OTHER FLOORBEAM SECTIONS SEE SHTS 6&7



SECTION A-A
SCALE: 1"=1'-0"



SECTION B-B
SCALE: 1" = 1'-0"

NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS SILICON STEEL. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-572 GRADE 50 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. WORK ON THE FLOORBEAMS SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS PERFORMED.
4. WORK ON THE GIRDERS SHALL BE CARRIED OUT WHEN ONE OUTSIDE LANE IS CLOSED TO TRAFFIC AND THE WORK IS PERFORMED ON THE SIDE CLOSED. THE WORK ZONE SHALL COVER THE SPAN IN WHICH THE WORK IS PERFORMED.

REVISIONS	
1	7/7/87 CHANGED BOLT HOLE SIZE

MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION

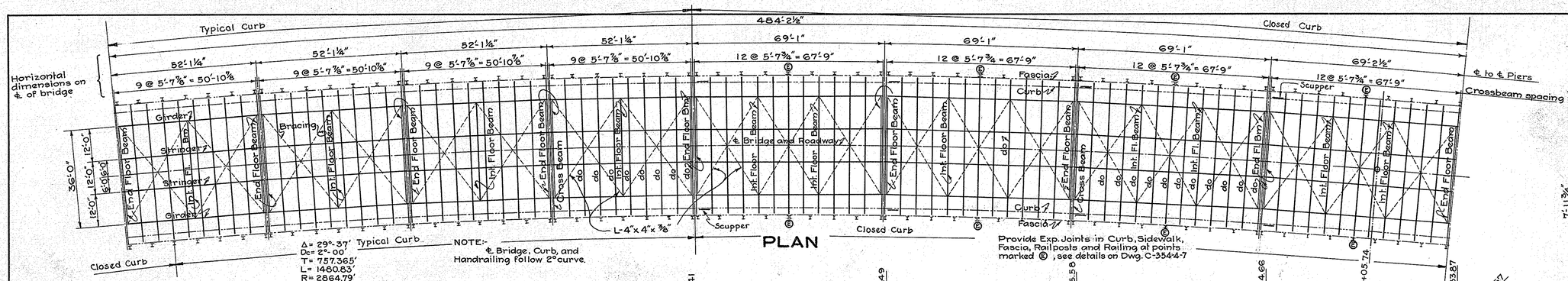
SPANS 2-5 & 46 (SIMPLE GIRDER SPANS)

GIRDER AND FLOORBEAM STRENGTHENING

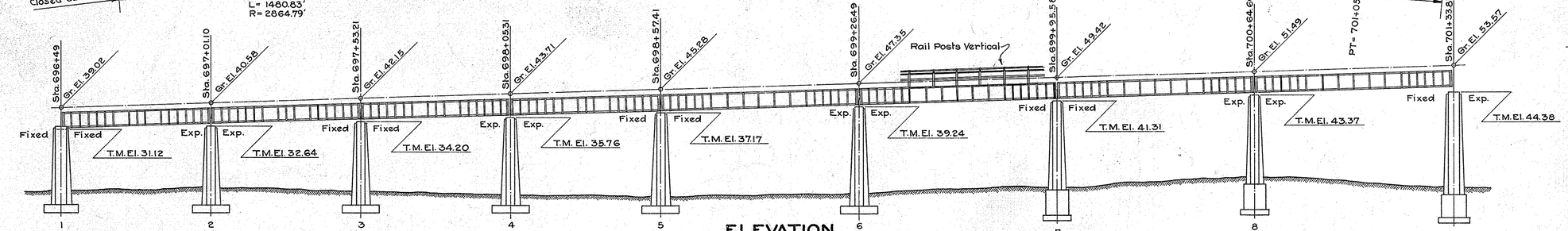
CONT. NO. TFA 2-1250-20 SHEET NO. 5 OF 18

DESIGNED BY RAP DRAWN BY DCF

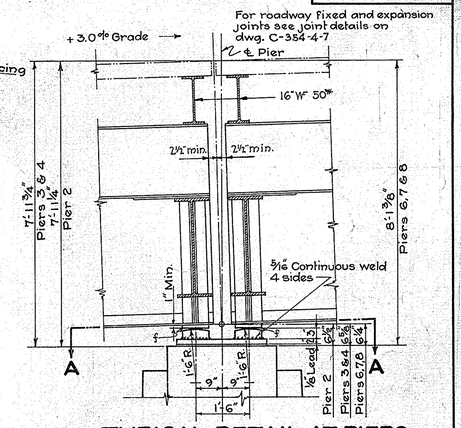
P.W.A. PROJECT
MD. 1139-1-F



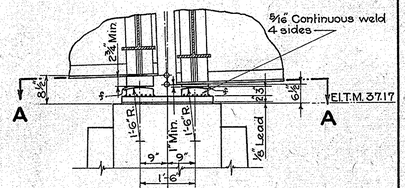
PLAN



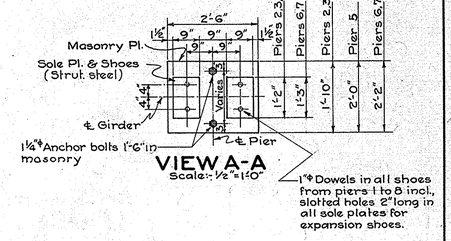
ELEVATION
Scale:- 1" = 20'-0"



TYPICAL DETAIL AT PIERS
Scale:- ½" = 1'-0"

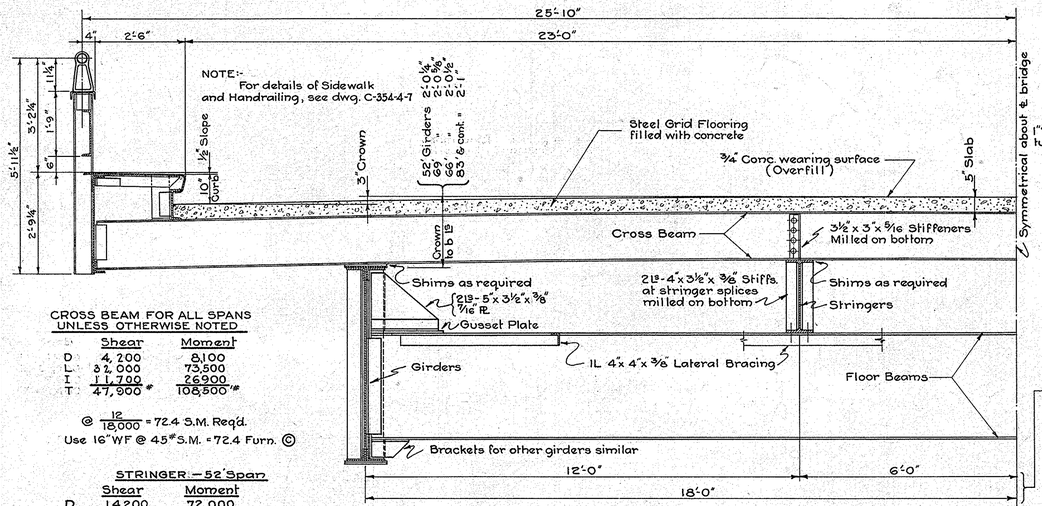


SHOE DETAIL-PIER 5
Scale:- ½" = 1'-0"



VIEW A-A
Scale:- ½" = 1'-0"

1"φ Dowels in all shoes from piers 1 to 8 incl., slotted holes 2" long in all sole plates for expansion shoes.



TYPICAL CROSS SECTION
Scale:- ½" = 1'-0"

CROSS BEAM FOR ALL SPANS UNLESS OTHERWISE NOTED

	Shear	Moment
D	4,200	8,100
L	32,000	73,500
I	11,700	26,900
T	47,900#	108,500'#

@ 12/18,000 = 72.4 S.M. Req'd.
Use 16" WF @ 45# S.M. = 72.4 Furn. Ⓒ

STRINGER: — 52' Span

	Shear	Moment
D	14,200	72,000
L	49,000	278,000
I	16,300	93,000
T	79,500#	443,000'#

@ 12/24,000 = 221.5 S.M. Req'd
Use 24" WF @ 94# S.M. = 220.9 Furn. Ⓢ

STRINGER: — 69' Span

	Shear	Moment
D	12,600	57,000
L	48,200	249,000
I	16,400	84,000
T	77,200#	390,000'#

@ 12/24,000 = 195.0 S.M. Req'd.
Use 24" WF @ 87# S.M. = 204.3 Furn. Ⓢ

END FLOOR BEAM - All Spans

	Shear	Moment
D	18,000	204,000
L	41,700	500,000
I	13,700	165,000
T	73,400#	869,000'#

@ 12/24,000 = 434.5 S.M. Req'd. Ⓢ
Use 36" WF @ 150# S.M. = 502.9 Furn.

52' GIRDER

	Shear	Moment
D	66,800	1,118,000
L	61,900	909,000
I	17,600	259,000
Sdwk. L	7,500	96,000
T	153,800#	2,382,000'#

@ 12/24000 x 64 = 18.6" Req'd.
⅛ Web 64 x ⅜ = 3.00"
2 Ls 6 x 4 x 7/16 - 4h = 6.61" } Ⓢ
2 Cov. Pls. 14" x ⅜ - 2h = 9.00"
Total 18.61" Furn.
Shear @ 14,000 = 11.0" Req'd.
Web 64 x ⅜ = 24.0" Furn.

INT. FLOOR BEAM - 52' Span

	Shear	Moment
D	39,500	466,000
L	42,100	504,000
I	13,900	143,000
T	95,500#	1,113,000'#

@ 12/24,000 = 556.5 S.M. Req'd.
Use 36" WF @ 170# S.M. = 579.1 Furn. Ⓢ

69' GIRDER

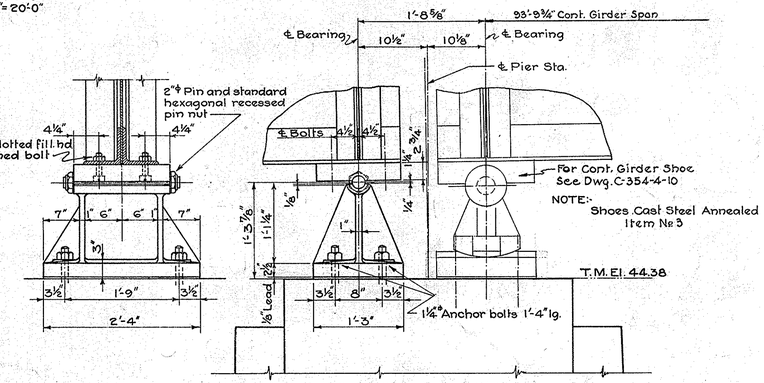
	Shear	Moment
D	105,800	1,990,000
L	79,500	1,204,000
I	20,700	312,000
Sdwk. L	8,900	151,000
T	214,900#	3,657,000'#

@ 12/24,000 x 65.4 = 28.1" Req'd.
⅛ Web 66 x ⅜ = 3.09"
2 Ls 6 x 6 x 5/8 - 4h = 11.72" } Ⓢ
2 Cov. Pls. 14 x 9/16 - 2h = 13.50"
Total 28.31" Furn.
Shear @ 14,000 = 15.35" Req'd.
Web 66 x ⅜ = 24.75" Furn.

INT. FLOOR BEAM - 69' Span

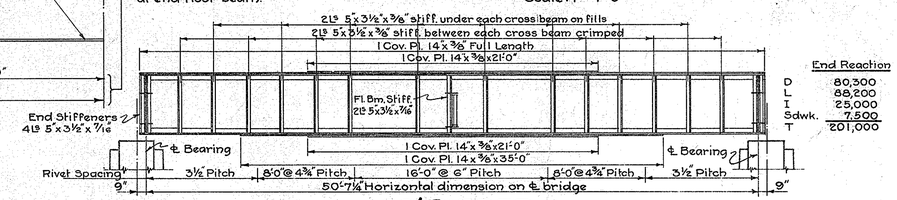
	Shear	Moment
D	34,500	406,000
L	41,400	495,000
I	12,300	146,000
T	88,200#	1,047,000'#

@ 12/24,000 = 523.0 S.M. Req'd.
Use 36" WF @ 160# S.M. = 541.0 Furn. Ⓢ



SHOE DETAIL-PIER 9
Scale: 1" = 1'-0"

These dimensions measured at end floor beam.

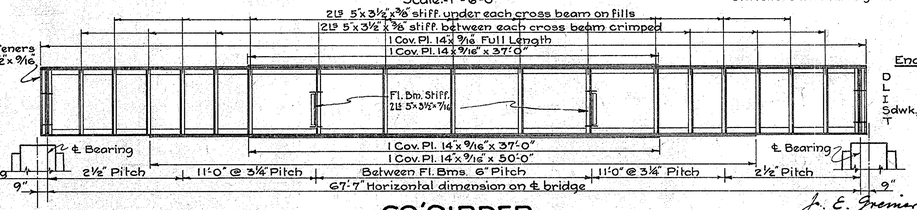


End Reaction

D	80,300
L	88,200
I	25,000
Sdwk.	7,500
T	201,000

52' GIRDER
Scale:- 1" = 6'-0"

NOTE:- Stiffeners normal to girder



End Reaction

D	122,100
L	95,400
I	24,700
Sdwk.	8,900
T	251,100

69' GIRDER
Scale:- 1" = 6'-0"

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

NOTES: See Sheet C-354-4-1 for General Notes
Details of Sidewalk, Handrail, etc over Piers similar to that shown on Sheet C-354-4-13
See Sheet C-354-4-36 & 37 for Drainage Details
Stringers, preferably, should be continuous over four supports; if splice is made full moment and shear to be developed.

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
52' & 69' GIRDER SPANS

SCALE As Noted — CONTRACT H-232-4-437

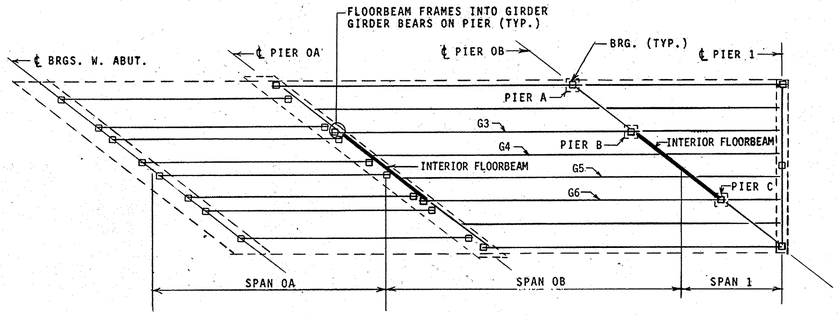
MADE BY J.E. GREINER CO. J.M.R. APPROVED
TRACED BY " " " J.M.R.
CHECKED BY " " " " — CHIEF ENGINEER
APPROVED — BRIDGE ENGINEER
4/11/39

APRIL 11, 1939

SHEET NO. 4 OF 37
C-354-4-4

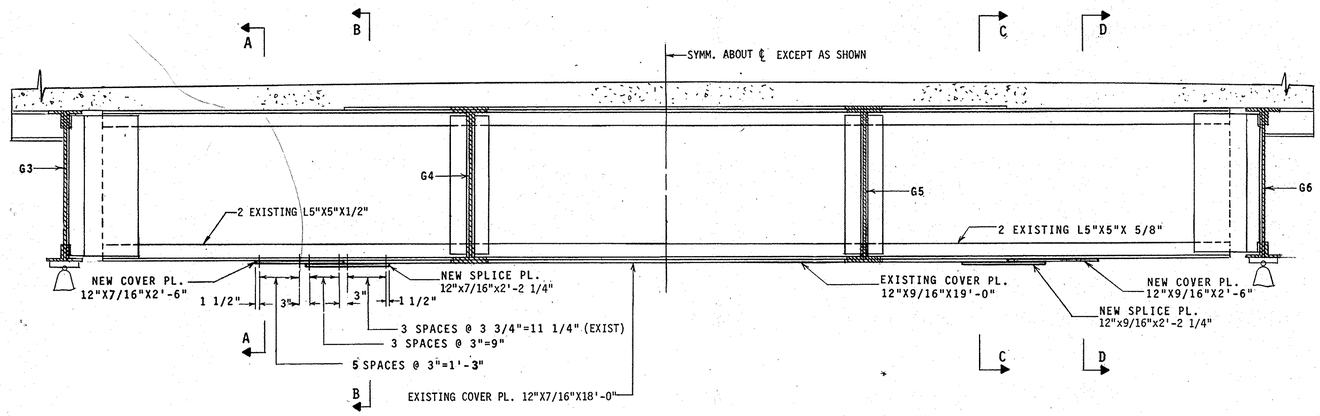
PRINTED ON "IMPERIAL" TRACING CLOTH
K & E CO., N. Y.

K&E BALTIMORE 19 1253



LOCATION DIAGRAM

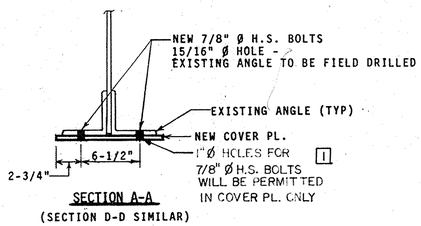
SUMMARY OF STRENGTHENING - THIS SHEET		
SPAN	MEMBER	NO. OF MEMBERS
OB	INTERIOR FLOORBEAM	1
1	INTERIOR FLOORBEAM	1



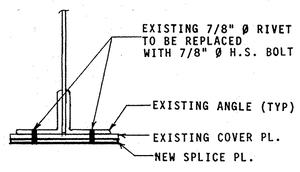
HALF ELEVATION INTERIOR FLOORBEAM - PIER OA
SCALE: 1/2"=1'-0"

HALF ELEVATION INTERIOR FLOORBEAM - PIER OB
SCALE: 1/2"=1'-0"

* BOLT SPACING SAME AS PIER OA FLOORBEAM



SECTION A-A
(SECTION D-D SIMILAR)
SCALE:11/2"=1'-0"



SECTION B-B
(SECTION C-C SIMILAR)
SCALE: 1 1/2"=1'-0"

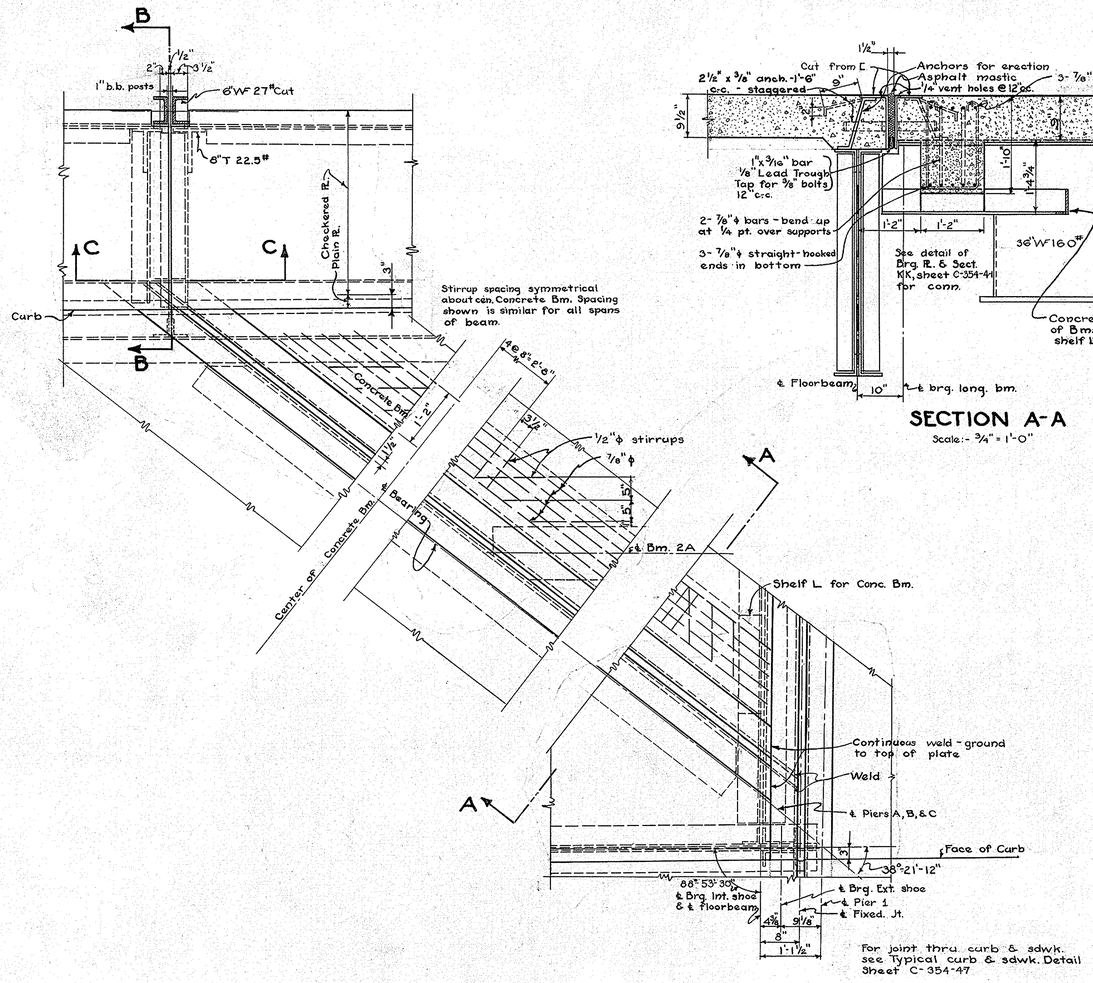
NOTES:

1. FOR GENERAL NOTES SEE SHEET NO. 1.
2. EXISTING STRUCTURAL STEEL IS ASTM A-7 DESIGNATION. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 DESIGNATION, EXCEPT FOR FASTENER MATERIAL.
3. WORK ON THIS SHEET SHALL BE CARRIED OUT WHEN THE TWO INSIDE LANES ARE CLOSED TO TRAFFIC. THE WORK ZONE SHALL COVER SPANS OA, OB AND SPAN 1.

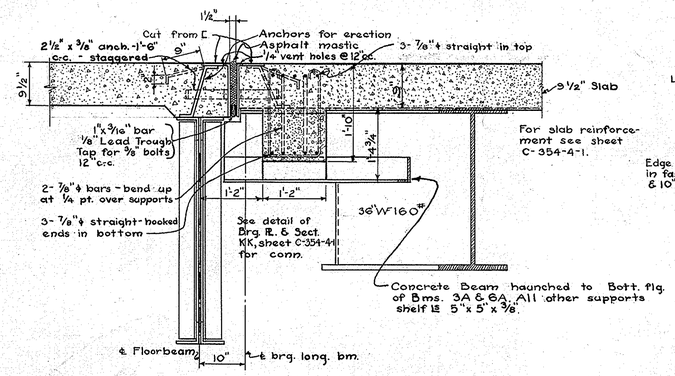
REVISIONS	
1	7/7/87 CHANGED BOLT HOLE SIZE

MARYLAND TRANSPORTATION AUTHORITY
SUSQUEHANNA RIVER BRIDGE - REHABILITATION
SPANS OA,OB & 1 (SIMPLE BEAM SPANS)
FLOORBEAM STRENGTHENING

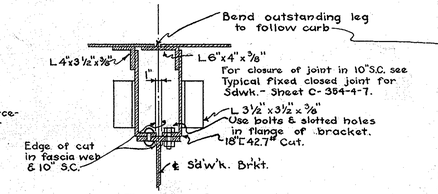
CONT. NO. TFA 2-1250-20 SHEET NO. 4 OF 18
DESIGNED BY RAP DRAWN BY DCF



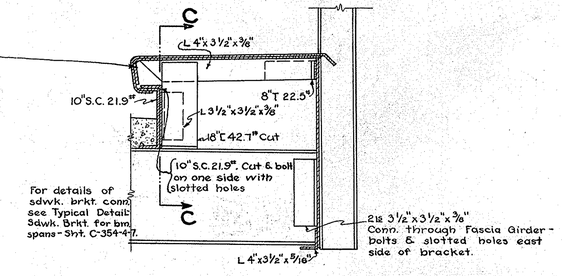
PLAN OF FIXED JT. AT INT. F.B.
& AT PIER 1
Scale:- ¾" = 1'-0"



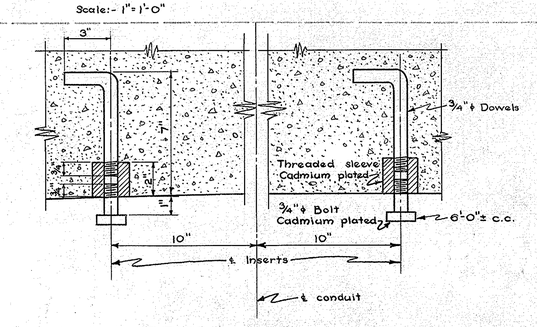
SECTION A-A
Scale:- ¾" = 1'-0"



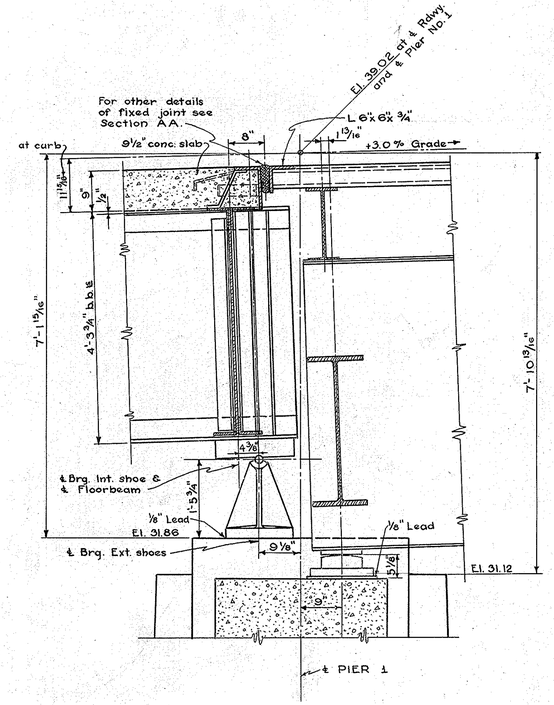
SECTION C-C
Scale:- 1" = 1'-0"



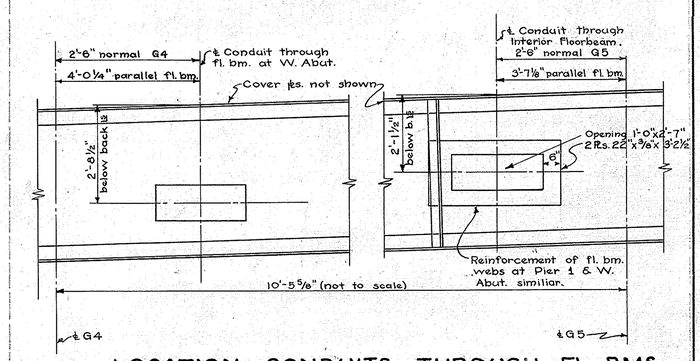
SECTION B-B
Scale:- 1" = 1'-0"



INSERTS FOR CONDUITS
Scale:- 3" = 1'-0"



SECTION L-L
See Plan - Sheet C-354-4-1
Scale: ¾" = 1'-0"



LOCATION - CONDUITS THROUGH FL. BMS.
Scale: ½" = 1'-0"

REVISIONS
(1) Provisions for utility conduits removed. 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
111'-0" GIRDER SPAN - DETAILS

SCALE:- AS SHOWN — CONTRACT H-232-4-437

MADE BY J. E. GREINER CO - E. J. D. R.B.C. APPROVED
TRACED BY R.B.C.
CHECKED BY HK
APPROVED — CHIEF ENGINEER
4/11/39
BRIDGE ENGINEER

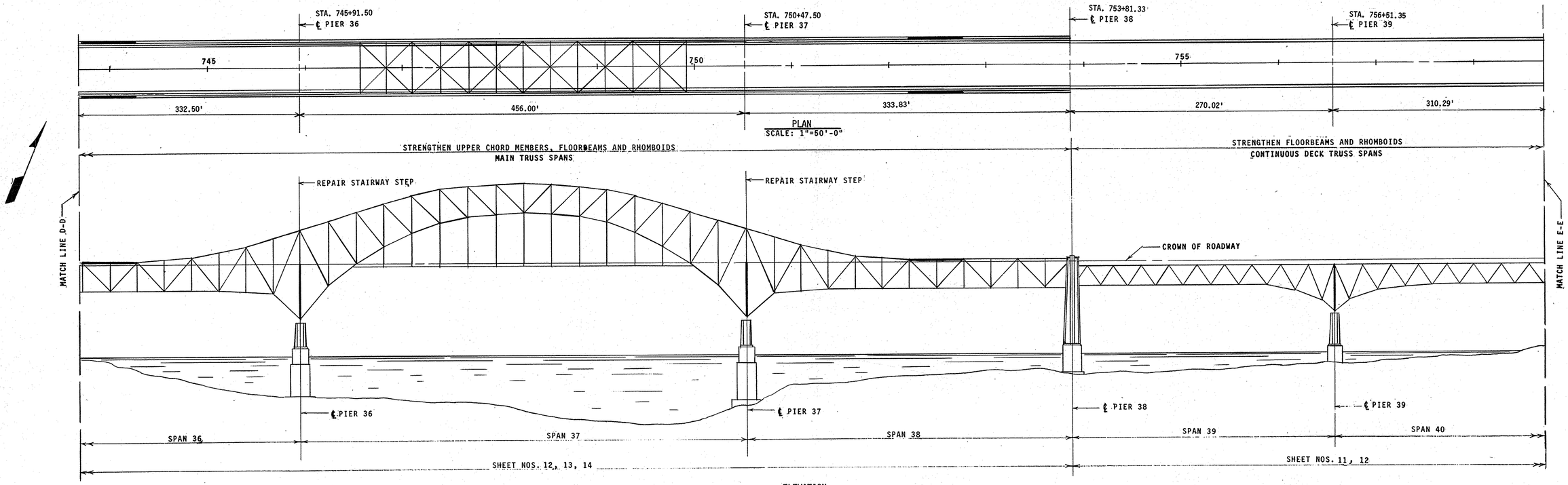
J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

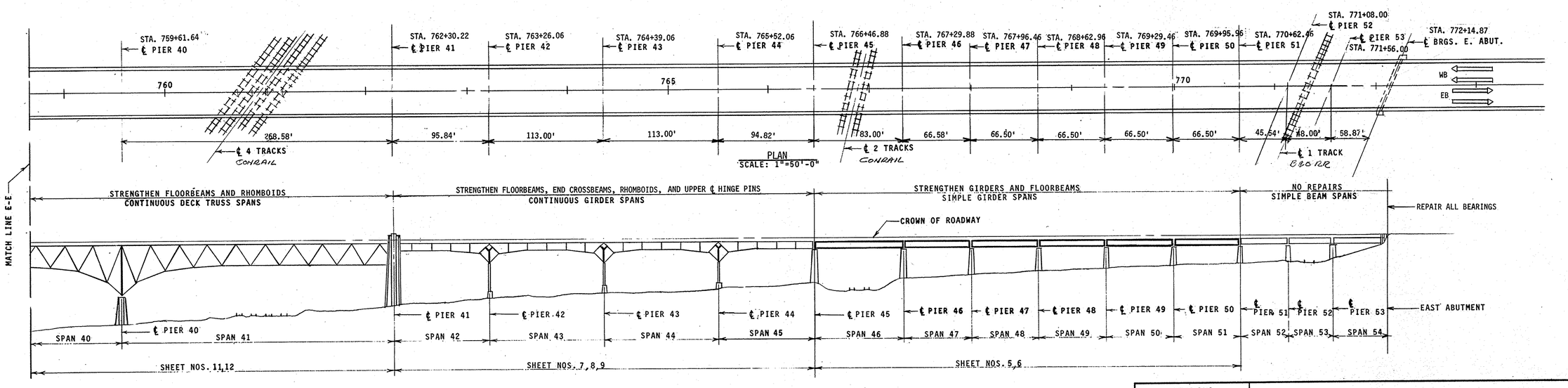
APRIL 11, 1939

SHEET No. 3 OF 37
C-354-4-3

PRINTED ON "IMPERIAL" TRACING CLOTH E. & J. CO., N.Y.

K&E BALTIMORE 19 1253





NOTE:

1. WORK THIS SHEET WITH SHEET NO. 1 AND 2.

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY

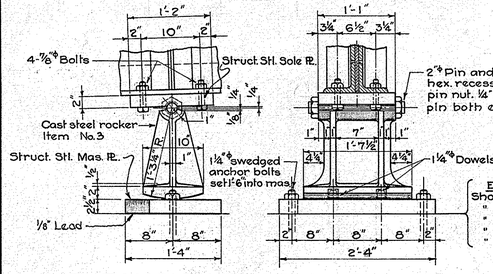
SUSQUEHANNA RIVER BRIDGE - REHABILITATION

GENERAL PLAN AND ELEVATION III

CONT. NO. TFA 2-1250-20 SHEET NO. 3 OF 18

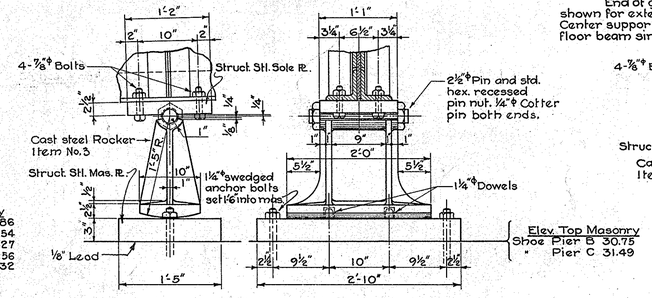
DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F



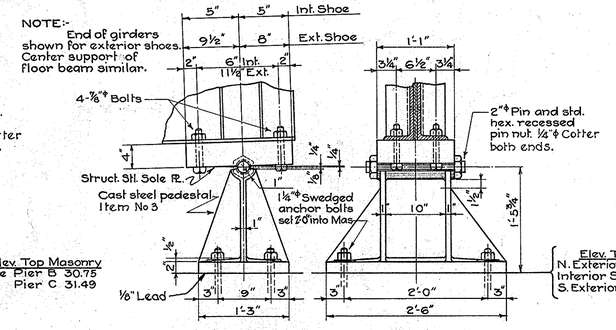
EXPANSION SHOE - W. ABUT. & PIER A

Scale:- 1" = 1'-0"
5 - Req'd.



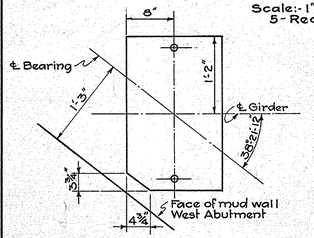
EXPANSION SHOE - PIERS B & C

Scale:- 1" = 1'-0"
2 - Req'd.



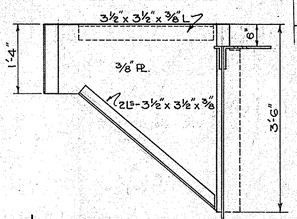
FIXED SHOE - PIER 1

Scale:- 1" = 1'-0"
3 Req'd.



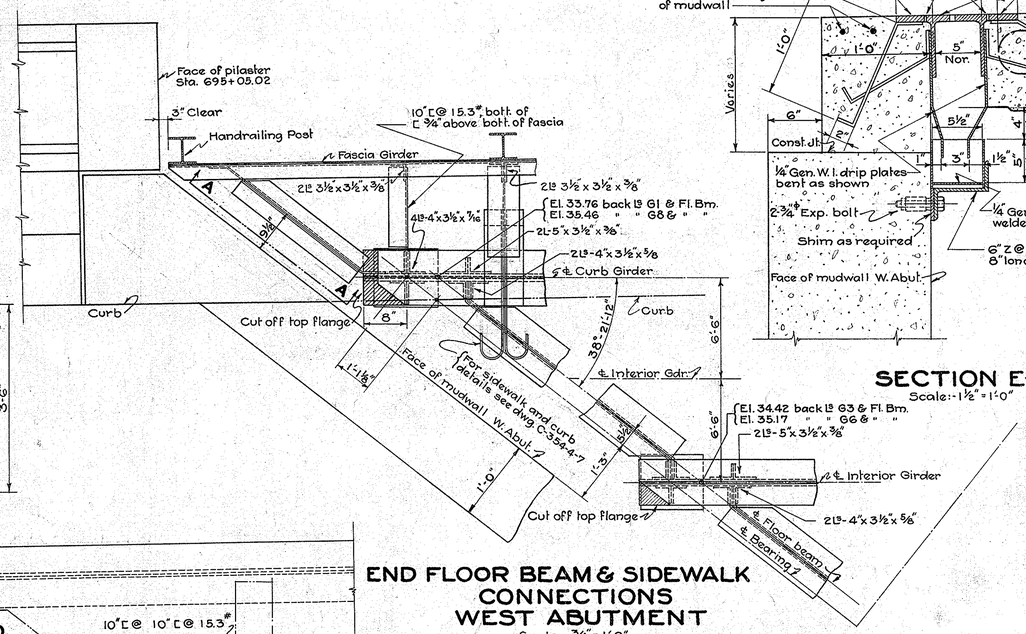
PLAN MASONRY PLATE

Scale:- 1½" = 1'-0"



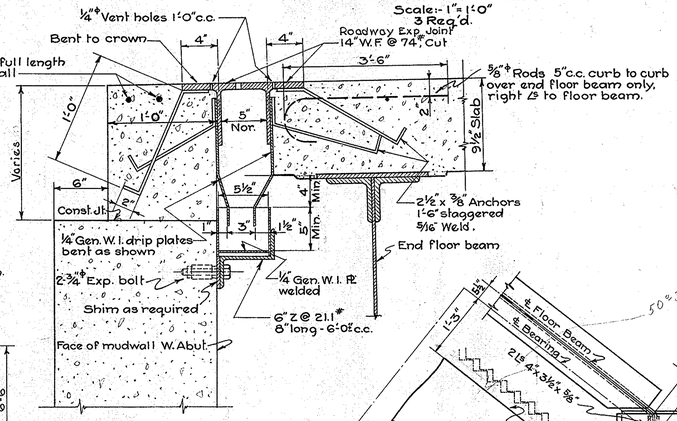
SECTION A-A

Scale:- 3/4" = 1'-0"



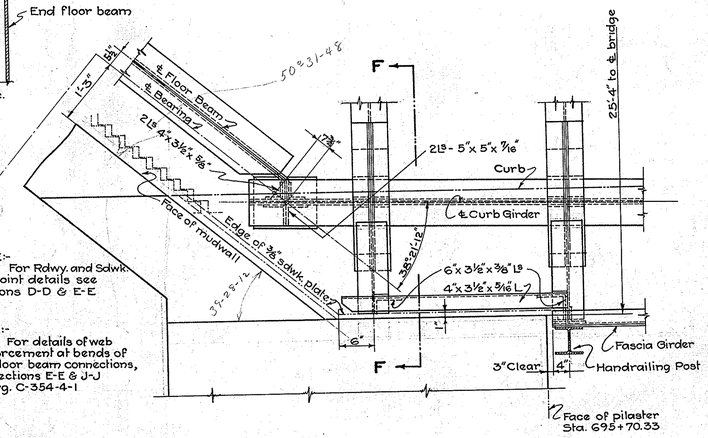
END FLOOR BEAM & SIDEWALK CONNECTIONS WEST ABUTMENT

Scale:- 3/4" = 1'-0"



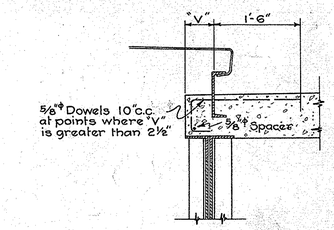
SECTION E-E

Scale:- 1½" = 1'-0"



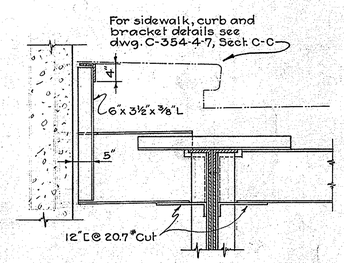
NOTE:- For Rdwy. and Sdwk. exp. joint details see Sections D-D & E-E

NOTE:- For details of web reinforcement at bends of and floor beam connections, see sections E-E & J-J on dwg. C-354-4-1



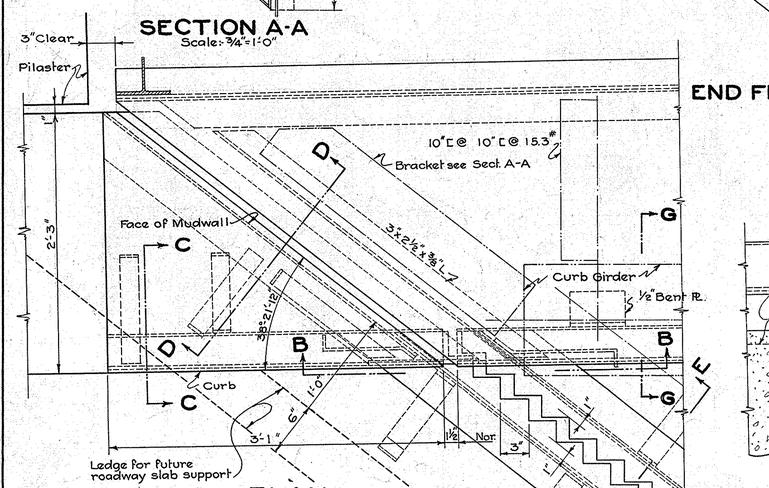
SECTION G-G

Scale:- 3/4" = 1'-0"



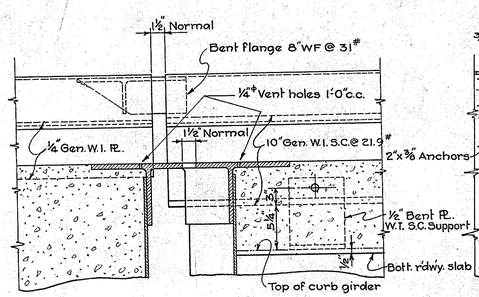
SECTION F-F

Scale:- 3/4" = 1'-0"



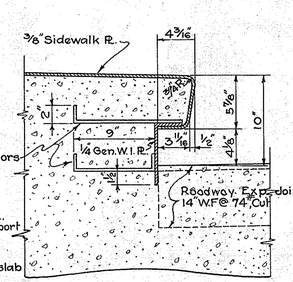
PLAN ROADWAY & SIDEWALK EXP. JOINTS WEST ABUTMENT

Scale:- 1½" = 1'-0"



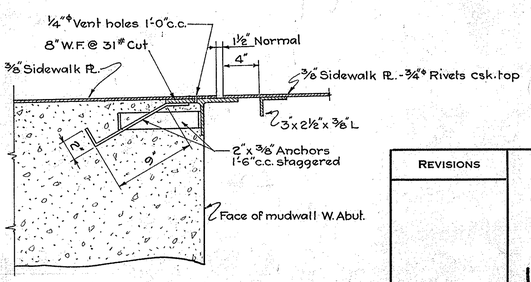
SECTION B-B

Scale:- 1½" = 1'-0"



SECTION C-C

Scale:- 1½" = 1'-0"



SECTION D-D

Scale:- 1½" = 1'-0"

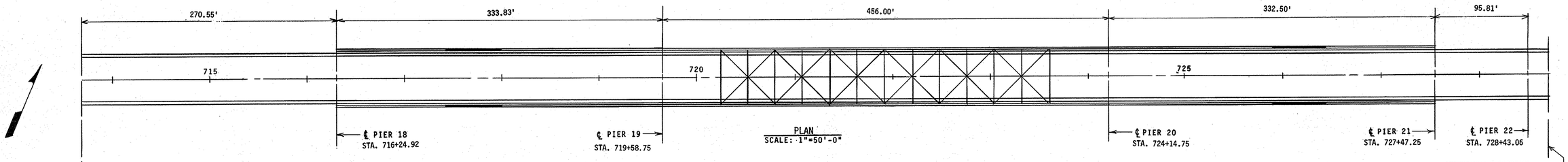
NOTES:
See sheet C-354-4-1 for General Notes.
See sheet C-354-4-36 & 37 for Drainage Details.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

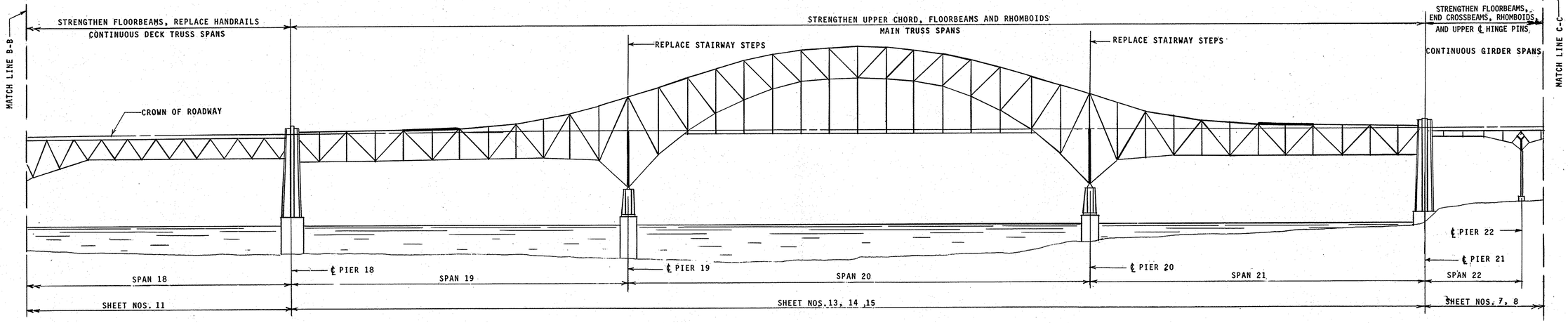
REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE 111'-0" GIRDER SPAN-DETAILS
	SCALE As Noted — CONTRACT H-232-4-437
	MADE BY J.E. GREINER CO. R.B.C.-J.M.R. APPROVED TRACED BY " " " J.M.R. CHECKED BY " " " " H.K. APPROVED — CHIEF ENGINEER BRIDGE ENGINEER — 4/11/39
	APRIL 11, 1939 — SHEET NO. 2 OF 37 C-354-4-2

PRINTED ON "IMPERIAL" TRACING CLOTH K & E CO., N.Y.

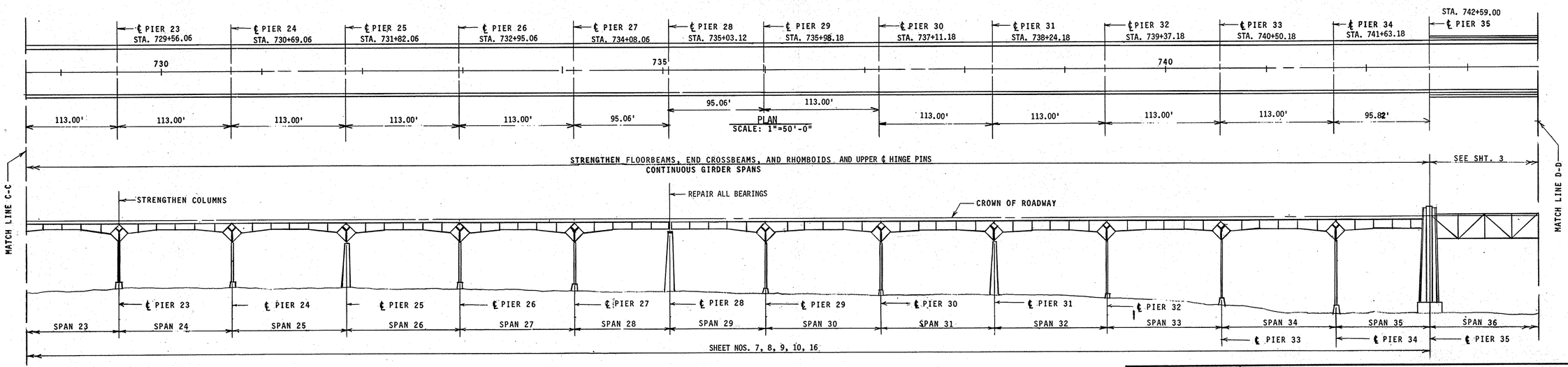
K&E BALTIMORE 19 1253



PLAN
SCALE: 1"=50'-0"



ELEVATION
SCALE: 1"=50'-0"



PLAN
SCALE: 1"=50'-0"

ELEVATION
SCALE: 1"=50'-0"

NOTE:

1. WORK THIS SHEET WITH SHEET NO. 1 AND 3.

REVISIONS

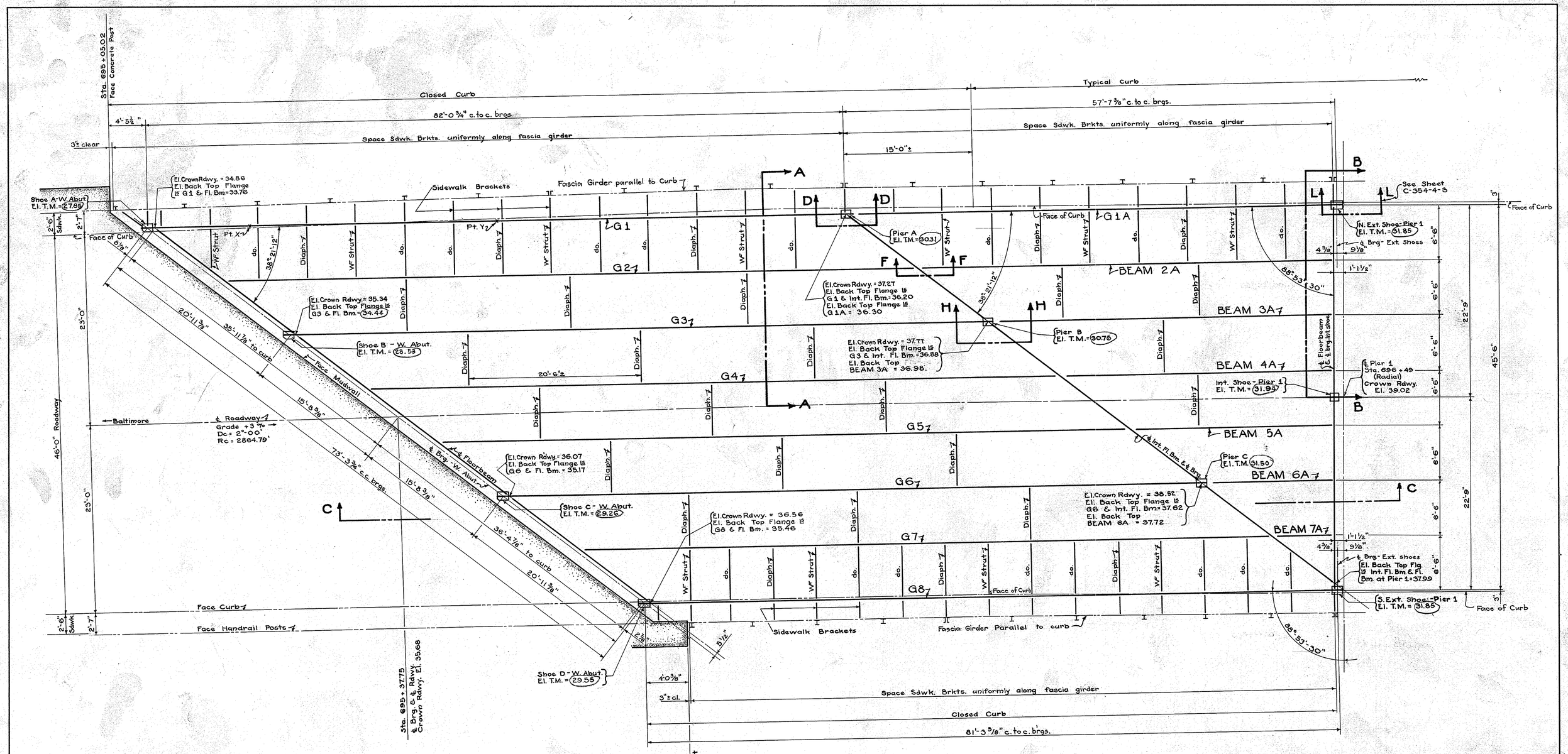
MARYLAND TRANSPORTATION AUTHORITY

SUSQUEHANNA RIVER BRIDGE - REHABILITATION

GENERAL PLAN AND ELEVATION II

CONT. NO. TFA 2-1250-20 SHEET NO. 2 OF 18

DESIGNED BY RAP DRAWN BY DCF



REVISIONS
El. Top of masonry. El. Back of top flange angles at shoe B West Abutment. 7-5-39. J.M.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
PLAN - 111'-0" GIRDER SPAN

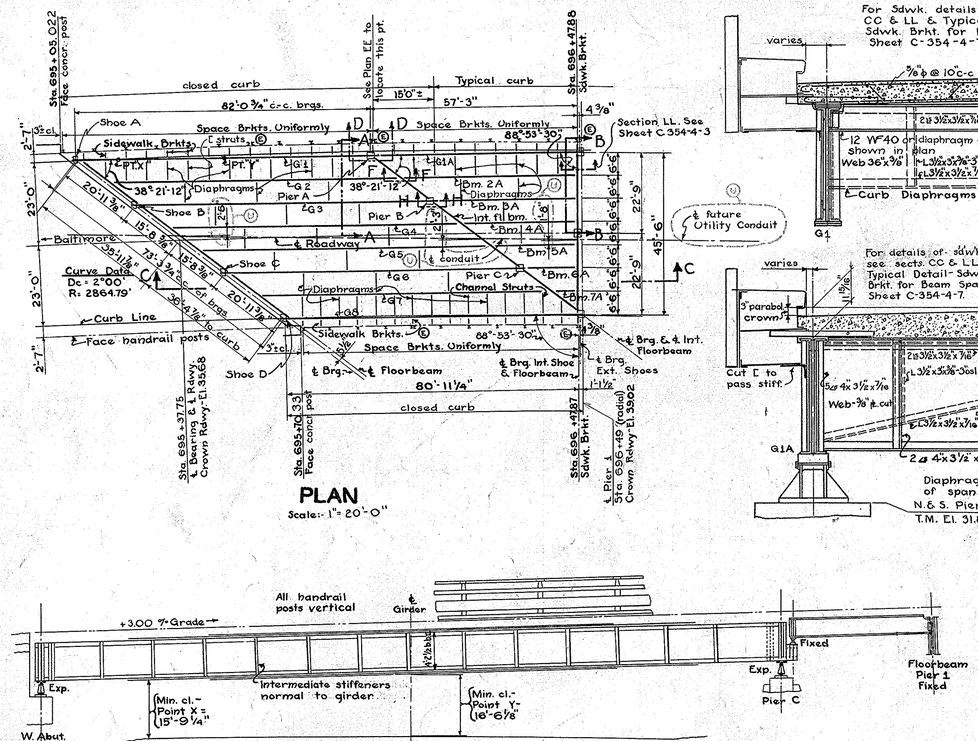
SCALE : 3/16 = 1'-0" CONTRACT

MADE BY J.E. GREINER CO. R.B.C. APPROVED
TRACED BY R.B.C.
CHECKED BY H. CHIEF ENGINEER
CORRECT
BRIDGE ENGINEER

SHEET NO. 1A OF C 354-4-1A.

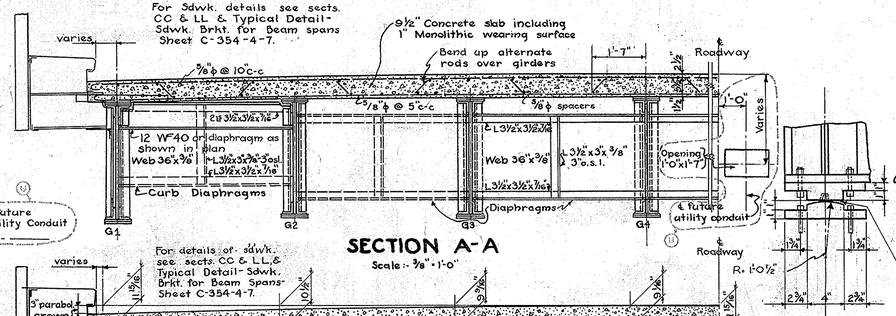
PRINTED ON "IMPERIAL" TRACING CLOTH
K & E CO., N. Y.

P.W.A PROJECT
MD.-1139-1-F



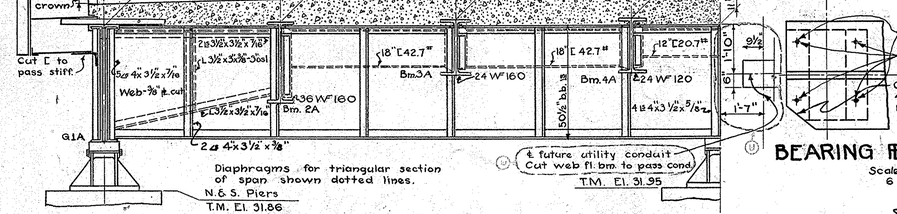
PLAN

Scale:- 1" = 20'-0"



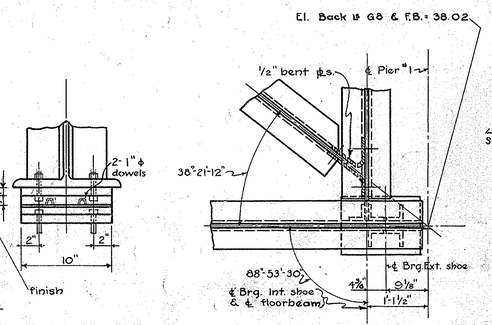
SECTION A-A

Scale:- 3/8" = 1'-0"



SECTION B-B

Scale:- 3/8" = 1'-0"

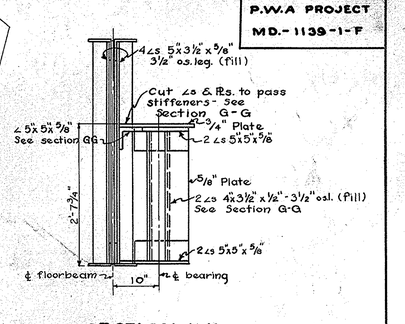


PLAN-END CONN.-PIER 1

Scale:- 3/4" = 1'-0"

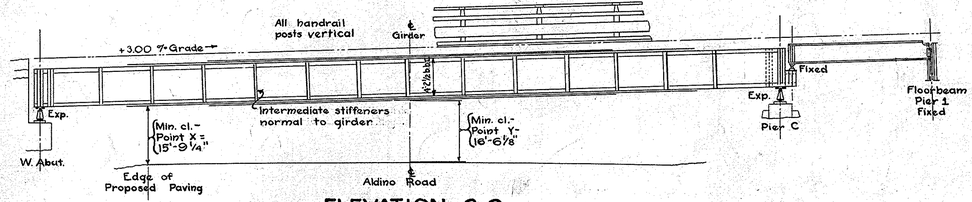
BEARING ⊥L. AT INT. F.B.

Scale:- 1 1/2" = 1'-0"
6 Required



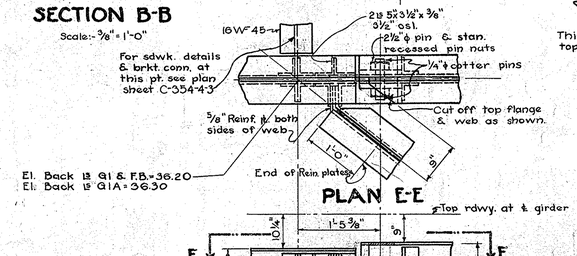
SECTION K-K

Scale: 3/4" = 1'-0"

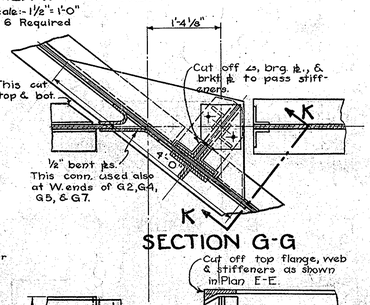


ELEVATION C-C

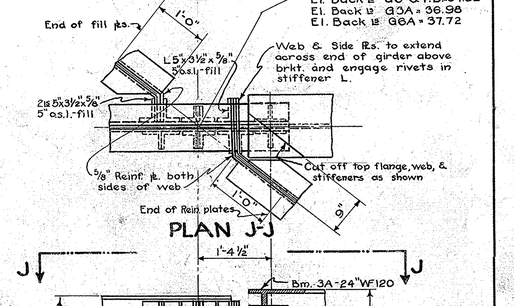
Scale:- 1/8" = 1'-0"



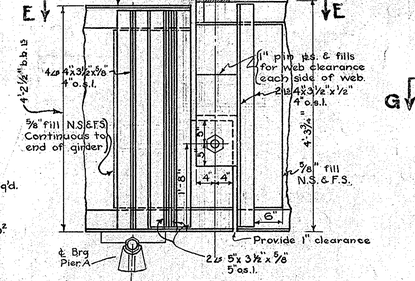
PLAN E-E



SECTION G-G

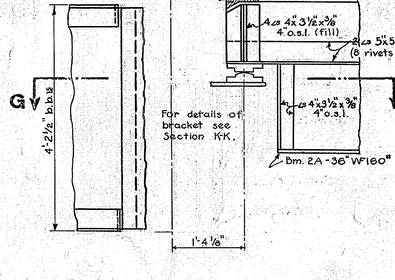


PLAN J-J



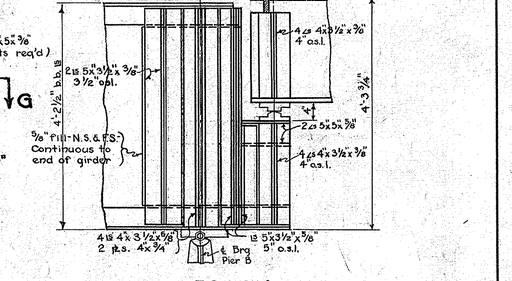
SECTION D-D

Scale: 3/4" = 1'-0"



SECTION F-F

Scale: 3/4" = 1'-0"



SECTION H-H

Scale:- 3/4" = 1'-0"

G1 & G8

	Shear	Moment
D.	51,200	1,029,000
L. Rdwy.	20,600	378,000
Imp.	5,000	217,000
L. Sdwk.	10,000	91,000
	87,400#	1,715,000'#

@ 11,000 = 7.95 in² req'd
Web = 50"x 3/8" = 18.75 in² furn.
End rivet pitch = 4 3/4"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8", on fills, @ 5'-6" end spac.
End Stiffeners
W. End- 4 ⊥s 4"x 3 1/2" x 7/16"
East End
G. 1-4 ⊥s 4"x 3 1/2" x 3/8"
G. 8-4 ⊥s 4"x 3 1/2" x 9/16"

1,715,000 / 4.15 x 18,000 = 23.0 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 5"/8" -4 h. = 9.22
1 Cov. ⊥ 12"x 7/8" - 2 h. = 6.25
1 Cov. ⊥ 12"x 9/16" - 2 h. = 5.62
Net Furn. = 23.43 in²
3/8" cov. ⊥s = 46'-0" T.&B.
5/8" cov. ⊥ = 62'-0" T.&B.
50 1/2" b.b. flg. ⊥s

G1A

	Shear	Moment
D.	32,100	474,000
L. Rdwy.	18,900	225,000
Imp.	5,200	61,000
L. Sdwk.	7,500	109,000
Totals	64,300#	869,000'#

@ 11,000 = 5.85 in² req'd
Web = 51 3/8" = 19.12 in² furn.
End rivet pitch = 6"
Int. stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8", on fills, @ 6'-0"
End Stiffeners
E. End- 4 ⊥s 4"x 3 1/2" x 7/16"

869,000 / 4.06 x 18,000 = 12.0 in² req'd.
1/8 web = 2.39
2 ⊥s 5"x 5"/8" - 2 h. = 10.47
Net Furn. = 12.86 in.²
51 3/4" b.b. flg. ⊥s.

BEAM 2A

	Shear	Moment
D.	28,900	361,000
L. Rdwy.	30,000	321,000
Imp.	8,600	93,000
Total	67,500#	775,000'#

@ 12/18,000 = 516.0 in³ S.M. req'd.
Use 36 WF 160 = 541.0 in³ S.M. furn.

BEAM 3A

	Shear	Moment
D.	24,000	250,000
L. Rdwy.	26,900	261,000
Imp.	8,100	78,300
Total	59,000#	589,300'#

@ 12/18,000 = 394.0 in³ S.M. req'd.
Use 24 WF 160 = 413.5 in³ S.M. furn.

G2 to G7 incl.

	Shear	Moment
D.	51,000	1,050,000
L. Rdwy.	37,800	655,000
Imp.	9,100	158,000
Totals	97,900#	1,863,000'#

@ 11,000 = 8.9 in² req'd.
Web = 50"x 3/8" = 18.75 in² furn.
End rivet pitch = 4 1/2"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8", crimped except at struts, spaced @ 5'-6" at end.
End Stiffeners
W. End- 4 ⊥s 4"x 3/2" x 3/4",
East End
G. 3-4 ⊥s 4"x 3 1/2" x 9/16"
2 ⊥s. 4"x 3/4"
G. 6-4 ⊥s 4"x 3 1/2" x 9/16"
2 ⊥s. 4"x 1/2"

1,863,000 / 4.15 x 18,000 = 24.9 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 3/8" -4 h. = 10.05
2 ⊥s. 12"x 7/8" -4 h. = 12.50
Net furn. = 24.89 in²
5/8" cov. ⊥s. = 48'-0" T.&B.
3/4" cov. ⊥s. = 62'-0" T.&B.
50 1/2" b.b. flg. ⊥s.

BEAM 4A

	Shear	Moment
D.	18,300	152,700
L. Rdwy.	26,500	202,000
Imp.	8,300	63,600
Totals	53,100#	418,300'#

@ 12/18,000 = 279.0 in³ S.M req'd.
Use 24 WF 120 = 299.1 in³ S.M. furn.

BEAM 5A

	Shear	Moment
D.	13,400	83,700
L. Rdwy.	25,600	142,000
Imp.	8,500	47,300
Totals	47,500#	273,000'#

@ 12/18,000 = 182.2 in³ S.M. req'd.
Use 24 WF 80 = 185.8 in.³ S.M. furn.

BEAM 6A

	Shear	Moment
D.	8,600	38,600
L. Rdwy.	24,100	96,000
Imp.	8,500	34,000
Totals	41,400#	166,600'#

@ 12/18,000 = 111.0 in³ S.M. req'd.
Use 21 WF 59 = 119.3 in³ S.M. furn.

BEAM 7A

Use 21 WF 59 = 119.3 in³ S.M. furn.

FLOORBEAM-WEST ABUTMENT

31'-5" Span

	Shear	Moment
D.	54,400	562,000
L. Rdwy.	47,300	352,000
Imp.	11,400	85,000
Total	113,100#	999,000'#

@ 11,000 = 10.3 in² req'd.
Web = 50"x 3/8" = 18.75 in² furn.
End rivet pitch = 3 3/4"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8" crimped, @ 4'-0" max.
50 1/2" b.b. flg. ⊥s.

999,000 / 4.07 x 18,000 = 13.6 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 5"/8" -4 h. = 7.50
1 ⊥s. 12"x 7/8" -2 h. = 4.37
Net furn. = 14.21 in.²
Cov. ⊥s. 18'-0" long T.&B.

20'-11 3/8" Span

	Shear	Moment
D.	27,110	276,000
L. Rdwy.	28,400	167,500
Imp.	6,800	40,500
Totals	62,310#	484,000'#

@ 11,000 = 5.66 in² req'd.
Web = 50"x 3/8" = 18.75 in²
End rivet pitch = 5"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8", crimped, @ 6'-0" max.
50 1/2" b.b. flg. ⊥s.

484,000 / 3.98 x 18,000 = 6.75 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 3/8" -2 h. = 6.47
Net Furn. = 8.81 in²
50 1/2" b.b. flg. ⊥s.

INTERIOR FLOORBEAM

31'-5" Span

	Shear	Moment
D.	71,600	735,000
L. Rdwy.	54,200	423,000
Imp.	11,500	89,500
Totals	137,300#	1,247,500'#

@ 11,000 = 12.5 in² req'd.
Web = 50"x 7/8" = 18.75 in² furn.
End rivet pitch = 3.10"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 7/8", crimped, @ 4'-6" and spac.
50 1/2" b.b. flg. ⊥s.

1,247,500 / 4.07 x 18,000 = 17.0 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 5"/8" -4 h. = 9.22
1 Cov. ⊥ 12"x 7/16" - 2 h. = 5.63
Net furn. = 17.19 in.²
Cov. ⊥s. = 19'-0" T. & B.

20'-11 3/8" Span

	Shear	Moment
D.	41,600	428,200
L. Rdwy.	33,800	225,000
Imp.	6,600	44,000
Totals	82,000#	697,200'#

@ 11,000 = 7.46 in² req'd.
Web = 50"x 7/8" = 18.75 in²
End rivet pitch = 5"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 7/8", crimped, @ 6'-0" max.

697,200 / 3.98 x 18,000 = 9.8 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 5"/16" - 2 h. = 7.48
Net furn. = 9.82 in²
50 1/2" b.b. flg. ⊥s.

FLOORBEAM-PIER 1

	Shear	Moment
D.	60,700	250,000
L. Rdwy.	48,600	282,000
Imp.	13,800	83,000
Totals	123,100#	615,000'#

@ 11,000 = 11.2 in² req'd.
Web = 50"x 3/8" = 18.75 in² furn.
End rivet pitch = 3 3/8"
Int. Stiffs:- 2 ⊥s 4"x 3 1/2" x 3/8", crimped except at bms @ 3'-3"

615,000 / 3.98 x 18,000 = 8.58 in² req'd.
1/8 web = 2.34
2 ⊥s 5"x 5"/8" - 2 h. = 6.47
Net furn. = 8.81 in²
50 1/2" b.b. ⊥s.

GENERAL NOTES

See Specifications for loading and unit stresses.

Ⓢ indicate Silicon Steel.
Ⓒ indicate Carbon Steel.

Parts not designated otherwise are of carbon steel.

Rivets to be made of rivet steel and are 7/8"ϕ unless otherwise noted. Ribbed bolts permissable only in places inaccessible for riveting.

See Sheet No. C-354-4-7 for details of Sdwk. Exp. Joints called for by Ⓔ on plan.

Curb, Fascia, & Handrail to follow curve in chord lengths of 18'-0"±

Permanent connection at top of Handrail Post to be made after rdwy. conc. is poured.

Shims to be provided to secure exact alignment and grade on floor, curbs, sidewalk, & railing.

Camber girders and trusses for dead load based on 65#/□' for 5" floor.

Surfaces in contact not permanently connected and sliding surfaces to be faced with stainless steel.

J. E. Greiner Co.
CONSULTING ENGINEERS
4-11-39

NOTES

See Sheets No. C-354-4-36 & C-354-4-37 for drainage details.
See Sheet No. C-354-4-3 for details of inserts along ℄ conduit.

REVISIONS
① Provisions for utility conduits removed 5/16/39 E.G.R.

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.

SUSQUEHANNA RIVER BRIDGE
BETWEEN
HAVRE DE GRACE & PERRYVILLE
111'-0" GIRDER SPAN-STRESS SHEET

SCALE:- As noted — CONTRACT H-232-4-437

MADE BY J.E. GREINER Co. R.B.C. APPROVED
TRACED BY R.B.C.
CHECKED BY K
APPROVED — BRIDGE ENGINEER
CHIEF ENGINEER 4/11/39
APRIL 11, 1939

SHEET No. 1 OF 37
C-354-4-1

PRINTED ON "IMPERIALITY" TRACING CLOTH K & E CO., N. Y.

K&E BALTIMORE 19 1253

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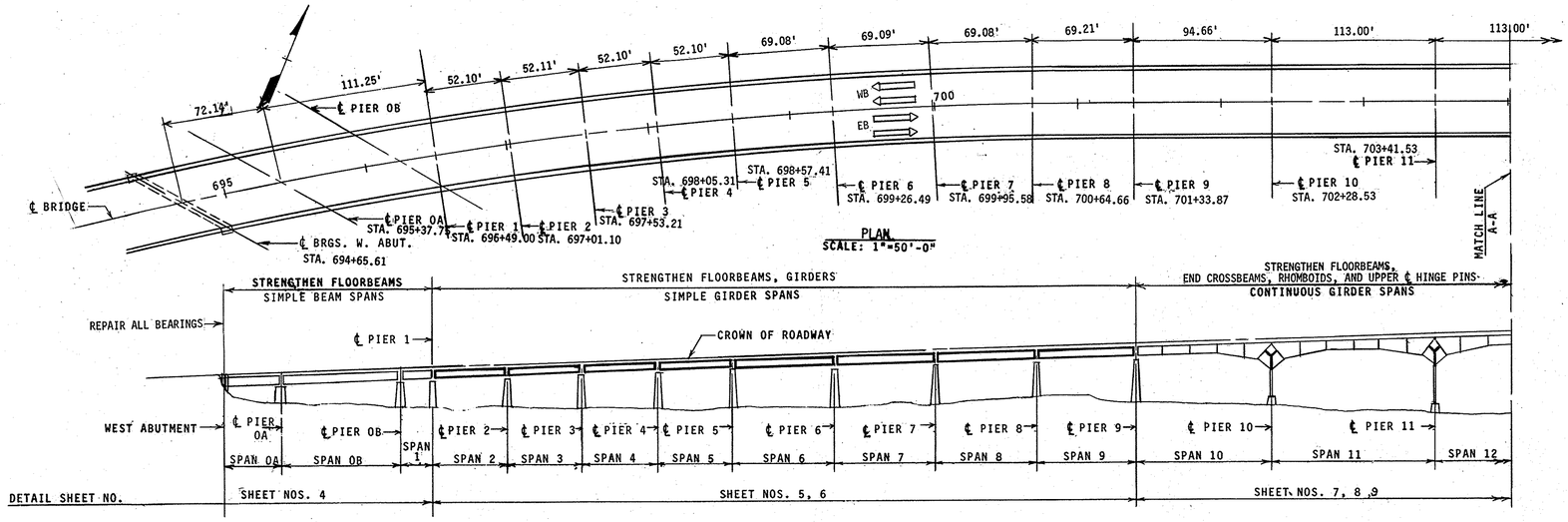
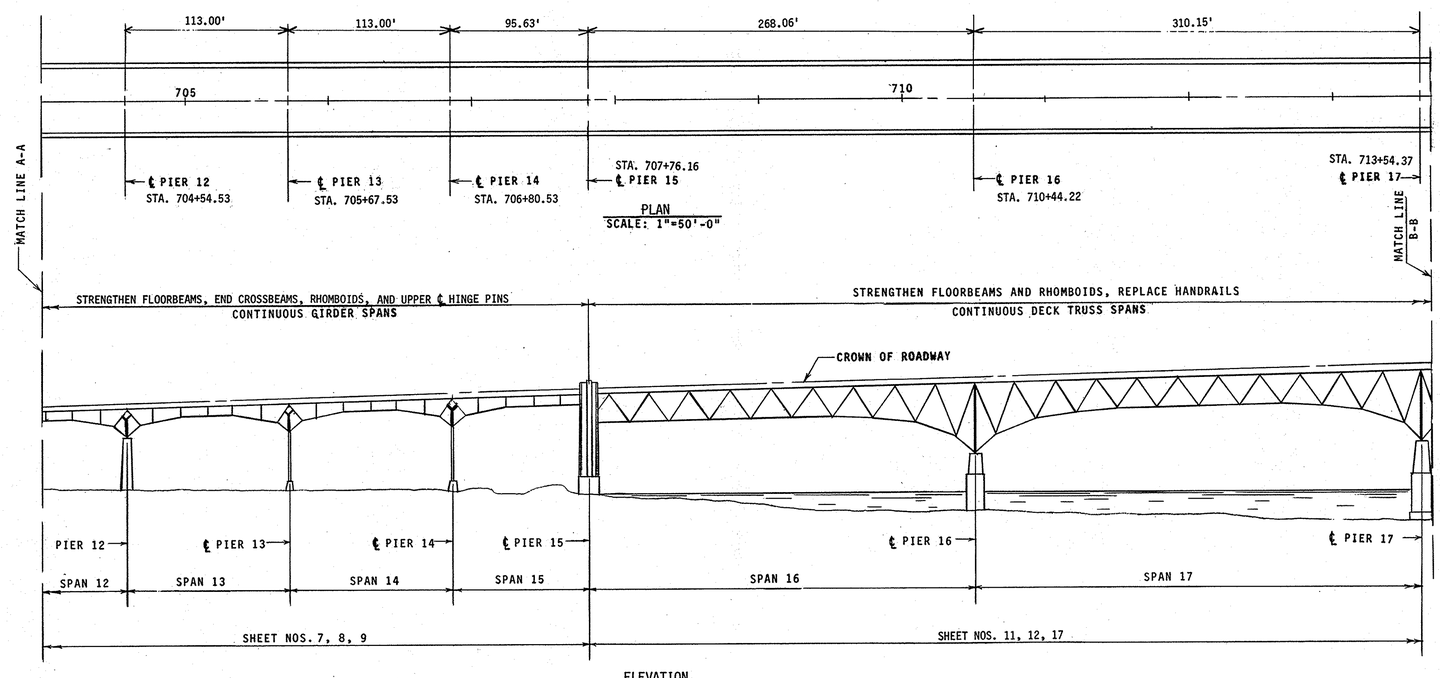
16	BEARING REPAIRS
17	STAIRWAYS & WALKWAYS STRENGTHENING
18	TRAFFIC CONTROL PLANS



PLAN
SCALE: 1"=50'-0"

ELEVATION
SCALE: 1"=50'-0"



PLAN
SCALE: 1"=50'-0"

ELEVATION
SCALE: 1"=50'-0"

GENERAL NOTES

1. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH SPECIFICATIONS, SHA STANDARD DATED JANUARY 1982 INCLUDING REVISIONS THEREOF, ADDITIONS THERETO AND SPECIAL PROVISIONS, AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" DATED 1983 FOR DESIGN INCLUDING ALL INTERIM SPECIFICATIONS, AND AWS STRUCTURAL WELDING CODE AWS D1.1-80.
2. STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 OR ASTM A-572 GRADE 50 DESIGNATION AS NOTED.
3. DESIGN SPECIFICATIONS: WORKING STRESS DESIGN METHOD DESIGN DIVISION OF 1983 AASHTO, "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES".
4. ALL FASTENERS ARE 7/8" DIAMETER H.S. BOLTS EXCEPT AS NOTED. ALL BOLT HOLES SHALL BE 15/16" Ø EXCEPT AS NOTED.
5. SURFACES OF EXISTING STEEL MEMBERS WHICH WILL BE IN CONTACT WITH NEW STEEL PLATES SHALL BE CLEANED OF ALL PAINT AND RUST AND BE SANDBLASTED.
6. SURFACES OF NEW STEEL PLATES WHICH WILL BE IN CONTACT WITH OTHER STEEL MEMBERS SHALL BE UNPAINTED AND FREE OF LOOSE RUST, VISIBLE MILL SCALE, DIRT OR ANY FOREIGN MATTER, OTHER SURFACES OF ALL NEW STEEL SHALL BE PAINTED AS PER SPECIFICATIONS.
7. THE PROCEDURE FOR INSTALLATION OF NEW MATERIAL AND REPLACEMENT OF RIVETS WITH NEW 7/8" Ø H.S. BOLTS SHALL BE AS FOLLOWS:
   - A. ONE HEAD OF AN EXISTING RIVET DESIGNATED TO BE REPLACED SHALL BE REMOVED BY USE OF PNEUMATIC OR MECHANICAL TOOLS IN A MANNER THAT WILL NOT DAMAGE THE UNDERLYING CONNECTED MATERIAL. FLAME CUTTING SHALL NOT BE USED. THE RIVET SHALL BE MADE FLUSH BY GRINDING OFF THE EXCESS HEAD, LEAVING THE SHANK INTACT IN THE HOLE.
   - B. WHEN A RIVET HEAD IS REMOVED, PROVISION SHALL BE MADE TO KEEP THE RIVET FROM FALLING OUT OF THE HOLE.
   - C. NEW PLATES SHALL BE TEMPORARILY AND SECURELY FASTENED TO THE EXISTING MATERIAL IN THE PROPER POSITION WITH BOLTS AND CLAMPS. NO TACK WELDING IS PERMITTED, EXCEPT AS NOTED.
   - D. ONE RIVET SHANK AT A TIME SHALL BE DRIVEN OUT AND REPLACED WITH A HIGH STRENGTH BOLT. EXCEPT AS OTHERWISE NOTED. SUBPUNCHED OR SUBDRILLED SHOP HOLES IN NEW MEMBERS SHALL BE FIELD REAMED TO A HOLE SIZE 1/16" LARGER THAN THE BOLT TO BE USED.

     WHERE IRREGULARITIES OF THE CYLINDRICAL SURFACE OF THE HOLE PREVENT ALIGNMENT OF THE HIGH STRENGTH BOLT PERPENDICULAR TO THE PLANE BETWEEN PLATES BEING FASTENED OR PREVENT INSERTION OF THE BOLT WITHOUT DAMAGE TO THE THREADS, THE HOLE SHALL BE REAMED AS REQUIRED TO ALLOW PROPER ALIGNMENT AND INSERTION. THE DIAMETER OF THE REAMED HOLE SHALL NOT BE GREATER THAN ONE BOLT SIZE LARGER THAN THE BOLT TO BE INSERTED. THE REPLACEMENT BOLT SHALL BE PROPERLY TENSIONED BEFORE REMOVAL OF A SUBSEQUENT RIVET SHANK. ALSO, ANY RIVET WITH A HEAD REMOVED IN A WORK SHIFT SHALL BE REPLACED WITH A HIGH-STRENGTH BOLT IN THE SAME SHIFT.
   - E. THE CONTRACTOR SHALL SUBMIT HIS PROCEDURE FOR INSTALLATION OF NEW MATERIAL FOR APPROVAL.
8. DIMENSIONS OF THE EXISTING STRUCTURE SHOWN ON THESE PLANS ARE FOR GENERAL REFERENCE ONLY. THEY HAVE BEEN TAKEN FROM THE ORIGINAL CONSTRUCTION DRAWINGS AND ARE NOT GUARANTEED. THE CONTRACTOR TAKES ALL SUCH FIELD MEASUREMENTS AS ARE NECESSARY TO ASSURE PROPER FIT OF THE FINISHED WORK. BOLT SPACINGS AND THE LENGTH OF NEW STRUCTURAL MEMBERS SHOULD BE ADJUSTED TO FIT FIELD MEASUREMENTS. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON THE FIELD MEASUREMENTS ARE SUBMITTED FOR APPROVAL, INCLUDE THE FIELD MEASUREMENTS FOR THE REFERENCE OF THE REVIEWER.

LEGEND

B.S. - BOTH SIDES

FPGW - FULL PENETRATION GROOVE WELD

NOTE:

1. **WORK THIS SHEET WITH SHEET NO. 2 AND 3.**

REVISIONS

MARYLAND TRANSPORTATION AUTHORITY

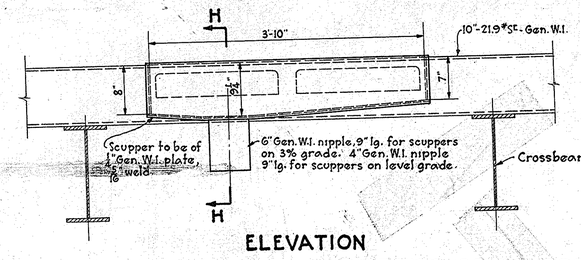
SUSQUEHANNA RIVER BRIDGE - REHABILITATION

GENERAL PLAN AND ELEVATION I

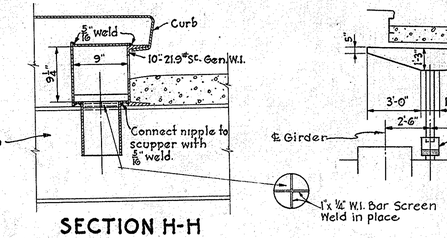
CONT. NO. TFA 2-1250-20 SHEET NO. 1 OF 18

DESIGNED BY RAP DRAWN BY DCF

P.W.A. PROJECT
MD. 1139-1-F

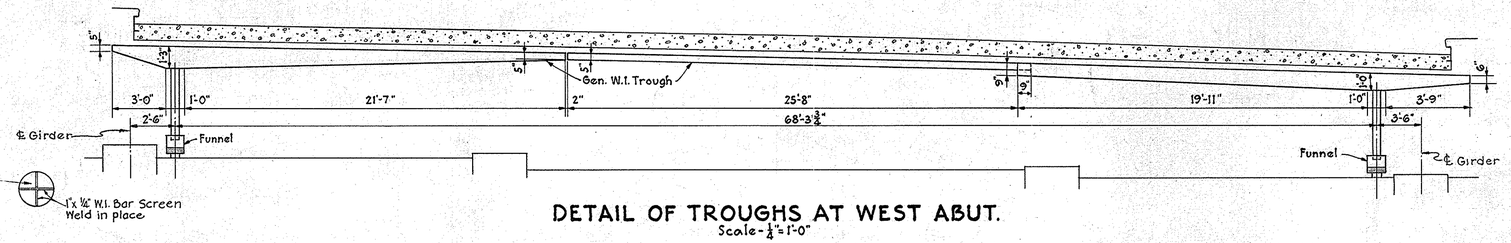


ELEVATION

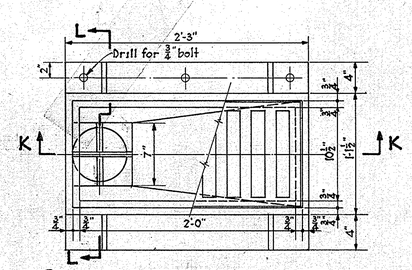


SECTION H-H

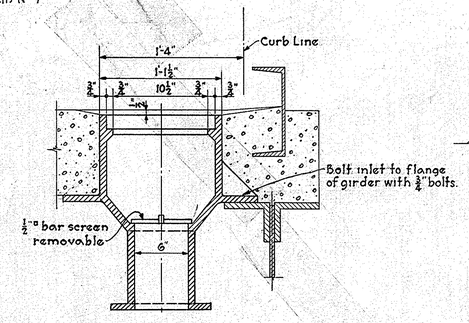
DETAILS OF SCUPPER
Scale - 1" = 1'-0"
58 Req. with 4" outlet.
10 Req. with 6" outlet.
Item No. 7



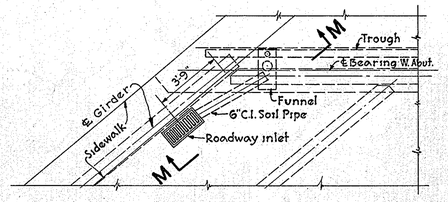
DETAIL OF TROUGHS AT WEST ABUT.
Scale - ¼" = 1'-0"



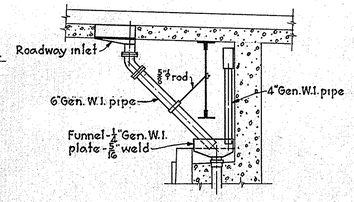
PLAN OF ROADWAY INLET
Scale - 1½" = 1'-0"
2 Req. - Mat. Gray cast iron. Item No. 6



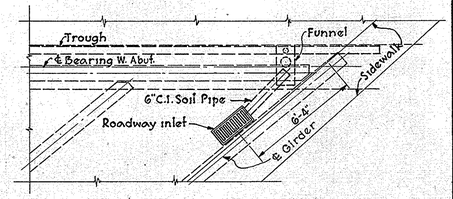
SECTION L-L
Scale - 1½" = 1'-0"



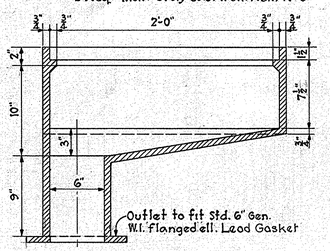
PLAN AT S. WING CORNER
Scale - ¼" = 1'-0"



SECTION M-M
Scale - ¼" = 1'-0"



PLAN AT N. WING CORNER
Scale - ¼" = 1'-0"



SECTION K-K
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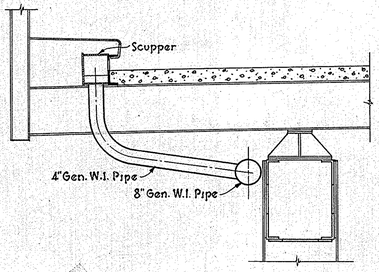

CONN. FROM SCUPPERS ON LEVEL GRADE
Scale - ½" = 1'-0"

J. E. Greiner Co
CONSULTING ENGINEERS
4-11-39

REVISIONS	STATE OF MARYLAND STATE ROADS COMMISSION BALTIMORE, MD. SUSQUEHANNA RIVER BRIDGE BETWEEN HAVRE DE GRACE & PERRYVILLE DRAINAGE DETAILS
	SCALE - AS NOTED — CONTRACT H-232-4-437
	MADE BY J.E. GREINER CO. J.M. — APPROVED TRACED BY J.M. CHECKED BY KK — CHIEF ENGINEER 4/11/39 APPROVED — BRIDGE ENGINEER APRIL 11, 1939 — SHEET No. 37 OF 37 C-354-4-37

PRINTED ON "IMPERIAL" TRACING CLOTH K & F CO., N.Y.