

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

CONTRACT NO. PC – 2019

PROTECTIVE COATINGS OF STRUCTURES

ADDENDUM NO. 1

June 28, 2019

DESCRIPTION

The attached pages are issued to amend, and become part of, the Contract Documents.

Contractor shall acknowledge receipt of this Addendum on the Receipt of Addenda form (Contract Page RA-1). Failure to complete and include the RA-1 form in the bid package may cause bid to be found irregular.

Date of receipt of bids is unchanged.

Date of contract completion is unchanged.

ADDENDUM NO. 1

6/28/19

RA1-1

APPENDIX PC-2019 RECORD SET PLANS

1. All Bidders are directed to add the Boulevard Bridge Record Set Plans Addendum 1 to the Appendix of the PC 2019 bid documents.
2. This addendum has been issued to provide existing structural steel drawings for the Boulevard Bridge.

ADDENDUM NO. 1

6/28/19

RA1-2

Boulevard Bridge

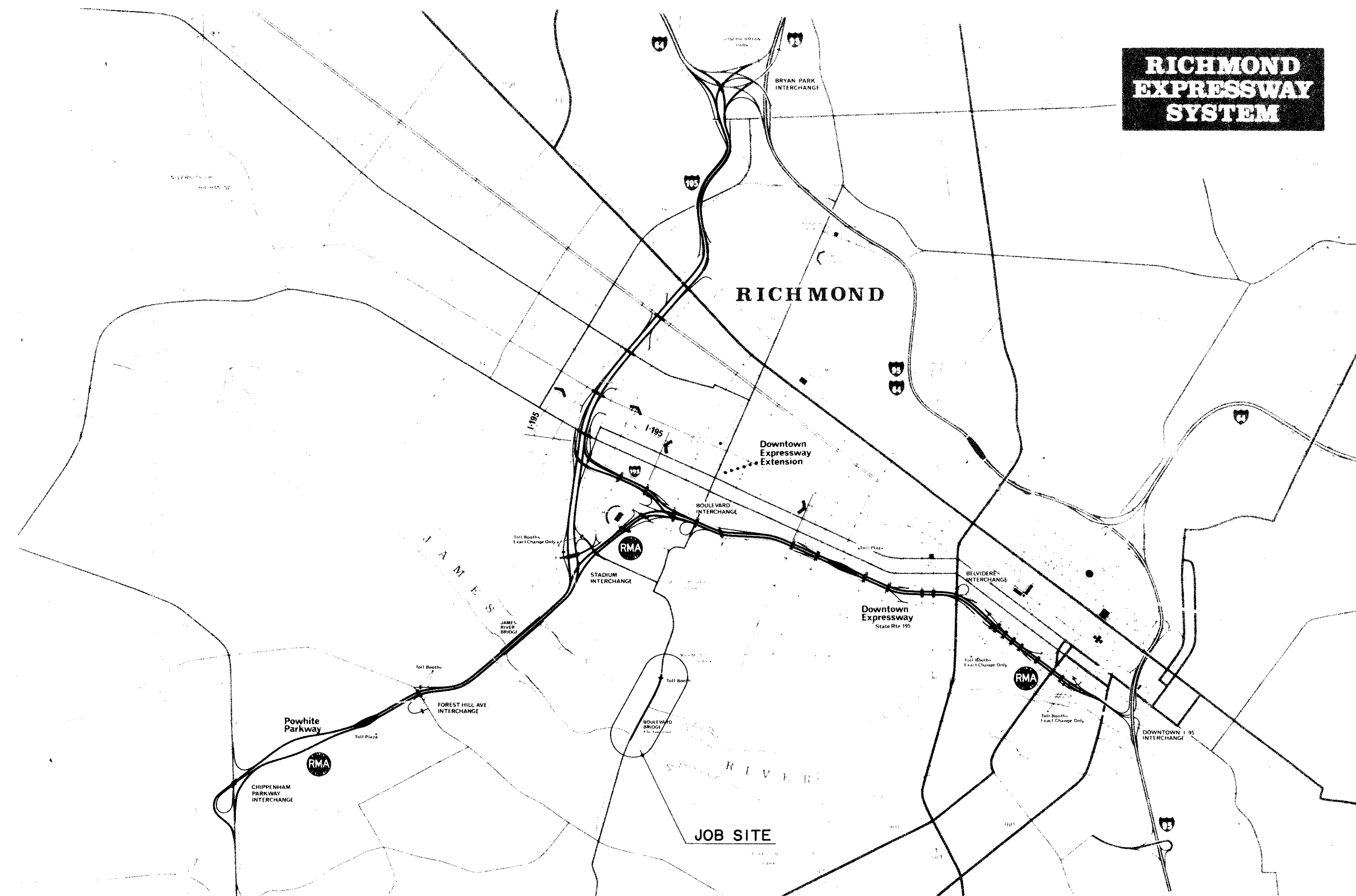
Record Set Plans Addendum #1

CONTRACT NO. C-17A

BOULEVARD BRIDGE REHABILITATION-PARTIAL DEMOLITION AND STEEL REPAIRS














RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	BOULEVARD BRIDGE REHABILITATION	1	

INDEX	
SHEET NO.	TITLE
1	Title Sheet
2	General Plan and Elevation
3	General Notes and Quantities
4	Bridge Closure Details
5 & 6	Existing Pier Details
7	Table of East Truss Repairs
8	Table of West Truss Repairs
9	Typical Repair Details
10	Bearing Details
11	Expansion Joint Support Details
RF-1 thru RF-22	Shop Drawing Reference Sheets



STATE LINE
COUNTY LINE
CITY, TOWN OR VILLAGE
RIGHT OF WAY LINE
FENCE LINE
UNFENCED PROPERTY LINE
FENCED PROPERTY LINE
TRAVELED WAY
GUARD RAIL
RETAINING WALL
RAILROADS
BASE OR SURVEY LINE

CONVENTIONAL SIGNS

	LEVEE OR EMBANKMENT
	BRIDGES
	CULVERTS
	DROP INLET
	TROLLEY POLES
	POWER POLES
	TELEPHONE OR TELEGRAPH POLES
	MARSH
	HEDGE
	WOODS
	GROUND ELEVATION
	GRADE ELEVATION
	POLES WITHIN CONSTRUCTION LIMIT

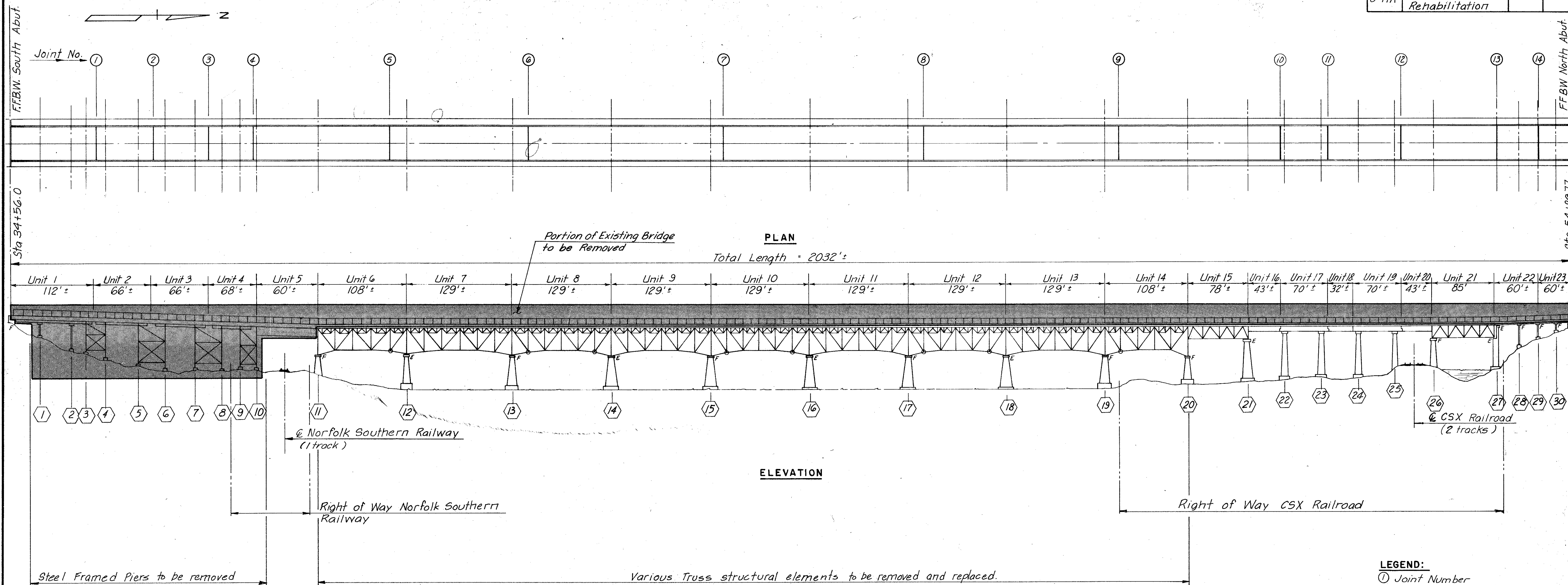
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SUBMITTED BY	
Date	
3/30/92	<i>Steve A. Roub</i>
Date	HOWARD, NEEDLES, TAMMEN & BERGENDOFF

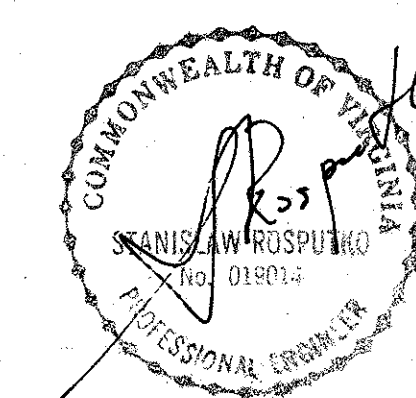
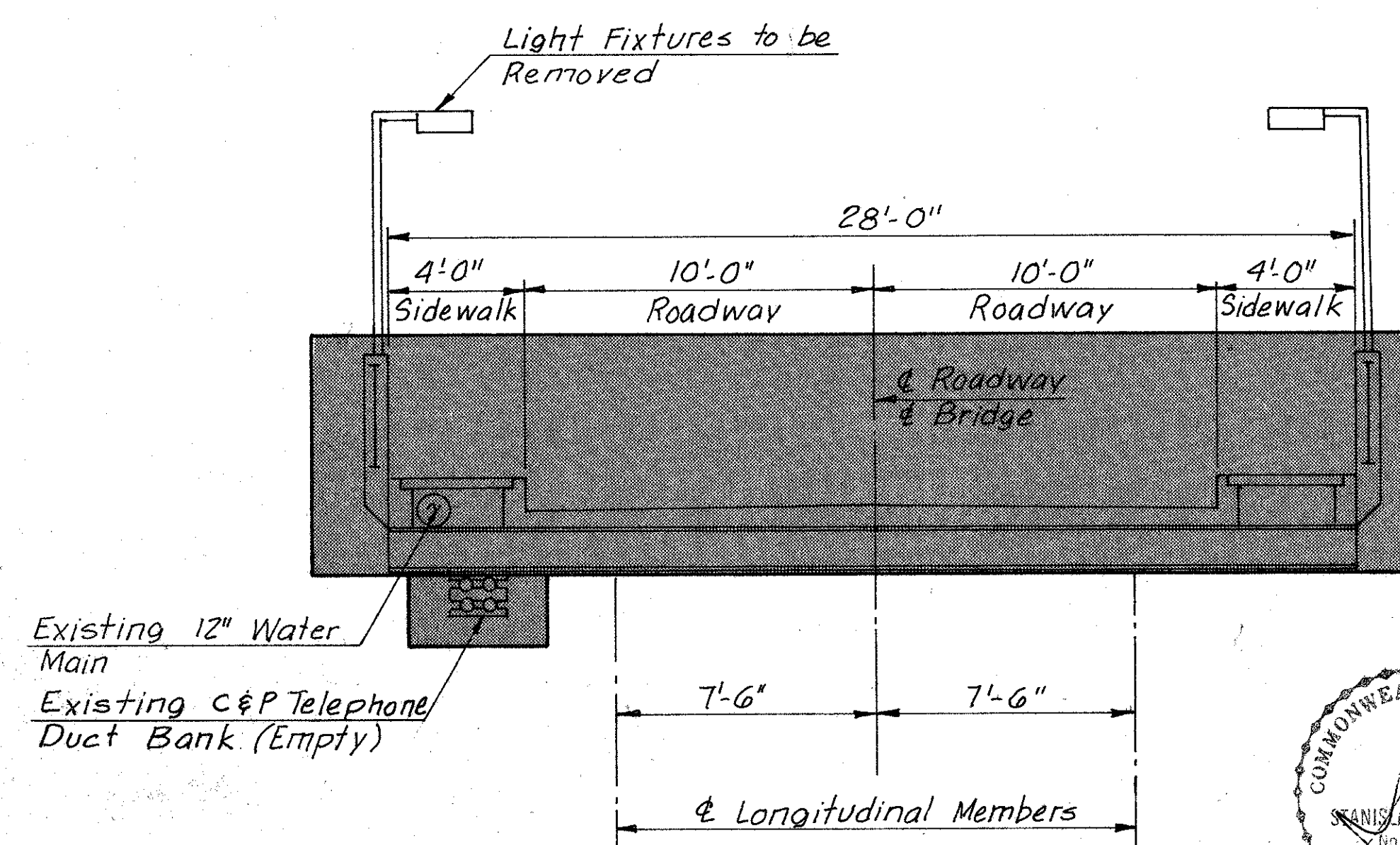
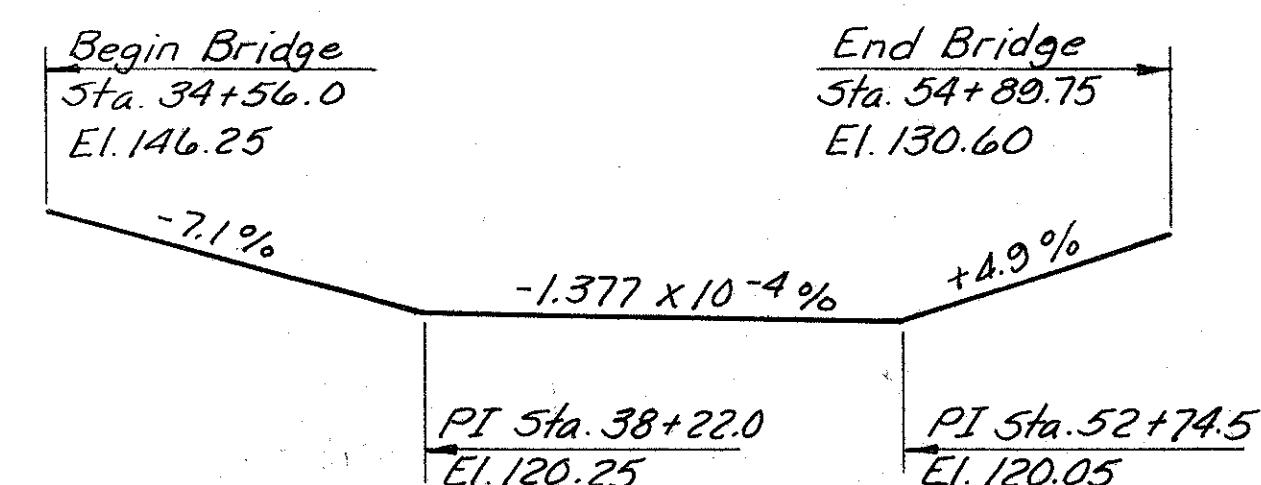
RECOMMENDED BY	
Date	
3/1/94	
Date	GENERAL MANAGER RICHMOND METROPOLITAN AUTHORITY

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RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		



NOTE:
LOAD RESTRICTIONS ARE CURRENTLY IN EFFECT ON THE EXISTING BRIDGE. CONSTRUCTION EQUIPMENT WEIGHING IN EXCESS OF 8 TONS SHOULD NOT BE PERMITTED ON THE BRIDGE.



MADE	BY	DATE	NO.	REVISION	BY	DATE
	H.S.	10-91				
CHECKED	T.E.M.	10-91				
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE REHABILITATION PARTIAL DEMOLITION AND STEEL REPAIRS	
GENERAL PLAN AND ELEVATION	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SCALE: No Scale CONTRACT NO. C-17A SHEET NO. 2 OF 11

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		

ITEM	UNITS	QUANTITY
Mobilization	L.S.	1
Remove Portion of Existing Structure	L.S.	1
Structural Steel (A36) Floor Beams	Lbs.	426,000
Bearing Plates	Lbs.	4,740
Structural Steel (A36) Miscellaneous	Lbs.	20,000
Remove & Replace Truss Vertical V12	Each	2
" " " " V16	"	8
" " " " V32	"	2
Remove & Replace Lower Chord BC 1	"	1
" " " " BC 2	"	1
" " " " BC 3	"	1
" " " " BC 5	"	1
" " " " BC11	"	1
" " " " BC12	"	2
Remove & Replace Lower Chord Field Splice (Existing)	"	1
Remove & Replace Lower Transverse Strut BS1	"	1
" " " " BS3	"	2
" " " " BS5	"	6
" " " " BS6	"	1
" " " " S2	"	1
" " " " S4	"	1
Remove & Replace Sway Brace L50/L50A	"	1
Remove & Replace Lower Lateral L6	"	1
" " " " L28	"	1
" " " " L32/L32A	"	1
" " " " L40	"	1
" " " " L41	"	1
" " " " L41/L41A	"	1
" " " " GL5	"	1
" " " " GL7	"	1
" " " " GL11	"	1
" " " " GL13	"	1
" " " " GL19	"	1
" " " " GL19A	"	1
Remove & Replace Diaphragm GS3/GD3	"	3
Remove & Replace Bearing Plates pn & ph	"	6
Self Lubricating Plates	"	6
Remove & Replace Gusset Plates	"	12
Field Splice (New) at Bottom Chord	"	2
Field Splice (New) at Diagonal	"	2
Field Splice (New) at Top Chord	Each	2
Remove Existing C&P Telephone Duct Bank	L.S.	1
Remove Existing Water Main	L.S.	1
Prepare and Paint Existing Structure (Type B, System F)	L.S.	1
Environmental Protection (Type B)	L.S.	1
Disposal of Material (Type B)	L.S.	1
Repair Pier No. 11 through Pier No. 30	L.S.	20
Concrete Surface Penetrant Sealer	S.Y.	2315
Bridge Closure	L.S.	1

FLOOR BEAM STATION	SIZE	SHIM THICKNESS	TOP OF FLOOR BEAM ELEVATION
51 + 73.42	W16x36	1/8"	119.40
51 + 79.18	W16x36	1/8"	119.40
51 + 84.94	W16x36	1/4"	119.41
51 + 90.70	W16x36	1/2"	119.43
51 + 96.46	W16x36	3/4"	119.45
52 + 02.22	W16x36	1/4"	119.49
52 + 07.98	W16x36	1/4"	119.53
52 + 13.74	W18x35	3/8"	119.58
52 + 19.50	W18x35	1/8"	119.64
52 + 25.26	W18x35	1/8"	119.71
52 + 31.02	W21x44	0"	119.79
52 + 36.78	W21x44	1"	119.87
52 + 42.54	W21x44	2"	119.96
52 + 48.30	W24x55	1/4"	120.06
52 + 54.06	W24x55	1/2"	120.17
52 + 59.82	W24x55	2/8"	120.28
52 + 65.58	W24x55	4/8"	120.41
52 + 71.34	W24x55	6"	120.54
52 + 77.10	W24x55	7/8"	120.68
52 + 82.86	W24x55	9/8"	120.83
52 + 88.20	W24x55	7/4"	120.97
52 + 93.55	W24x55	6/4"	121.13
52 + 98.89	W24x55	4/2"	121.28
53 + 04.24	W24x55	3/8"	121.45
53 + 09.58	W24x55	1/2"	121.62
53 + 14.92	W24x55	1/2"	121.80
53 + 20.27	W21x44	2/8"	121.99
53 + 25.61	W21x44	1/4"	122.18
53 + 30.95	W21x44	1/4"	122.39
53 + 36.30	W21x44	2/8"	122.59
53 + 41.64	W18x35	1/4"	122.81
53 + 46.99	W18x35	1/2"	123.03
53 + 52.33	W16x36	1/8"	123.26
53 + 57.67	W16x36	1/4"	123.50
53 + 63.02	W16x36	3/4"	123.74
53 + 68.36	W16x36	1/4"	123.99

NOTE:
Floor beam stations are based on survey joint locations and "As Built" span lengths. The Contractor shall verify all dimensions and elevations prior to fabrication of any structural steel.

FLOOR BEAM STATION	SIZE	SHIM THICKNESS	TOP OF FLOOR BEAM ELEVATION
38 + 27.20	W24x55	7/2"	120.92
32.58		5/8"	120.75
37.95		3/8"	120.60
43.33		1/8"	120.46
48.70	W24x55	3/8"	120.33
54.08	W21x44	1/8"	120.21
59.45	W21x44	3/4"	120.11
64.83	W18x35	2/4"	120.00
70.20	W18x35	1/8"	119.92
75.58	W18x35	3/8"	119.84
80.95	W16x36	1/8"	119.78
86.33	W16x36	1/8"	119.72
91.70	W16x36	3/8"	119.68

NOTE:
Unless otherwise shown floor beams shall be W16x36. Shims are to be made of plates 12"x7" with thickness's totalling that shown in the table. Shims $\leq \frac{3}{4}$ " shall consist of a single plate of the required thickness. All others shall utilize 1" thick or thicker plates to the maximum extent possible.

NOTE:
THE PLATFORM UNDER THE GIRDERS ADJACENT TO THE NORTH SIDE OF PIER 25 IS TO BE REMOVED. ANY WELD ADHERING TO THE EXISTING STRUCTURAL STEEL IS TO BE GROUND SMOOTH. COST IS TO BE INCLUDED IN THE PAY ITEM "REMOVE PORTION OF EXISTING STRUCTURE".

NOTE:
THE PULLING PLATFORM FOR THE C&P TELEPHONE CONDUIT IS TO BE REMOVED. COST IS TO BE INCLUDED IN THE PAY ITEM "REMOVE EXISTING C&P TELEPHONE DUCT BANKS".

NOTE:
THE EXISTING BRIDGE PLAQUE LOCATED IN THE TERMINAL WALL AT THE SOUTH END OF THE BRIDGE IS TO BE REMOVED AND GIVEN TO THE RMA.

NOTE:
THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW THE DESIGN AND DETAILS FOR TEMPORARY SUPPORT OF THE TRUSS AND GIRDERS DURING STRUCTURAL STEEL REPAIR.

A TEMPORARY CAUSEWAY WILL NOT BE PERMITTED.

TEMPORARY SUPPORTS FOUNDED IN THE RIVER WILL NOT BE PERMITTED.

NOTE:
BRIDGE CLOSURE ITEMS ARE TO BE INSTALLED UNDER CONTRACT C-17A. REMOVAL WILL BE BY THE CONTRACTOR FOR CONTRACT C-17B.

NOTE:
THE EXISTING BUILDING ADJACENT TO UNIT 14 AT PIER 20 IS TO BE REMOVED. COST IS TO BE INCLUDED IN THE PAY ITEM "REMOVE PORTION OF EXISTING STRUCTURE".

NOTE:
ALL BOLTED CONNECTIONS ARE TO BE MADE WITH 3/4" Ø H.S. BOLTS, NUTS AND WASHERS.

NOTE:
THE EXISTING WATERMAIN IS TO BE KEPT IN SERVICE UNTIL ACTUAL DEMOLITION IS READY TO BEGIN. SEVEN (7) DAY NOTICE IS REQUIRED FOR WATERMAIN SHUT DOWN PRIOR TO DEMOLITION.

GENERAL NOTES:

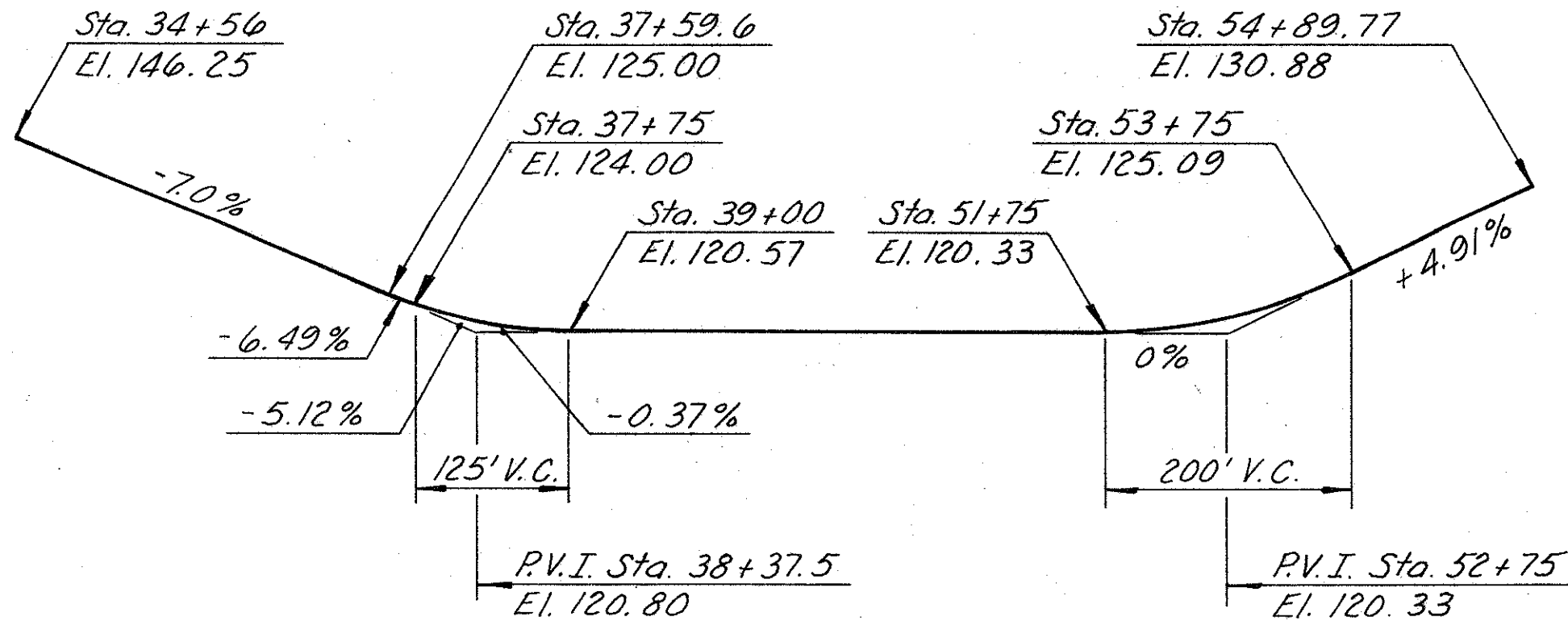
SPECIFICATIONS:
CONSTRUCTION: VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS, 1991.

THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED IN THE CONTRACT DOCUMENTS.

ALL STRUCTURAL STEEL, INCLUDING BEARINGS, SHALL BE ASTM A36.

FINISH PAINT SHALL BE ALUMINUM EPOXY MASTIC SIMILAR IN COLOR TO THAT PRESENTLY USED ON RMA BRIDGES. THE CONTRACTOR SHALL SUBMIT A SAMPLE TO THE ENGINEER FOR APPROVAL.

DEFORMED REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 50; TIE BARS IN PIER COLUMNS AND PILES MAY BE GRADE 40. ALL REINFORCING BAR DIMENSIONS ON THE DETAILED DRAWINGS ARE TO CENTERS OF BARS EXCEPT WHERE OTHERWISE NOTED AND ARE SUBJECT TO FABRICATION AND CONSTRUCTION TOLERANCES.



PROPOSED PROFILE GRADE

	BY	DATE				
MADE	EJM	3-92				
CHECKED	JEM	3-92				
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE REHABILITATION
PARTIAL DEMOLITION AND STEEL REPAIRS
GENERAL NOTES AND QUANTITIES

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: No Scale
CONTRACT NO. C-17A
SHEET NO. 3 OF 11

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		

Pier 11 Remove vegetation in and around piers/web wall.
Repair moderate scaling on the top of pier caps and web wall.

Pier 12 Repair moderate scaling on the top of pier caps and web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 13 Repair moderate scaling on the top of pier caps and toe of web wall.
Remove drift accumulation at west pier.
Seal piers/caps/wall with water repellant surface treatment.

Pier 14 Repair moderate scaling on the top of pier caps and top of web wall.
Repair full depth full height crack in the web wall.
Repair the top 1' of the spread footing.
Seal piers/caps/wall with water repellant surface treatment.

Pier 15 Repair moderate scaling on the top of pier caps and top of web wall.
Repair 8" x 8" spall below cap on north face of west pier.
Repair 3/16" wide 6' long crack located 4' east of west pier on the web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 16 Repair moderate scaling on the top of pier caps and top of web wall.
Repair 6' of 1/8" wide crack located in the top of the web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 17 Repair moderate scaling on the top of pier caps and top of web wall.
Repair 1" wide x 16" long crack on the top of the web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 18 Repair moderate scaling on the east and west top of pier caps.
Repair 1/8" wide 12" long crack on the north face of the web wall 16" from west pier column.
Seal piers/caps/wall with water repellant surface treatment.

Pier 19 Repair 4" x 8" spall on the west face of the west pier.
Repair moderate scaling on the west face of the west pier.
Seal piers/caps/wall with water repellant surface treatment.

Pier 20 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.
Repair 1' spall on the east face of the east pier.

Pier 21 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.
Repair 2' x 2-1/2' delaminated area at the base of the west pier.

Pier 22 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.
Repair 1' diameter spall mid-way up west pier.

Pier 23 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 24 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.

Pier 25 Remove vegetation from piers/caps/web wall.
Seal piers/caps/wall with water repellant surface treatment.
Repair moderate scaling on west face of west pier and north face of the web wall.

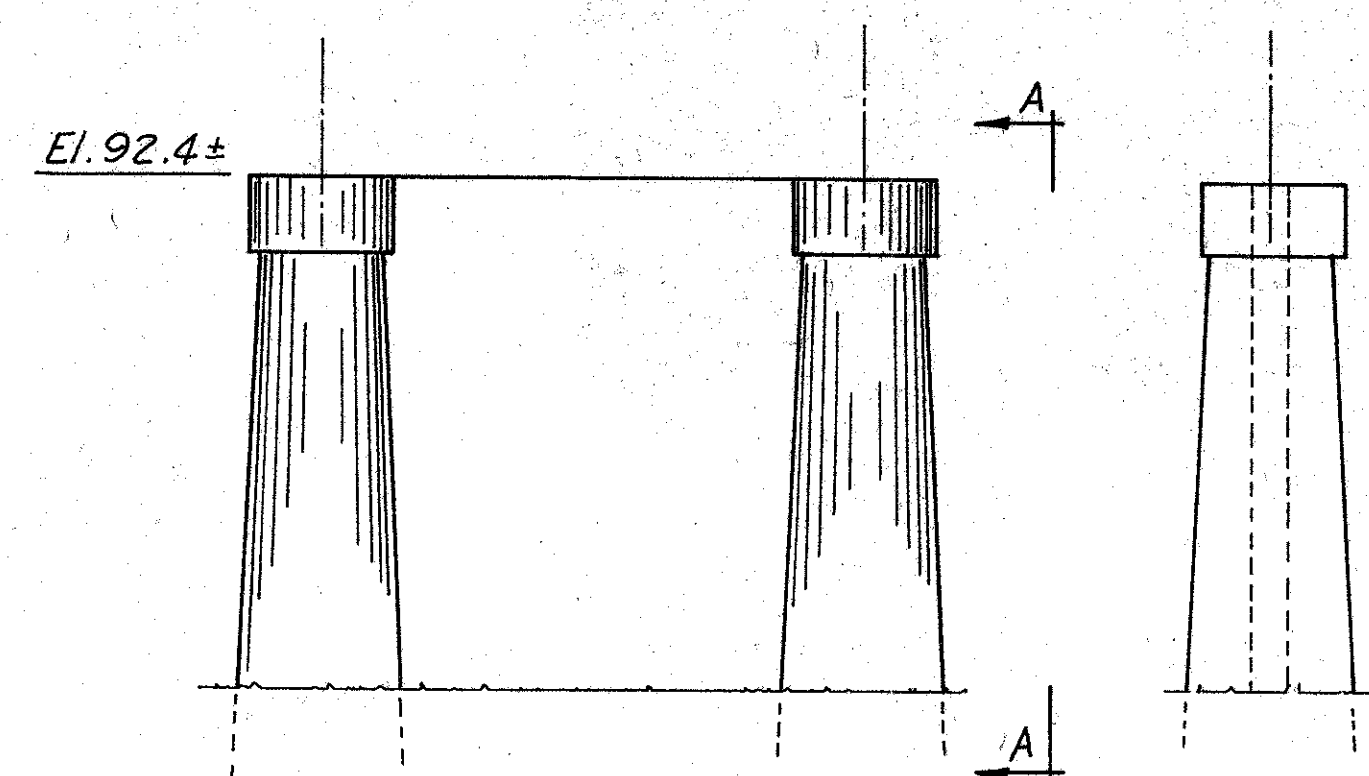
Pier 26 Repair 2' x 1' spall on south face of west pier (near pier cap).
Repair (2) 1' x 1' spalls on north face of west pier (near pier cap).
Remove vegetation from piers/caps/web wall.
Seal piers/caps/web wall with water repellant surface treatment.

Pier 27 Repair west pier cap at girder bearing. (There is an existing wrap around collar in-place).
Repair spalls along construction joints.
Repair the top 1' of the spread footing.
Seal piers/caps/web wall with water repellant surface treatment.
Remove vegetation from east pier.

Pier 28 Repair honeycomb areas at construction joints.
Seal piers/caps with water repellant surface treatment.

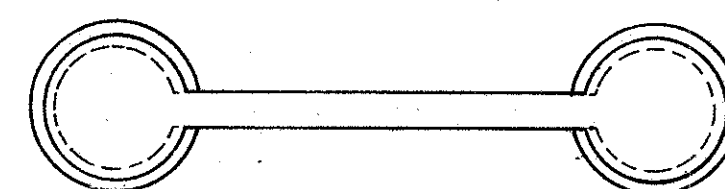
Pier 29 Remove vegetation from piers/pier cap.
Seal piers/caps with water repellant surface treatment.

Pier 30 Repair 9" diameter spall on south face of pier cap (east pier).
Seal piers/caps with water repellant surface treatment.

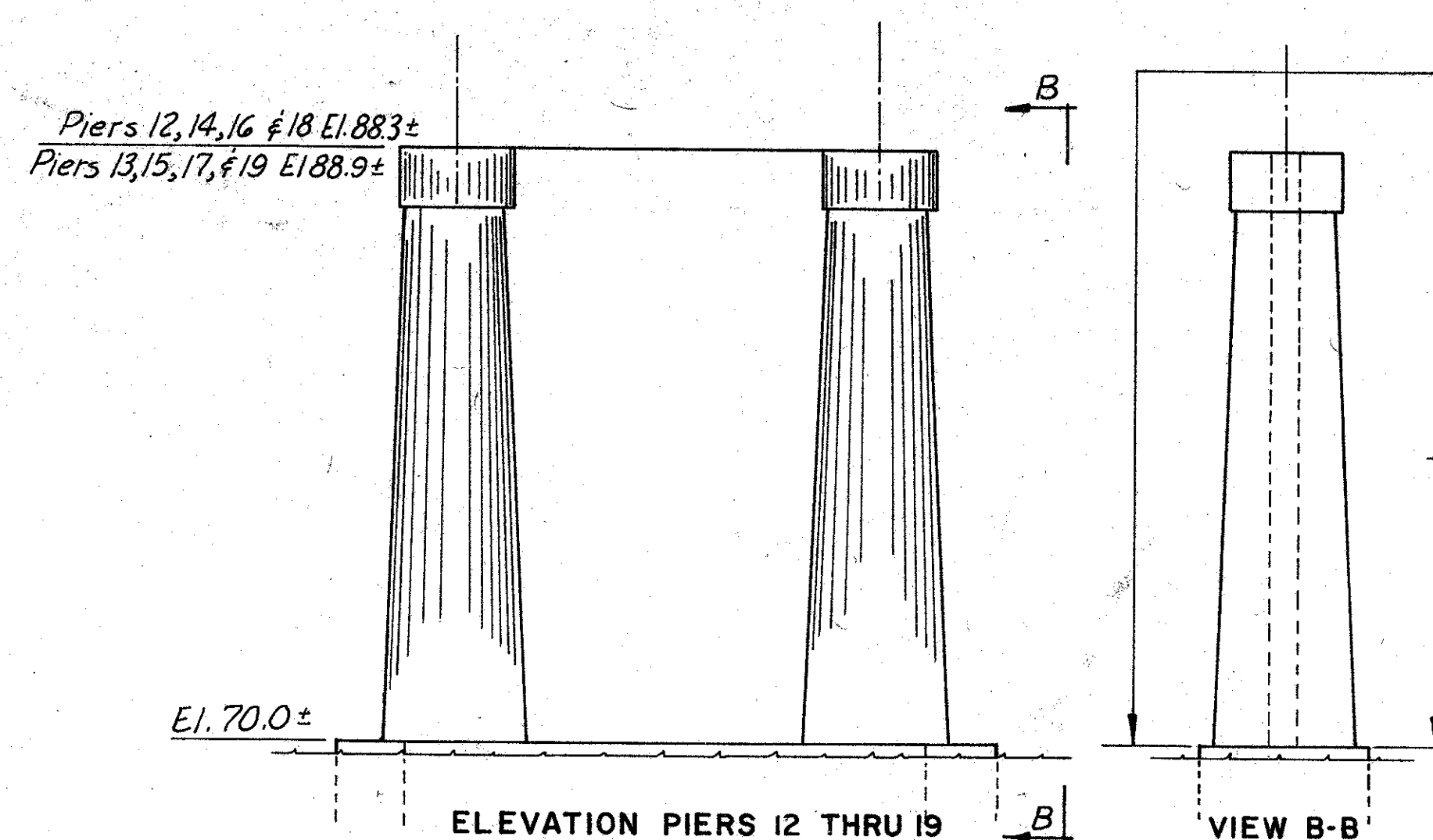


ELEVATION PIER II

VIEW A-A

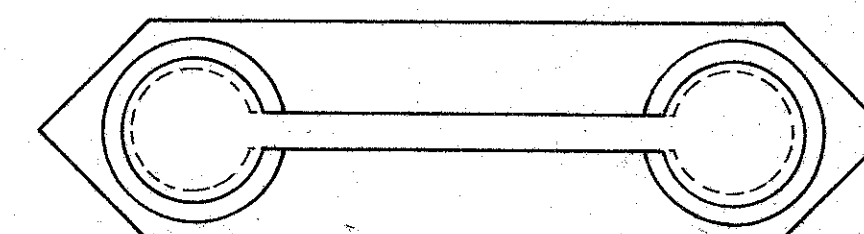


PLAN PIERS II AND 20-26

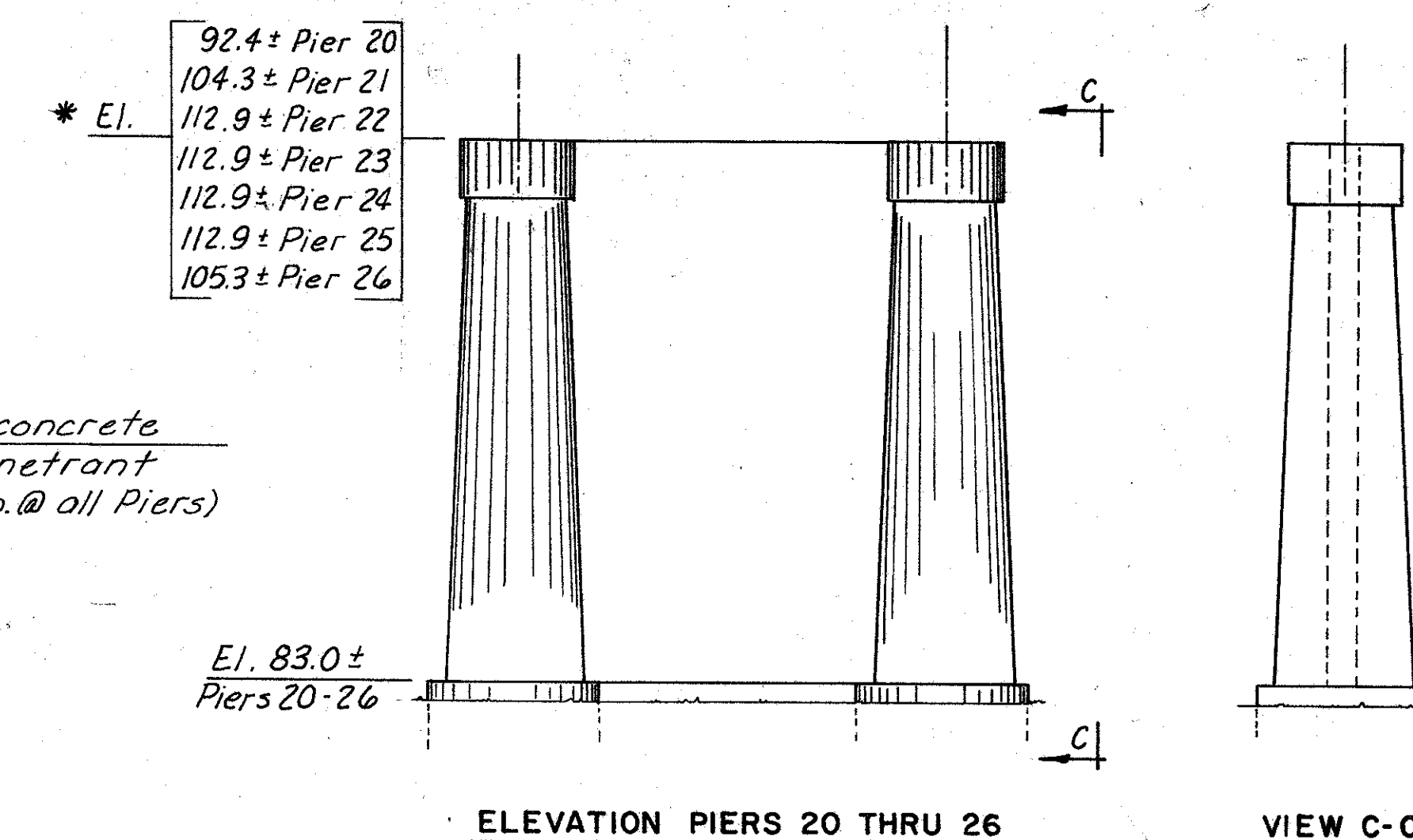


ELEVATION PIERS 12 THRU 19

VIEW B-B



PLAN PIERS 12 THRU 19



ELEVATION PIERS 20 THRU 26

VIEW C-C

* NOTE:
Elevations shown are approximate
and for reference only.

BY	DATE				
MADE	EJM	2-92			
CHECKED	TEM	2-92			
IN CHARGE					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

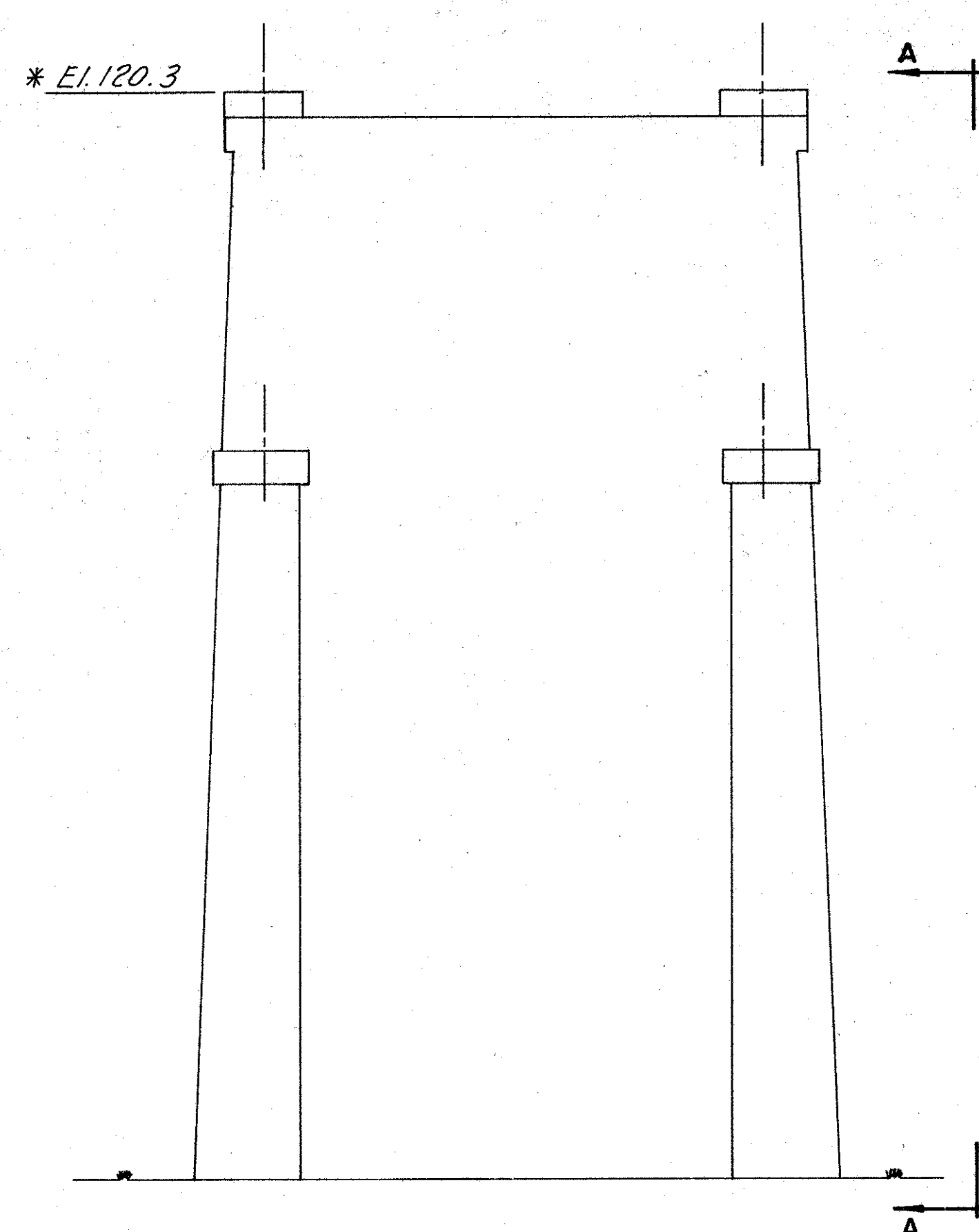
BOULEVARD BRIDGE REHABILITATION
PARTIAL DEMOLITION AND STEEL REPAIRS

EXISTING PIER REPAIRS

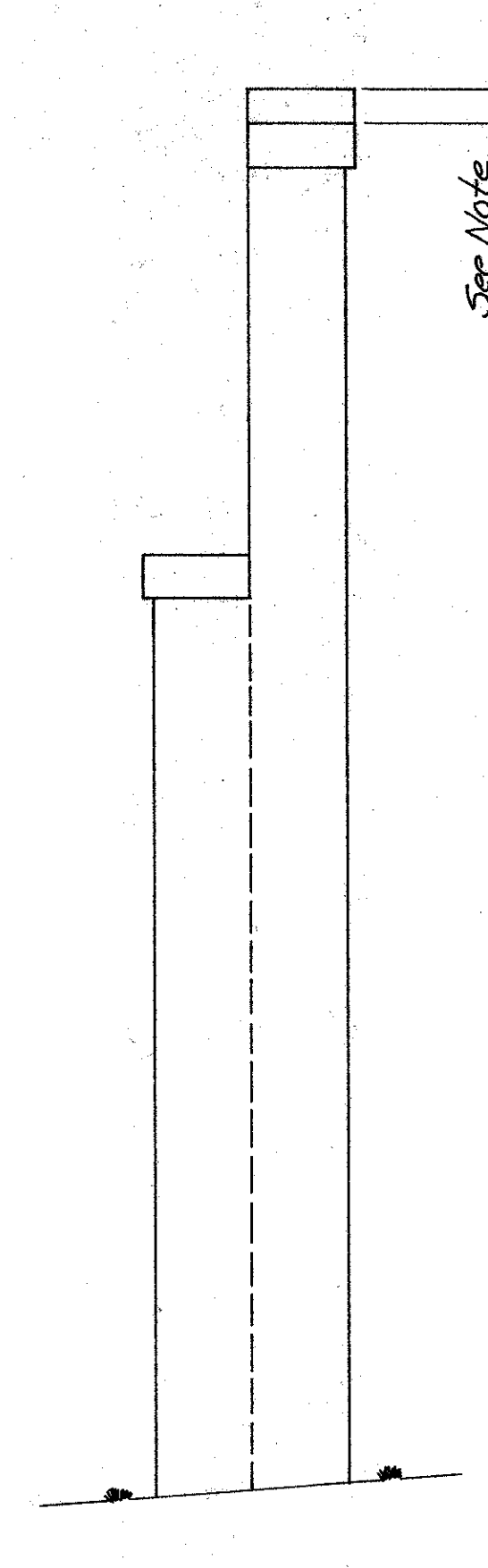
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: No Scale
CONTRACT NO: C-17A
SHEET NO. 5 OF 11

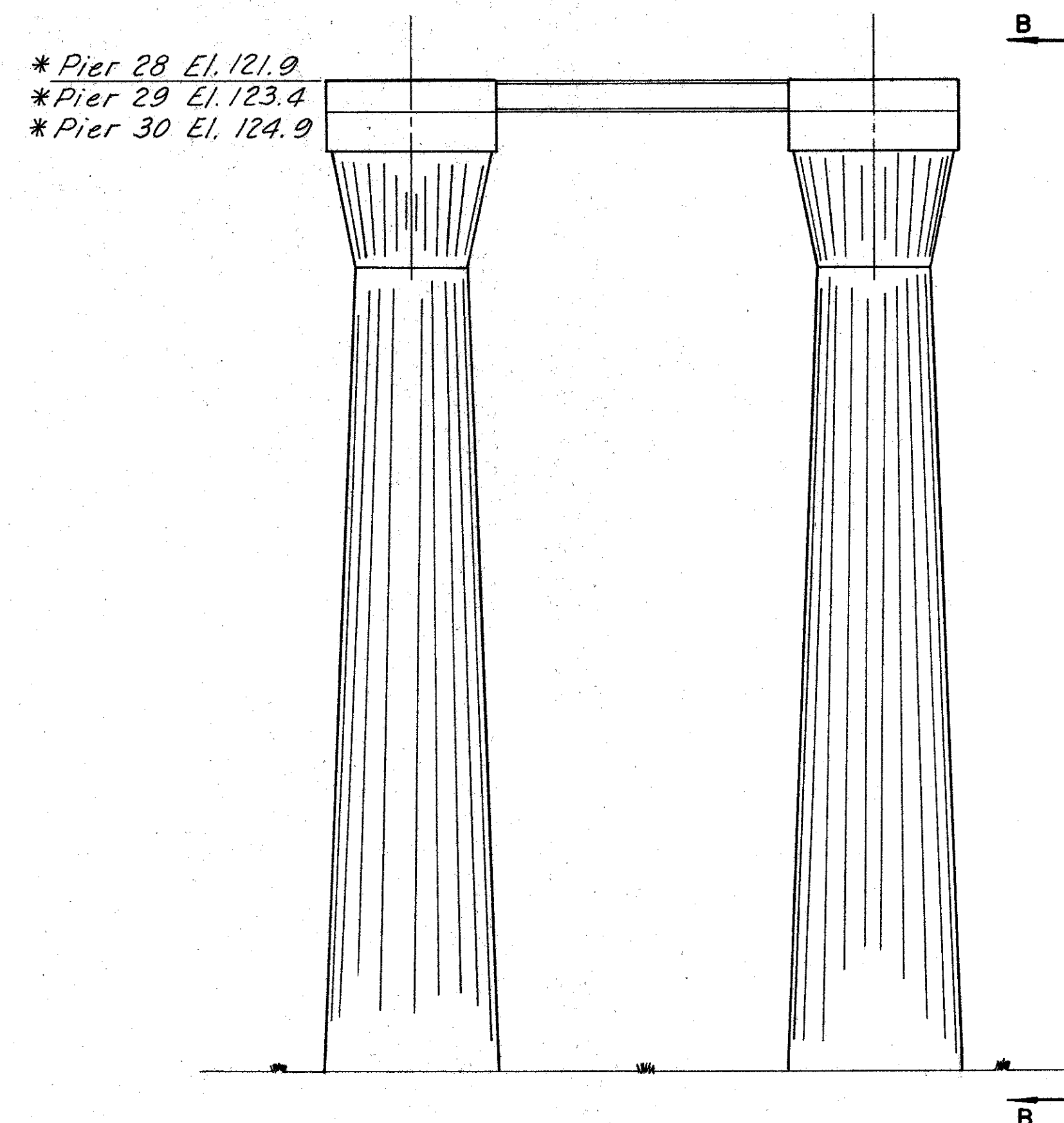
RICHMOND EXPRESSWAY SYSTEM				
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS	
C-17A	Boulevard Bridge Rehabilitation			



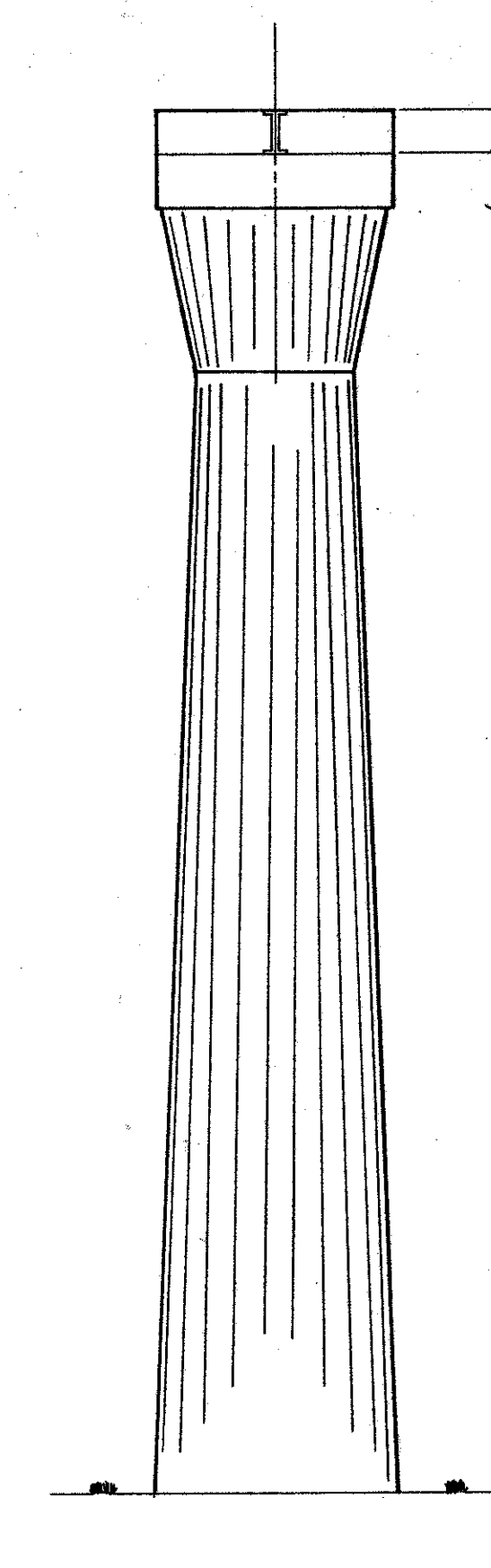
ELEVATION PIER 27



VIEW A-A



ELEVATION PIERS 28 THRU 30

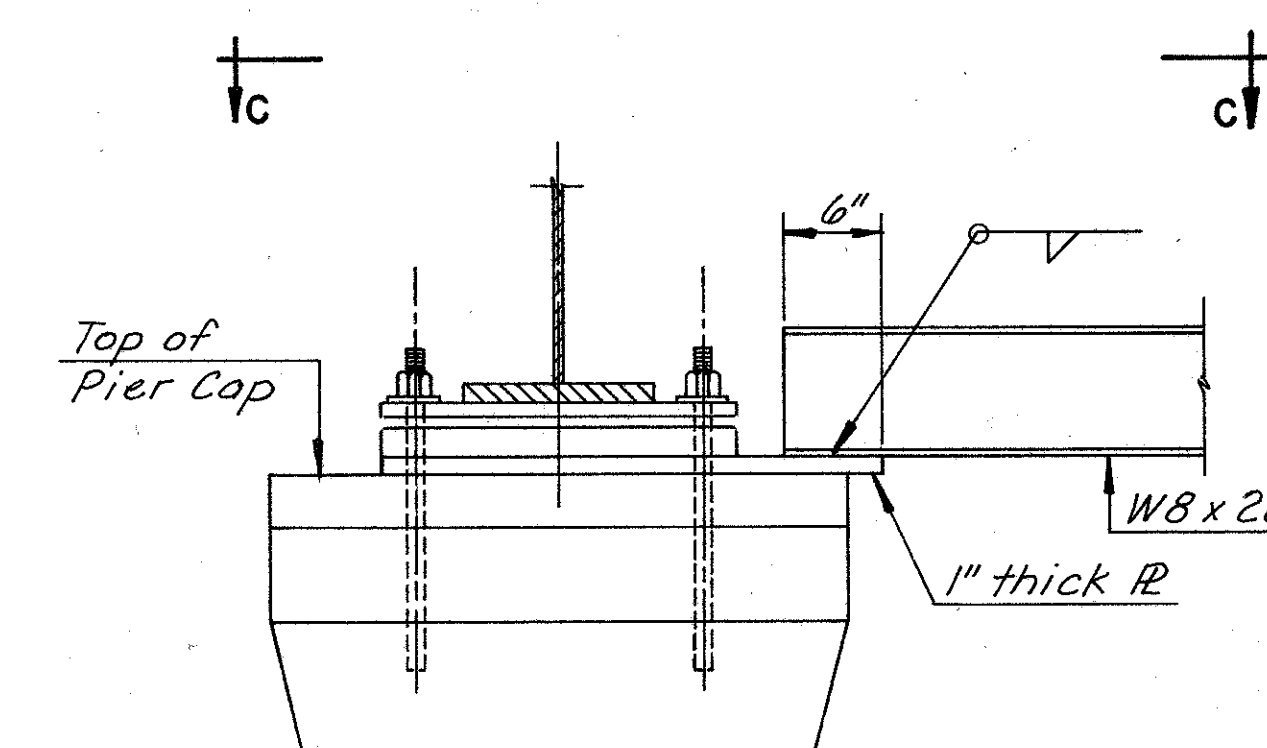


VIEW B-B

NOTE:
 Portions of the pier caps are to be removed by chipping and grouting to a smooth level surface to the elevations given below.

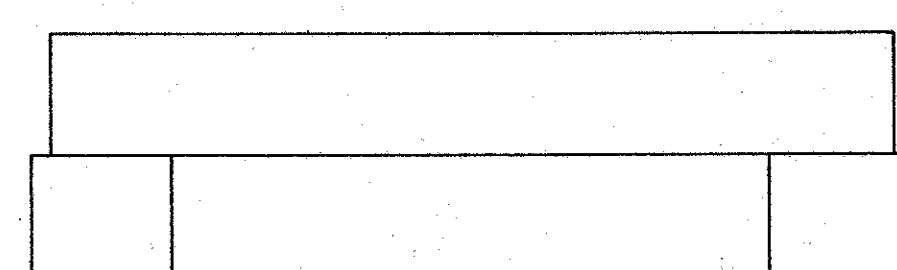
Pier 22	112.62
23	112.70
24	112.68
25	112.56
27	119.98
28	121.48
29	122.88
30	122.95

Elevations are based on surveyed top of deck elevations.
 Anchor Bolts for the shoe are to be set in drilled holes and grouted. For Anchor Bolt Details see the Shoe Detail Sheet.

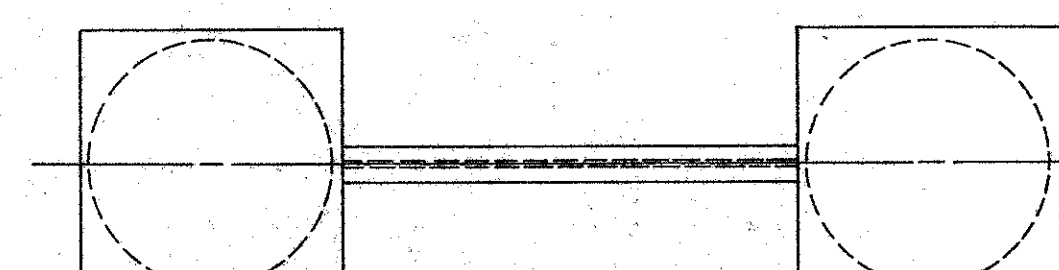


ELEVATION-COLUMN TIE
PIERS 28 THRU 30

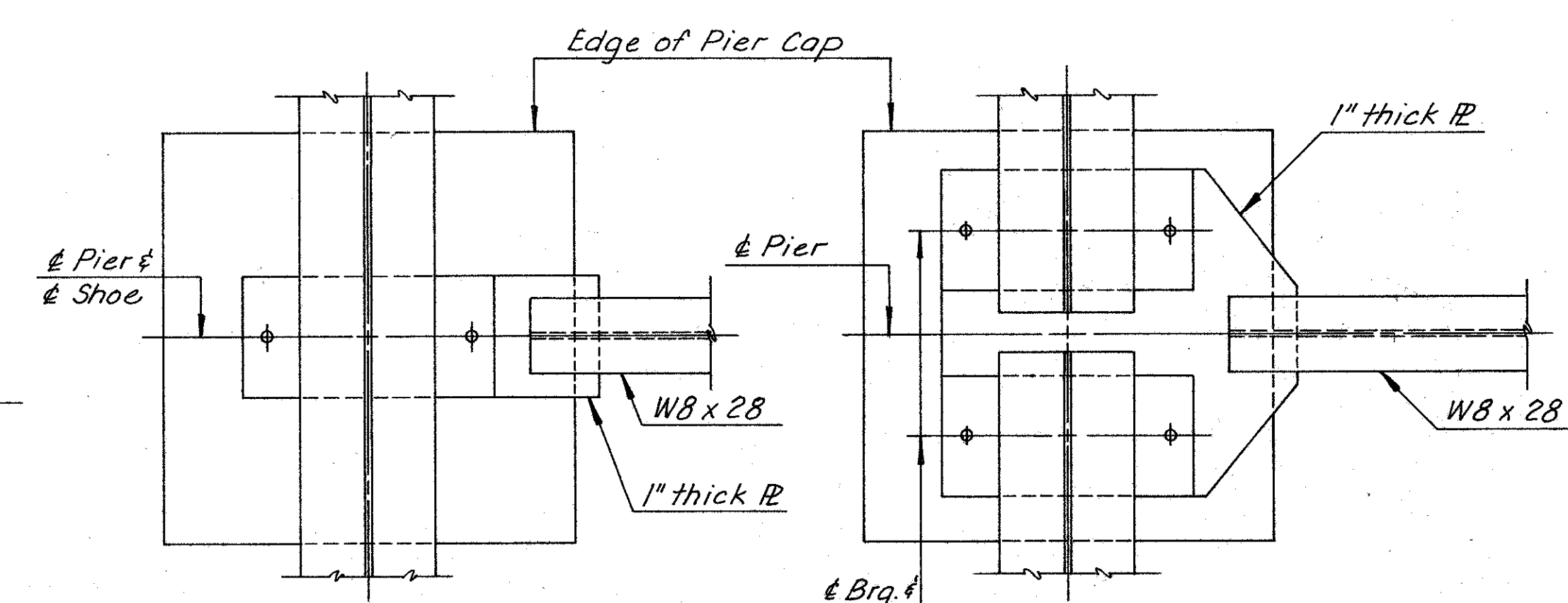
*** NOTE:**
 Elevations shown are approximate and for reference only.



PLAN



PLAN



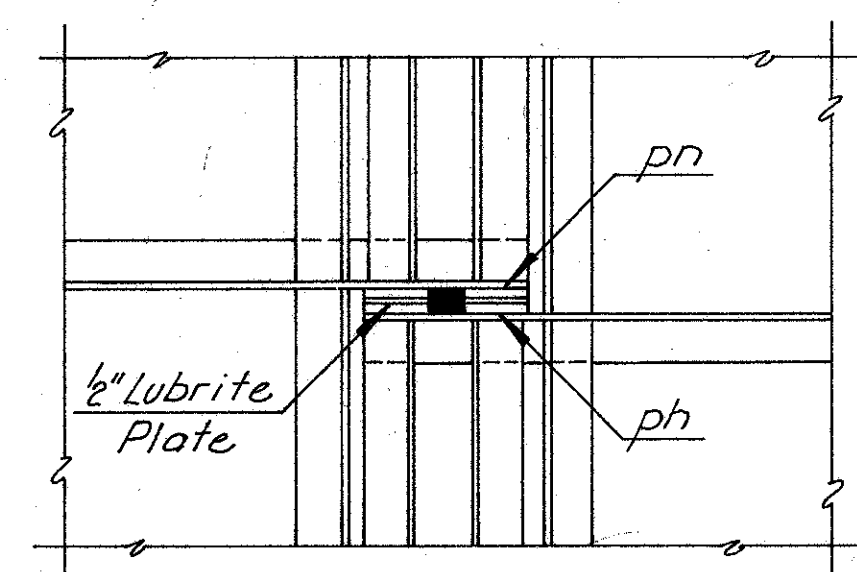
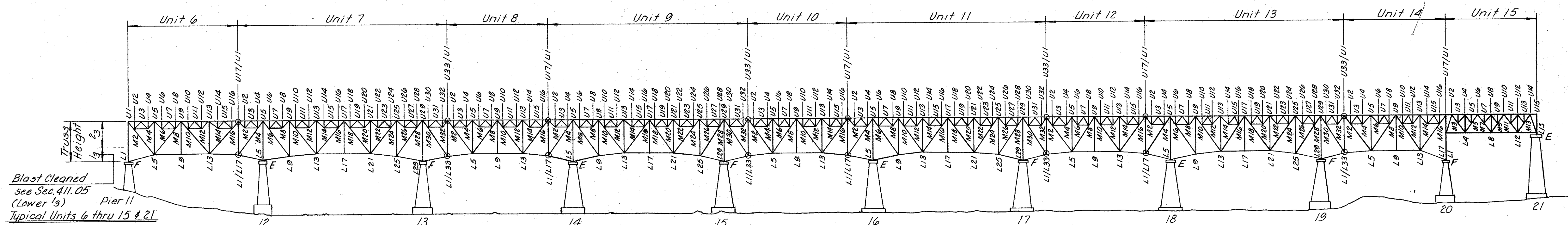
VIEW C-C
AT PIERS 28 & 30

VIEW C-C
AT PIER 29

BY	DATE				
MADE	EJM	3-92			
CHECKED	TEM	3-92			
IN CHARGE			NO.	REVISION	BY DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE REHABILITATION PARTIAL DEMOLITION AND STEEL REPAIRS EXISTING PIER REPAIRS	
HOWARD, NEEDLES, TAMMEN & BERGENDORFF consulting engineers Alexandria, Virginia	SCALE: No Scale CONTRACT NO. C-17A SHEET NO. 6 OF 11

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		

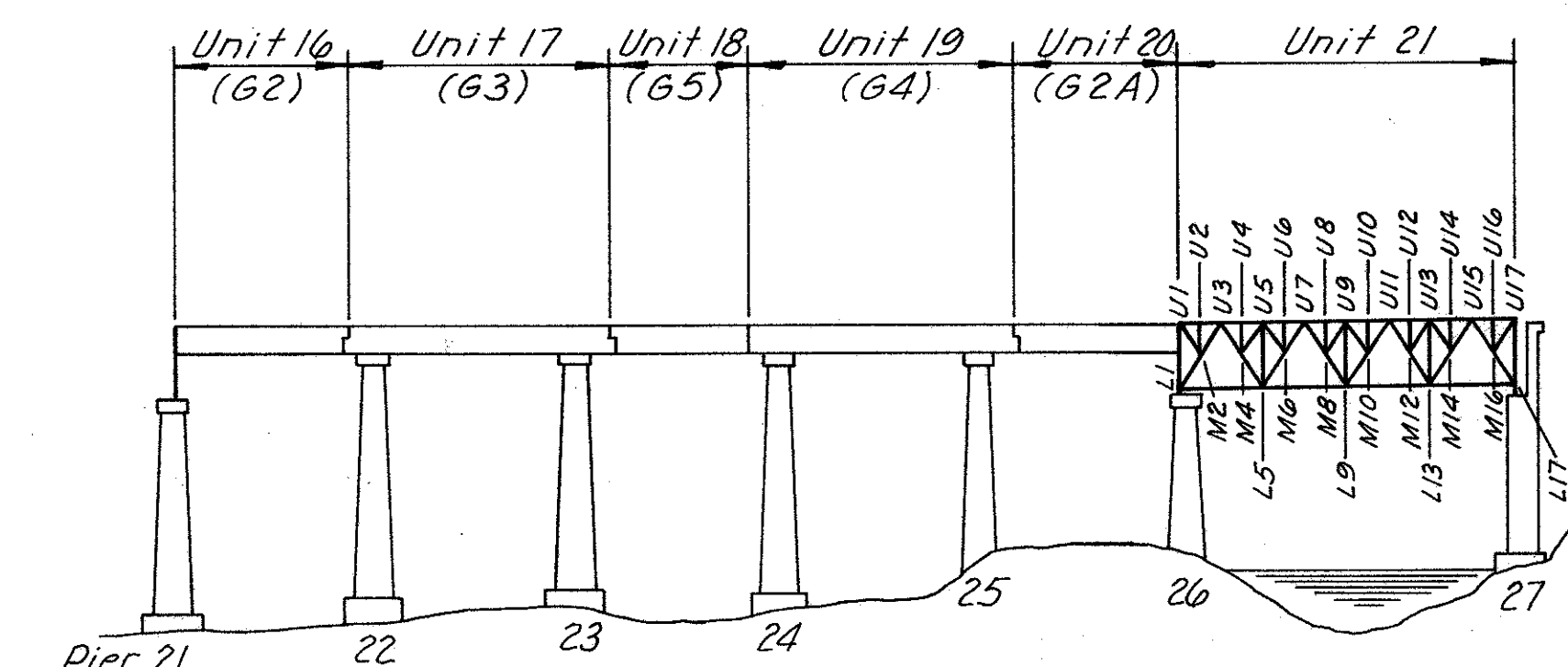


DETAIL A
Scale: 1" = 1'-0"

NOTE: Marks pn and ph are to have a 125 finish on the contact surfaces. Provide 12" x 1/2" x 0'-10 3/4" Lubrite plate at each Brg. seat, 6 required. See Detail A above.

EAST TRUSS-PARTS TO BE REMOVED AND REPLACED				
UNIT	DESIGNATION	SHOP DWG. REFERENCE		
		MEMBER	MARK	SHEET NO.
6	EL1 to WL1	Lower Transverse Strut	S4	RF10
6	L9	Outside Vertical Gusset R	pa15	RF13
6	L9	Lower Strut Gusset R	lp11	RF19
6	L13	Lateral Gusset R	lp10	RF19
6	EUI7 to EL17	Vertical Member	V32	RF13
7	EL1 to WL1	Lower Transverse Strut	BS5	RF20
7	EL29 to WL29	Lower Transverse Strut	BS1	RF19
8	EL1 to WL1	Lower Transverse Strut	BS5	RF20
8	EL5 to WL5	Lower Transverse Strut	BS3	RF20
8	EL9 to WL9	Lower Transverse Strut	BS6	RF19
8	EUI to EL1	Vertical Member	V16	RF13
9	EL29 to WL25	Lower Lateral	L28	RF19
9	EL29 to WL33	Lower Lateral	L32A/L32	RF19
10	EUI to EL1	Vertical Member	V16	RF13
10	EL1 to WL1	Lower Transverse Strut	BS5	RF20
10	EL5 to WL5	Lower Transverse Strut	BS3	RF20
10	EL9 to WL5	Lower Lateral	L40	RF19
12	EL1 to WL1	Lower Transverse Strut	BS5	RF20
12	EUI to EL1	Vertical Member	V16	RF13
14	EL1 to WL1	Lower Transverse Strut	BS5	RF20
14	EUI to EL1	Vertical Member	V16	RF13
16	Diaphragm	G2 at Joint G2 to G3	G53/GD3	RF21
16	Brg. Plate	R 12 1/2 x 3/4 x 0'-10 3/4"	pn	RF21
16	Laterals	G2 at Joint G2 to G3	GL19	RF21
16	Laterals	G2 at Joint G2 to G3	GL19A	RF21
17	Brg. Plate	R 12 1/2 x 3/4 x 0'-10 3/4"	ph	RF22
17	Diaphragm	G3 at Joint G3 to G5	G53/GD3	RF21
17	Laterals	G3 at Joint G3 to G5	GL11	RF21
17	Laterals	G3 at Joint G3 to G5	GL13	RF21
18	Diaphragm	G4 at Joint G4 to G2A	G53/GD3	RF21
18	Laterals	G4 at Joint G4 to G2A	GL5	RF21
18	Laterals	G4 at Joint G4 to G2A	GL7	RF21
18	Brg. Plate	R 12 1/2 x 3/4 x 0'-10 3/4"	pn	RF21
19	Brg. Plate	R 12 1/2 x 3/4 x 0'-10 3/4"	ph	RF22
20	Brg. Plate	R 12 1/2 x 3/4 x 0'-10 3/4"	pn	RF21

EAST TRUSS - PARTS TO BE REMOVED AND REPLACED				
UNIT	DESIGNATION	SHOP DWG. REFERENCE		
		MEMBER	MARK	SHEET NO.
21	EUI7 to EL17	Vertical Member	V12	RF9
21	EL17 to WL17	Lower Transverse Strut	S2	RF9
21	EL17 to WL13	Lower Lateral	L6	RF9
All Members		Lacing Bars *		
All Members		Stay Plates *		



NOTE: Approximately 325 Floor Beams are to be installed under this contract. Consisting of approximately:

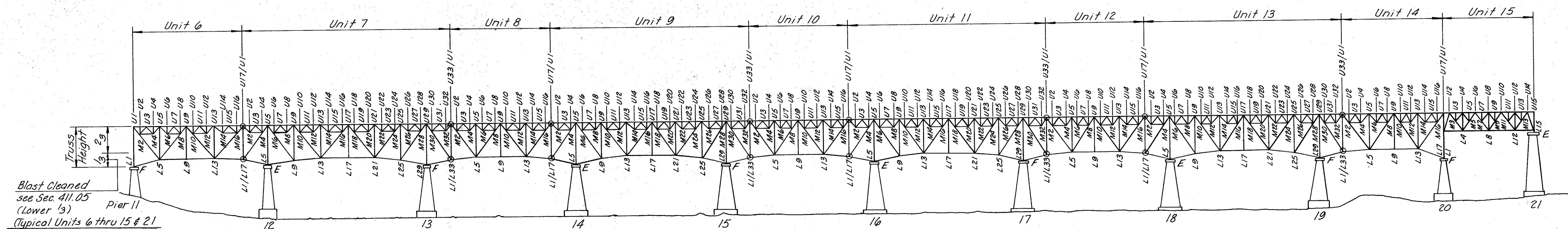
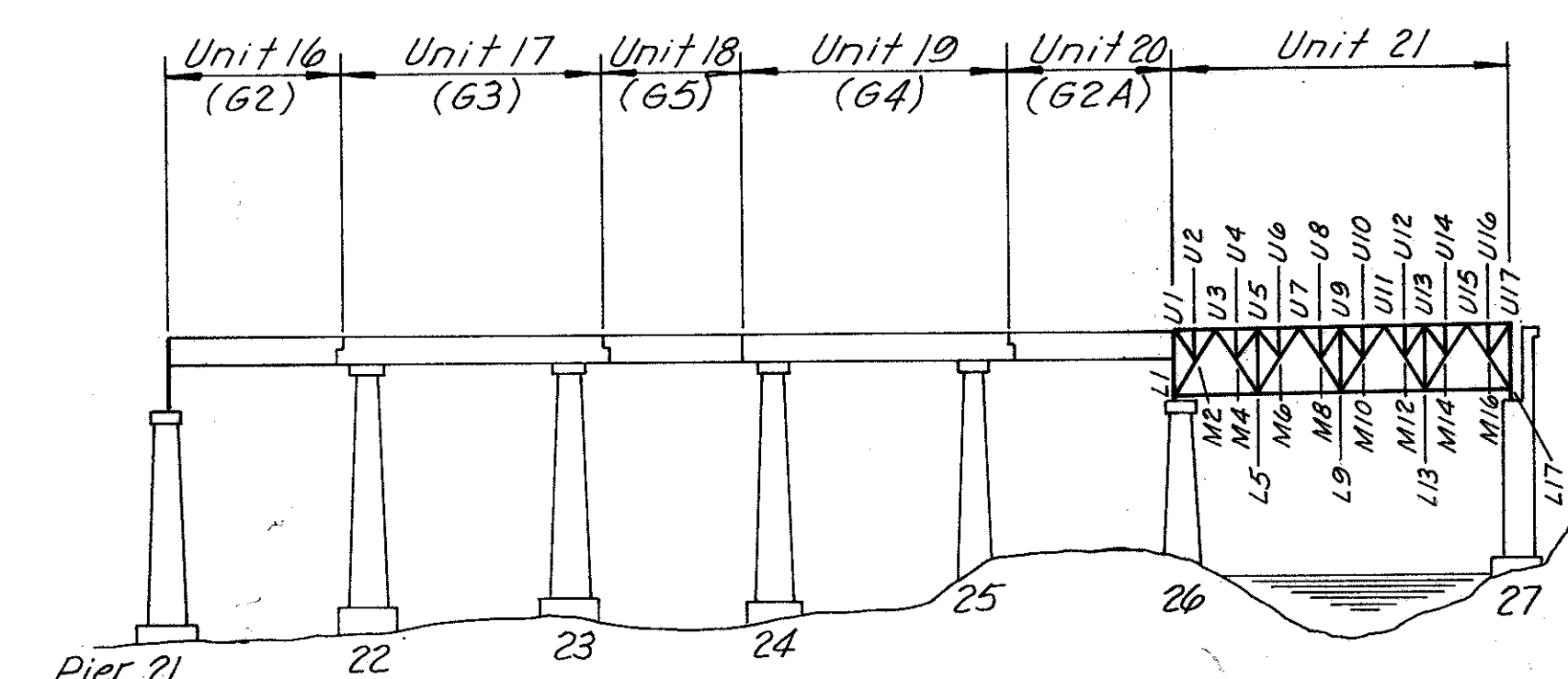
- 5 - W14 x 34
- 285 - W16 x 36
- 8 - W18 x 35
- 9 - W21 x 44
- 18 - W24 x 55

* Locations are as directed by the Engineer. Cost is to be paid in lbs. and is included in the pay item Structural Steel (A36) Miscellaneous.

MADE	BY	DATE			
	EJM	2-92			
CHECKED	BY	DATE			
	TEM	2-92			
IN CHARGE	NO.	REVISION	BY	DATE	

RICHMOND METROPOLITAN AUTHORITY	
RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE REHABILITATION	
PARTIAL DEMOLITION AND STEEL REPAIRS	
TABLE OF EAST TRUSS REPAIRS	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: No Scale CONTRACT NO.: C-17A SHEET NO.: 7 OF 11

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		

[illegible][illegible]

* Locations are as directed by the Engineer. Cost is to be paid in lbs. and is included in the pay item Structural Steel (A36) Miscellaneous.

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE REHABILITATION PARTIAL DEMOLITION AND STEEL REPAIRS

TABLE OF WEST TRUSS REPAIRS

MADE	EJM	2-92				
CHECKED	TEM	2-92				
IN CHARGE			NO.	REVISION	BY	DATE

Pay Item- Field Splice
(New) Diagonal- includes:

- ① Stay Plate / splice plate
- ② Segment of 4 L's 5x3x1/2
- ③ Fill Plates

Pay Item - Field Splice
(New) Bottom Chord - includes:

- 1 Stay Plate / splice plate
- 2 Segment of 2 L's 12 @ 20.7
- 3 Fill Plates

[illegible]

Splice R
 R 9 x 1/16 x 5'-4 3/4"
 5 Spa. @ 4" = 1'-8"
 5 Spa. @ 4" = 1'-8"
 3/8" Fill R
 Existing L12 x 20.7
 L12 x 20.7
 3/8" Fill R
 Field Splice
 R 9 x 3/8 x 3'-11"

Technical drawing of a cross-section of a built-up I-beam. The drawing shows a central web and two flanges. Dimensions are given in inches. The total width of the flanges is 68 inches, with 13 inches of overlap on each side. The total height of the section is 16 inches, with 1 1/4 inches of overlap on each side. The web is labeled "R 1/2 x 9 Web Splice R" and the flange is labeled "R 1/2 x 10 1/2 Flange Splice R".

2-L's 5x3x1/2

No Scale

2" 2"

3 Spa @ 4" = 1.0" 3 Spa @ 4" = 1.0"

3/8" Fill R Existing 2-L's 5x3x1/2

Splice R R 10# x 1/2 x 5' 5"

3/8" Fill R

Field Splice

Parts ① & ④ Replaced under the
Pay Item - Remove and Replace
Truss Vertical.

BOULEVARD BRIDGE REHABILITATION
PARTIAL DEMOLITION AND STEEL REPAIRS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: _____
CONTRACT NO.: C17A
SHEET NO. 9 OF 11



Scale: $1\frac{1}{2}'' = 1'-0''$

Diagram illustrating the Typical Field Splice Detail for a steel beam. The detail shows a cross-section of the beam with various dimensions and components labeled:

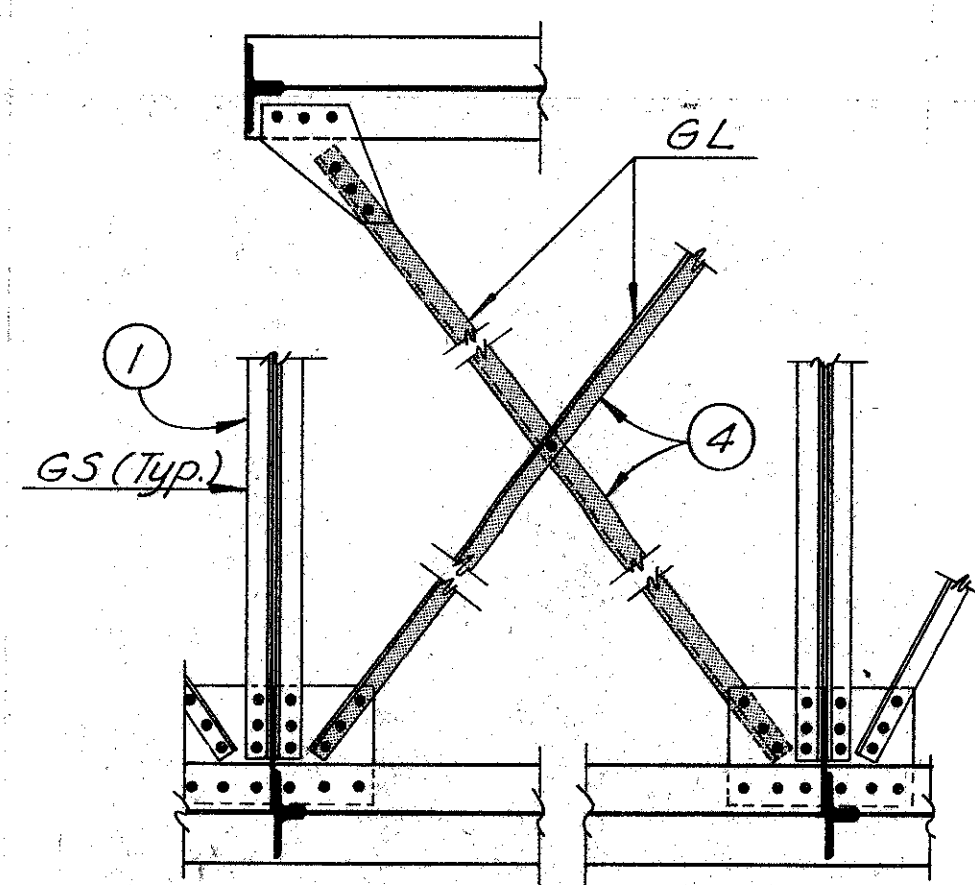
- Field Splice:** Indicated by a horizontal line across the top of the beam.
- Dimensions:**
 - $2\text{ Spa. @ } 2\frac{1}{2}"$ (Top Chord)
 - $2\frac{1}{2}"$ (Top Chord)
 - $2\text{ Spa. @ } 2\frac{1}{2}"$ (Top Chord)
 - $2\frac{1}{2}"$ (Top Chord)
 - $7\text{ Spa. @ } 2\frac{1}{2}" = 1'-5\frac{1}{2}"$ (Bottom Chord)
 - $5\frac{1}{16}"$ (Bottom Chord)
- Components:**
 - $\frac{7}{8}" \phi$ H.S. Bolts (Typ.)
 - $\frac{1}{4}"$ PL (Top Chord)
 - $\frac{1}{4}"$ PL (Bottom Chord)
 - $L 3 \times 2\frac{1}{2} \times \frac{3}{16}$ (Top Chord)
 - $L 3\frac{1}{2} \times 3 \times \frac{3}{16}$ (Diagonal)
- Labels:**
 - A** (Top Left)
 - A** (Bottom Left)
 - 3** (Bottom Right)

Hand-drawn detail of floor beam supports. The diagram shows a cross-section of a beam with two rows of bolts. The top row is labeled "Existing Bolt Spacing" and the bottom row is labeled "W16 x 36 Floor Beam". Dimensions are indicated: "4 1/2\" between the first and second bolts in the top row, "4 1/2\" between the second and third bolts in the top row, and "1 3/8\" between the first and second bolts in the bottom row. A note on the left indicates a "1 3/16\" hole for a 3/4\" bolt". A note on the right indicates the beam is a "W16 x 36 Floor Beam".

Pay Item- Remove & Replace
Lower Transverse Strut- includes:

- (1) Strut and web plates if applicable
- (2) Diagonal in girder spans
- (3) Clip angles or gusset plates optional

TYPICAL LATERAL BRACING DETAIL

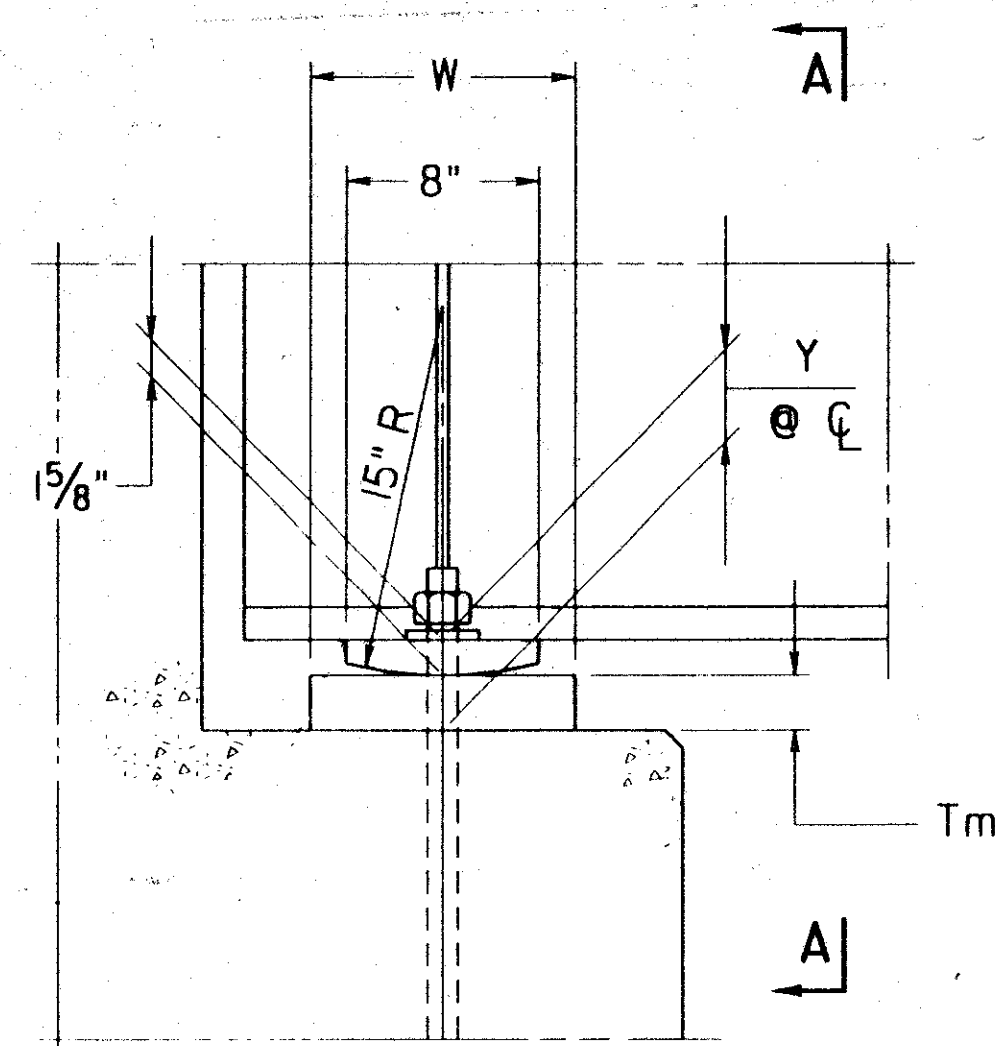


Pay Item - Remove & Replace
Lower lateral - includes:
(4) Lateral

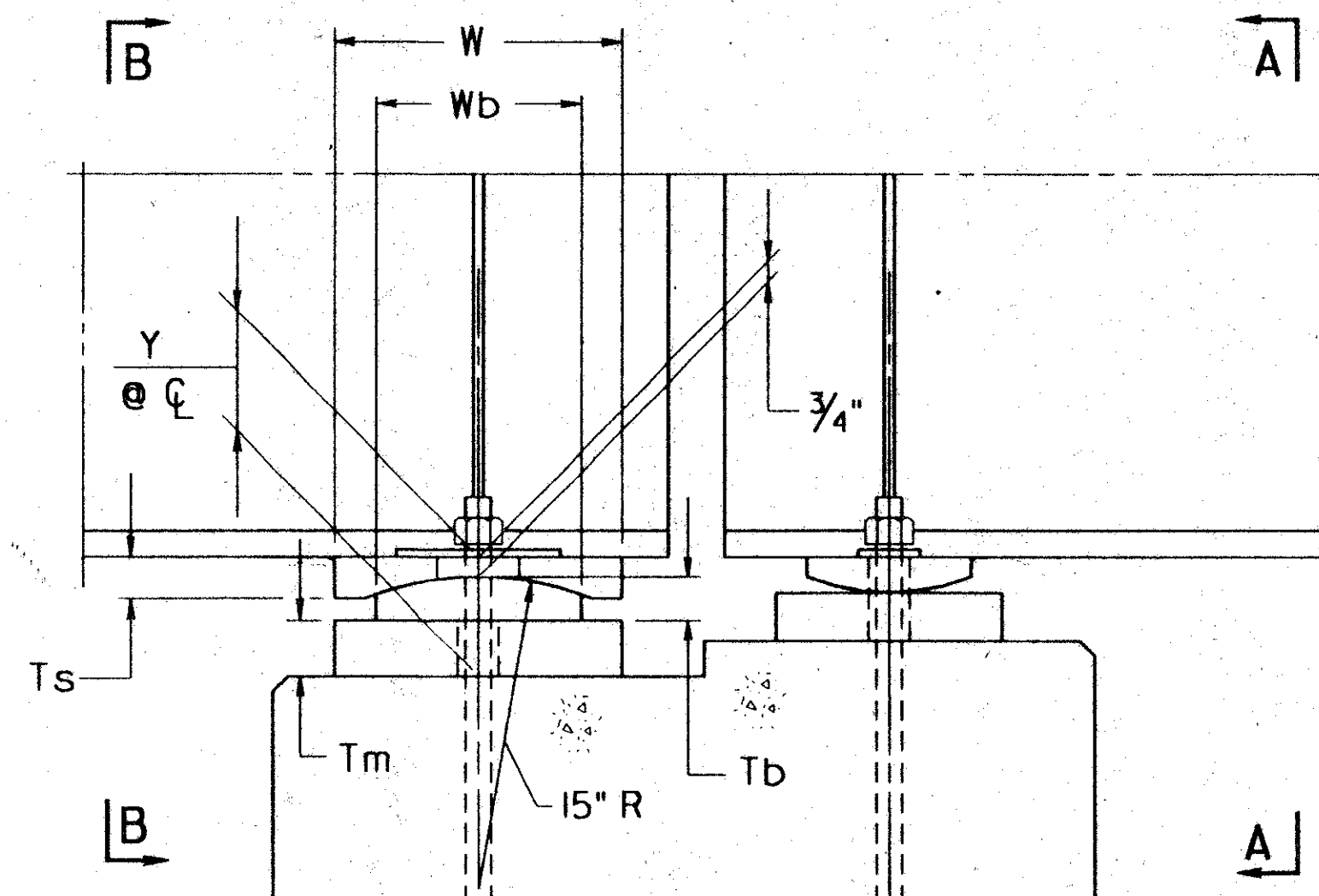
 Members to be replaced

	BY	DATE				
MADE	<i>EJM</i>	<i>2-92</i>				
CHECKED	<i>TEM</i>	<i>2-92</i>				
IN CHARGE			NO.	REVISION	BY	DATE

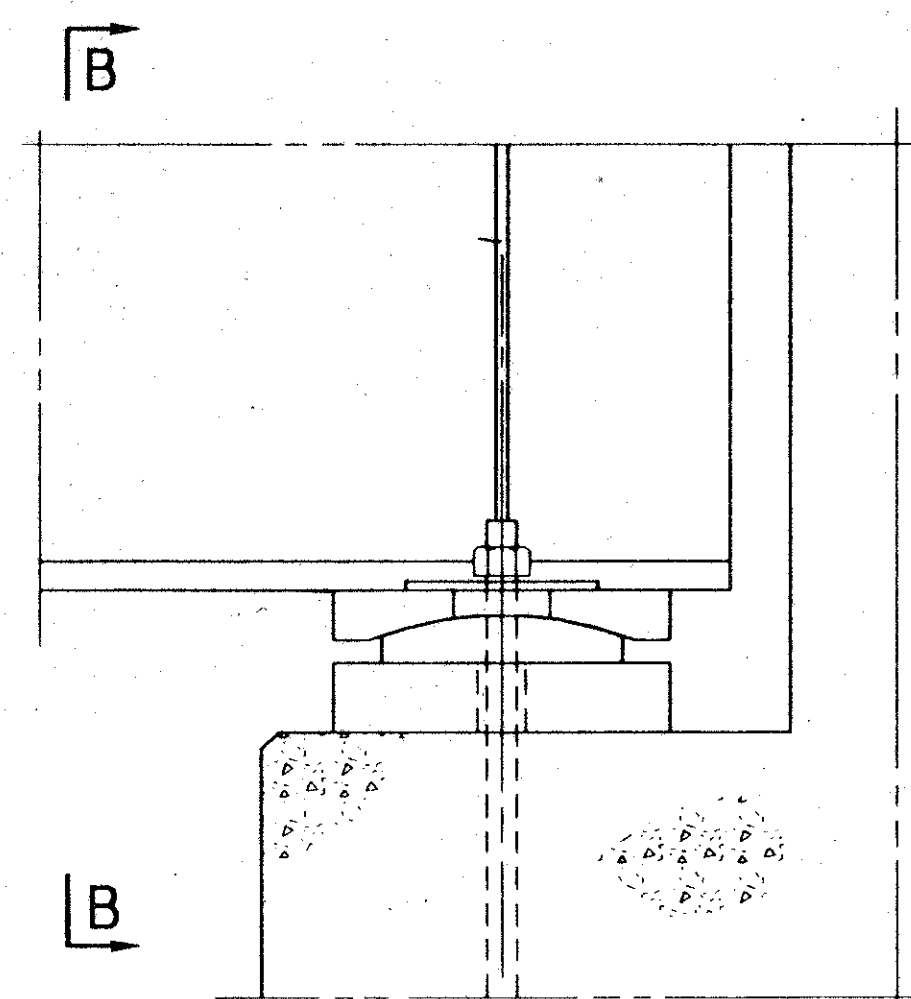
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		



FIXED BEARING
ABUTMENT ELEVATION



EXP. BEARING FIXED BEARING
PIER ELEVATION



EXP. BEARING
ABUTMENT ELEVATION

NOTES:

Design is based on AASHTO M183 (ASTM A36) steel stresses.

Fill slots and holes in masonry plate around anchor bolts with a nonhardening caulking compound or elastic joint sealer.

Bearing details are satisfactory for the earthquake requirement for Zone II.

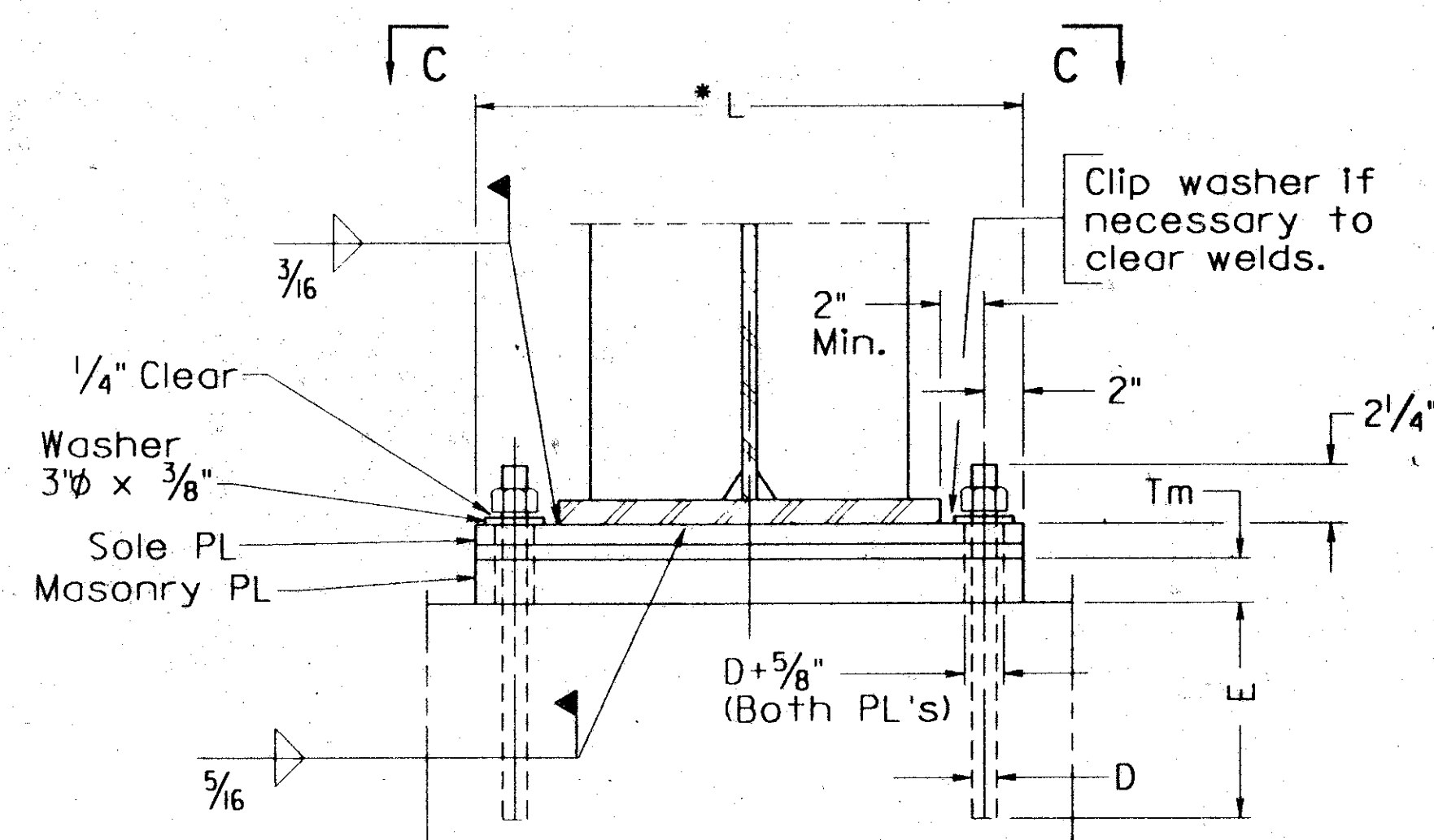
For expansion bearing, bevel sole plate to match grade if grade exceeds 1%. For fixed bearing, bevel sole plate if grade exceeds 3%.

Bearing stiffeners shown are omitted if rolled beam is used.

Radius may be machined to compensate for grade.

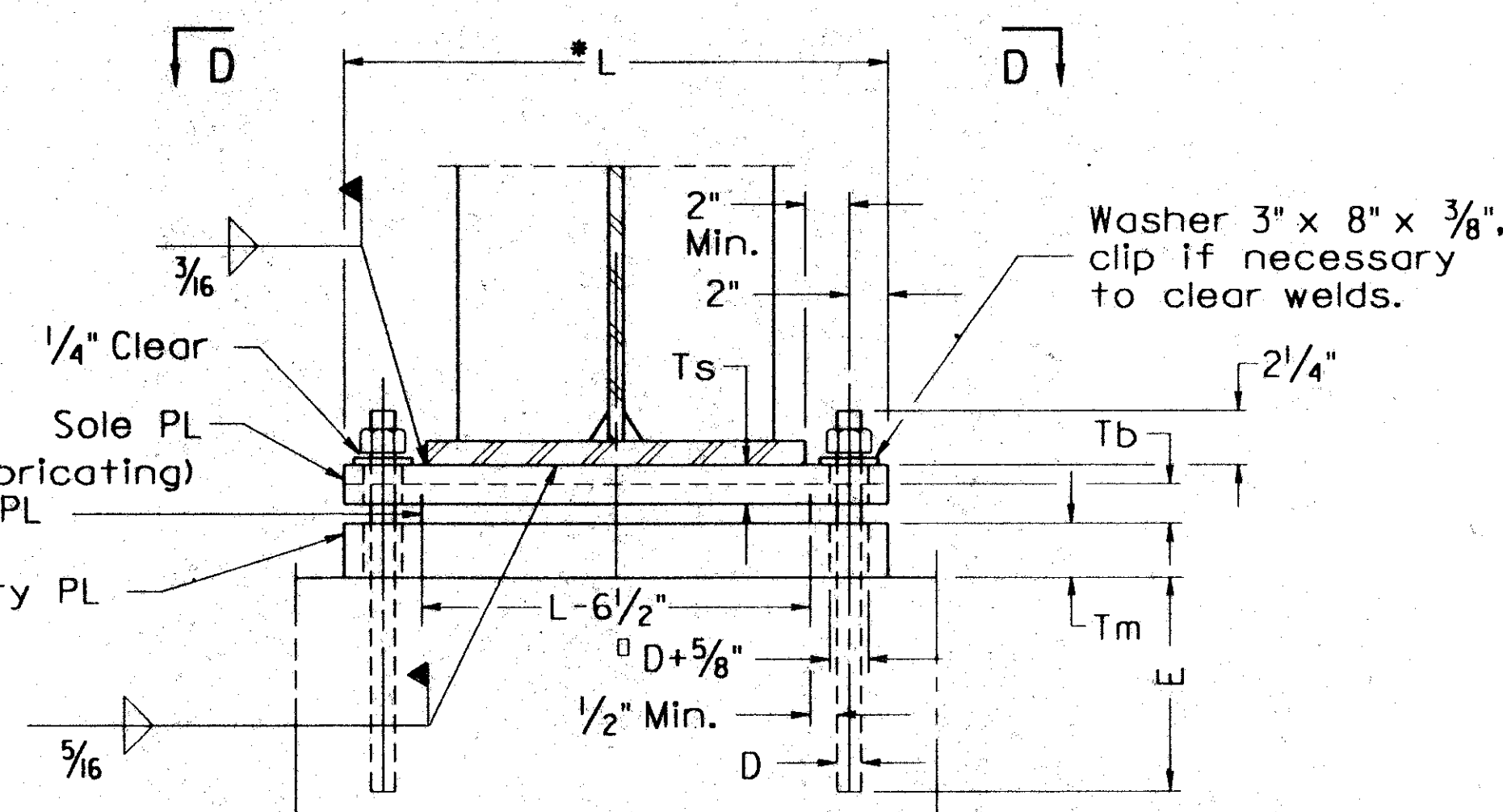
Bearing shall be set so that at 60°F it is at the midpoint of its movement.

For expansion bearings, 15" Radius
tolerances: Sole PL -0", +0.01"
Bronze PL -0.01", +0"



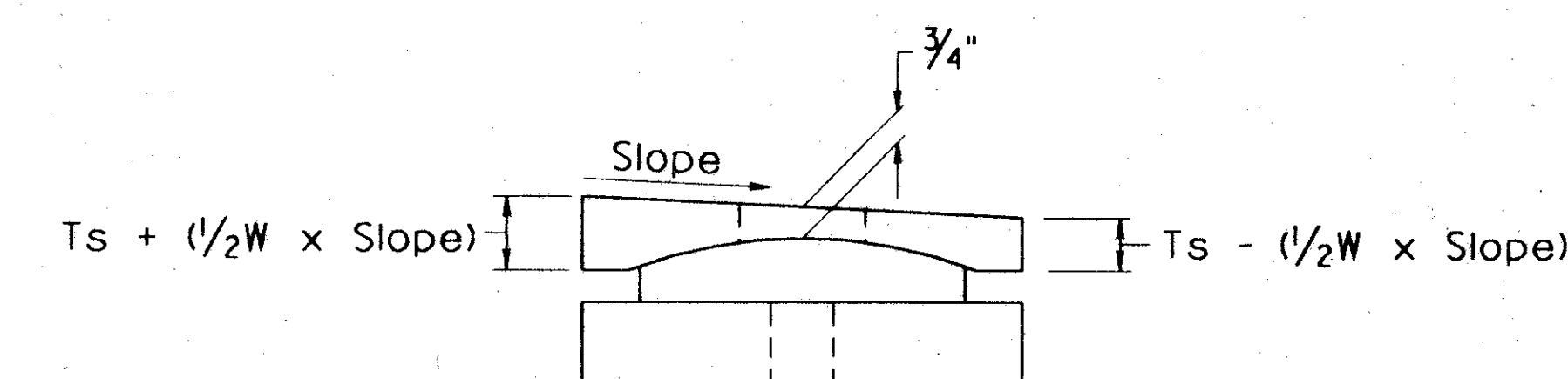
SECTION A-A

* Min. = Flange + 8" or L
whichever is greater.

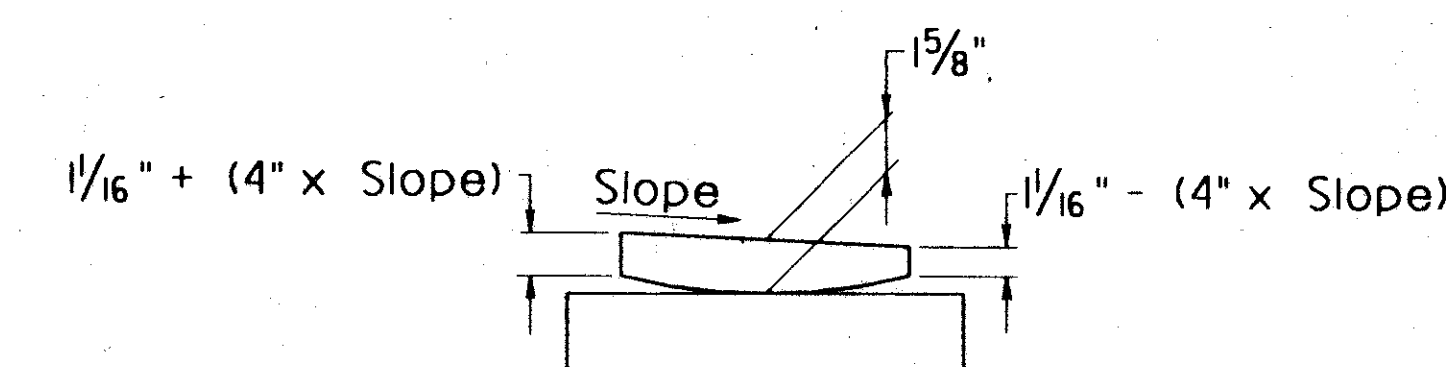


SECTION B-B

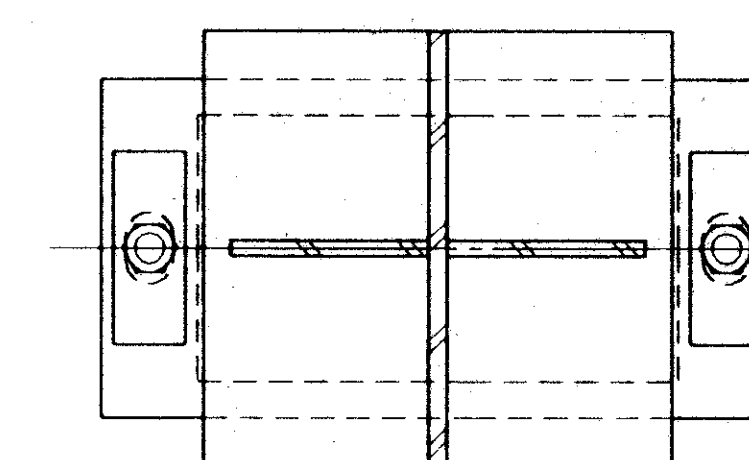
Masonry PL only



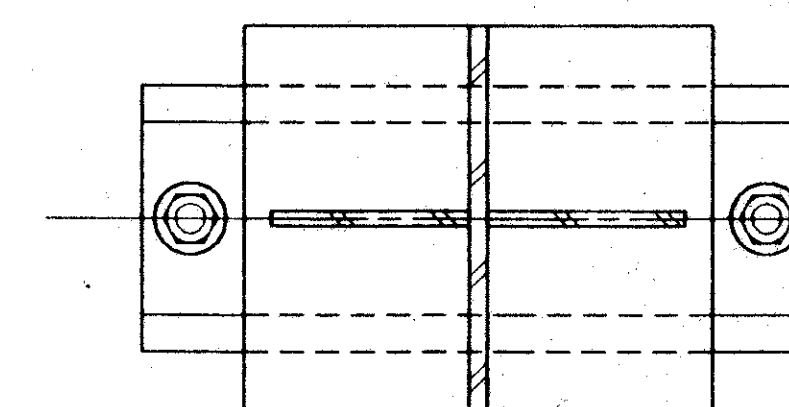
PART DETAIL OF
EXPANSION BEARING
(Showing beveled sole plate)



PART DETAIL OF
FIXED BEARING
(Showing beveled sole plate)



SECTION D-D



SECTION C-C

SOLE PLATE SLOTS

Δm	Size
1	1 7/8" x 2 7/8"
1 1/2	2 1/8" x 3 7/8"
2	2 1/8" x 4 7/8"

Slotted holes in sole plate may be drilled or machine burned.

DESIGNATION TABLE

Span	Abut.	Pier	Type	Y	Tm
N. Brg.		22	EB-2	4 1/2"	2 1/4"
		23	FB-9	3 3/8"	1 3/4"
		24	FB-9	3 3/8"	1 3/4"
		25	EB-2	4 1/2"	2 1/4"
		27	EB-1	4 1/4"	2"
S. Brg.		28	FB-9	3 3/8"	1 3/4"
		29	EB-1	4 1/4"	2"
		30	FB-9	3 3/8"	1 3/4"

DATA TABLE

Reaction	Type	L	W	Wb	Ts	Tb	D	E	Δm
120k	EB-1	20	10 1/2	8	1 1/2	1 1/2	1 1/4	12	1
140k	FB-8	20	8	—	—	—	1 1/4	12	—
180k	EB-2	22	12	9 1/2	1 3/4	1 1/2	1 1/4	12	1
	FB-9	22	9	—	—	—	1 1/4	12	—
220k	EB-3	24	12 1/2	10	1 3/4	1 3/4	1 1/2	15	1 1/2
	FB-10	24	10	—	—	—	1 1/2	15	—
260k	EB-4	26	13 1/2	11	2	2	1 1/2	15	1 1/2
	FB-11	26	10	—	—	—	1 1/2	15	—
300k	EB-5	28	14	11	2	2	1 1/2	15	2
	FB-12	28	11	—	—	—	1 1/2	15	—
340k	EB-6	30	14 1/2	11 1/2	2 1/4	2 1/4	1 1/2	15	2
	FB-13	30	12	—	—	—	1 1/2	15	—
400k	EB-7	32	15 1/2	12 1/2	2 1/2	2 1/2	1 1/2	15	2
	FB-14	32	13	—	—	—	1 1/2	15	—

Dimensions Ts, Tb and Y are measured at center of bearing.

MADE	BY	DATE			
CHECKED	TAL	2-92			
IN CHARGE	TEM	2-92			
			NO.	REVISION	BY
					DATE

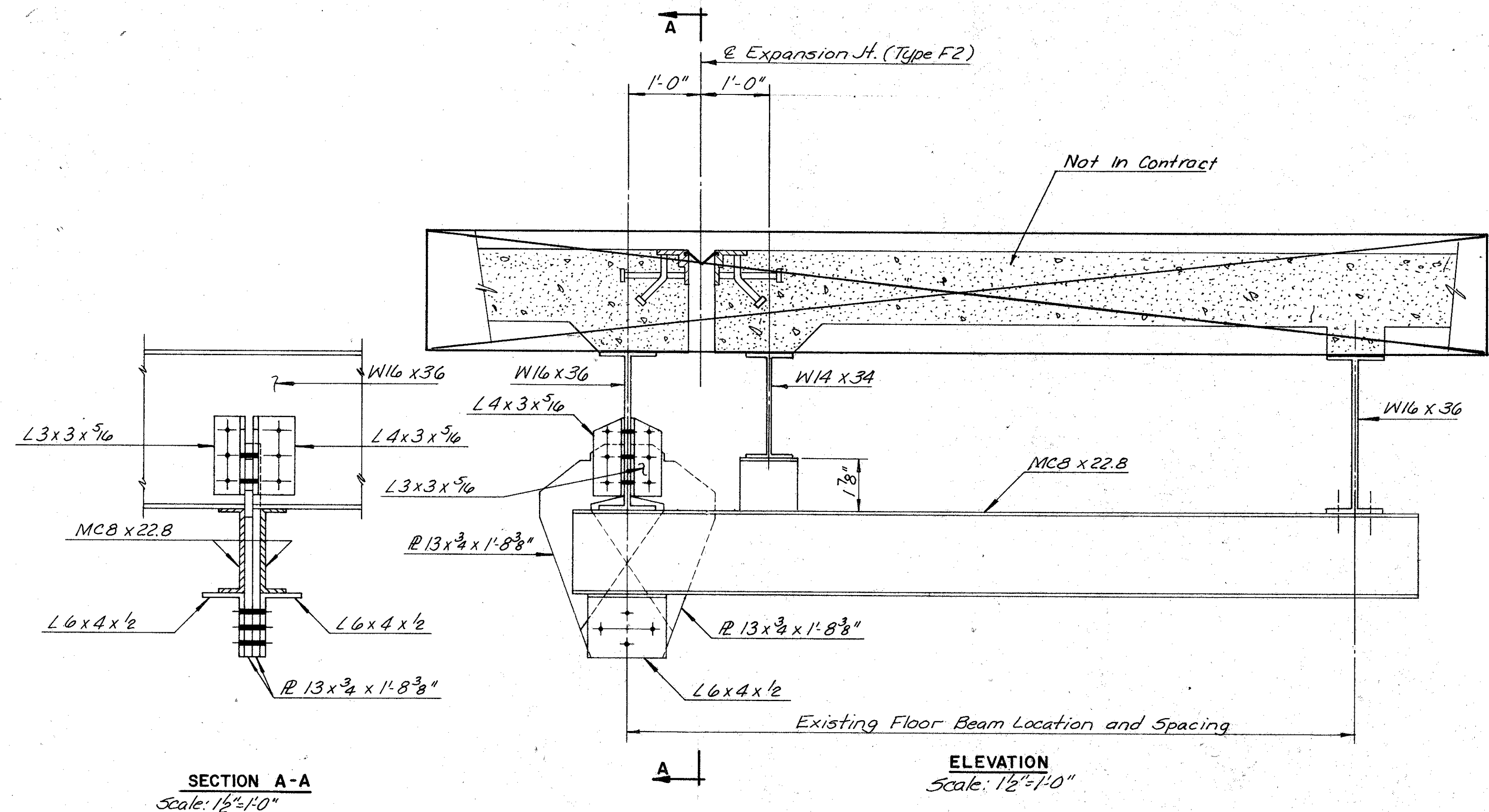
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE REHABILITATION
PARTIAL DEMOLITION AND STEEL REPAIRS
BEARING DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDORFF
consulting engineers
Alexandria, Virginia

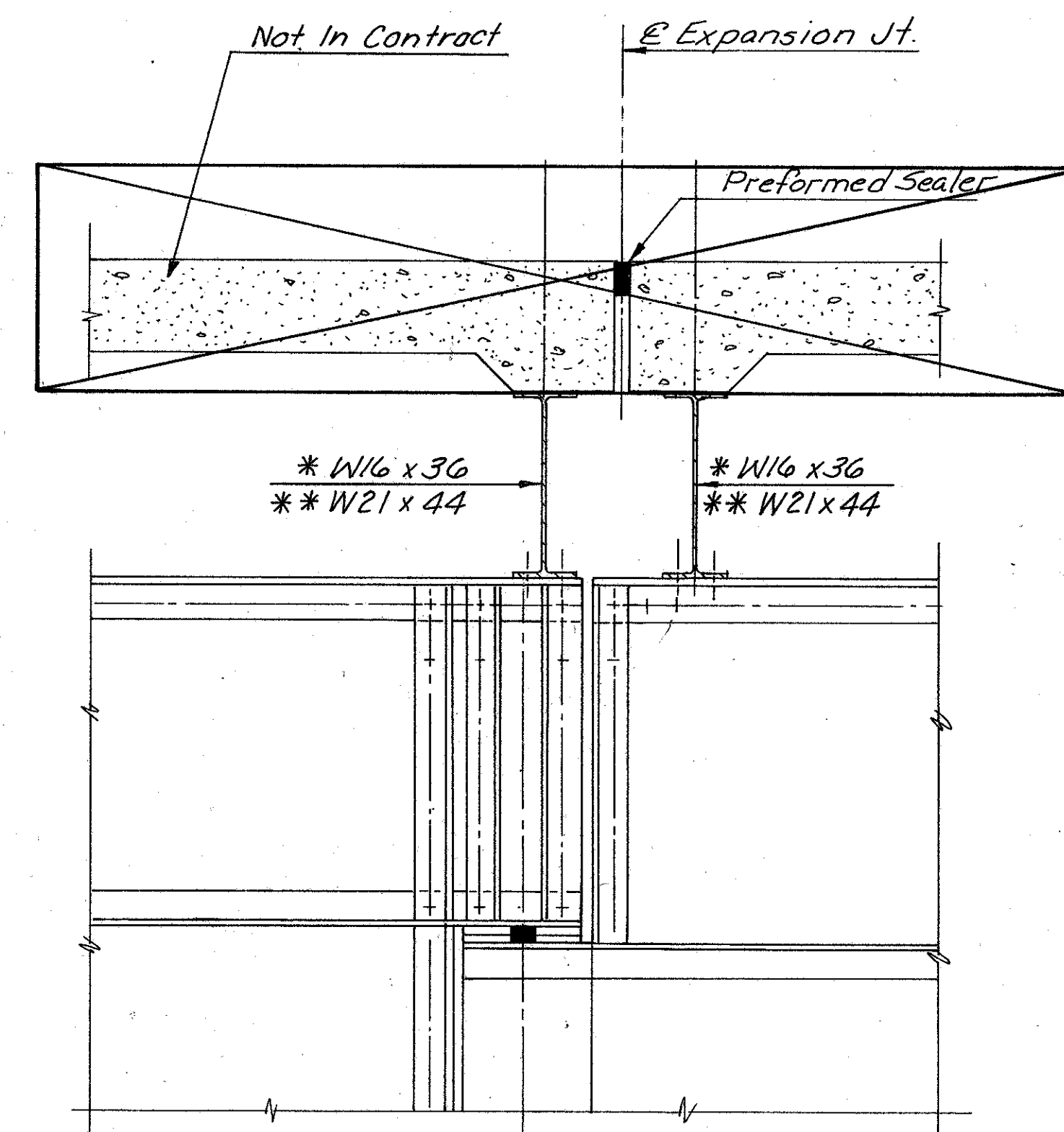
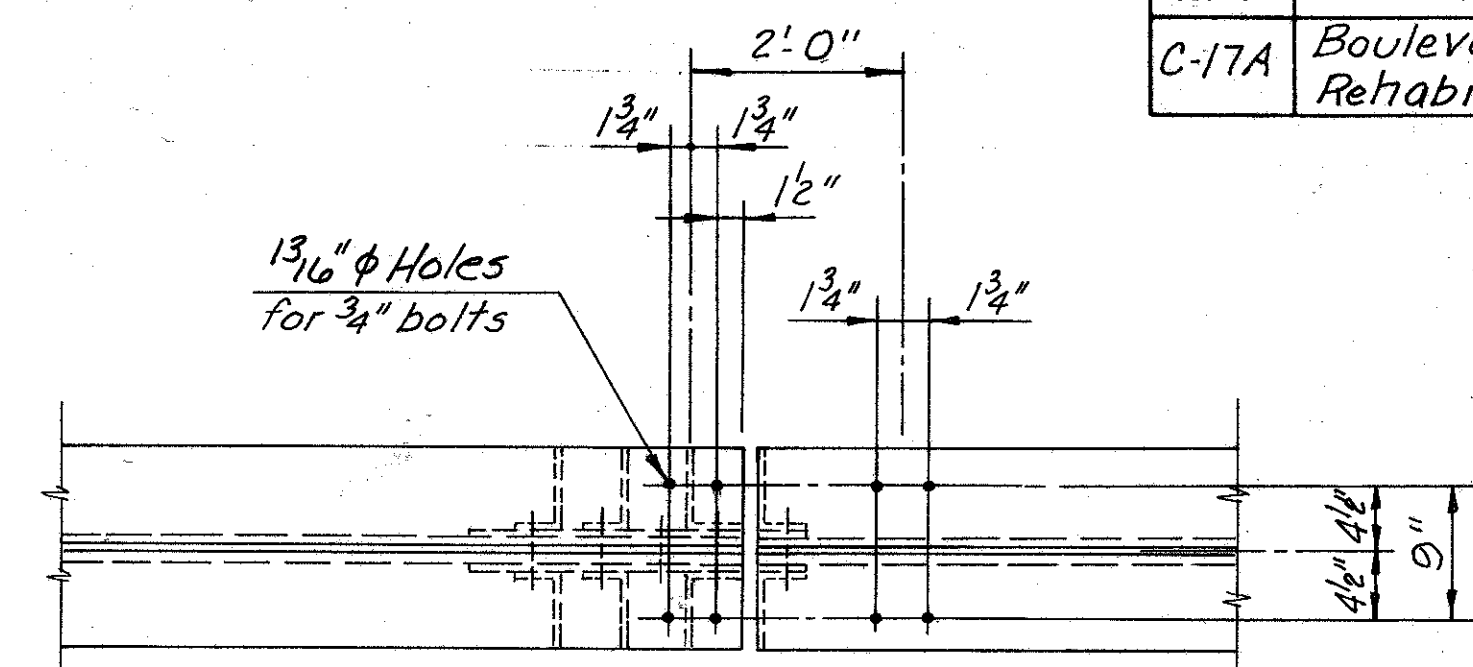
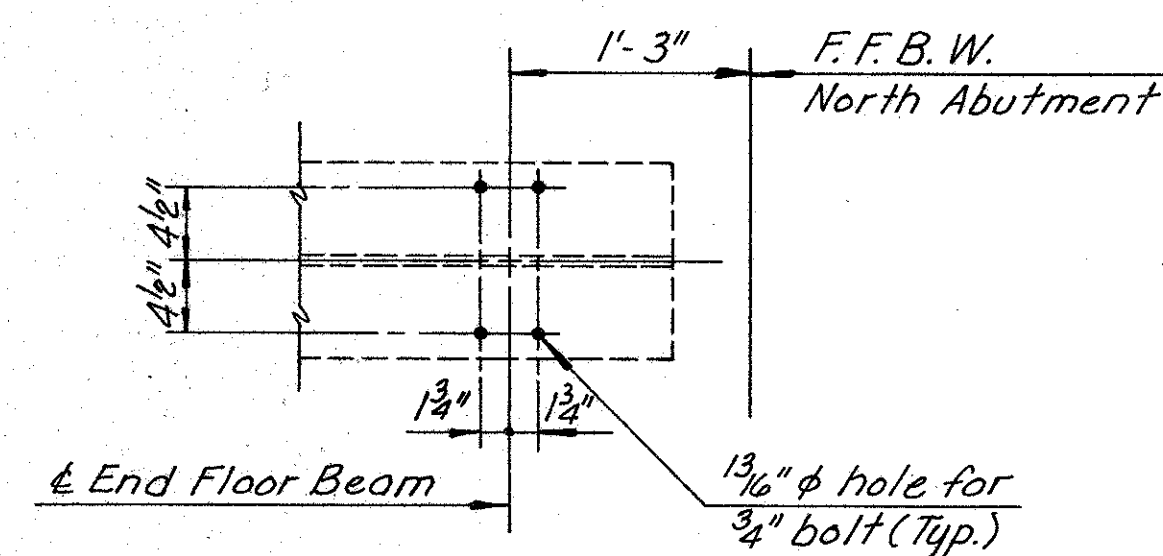
SCALE: No Scale
CONTRACT NO. C-17A
SHEET NO. 10 OF 11

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
C-17A	Boulevard Bridge Rehabilitation		



TYPE I EXPANSION JOINT SUPPORT

JOINT NUMBER	SUPPORT TYPE
5	1 (4 req'd)
6	1 "
7	1 "
8	1 "
9	1 "
10	2 "
11	2 "
12	2 "
13	2 "
North Abutment	2 "

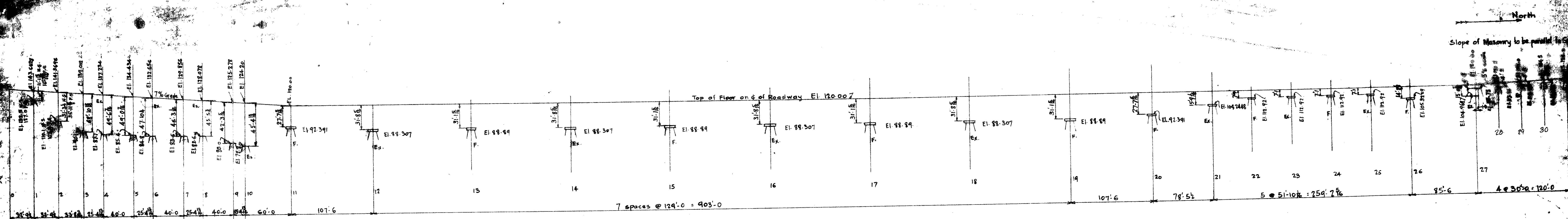


* Typical at joints 10, 11, 13, 14 and North Abutment.
** Typical at joint 12.

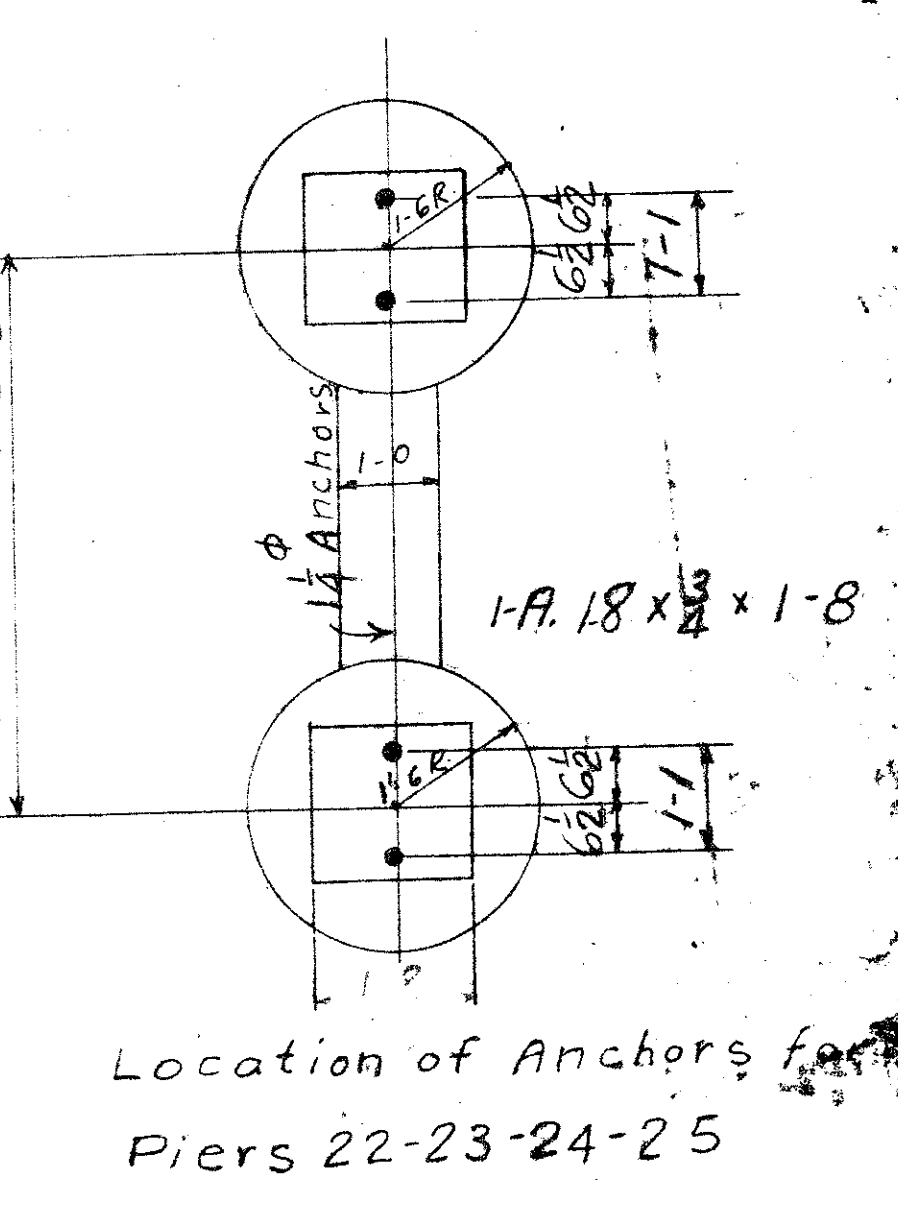
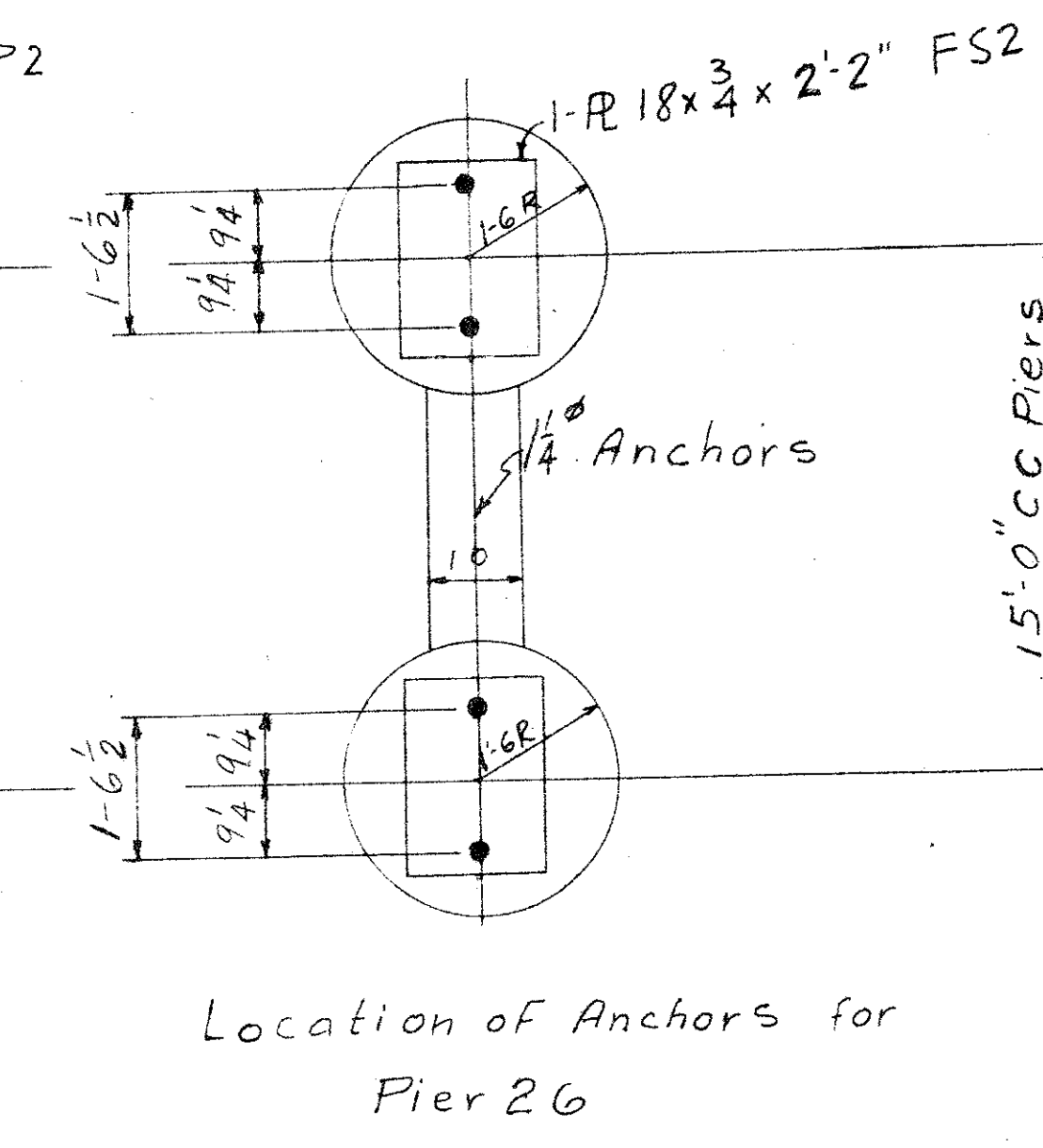
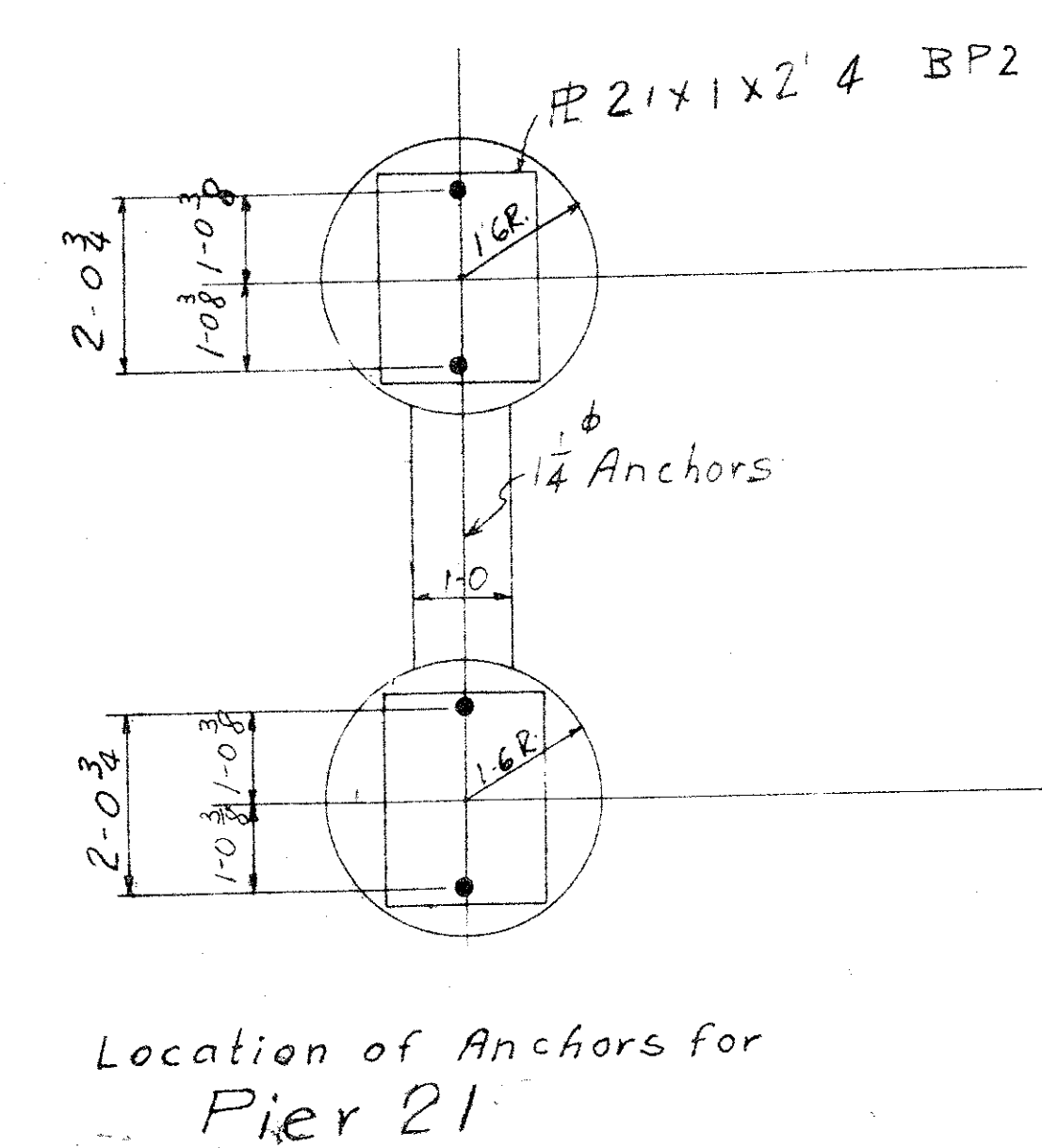
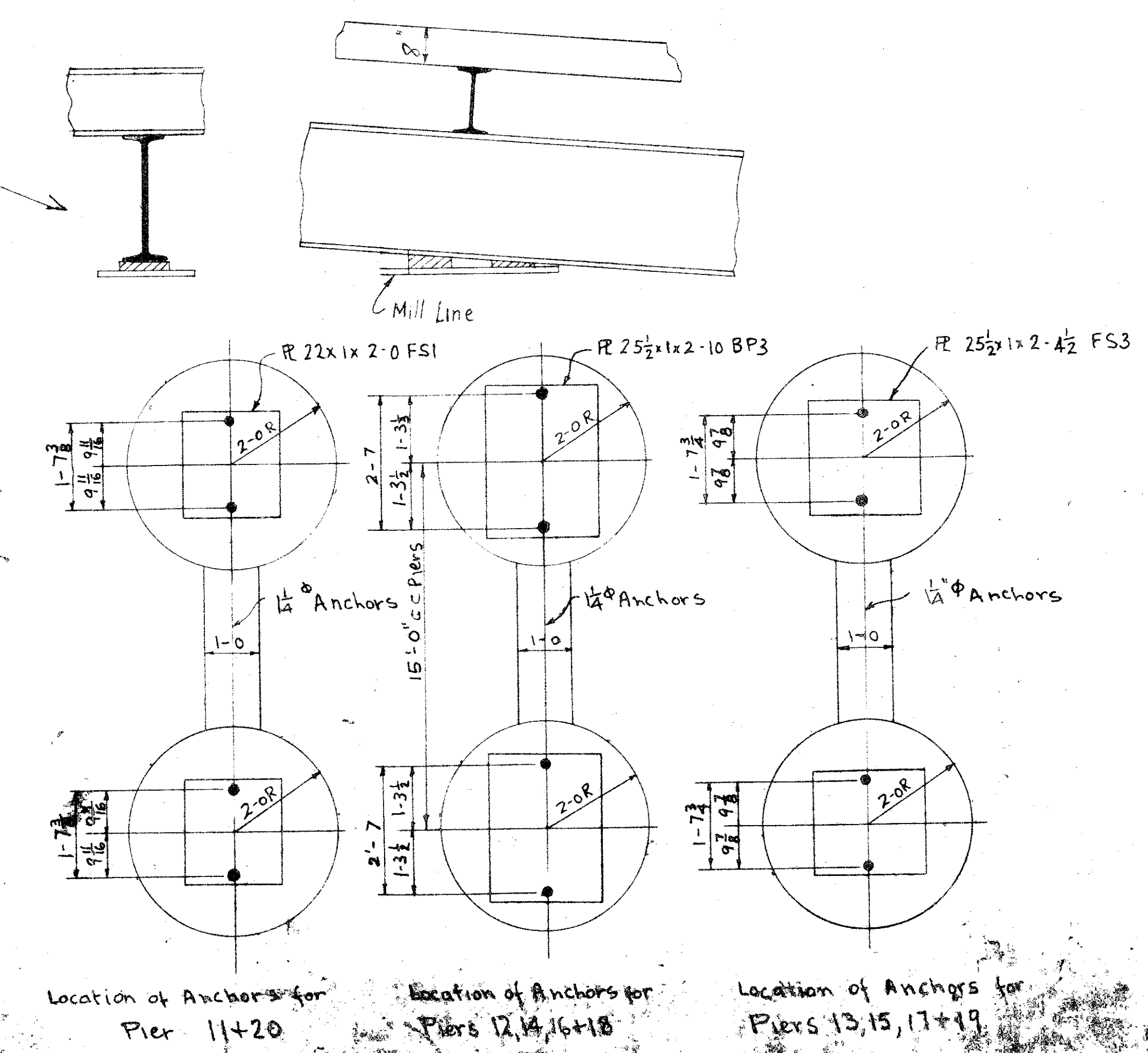
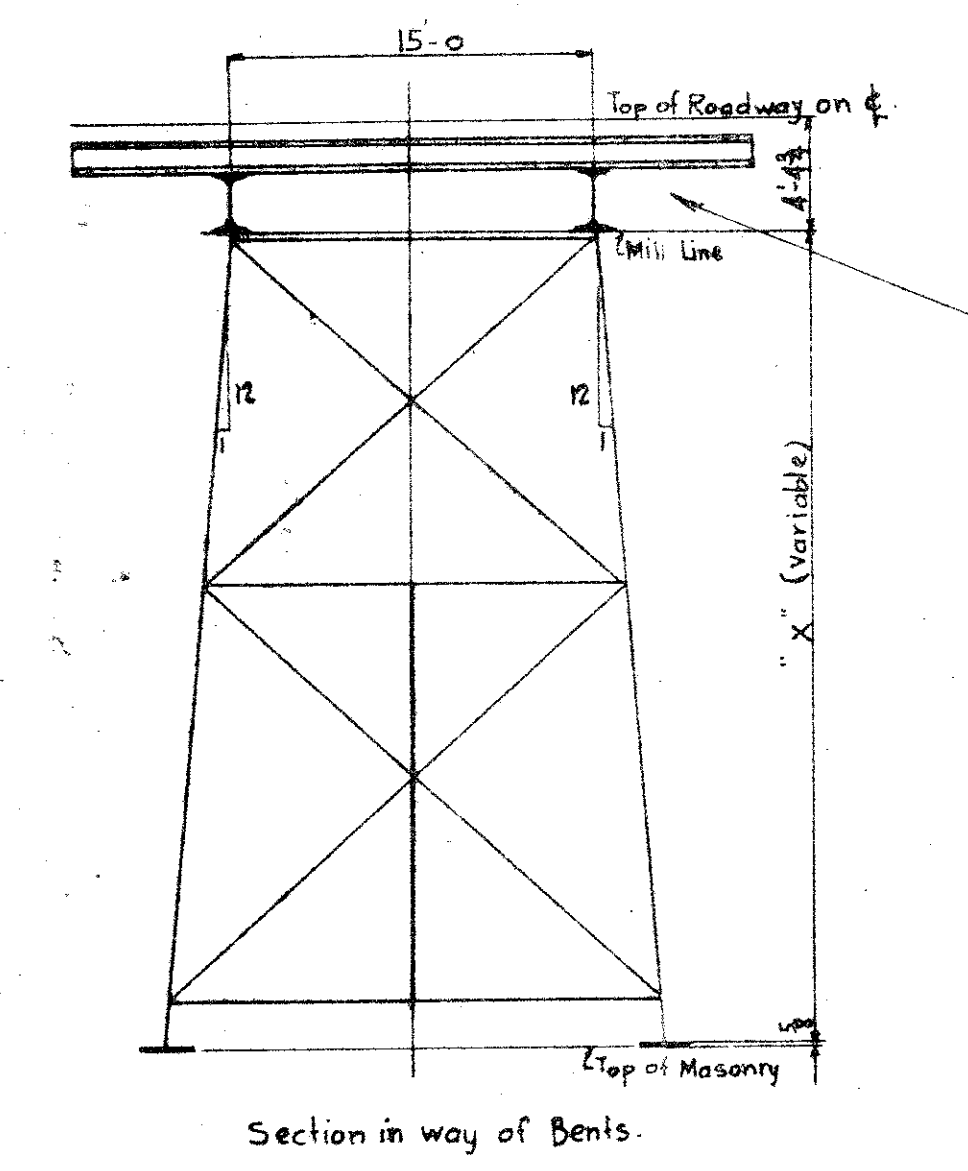
TYPE 2 EXPANSION JOINT SUPPORT

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE REHABILITATION PARTIAL DEMOLITION AND STEEL REPAIRS EXPANSION JOINT SUPPORT DETAILS	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: AS-shown CONTRACT NO. C-17A SHEET NO. 11 OF 11

MADE	BY	DATE	NO.	REVISION	BY	DATE
TAL	2-92					
TEM	3-92					
IN CHARGE						



Masonry Plan



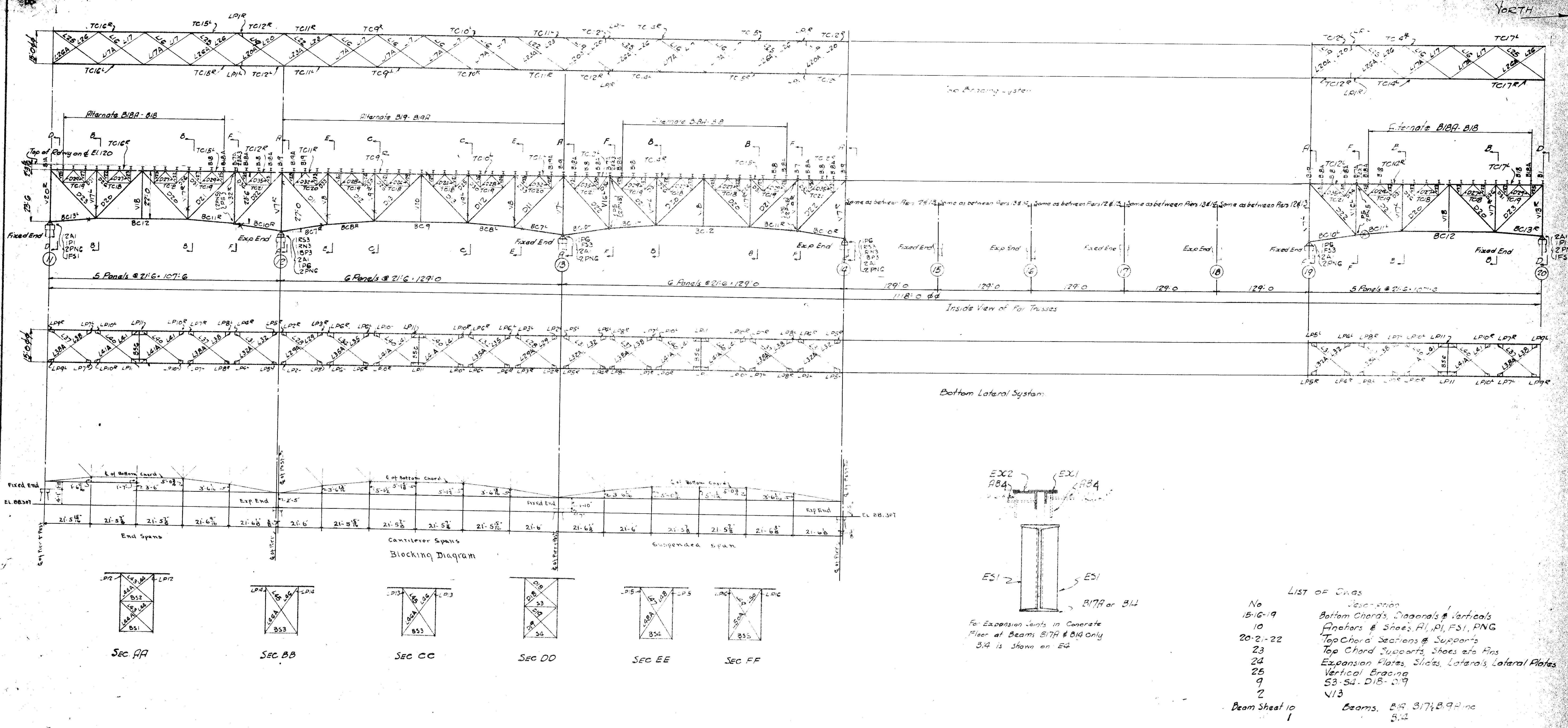
BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

SHEET NO. R11

Masonry furnished by Customer
GENERAL NOTES:

- Material
- Specifications
- Reinforcement
- Notes
- Reinforcement
- Notes
- Notes

CONTINUED ON R12



BOULEVARD BRIDGE REHABILITATION FOR REFERENCE ONLY

SHEET NO. RF3

- GENERAL NOTES:
- Material O.H. Struct Steel
 - Specifications ASTM
 - Rivets 3/4"
 - Holes 1/8" unless noted
 - Reaming Where necessary
 - Shop Paint 1 Coat Red Lead Oil
 - Field Paint By Others
 - Erection By Customer
 - Field Conn's Pin & Riveted
 - Inspection Shop: Froehling & Robertson

CONTRACT V 5585

Details of ERECTION PLAN

For Pier 11 to Pier 20 (incl)

Location Bridge over James River

Owner Richmond, Va

Atlantic Bridge Co

VIRGINIA BRIDGE AND IRON CO.
ROANOKE, VA.

To be fabricated at Roanoke

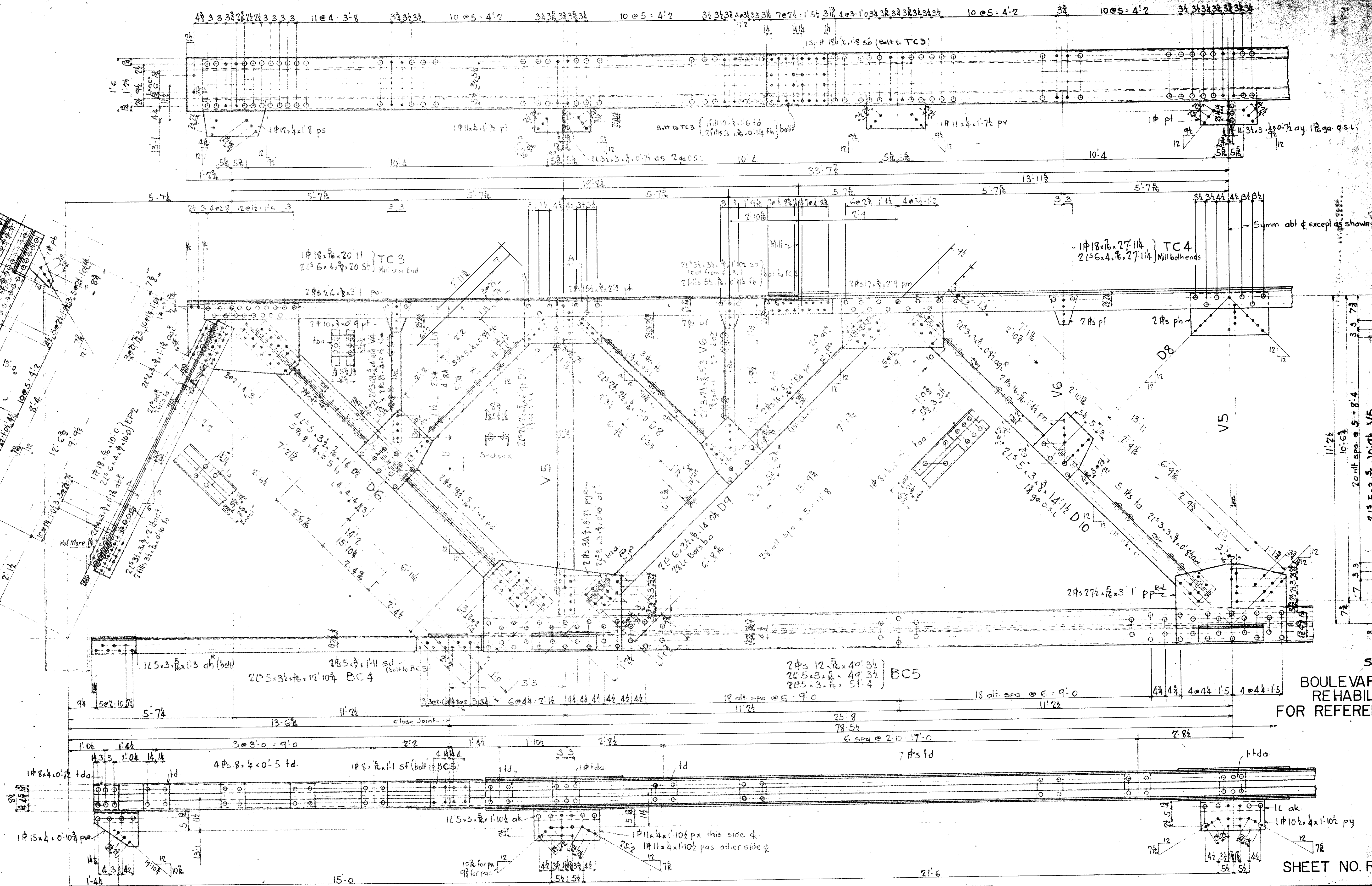
Made by JMT

In charge of Moore

Revised

Scales 1" = 1 Ft. Sheet 10 of 10

Details of: Erection Plan from Pier 31 (North End)
 For: Bridge over James RIVER
 Location: Richmond, Va.
 Owner: Atlantic Bridge Co.
 VIRGINIA BRIDGE AND IRON
 ROANOKE VA.
 Roanoke
 To be fabricated at
 Made by: H.G.S.
 In charge of: Moore
 Revised
 Date:

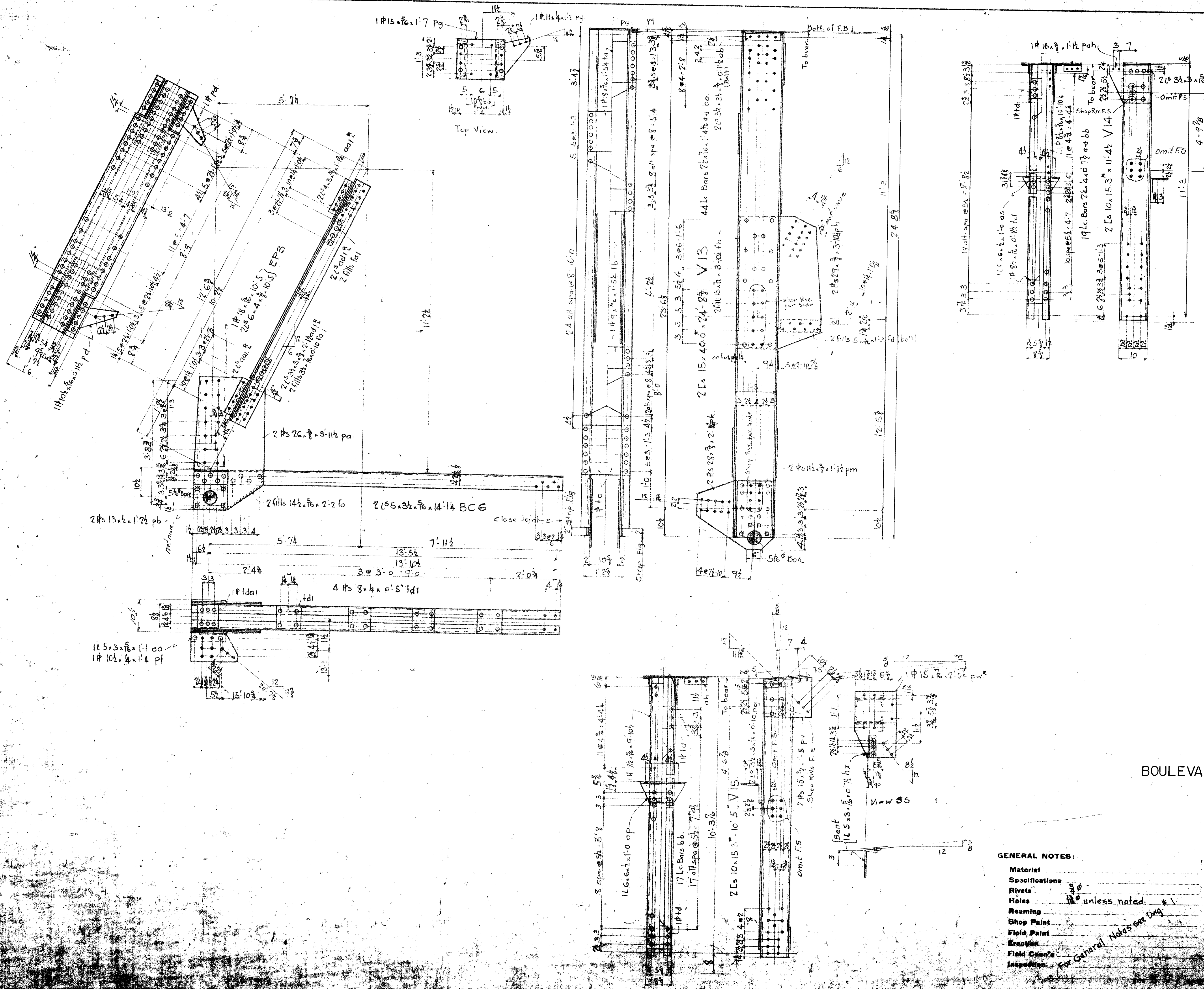


Section A
BOULEVARD BRIDGE
REHABILITATION
FOR REFERENCE ONLY

REQUIRED LIST					
Make	Description	Mark	Make	Description	Mark
1	End Post as shown	EP2R	4	Verticals as shown	V4
1	" opp hand	EP2L	6	" "	V5
2	Top Chords as shown	TC3R	8	" "	V6
2	" opp hand	TC3L	1	Bottom Chord as shown	BC4R
1	" as shown	TC4R	1	" opp hand	BC4L
1	" opp hand	TC4L	1	" as shown	BC5R
4	Diagonals as shown	D6	1	" opp hand	BC5L
4	" "	D7			
4	" "	D8			
4	" "	D9			
4	" "	D10			

GENERAL NOTES:
 Material 0. H. Struct. Steel
 Specifications Manfrs. Std.
 Rivets 3/4"
 Bolts 1/2" unless noted
 Hoists None
 Reaming None
 Shop Paint 1 Coat Red Lead + Oil
 Field Paint Others
 Erection Others
 Field Conn's Riveted
 Inspection Shop: Breathing & Robertson

CONTRACT V 5585
 Details of 78' 5 1/2' Truss
 For Bridge over James River
 Location Richmond, Va.
 Owner Atlantic Bridge Co.
 Virginia Bridge and Iron Co.
 ROANOKE, VA.
 To be fabricated at the
 Made by M. G. G.
 Checked by M. G. G.
 Date 1/1/24
 Traced by 1/1/24
 Field by 1/1/24
 Material on Shop Bill 7-3



REQUIRED LIST		
Make	Description	Mark
1	End Post as shown	EP3
1	" " opp hand	EP3
1	Bottom Chord as shown	BC6
1	" " opp hand	BC6
1	Vertical Posts as shown	V13
1	" " as shown	V14
1	" " opp hand	V14
1	" " as shown	V15
1	" " opp hand	V15
1	" " " "	V13

BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

SHEET NO. RF 7

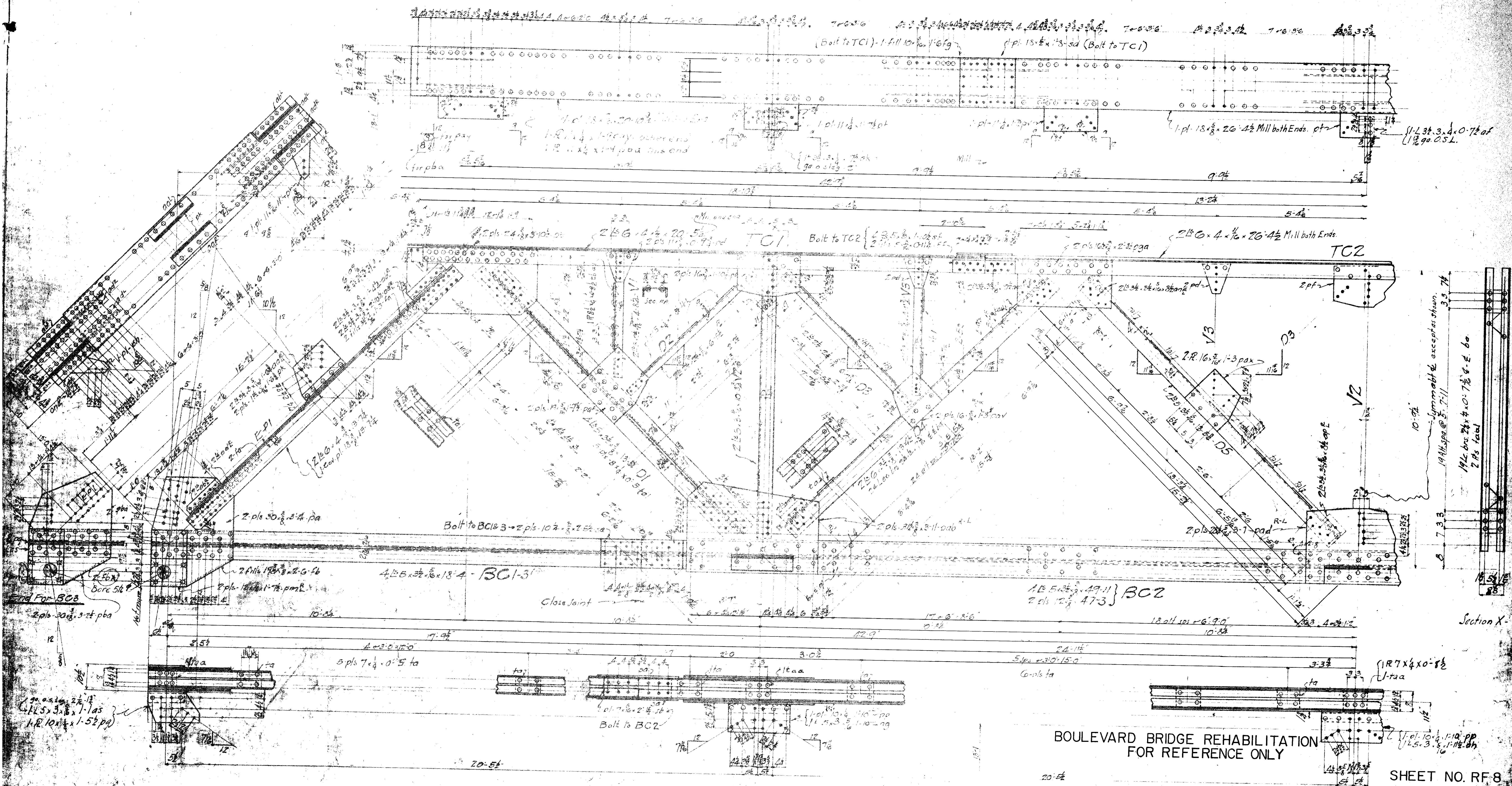
GENERAL NOTES:

- Material Specifications
 - Rivets
 - Holes
 - Roaming
 - Shop Paint
 - Field Paint
 - Erection
 - Field Conn's
 - Inspection
- unless noted. #1
- For General Notes see DWG.

CONTRACT V 5545
Details of End Post, Bottom Chord, Vertical Posts

For Bridge over James River
Location Richmond, Va
Owner Atlantic Bridge Co.

Virginia Bridge and Iron Co.
Richmond, Va.



BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

SHEET NO. RF-8

Make 2 End Posts as shown Mark E-PIR

2	opp hand	E-PIR
4	Diagonals	as shown
4	"	D1
4	"	D2
4	"	D3
4	"	D4
4	"	D5
4	Verticals	"
6	"	V1
6	"	V2
8	"	V3

Make 2 Top Chords as shown Mark TC1R

2	opp hand	TC1R
1	"	as shown
1	"	TC2R
1	Bottom Chord	as shown
1	"	BC1R
1	"	opp hand
1	"	BC2R
1	"	as shown
1	"	BC3R
1	"	opp hand
1	"	BC4R

GENERAL NOTES:

- Material Specifications
 - Rivets
 - Holes
 - Reaming
 - Shop Paint
 - Field Paint
 - Erection
 - Field Conn's
 - Inspection
- 18" unless noted see Sheet

CONTRACT V. 5585

Details of 85-6 Truss

For Location Richmond, Va

Bridge over James River

Atlantic Bridge Co.

Virginia Bridge and Iron Co.

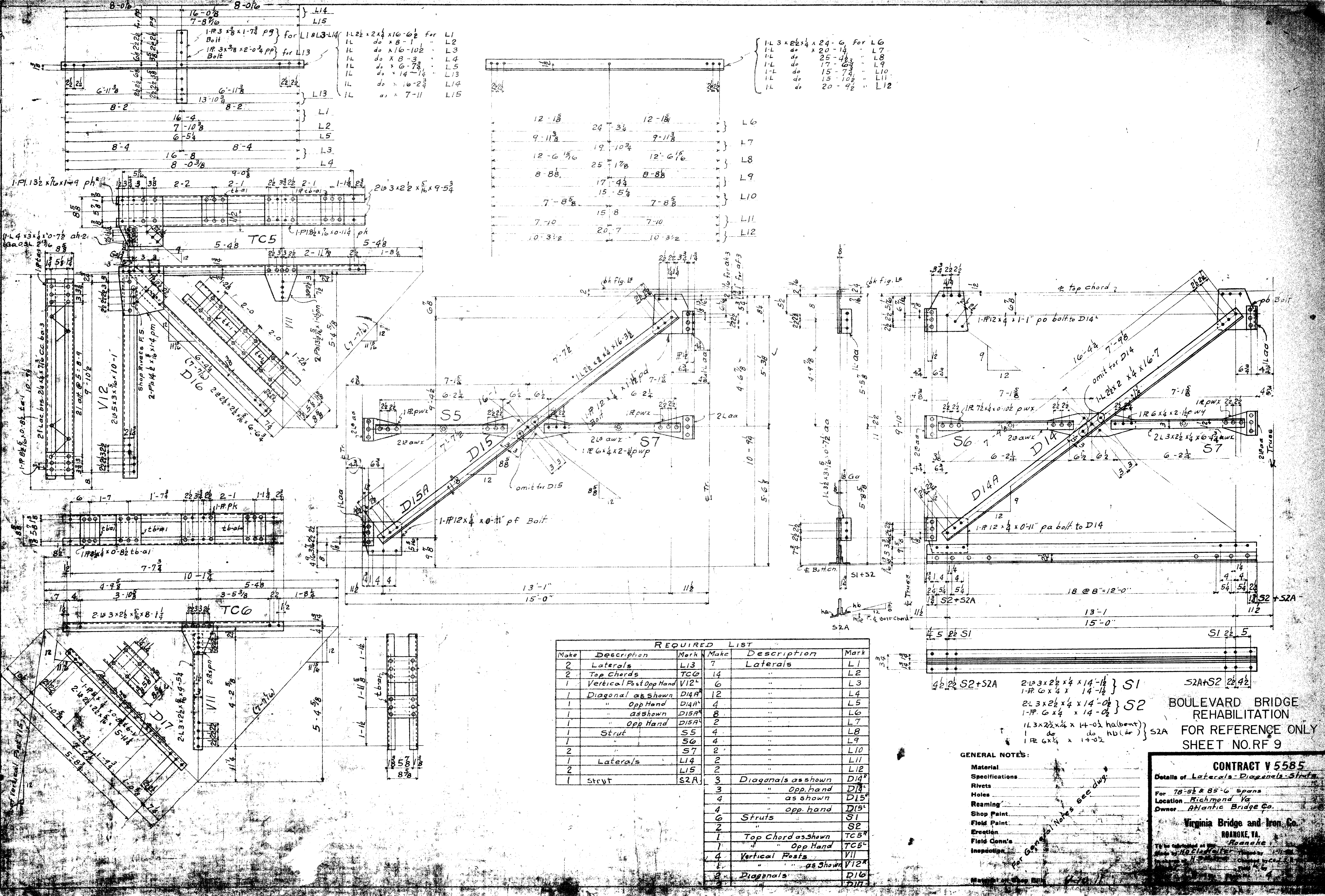
ROANOKE, VA.

Roanoke

To be fabricated at the Roanoke, Va. Shop

Checked by

Drawn by



REQUIRED LIST					
Make	Description	Mark	Make	Description	Mark
2	Laterals	L13	7	Laterals	L1
2	Top Chords	TC5	14	"	L2
1	Vertical Post Opp Hand	V12	6	"	L3
1	Diagonal as shown	D14A	12	"	L4
1	" Opp Hand	D14A	4	"	L5
1	" as shown	D15A	8	"	L6
1	" Opp Hand	D15A	2	"	L7
1	Strut	S5	4	"	L8
1	"	S6	4	"	L9
2	"	S7	2	"	L10
1	Laterals	L14	2	"	L11
2	"	L15	2	"	L12
1	Strut	S2A	3	Diagonals as shown	D14
			3	" Opp hand	D14
			4	" as shown	D15
			4	" Opp hand	D15
			6	Struts	S1
			2	"	S2
			1	Top Chord as shown	TC5
			1	" Opp Hand	TC5
			4	Vertical Posts	V11
			1	" as shown	V12
			2	Diagonals	D16
			2	"	D17

2-15 3x2 1/2 x 4 x 14-1/2 } S1
 1-R 6x4 x 14-1/2 } S2
 2-1 3x2 1/2 x 4 x 14-0 1/2 } S2
 1-R 6x4 x 14-0 1/2 } S2
 1-L 3x2 1/2 x 4 x 14-0 1/2 (half bent)
 1 do do (do) } S2A
 1-R 6x4 x 14-0 1/2 } S2A

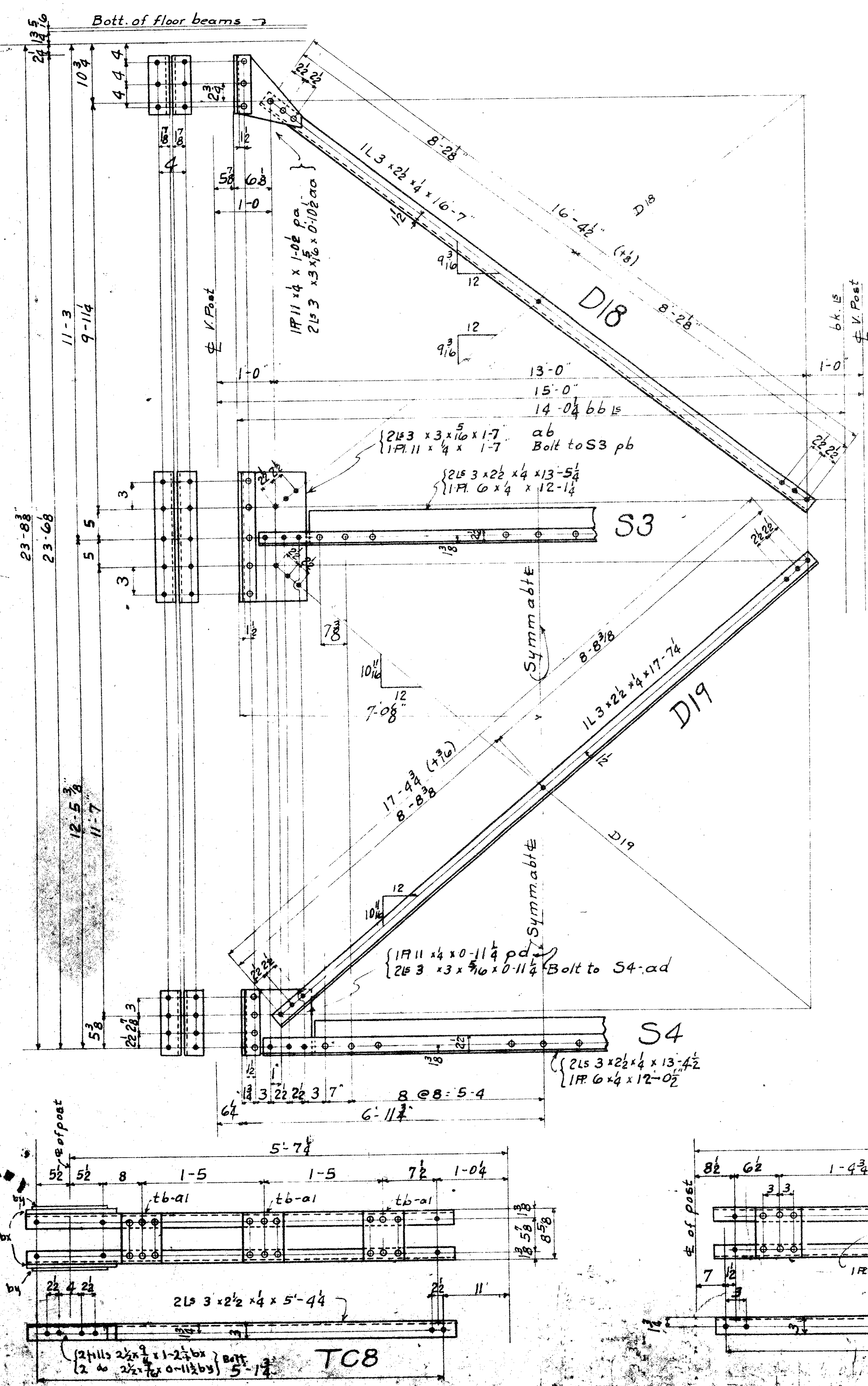
GENERAL NOTES:

- Material
- Specifications
- Rivets
- Holes
- Reaming
- Shop Paint
- Field Paint
- Erection
- Field Conn's
- Inspection

General Notes see dwg.
 General Notes see dwg.

BOULEVARD BRIDGE REHABILITATION
 FOR REFERENCE ONLY
 SHEET NO. RF 9

CONTRACT V 5585
 Details of Laterals-Diagonals-Struts
 For 78'-5 1/2" & 85'-6" Spans
 Location Richmond Va
 Owner Atlantic Bridge Co.
 Virginia Bridge and Iron Co.
 ROANOKE, VA.
 Roanoke
 Made by H. C. L. Co.
 Checked by H. C. L. Co.
 Date 4/1/24



2-Pls 15 x 5/8 x 1-6 pma
 2-Pls 15 x 5/8 x 1-6 pin
 To bear on pin
 2-Pls 6 x 4 x 1/2 x 1-6 ah
 1-Pl 18 x 3/4 x 2-2 pn
 2-Pls 6 x 4 x 1/2 x 1-6 an
 4-Pls 3 x 3 x 1/2 x 0-5 as
 1-Pl 5 x 1/2 x 0-92 pv

2-Pls 18 x 3/4 x 1-3 pp
 To bear on ps
 2-Pls ah
 1-Pl 18 x 3/4 x 1-10 1/2 ps
 1-Bar 24 x 4 x 1-6 ba
 1-Bar from 2 1/2 x 4
 2-Pls 6 x 4 x 1/2 x 1-6 ap
 4-Pls
 1-R pv

Mat'l for one R. Nest
 2-Bars 3/4 x 1-1/4 Rivet bb
 2-G.P. 3/4 x 1-1/2 ma
 2-Bars 2 1/2 x 1-1/2 bd
 4 Rollers 3/2 x 1-10 1/2
 Turned from 3 1/2

Mat'l for one Bearing Pl. BPI
 2-Pls 4 x 4 x 5/16 x 1-7 ah bolt
 2-Pls 4 x 3 1/2 x 5/16 x 1-7 am
 1-Bar 24 x 4 x 1-7 bf
 Plane from 2 1/2 x 4
 1-Pl 19 x 1 x 2-7 pt
 Plane from 1/16 Pl.
 8 Tap Bolts 3/4 x 0-1 1/4 Sq. Head

BOULEVARD BRIDGE REHABILITATION FOR REFERENCE ONLY

SHEET NO. RF 10

GENERAL NOTES:

- Material
- Specifications
- Rivets 3/4
- Holes 1/8" Unless Noted
- Reaming
- Shop Paint
- Field Paint
- Erection
- Field Corn's
- Inspection

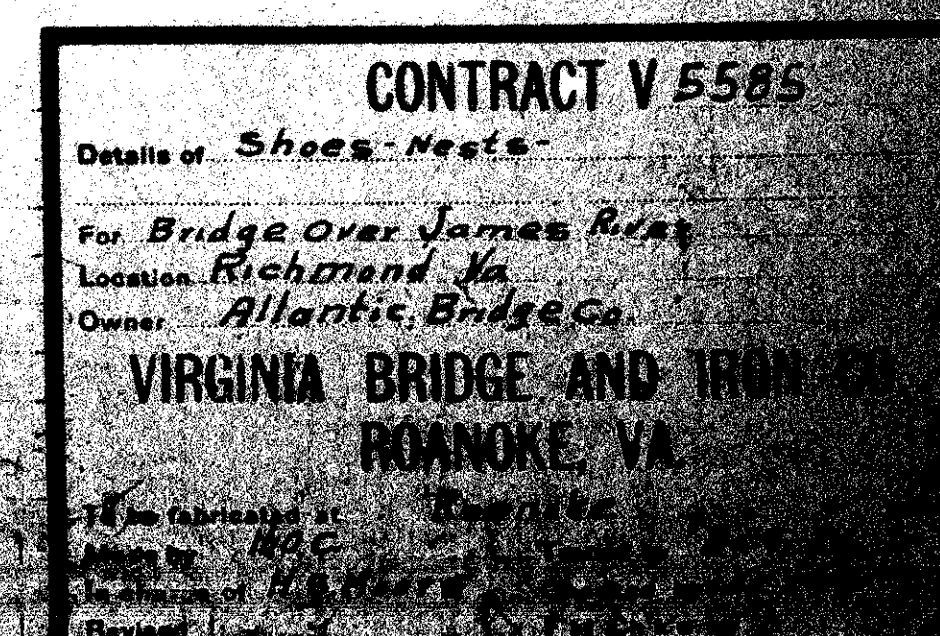
Material on Shop Bill

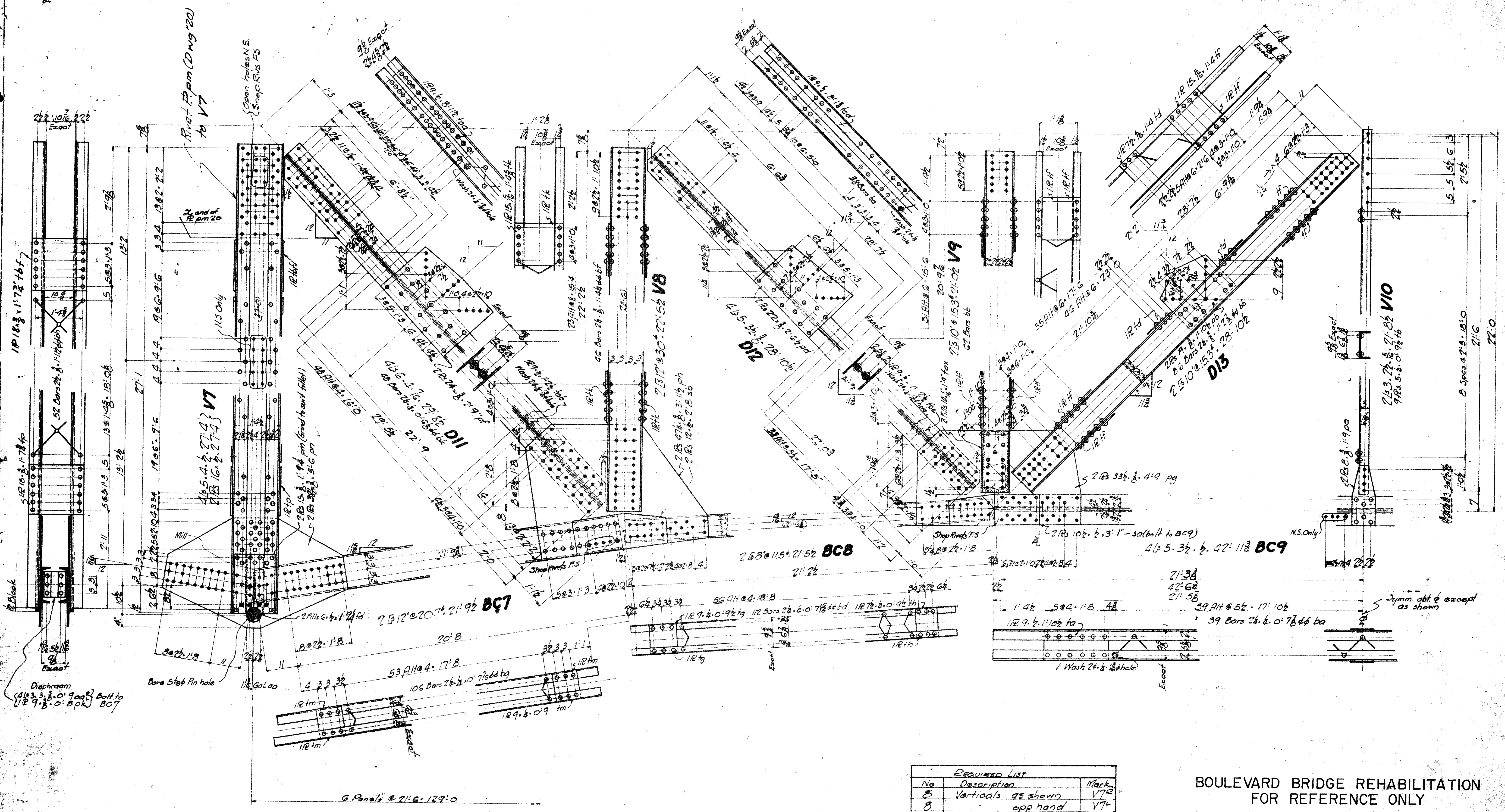
REQUIRED LIST		
No	Description	Mark
4	Fixed Shoes	FS1
2	"	FS2
2	Roller	RS1
2	" Nests	RNI
2	Bearing Plates	BPI
2	Top Chords	TC7
2	"	TC8
2	Struts	S3
2	"	S4
4	Diagonals	DI8
4	"	DI9
4	Pins	PI
2	Pins	P2
20	Lomas Nuts (Shipon Pins)	PNG
1	Pilot Nut	P3
2	Pins	P4

CONTRACT V 5585

Details of Diagonals, Top Chords, Fixed Shoes, Roller Shoes, etc.
 For Bridge Over James River
 Location Richmond Va
 Owner Atlantic Bridge Co.
VIRGINIA BRIDGE AND IRON CO.
 ROANOKE, VA.

To be fabricated at
 Made by M.C.
 In charge of H.S. Moore
 Revised
 Scale 1" = 1'-0"





REQUIRED LIST		
No	Description	Mark
8	Verticals as shown	V7
8	app hand	V7L
16		V8
8		V10
16	Diagonals	D11
16		D12
16		D13
8	Bottom Chords as shown	BC7
8	app hand	BC7L
8	as shown	BC8
8	app hand	BC8L
8		BC9
8	Verticals as shown	V9
8	app hand	V9L

BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

SHEET NO. RF 12

GENERAL NOTES:

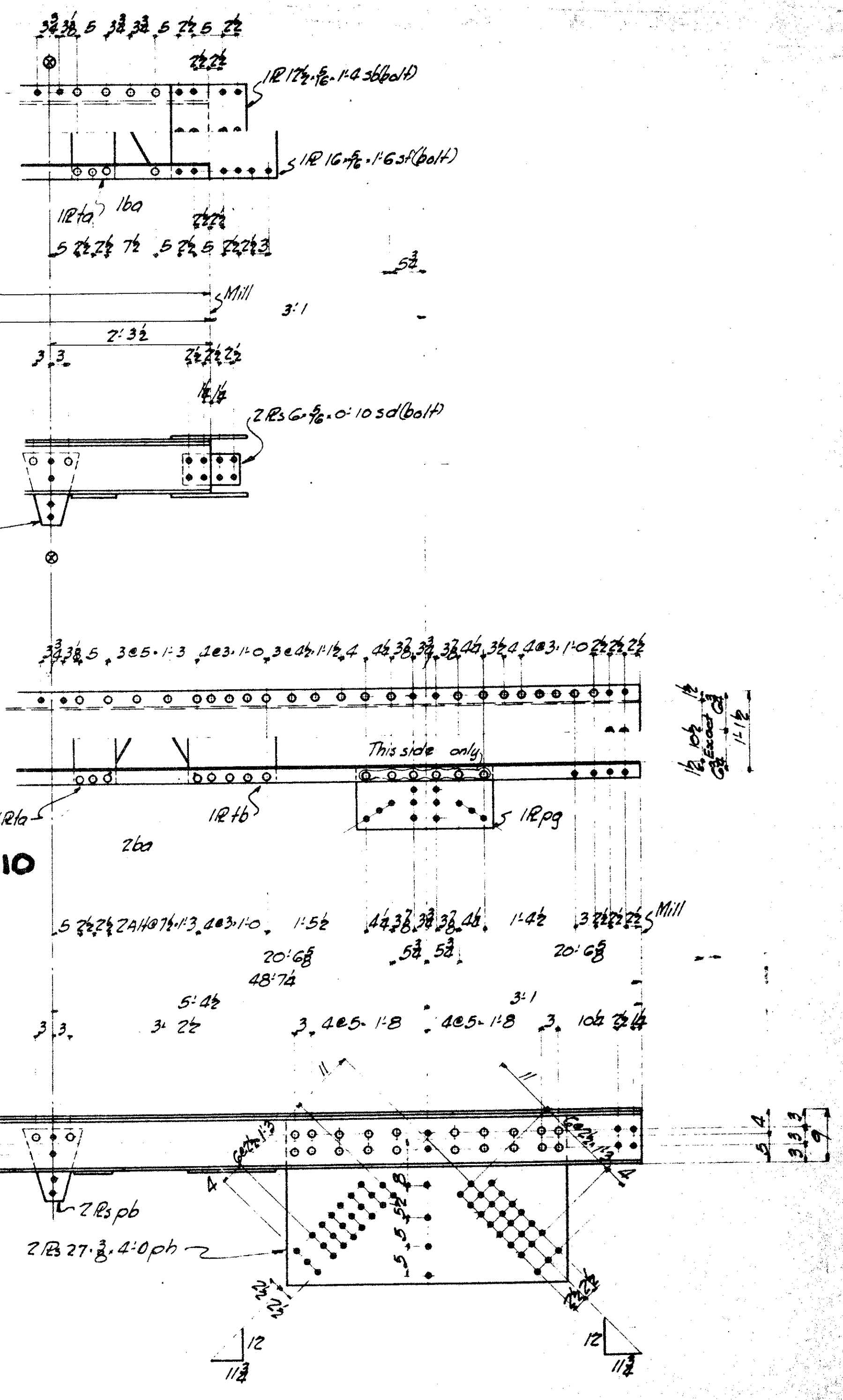
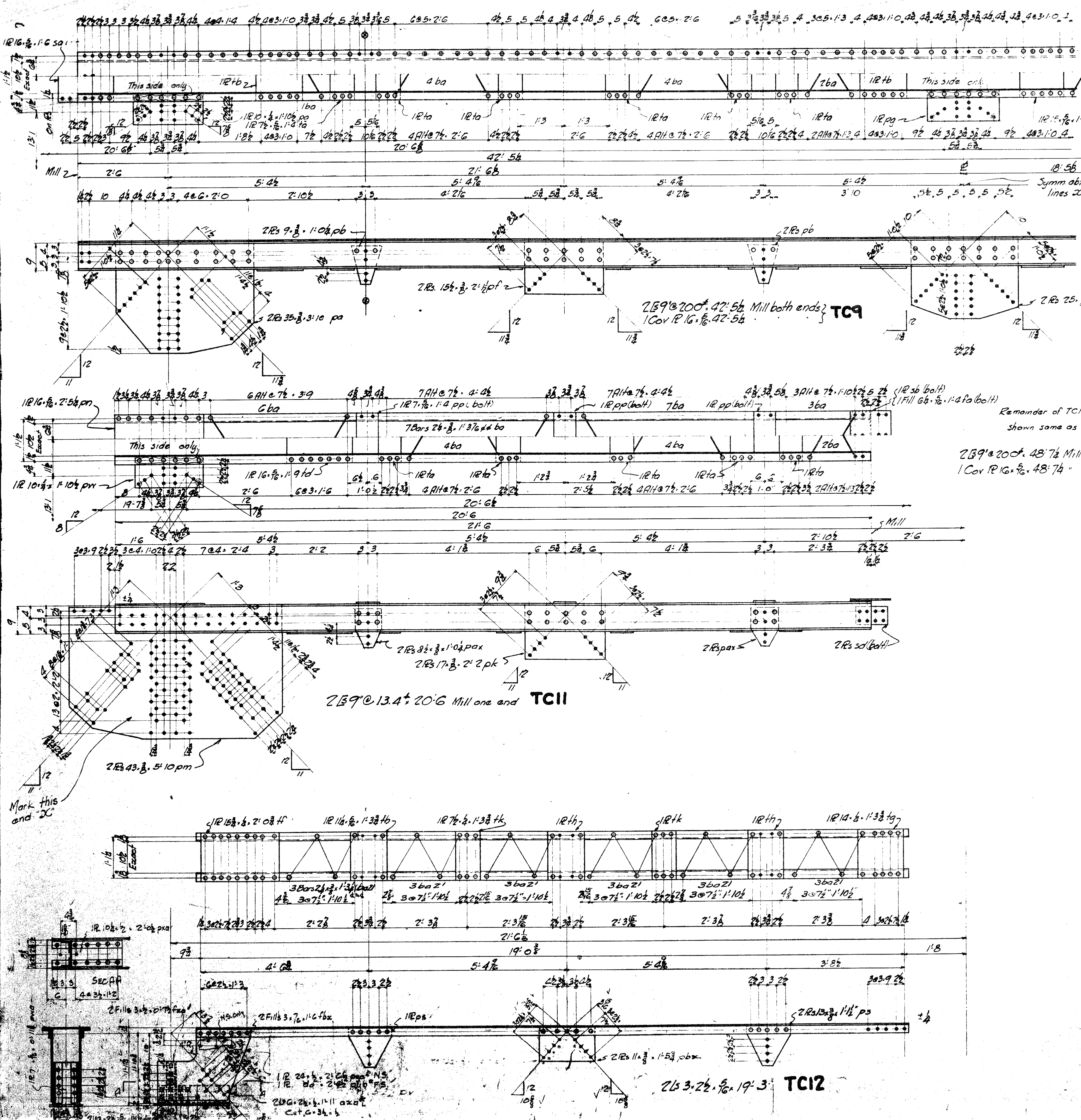
- Material
- Specifications
- Rivets 3/8" unless noted
- Holes 1/8" unless noted
- Reaming
- Shop Paint 1 Ct Red Lead & Oil
- Field Paint
- Erection
- Field Conn's
- Inspection

CONTRACT V 5585

Details of *Continous Trusses*

For - Bridge over James River
Location - Richmond, Va.
Owner - Atlantic Bridge Co.
Virginia Bridge and Iron Works
Richmond, Va.

To be forwarded to	<i>Example</i>
Mailed by <i>W.H.H.</i>	Traced by
To <i>George A. Moore</i>	Checked with
Number	File Number
Date	Index No. <i>16</i>



BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

GENERAL NOTES:

- Material
- Specifications
- Rivets 3/8"
- Holes 1/8" unless noted
- Reaming
- Shop Paint 1 Ct. Red Lead paint
- Field Paint
- Erection
- Field Conn's
- Inspection

Material on Shop Bills

REQUIRED LIST		
No	Description	Mark
4	Top Chords as shown	TC9
4	" opp hand	TC9
4	" as shown	TC10
4	" opp hand	TC10
8	" as shown	TC11
8	" opp hand	TC11
8	" as shown	TC12
8	" opp hand	TC12

SHEET NO. RF 15

CONTRACT V 5585

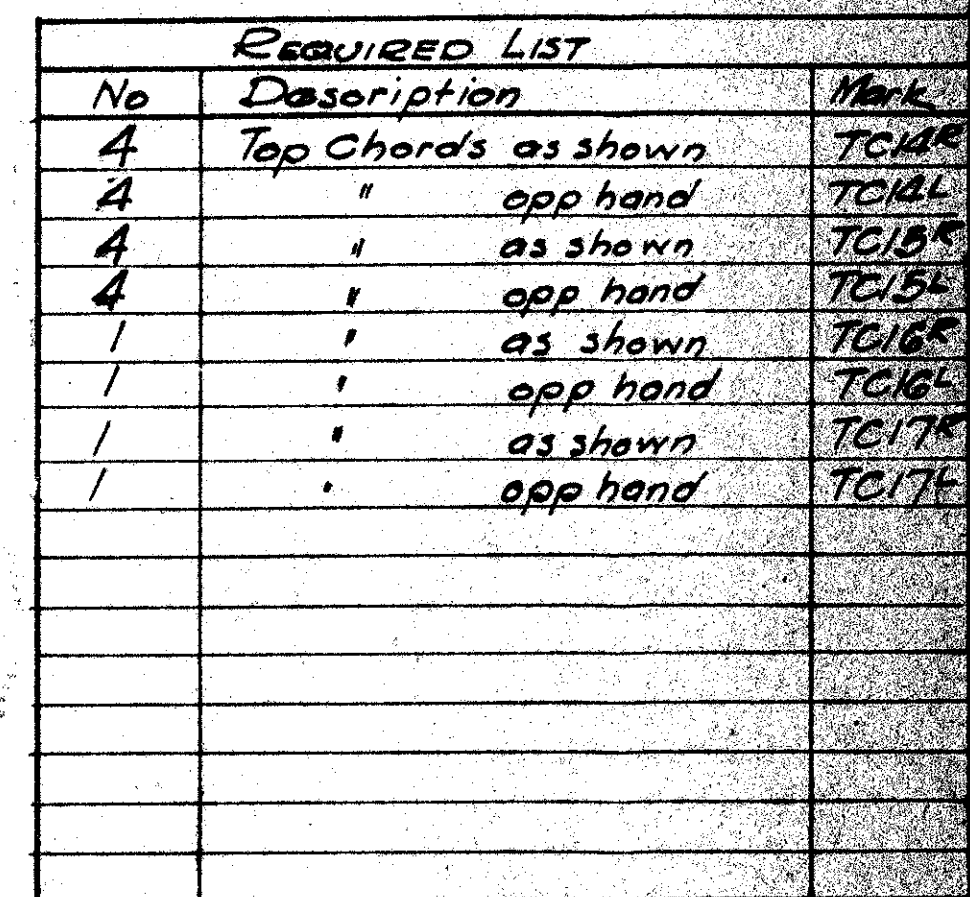
Details of Top Chord Sections

For Bridge over James River
Location Richmond, Va.
Owner Atlantic Bridge Co.

VIRGINIA BRIDGE AND IRON CO.
ROANOKE, VA.

To be fabricated at
Made by J.M.H.
In charge of Work
Inspector

Material on Shop Bills



CONTRACT V 5506

Details of *Top Chord Sections*

For *Bridge over James River*

Location *Richmond, Va.*

Owner *Atlanta Bridge Co.*

VIRGINIA BRIDGE AND IRON CO.

ROANOKE, VA.

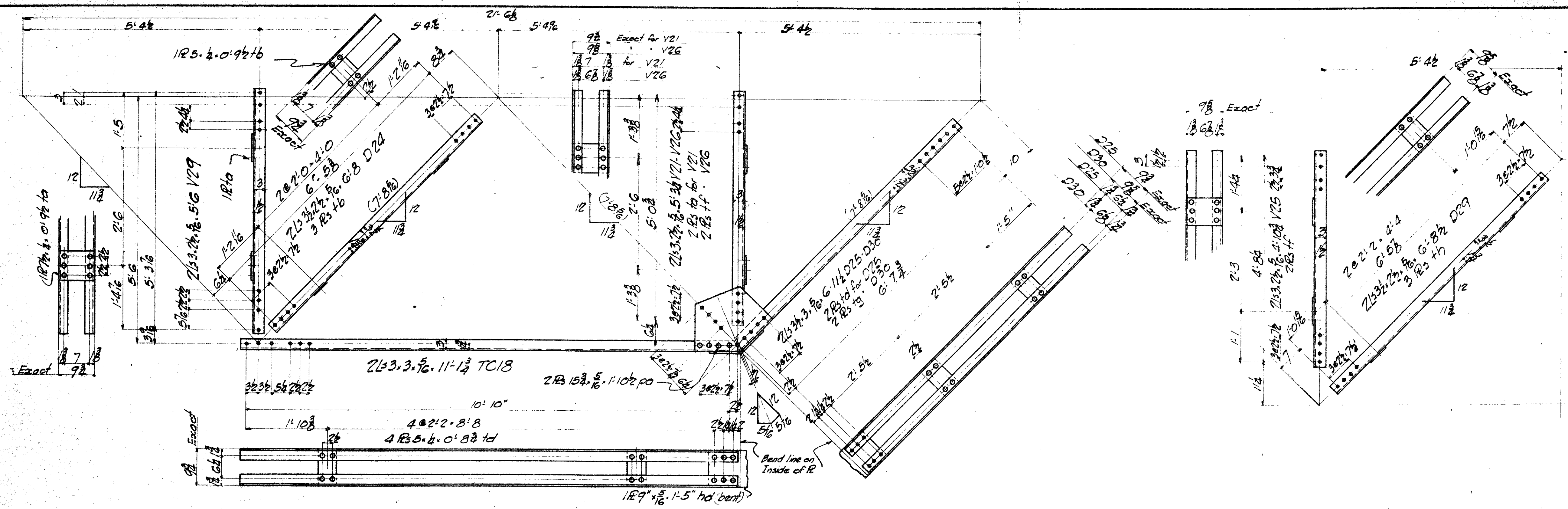
To be fabricated at *Roanoke*

Made by *JMH*

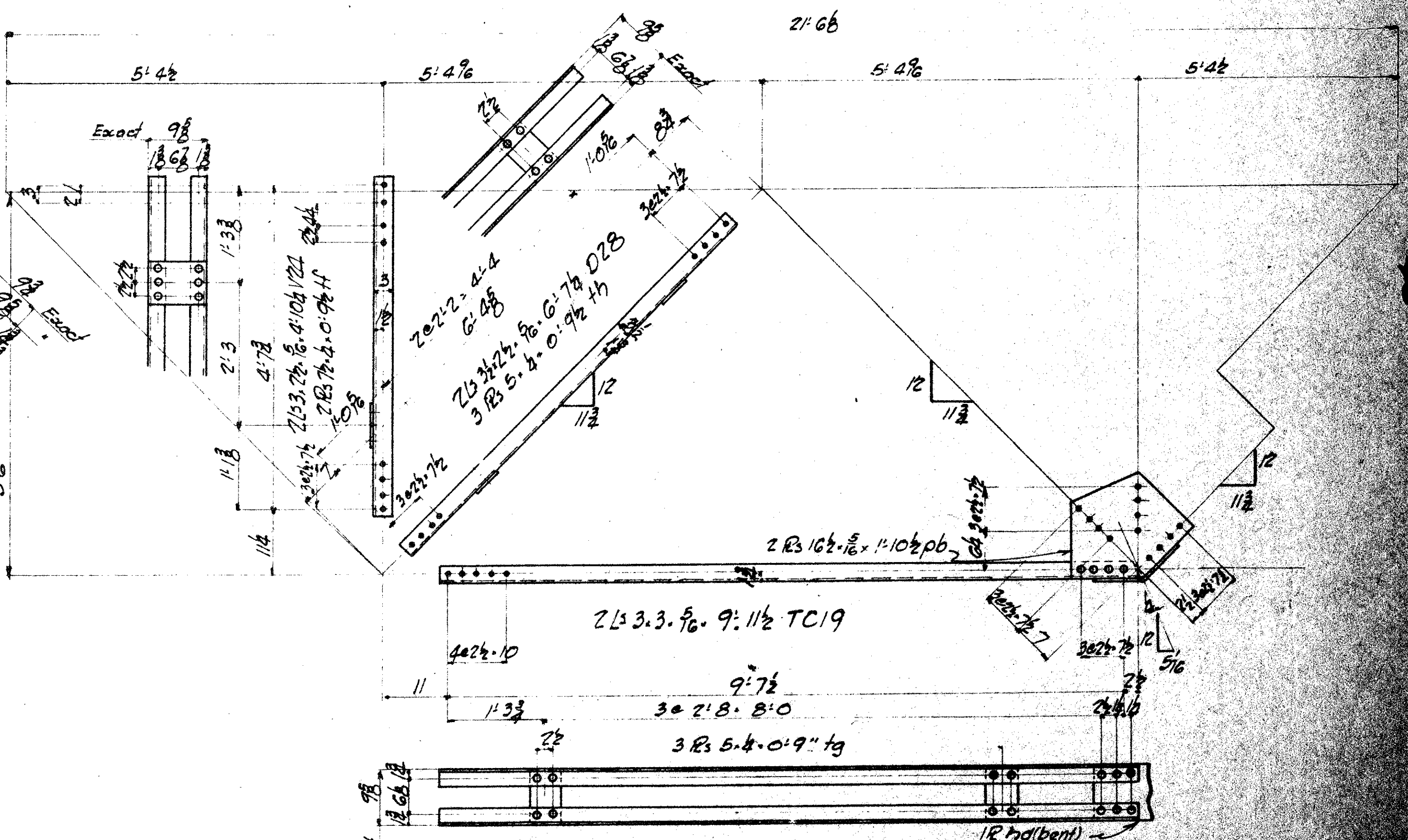
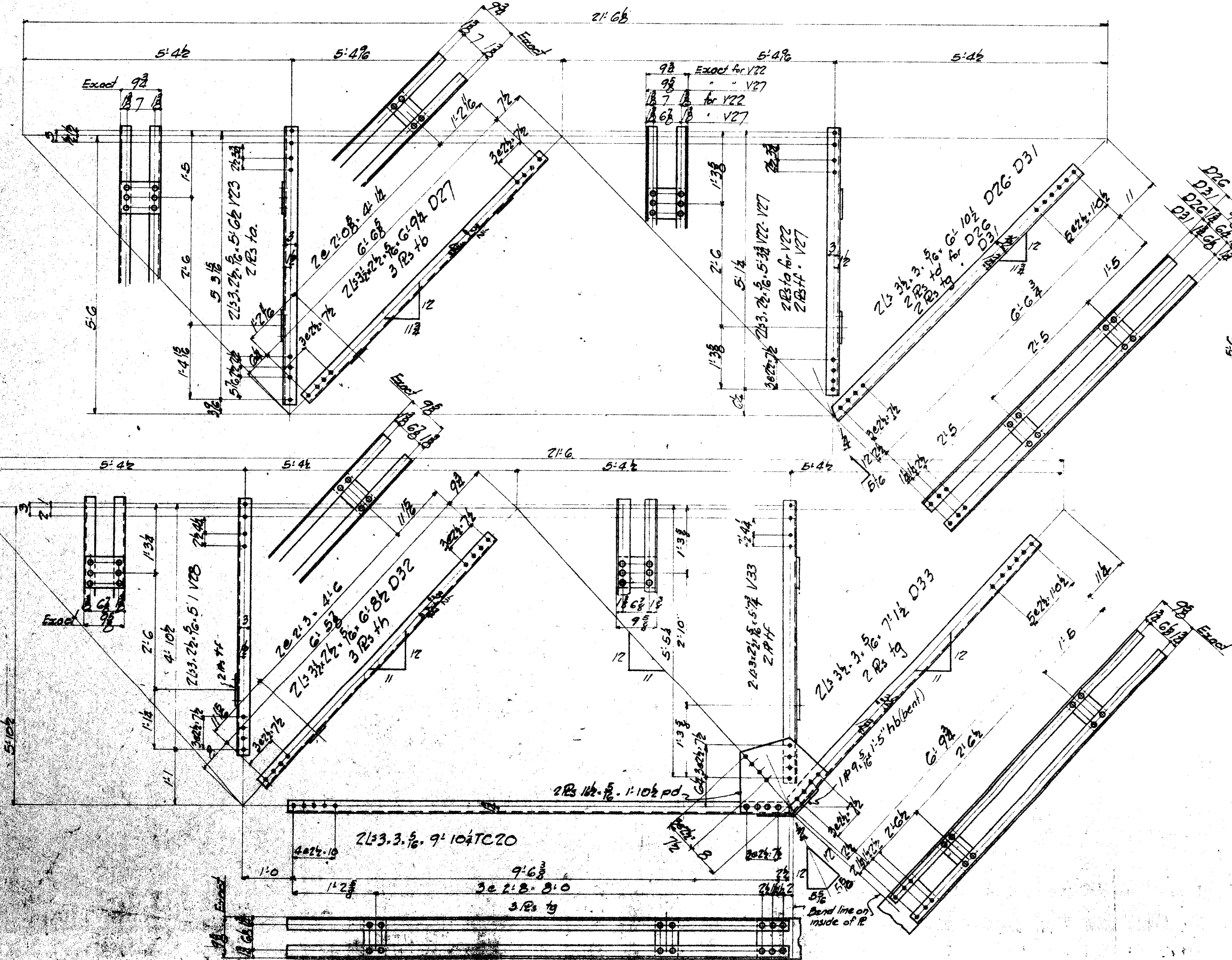
In charge of *Morse*

Checked by *W. H. H. H.*

Scale *1 in. = 1 ft.* Sheet No. *1*



REQUIRED LIST		
No	Description	Mark
16	Verticals	V29
16	"	V21
32	Diagonals	D24
16	"	D25
36	Chords	TC18
20	Verticals	V22
20	"	V23
20	Diagonals	D26
40	"	D27
36	Chords	TC19
32	Diagonals	D28
16	Verticals	V24
40	Diagonals	D29
20	Verticals	V25
16	Diagonals	D30
20	"	D31
20	Verticals	V27
16	"	V26
16	"	V28
32	Diagonals	TC20
16	Chords	TC20
16	Diagonals	D33
16	Verticals	V33



BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY
SHEET NO. RF17

GENERAL NOTES:

- Material
- Specifications
- Rivets
- Holes
- Reaming
- Shop Paint
- Field Paint
- Erection
- Field Conn's
- Inspection

CONTRACT V 6505

Details of Top Chord Supports

For Bridge over James River

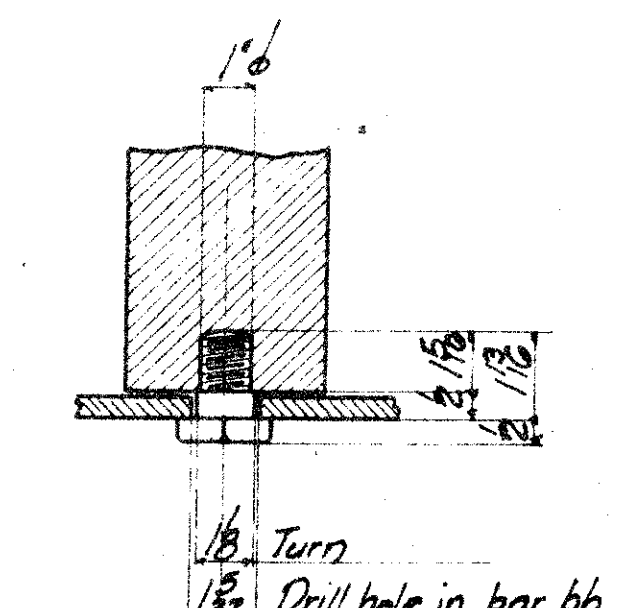
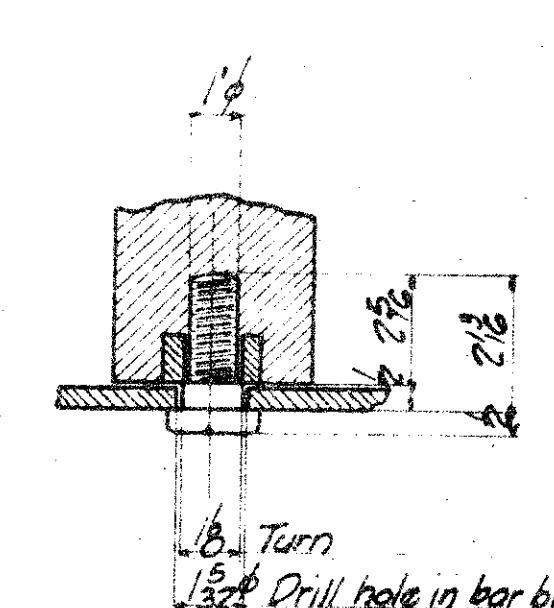
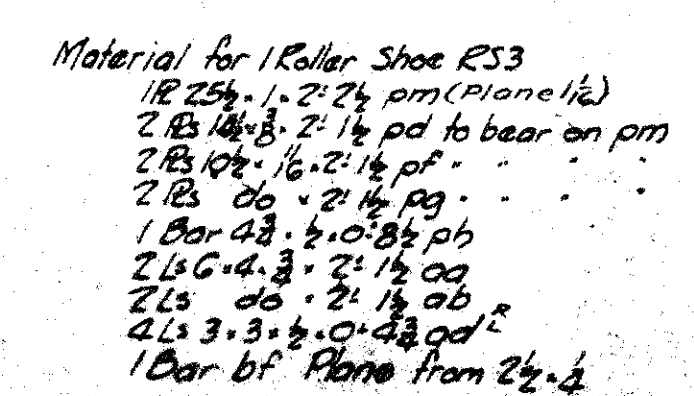
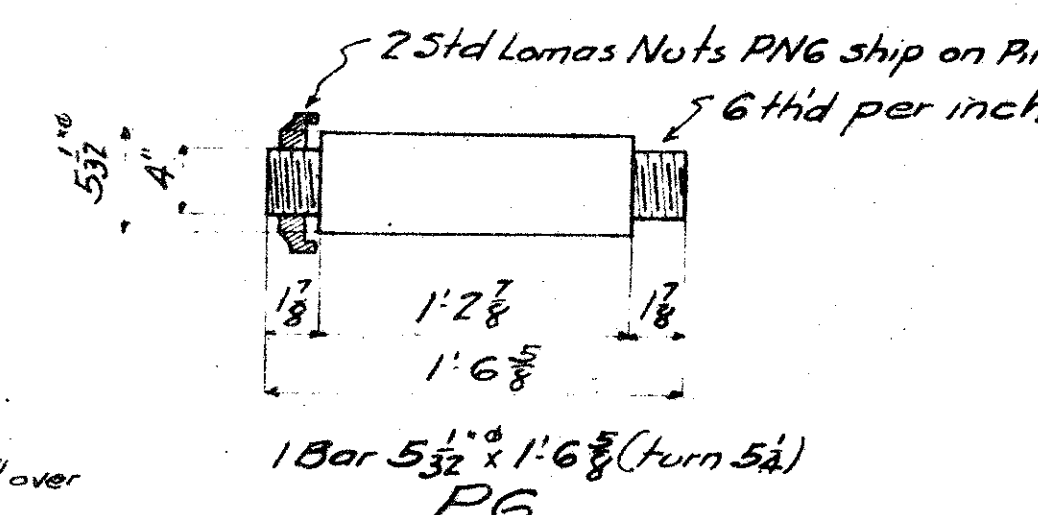
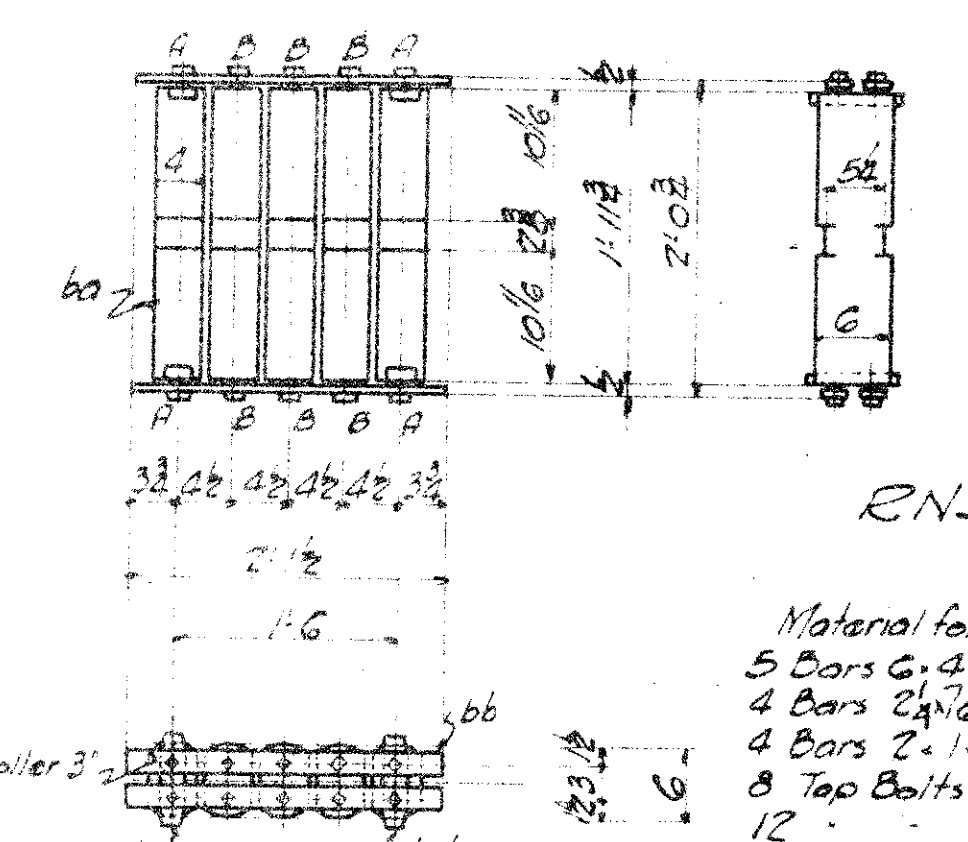
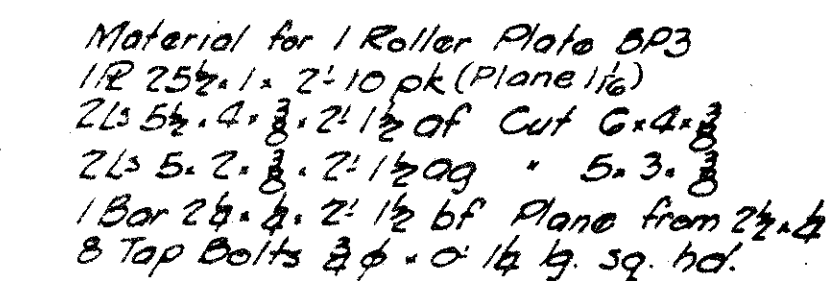
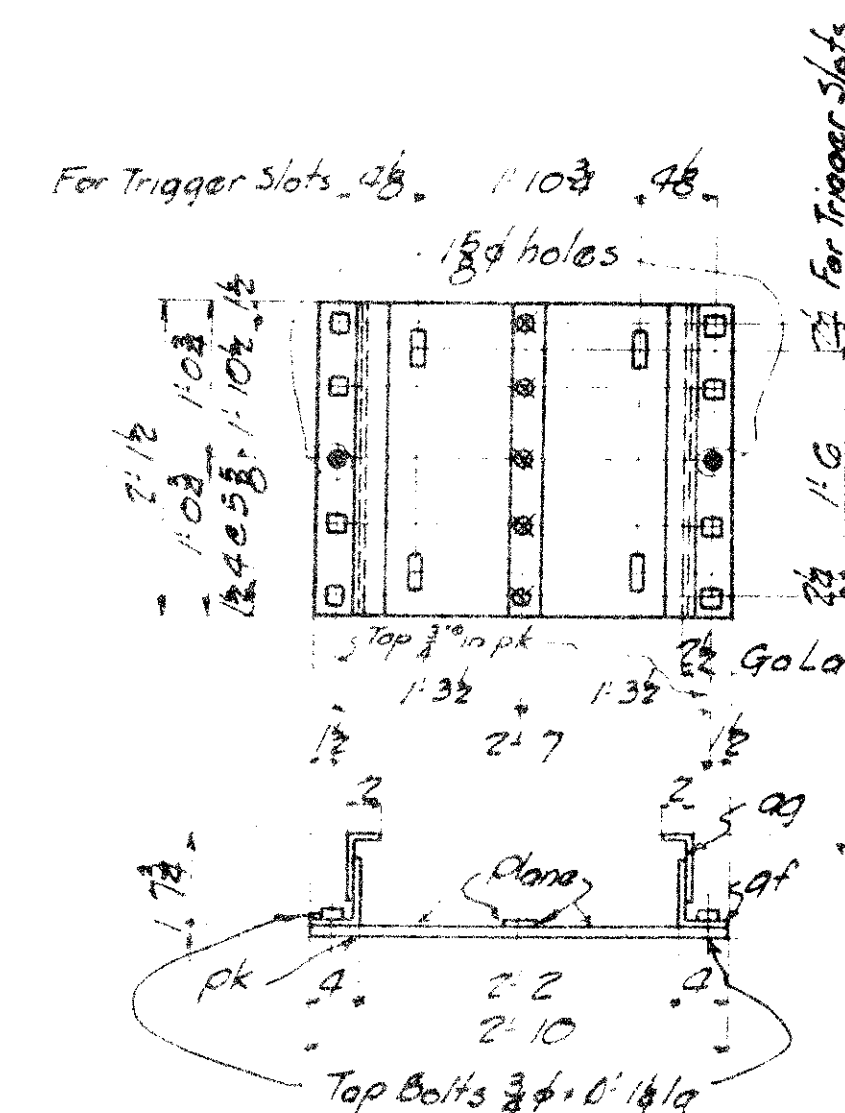
Location Richmond, VA

Owner Virginia Bridge and Iron

RDANOKE, VA

Material on Shop Bldg 52, 53, 54

Inventory	
16	Diagonal
16	Diagonals
32	
16	Chords
16	Verticals
16	
8	Fixed Shoes
8	Roller Nests
8	Roller Shoes
8	Roller Plates
16	Pins
32	Std. Pin Nuts Ship on Pin
32	Pins
64	Std Pin Nuts Ship on P5
1	PL 1 IN. DIA



SHEET NO. RF 18

Material	
Specifications	
Rivets	<i>2d</i>
Holes	<i>1/2" unless noted</i>
Roaming	
Shop Paint	<i>1/1 Red Lead</i>
Field Paint	
Erection	
Field Conn's	
Inspection	

noted
Lead & oil
For General Notes see Sheet 41

CONTRACT V 5585

Details of *Top Chord Support, Pins, Shoes*
Rollers, Roller Nests for Main Trusses

For *Bridge Over James River*

Location *Richmond, Va*

Owner *Atlantic Bridge Co*

VIRGINIA BRIDGE AND IRON CO

ROANOKE, VA.

To be fabricated at *Roanoke*

Made by *Rumrutt*

In charge of *Moore*

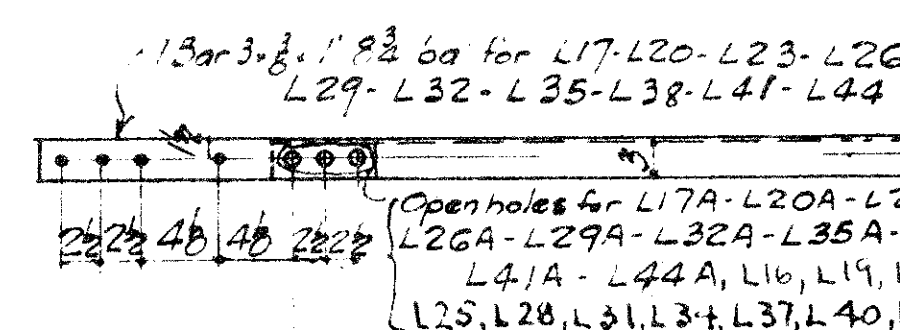
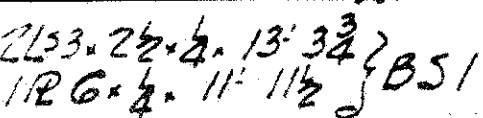
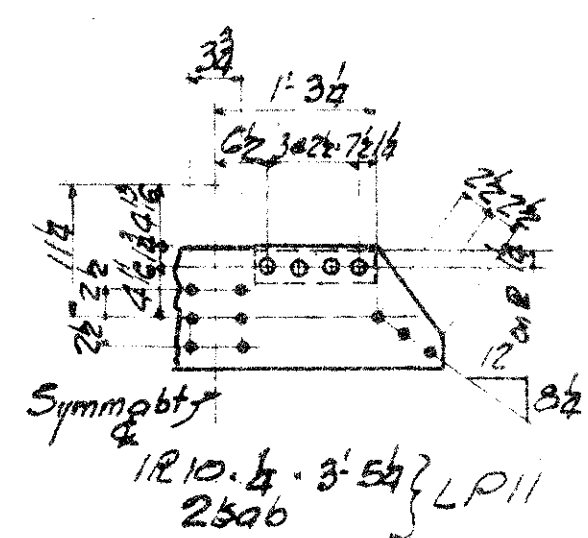
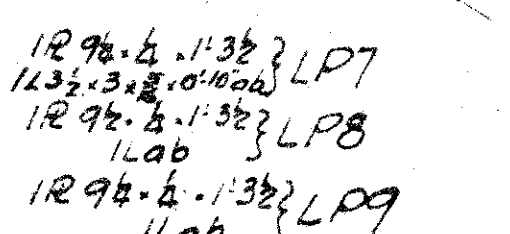
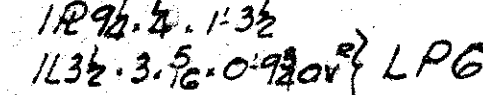
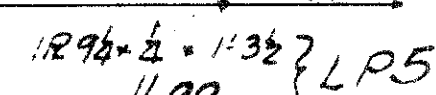
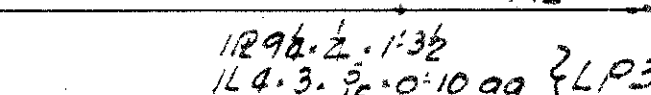
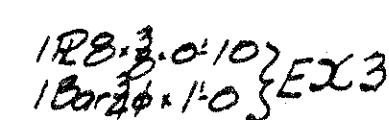
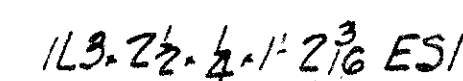
Revised _____

Scale *in = 1 Ft.* Sheet No. *23* of _____

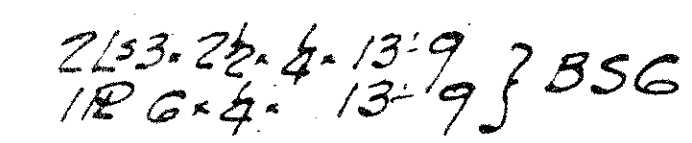
Traced by _____

Checked by *C. F. Moore*

Field Engineer _____



24: 68 L16
23: 94 L19
24: 68 L22
23: 8 L25
23: 32 L28
22: 113 L31
23: 108 L34
23: 52 L37
23: 44 L40
18: 24 L43
12: 06 L17
11: 73 L20+L20A
12: 02 L23+L23A
11: 78 L26+L26A
11: 5 L29+L29A
11: 36 L32+L32A
11: 8 L35+L35A
11: 53 L38+L38A
11: 52 L41+L41A
8: 102 L44+L44A



SHEET NO. RF 19

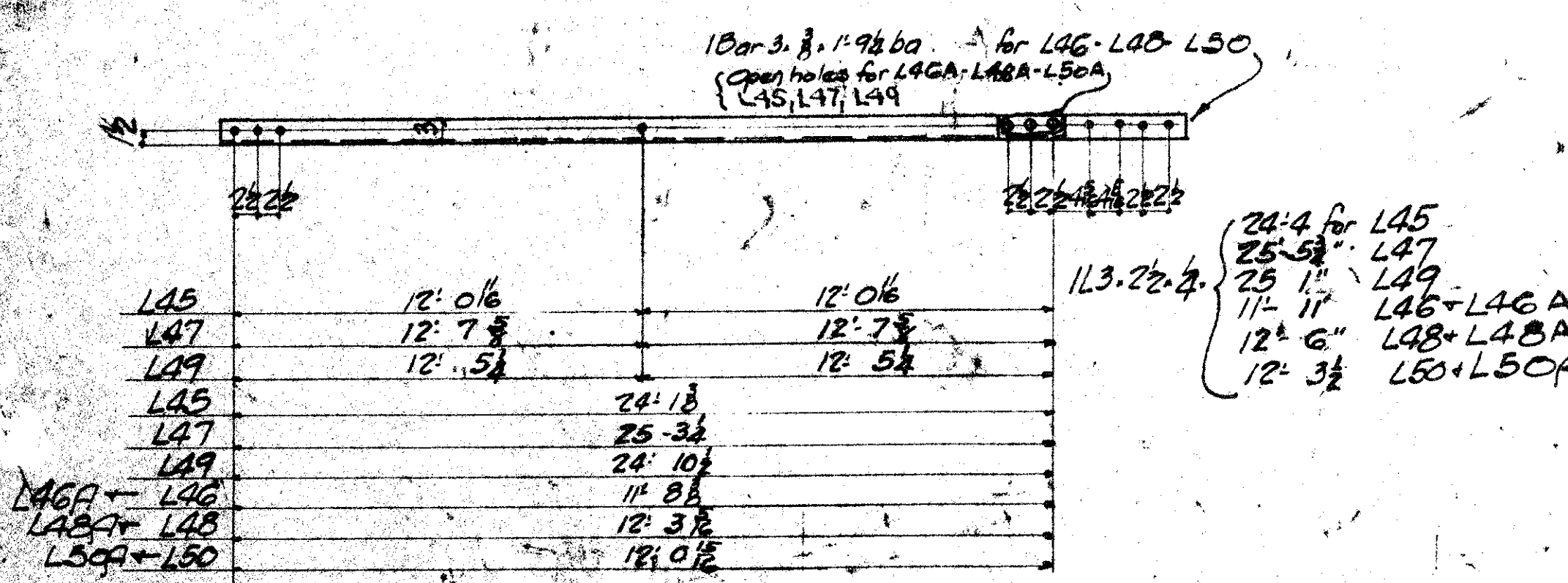
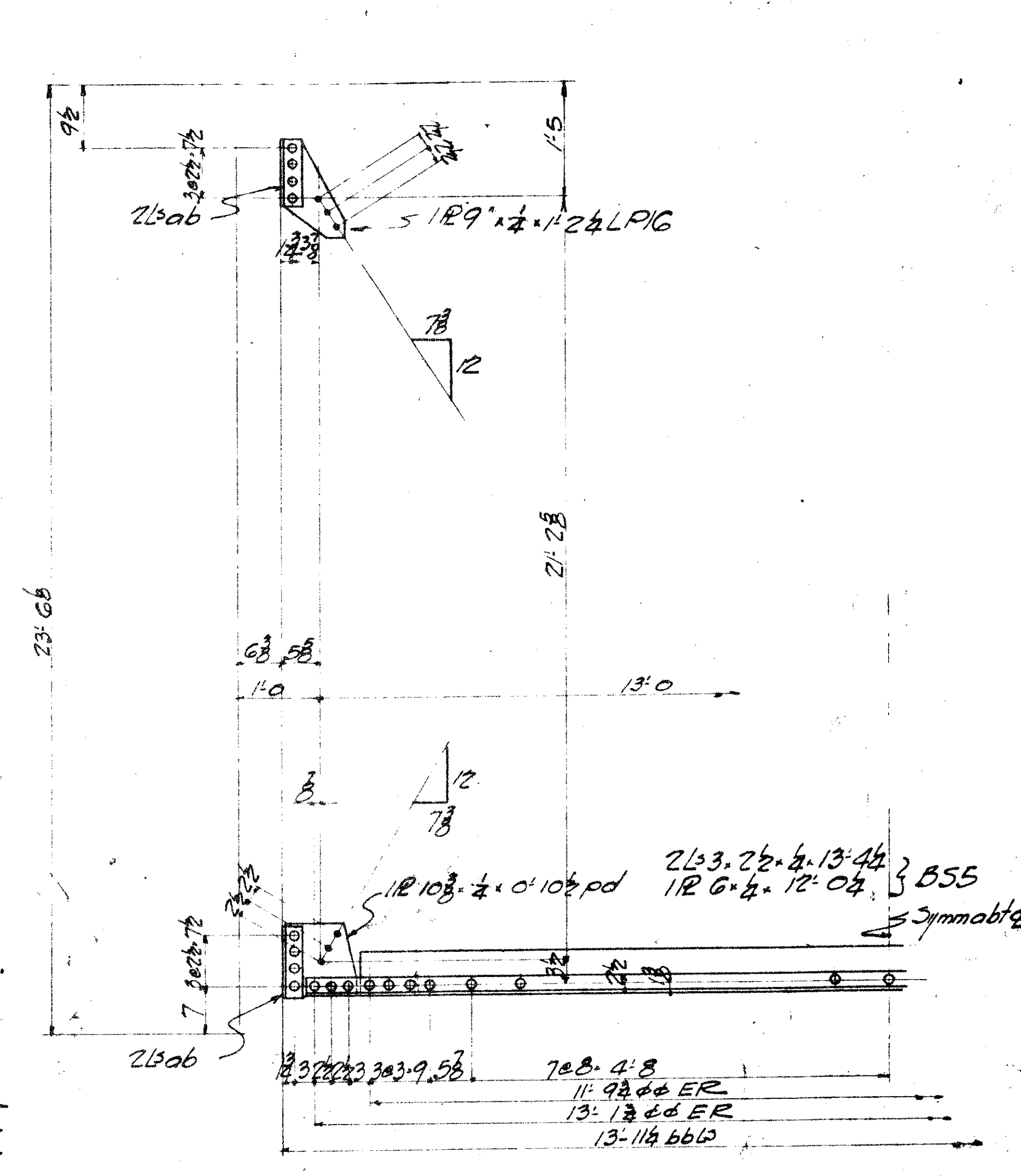
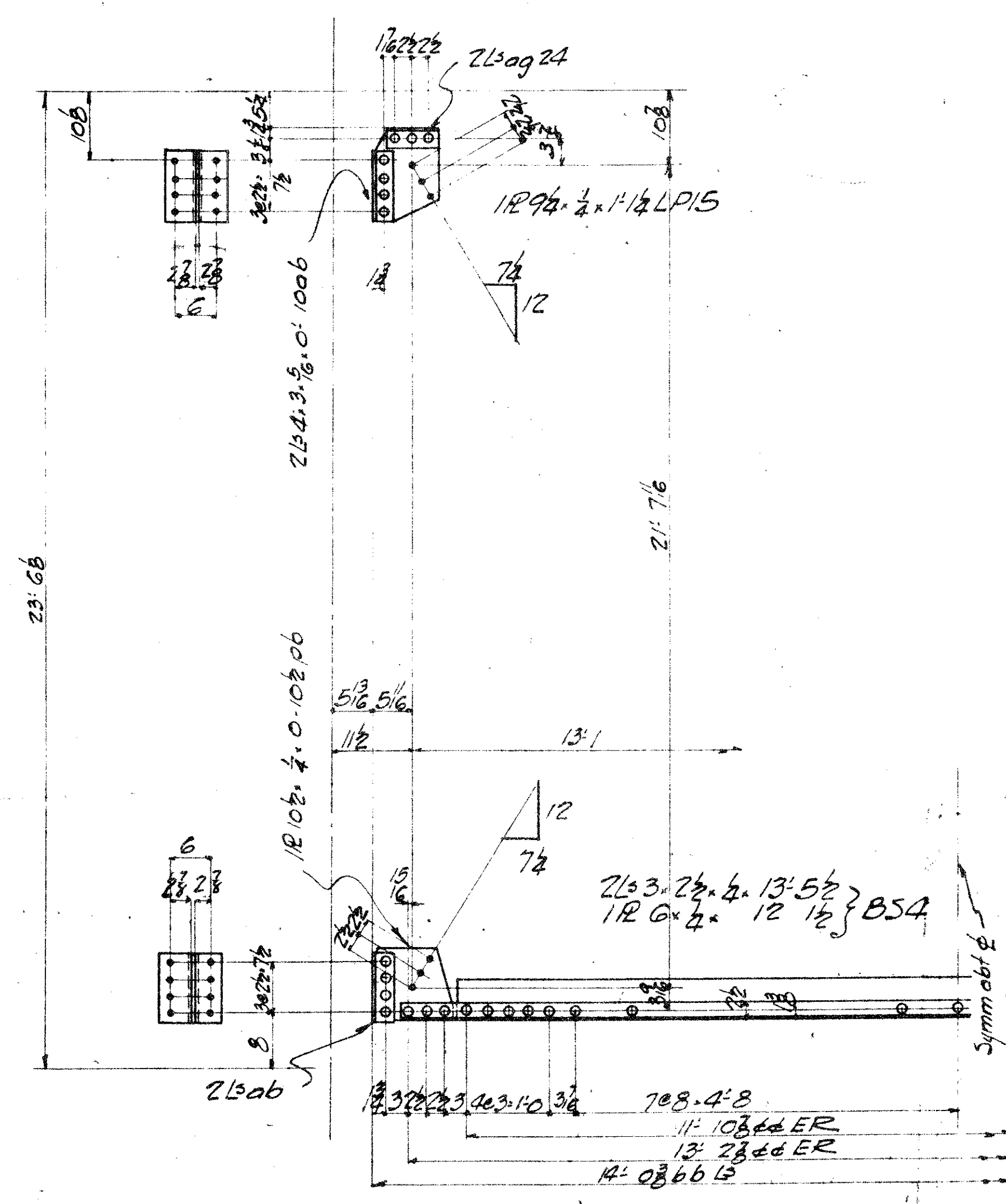
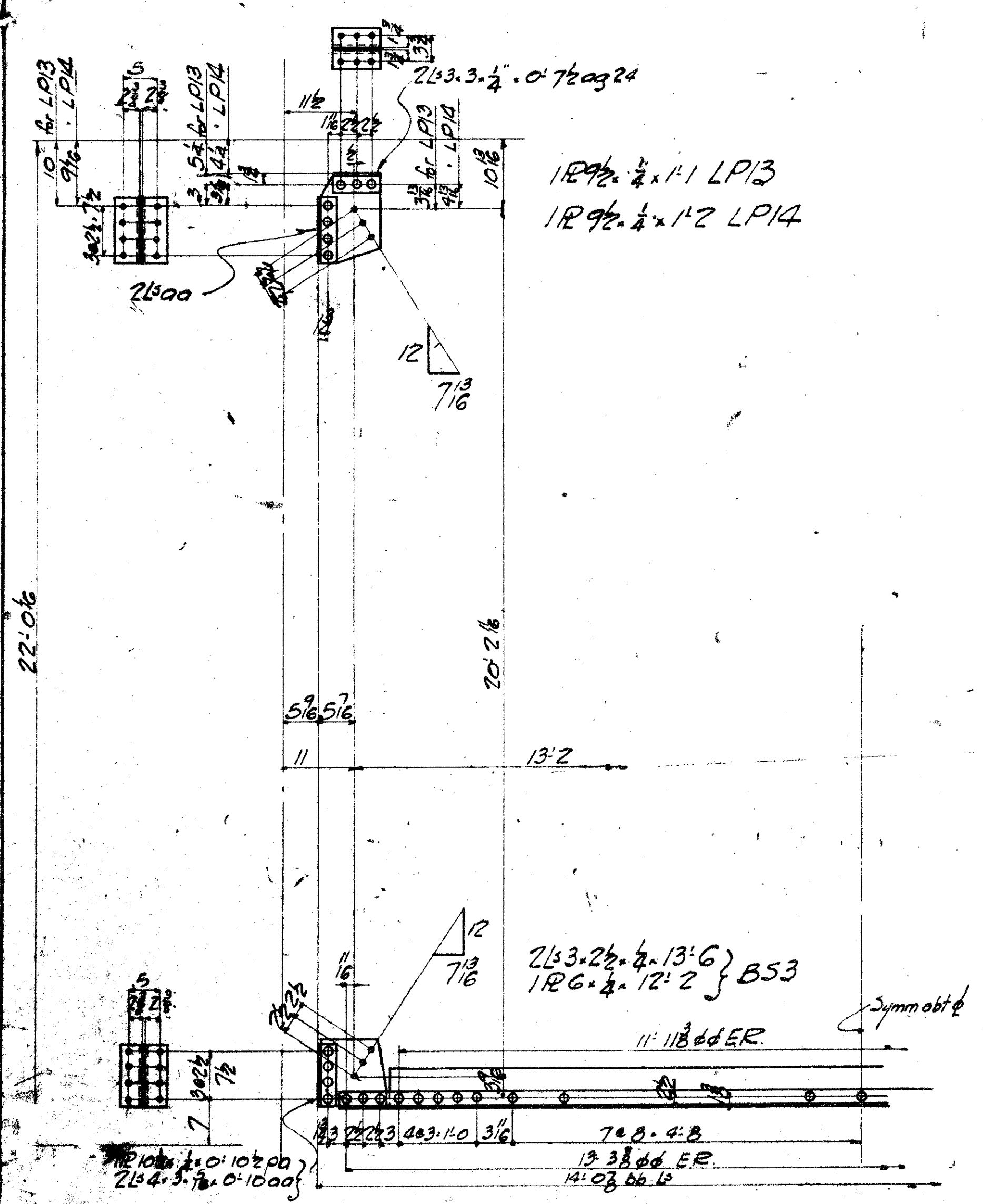
CONTRACT Y 5585

GENERAL NOTES:

Material
Specifications
Rivets 24 unless noted
Holes 1/2" "
Reaming
Shop Paint 1 Ct. Red Lead
Field Paint
Erection
Field Conn's
Inspection

Material on Skin Care

REQUIRED LIST		
No	Description	Mark
18	Struts	B53
20	Lateral Plates	LP14
16	"	LP13
16	"	LP15
8	Struts	B54
8	"	B55
16	Lateral Plates	LP16
18	Lateral Plates	L45
18	"	L46
8	"	L47
8	"	L48
8	"	L49
8	"	L50
13	"	L46A
8	"	L48A
8	"	L50A



BOULEVARD BRIDGE REHABILITATION
FOR REFERENCE ONLY

SHEET NO. RF 20

GENERAL NOTES:

- Material
- Specifications
- Rivets
- Holes
- Redding
- Shop Paint
- Field Paint
- Erection
- Field Conn's
- Inspection

CONTRACT V5585

Details of Vertical Bracing & Struts

For Bridge over James River

Location Richmond, Va.

Owner Atlanta Bridge Co.

VIRGINIA BRIDGE AND IRON ROADS CO.

SHEET NO.	TITLE
1	COVER SHEET
2	PLAN & TYPICAL SECTION
3	CONSTRUCTION SEQUENCE & MAINTENANCE OF TRAFFIC
4	GENERAL NOTES
5-7	CROSS SECTIONS

PLAN AND PROFILE OF PROPOSED RICHMOND EXPRESSWAY SYSTEM

This is a detailed black and white map of Richmond, Virginia, and its surrounding areas. The map shows the James River flowing through the city, with numerous streets, highways, and landmarks labeled. Key locations include Henric, Churchland, and the city center. A compass rose and a scale bar (0 to 2000 feet) are located in the top right corner.

CONVENTIONAL SIGNS

<p>STATE LINE</p> <p>COUNTY LINE</p> <p>CITY, TOWN OR VILLAGE</p> <p>RIGHT OF WAY LINE</p> <p>FENCE LINE</p> <p>UNFENCED PROPERTY LINE</p> <p>FENCED PROPERTY LINE</p> <p>TRAVELED WAY</p> <p>GUARD RAIL</p> <p>RETAINING WALL</p> <p>RAIL ROADS</p> <p>BASE OR SURVEY LINE</p>	<p>LEVÉE OR EMBANKMENT</p> <p>BRIDGES</p> <p>CULVERTS</p> <p>DROP INLET</p> <p>TROLLEY POLES</p> <p>POWER POLES</p> <p>TELEPHONE OR TELEGRAPH POLES</p> <p>MARSH</p> <p>HEDGE</p> <p>WOODS</p> <p>GROUND ELEVATION</p> <p>GRADE ELEVATION</p> <p>POLES WITHIN CONSTRUCTION LIMITS</p>
---	---

LIMITED ACCESS HIGHWAY			
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
	BB-1	1	7

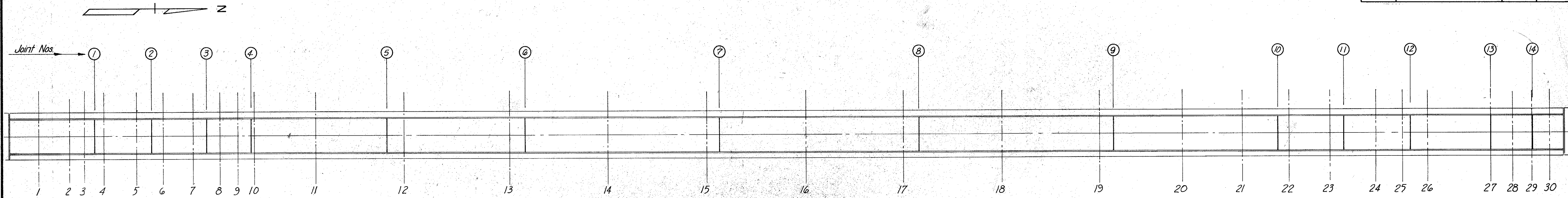
SUBMITTED BY	
Date	
Date	HOWARD, NEEDLES, TAMMEN & BERGENDOFF

RECOMMENDED BY	
Date	
Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

APPROVED BY	
Date	CHAIRMAN, RICHMOND METROPOLITAN AUTHORITY

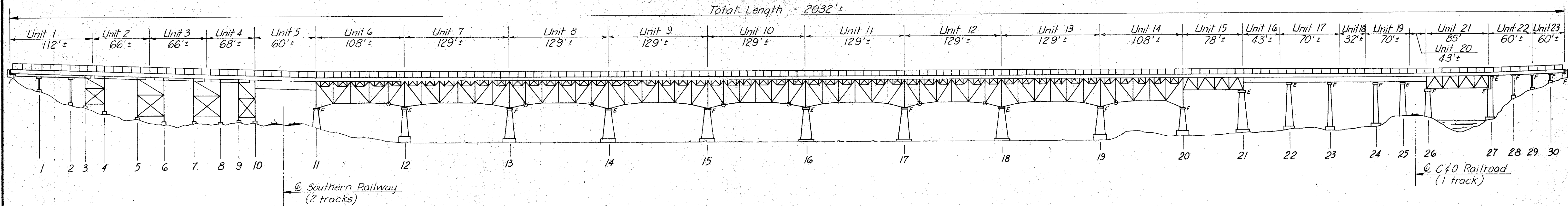
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RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



PLAN

Total Length = 2032'±



ELEVATION

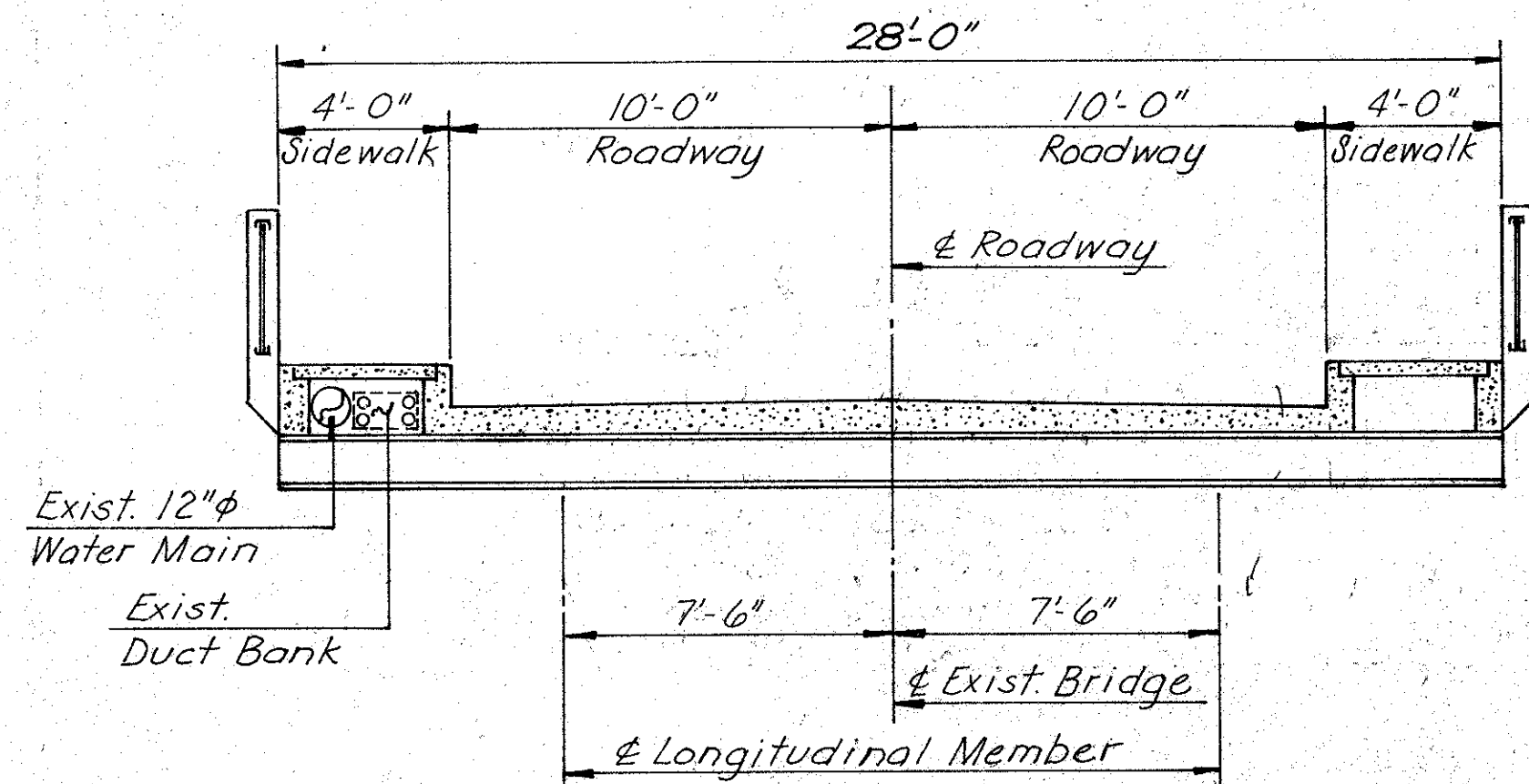
No Scale

GENERAL NOTES:

SPECIFICATIONS: VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS, 1987

THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED IN THE CONTRACT.

THE FLOOR BEAMS, NOS. 17 AT UNIT 16, 18 AT UNIT 17 AND 17 AT UNIT 21 SHALL BE REPAIRED IN CONJUNCTION WITH STEP 1 OF THE BOTTOM CHORD MEMBER REPLACEMENT PROCEDURE.



TYPICAL CROSS SECTION—LOOKING NORTH

No Scale

MADE	BY	DATE	NO.	REVISION	BY	DATE
	EJM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS

KEY PLAN & ELEVATION

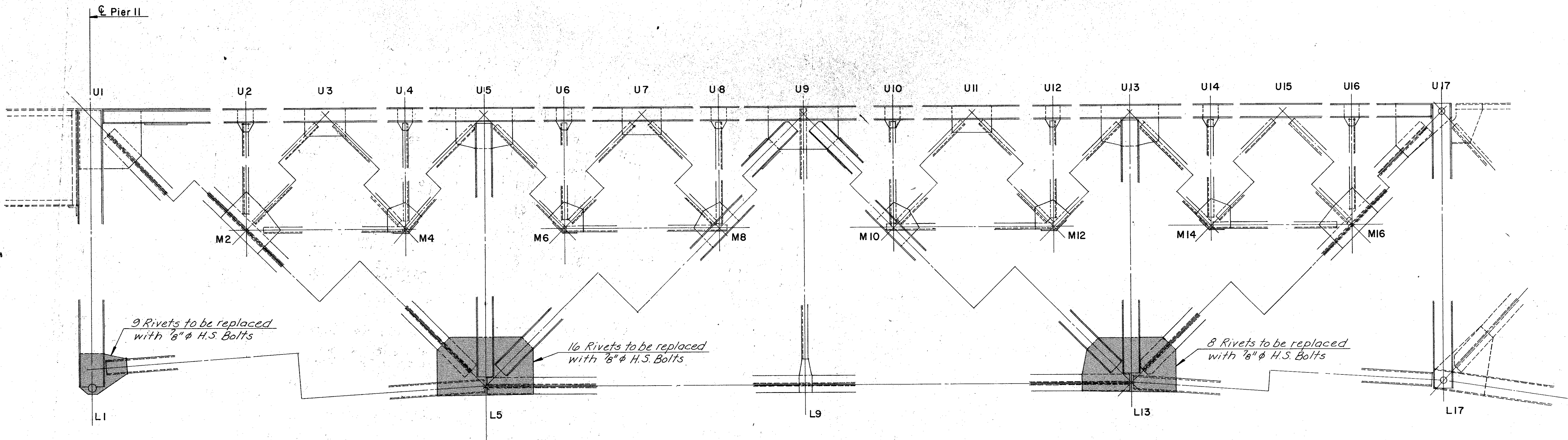
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: No Scale

CONTRACT NO. BB-191

SHEET NO. 1 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



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

Pier 12 →

MADE	CHECKED	IN CHARGE	BY	DATE	NO.	REVISION	BY	DATE
EJM	SR	SR		1-91				

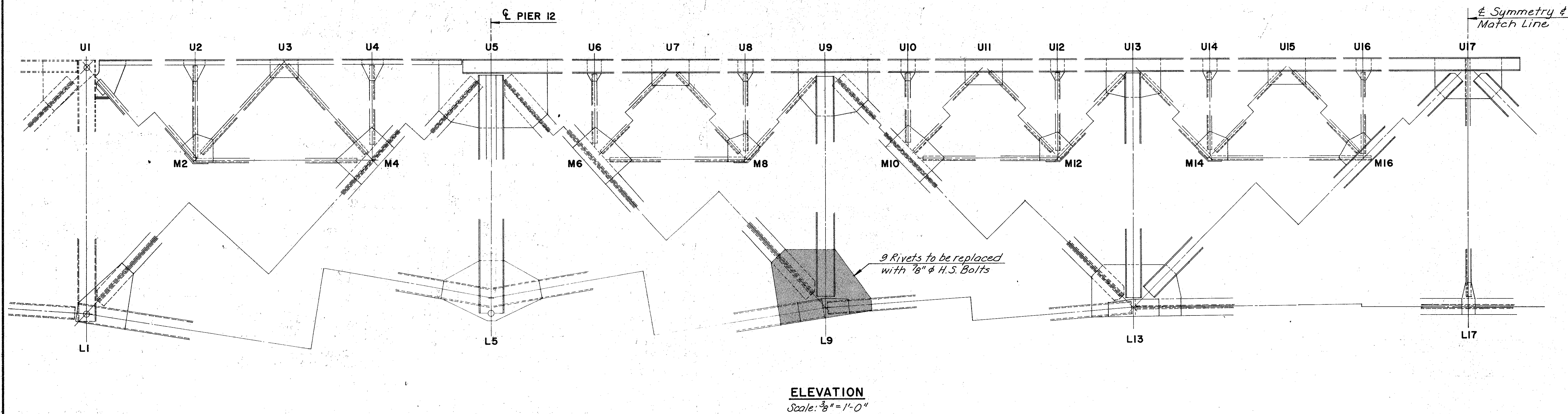
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS
UNIT-6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: As Shown
CONTRACT NO. 98-1-91
SHEET NO. 3 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

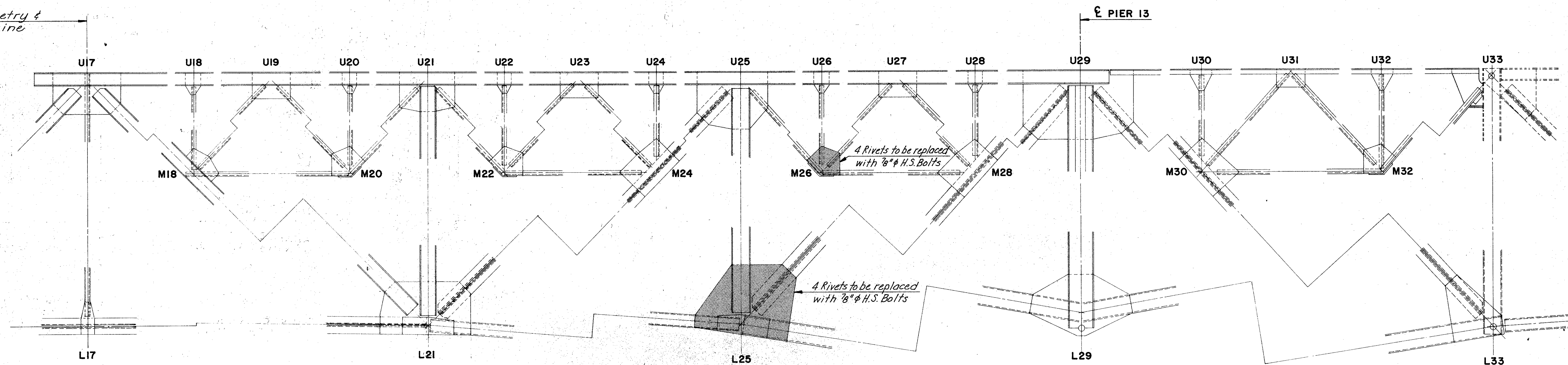


MADE	BY	DATE	NO.	REVISION	BY	DATE
	EUM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR					

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS UNIT-7	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: <i>As Shown</i> CONTRACT NO: <i>BB-1-91</i> SHEET NO. <i>4</i> OF <i>18</i>

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

± Symmetry &
Match Line

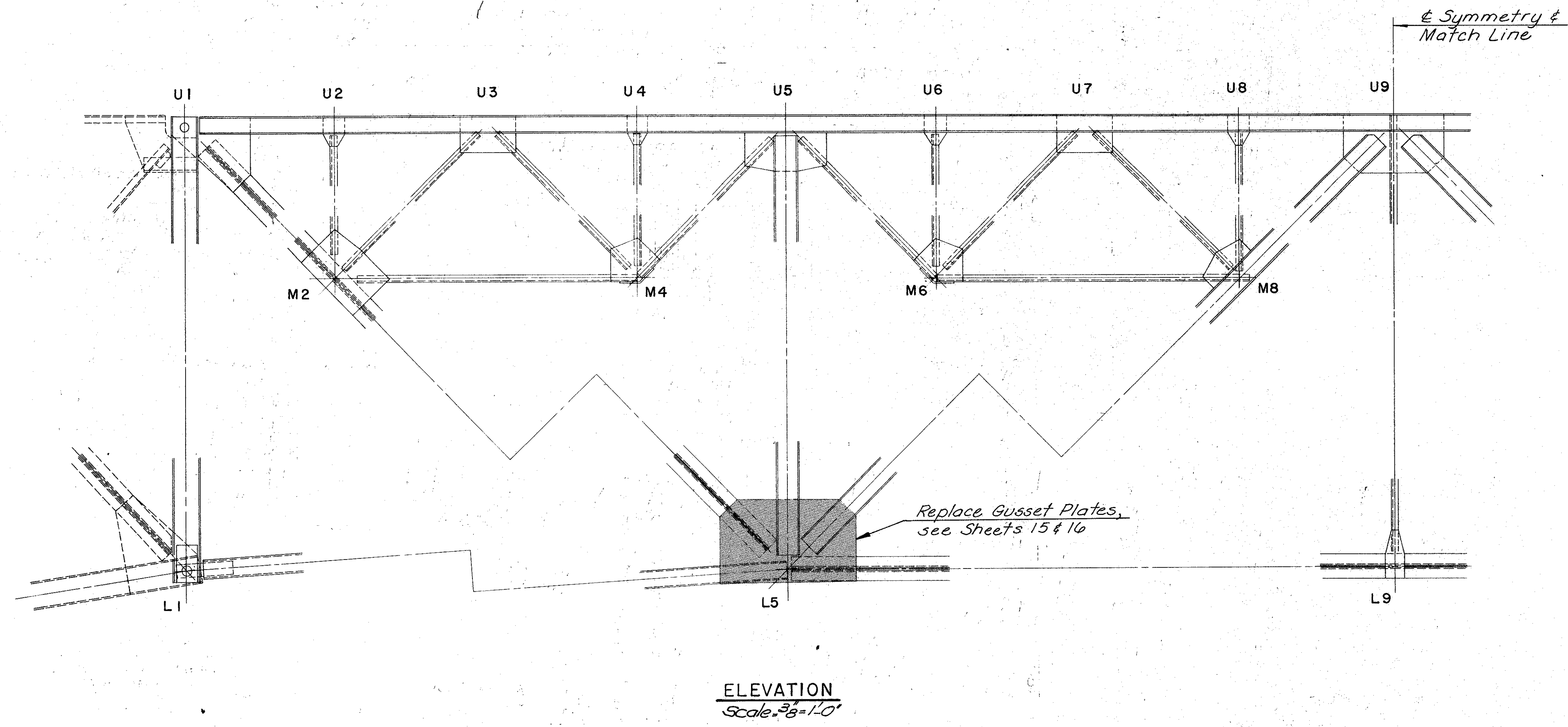


ELEVATION
Scale: 3/8" = 1'-0"

BY	DATE				
MADE	EUM	1-91			
CHECKED	SR	1-91			
IN CHARGE	SR		NO.	REVISION	BY DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS UNIT-7	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: As Shown CONTRACT NO. 88-1-91 SHEET NO. 5 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

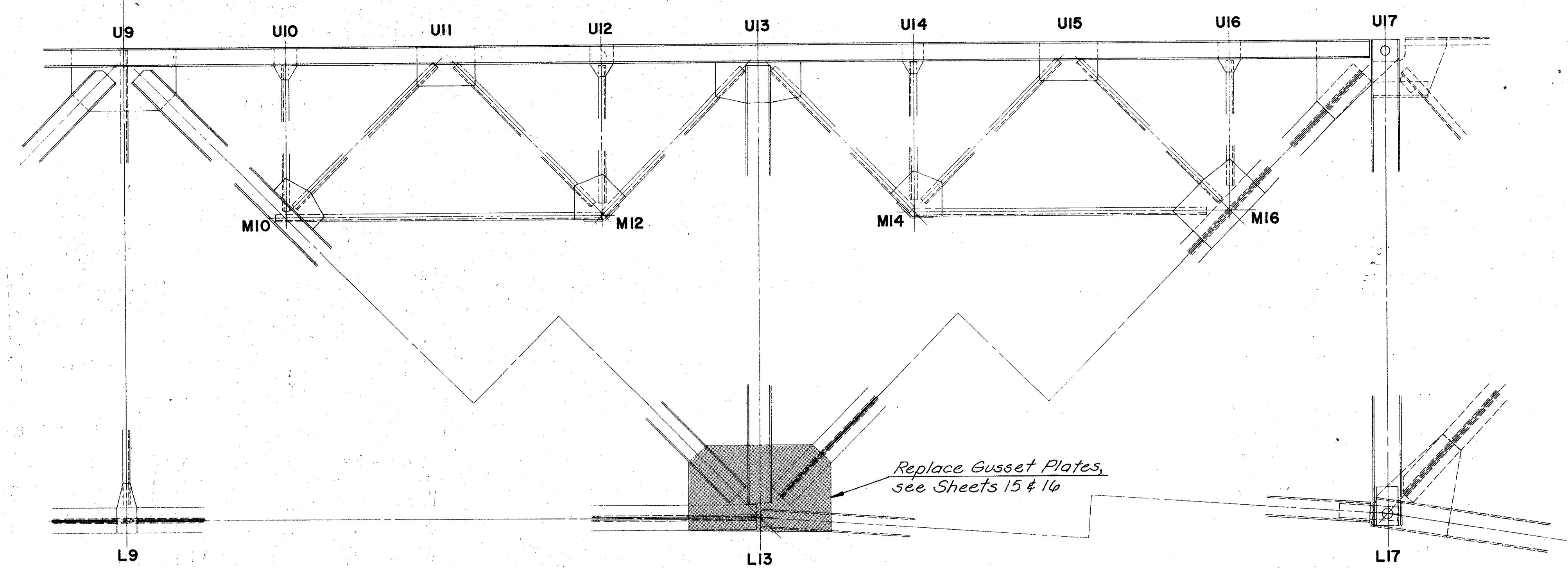


	BY	DATE				
MADE	EUM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS UNIT-8	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: <i>As Shown</i> CONTRACT NO. <i>88-1-91</i> SHEET NO. <i>6</i> OF <i>18</i>

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

± Symmetry & Match Line



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

	BY	DATE				
MADE	EUM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

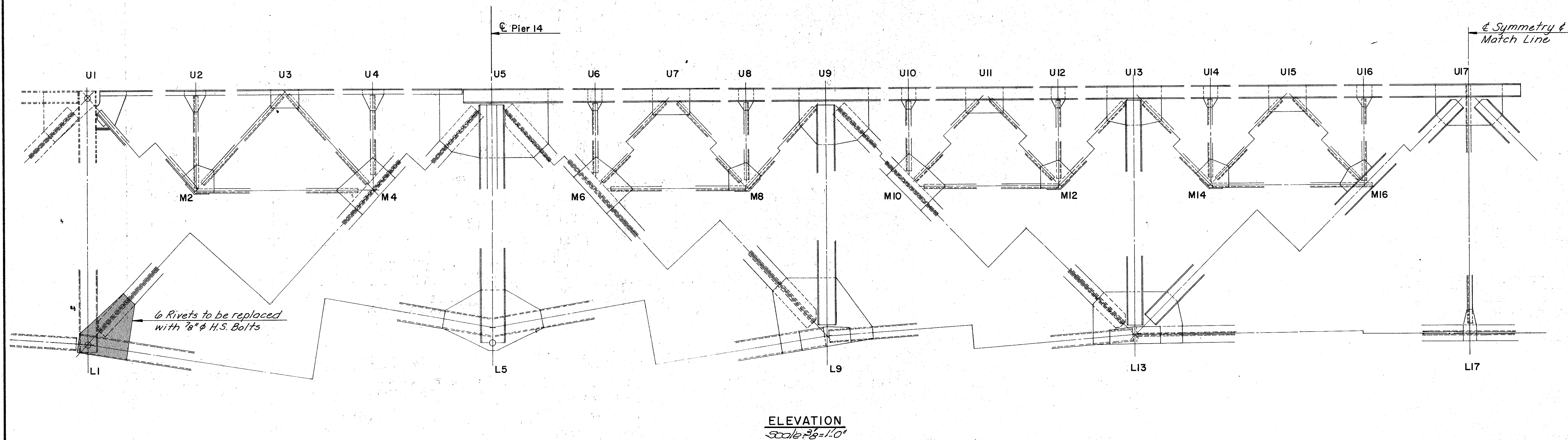
**RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM**

**BOULEVARD BRIDGE
STRUCTURAL REPAIRS
UNIT-8**

HOWARD NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: *As Shown*
CONTRACT NO: *BB-1-91*
SHEET NO. *7* OF *18*

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



	BY	DATE			
MADE	EJM	1-91			
CHECKED	SR	1-91			
IN CHARGE	SR		NO.	REVISION	BY DATE

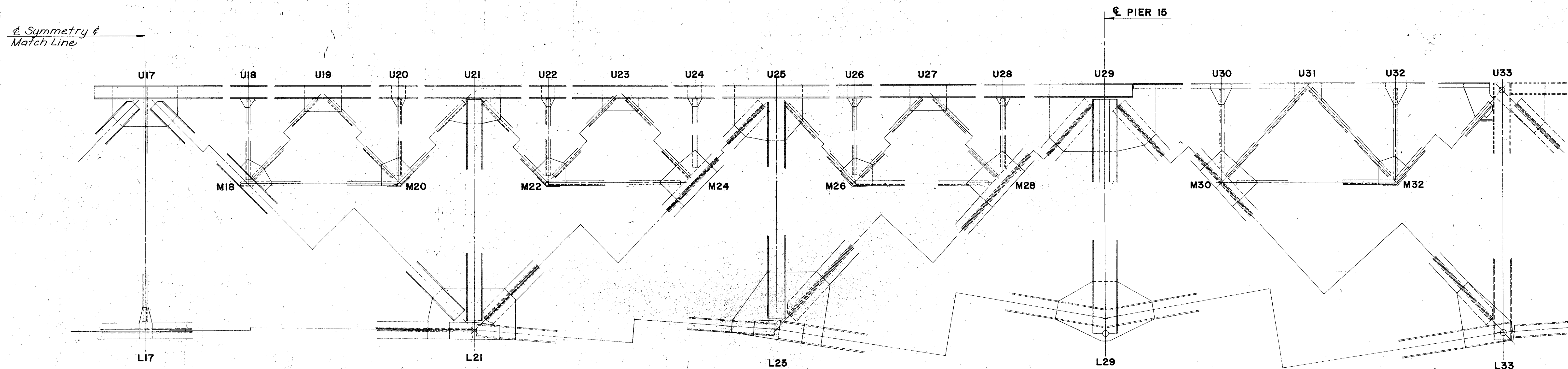
**RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM**

**BOULEVARD BRIDGE
STRUCTURAL REPAIRS
UNIT-9**

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: *As Shown*
CONTRACT NO. *88-1-91*
SHEET NO. *8* OF *18*

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



ELEVATION
 Scale: $\frac{3}{8}'' = 1'-0''$

	BY	DATE				
MADE	EUM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

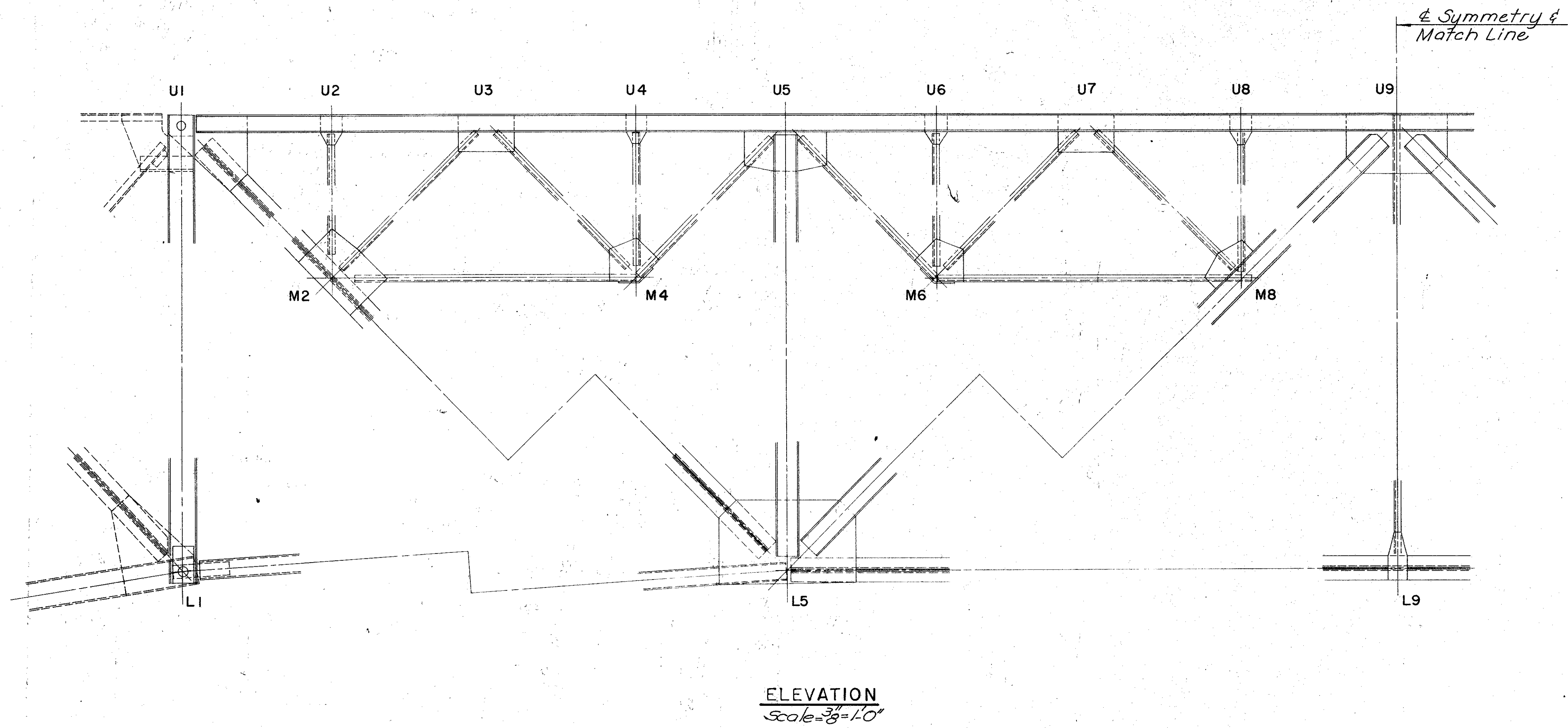
RICHMOND METROPOLITAN AUTHORITY
 RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
 STRUCTURAL REPAIRS
 UNIT-9

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
 consulting engineers
 Alexandria, Virginia

SCALE: *As Shown*
 CONTRACT NO. *88-1-91*
 SHEET NO. *9* OF *18*

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



	BY	DATE				
MADE	EJM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS

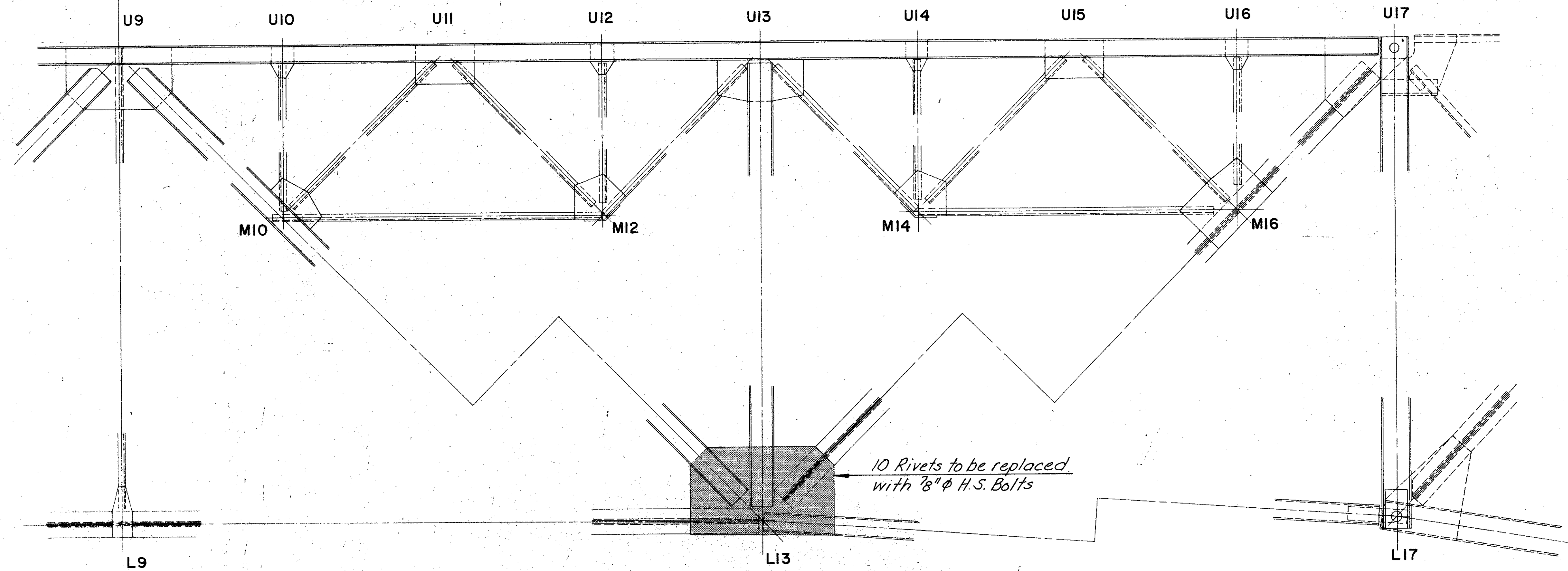
UNIT-10

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: *As Shown*
CONTRACT NO. *BB-1-91*
SHEET NO. *10* OF *18*

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

*± Symmetry &
Match Line*

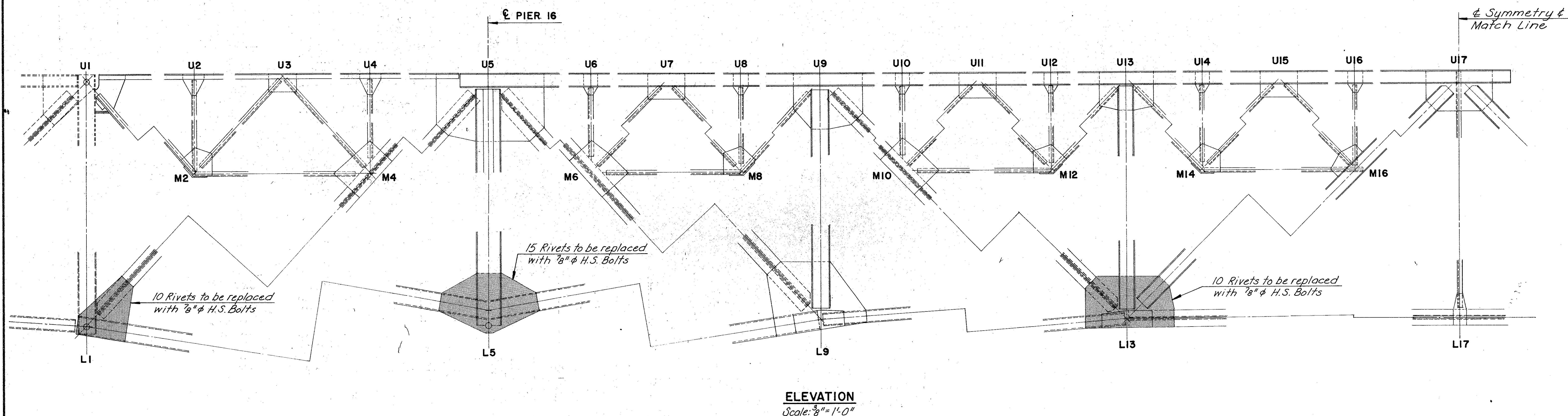


ELEVATION
Scale: 3/8" = 1'-0"

	BY	DATE				
MADE	EUM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS UNIT-10	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: <i>As Shown</i> CONTRACT NO. <i>88-191</i> SHEET NO. <i>11</i> OF <i>18</i>

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



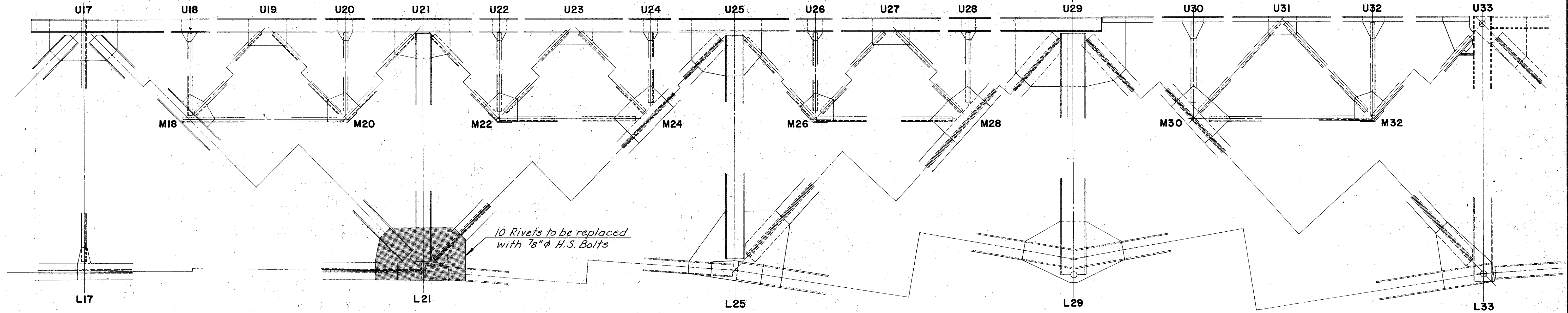
	BY	DATE			
MADE	EJM	1-91			
CHECKED	SR	1-91			
IN CHARGE	SR		NO.	REVISION	BY
					DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS UNIT-II	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: <i>As Shown</i> CONTRACT NO: <i>BB-1-91</i> SHEET NO <i>12</i> of <i>18</i>

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

± Symmetry & Match Line

← PIER 17



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

	BY	DATE				
MADE	EJM	1-91				
CHECKED	SR	1-91				
IN CHARGE	SR		NO.	REVISION	BY	DATE

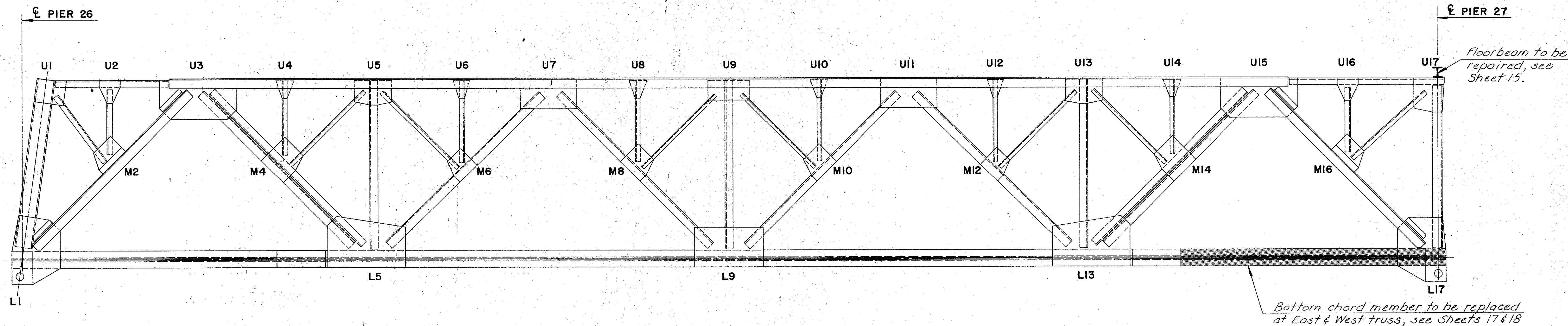
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS
UNIT-II

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: As Shown
CONTRACT NO: BB-1-91
SHEET NO. 13 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



ELEVATION
Scale: $\frac{3}{8}'' = 1'-0''$

MADE	BY	DATE			
CHECKED	SR	1-91			
IN CHARGE	SR		NO.	REVISION	BY
					DATE

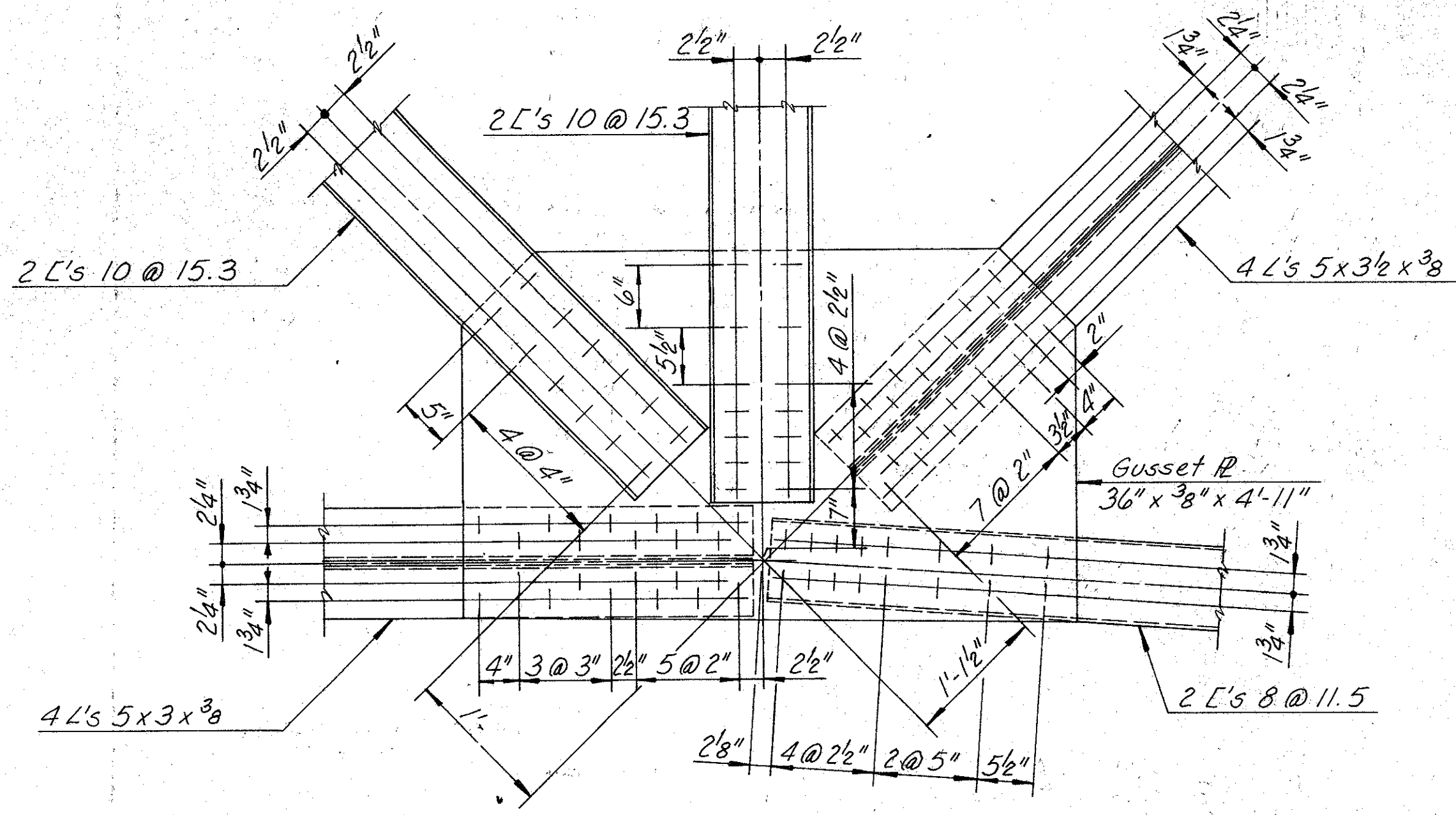
RICHMOND METROPOLITAN AUTHORITY
- RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS
UNIT-21

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

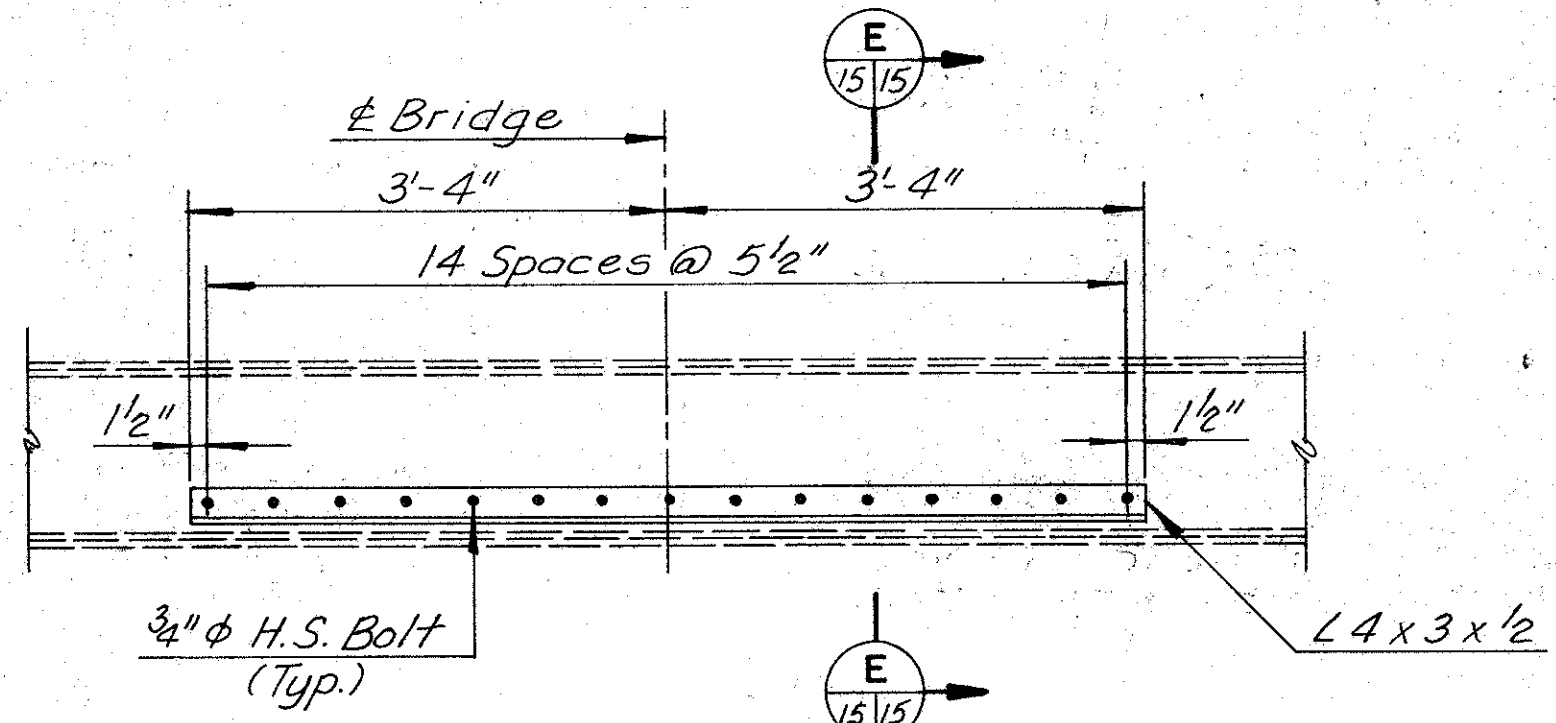
SCALE: *As Shown*
CONTRACT NO. *88-1-91*
SHEET NO. *14* OF *18*

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

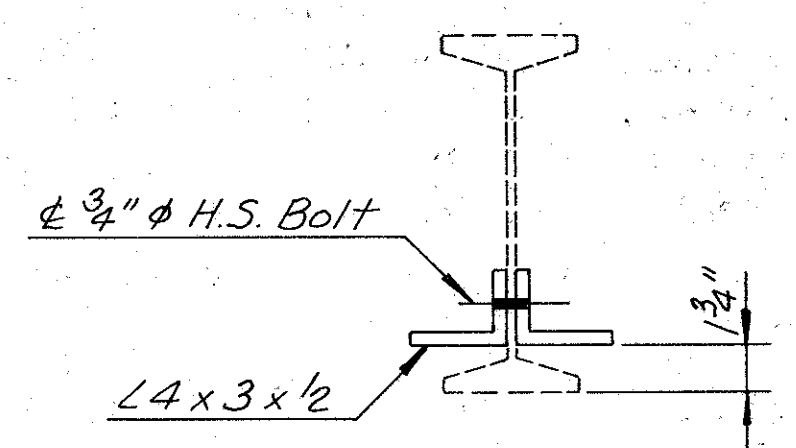


EXISTING
Scale: 1"=1'-0"

NOTE:
For suggested gusset plate replacement procedure, see Sheet 16.
The Contractor shall complete the replacement of the exterior gusset plate prior to any work being performed on the interior gusset plate.

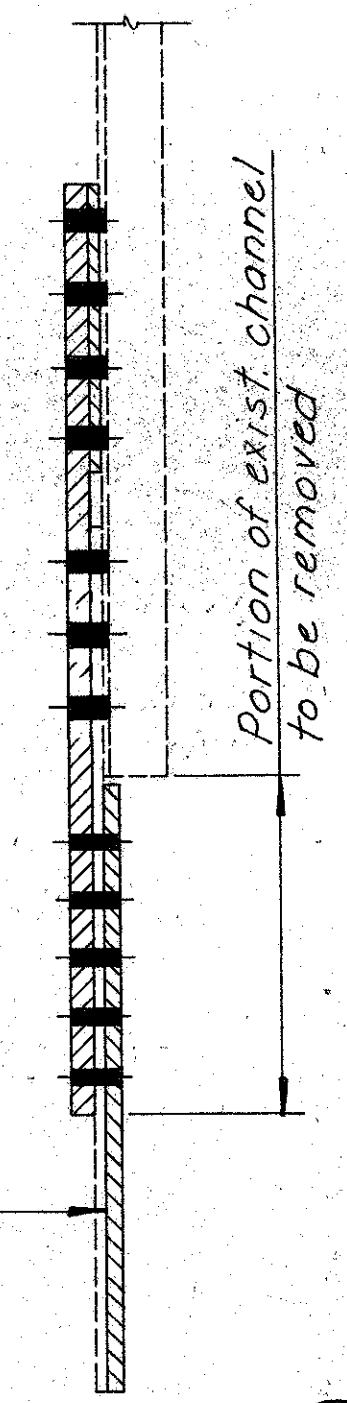


FLOORBEAM REPAIR-ELEVATION
No Scale

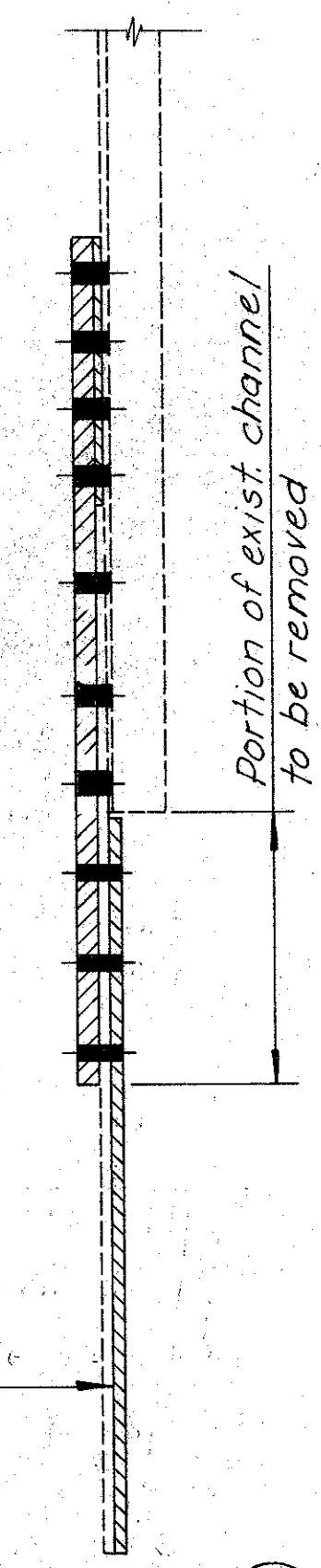


SECTION E
No Scale

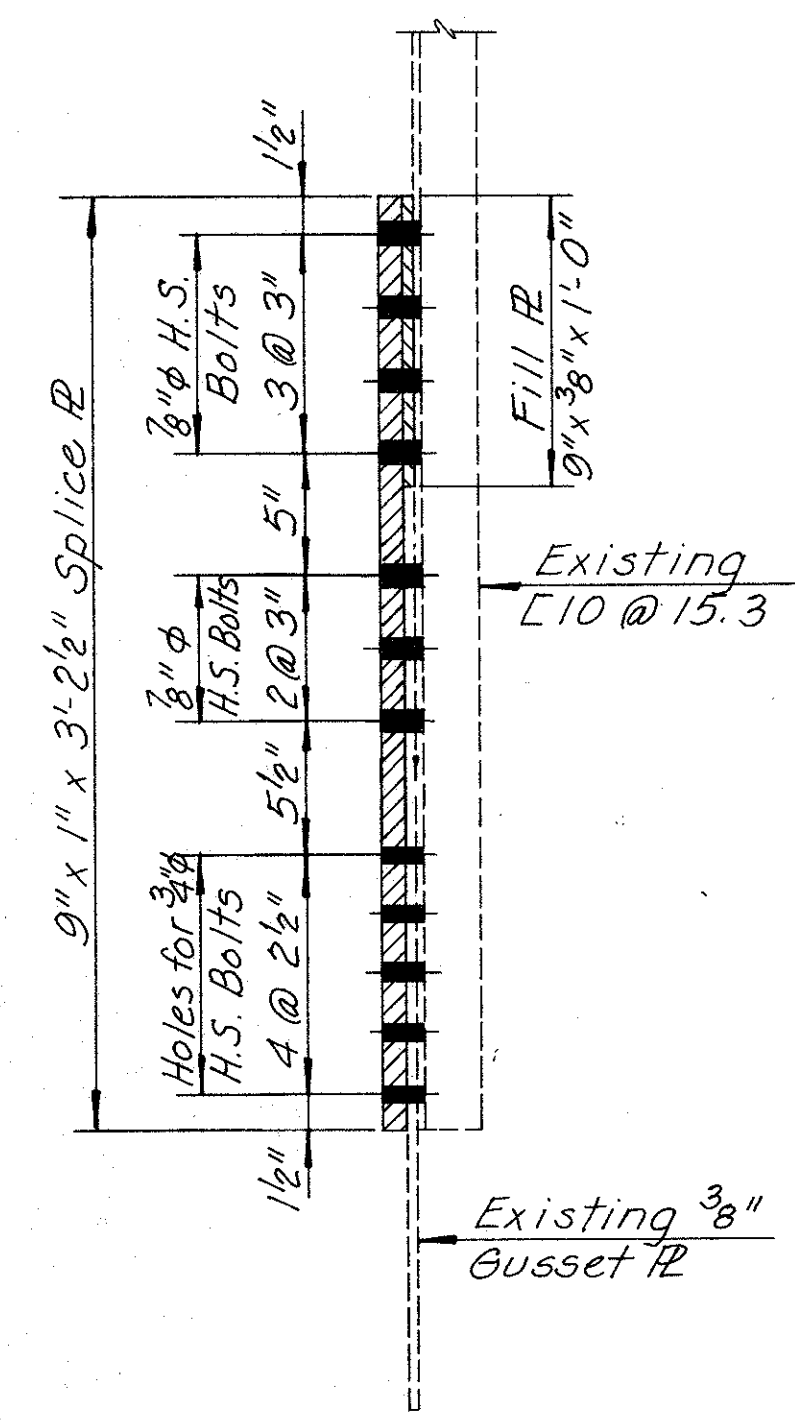
MADE	CHECKED	IN CHARGE	BY	DATE	NO.	REVISION	BY	DATE
EUM	SR	SR		1-91				



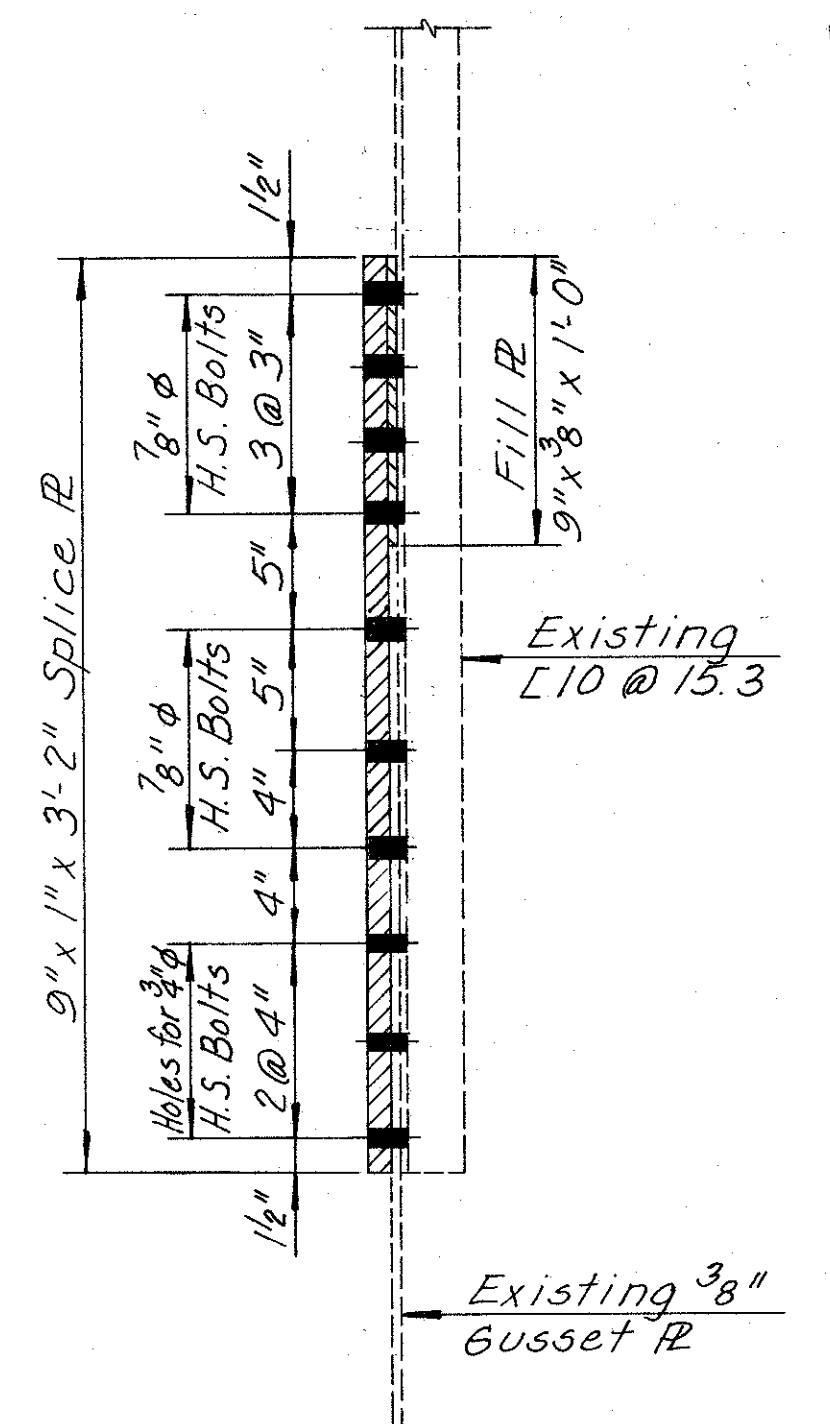
SECTION C
Scale: 1/2"=1'-0"
(For dimensions not shown see Section A-A)



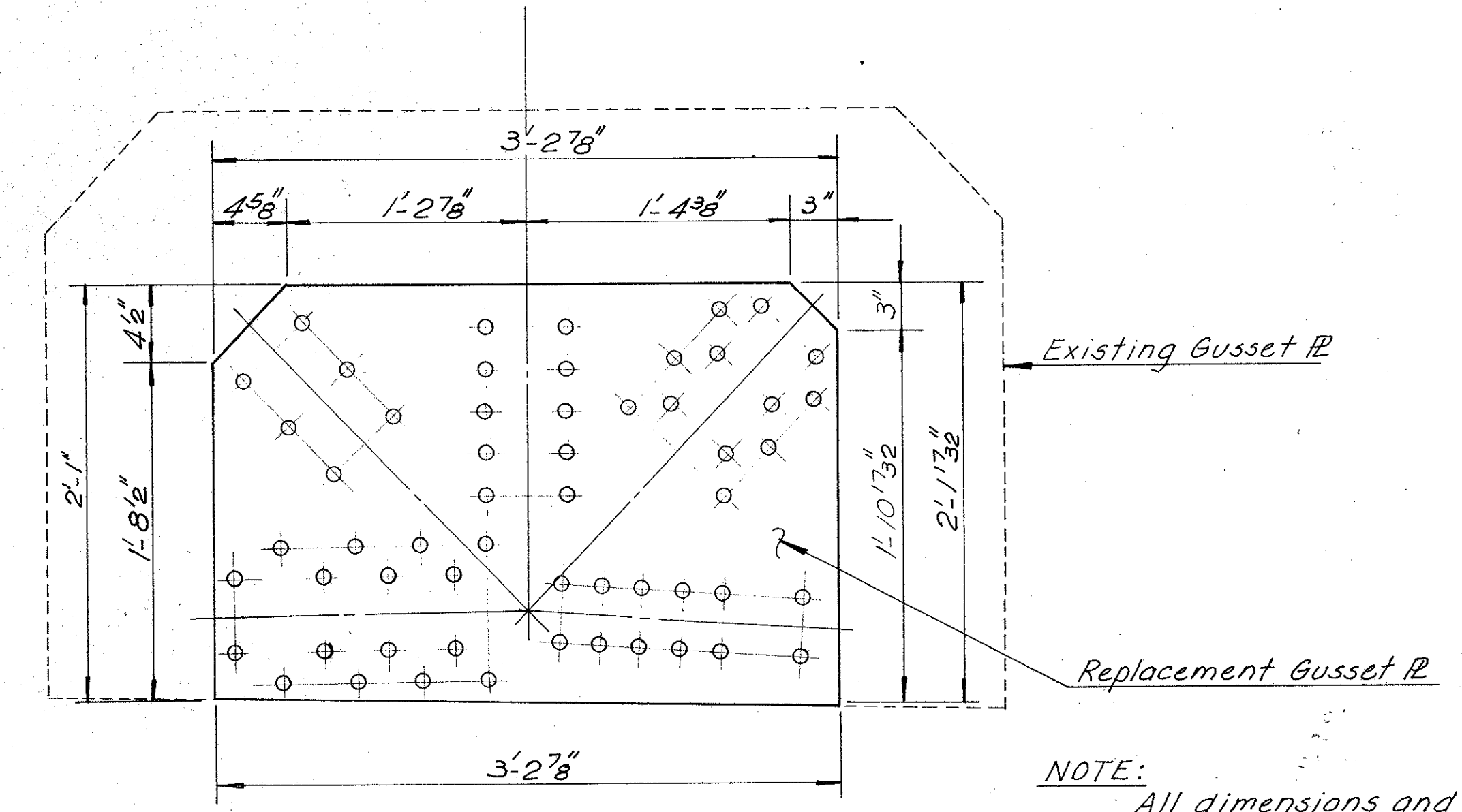
SECTION D
Scale: 1/2"=1'-0"
(For dimensions not shown see Section B-B)



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



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



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

NOTE:
All dimensions and hole locations to be field verified.

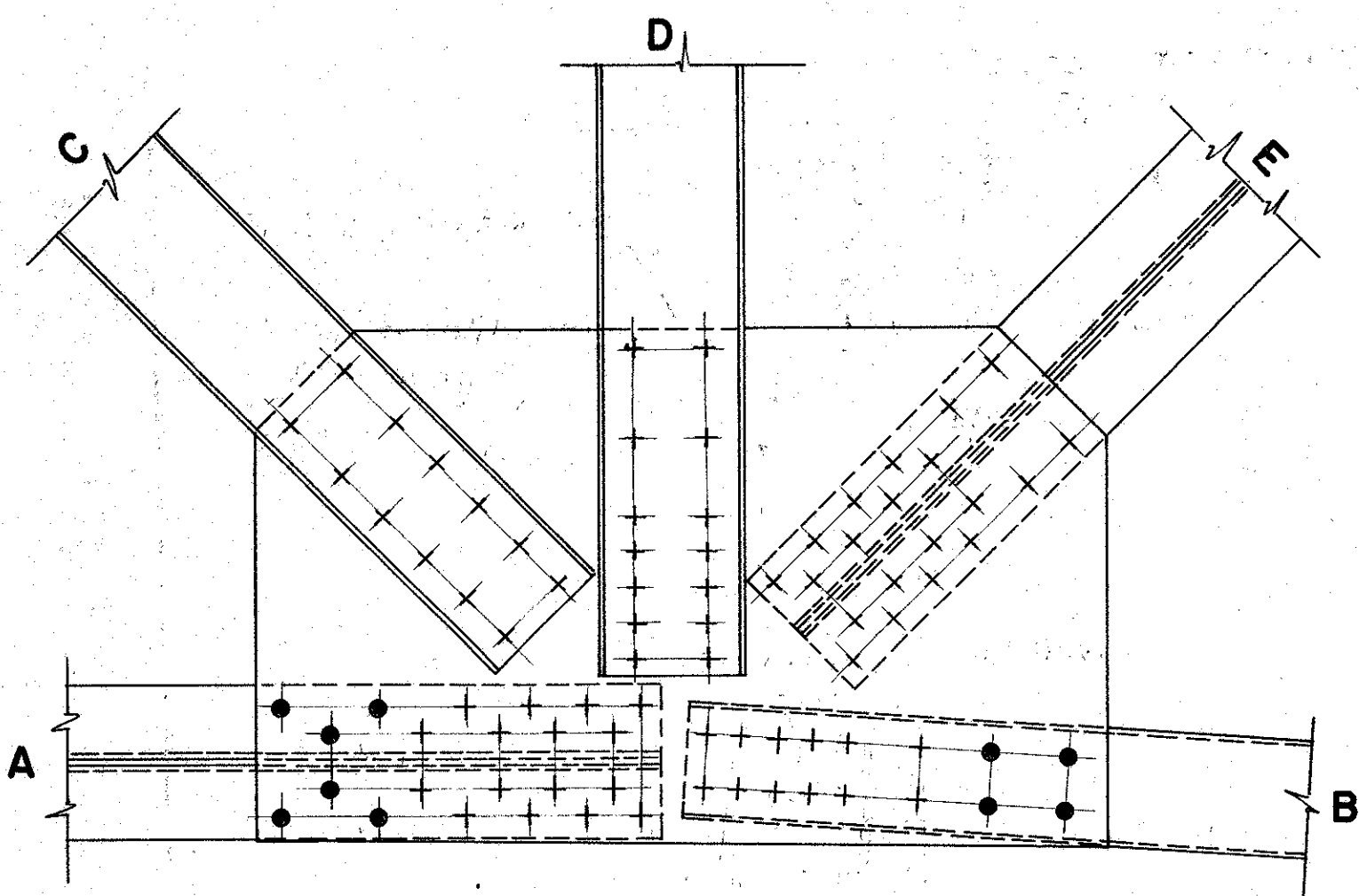
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS
GUSSET PLATE REPLACEMENT

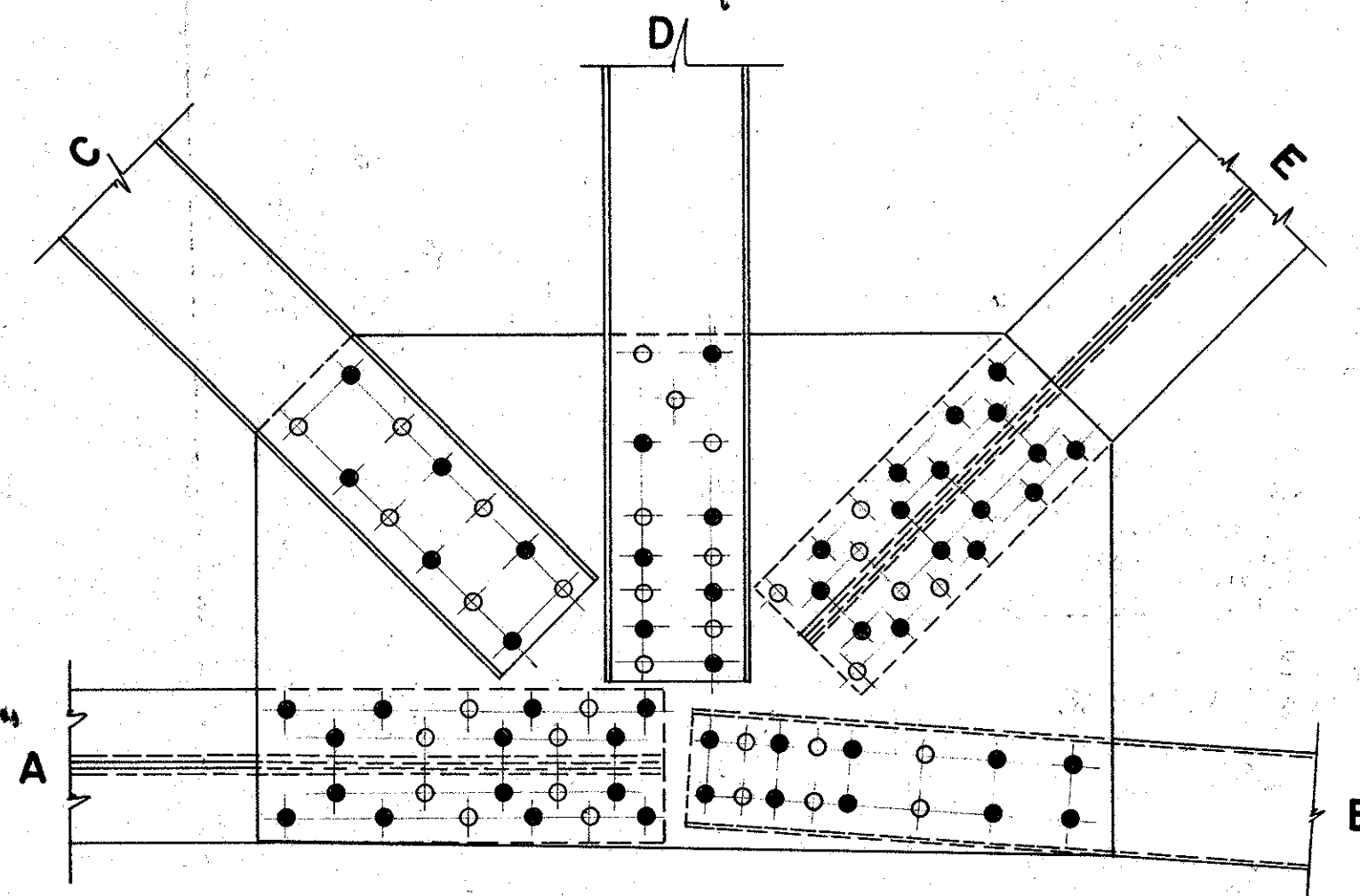
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia
CONTRACT NO. 3B-1-91
SHEET NO. 15 OF 18

SCALE: As Shown

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

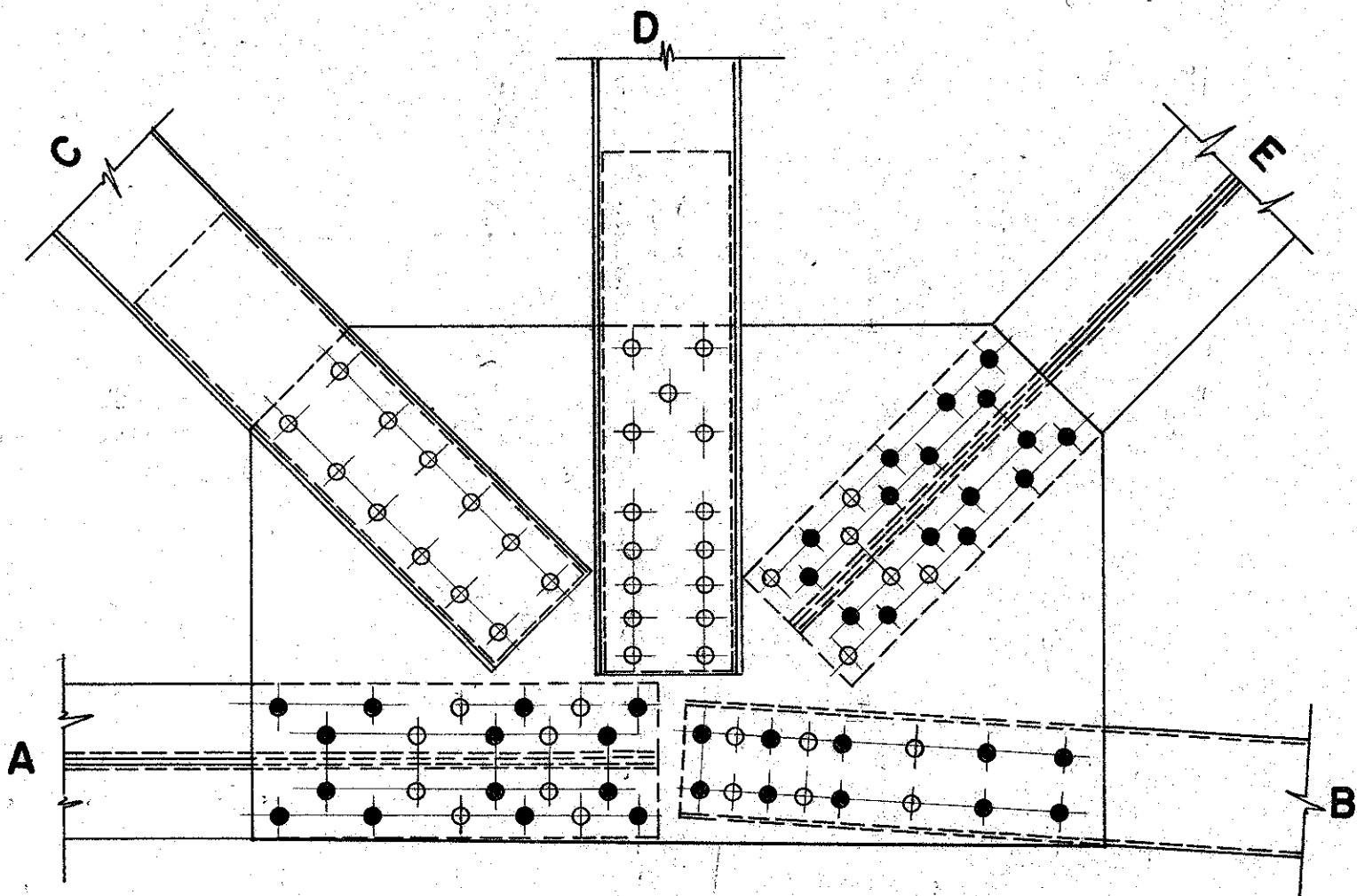


1. MEMBER A - REMOVE 6 RIVETS CLOSEST TO GUSSET PLATE EDGE, REAM HOLES TO 15/16" Ø AND REPLACE WITH TORQUED 7/8" Ø H.S. BOLTS. RIVETS TO BE SINGULARLY REMOVED AND REPLACED WITH TORQUED BOLTS.
2. MEMBER B - REMOVE 4 RIVETS CLOSEST TO GUSSET PLATE EDGE, REAM HOLES TO 15/16" Ø AND REPLACE WITH TORQUED 7/8" Ø H.S. BOLTS. RIVETS TO BE SINGULARLY REMOVED AND REPLACED WITH TORQUED BOLTS.

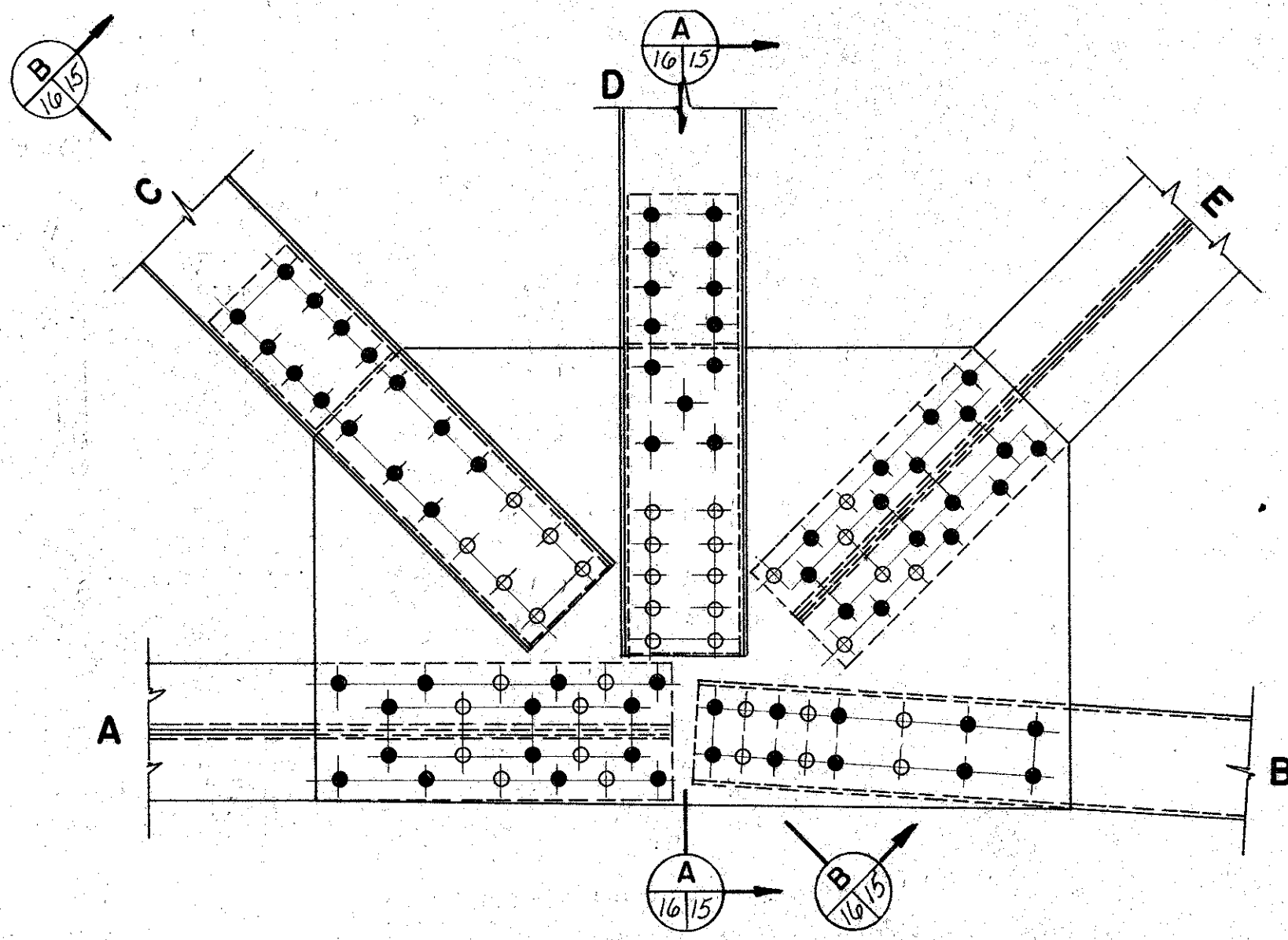


3. MEMBERS A AND B - REMOVE REMAINING RIVETS, ONE AT A TIME, REAM HOLE TO 15/16" Ø AND FILL HOLES WITH 50% DRIFT PINS, 50% SNUG TIGHT 7/8" Ø H.S. BOLTS, TO PRODUCE A UNIFORM PIN/BOLT PATTERN. MEMBERS A AND B MAY BE WORKED UPON SIMULTANEOUSLY, HOWEVER NO MORE THAN ONE CONNECTOR MAY BE ABSENT FROM ANY MEMBER.
4. MEMBERS C, D AND E - REMOVE RIVETS, ONE AT A TIME AND FILL HOLES WITH 50% DRIFT PINS AND 50% 7/8" Ø H.S. BOLTS TO PRODUCE A UNIFORM PIN/BOLT PATTERN. ADD ONE NEW HOLE TO MEMBER D PATTERN AND TWO NEW HOLES TO MEMBER E PATTERN PER DETAIL. MEMBERS A, B AND C MAY BE WORKED UPON SIMULTANEOUSLY, HOWEVER NO MORE THAN ONE CONNECTOR MAY BE ABSENT FROM ANY MEMBER. TEN HOLES IN MEMBER E, LOCATED CLOSEST TO GUSSET PLATE EDGE, TO BE FILLED WITH TORQUED 7/8" Ø H.S. BOLTS.

NOTE: COMPLETE ALL TASKS ASSOCIATED WITH EXTERIOR GUSSET BEFORE DOING ANY WORK ON INTERIOR GUSSET. ONLY ONE HOLE IS TO BE OPEN IN MEMBER A, B, C, D OR E AT ONE TIME. LACING BAR AND BATTEN PLATE REMOVAL AND REPLACEMENT MAY BE ASSOCIATED WITH MEMBER C AND D WORK.



5. MEMBERS C AND D - MEASURE CONNECTOR PATTERN FOR USE IN FABRICATION OF 1" INTERIOR SPLICE PLATE AND EXTERIOR 5/8" GUSSET PLATE. HOLES IN SPLICE PLATE CAN BE DRILLED TO 1" Ø FOR 7/8" Ø H.S. BOLTS.
6. MEMBERS A, B AND E - MEASURE CONNECTOR PATTERN FOR USE IN FABRICATION OF 3/4" GUSSET PLATE. HOLES IN GUSSET PLATE CAN BE DRILLED TO 1" FOR 7/8" Ø H.S. BOLTS.
7. FABRICATE SPLICE PLATES AND GUSSET PLATE. PROVIDE FILL PLATES. EIGHT HOLES AT TOP END OF SPLICE PLATES AND HOLES IN FILL PLATES TO BE DRILLED IN FIELD AT TIME MEMBERS C AND D ARE DRILLED.
8. MEMBERS C AND D - REPLACE SNUG TIGHT H.S. BOLTS WITH DRIFT PINS AND CAREFULLY ERECT 1" SPLICE PLATES OVER DRIFT PINS.



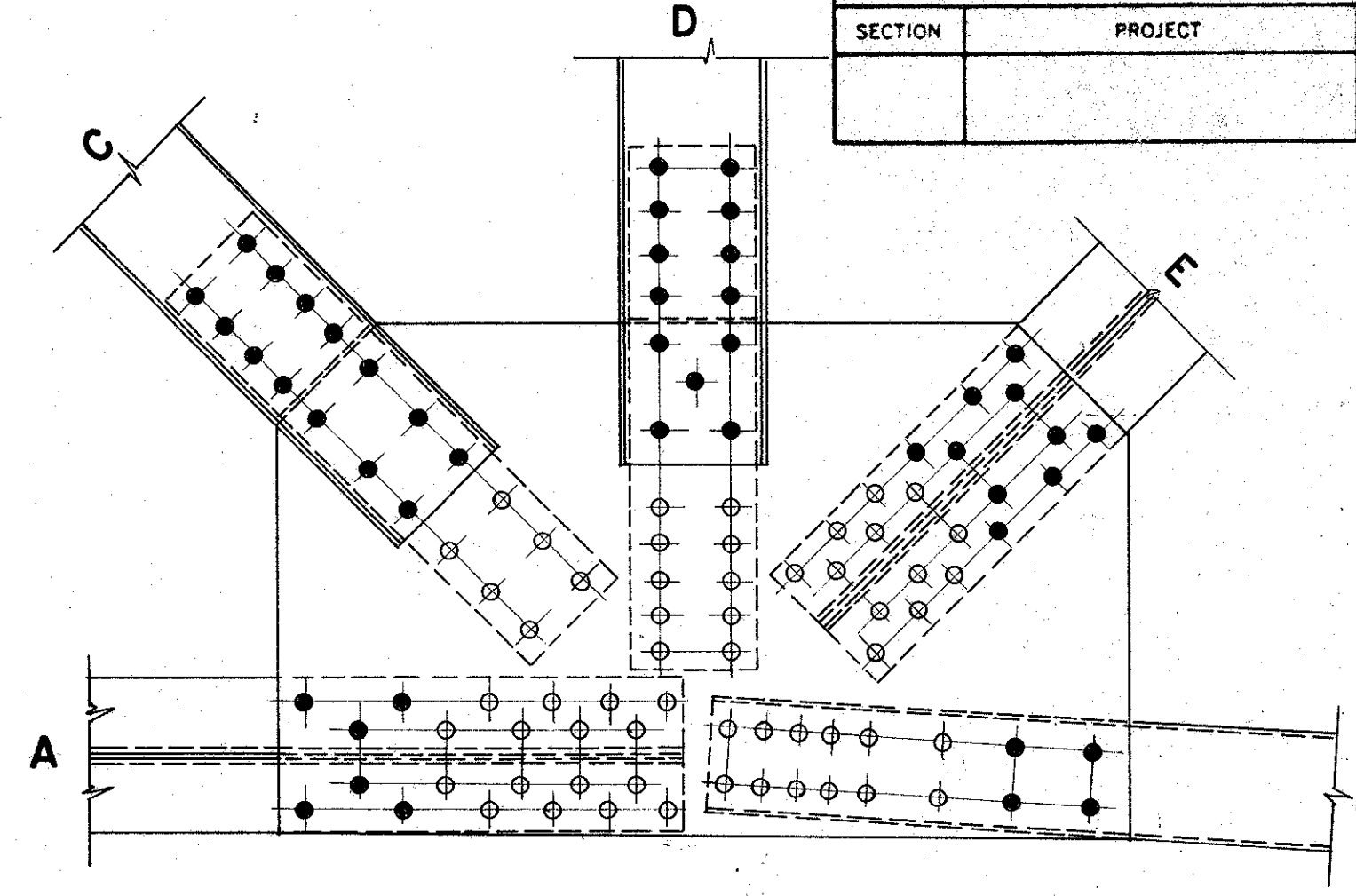
9. REPLACE DRIFT PINS NEAR GUSSET EDGE, 6 IN MEMBER C AND 5 IN MEMBER D, WITH SNUG TIGHT 7/8" Ø H.S. BOLTS. AT MEMBERS C AND D, DRILL 15/16" Ø HOLES FOR AND INSTALL 8 SNUG TIGHT 7/8" Ø H.S. BOLTS AT TOP END OF SPLICE PLATES (DRILL THROUGH CHANNEL, FILL PLATE AND SPLICE PLATE).

LEGEND:

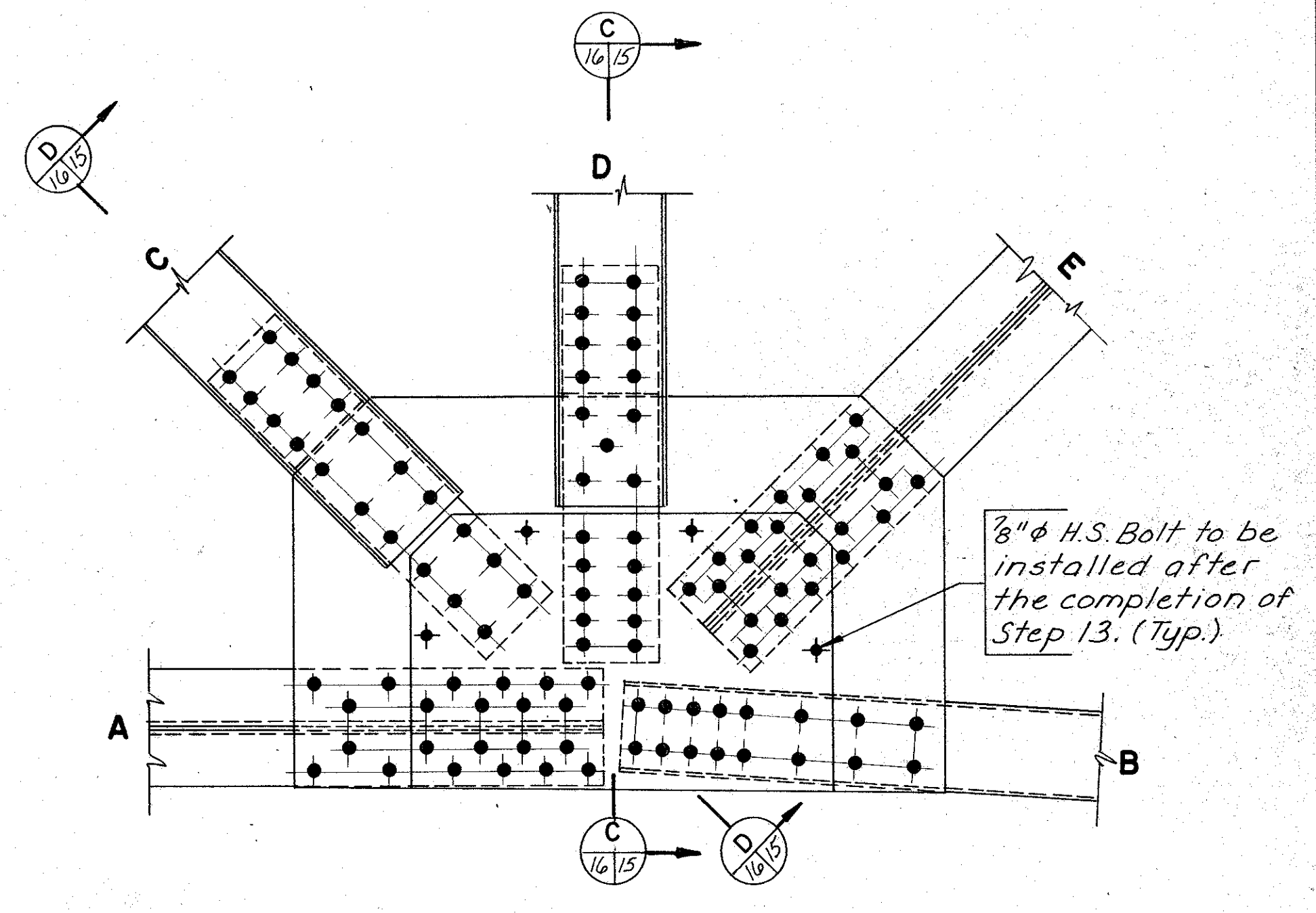
- + 3/4" Ø RIVETS
- * 3/4" Ø RIVETS TO BE REMOVED
- * 7/8" Ø H.S. BOLTS TO BE REMOVED
- ◆ 7/8" Ø H.S. BOLTS
- ◆ DRIFT PINS

NOTE TO CONTRACTOR:

Steps 10 thru 12 shall be a continuous operation. A Flagman shall be posted at the north end of the bridge to prevent any vehicle that exceeds the posted gross weight limits from crossing during these procedures.



10. MEMBERS C AND D - LOOSEN THE SNUG TIGHT 7/8" Ø H.S. BOLTS AS NEEDED TO INSERT 10 GA. STAINLESS STEEL PLATE BETWEEN CHANNEL AND GUSSET AT MEMBER CUT LINE. REMOVE MEMBER END WITH AIR ARC, ACETYLENE TORCH OR ABRASIVE SAW. FULLY TORQUE H.S. BOLTS LOCATED BEYOND LIMITS OF NEW 3/4" GUSSET PLATE.
11. MEMBERS A, B AND E - REPLACE SNUG TIGHT H.S. BOLTS WITH DRIFT PINS.



12. CAREFULLY ERECT GUSSET OVER DRIFT PINS AND INSTALL 7/8" Ø H.S. BOLTS. ONLY ONE HOLE IS TO BE OPEN IN MEMBER A, B, C, D OR E AT ONE TIME.
13. REPEAT SEQUENCE ON INTERIOR GUSSET PLATE. GUSSET WHICH CONNECTS STRUT AND LATERAL TO PANEL POINT MAY BE TRIMMED ALONG GUSSET PLATE EDGE IF NEEDED. CLIP ANGLE TO BE REPLACED WITH A NEW ANGLE OF SAME SIZE; HOLES IN VERTICAL LEG CAN BE SHOP DRILLED TO 1". HOLES IN OUTSTANDING LEG TO BE FIELD DRILLED USING LATERAL GUSSET AS A GUIDE - CONNECT WITH 7/8" Ø H.S. BOLTS.

EDGES OF GUSSET AND SPLICE PLATES AND GAP AT END OF FILL PLATES TO BE CAULKED WITH SILICONE SEALANT.

MADE	BY	DATE				
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IN CHARGE	SR		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

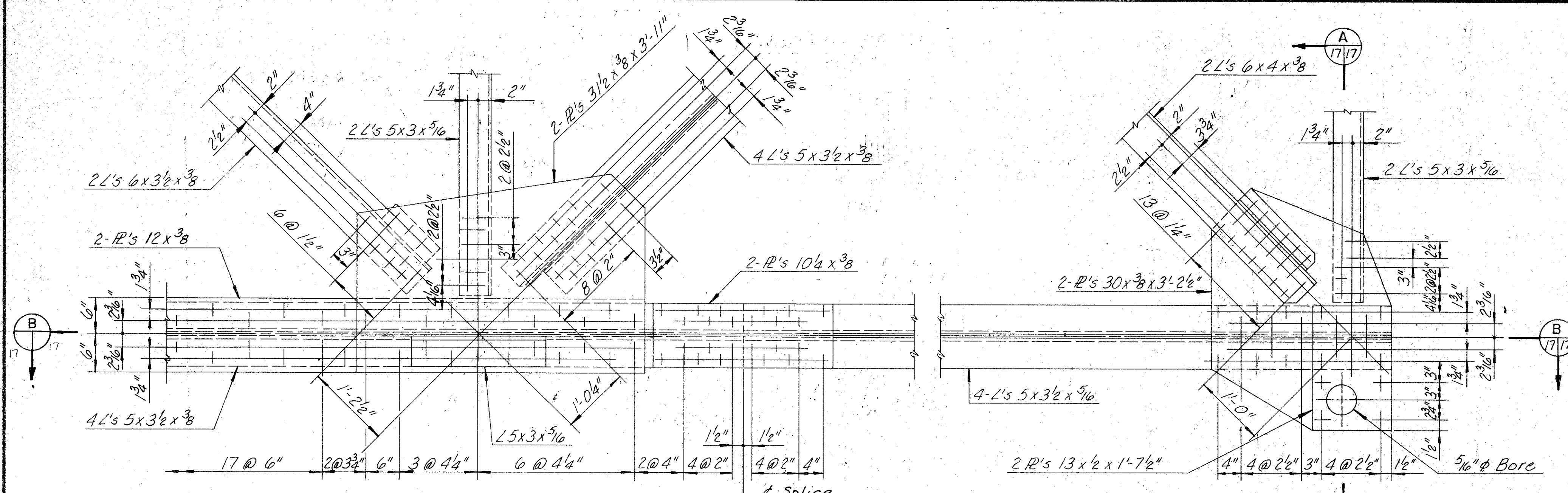
BOULEVARD BRIDGE
STRUCTURAL REPAIRS

GUSSET PLATE REPLACEMENT

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: As Shown
CONTRACT NO. BB-1-91
SHEET NO. 16 OF 18

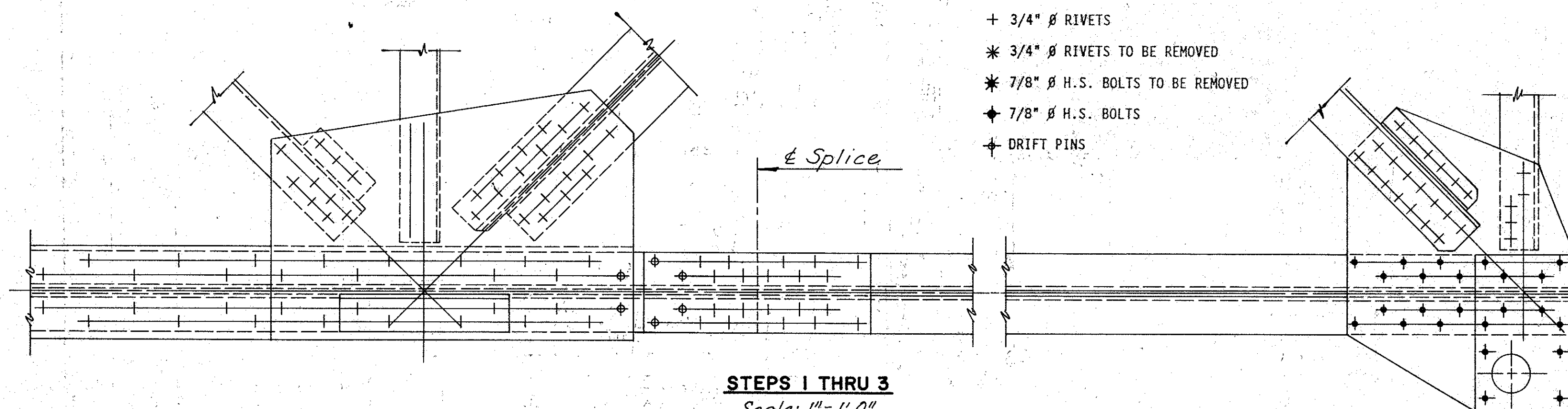
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



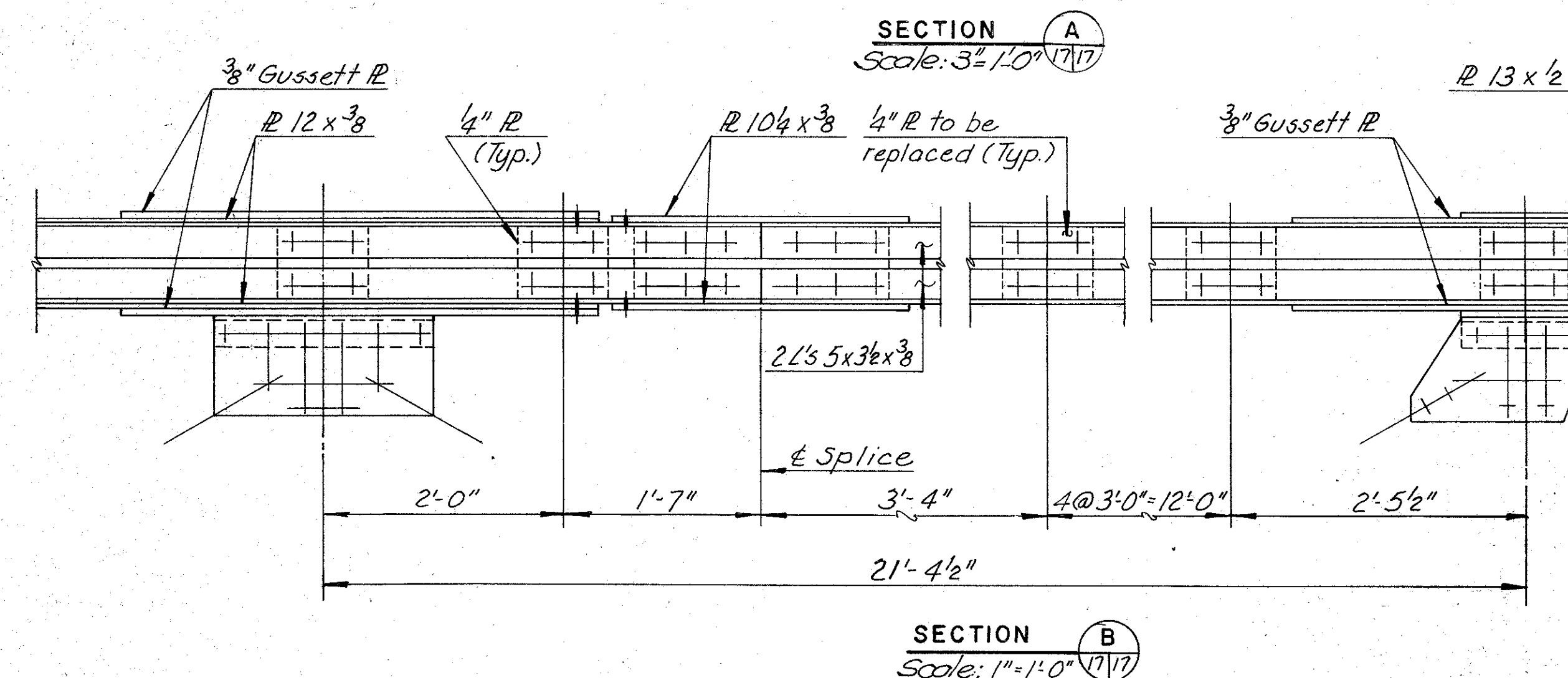
NOTE:
All dimensions shown are to be field verified.

EXISTING
Scale: 1"=1'-0"

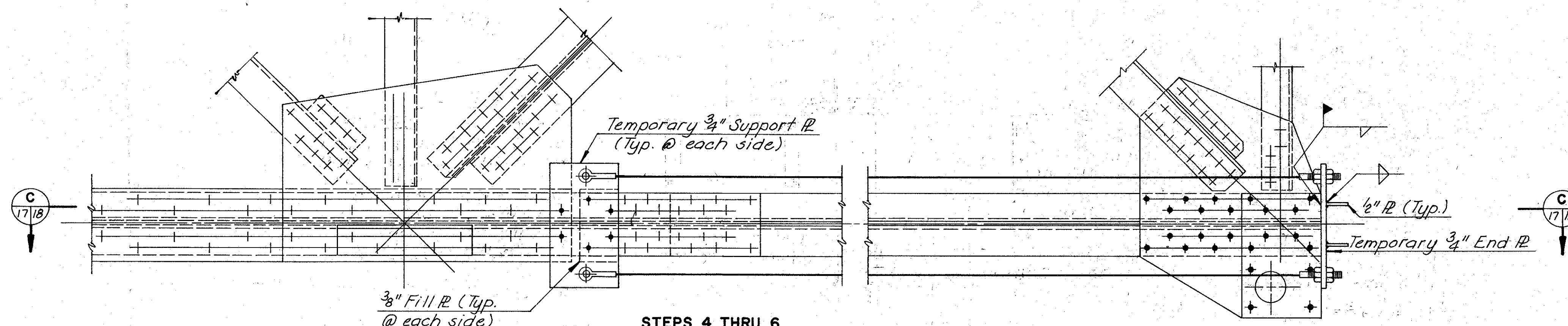
- LEGEND:**
- + 3/4" ϕ RIVETS
 - * 3/4" ϕ RIVETS TO BE REMOVED
 - * 7/8" ϕ H.S. BOLTS TO BE REMOVED
 - ◆ 7/8" ϕ H.S. BOLTS
 - ✦ DRIFT PINS



- STEPS 1 THRU 3**
Scale: 1"=1'-0"
- STEP 1: REMOVE RIVETS AND REAM HOLES TO 5/16" ϕ . REPLACE WITH 50% SNUG TIGHT 7/8" ϕ H.S. BOLTS. RIVETS TO BE SINGULARLY REMOVED AND REPLACED WITH BOLTS.
- STEP 2: REMOVE RIVETS AND REAM HOLES TO 15/16" ϕ AND REPLACE WITH DRIFT PINS.
- STEP 3: MEASURE CONNECTOR PATTERN FOR USE IN FABRICATION OF TEMPORARY SUPPORT PLATE. HOLES IN THE TEMPORARY SUPPORT PLATE CAN BE DRILLED TO 1" ϕ FOR 7/8" H.S. BOLTS.



NOTE:
The removal and replacement with 50% snug tight 7/8" ϕ H.S. Bolts as suggested in Step 1, should be done concurrently for East and West Truss members.

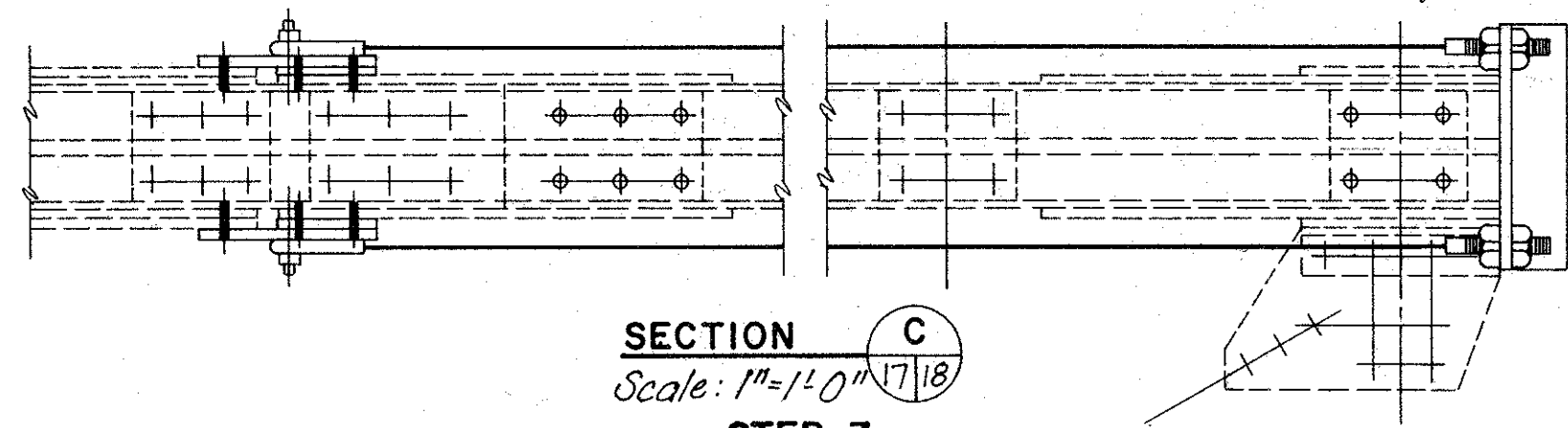


- STEPS 4 THRU 6**
Scale: 1"=1'-0"
- STEP 4: CAREFULLY ERECT TEMPORARY SUPPORT PLATE OVER DRIFT PINS.
- STEP 5: REPLACE DRIFT PINS WITH TORQUED 7/8" ϕ H.S. BOLTS. DRIFT PINS TO BE SINGULARLY REMOVED AND REPLACED WITH TORQUED BOLTS.
- STEP 6: INSTALL TEMPORARY END PLATE AND THE 4 TEMPORARY CABLES OR ANY OTHER APPROVED DEVICE AND APPLY SIMULTANEOUSLY 20 KIPS TENSION ON EACH CABLE.

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	EJM	1-91			
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IN CHARGE	SR		NO.	REVISION	BY

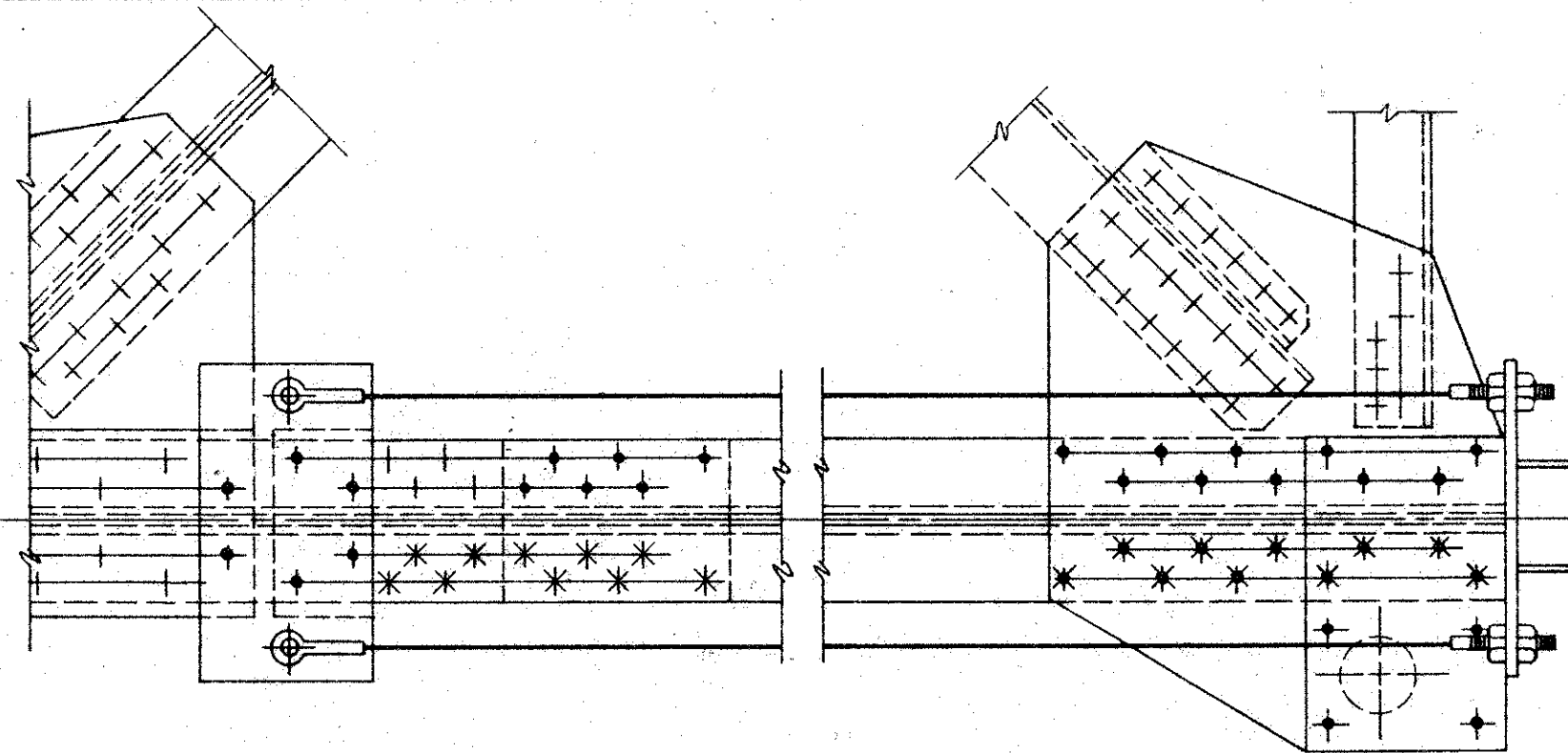
RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE STRUCTURAL REPAIRS BOTTOM CHORD MEMBER REPLACEMENT	
HOWARD NEEDLES, TAMMEN & BERGENDOFF consulting engineers Alexandria, Virginia	SCALE: As Shown CONTRACT NO. BB-1-91 SHEET NO. 17 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



SECTION C
Scale: 1"=1'-0" 17/18
STEP 7

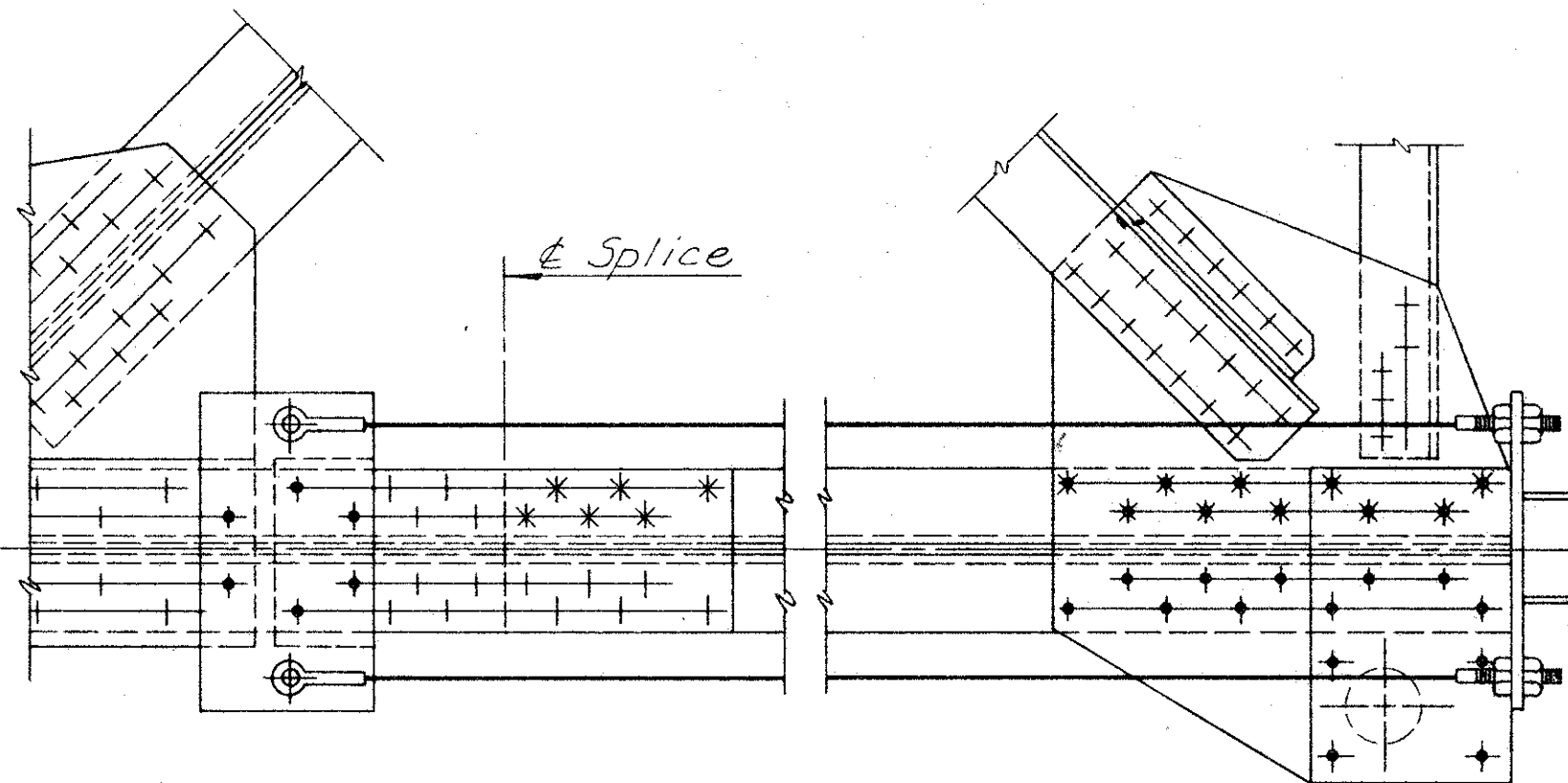
STEP 7: REMOVE RIVETS AND REAM HOLES TO 15/16" Ø AND REPLACE WITH DRIFT PINS.



STEP 10
Scale: 1"=1'-0"

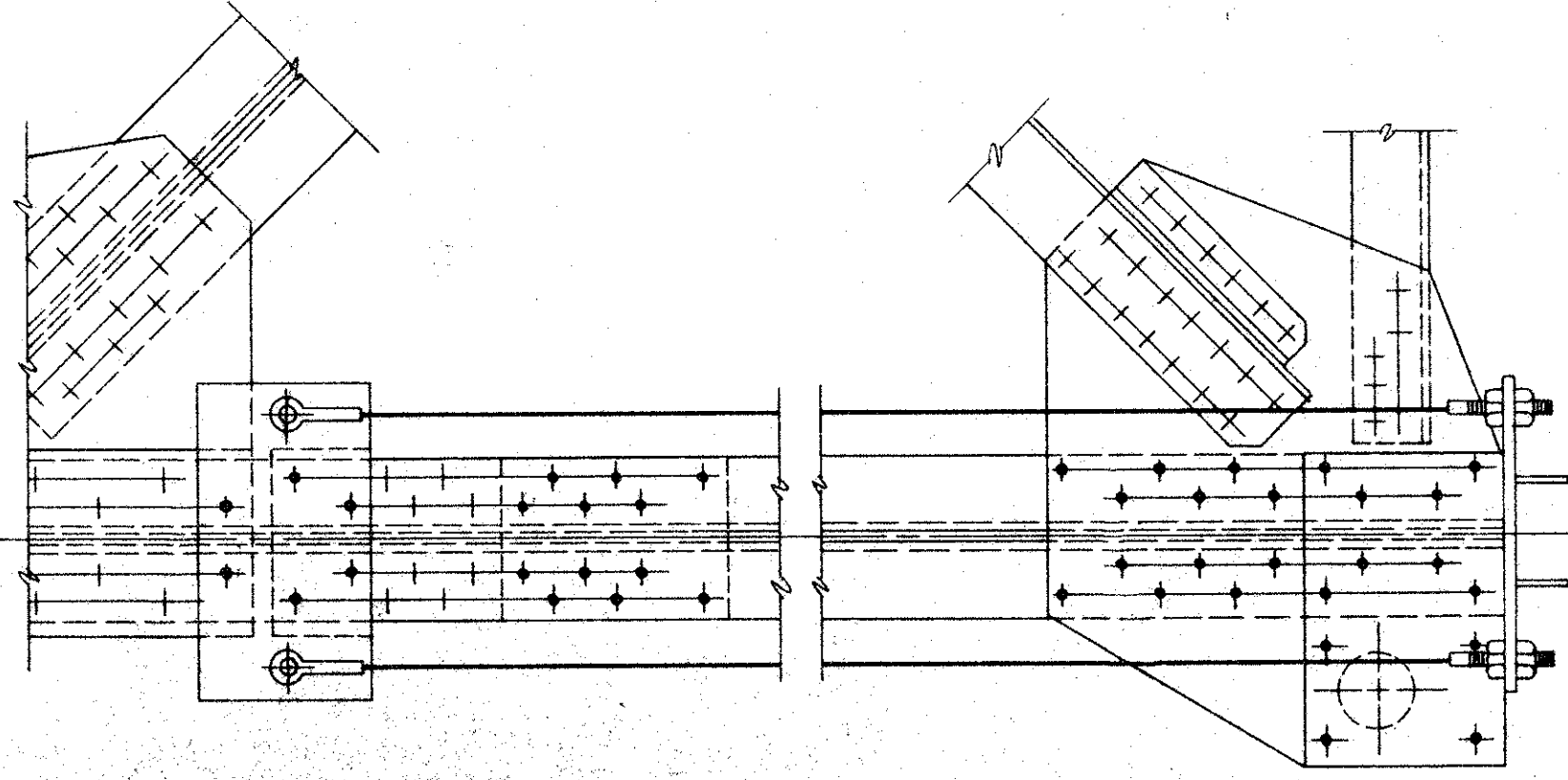
STEP 10: REMOVE RIVETS AND THE PREVIOUSLY INSTALLED H.S. BOLTS AND CAREFULLY REMOVE THE EXISTING 5 X 3-1/2 X 5/16 ANGLE.

- LEGEND:**
- + 3/4" Ø RIVETS
 - * 3/4" Ø RIVETS TO BE REMOVED
 - * 7/8" Ø H.S. BOLTS TO BE REMOVED
 - ◆ 7/8" Ø H.S. BOLTS
 - ⊕ DRIFT PINS



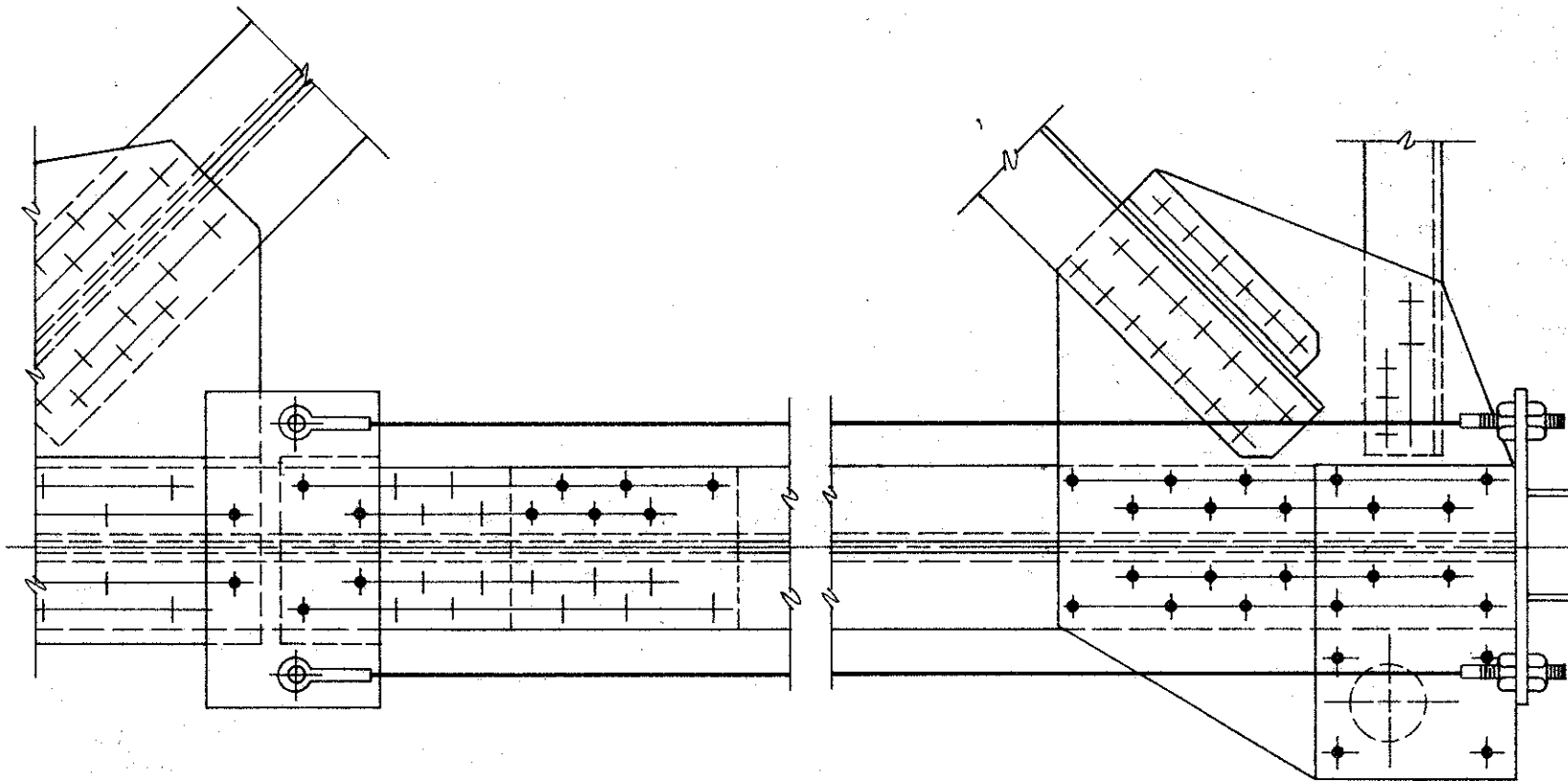
STEP 8
Scale: 1"=1'-0"

STEP 8: REMOVE RIVETS AND THE PREVIOUSLY INSTALLED H.S. BOLTS AND CAREFULLY REMOVE THE EXISTING 5 X 3-1/2 X 5/16 ANGLE.



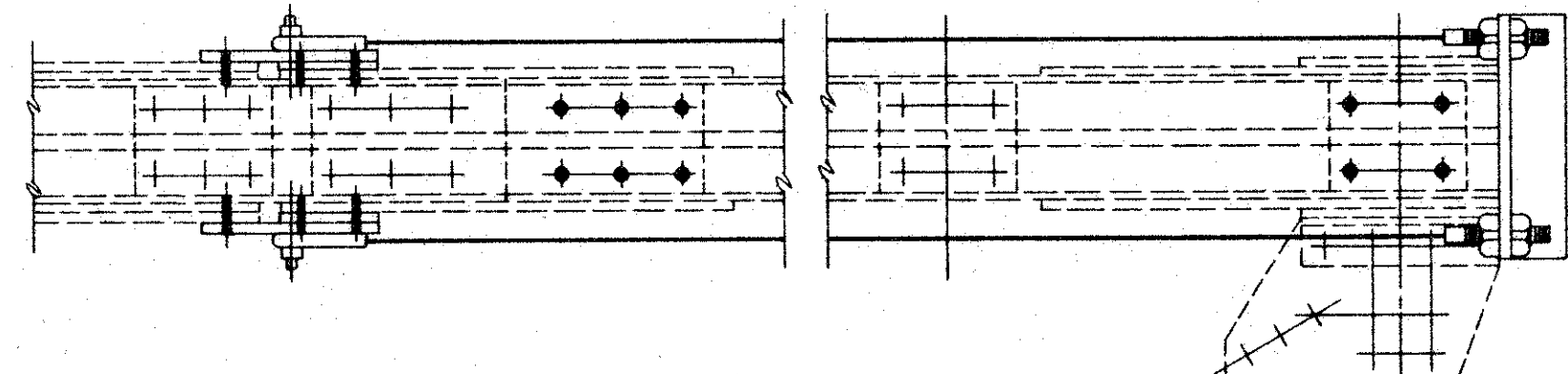
STEP 11
Scale: 1"=1'-0"

STEP 11: PLACE NEW 5 X 3-1/2 X 5/16 ANGLE AND FIELD DRILL HOLES NEAR THE SPLICE USING THE SPLICE PLATE AS A TEMPLATE AND INSTALL THE 7/8" Ø H.S. BOLTS.



STEP 9
Scale: 1"=1'-0"

STEP 9: PLACE NEW 5 X 3-1/2 X 5/16 ANGLE AND FIELD DRILL HOLES NEAR THE SPLICE USING THE SPLICE PLATE AS A TEMPLATE AND INSTALL THE 7/8" Ø H.S. BOLTS.



STEP 12
Scale: 1"=1'-0"

STEP 12: REMOVE DRIFT PINS AND INSTALL 1/4" SPACER PLATES AND 7/8" Ø H.S. BOLTS.

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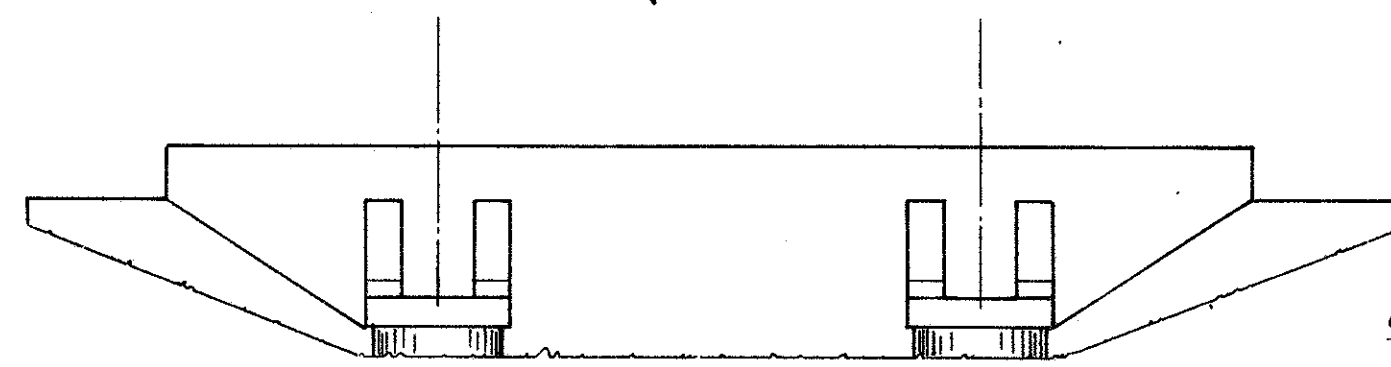
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE
STRUCTURAL REPAIRS
BOTTOM CHORD
MEMBER REPLACEMENT

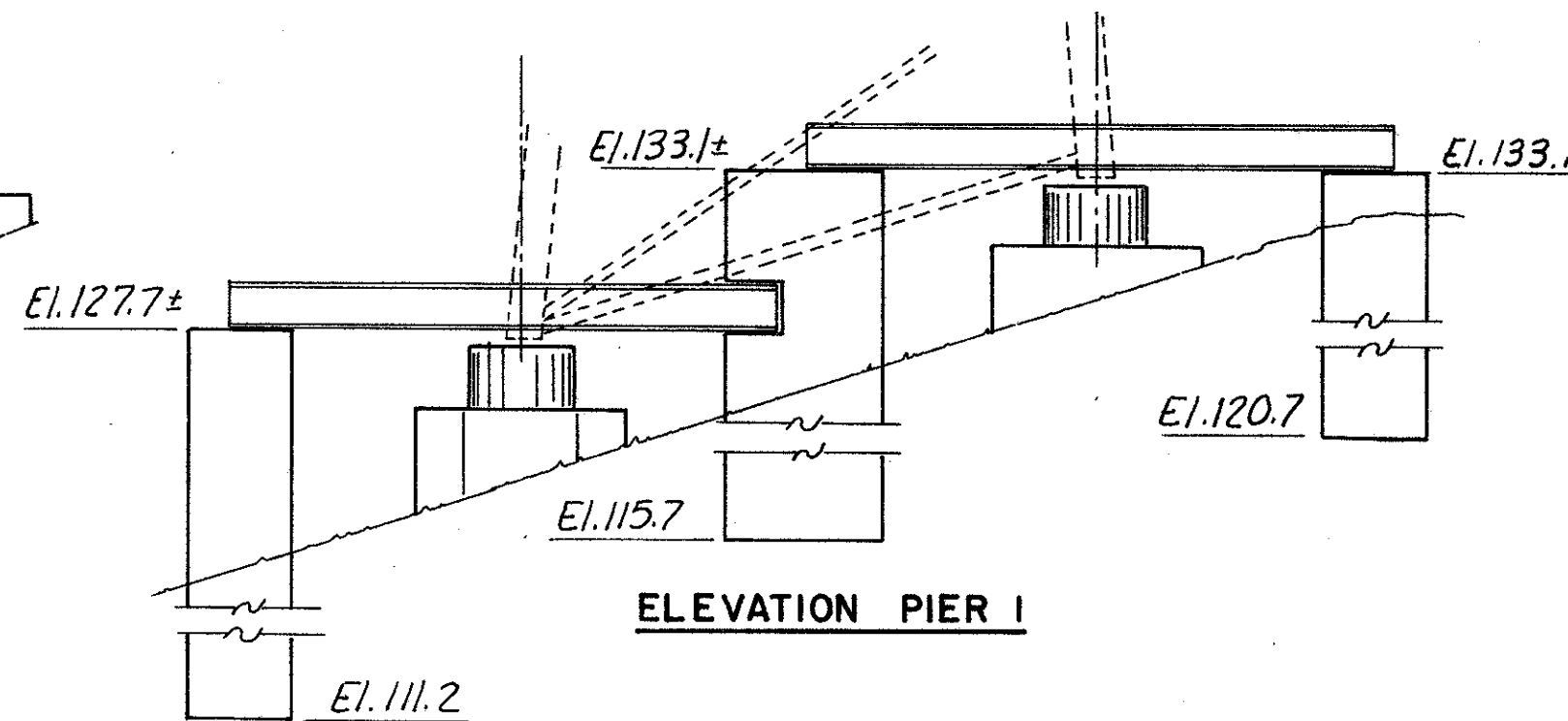
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: *As Shown*
CONTRACT NO. *88-191*
SHEET NO. *13* OF *13*

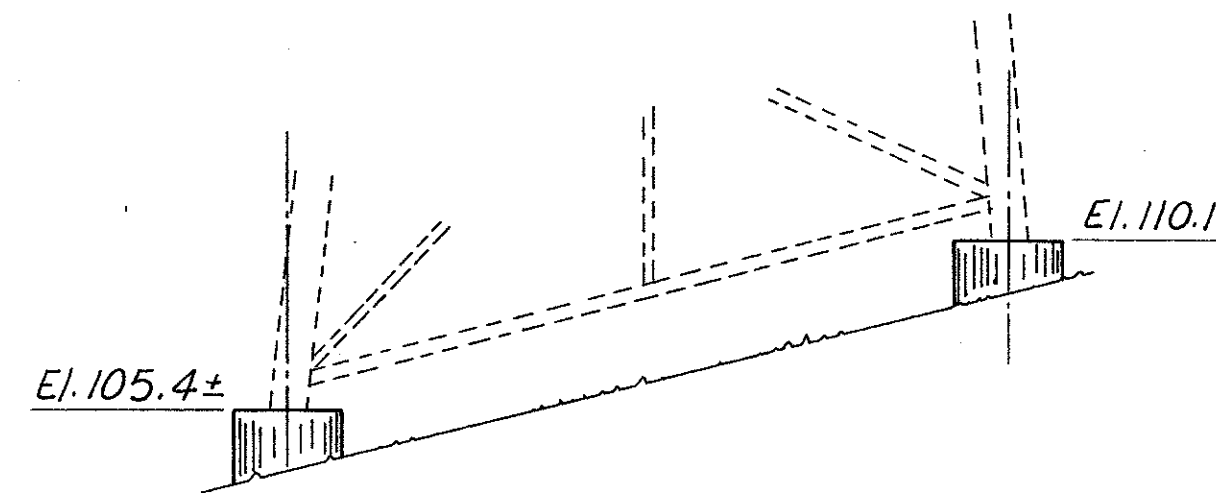
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



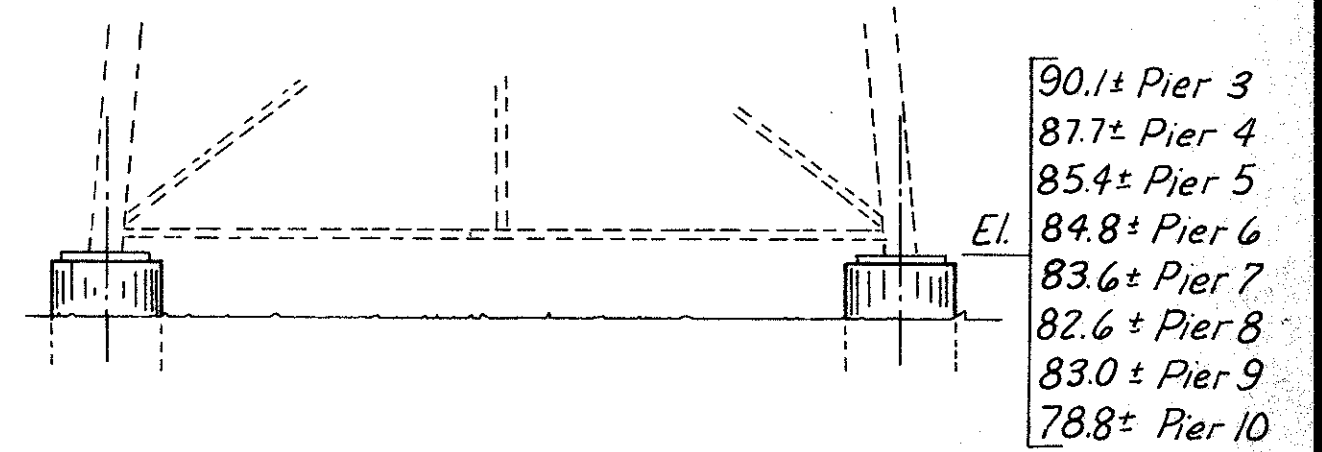
TYPICAL ABUTMENT ELEVATION



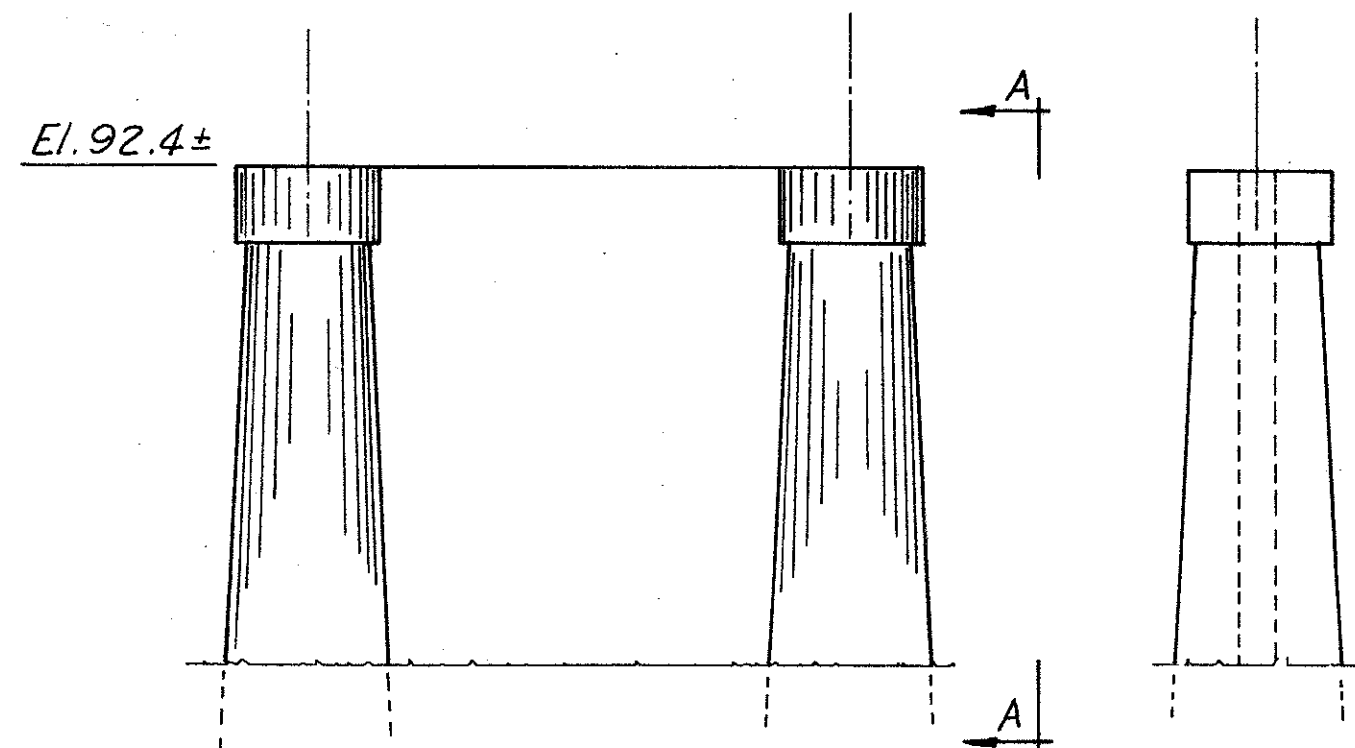
ELEVATION PIER 1



ELEVATION PIER 2

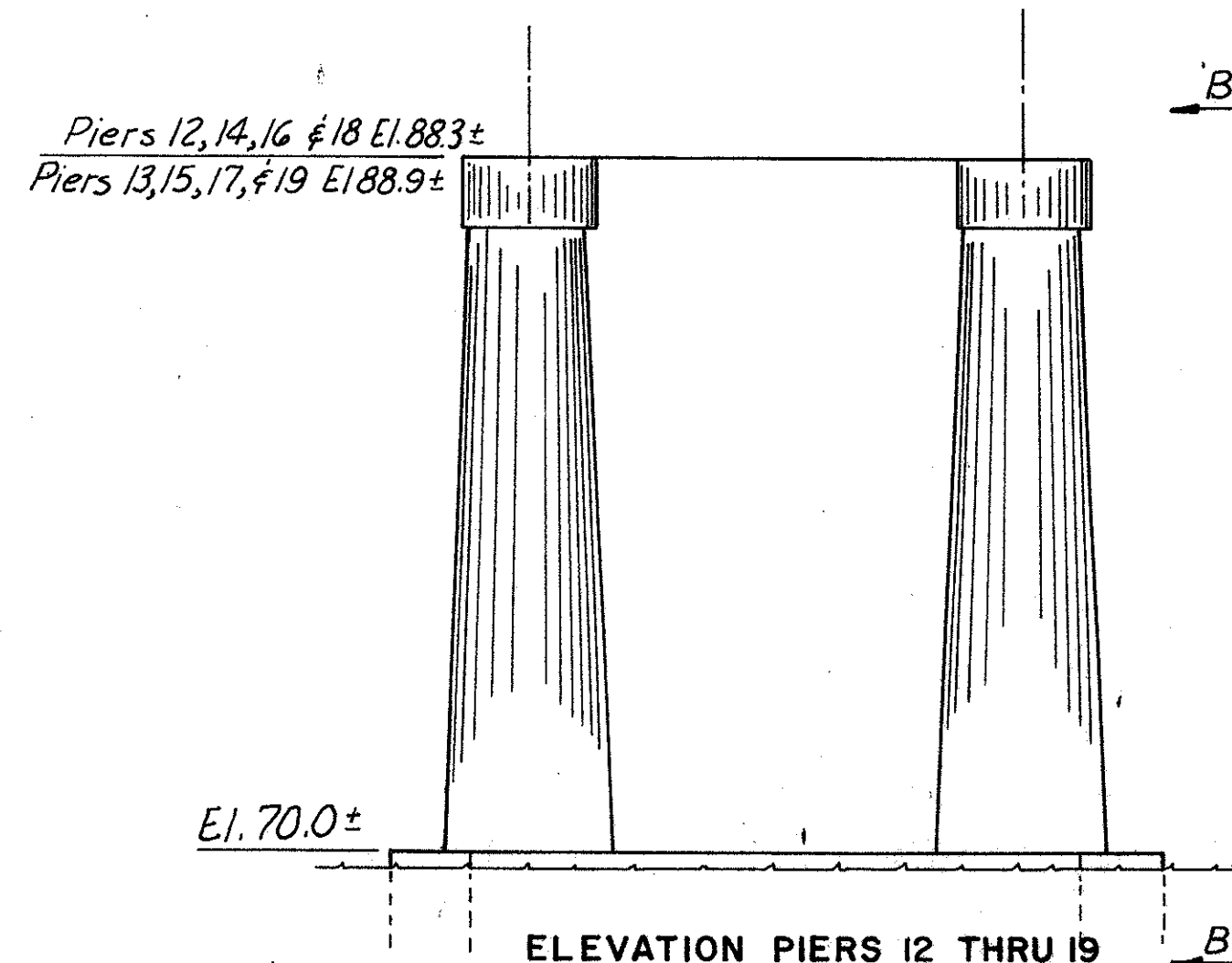


ELEVATION PIERS 3 THRU 10

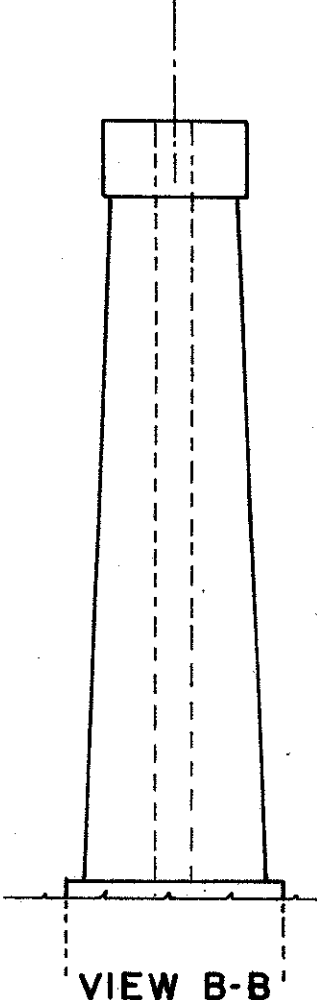


ELEVATION PIER 11

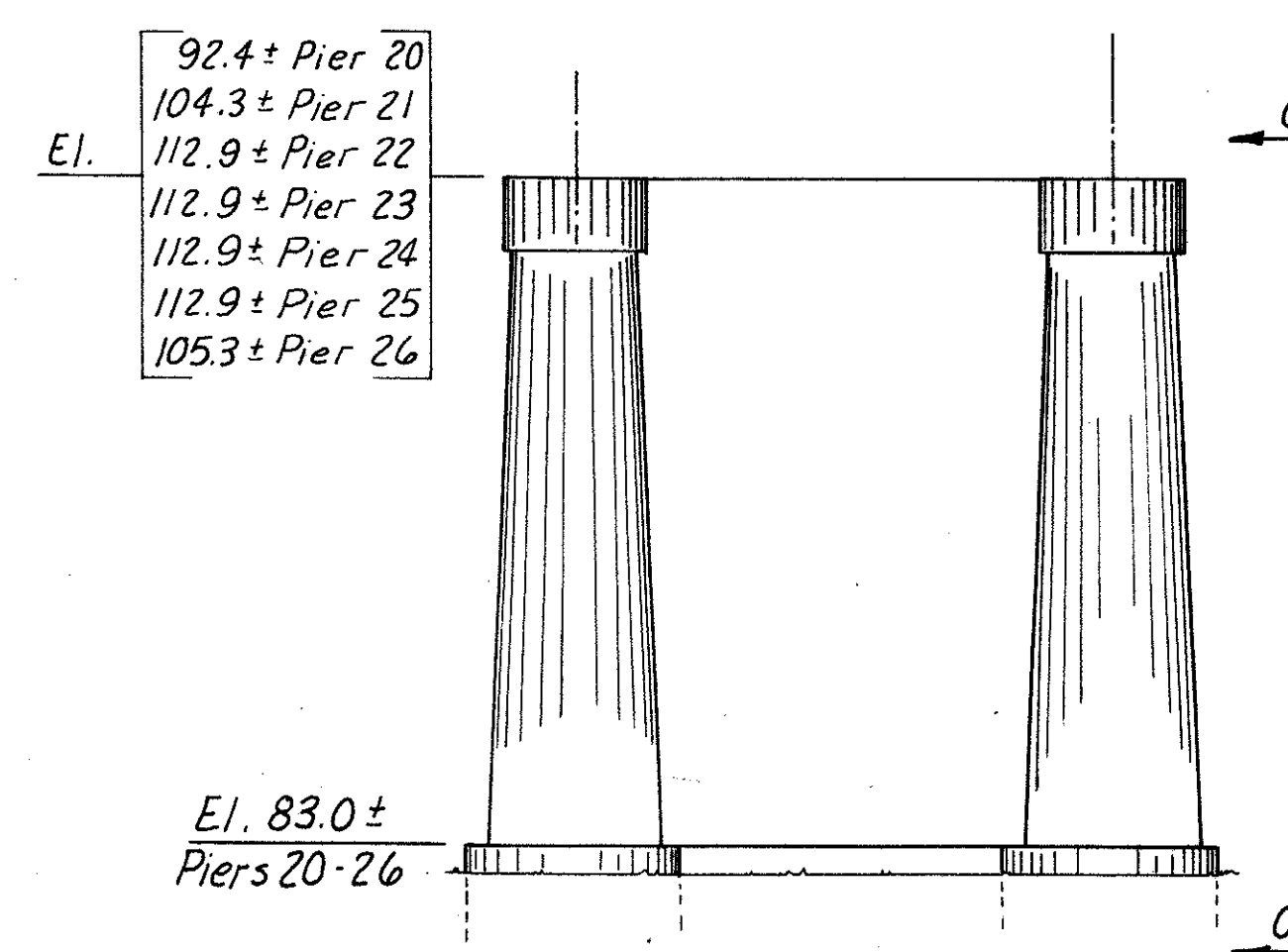
VIEW A-A



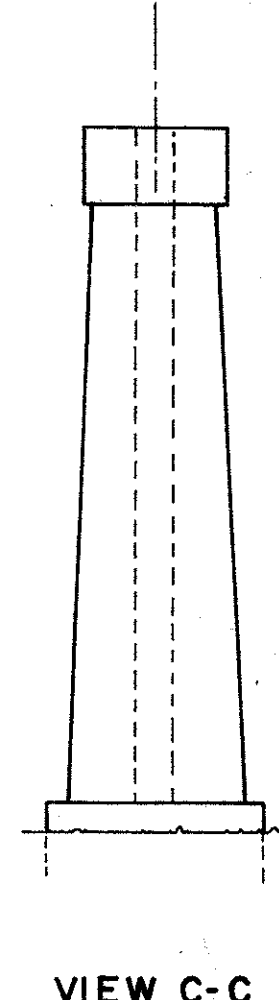
ELEVATION PIERS 12 THRU 19



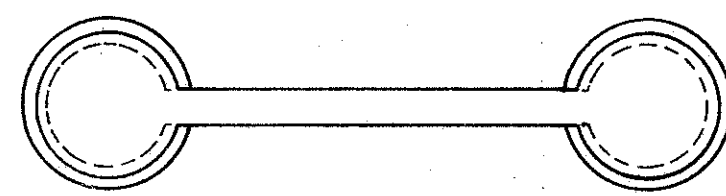
VIEW B-B



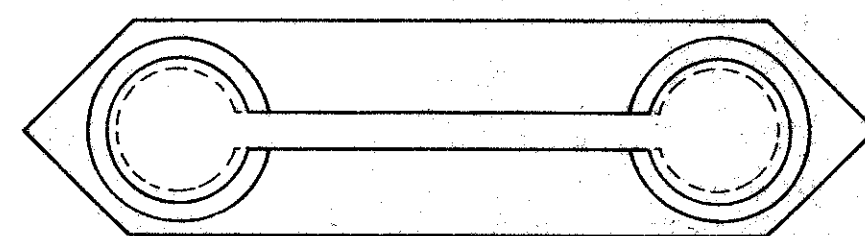
ELEVATION PIERS 20 THRU 26



VIEW C-C



PLAN PIERS 11 AND 20-26



PLAN PIERS 12 THRU 19

BY	DATE				
MADE	T.E.M.	2-72			
CHECKED	H.B.W.	3-72			
IN CHARGE	P.R.Y.				

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

PIER ELEVATIONS

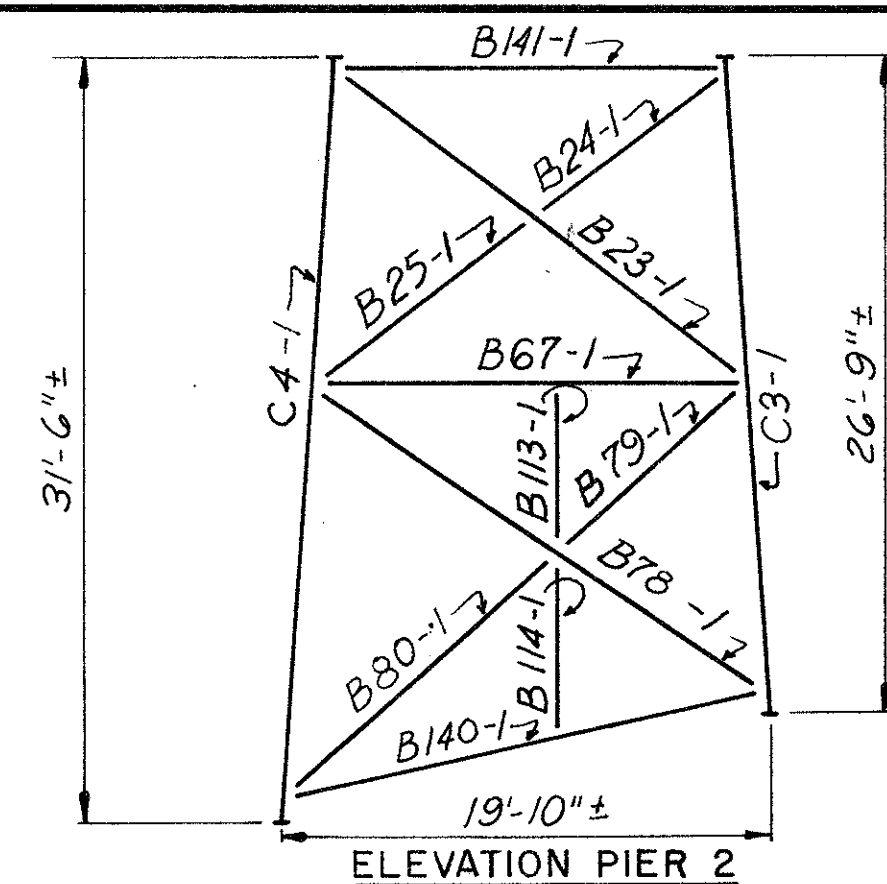
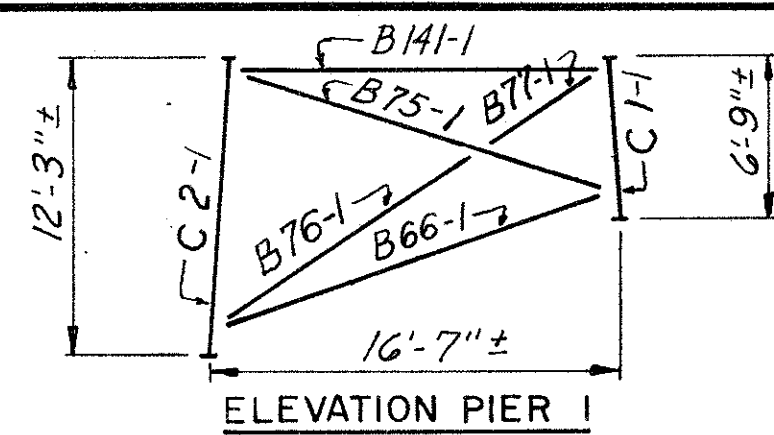
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: No Scale

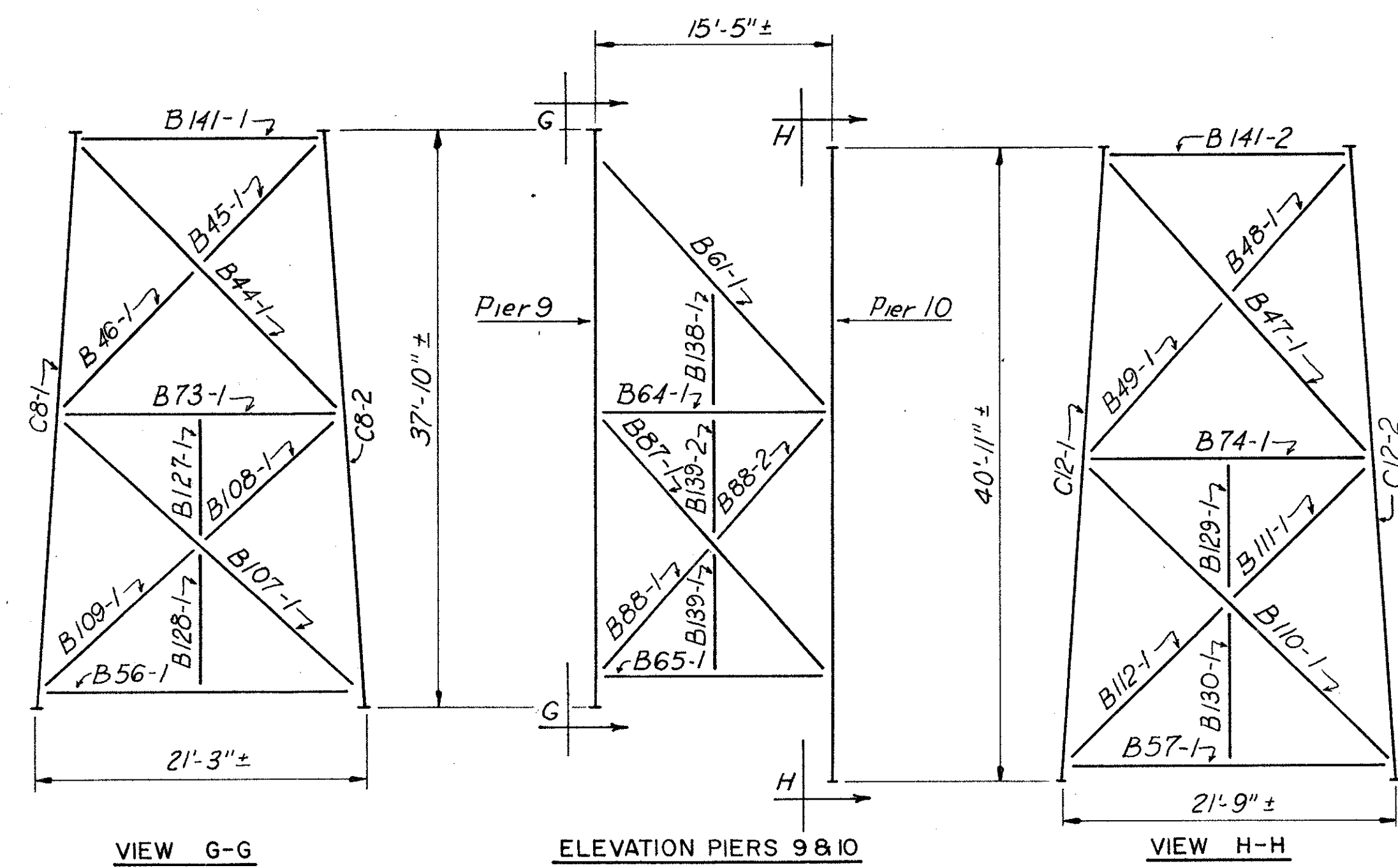
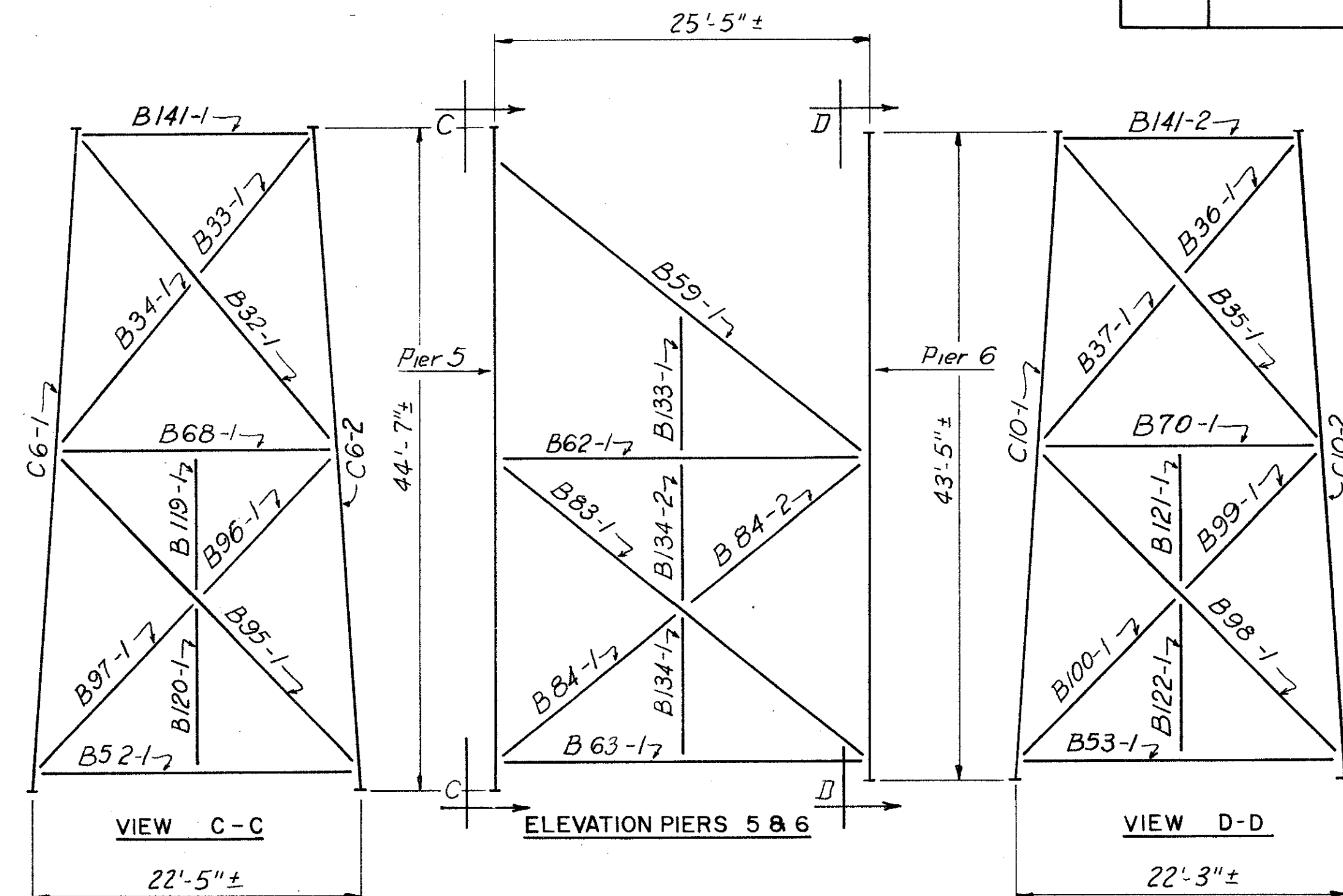
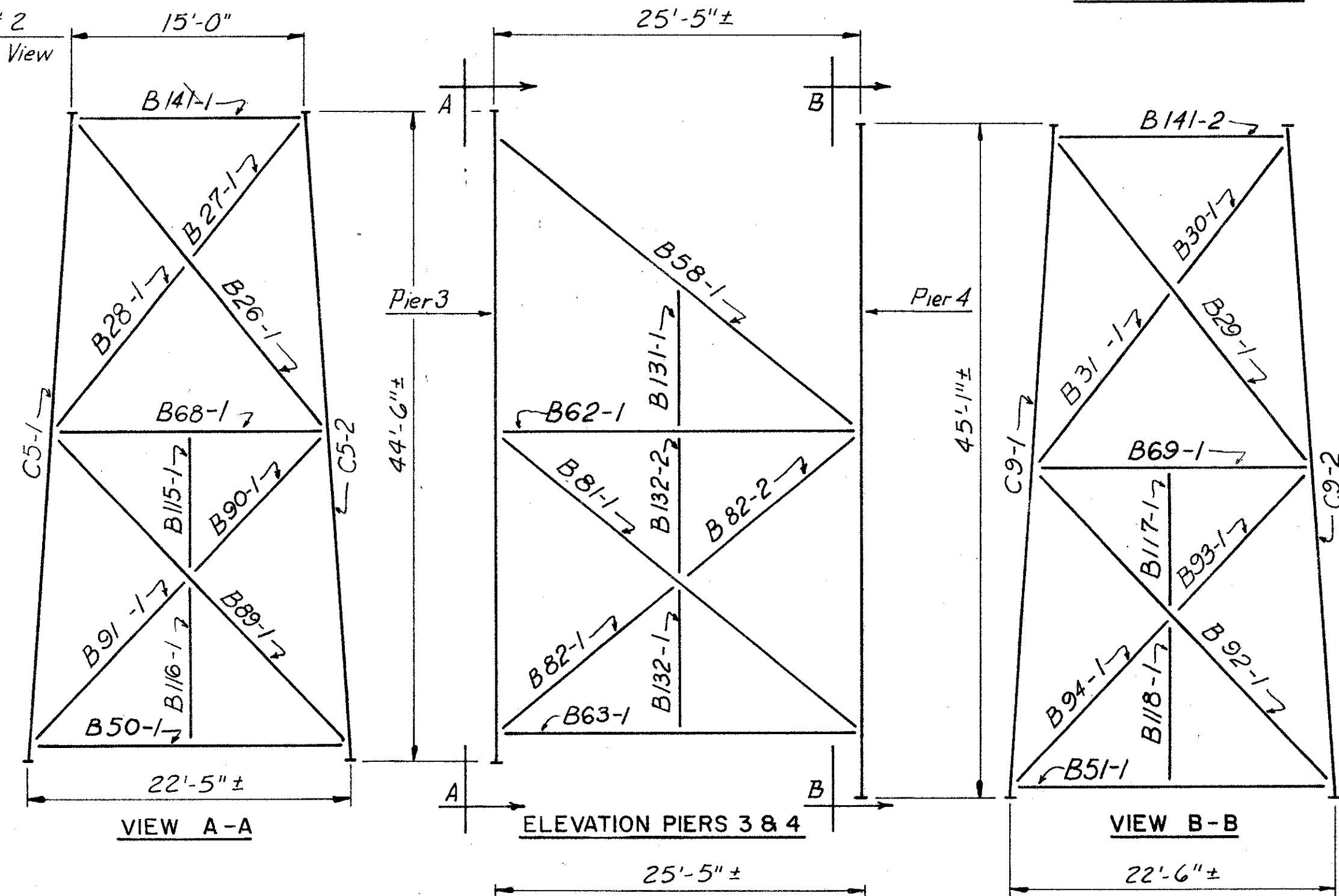
CONTRACT NO.

SHEET NO. 2 OF

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



Typ. Elev. Piers 1 & 2
and View A-A thru View
H-H



Note:
Elevation of right Framed Bent is shown,
left Framed Bent is similar. Parts appearing
in left Framed Bent (except parts marked C)
are indicated, in the tables, with an L following
the part identification.

BY	DATE				
MADE	H.S.	2-72			
CHECKED	T.E.M.	2-72			
IN CHARGE	PRY		NO.	REVISION	BY
					DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

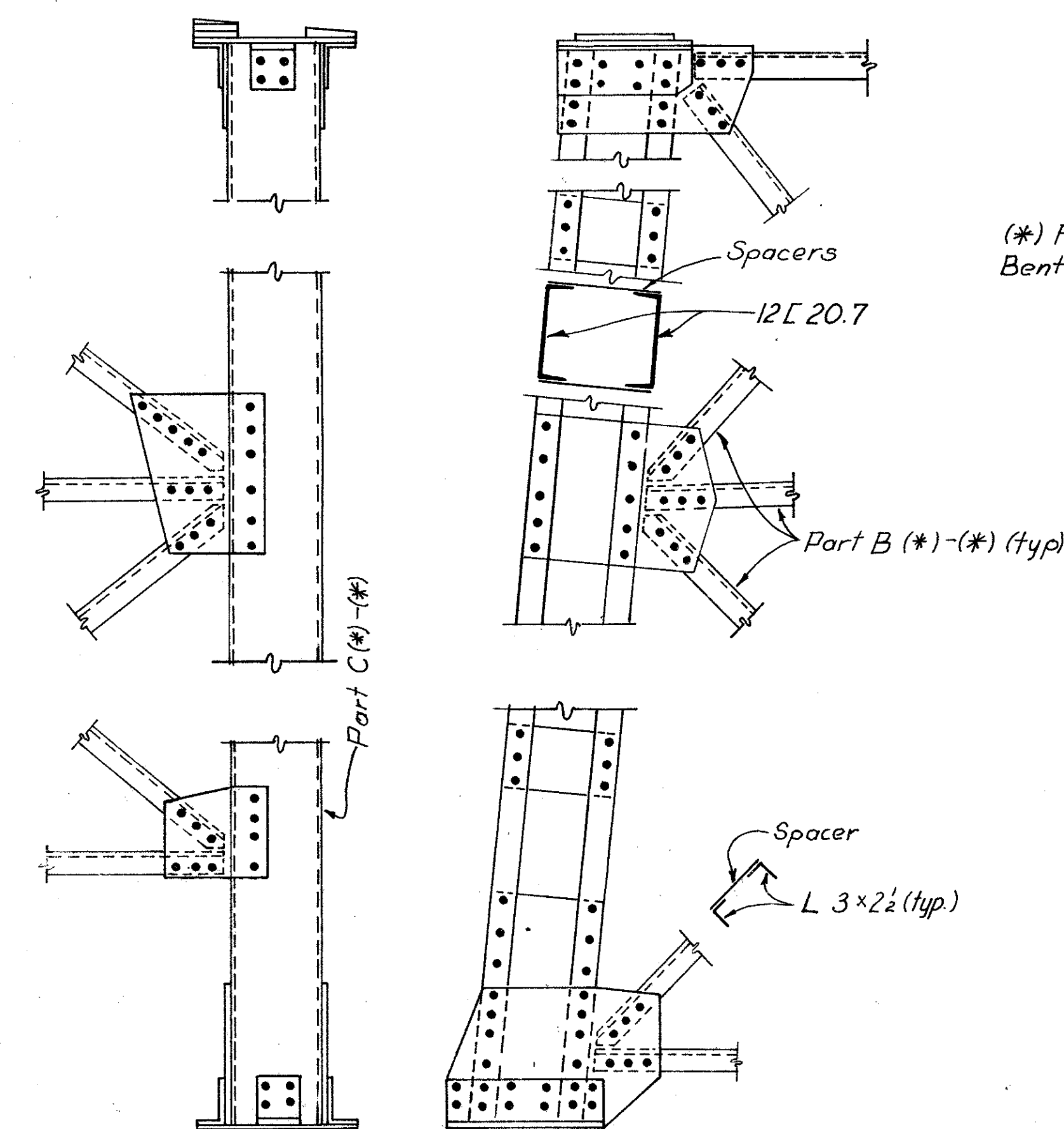
FRAMED BENT LAYOUTS PIERS 1 THRU 10

SCALE: No Scale
CONTRACT NO.:
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SHEET NO. 3 OF

[illegible]

P A R T		R E M A R K S
	B107-1	
	B108-1	
	B109-1	
	B110-1	
	B111-1	
	B112-1	
	B127-1	
	B128-1	
	B129-1	
	B130-1	
	B138-1	
	B139-1	
	B139-2	
	B141-1	
	B141-2	
	B61-IL	
	B64-IL	
	B65-IL	
	B87-IL	
	B88-IL	
	B88-2L	
	B138-IL	
	B139-IL	
	B139-2L	



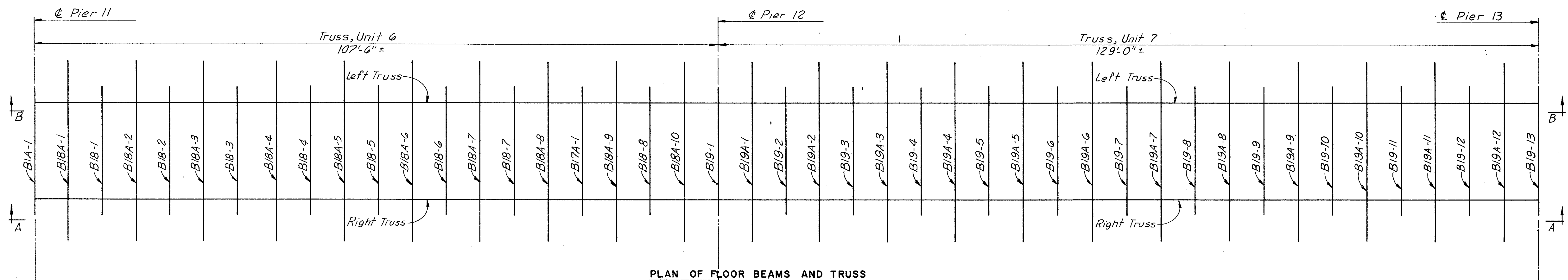
(*) For identification see Framed Bent Layout Piers 1 thru 10.

TYPICAL FRAMED BENT DETAIL

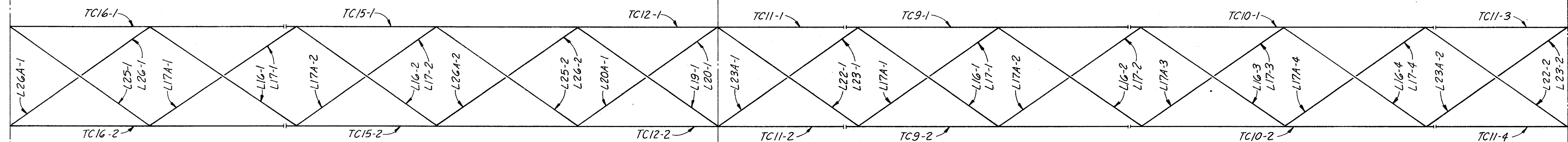
	BY	DATE				
MADE	<i>H. S.</i>	<i>2-72</i>				
CHECKED	<i>TEM</i>	<i>2-72</i>				
IN CHARGE	<i>P.R.Y.</i>		NO.	REVISION	BY	DATE

<p align="center">RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM</p>	
<p align="center">BOULEVARD BRIDGE OVER JAMES RIVER</p>	
<p align="center">TABLE OF PARTS PIERS 7 THRU 10</p>	
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SCALE: <u>No Scale</u> CONTRACT NO.: SHEET NO. <u>5</u> OF

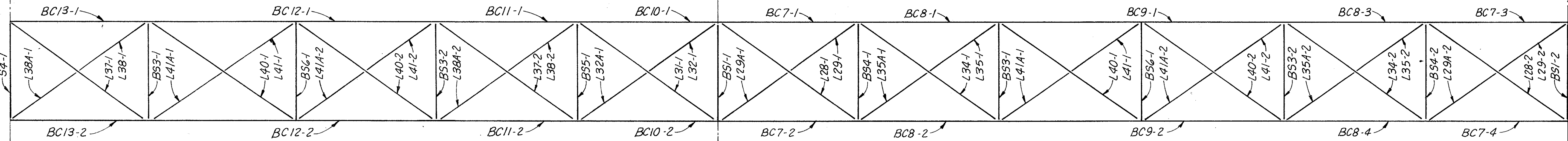
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



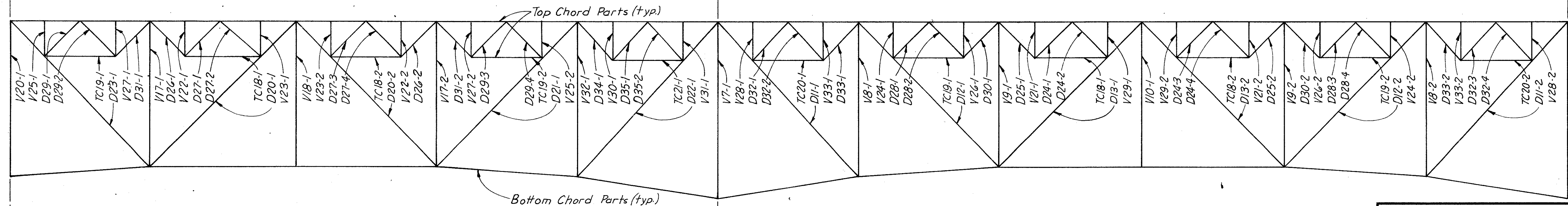
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGM AND LATERAL BRACING



VIEW A-A

Note:

View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.

Notes:

For Typical Floor Beam Detail, see Layout Units 1 thru 5.
For Typical Diaphragm Details and Elevations, see Layout Unit 14.
For Truss Details see, Typical Truss Detail Sheet.

BY	DATE				
MADE	T.E.M. 2-72				
CHECKED	H.B.W. 3-72				
IN CHARGE	P.R.V.	NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

LAYOUT UNITS 6 & 7

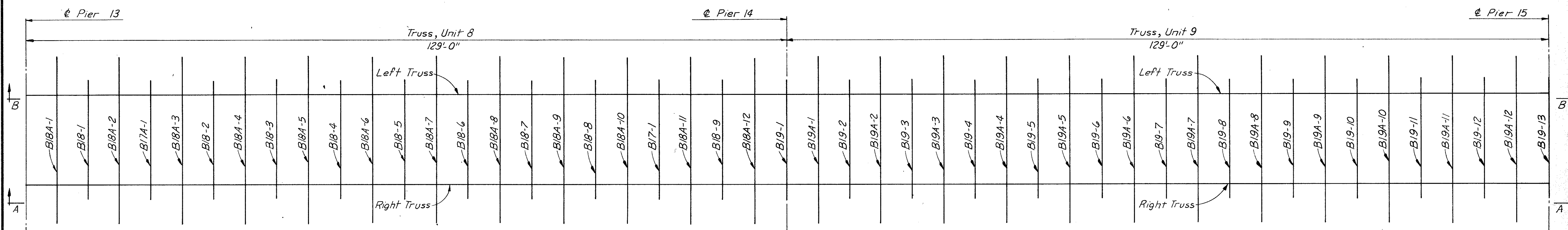
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: No Scale

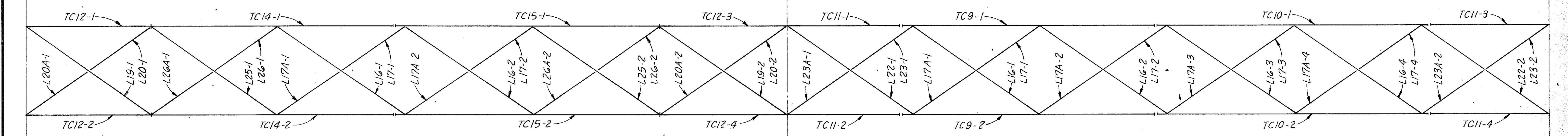
CONTRACT NO.

SHEET NO. 8 OF

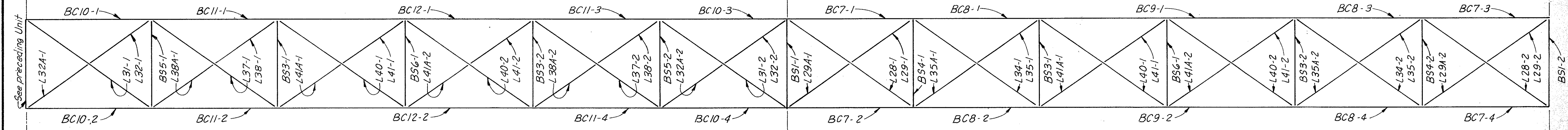
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



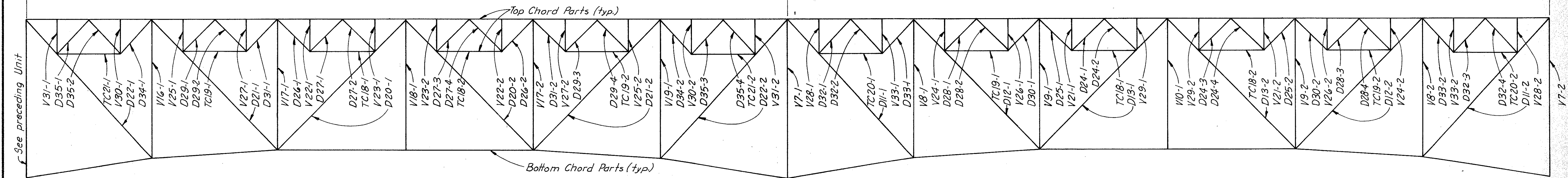
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGMS AND LATERAL BRACING



VIEW A-A

Note:
View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.

Notes:
For Typical Floor Beam Details, see Layout Units 1 thru 5.
For Typical Diaphragm Details and Elevations, see Layout Unit 14.
For Truss Details, see Typical Truss Detail Sheet.

MADE	BY	DATE			
CHECKED	H.B.W.	3-72			
IN CHARGE	P.R.Y.		NO.	REVISION	BY
					DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER JAMES RIVER

LAYOUT UNITS 8 & 9

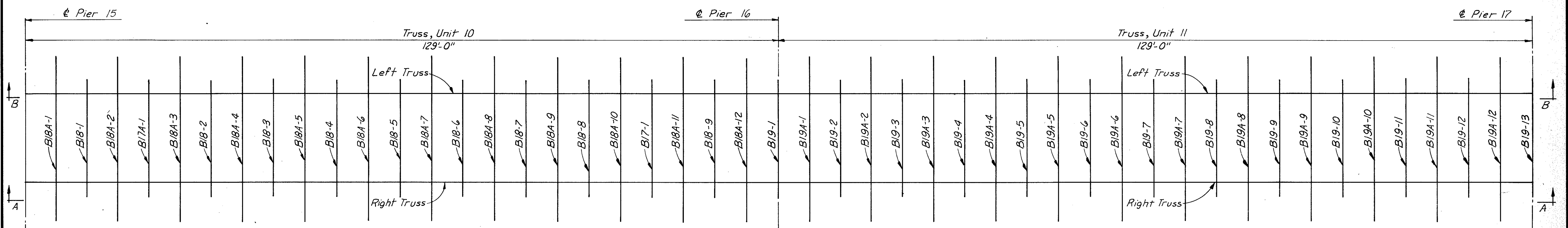
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CONTRACT NO.: _____

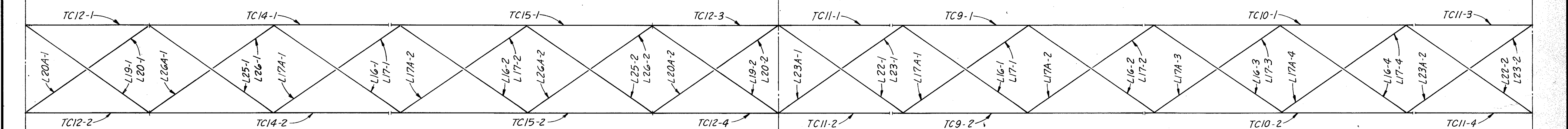
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SHEET NO. 12 OF _____

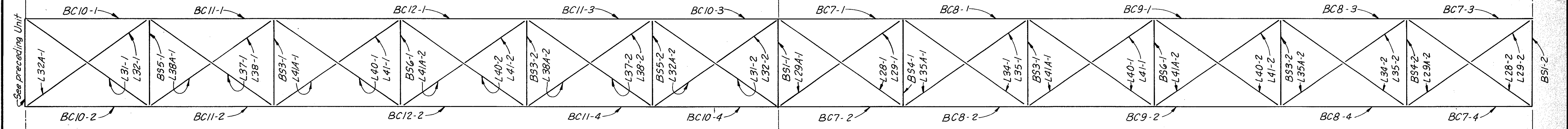
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



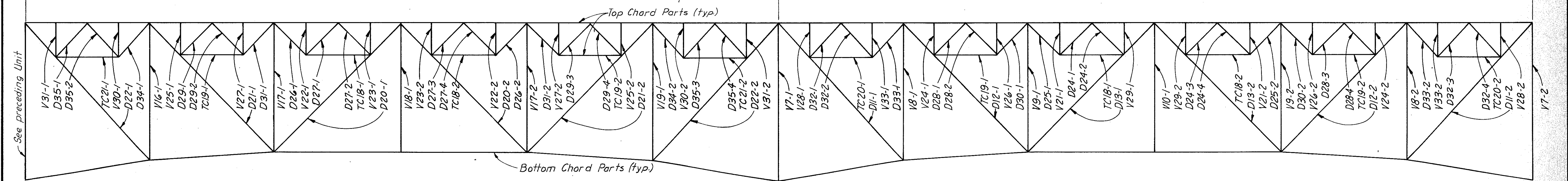
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGMS AND LATERAL BRACING



VIEW A-A

Note:
View B-B is similar to View A-A Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table with an L following the part identification.

Notes:
For Typical Floor Beam Detail, see Layout Units 1 thru 5.
For Typical Diaphragm Details and Elevations, see Layout Unit 14.
For Truss Details see, Typical Truss Detail Sheet.

BY	DATE				
MADE	T.E.M.	2-72			
CHECKED	H.B.W.	3-72			
IN CHARGE	P.R.Y.				
NO.	REVISION	BY	DATE		

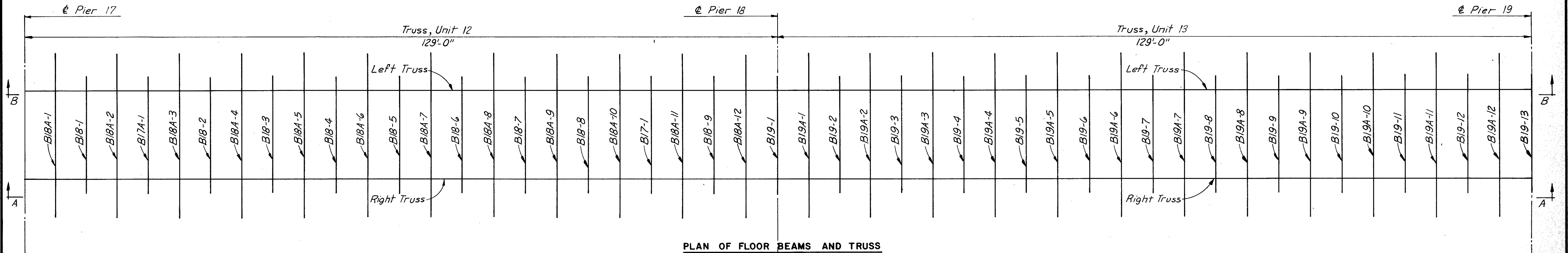
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

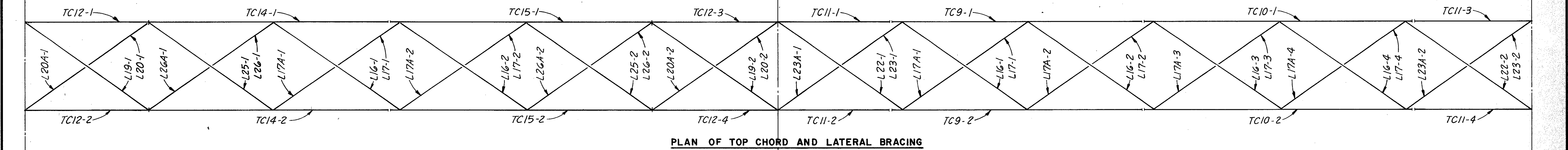
LAYOUT UNITS 10 & 11

SCALE: No Scale
CONTRACT NO.:
HOWARD, NEEDLES, TAMMEN & BERGENOFF
General Consultants
SHEET NO. 16 OF

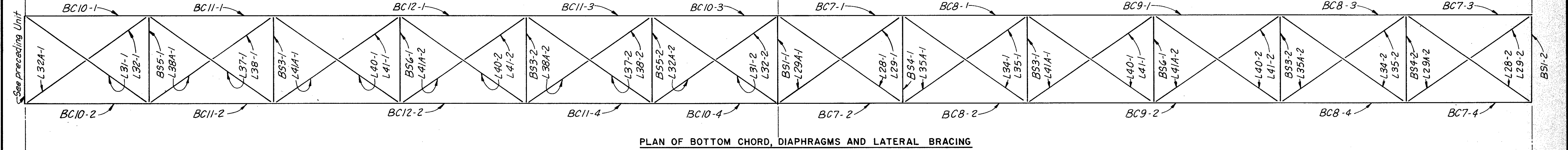
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



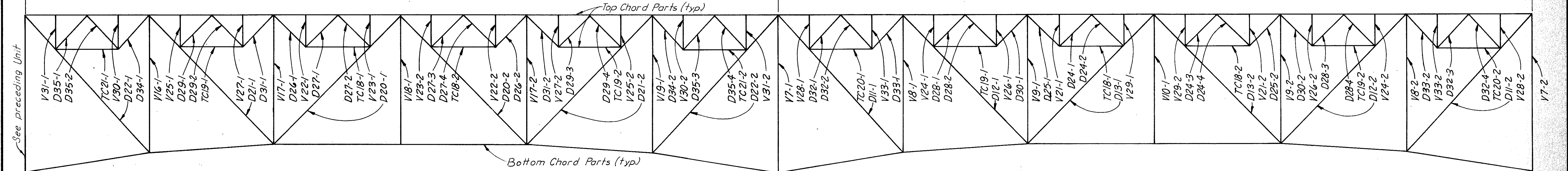
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGMS AND LATERAL BRACING



VIEW A-A

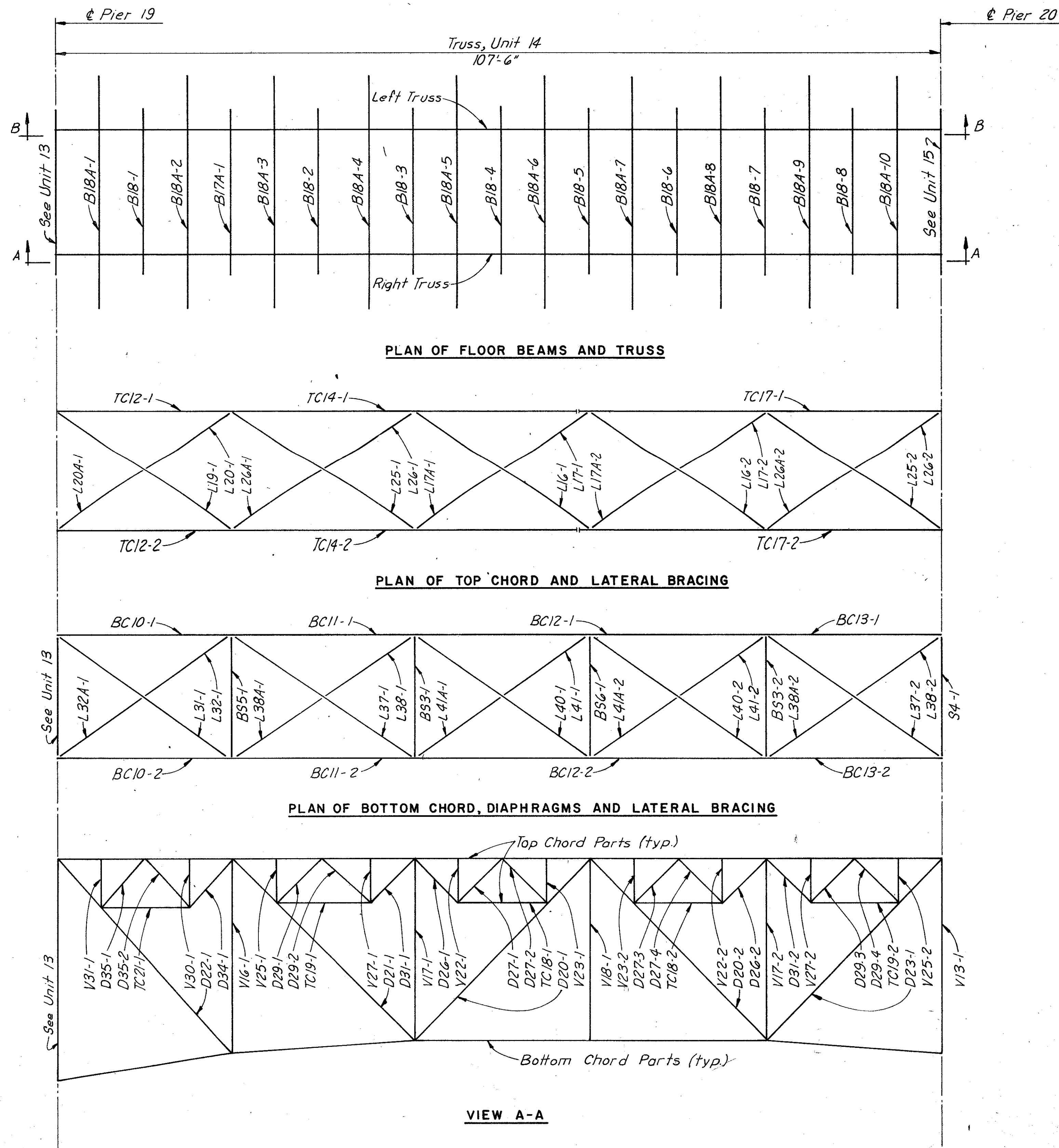
Note:
View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.

Notes:
For Typical Floor Beam Detail, see Layout Units 1 thru 5.
For Typical Diaphragm Details and Elevations, see Layout Unit 14.
For Truss Details see, Typical Truss Detail Sheet.

MADE	BY	DATE			
CHECKED	HBW	3-72			
IN CHARGE	PRV		NO.	REVISION	BY
					DATE

RICHMOND METROPOLITAN AUTHORITY	
RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE OVER JAMES RIVER	
LAYOUT UNITS 12 & 13	
SCALE: No Scale	
CONTRACT NO.:	
HOWARD, NEEDLES, TAMMEN & BERGENOFF	
General Consultants	
SHEET NO. 20 OF	

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



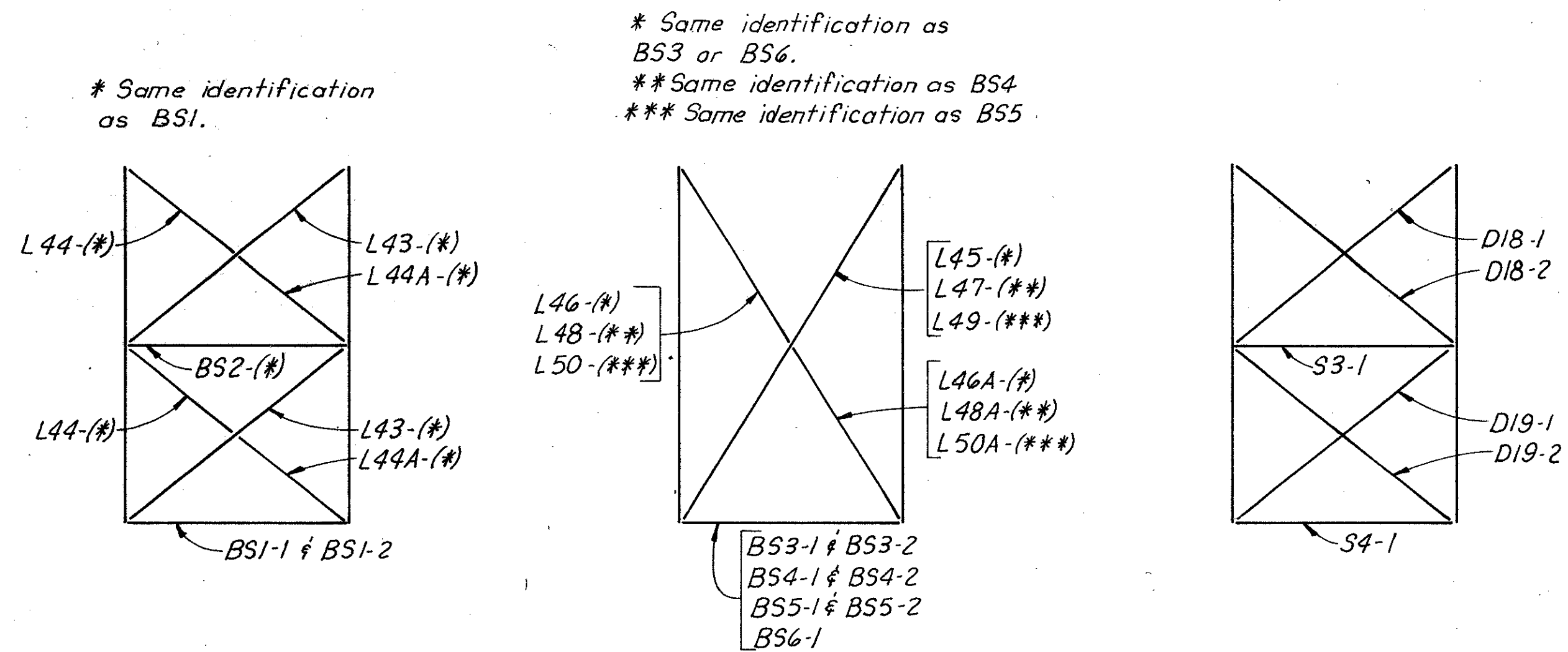
Notes:

For Typical Floor Beam Detail, see Layout Units 1 thru 5.

For Truss Details see, Typical Truss Detail Sheet.

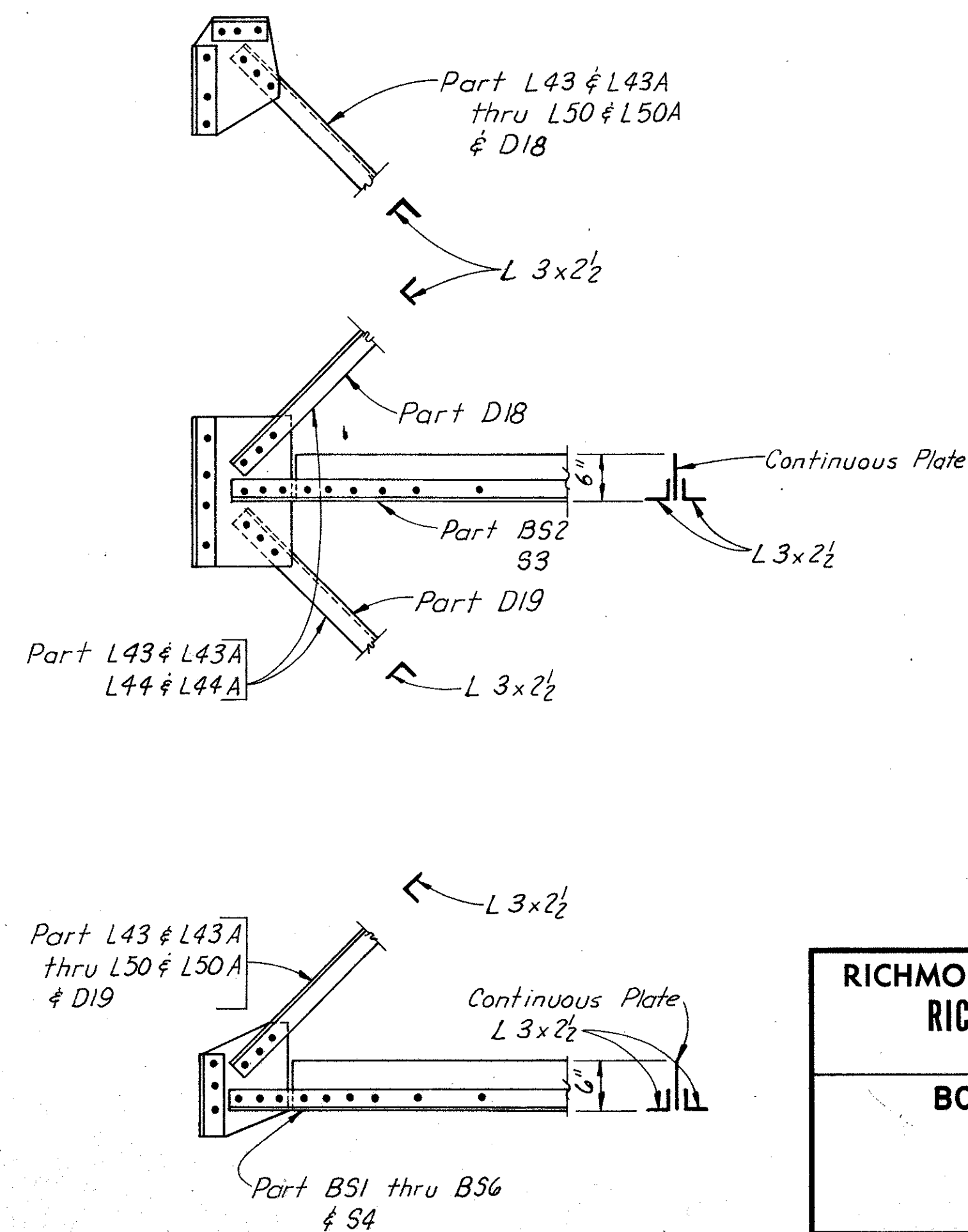
Note:

View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.



Note:

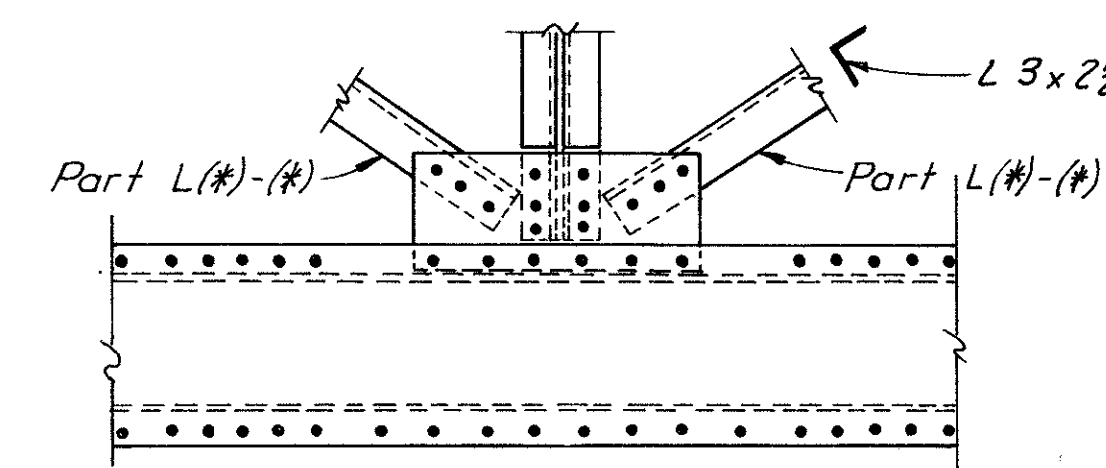
Only the bottom chord of the diaphragm is listed in the tables. Necessary repair to the diagonals and additional chords will be indicated in the remarks column for the bottom chord. The diagonals and additional chords will be identified by the part number as shown on the diaphragm elevations.



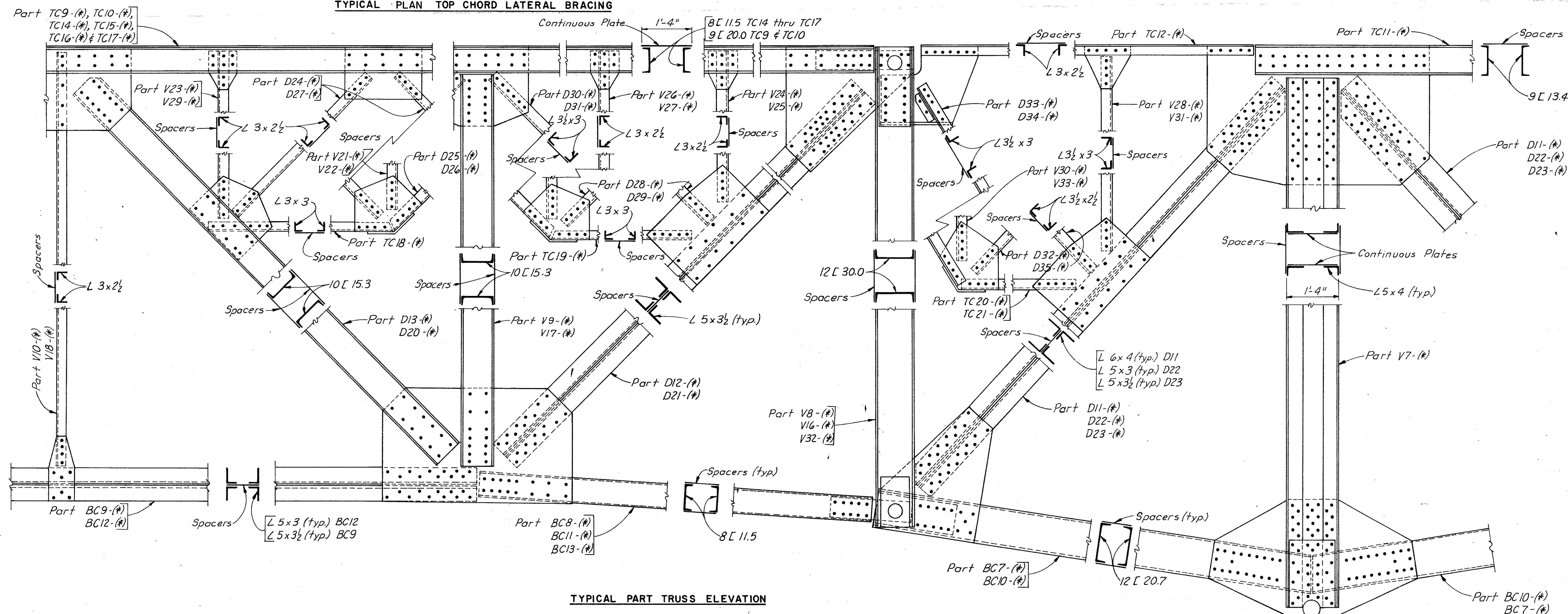
BY	DATE				
MADE	T.E.M.	2-72			
CHECKED	H.B.W.	3-72			
IN CHARGE	P.R.Y.		NO.	REVISION	BY DATE

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE OVER JAMES RIVER	
LAYOUT, UNIT 14	
SCALE: No Scale	CONTRACT NO.:
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SHEET NO. 24 OF

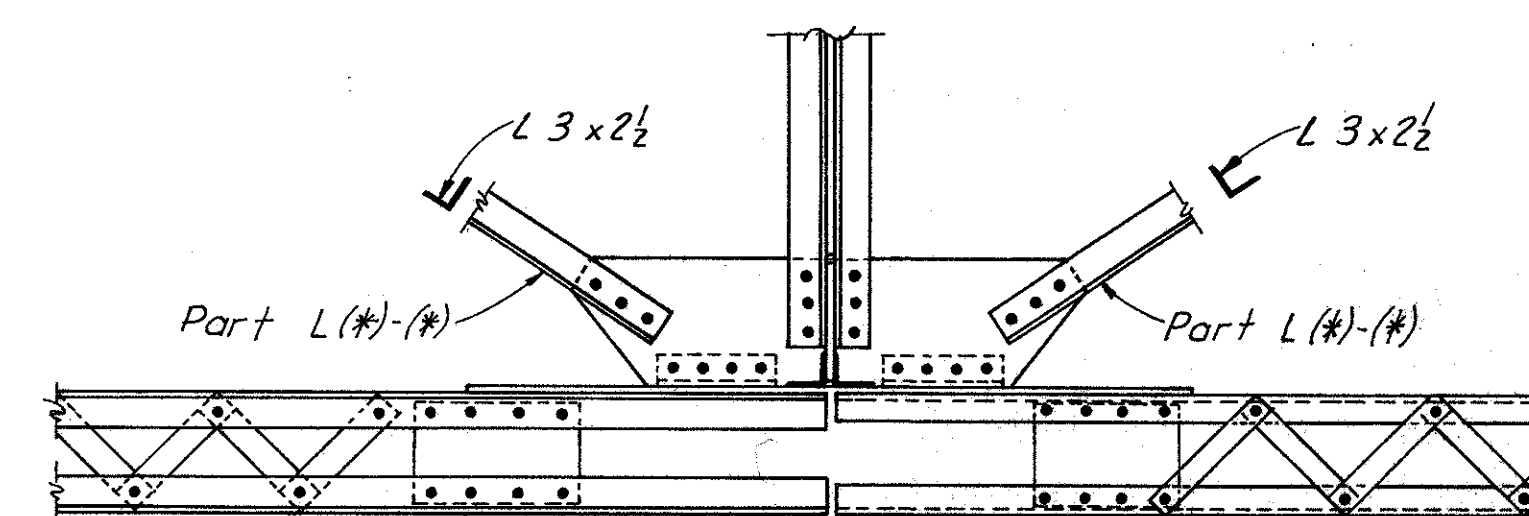
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



TYPICAL PLAN TOP CHORD LATERAL BRACING



TYPICAL PART TRUSS ELEVATION



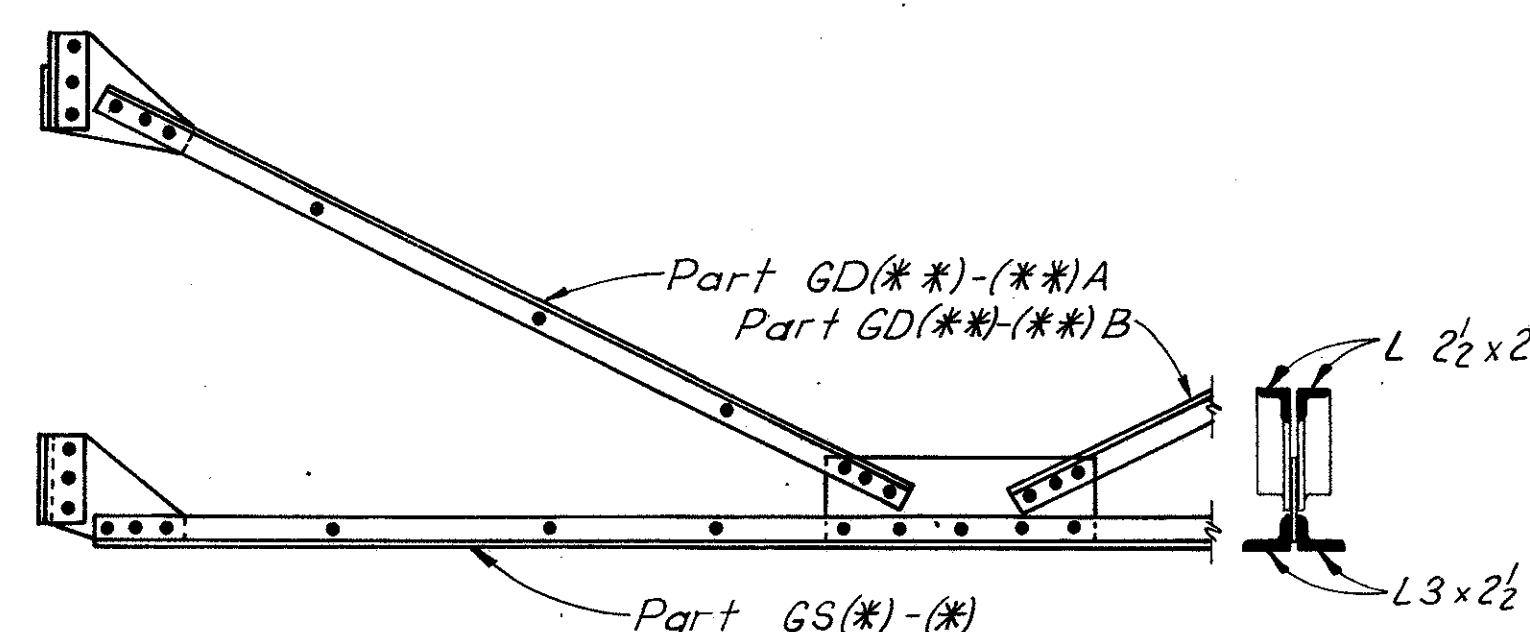
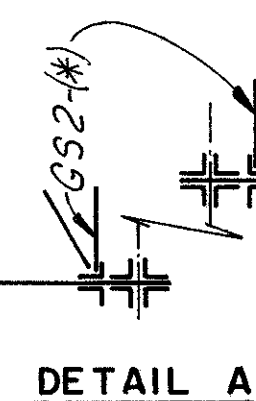
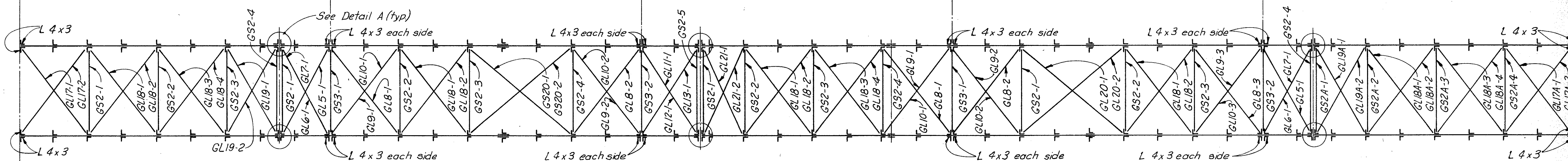
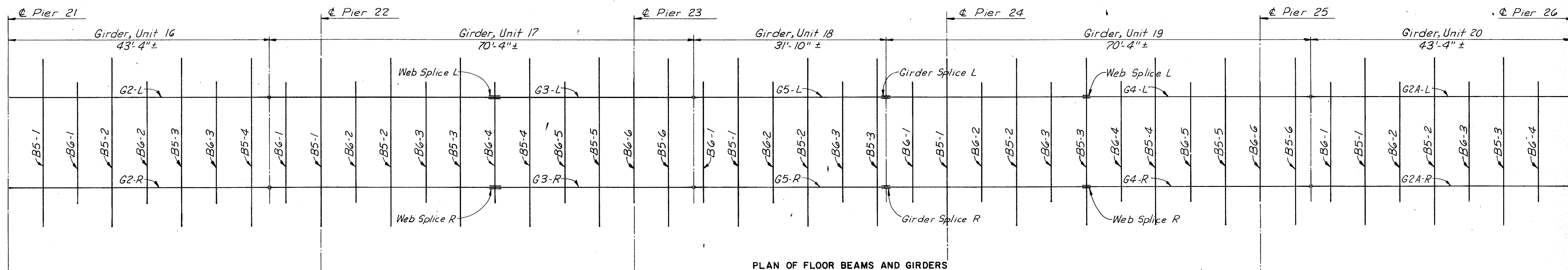
TYPICAL PLAN BOTTOM CHORD LATERAL BRACING

* See Unit 6 thru 15 for identification.

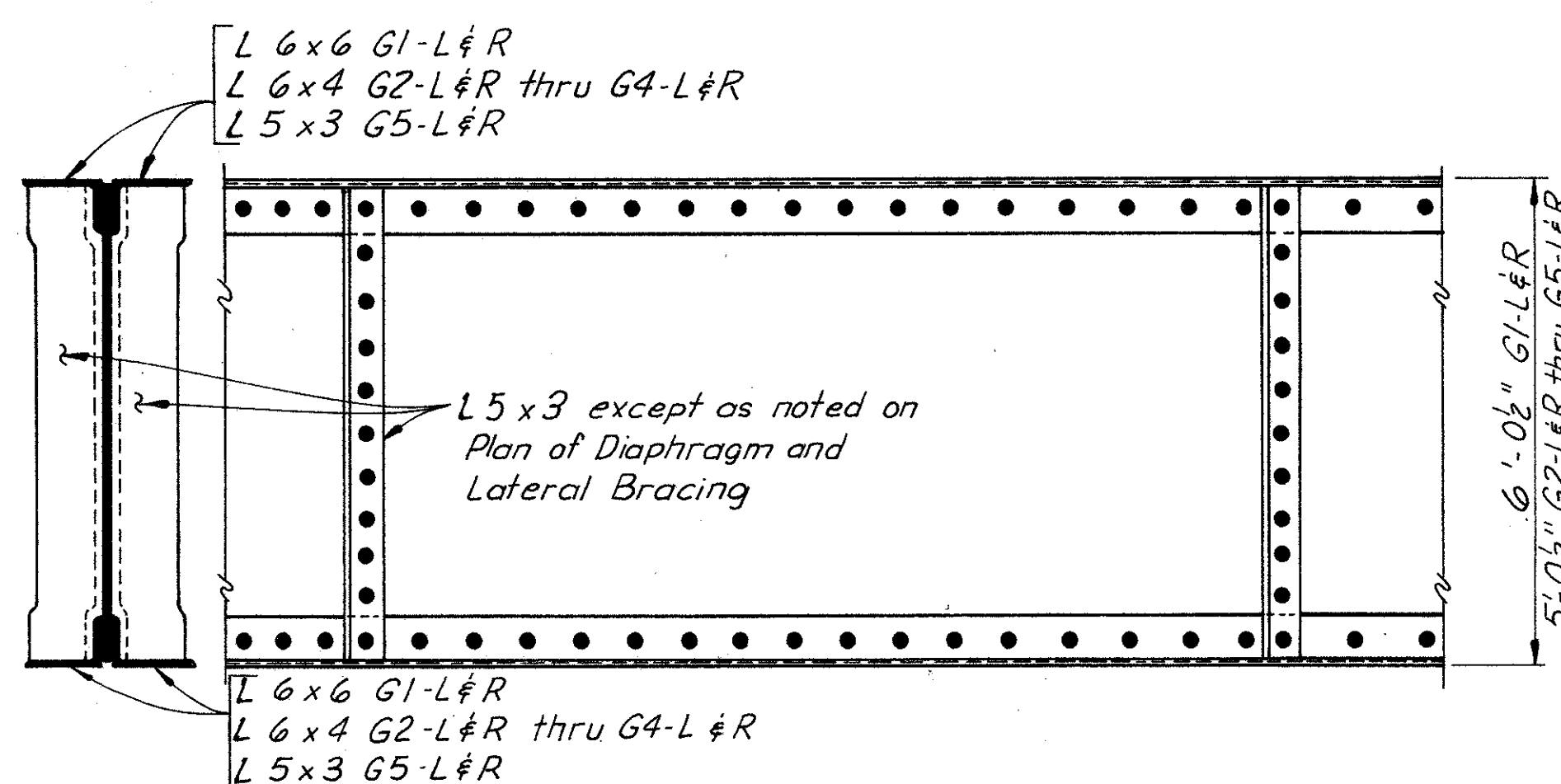
BY	DATE				
MADE	TEM	2-72			
CHECKED	HBW	3-72			
IN CHARGE	P.R.Y.		NO.	REVISION	BY DATE

RICHMOND METROPOLITAN AUTHORITY	
RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE OVER JAMES RIVER	
TYPICAL TRUSS DETAILS	
SCALE: No Scale	CONTRACT NO.:
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SHEET NO. 26 OF

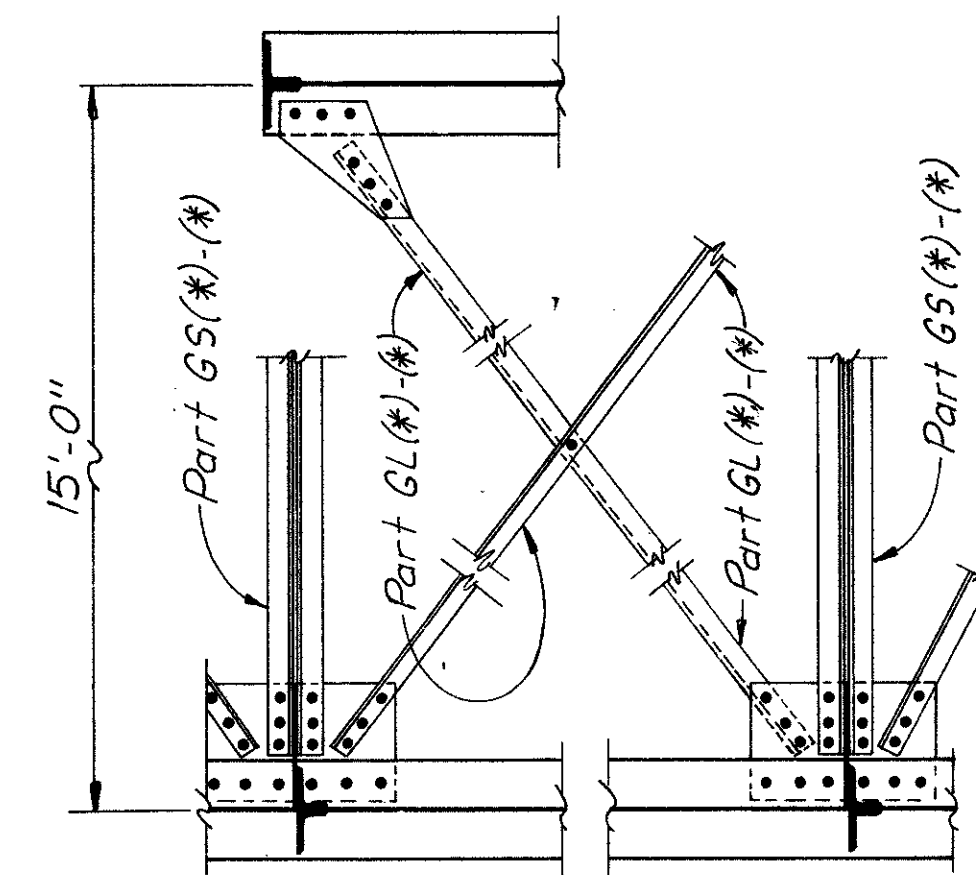
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



TYPICAL DIAPHRAGM DETAIL GS2 AND GS3



TYPICAL GIRDER DETAIL G2 THRU G5



TYPICAL LATERAL BRACING DETAIL

Part GL(*)-(*)
L 2 1/2 x 2 1/2

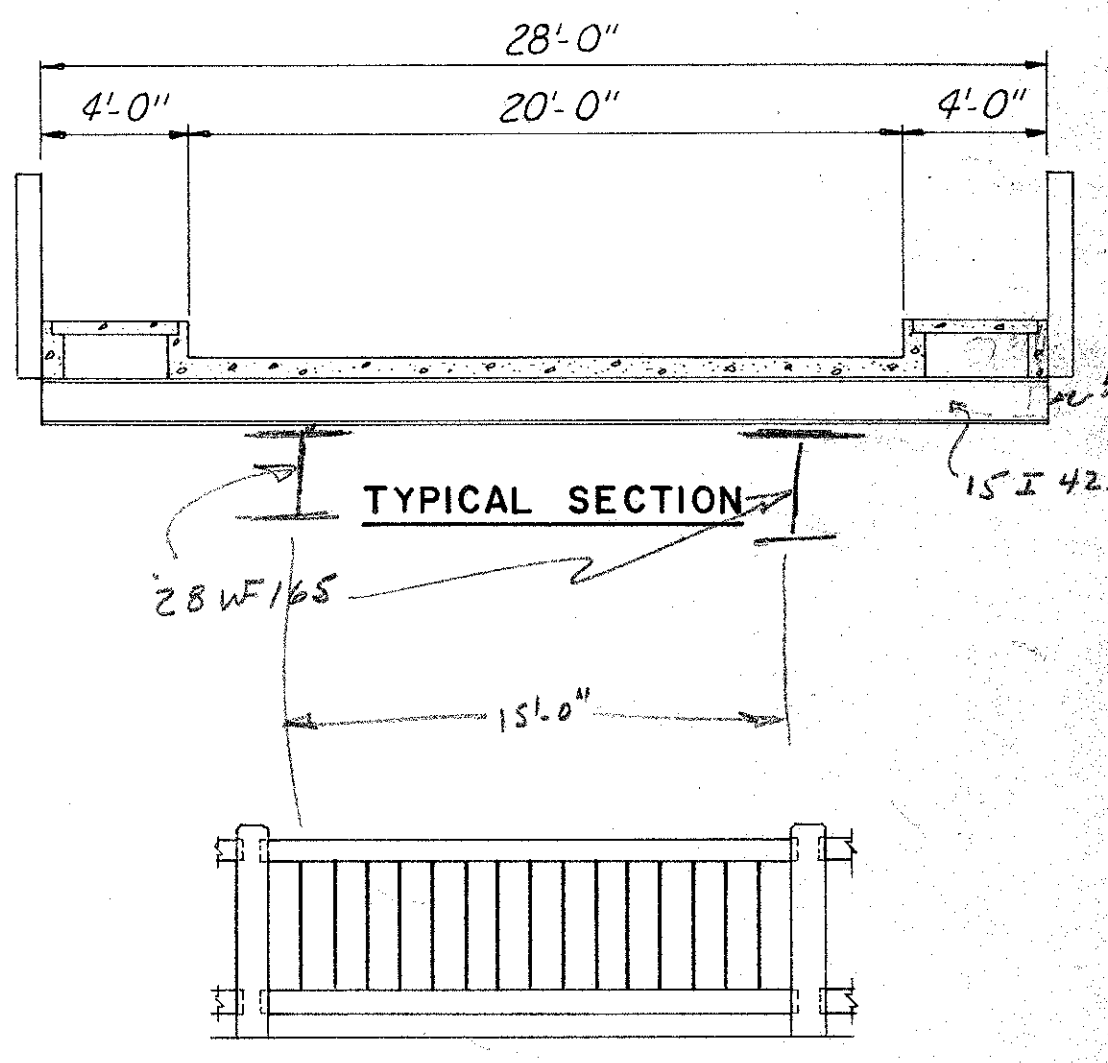
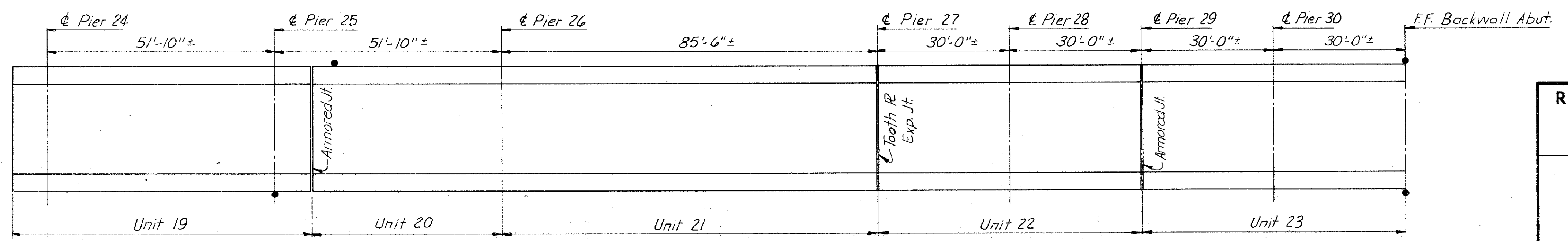
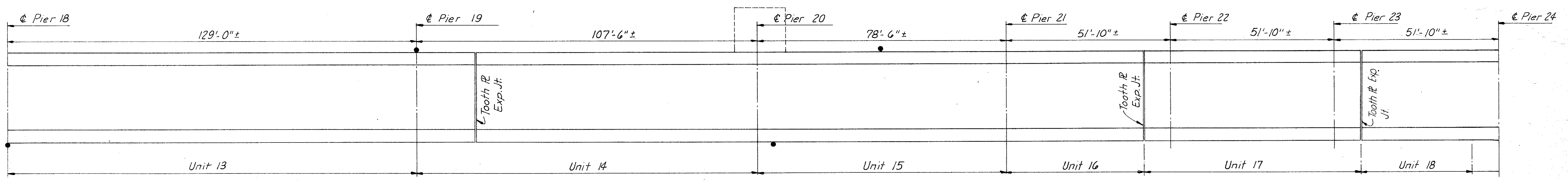
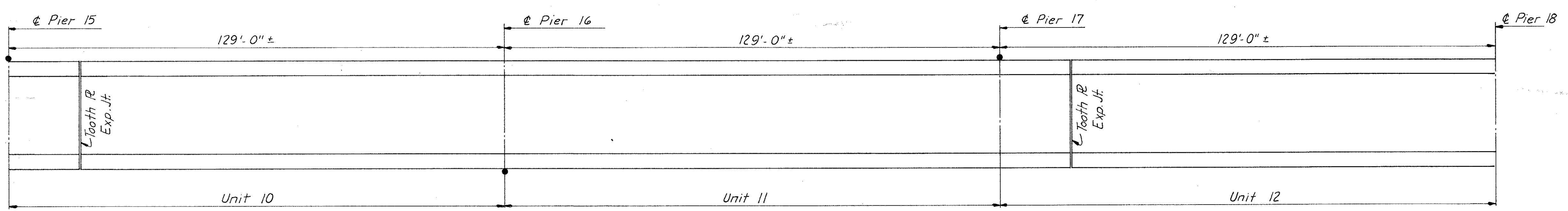
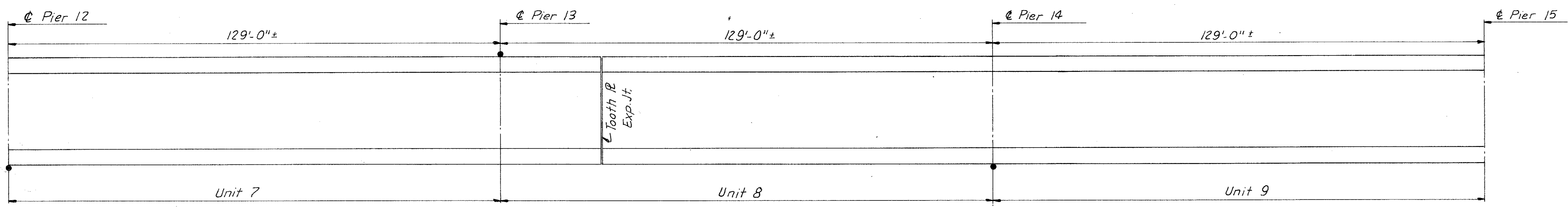
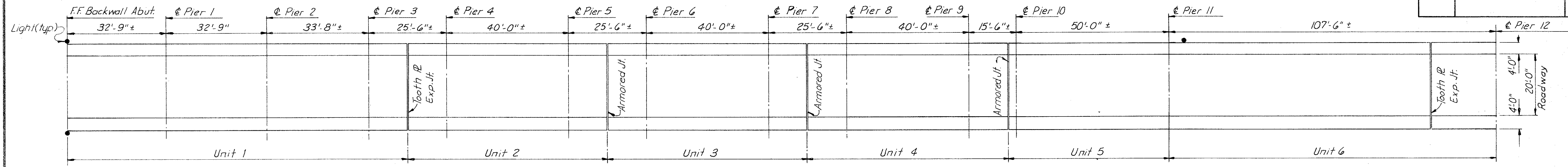
BY	DATE				
MADE	T.E.M. 1-72				
CHECKED	H.B.W. 3-72				
IN CHARGE	P.R.Y.	NO.	REVISION	BY	DATE

* See Lateral Bracing & Diaphragm Plan for identification.
** Same identification as Part GS. Only the bottom chord of the diaphragm is listed in the tables. Necessary repair to the diagonals will be listed in the remarks column for the bottom chord.

Notes:
For Typical Floor Beam Detail, see Layout Units 1 thru 5.

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE OVER JAMES RIVER	
LAYOUT UNITS 16 THRU 20	
SCALE: No Scale	CONTRACT NO.:
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SHEET NO. 29 OF

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



TYPICAL PART ELEVATION OF RAILING

MADE	BY	DATE	NO.	REVISION	BY	DATE
	TE.M	2-72				
CHECKED						
IN CHARGE	P.R.Y.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

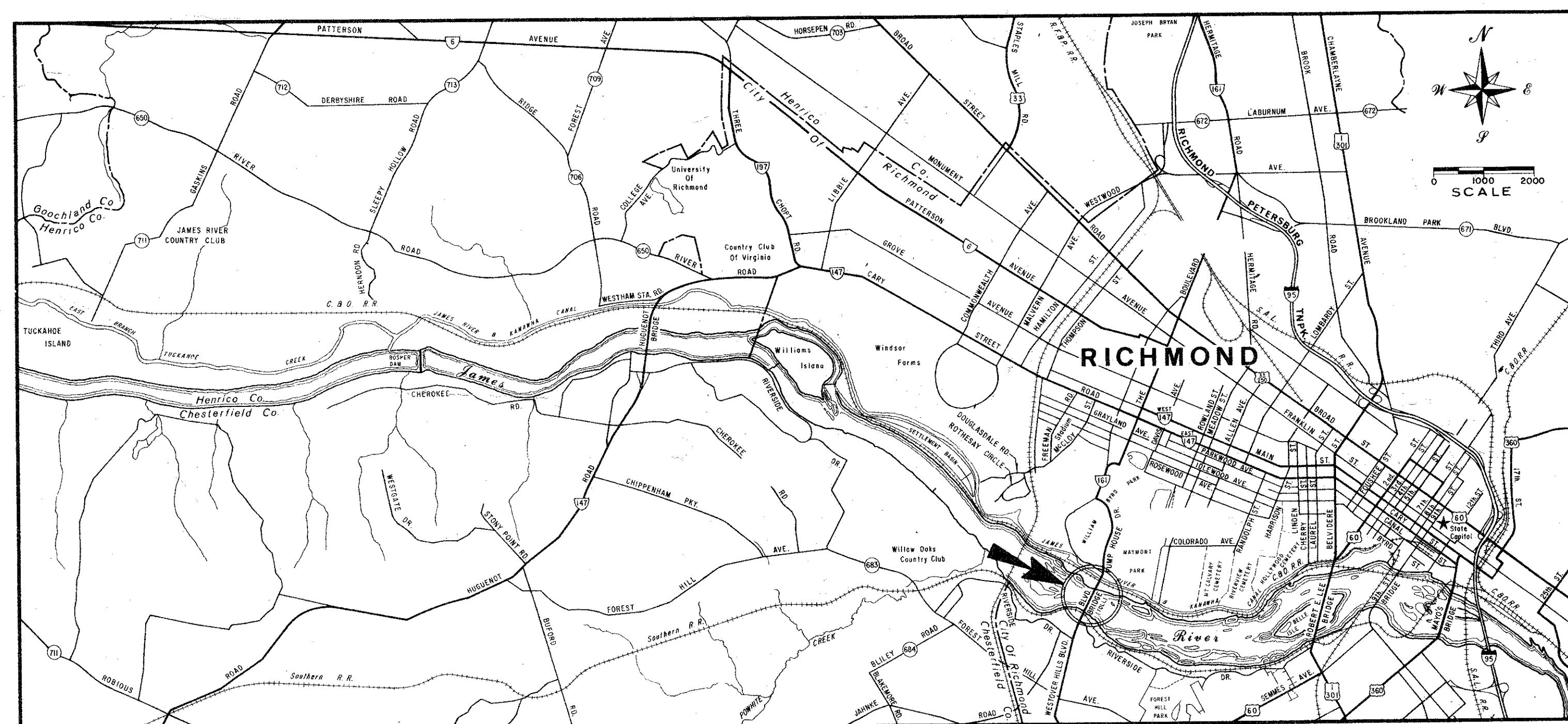
DECK PLAN

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE:
CONTRACT NO.:
SHEET NO. 34 OF

RICHMOND EXPRESSWAY SYSTEM

REPAINTING AND REPAIRING THE BOULEVARD BRIDGE OVER THE JAMES RIVER



CONTRACT B B - 2

LIMITED ACCESS HIGHWAY _____			
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
		1	18

SUBMITTED BY	
Date	
1-26-73	<i>Philip R. Yeager</i>
Date	HOWARD, NEEDLES, TAMMEN & BERGENDORF

RECOMMENDED BY	
Date	<i>James H. Chadwell</i>
Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

APPROVED BY	
1-29-73	<i>Chas. A. Taylor</i>
Date	CHAIRMAN, RICHMOND METROPOLITAN AUTHORITY

[illegible]

PRINTS SENT TO	NO.	DATE
ADVANCE PLANS		
R/W DIV. COMPLETED PLANS		
ADVANCE PLANS		
DIST. ENGR. COMPLETED PLANS		
FOR UTILITIES		
ADVANCE PLANS		
RES. ENGR. COMPLETED PLANS		
CONSTR. ENGR.		

REVISED BY...

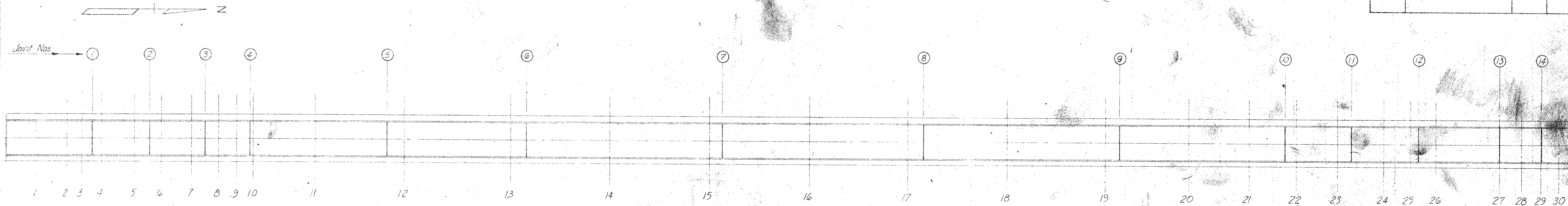
DESIGNED BY...

CONVENTIONAL SIGNS

STATE LINE
COUNTY LINE
CITY, TOWN OR VILLAGE
RIGHT OF WAY LINE
FENCE LINE
UNFENCED PROPERTY LINE
FENCED PROPERTY LINE
TRAVELED WAY
GUARD RAIL
RETAINING WALL
RAILROADS
BASE OR SURVEY LINE

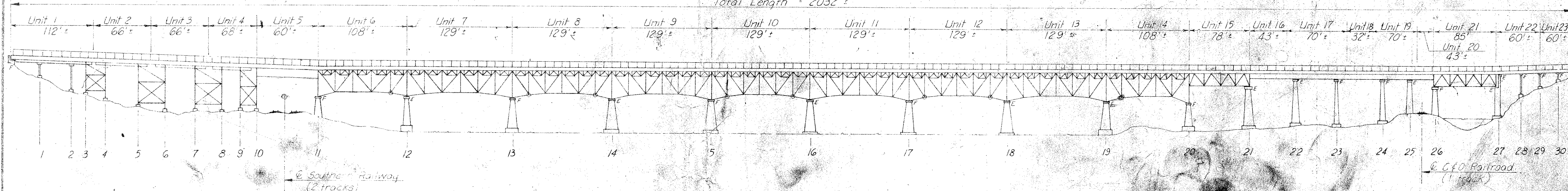
LEVEE OR EMBANKMENT
BRIDGES
CULVERTS
DROP INLET
TROLLEY POLES
POWER POLES
TELEPHONE OR TELEGRAPH POLES
MARSH
HEDGE
WOODS
GROUND ELEVATION
GRADE ELEVATION
BOXES WITHIN CONSTRUCTION LIMITS

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



PLAN

Total Length = 2032'±



ELEVATION

SPECIFICATIONS: GENERAL - Virginia Department of Highways Road and Bridge Specifications, 1970.
CONTRACT SPECIAL PROVISIONS - Specifications and Contract Special Provisions are necessary to make this set of plans complete.

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designation A588.
SHOP WELDS PERMITTED FOR PREFABRICATION.
High strength bolts shall conform to ASTM 325, shall have weathering characteristics comparable to those of the A588 weathering steel and shall be 1/2 inch diameter.
ALL MEMBERS MARKED "REPLACE" WERE REPLACED WITH NEW MEMBERS.
ASTM and AASHTO designations refer to the edition in effect when documents are made available.

DATES:

PLAN ADJ. QUANTITIES		
ITEM	UNIT	QUANTITY
FIELD OFFICE, TYPE III	L.S.	1
MOBILIZATION	L.S.	1
CLEANING AND PAINTING	L.S.	1,600,000 *
STRUCTURAL STEEL (A588)	lbs.	8,587.54
CONCRETE REPAIR	lbs.	3,832 **
FLAGMAN	MAN HRS.	704 ₀
CLEANING AND PAINTING OLD TOLL BUILDING	L.S.	1

* QUANTITY SHOWN IS IN POUNDS FOR REFERENCE ONLY.
** QUANTITY IN POUNDS OF CEMENT REQUIRED TO MAKE SPECIFIED MIX.

INDEX OF SHEETS	
SHEET NO.	TITLE
1	COVER SHEET
2	KEY PLAN & ELEVATION
3	MASONRY PIER DETAILS
4	FRAMED BENT LAYOUTS, PIERS 1 THRU 10
5	TYPICAL REPAIR DETAILS, PIERS 3 THRU 10
6	REPAIR DETAILS, PIERS 3 & 4
7	REPAIR DETAILS, PIERS 5 & 6
8	REPAIR DETAILS, PIERS 7 & 8
9	REPAIR DETAILS, PIERS 9 & 10
10	LAYOUT UNITS 1 THRU 5
11	LAYOUT UNITS 6 THRU 7
12	LAYOUT UNITS 8 THRU 13
13	LAYOUT UNIT 14
14	LAYOUT UNIT 15
15	TYPICAL TRUSS DETAILS
16	LAYOUT UNITS 16 THRU 20
17	LAYOUT UNITS 21 THRU 23
18	DECK PLAN

MADE	BY	DATE	NO.	REVISION	BY	DATE
1-5	3-72					
CHECKED	TEM	3-72	45 BUILT	LWC	7-73	
IN CHARGE	PRY					

AS BUILT

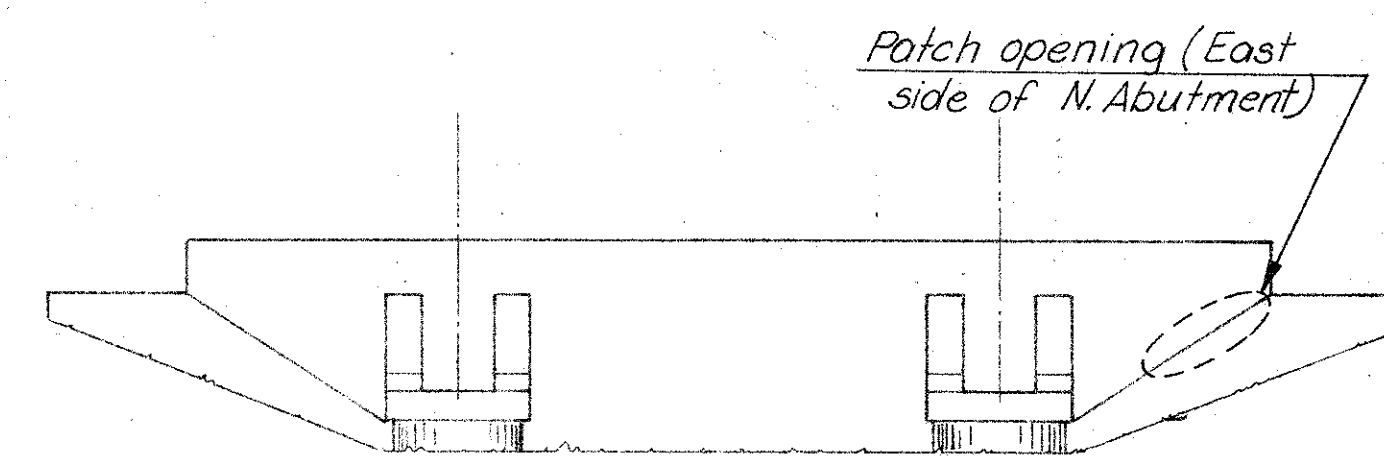
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

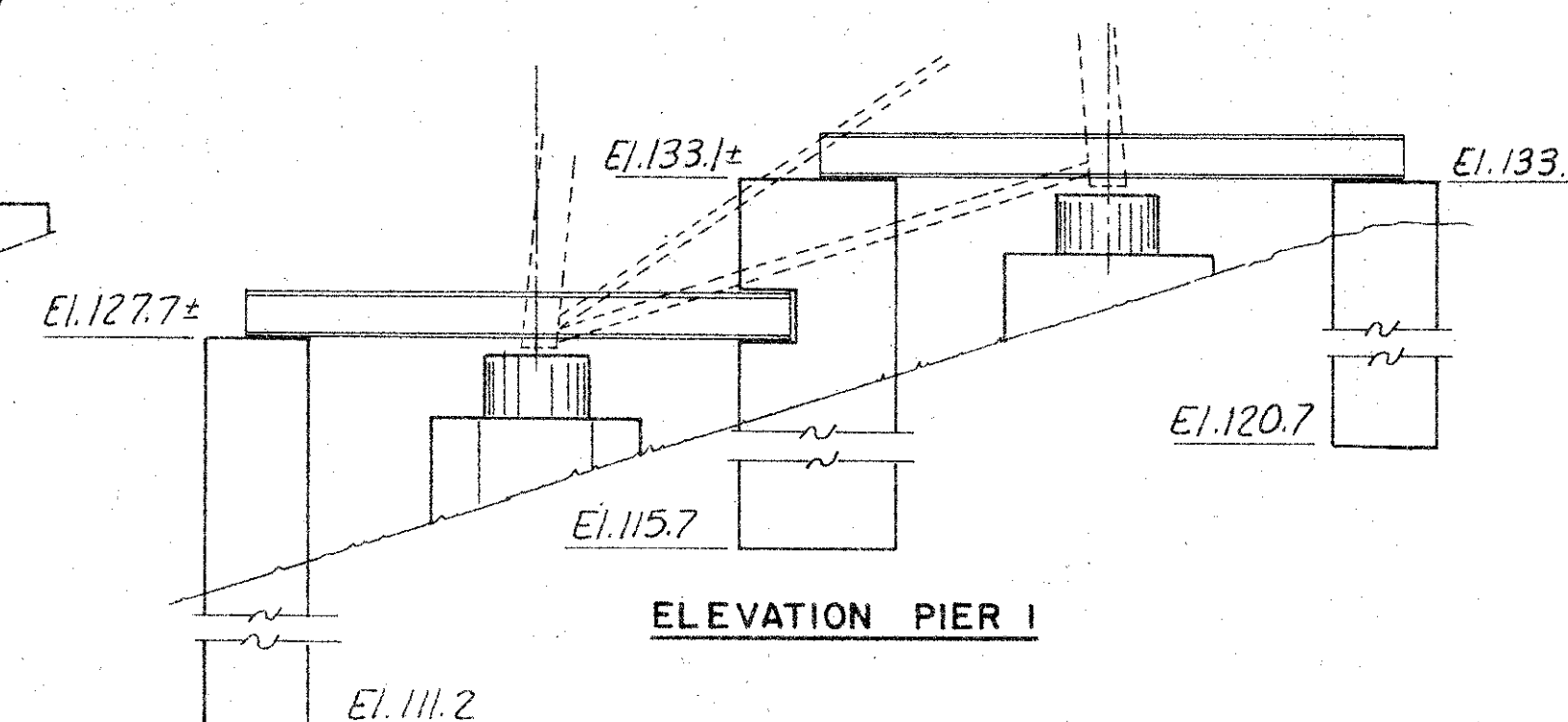
KEY PLAN & ELEVATION

SCALE: No Scale
CONTRACT NO. BB-2
SHEET NO. 2 OF 18
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

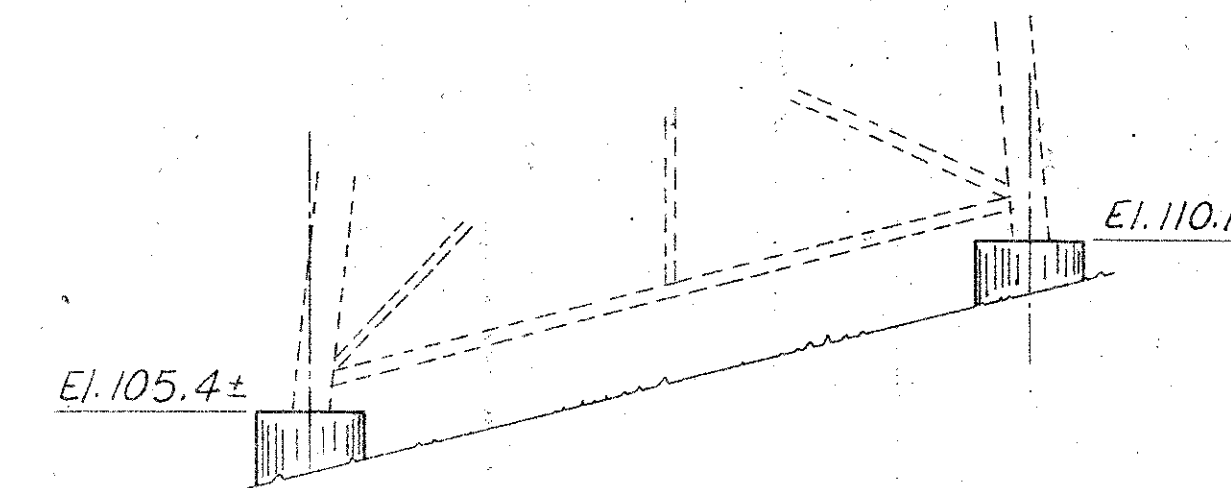
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



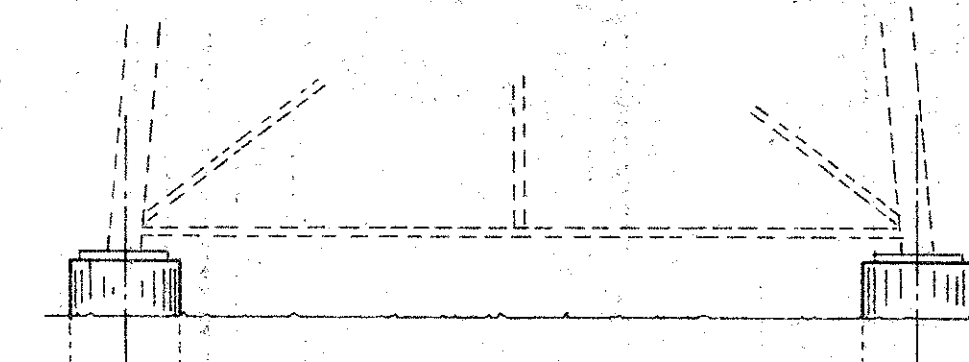
TYPICAL ABUTMENT ELEVATION



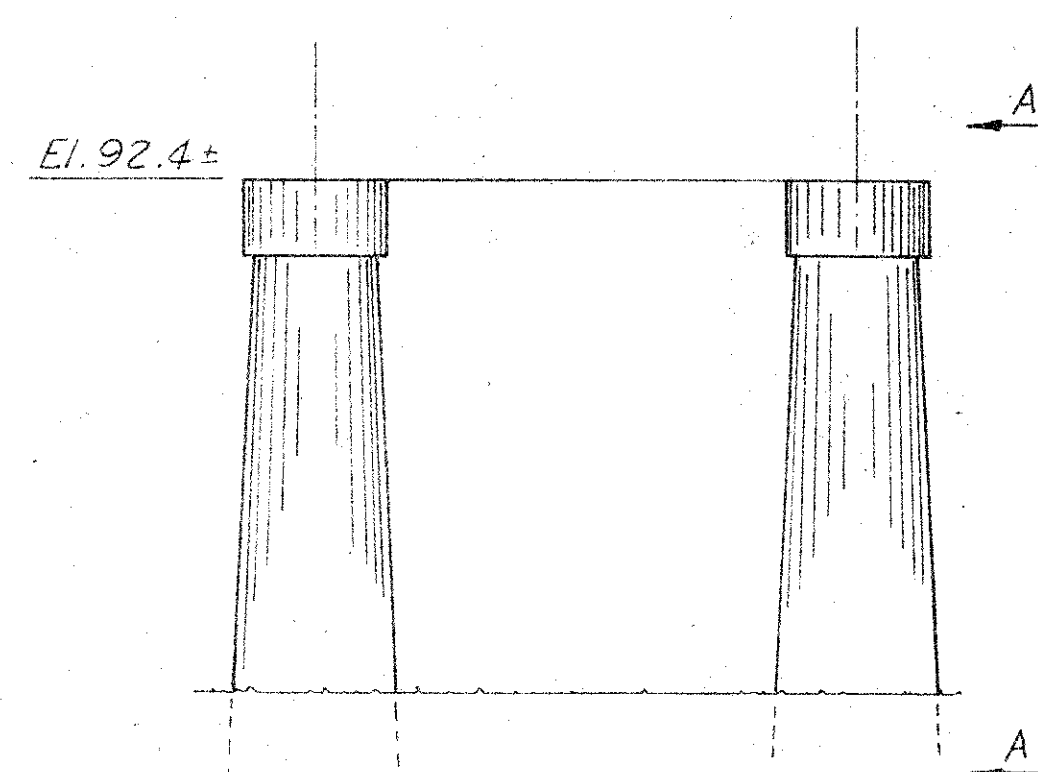
ELEVATION PIER 1



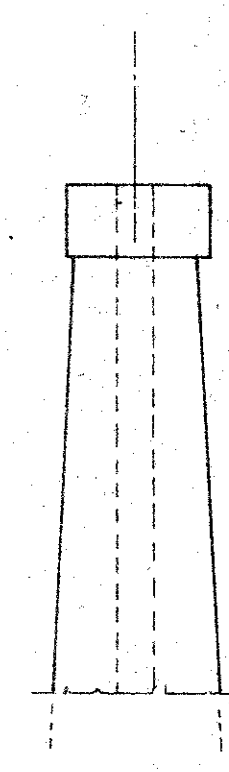
ELEVATION PIER 2



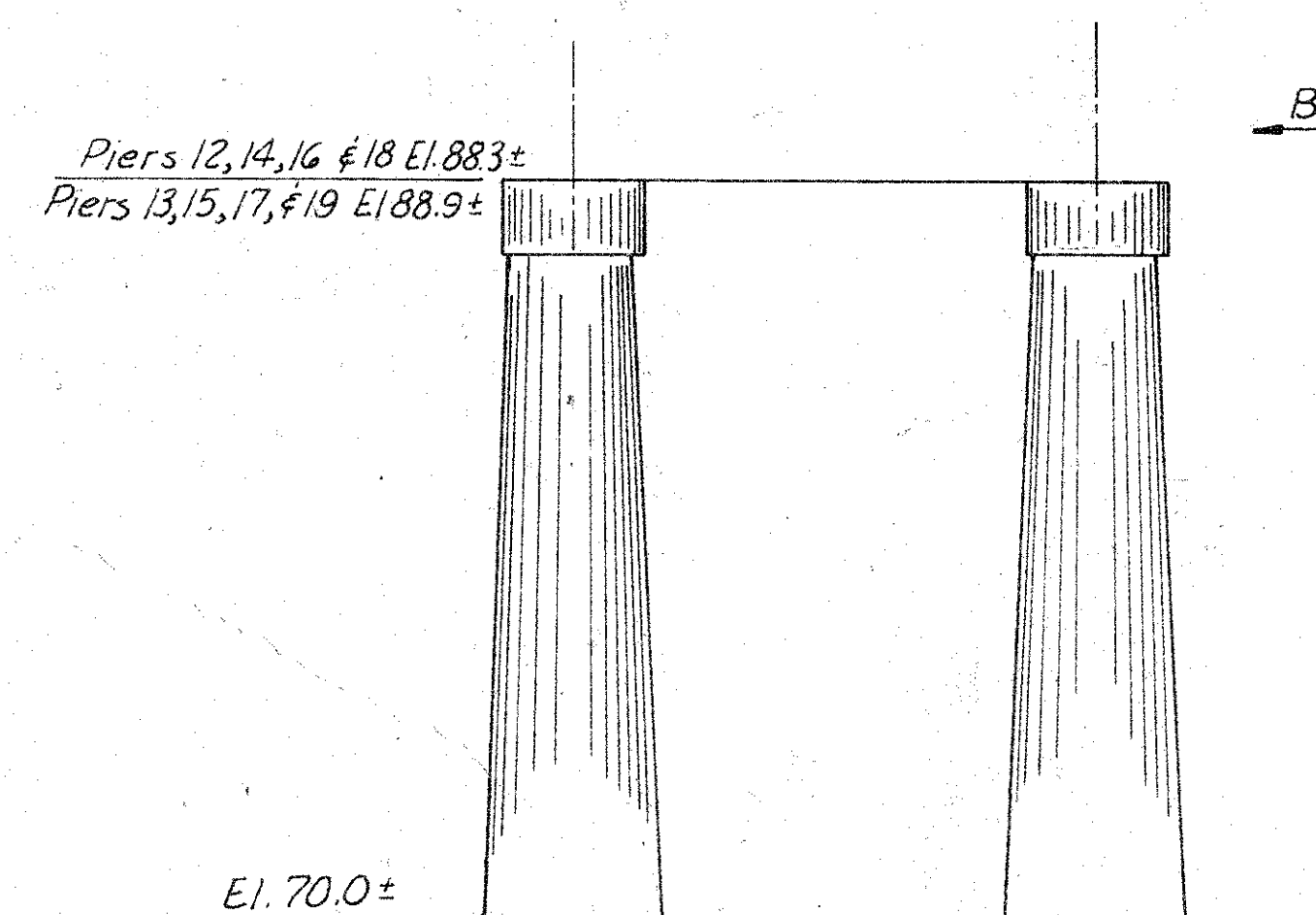
ELEVATION PIERS 3 THRU 10



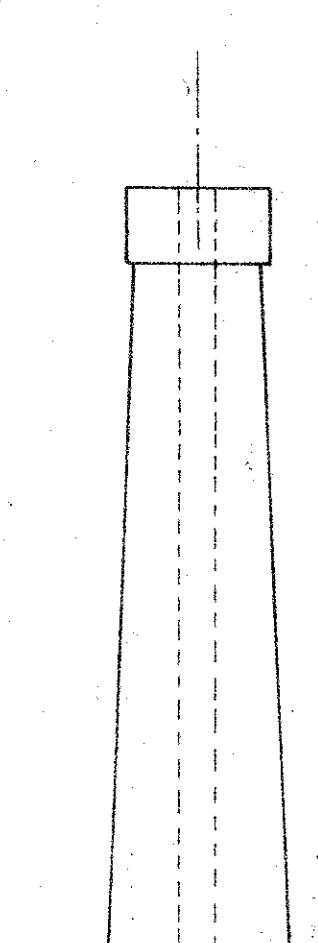
ELEVATION PIER 11



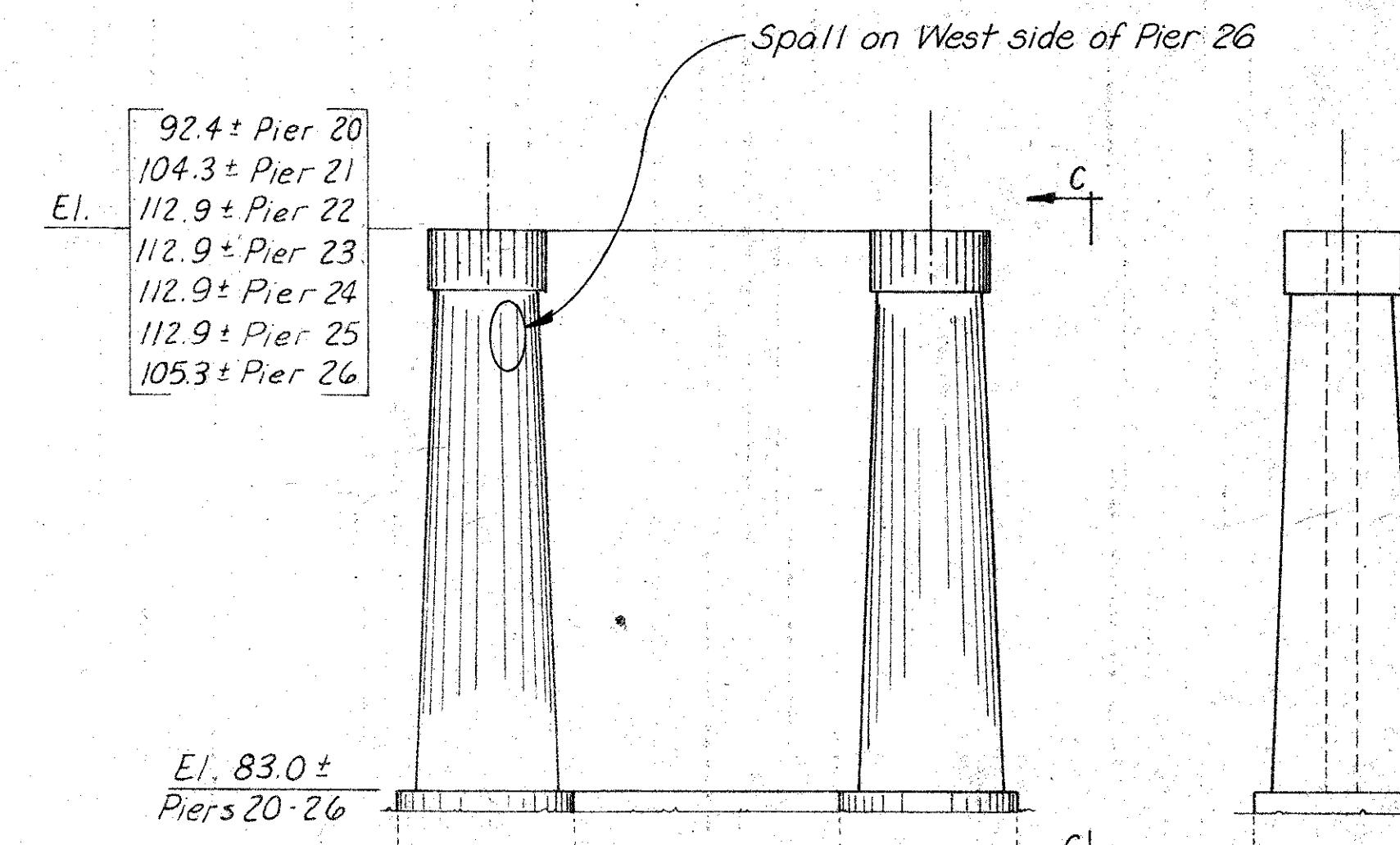
VIEW A-A



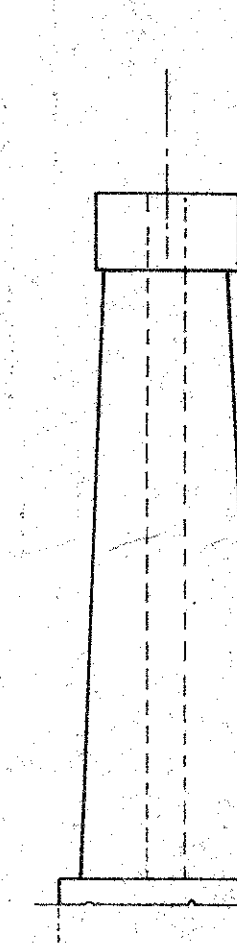
ELEVATION PIERS 12 THRU 19



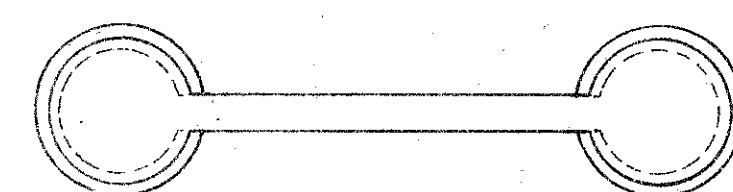
VIEW B-B



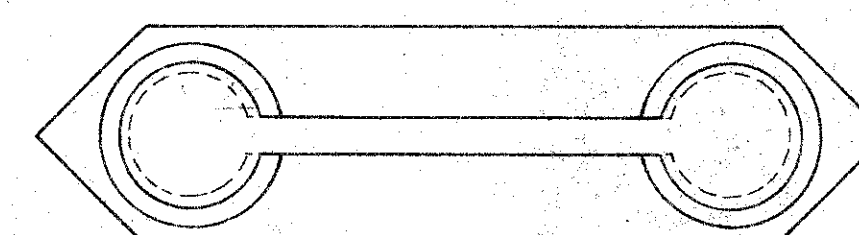
ELEVATION PIERS 20 THRU 26



VIEW C-C



PLAN PIERS 11 AND 20-26



PLAN PIERS 12 THRU 19

MADE	BY	DATE				
CHECKED	H.B.W.	3-72	AS BUILT	LWC	9-73	
IN CHARGE	P.R.Y.					

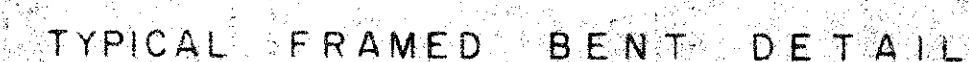
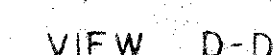
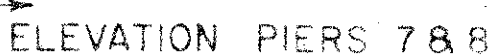
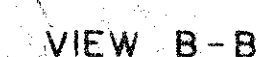
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

MASONRY PIER DETAILS

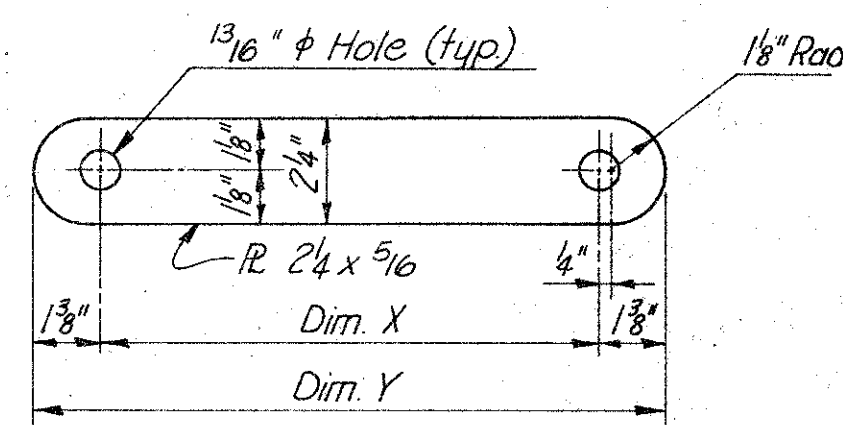
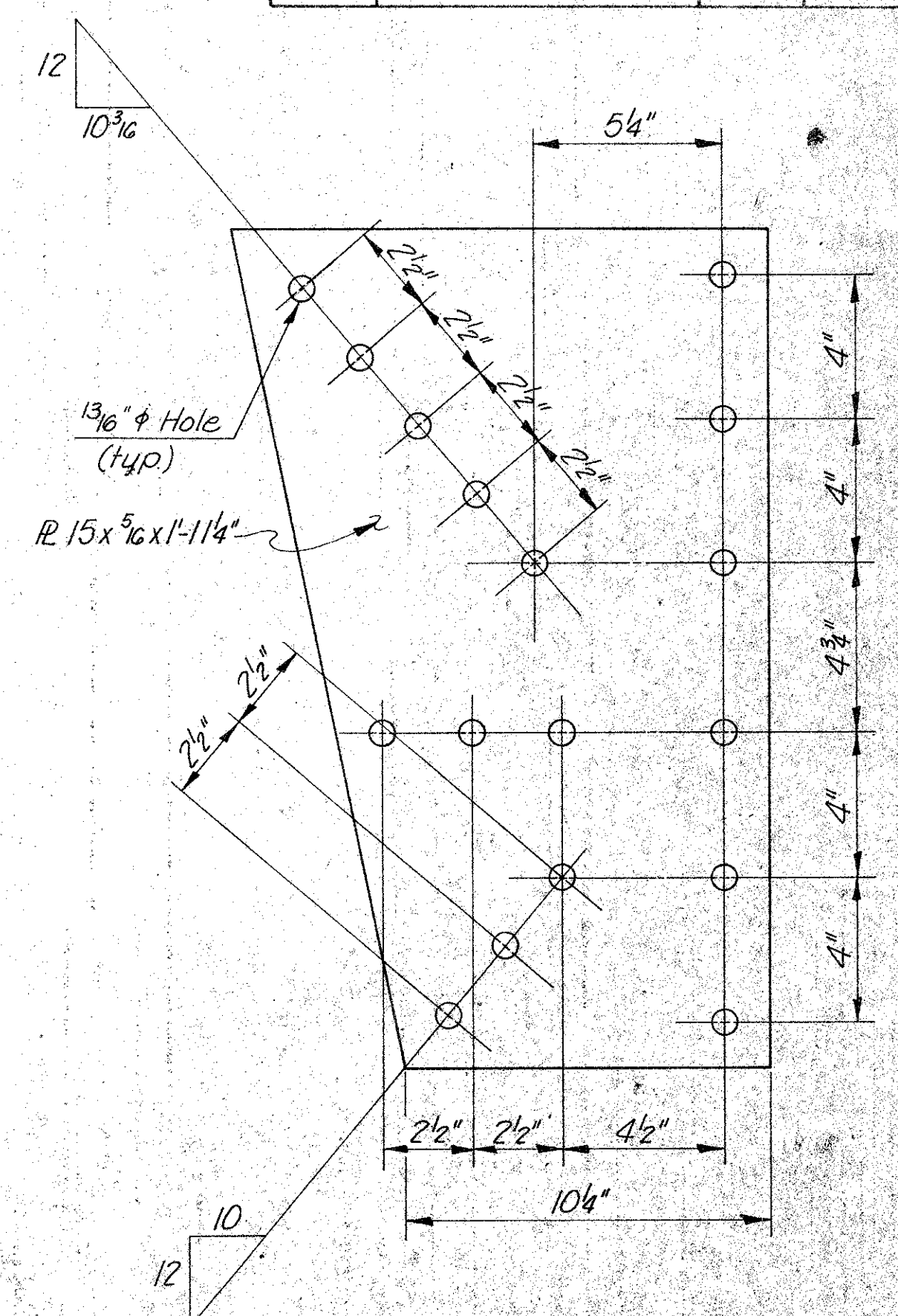
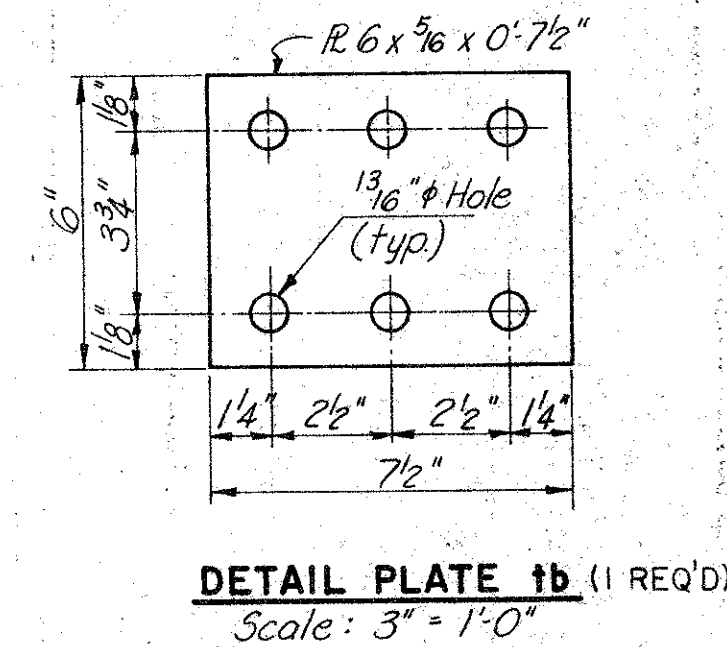
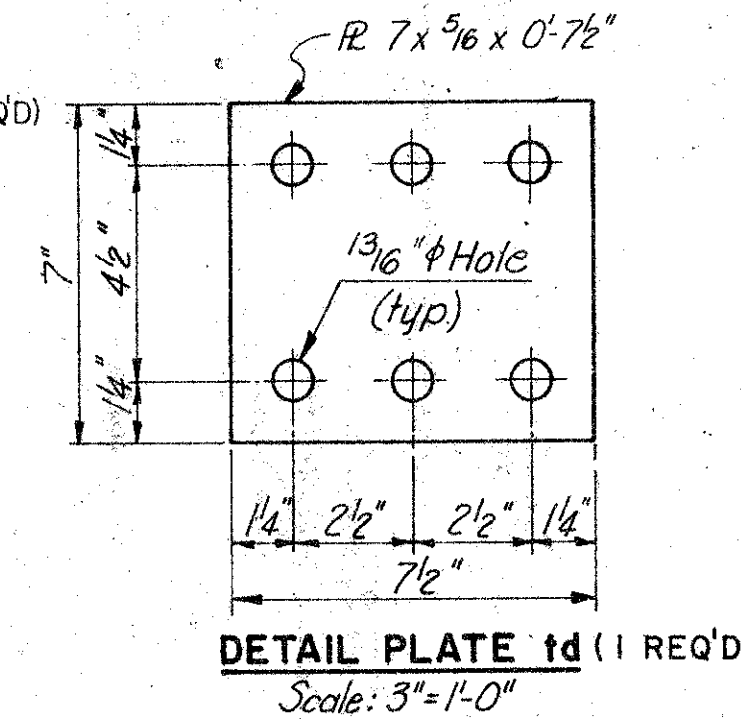
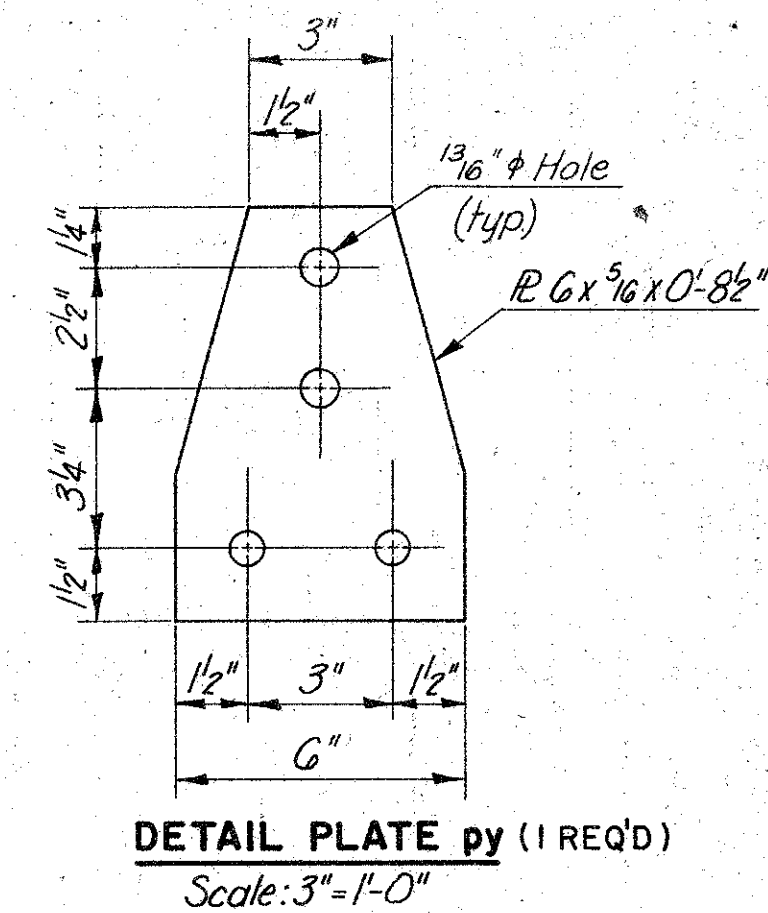
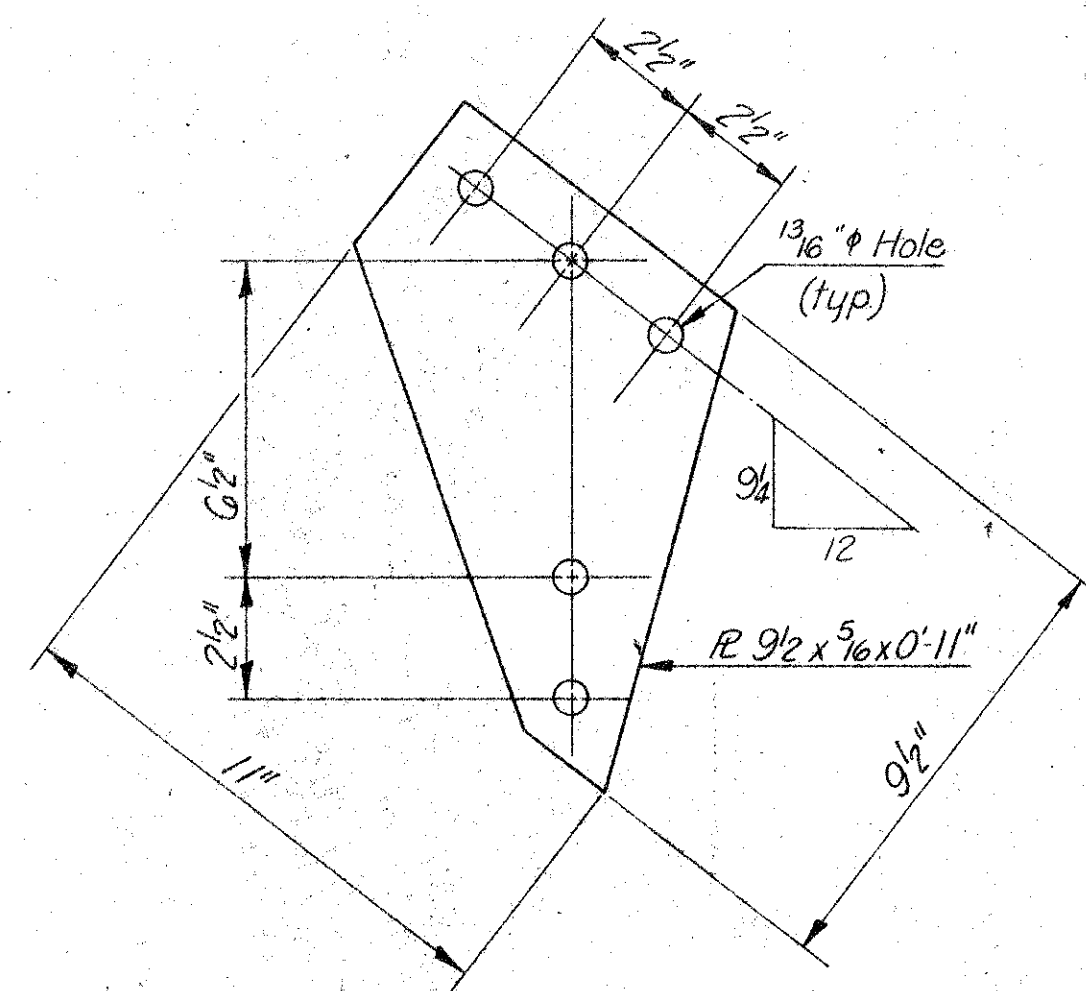
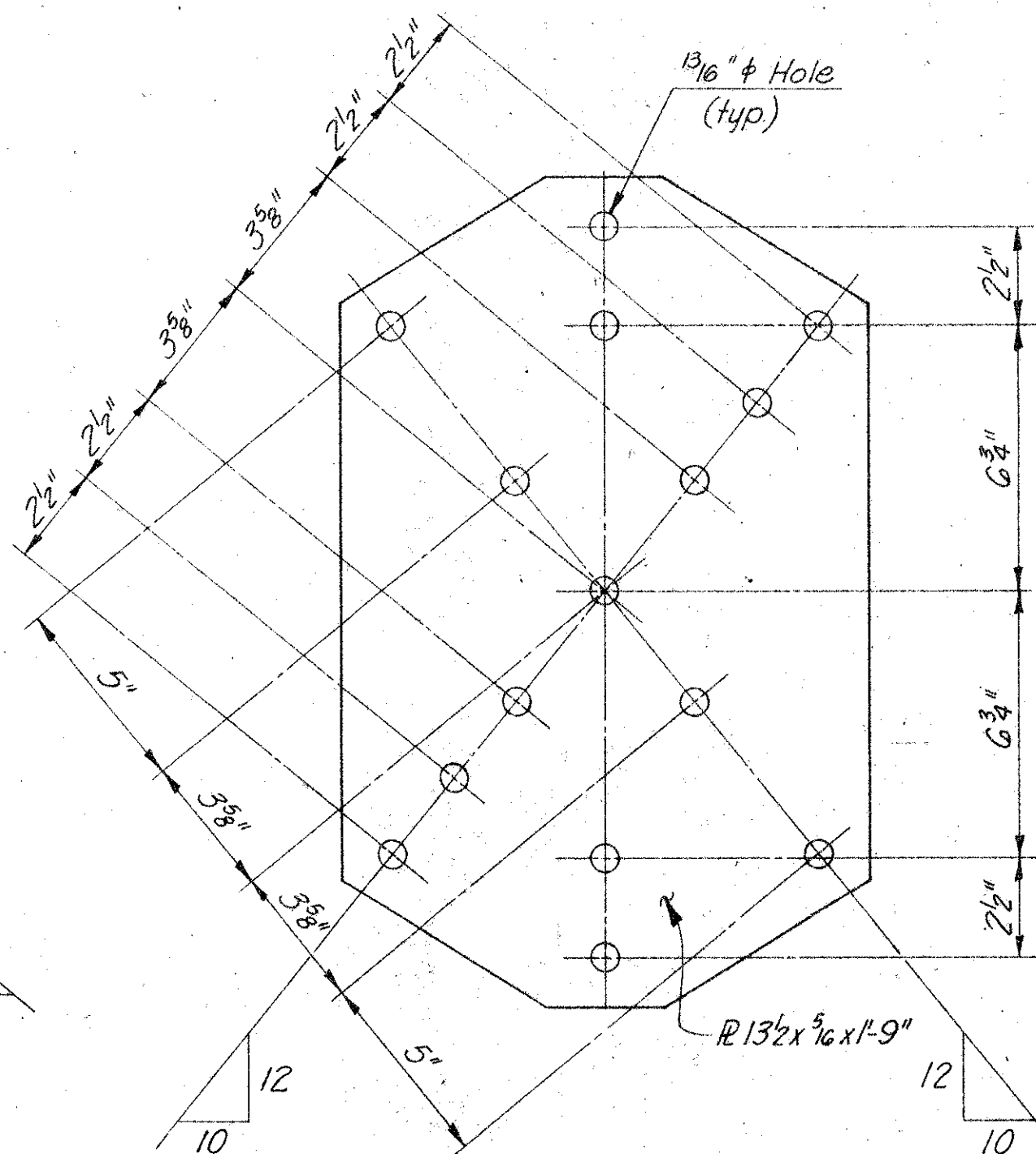
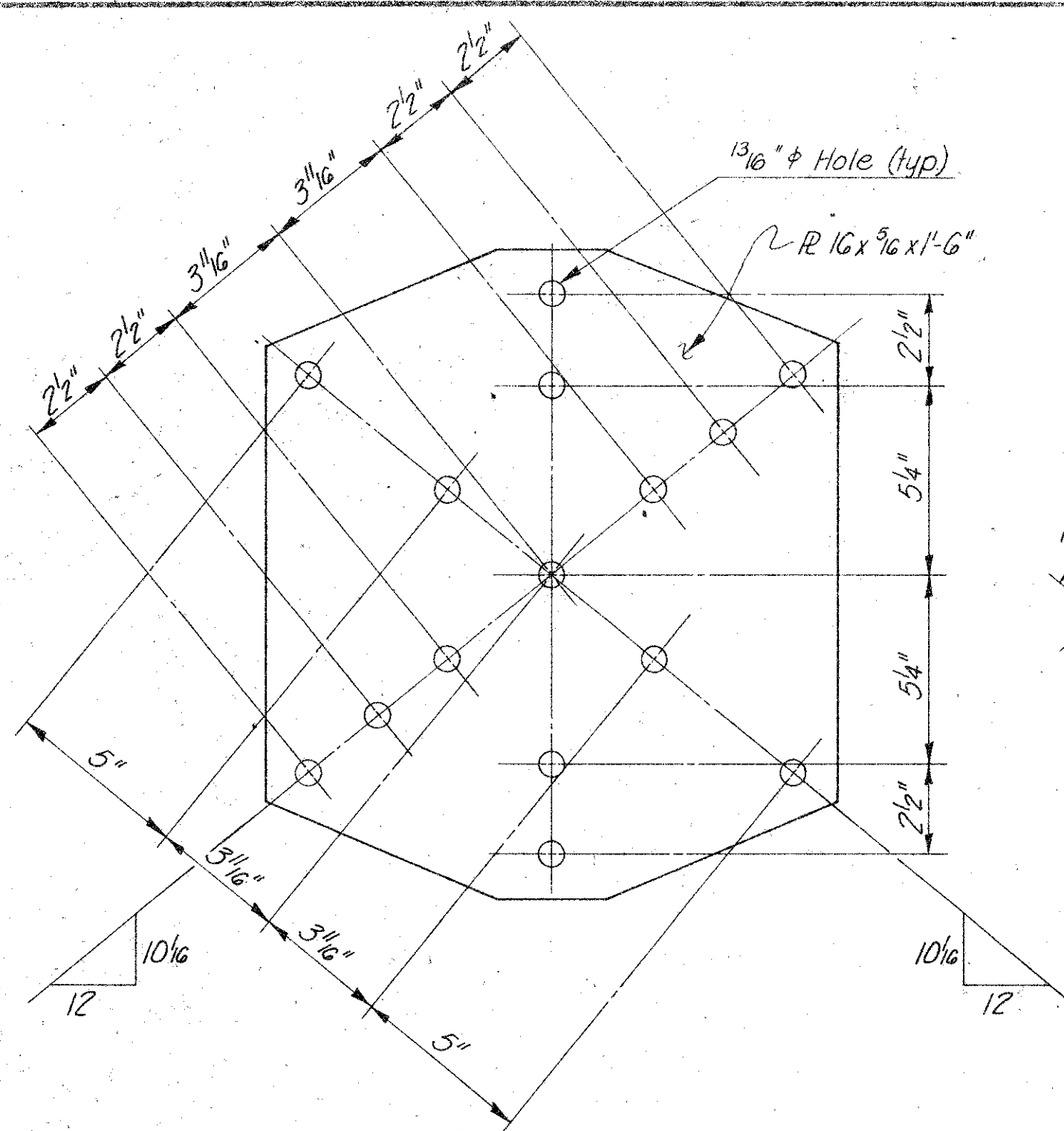
HOWARD, NEEDLES, TAMMEN & BERGENDOFF consulting engineers NEW YORK ALEXANDRIA KANSAS CITY	SCALE: No Scale CONTRACT: BB-2 SHEET: 3 18
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AS BUILT

FOR REFERENCE

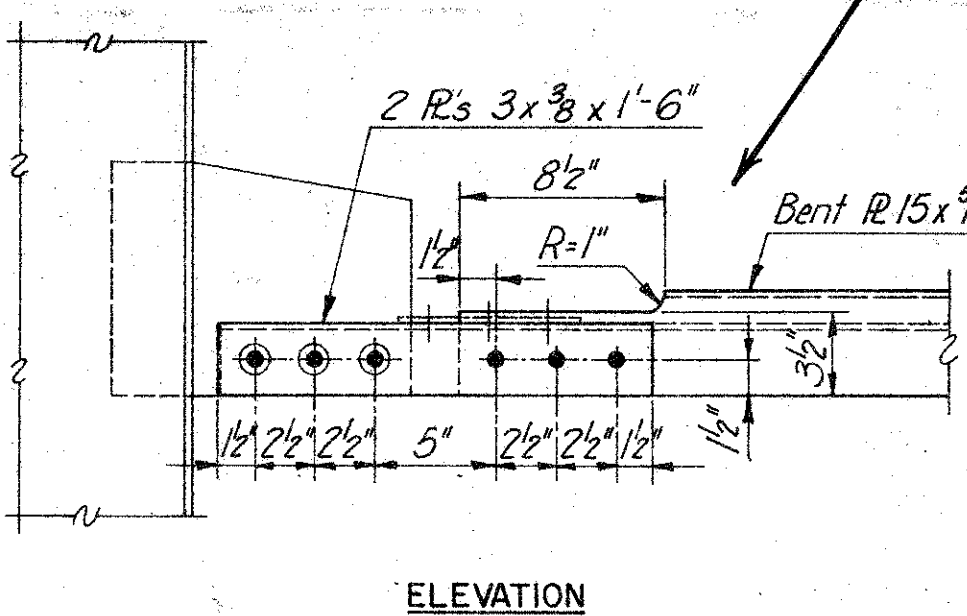
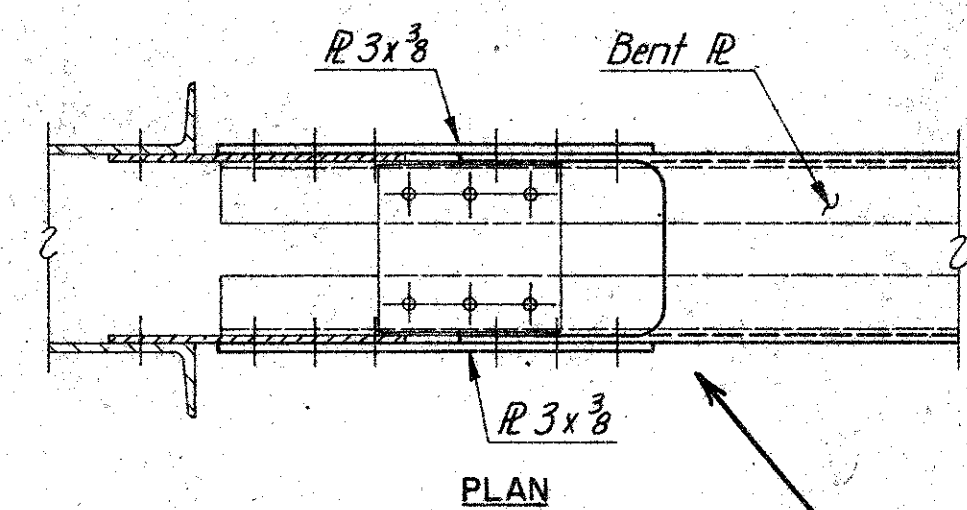
4. 18



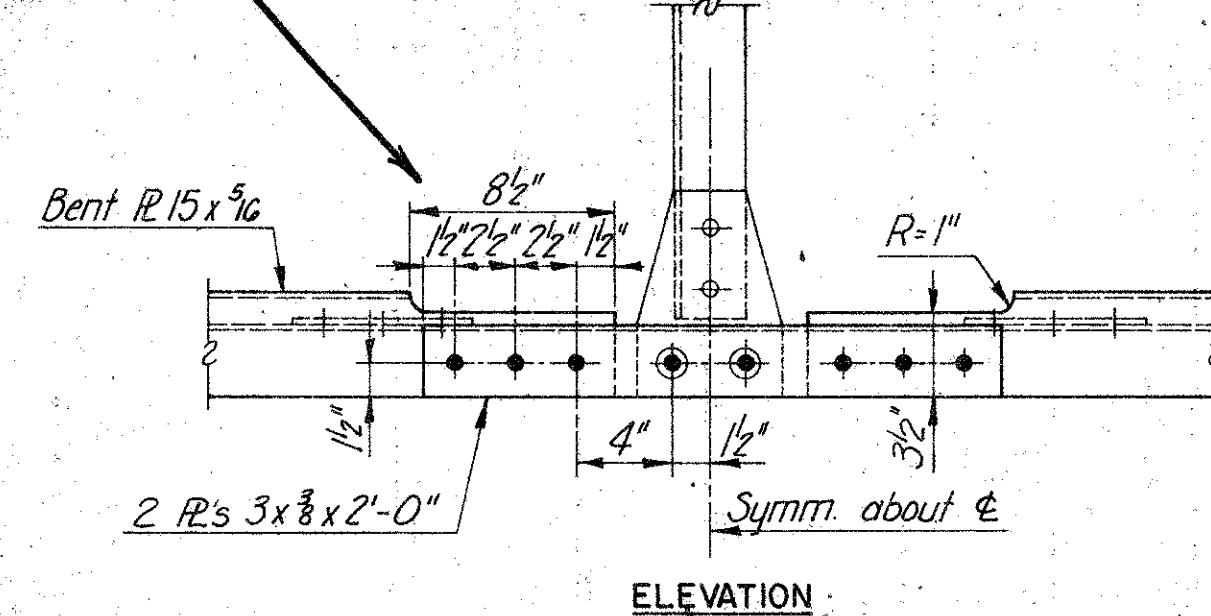
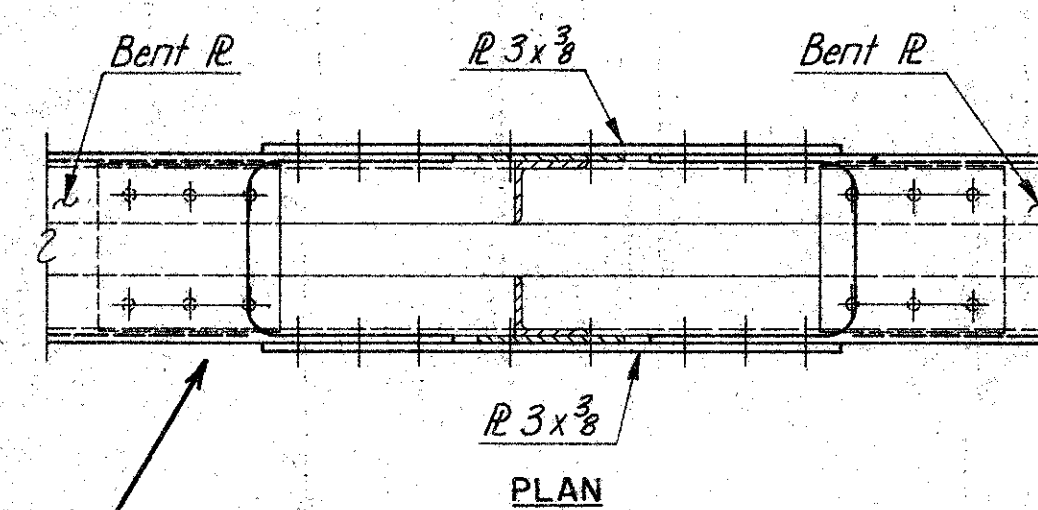
LACING BAR DETAIL
Scale: 3"=1'-0"

LACING BAR	DIM. X	DIM. Y
Type "A"	10 3/8"	1'-1 1/8"
Type "B"	1'-1 3/16"	1'-3 1/2"
Type "C"	1'-1"	1'-3 3/4"

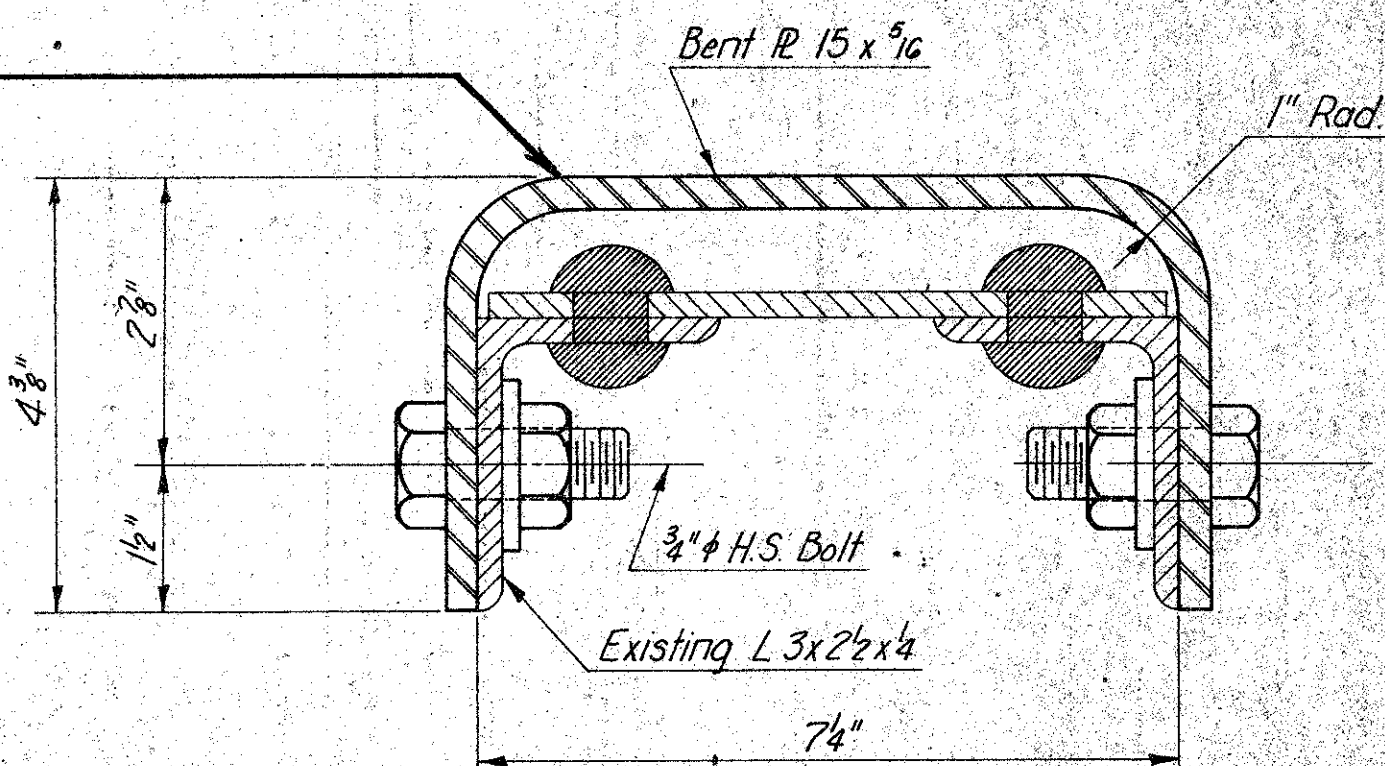
LACING BAR REPLACEMENT SCHEDULE			
PIER	MEMBER	LACING BAR TYPE	NUMBER REQ'D
3	C5-1	"B"	9
3	C5-2	"B"	9
4	C9-1	"B"	8
4	C9-2	"B"	4
5	C6-1	"B"	8
5	C6-2	"B"	3
5	B53-1	"A"	10
6	C10-1	"C"	29
6	C10-2	"C"	14
7	C7-1	"C"	46
7	C7-2	"C"	7
7	B54-1	"A"	4
8	C11-2	"C"	6
8	B55-1	"A"	8
9	C8-1	"B"	10
9	B56-1	"A"	4
10	C12-1	"C"	28
10	C12-2	"C"	10
10	B57-1	"A"	10
TOTAL			227



TYPICAL END CONNECTION
Scale: 1/2"=1'-0"



TYPICAL CENTER CONNECTION
Scale: 1/2"=1'-0"



- LEGEND FOR SHEETS 5 thru 9:
- Indicates existing rivet, except as noted.
 - ⊙ Indicates existing 3/4" φ rivet to be removed and replaced by 3/4" φ H.S. Bolt. Hole in new steel to be subpunched 7/16" φ and reamed in the field.
 - Indicates 3/4" φ H.S. Bolt. Hole in existing steel to be field drilled 13/16" φ.

PLATE REPLACEMENT SCHEDULE			
PIER	MEMBERS	PLATE	NO. REQUIRED
3 & 4	B82-1, B81-1	PB1	2
	B82-1L, B81-1L	PB1	2
	B63-1L, B132-1L	py	1
5 & 6	B62-1	td	1
7 & 8	B60-1 & B136-1	pv	2
7 & 8	B87-1 & B88-2	PB4	1
	B61-1	tb	1
9 & 10	B64-1L & B88-2L	pm	1
3 & 4	B31-1, B7-1, B22-1, B51-1	GUSSET	1
7 & 8	B62-1L & B86-2L	pm1	1
9 & 10	B65-1L & B87-1L	GUSSET	1

5 & 6	B84-1L & B83-1L	PB1	1
	B63-1L, B134-1L, B63-1	py	2
	B59-1L & B133-1L	pv	1
	B62-1L, B133-1L, B87-1L	py1	1

Note:
Lacing bars for members B50-1 & B51-1, Piers 3 & 4 and member B52-1, Pier 5 are not included in the above schedule or the quantity "Lacing Bars Replaced".

BY	DATE				
MADE	18W	16V	5-72		
CHECKED				AS BUILT	LWC 9-73
IN CHARGE	P.R.Y.	NO	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

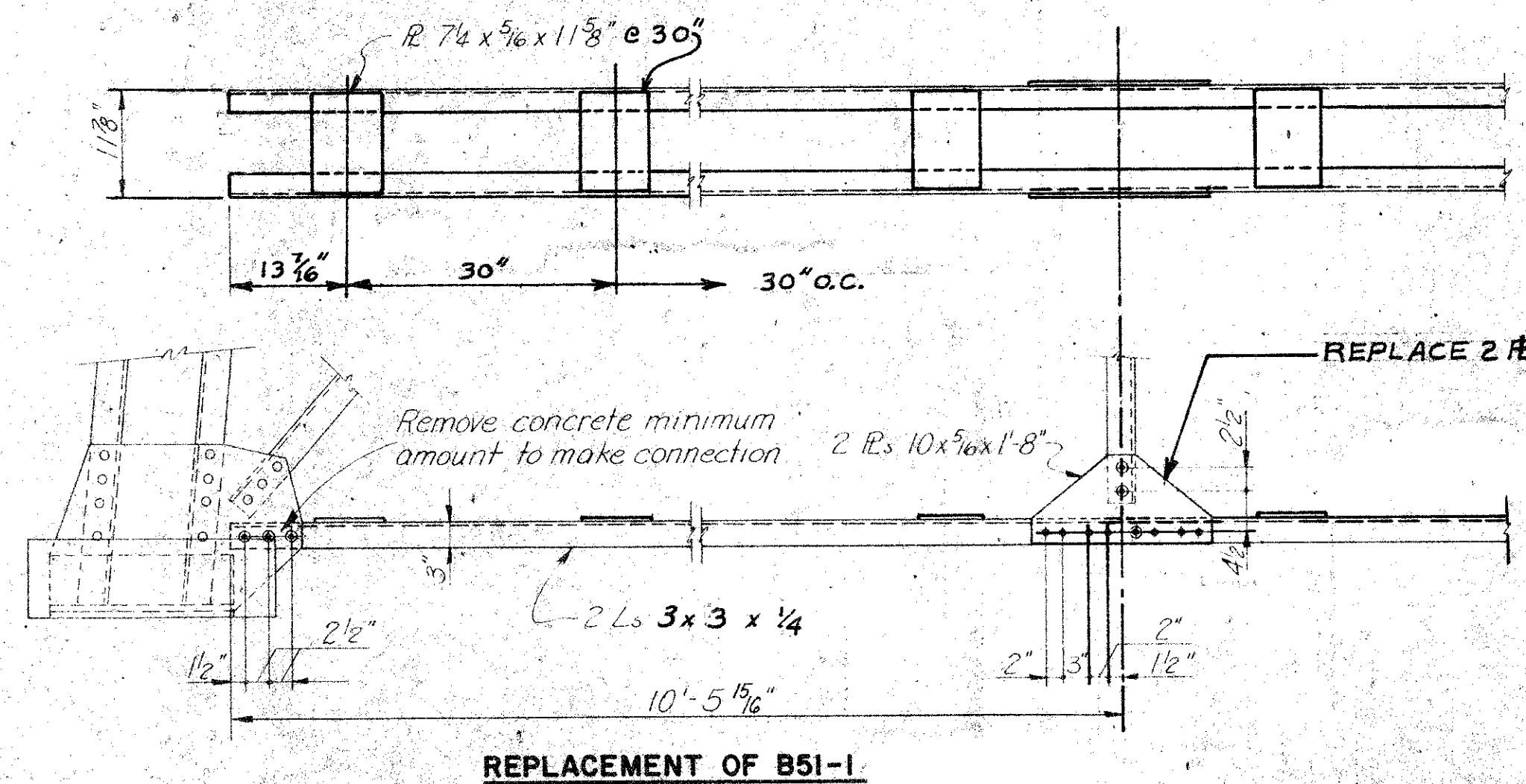
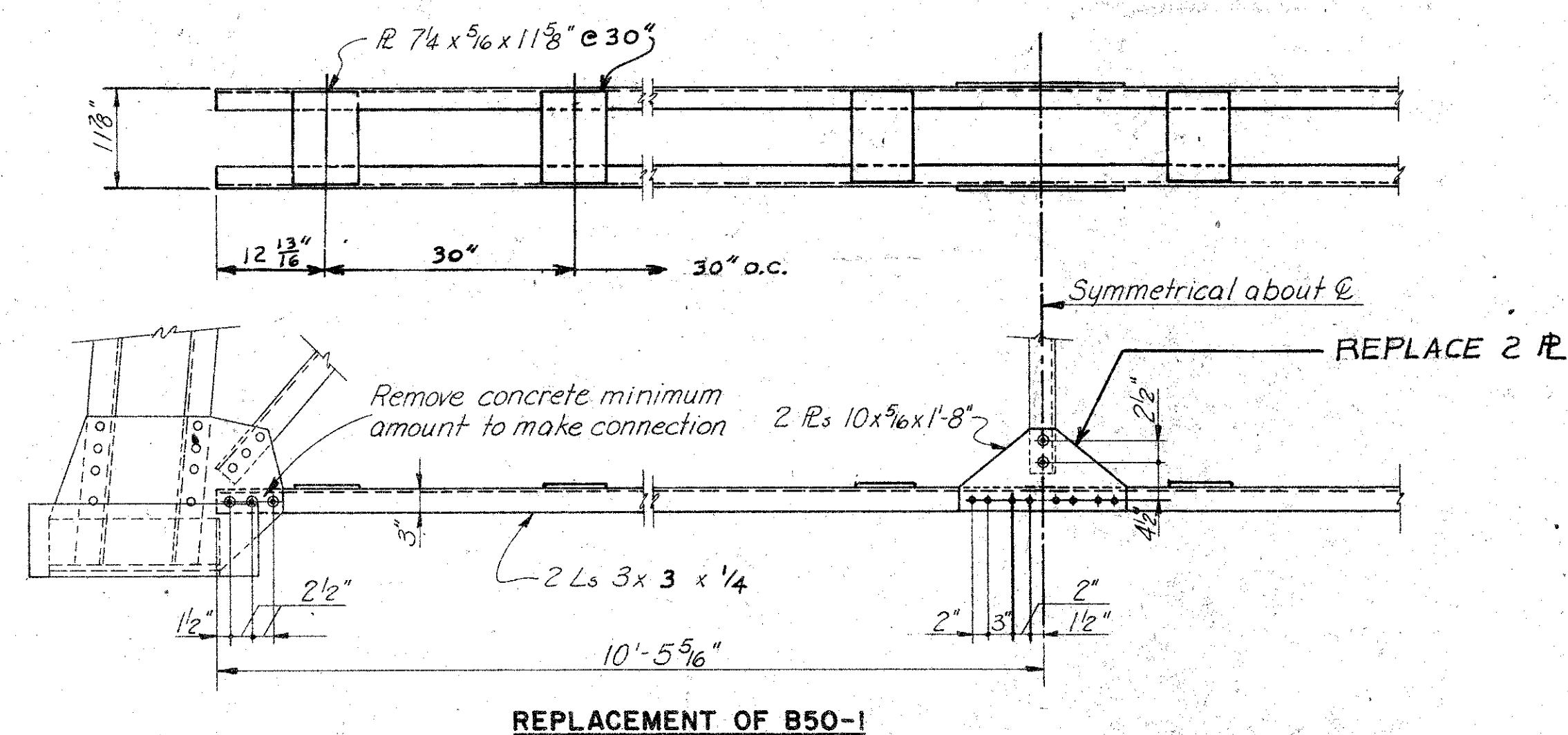
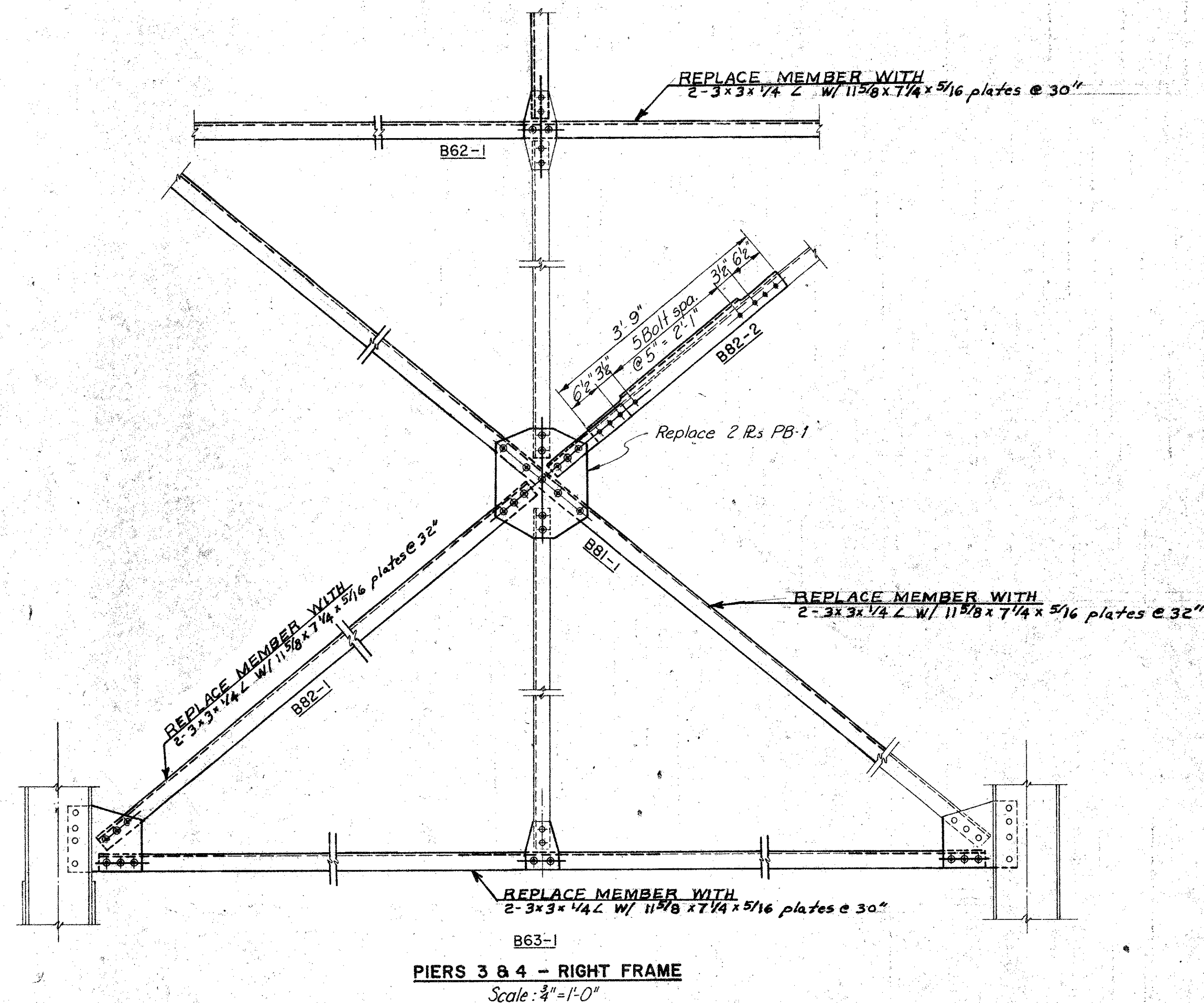
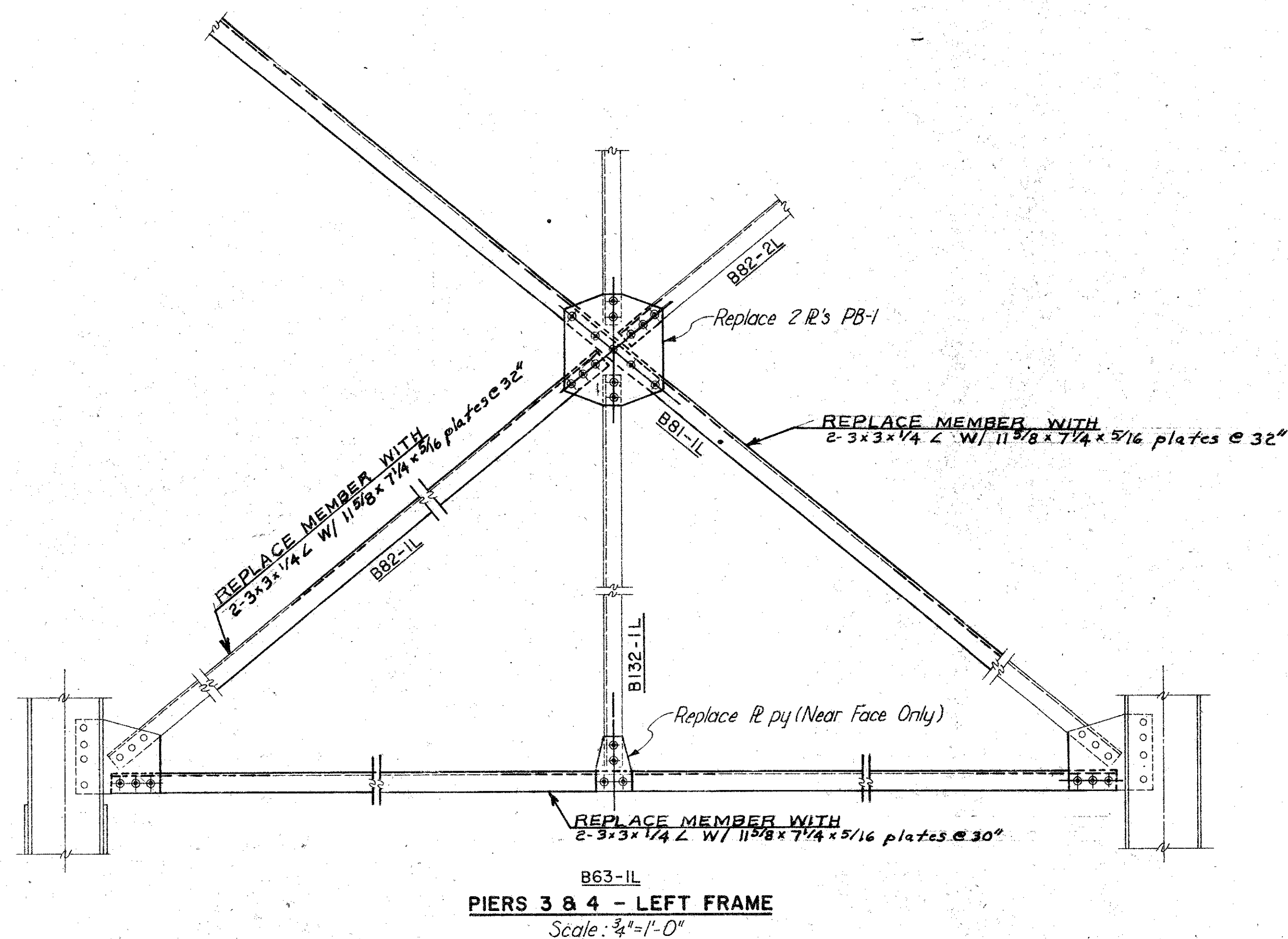
BOULEVARD BRIDGE OVER
JAMES RIVER

TYPICAL REPAIR DETAILS, PIERS 3 THRU 10

SCALE: As Shown
CONTRACT NO: BB-2
SHEET NO: 5

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS

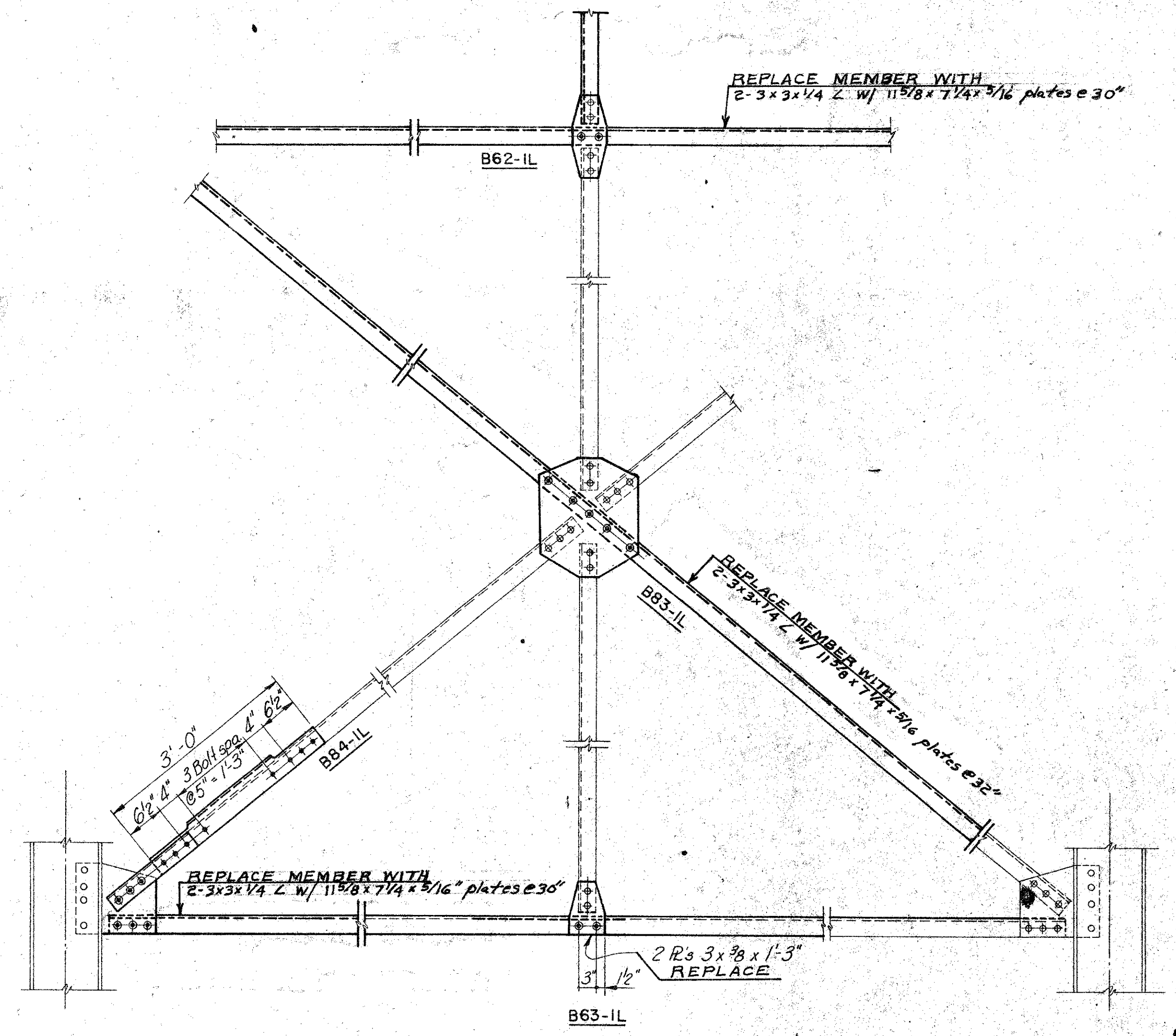


MADE	BY	DATE			
	HAW	5-72			
CHECKED	AJS	5-72	AS BUILT	LWC	9-73
IN CHARGE	PRY		NO	REVISION	BY
					DATE

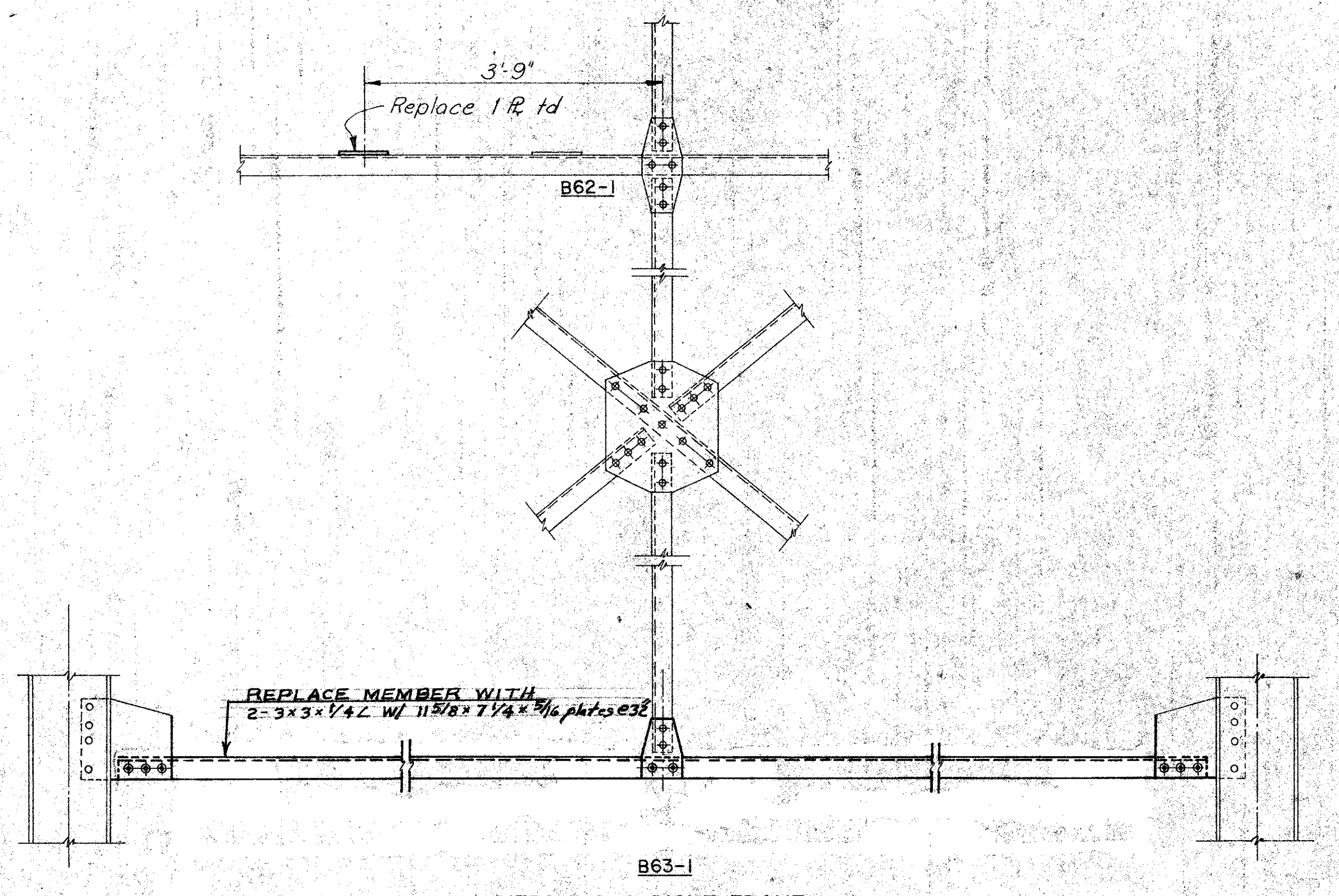
AS BUILT

RICHMOND METROPOLITAN AUTHORITY RICHMOND EXPRESSWAY SYSTEM	
BOULEVARD BRIDGE OVER JAMES RIVER REPAIR DETAILS PIERS 3 & 4	
SCALE: As Shown	CONTRACT NO. BB-2
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SHEET NO. 6 OF 18

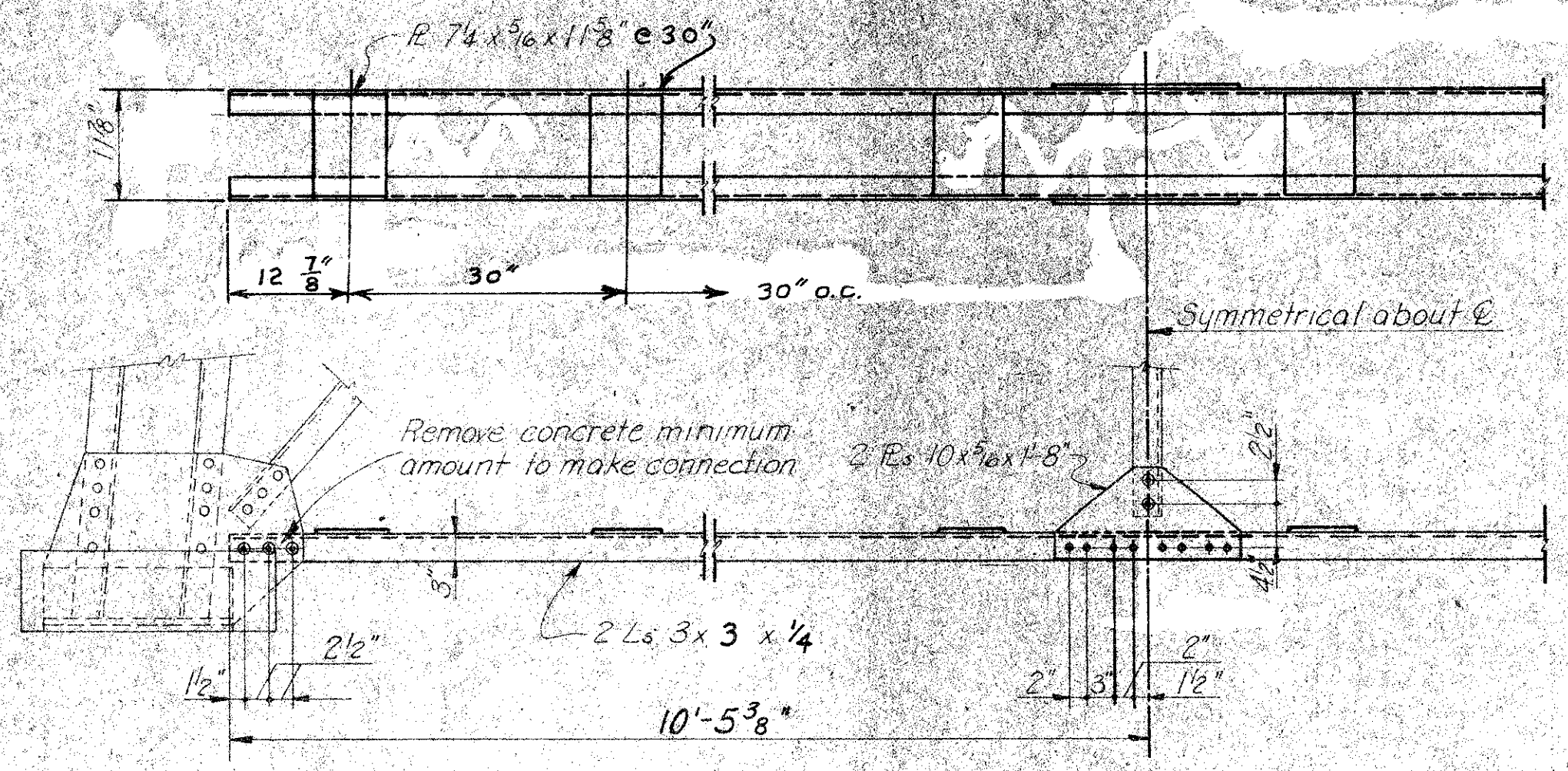
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



PIERS 5 & 6 - LEFT FRAME
Scale: 3/4" = 1'-0"



PIERS 5 & 6 RIGHT FRAME
Scale: 3/4" = 1'-0"



REPLACEMENT OF B52-1

AS BUILT

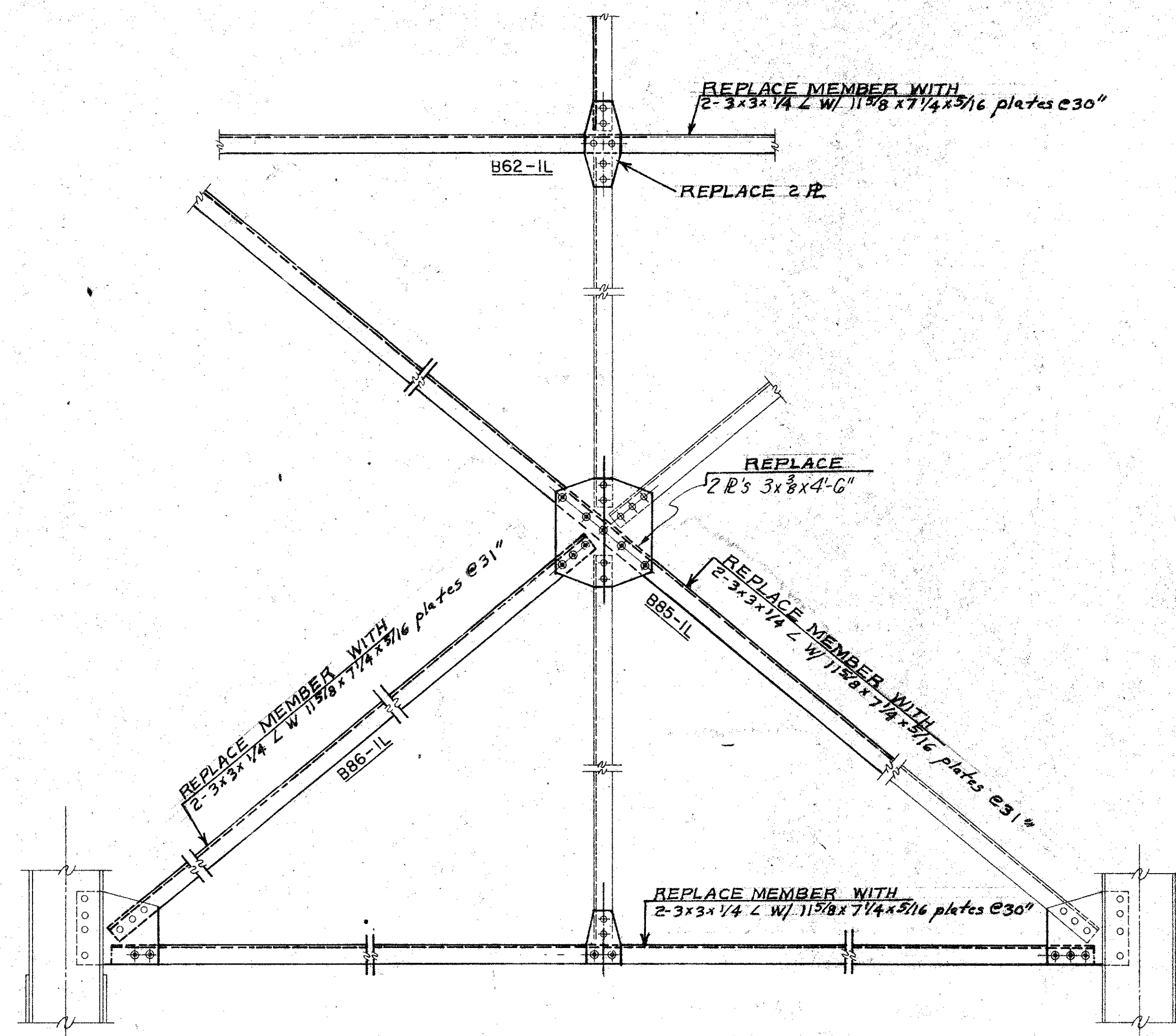
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER
REPAIR DETAILS
PIERS 5 & 6

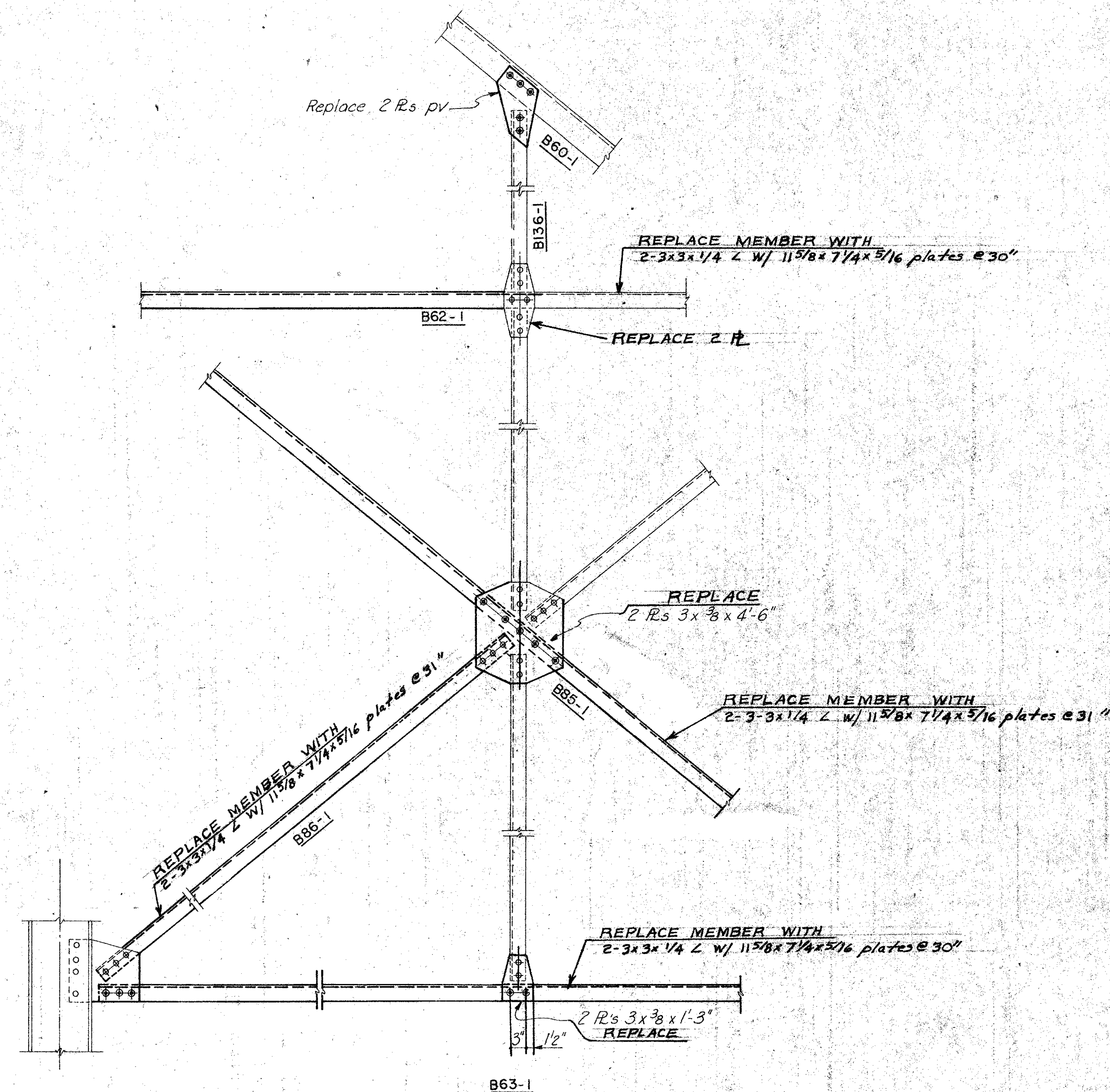
MADE	BY	DATE			
CHECKED	BY	DATE			
IN CHARGE	BY	DATE			

SCALE: As Shown	CONTRACT NO. BB-2
HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SHEET NO. 7 OF 18

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



B63-1L
PIERS 7 & 8 - LEFT FRAME
Scale: 3/4"=1'-0"



B63-1
PIERS 7 & 8 - RIGHT FRAME
Scale: 3/4"=1'-0"

AS BUILT

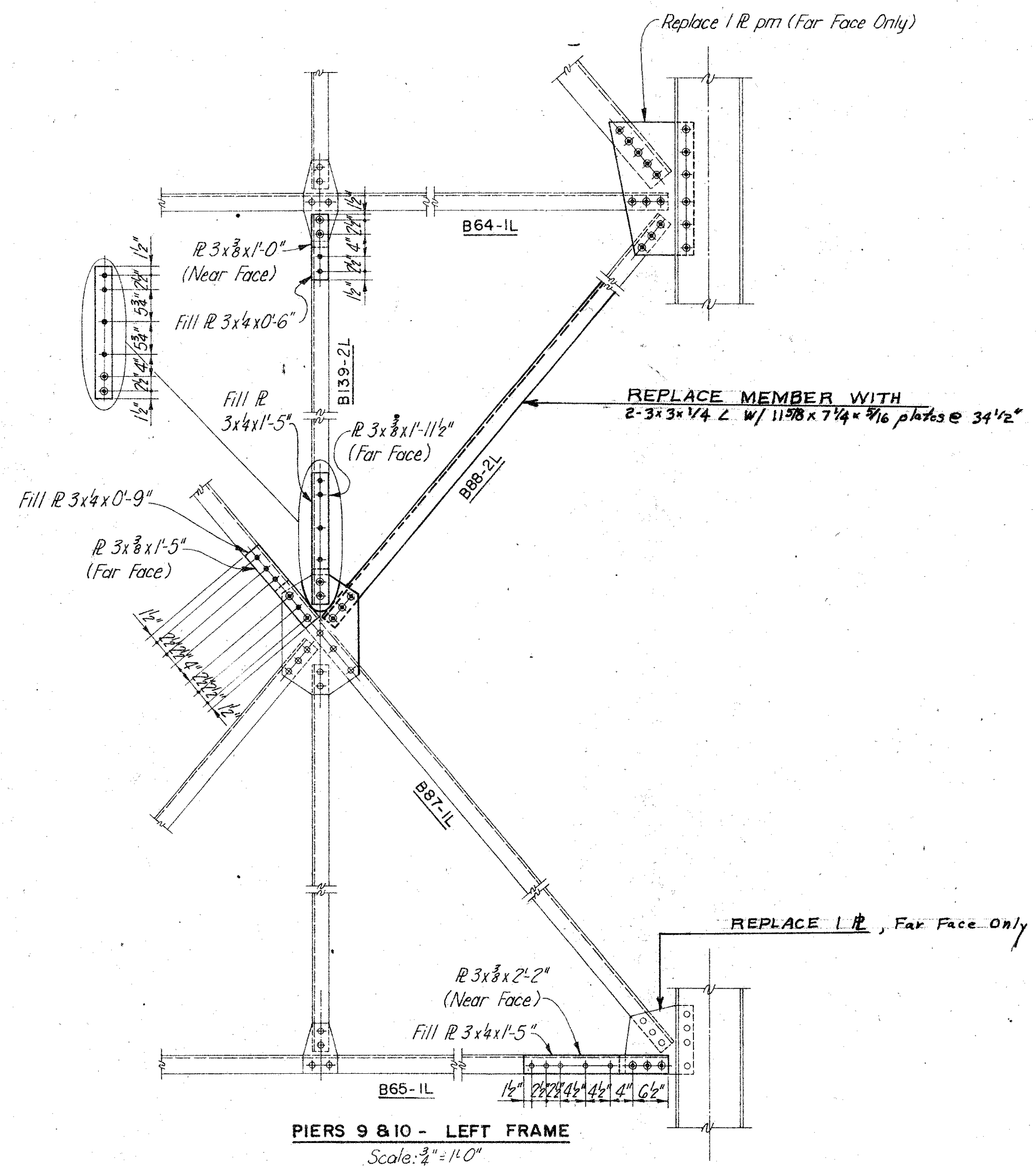
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER
REPAIR DETAILS
PIERS 7 & 8

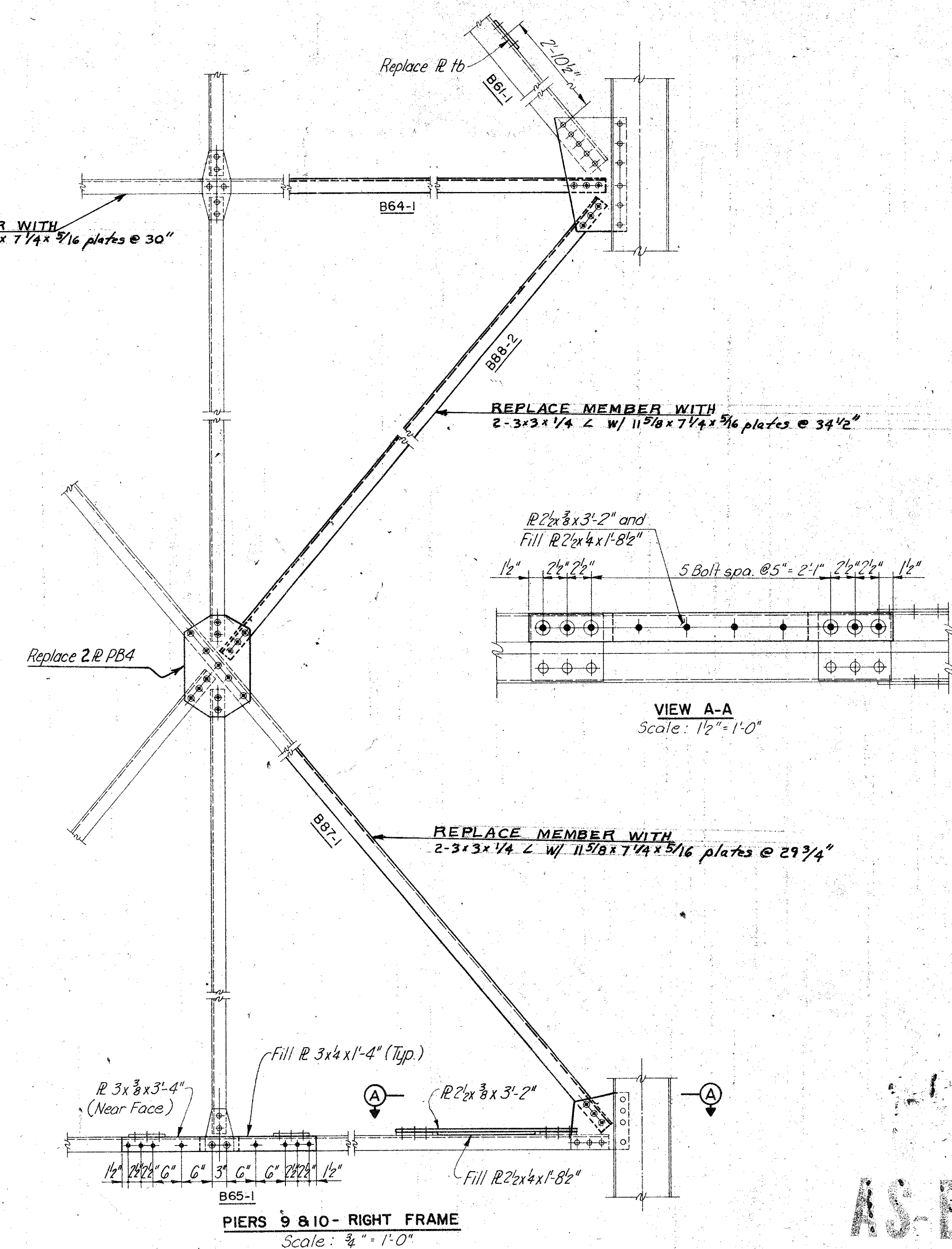
SCALE: As Shown
CONTRACT NO. BB-2
HOWARD, NEEDLES, TAMMEN & BERGENOFF
General Consultants
SHEET NO. 8 OF 18

MADE	BY	DATE			
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CHECKED	AJS	5-72	AS BUILT	LWC	7-73
IN CHARGE	PRY				

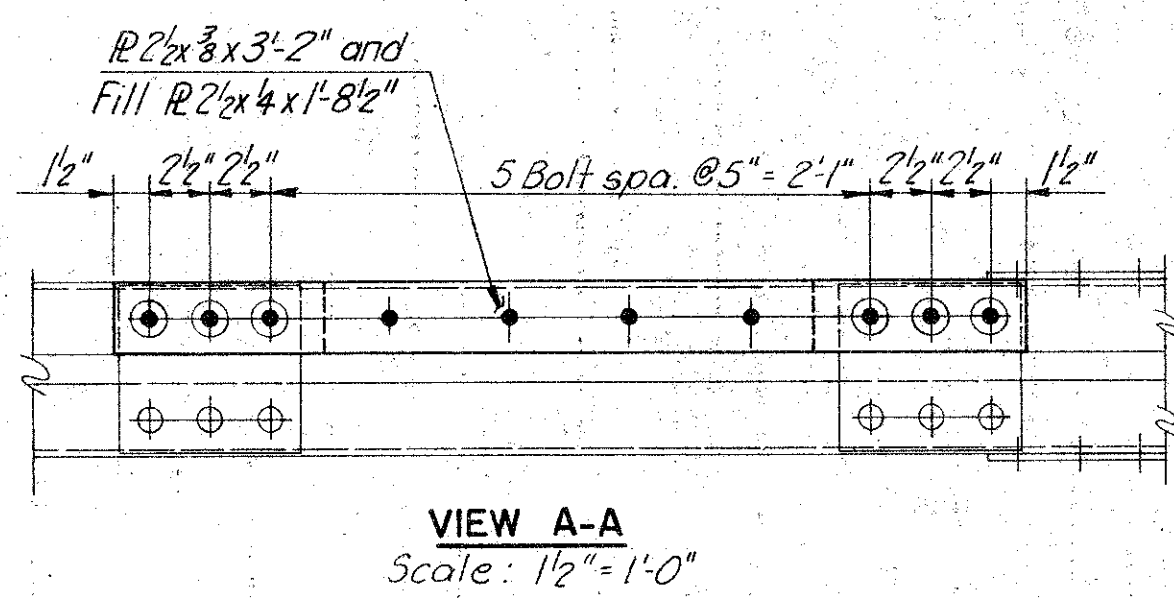
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



PIERS 9 & 10 - LEFT FRAME
Scale: 3/4" = 1'-0"



PIERS 9 & 10 - RIGHT FRAME
Scale: 3/4" = 1'-0"



AS-BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

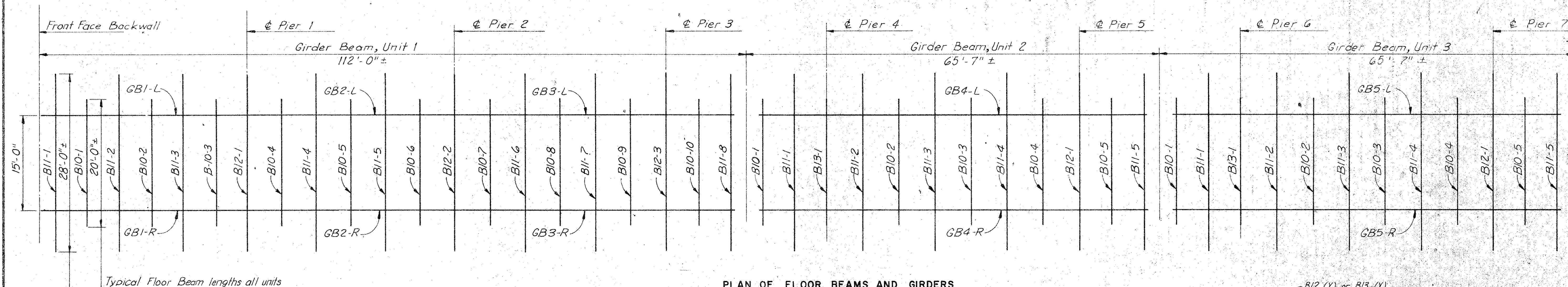
BOULEVARD BRIDGE OVER
JAMES RIVER
REPAIR DETAILS
PIERS 9 & 10

SCALE: As Shown	DATE: BB-2
HOWARD, NEEDLES, TAMMEN & BERGENOFF General Consultants	9 18

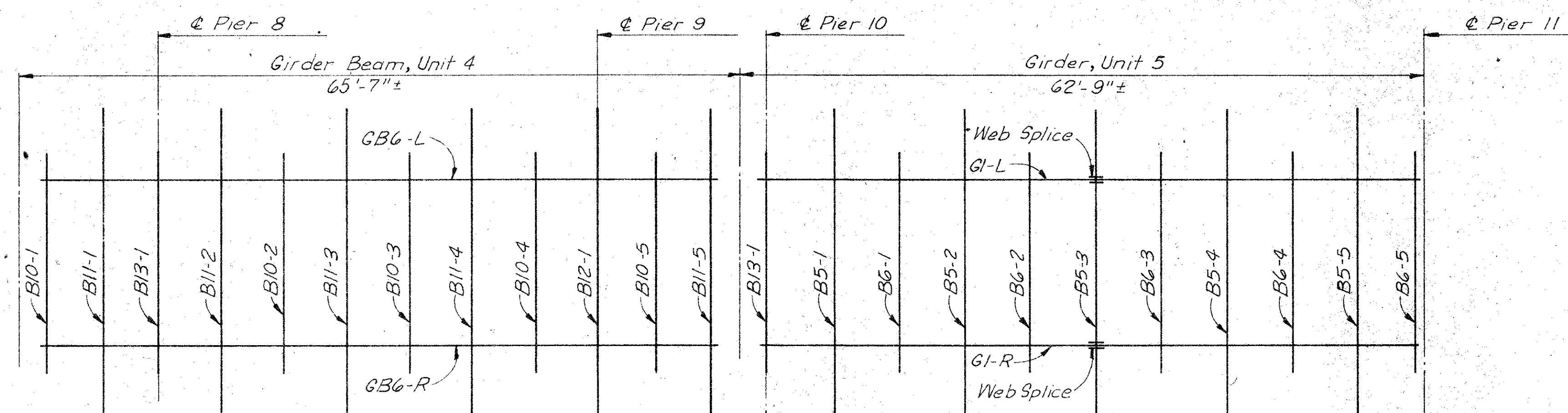
BY	DATE	NO.	REVISION	BY	DATE
BNV	5/72				
AJS	5/72				
PRY					

AS BUILT LWC 9-73

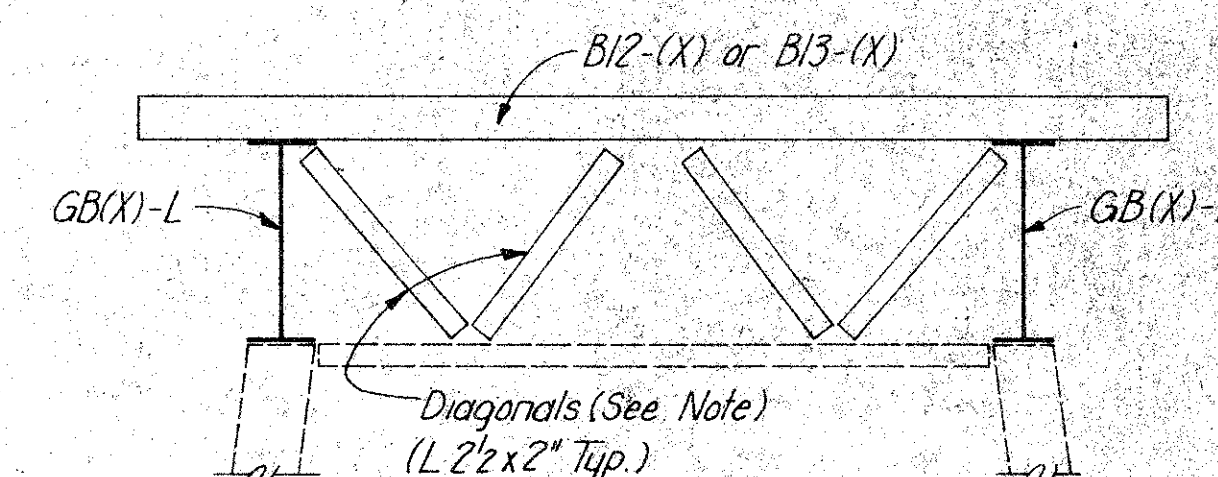
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



PLAN OF FLOOR BEAMS AND GIRDERS

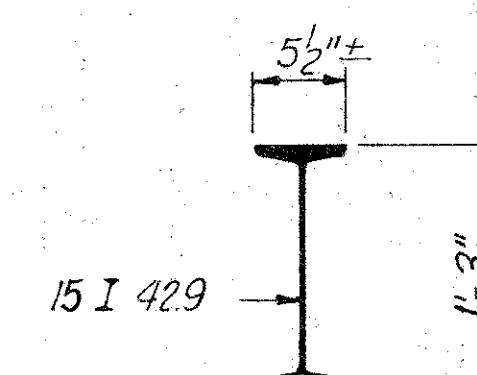


PLAN OF FLOOR BEAMS AND GIRDERS

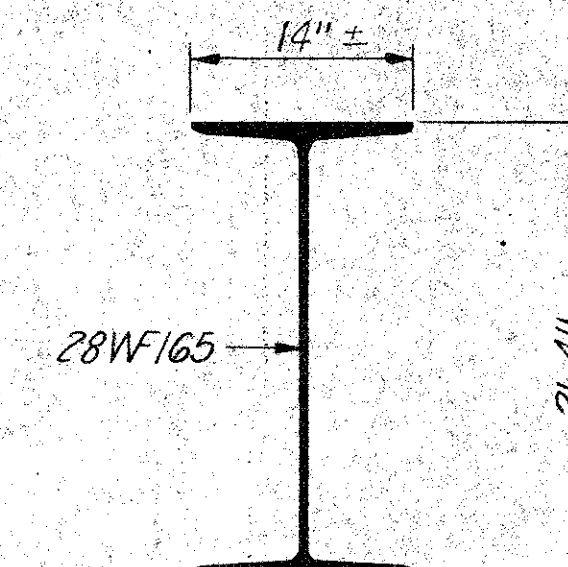


SECTION AT ALL FLOOR BEAMS B12 OR B13

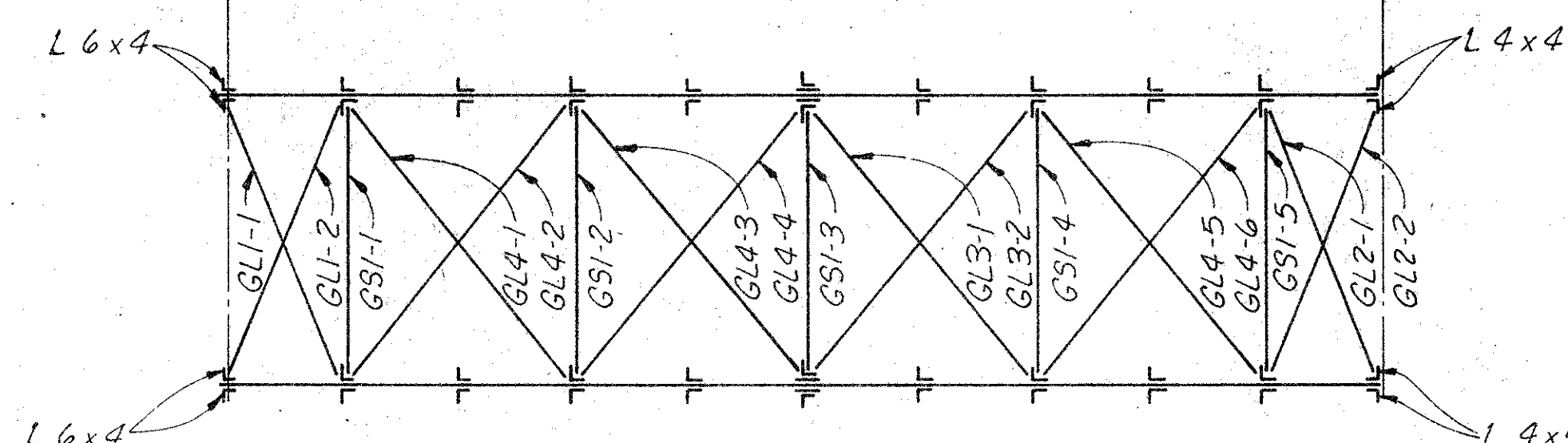
NOTE:
Condition of diagonals listed in remarks for Floor Beam B12-(X) or B13-(X).



TYPICAL SECTION THRU FLOOR BEAMS



TYPICAL SECTION THRU GIRDER BEAMS



PLAN OF DIAPHRAGMS AND LATERAL BRACING

Note:
For Girder Detail for Unit 5,
see Layout Units 16 thru 20.

BY	DATE				
MADE	T.E.M. 1-72				
CHECKED	H.B.W. 3-72	AS BUILT	LWC 9-73		
IN CHARGE	P.R.V.	NO.	REVISION	BY	DATE

AS BUILT

FOR REFERENCE

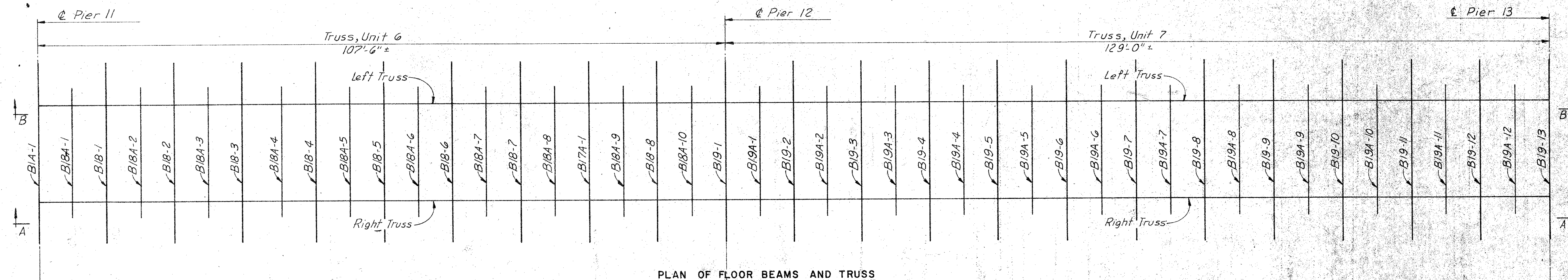
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BOULEVARD BRIDGE OVER
JAMES RIVER

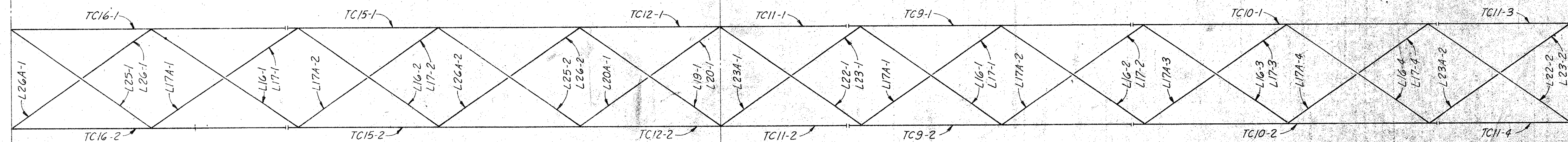
LAYOUT UNITS 1 THRU 5

SCALE	No Scale
CONTRACT NO.	BB-2
SHEET NO.	10 OF 18

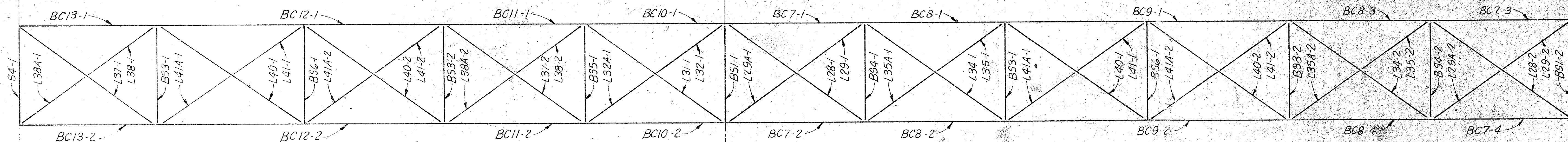
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants



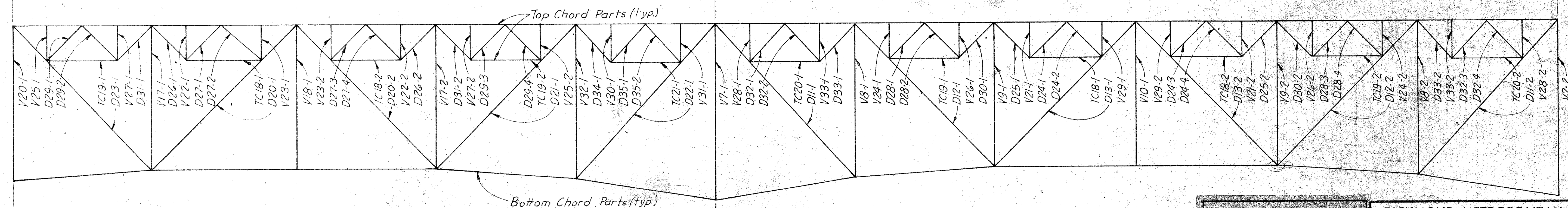
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGM AND LATERAL BRACING



VIEW A-A

Note:

View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.

Notes:

For Typical Floor Beam Detail,
see Layout Units 1 thru 5.
For Typical Diaphragm Details
and Elevations, see Layout Unit 14.
For Truss Details see, Typical
Truss Detail Sheet.

FOR REFERENCE

**RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM**

BOULEVARD BRIDGE OVER
JAMES RIVER

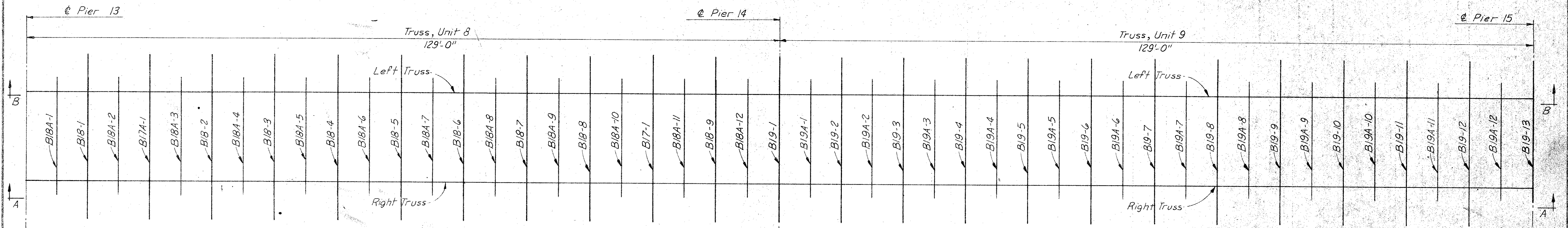
LAYOUT UNITS 6 8 7

SCALE *No Scale*

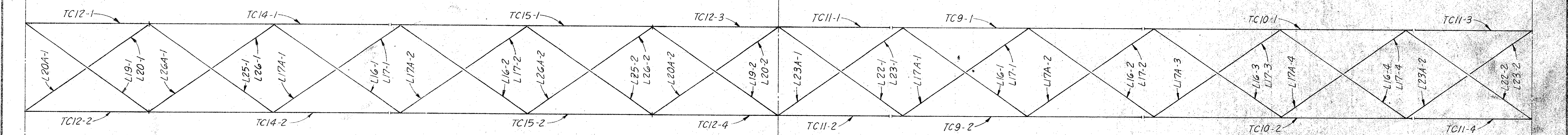
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
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CONTRACT NO. BB-2
JUL 11 1968

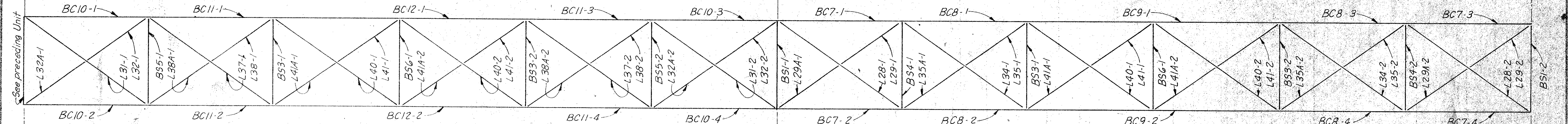
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS



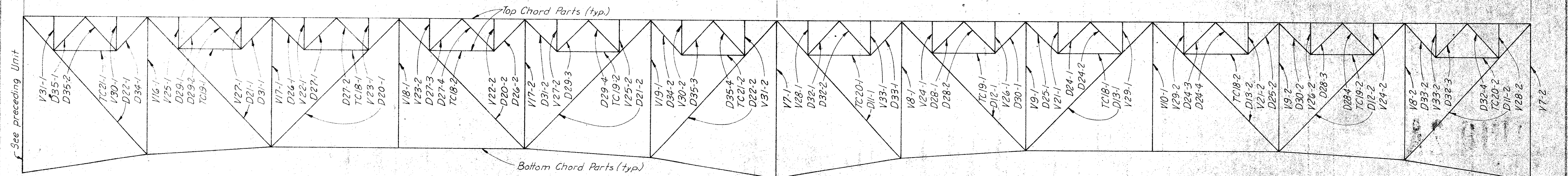
PLAN OF FLOOR BEAMS AND TRUSS



PLAN OF TOP CHORD AND LATERAL BRACING



PLAN OF BOTTOM CHORD, DIAPHRAGMS AND LATERAL BRACING



VIEW A-A

NOTE:
View A-A (right truss) is shown.
View B-B (left truss) is similar.
Units 8 & 9 are shown, Units 10
& 11 and Units 12 & 13 are similar.

NOTES:
For Typical Floor Beam Details,
see Layout Units 1 thru 5.
For Typical Diaphragm Details
and Elevations, see Layout Unit 14.
For Truss Details, see Typical
Truss Detail Sheet.

FOR REFERENCE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

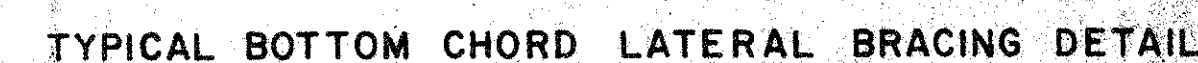
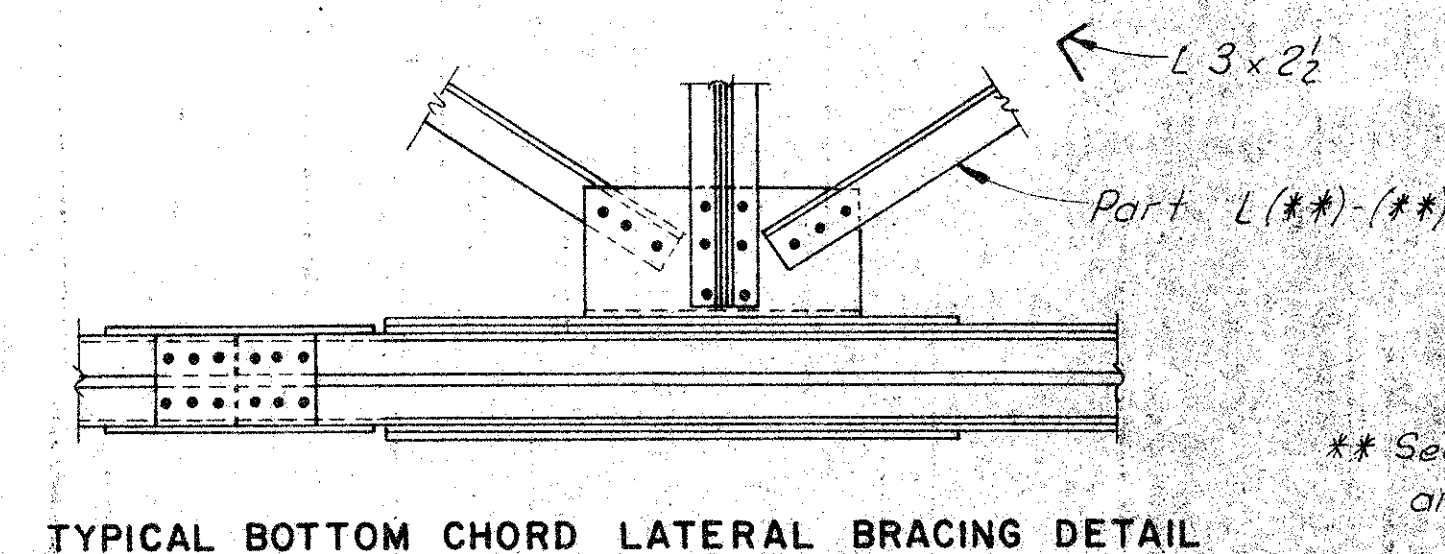
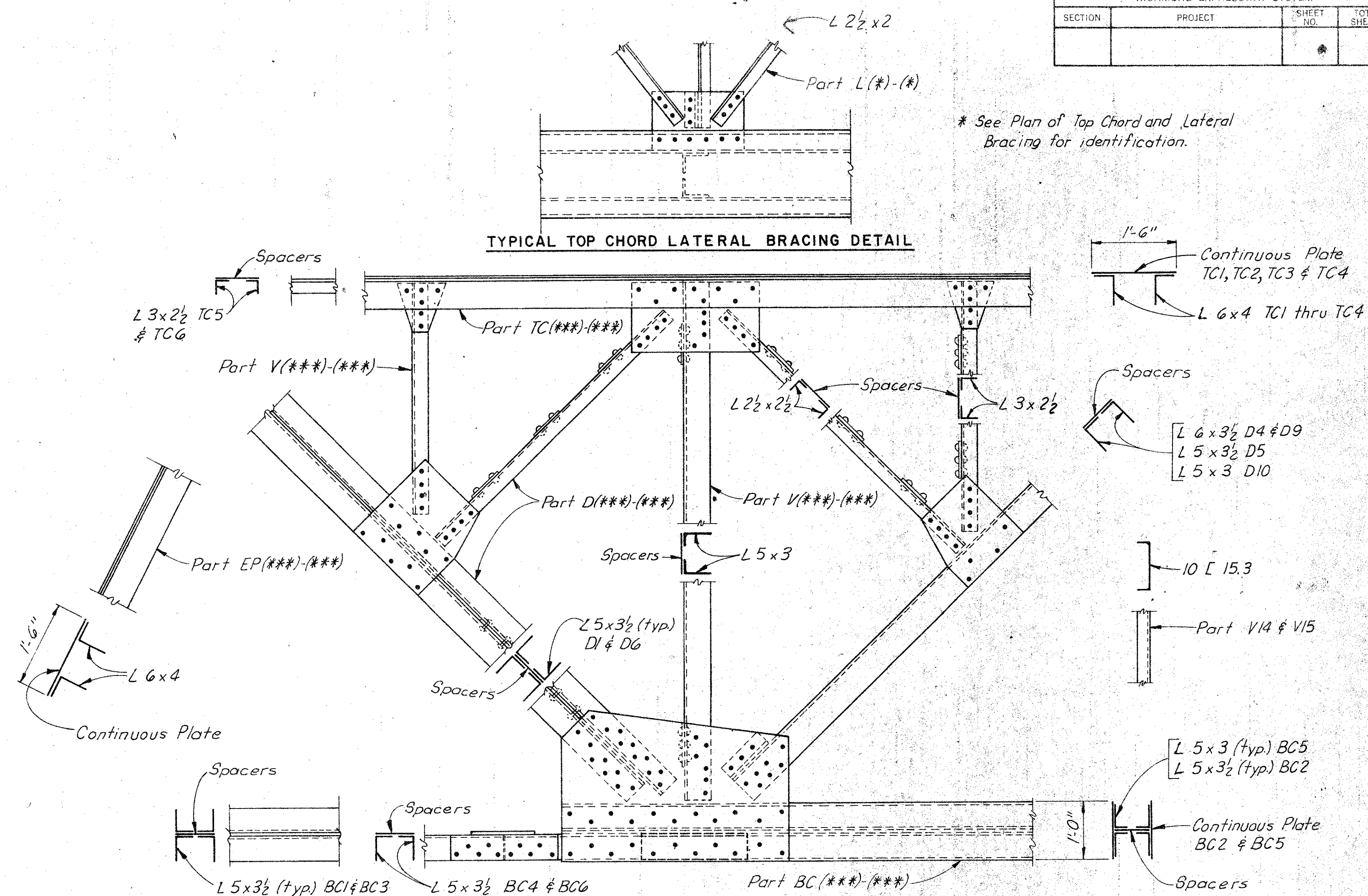
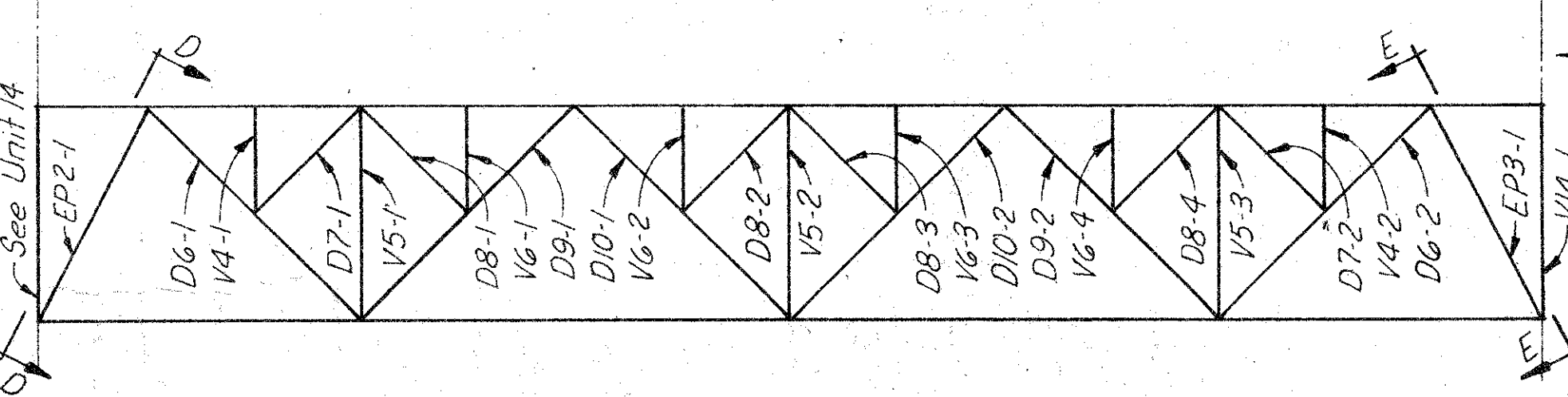
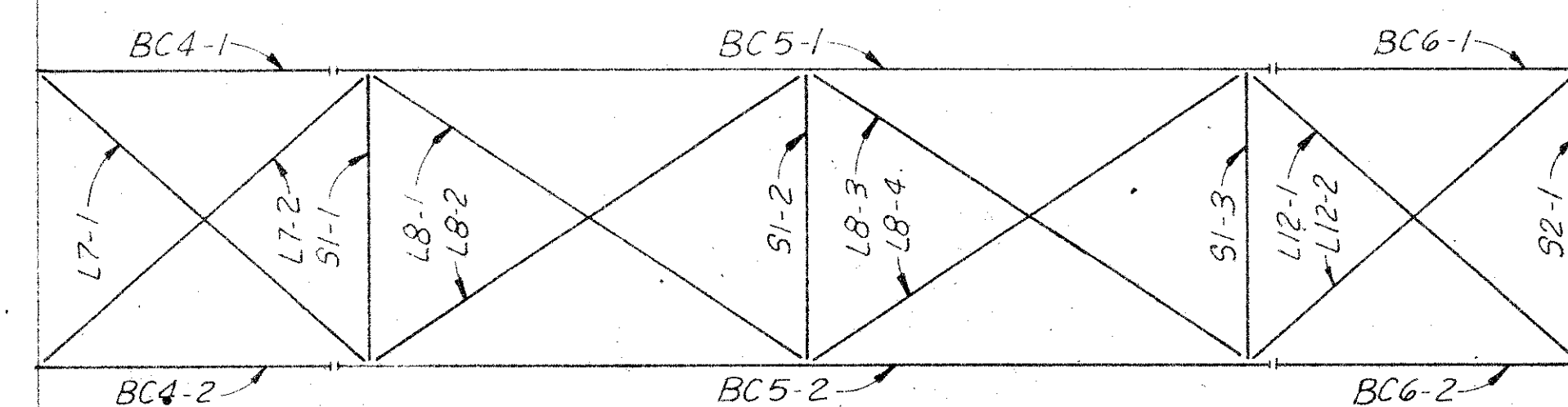
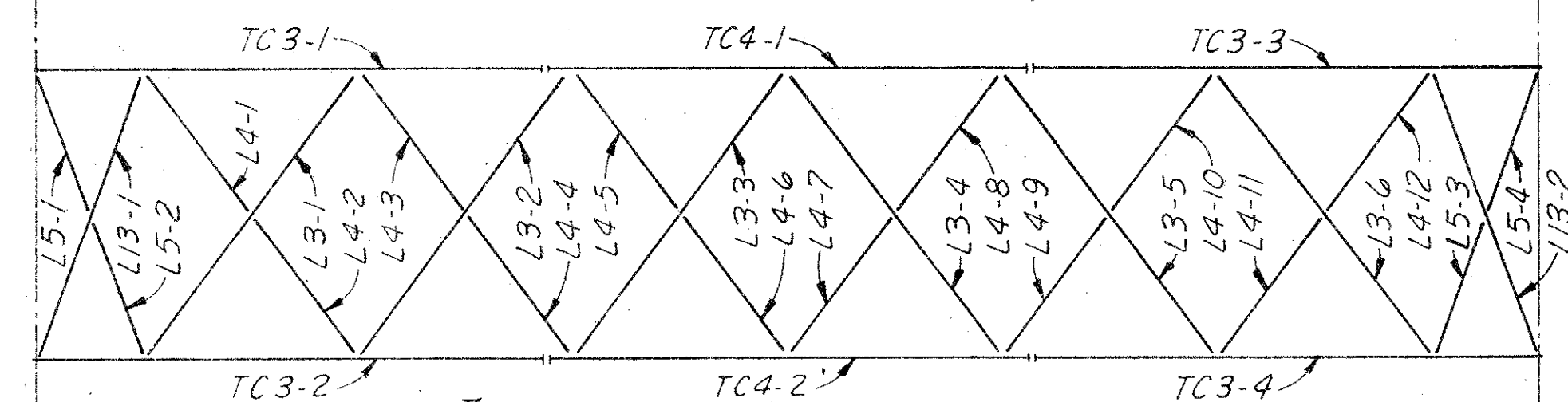
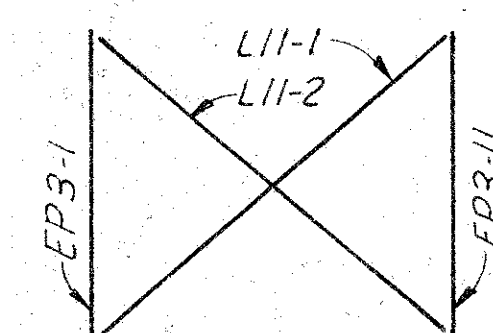
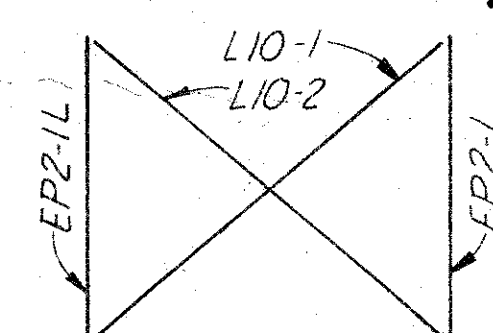
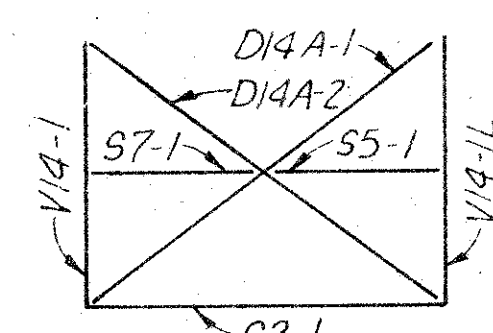
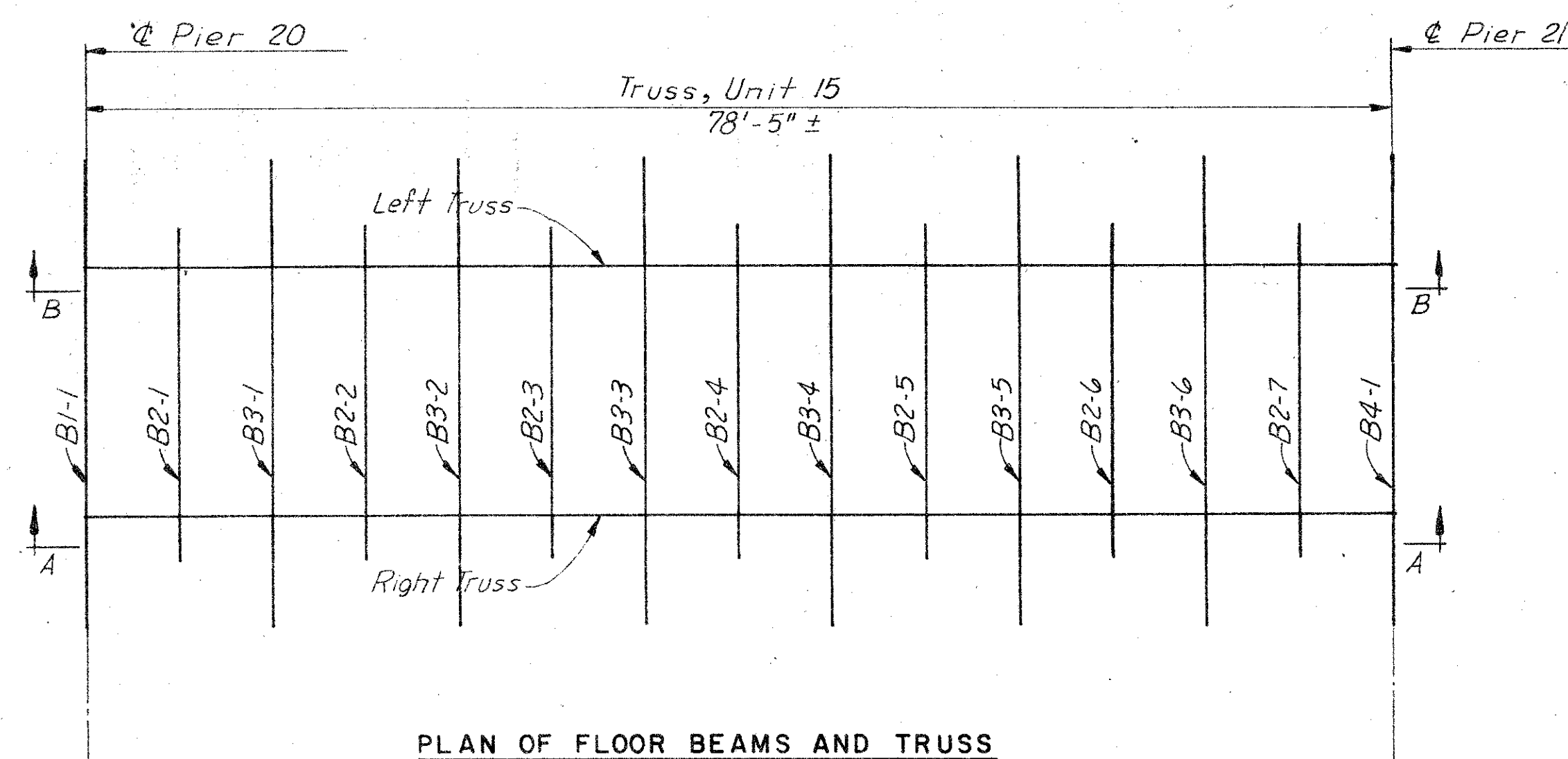
BOULEVARD BRIDGE OVER
JAMES RIVER

LAYOUT UNITS 8 THRU 13

MADE	BY	DATE			
HECKED	TEM	2-72			
CHARGE	H.B.W.	3-72			
	P.R.Y.				

AS BUILT LWC 9-73

HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants	SCALE: No Scale CONTRACT: 150 SHEET: 12	18
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Note:
View B-B is similar to View A-A. Parts appearing in the Left Truss (except those shown on the Plans of the Top and Bottom Chords) are indicated, in the table, with an L following the part identification.

Notes:
For Typical Floor Beam Detail,
see Layout Units 1 thru 5.
For Typical Diaphragm Details
see Layout Units 21 thru 23.

	BY	DATE				
MADE	T.E.M.	2-72				
CHECKED	H.B.W.	3-72		AS BUILT	LWC	9-73
IN CHARGE	PRY	NO.		REVISION	BY	DATE

AS BUILT

FOR REFERENCE

**RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM**

BOULEVARD BRIDGE OVER
JAMES RIVER

LAYOUT UNIT 15

SCALE: <i>No Scale</i> CONTRACT NO. <i>BB-2</i> SHEET NO. <i>14</i> OF <i>18</i>	HOWARD, NEEDLES, TAMMEN & BERGENDOFF General Consultants
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