SP-R

APPENDIX

RMTA As-Built Plans

INDEX OF SHEETS

SHEET NO.	TITLE
1	COVER SHEET
2-3	GENERAL PLAN AND ELEVATION
4	BRIDGE LAYOUT, GENERAL NOTES AND ESTIMATE OF QUANTITIES
5	PROFILES AND PAVEMENT ELEVATIONS
6	SOUTH ABUTMENT
7	NORTH ABUTMENT
8	ABUTMENT DETAILS
9	PIER 1
10	PIER 2
11	PIER 3 ⚠
12	(DELETED) ⚠
13	PIER 4 ⚠
14	(DELETED) ⚠
15	PIER 5
16	PIER 6
17	PIER 7
18	PIER 8
19	PIER 9
20	PIER 10
21	PIER 11
22	PIER 12
23	PIER 13
24	PIER 14
25	PIER 15
26	PIER 16
27	PIER 17
28	FRAMING PLAN - UNITS 1, 2, 3 AND 4
29	FRAMING PLAN - UNITS 5 THRU 12 ⚠
30	FRAMING PLAN - UNITS 13, 14 AND 15
31	FRAMING PLAN - UNITS 16, 17 AND 18
32-33	STRUCTURAL STEEL DETAILS
34	SHOES
35	JOINT DETAILS
36	DRAINAGE SCUPPERS
37	DECK PLAN - UNITS 1, 2, 3 AND 4
38	DECK PLAN - UNITS 5 THRU 12 ⚠
39	DECK PLAN - UNITS 13, 14 AND 15
40	DECK PLAN - UNITS 16, 17 AND 18
41	DECK DETAILS
42	ALUMINUM RAILING DETAILS
43	(DELETED) ⚠
44	ELECTRICAL DETAILS
45	APPROACH SLABS
46	SLOPE PROTECTION
47-53	BORING LOGS

LIMITED ACCESS HIGHWAY

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	1	53

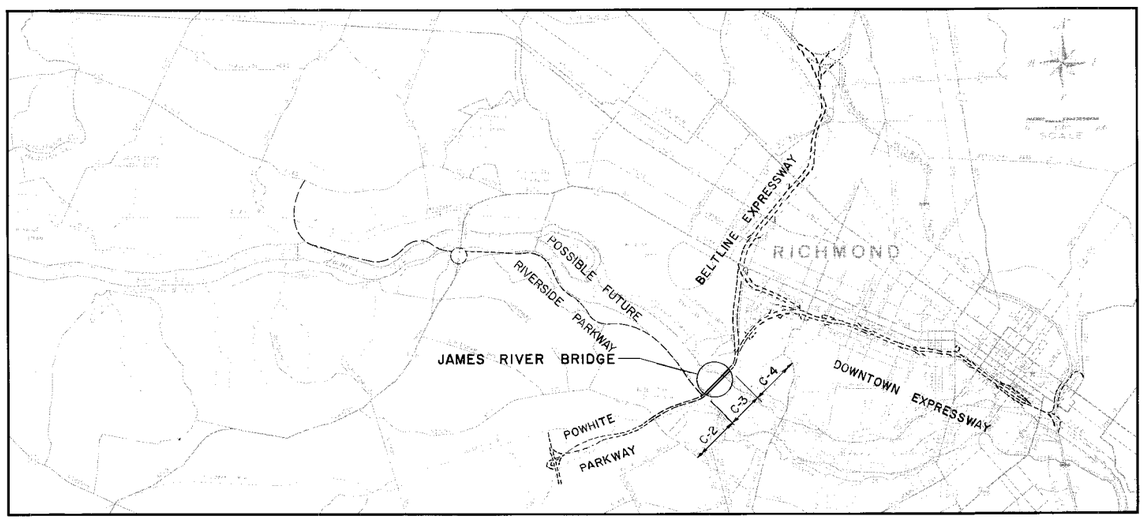
RICHMOND METROPOLITAN AUTHORITY

PLAN AND PROFILE OF PROPOSED

RICHMOND EXPRESSWAY SYSTEM

CHESTERFIELD COUNTY
CITY OF RICHMOND

JAMES RIVER BRIDGE



CONTRACT C-3

BRIDGE B-8

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
POLES WITHIN CONSTRUCTION LIMITS

⚠ Index Revised J.G.V. 2-20-71

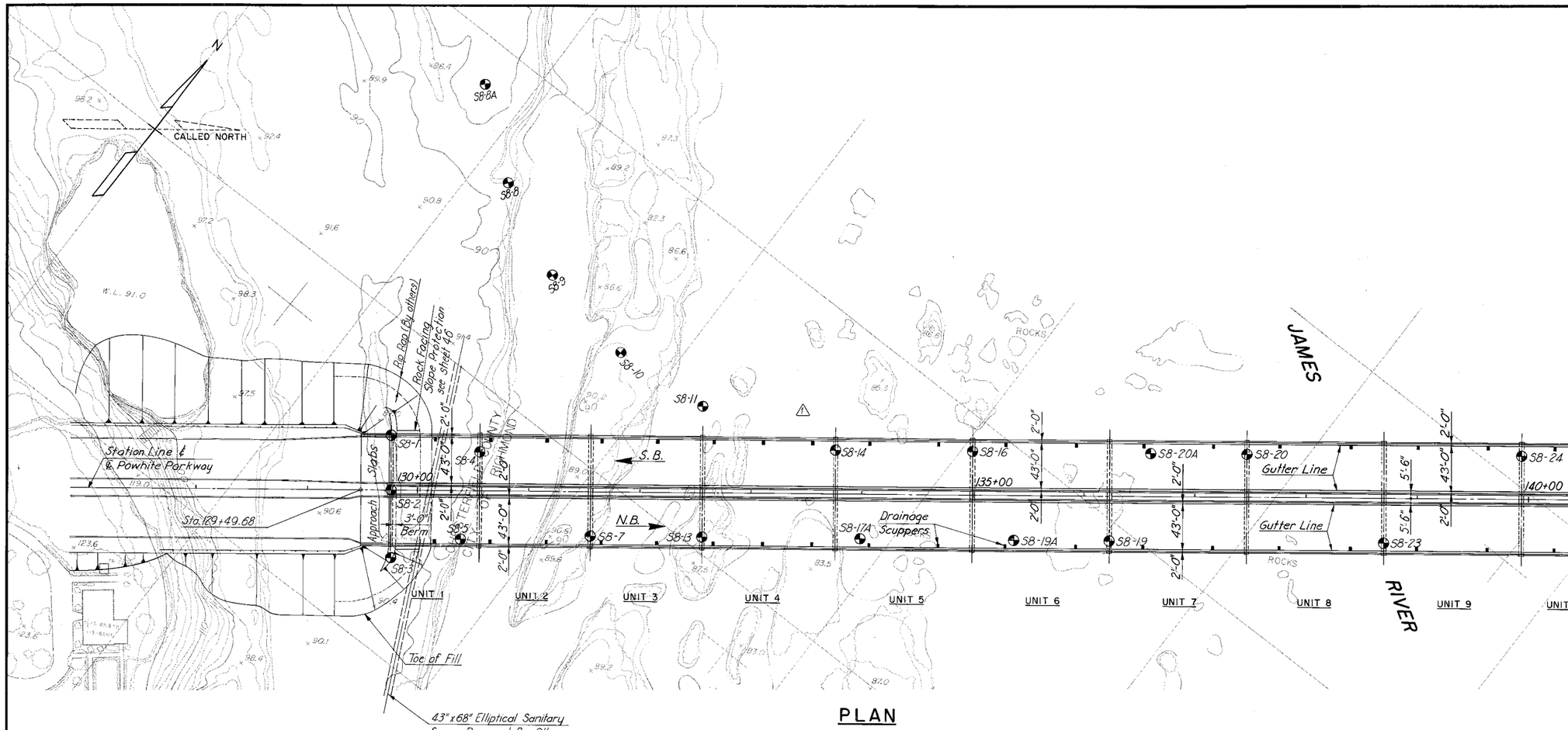
SUBMITTED BY	
Date	
1-22-71 Date	John P. Fowler JP — HOWARD, NEEDLES, TAMMEN & BERGENDOFF general consultant

RECOMMENDED BY	
Date	
1-23-71 Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

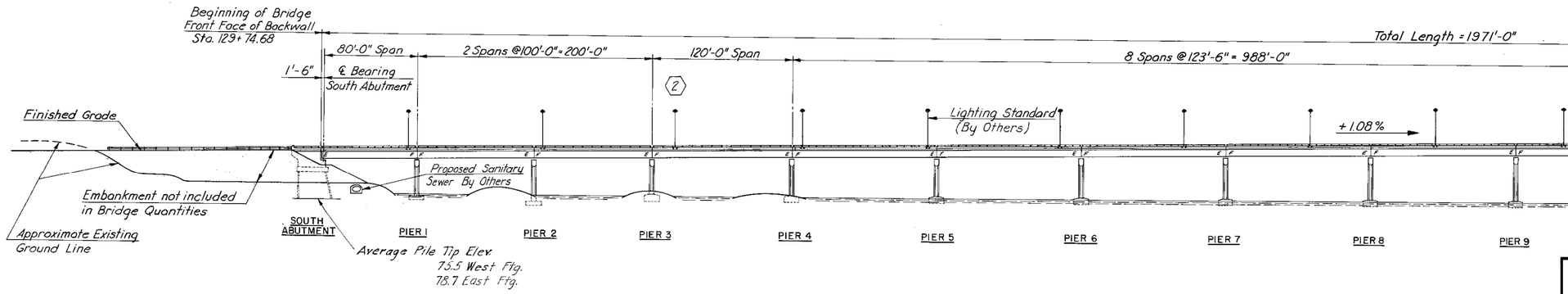
APPROVED BY	
1-23-71 Date	CHAIRMAN, RICHMOND METROPOLITAN AUTHORITY

Plans Revised			
Sheet No.	Date	Sheet No.	Date
1-6,9-16,28,29	2-20-71		
32-38,41,43,46	2-20-71		
1,2,3,17,37,	3-9-71		
38,39,40	3-9-71		
1,4,35,36,44	4-5-71		
21	9-3-71		
23	4-12-72		
45	9-12-72		

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	2	53



PLAN



ELEVATION

△1

CURVE DATA														SUMMARY				
CURVE NO.	△	D	R	T	L	~~BACK TANGENT BEARING~~	FORWARD TANGENT BEARING	BEGIN CURVE	COORDINATES NORTH	COORDINATES EAST	P.I.	COORDINATES NORTH	COORDINATES EAST	END CURVE	COORDINATES NORTH	COORDINATES EAST
1	8°00'00"	10°00'00.0"	572.96'	40.06'	80.00'	~~S 52°46'10.5" W~~	S60°46'10.5"W	P.C. 10+00.00	~~52,836.89~~	50,936.00	10+40.06	52,666.65	50,904.10	P.C.C. 10+80.00	52,647.09	50,869.14
2	61°13'55.5"	33°22'40.4"	310.00'	~~183.45'~~	331.30'	S60°46'10.5"W	N57°59'54.0"W	P.C.C. 10+80.00	52,647.09	50,869.14	12+63.45	~~52,551.50~~	~~50,709.05~~	P.C.C. 14+11.30	52,654.72	50,553.48
3	~~30°20'06"~~	~~10°00'00.0"~~	572.96'	153.52'	300.00'	N57°59'54.0"W	N 27°59'54.0"W	P.C.C. 14+11.30	52,654.72	50,553.48	15+64.82	52,736.08	50,423.28	P.T. 17+11.30	~~52,811.64~~	~~50,351.21~~

	BY	DATE
MADE	HBW	8-67
CHECKED	FXH	2-68
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
3	AS BUILT	JRC	12-72
②	Light Std. Location	J.G.V.	3/9/71
△1	Remove Ramp Taper	H.B.W.	2/20/71

NOTES:

For Bridge Layout and General Notes see sheet no. 4.

For Profiles see sheet no. 5.

⊕ Indicates 2½" ϕ Cased Hole Boring.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

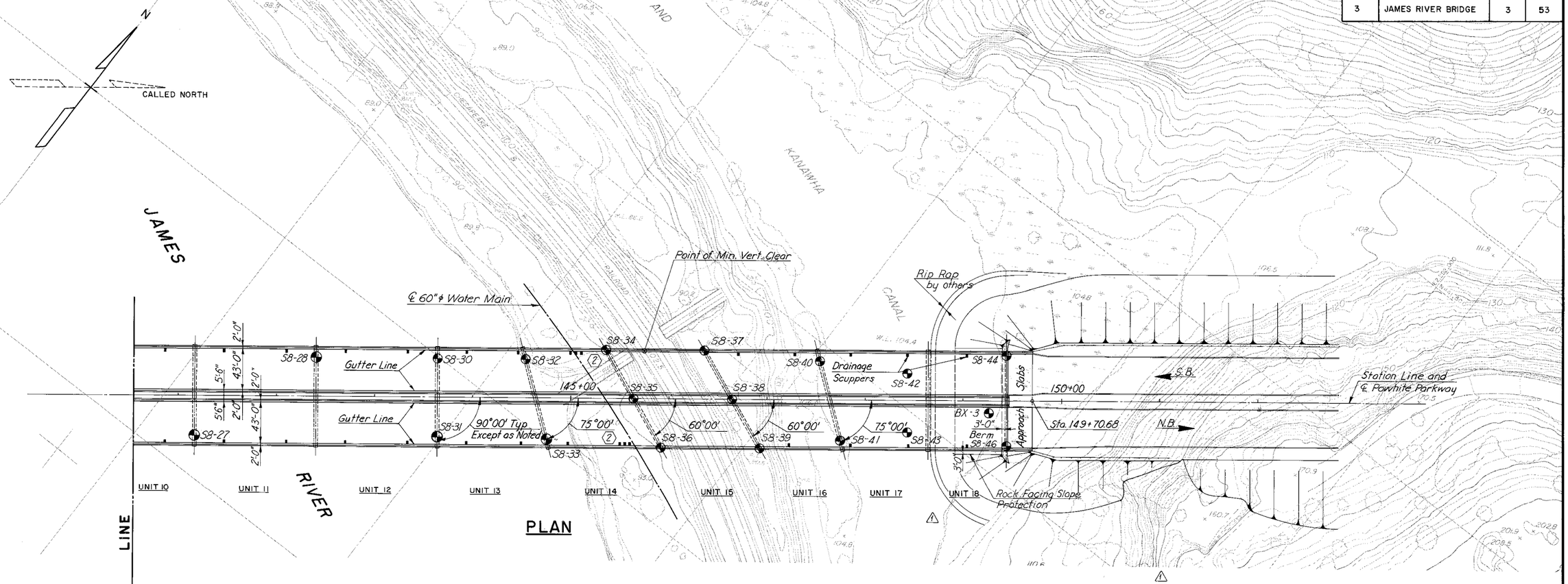
JAMES RIVER BRIDGE

GENERAL PLAN AND ELEVATION

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

SCALE: 1" = 50'
CONTRACT NO.: C-3
SHEET NO. 2 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	3	53



NOTES:

For Bridge Layout and General Notes see sheet no. 4.
For Profiles see sheet no. 5.
Indicates 2½" ϕ Cased Hole Boring.

AS BUILT

	BY	DATE
MADE	HBW	8-67
CHECKED	FXH	2-68
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
3	AS BUILT	JRC	12-72
②	Scupper Location	J.G.V.	3/9/71
⚠	Elim. Disposal Area Add Foot Path	E.V.R.	2/20/71

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

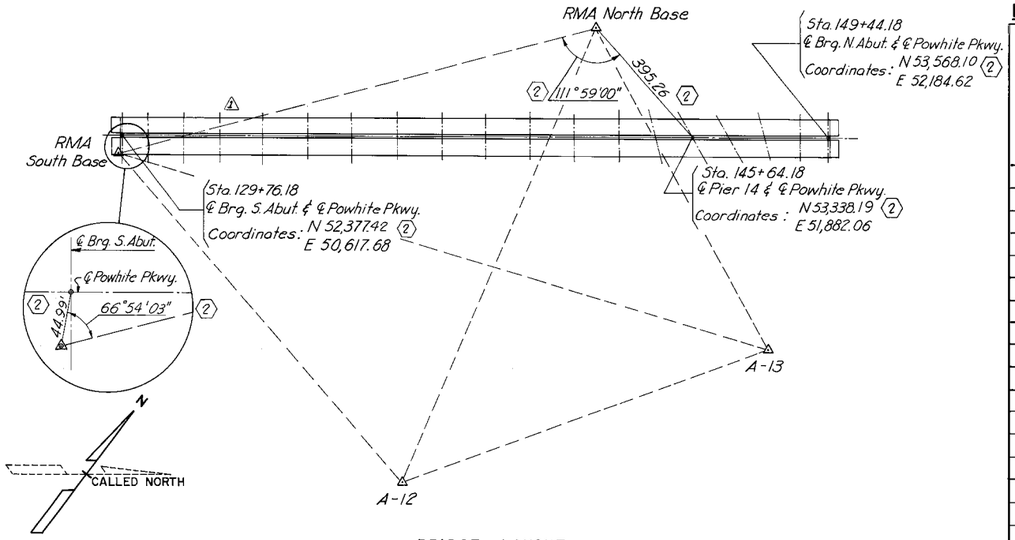
JAMES RIVER BRIDGE

GENERAL PLAN AND ELEVATION

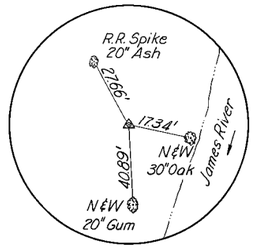
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 50'
CONTRACT NO.: C-3
SHEET NO. 3 OF 53

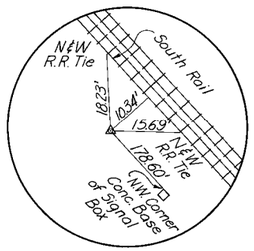
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	4	53



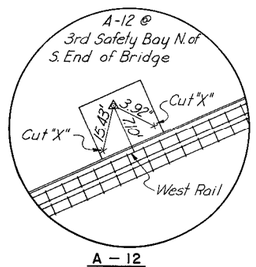
BRIDGE LAYOUT



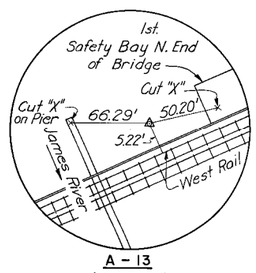
RMA SOUTH BASE
(Conc. Post w/ copper weld rod)
Elevation : 89.91
Coordinates : N 52,338.08
E 50,639.50



RMA NORTH BASE
(Conc. Post w/ copper weld rod)
Elevation : 103.89
Coordinates : N 53,446.49
E 51,501.93



A – 12
(5/8" Plug)
Elevation : 174.45
Coordinates : N 51,816.04
E 52,055.56



A – 13
(5/8" Plug)
Elevation : 174.20
Coordinates : N 52,797.35
E 52,600.49

ESTIMATE OF QUANTITIES (4)

	Struct. Excav. of Piers 10 To 13 Incl.	Struct. Excav. Except Piers 10 To 13 Incl.	Porous Backfill	Steel Sheet Piling (Left In Place)	Steel Piles 10BP42	Steel Piles 12BP53	Concrete Class A3 Substructure	Concrete Class A3 Appr. Slabs	Concrete Class A4	Concrete Class T3	Reinforcing Steel	Structural Steel	Aluminum Bridge Railing	Dampproofing	6" Pipe Underdrain	(4)	Rock Facing Slope Protect. 6" Thick	Water Borings & Cased Holes Incl. Sampling	NX Core Borings In Rock	(4)
	C.Y.	C.Y.	C.Y.	S.F.	L.F.	L.F.	C.Y.	C.Y.	C.Y.	C.Y.	Lbs.	Lbs.	L.F.	S.Y.	L.F.		S.Y.	L.F.	L.F.	
Superstructure									60598 (4)		1,345,522 (4)	6,310,579 (4)	7965 (4)							
South Abutment		624	48		1520.8		295.0				13465			142	133		170			
North Abutment		608	48		3226.0		286.7				13465			144	136		844			
Pier 1		323 (4)					270.9 (4)				44586 (4)									(4)
Pier 2		358 (4)					262.6 (4)				44586 (4)									(4)
Pier 3		123 (4)					274.5 (4)				44434 (4)									(4)
Pier 4		97 (4)					311.8 (4)				44435 (4)									(4)
Pier 5		156 (4)					324.2 (4)				44434 (4)									(4)
Pier 6		132 (4)					293.1 (4)				44435 (4)									(4)
Pier 7		133					341.8				44434									
Pier 8		105					328.4				44435									
Pier 9		154					318.3				44434									
Pier 10	245						382.7			51.0	56790							1.2	38.5	
Pier 11	705						547.5				74957							12.5	114.6	
Pier 12	842						575.5				75469							47.6	41.4	
Pier 13	886						596.8			28.5	89317							18.7	40.0	
Pier 14		845		1469			448.2			61.2	78522									
Pier 15		946		1494			483.3			25.0	78522									
Pier 16		656		2260		1465.7	370.8			156.7	46374									
Pier 17		478		2197		2048.8	353.0			151.3	43678									
Approach Slabs								238.6			51461									
		(4)					(4)		(4)		(4)	(4)	(4)							
TOTAL	2678	5,808	96	7920	5049.8	3514.5	7075.1	238.6	60598	473.7	2,361,755	6,310,579	7,965	286	269		1014	80	234.5	(4)

GENERAL NOTES:

ROADWAY — Twin Roadways 43'-0" clear.

CAPACITY — Dead Load-Includes 15 lbs. per sq. ft. for future wearing surface.
Live Loads-HS20-44 loading and B.P.R. Modified Loading for Military Vehicles.

SPECIFICATIONS — GENERAL - Virginia Department of Highway Road and Bridge Specifications, 1970.
DESIGN - A.A.S.H.O. Standard Specifications for Highway Bridges, 1961, modified by Special Design Provisions.
WELDING - 1969 Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society.
ELECTRICAL - National Electrical Code, National Electrical Safety Code.

CONTRACT SPECIAL PROVISIONS

Specifications and Contract Special Provisions referred to above are necessary to make these plans complete.

DATUM — CITY OF RICHMOND

TEMPERATURE — The normal temperature referred to on the plans is 68°F. The temperature range for movement is 0°F to 120°F.

DIMENSIONS — All dimensions are measured horizontally and vertically unless otherwise noted.

FOUNDATIONS — All footing concrete shall be placed in the dry except where Class T3 Concrete is indicated on the plans or approved by the Engineer. Special attention is called to Sections 401.04 and 401.05 of the General Specifications, and to the Contract Special Provisions, concerning preparation of foundations for footings.

Because of the erratic nature of ground conditions at the site, elevations of the bottoms of the footings shown on the plans shall be considered approximate only. Should excavations at the time of construction reveal the foundations to be inadequate, redesign may be required.

CONCRETE NOTES — Concrete in superstructure shall be Class A4. All other concrete (except tremie seal concrete) shall be Class A3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and/or other means shall be employed to prevent downgrade movement of newly placed slab concrete when the gradient is over 2%.

All reinforcing steel shall conform to A.S.T.M. A-615, Grade 40. reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be as shown on the plans.

STEEL NOTES — Structural steel shall conform to A.S.T.M. Specification A36 except as noted.

All field connections shall be made with ⅞" diameter high strength bolts unless otherwise noted. Bolts shall conform to A.S.T.M. Specification A-325.

	BY	DATE				
			(3)	As Built	JRC	12-72
MADE	HBW	11-67	(2)	Bridge Layout	H.B.W	4/5/71
CHECKED	FXH	2-68	(1)	Quantities & Ramp Widening	H.B.W. RB	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

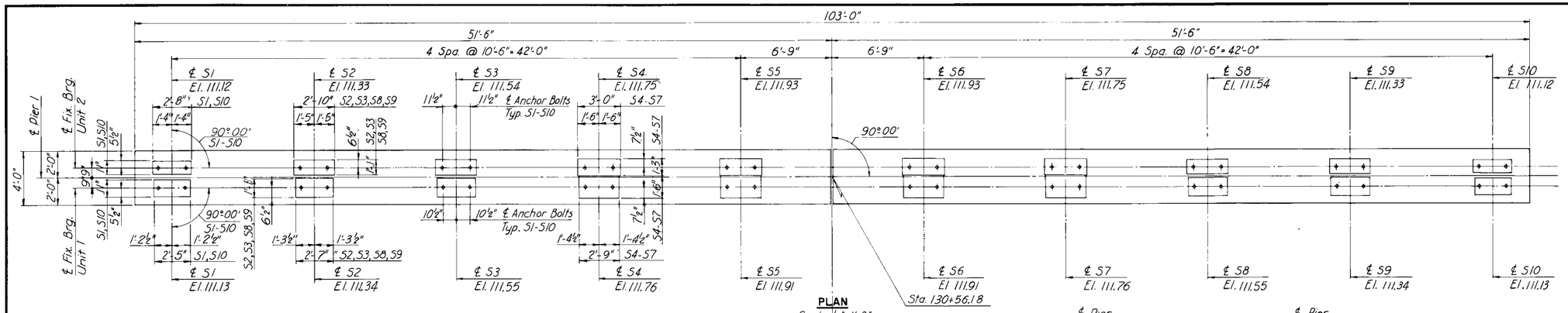
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
BRIDGE LAYOUT
GENERAL NOTES
ESTIMATE OF QUANTITIES

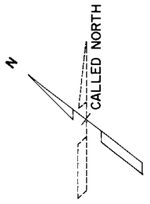
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

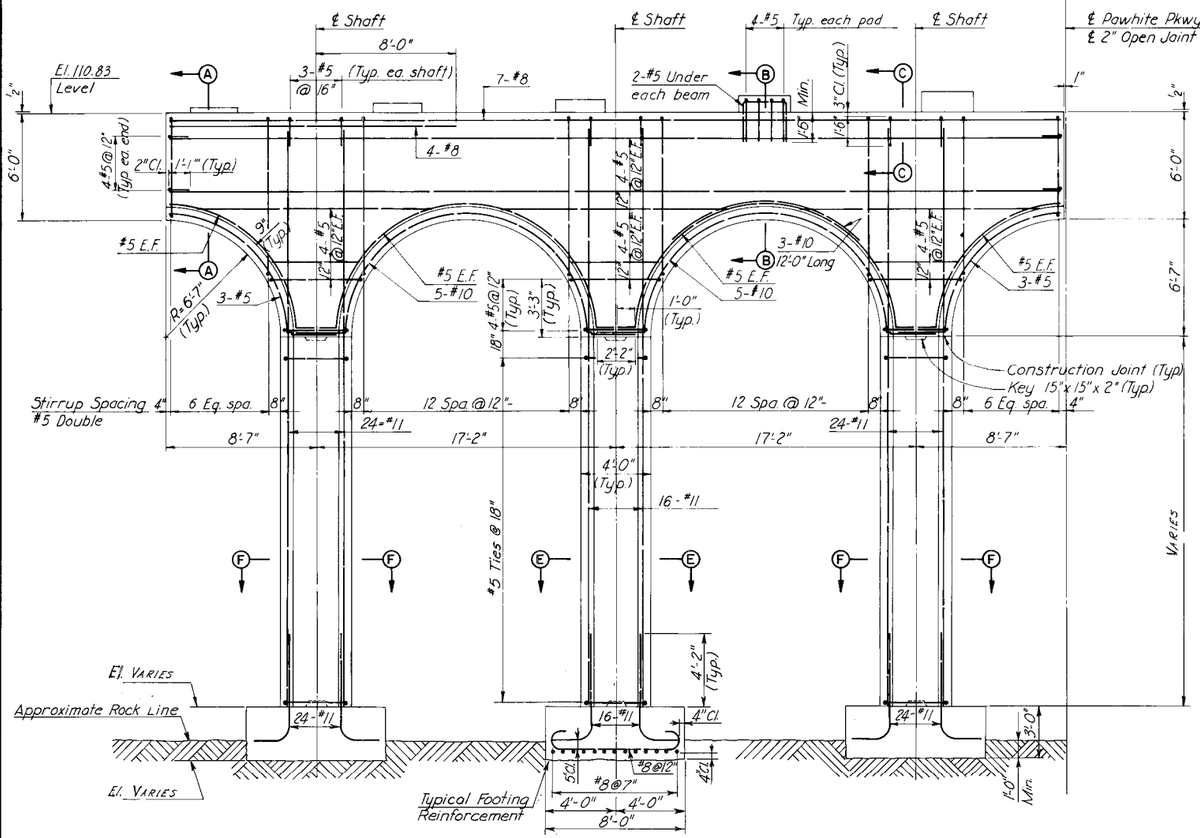
SCALE: NO SCALE
CONTRACT NO: C-3
SHEET NO. 4 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	9	53



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



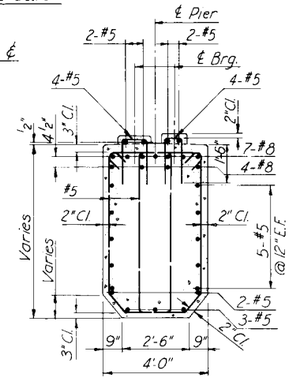


HALF ELEVATION
Scale: 1/4"=1'-0"

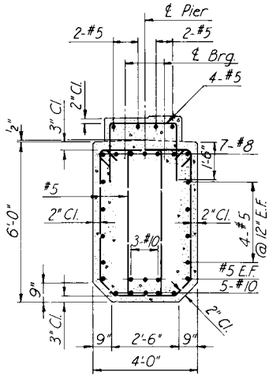
Note:
Pier symmetrical about ℄ Powhite Pkwy.

FOOTING NO.	TOP ELEV.	AVE. BOTTOM ELEV.	STEM LENGTH
1 L W	80.36	76.46	17.89
1 C W	79.32	75.58	18.93
1 R W	78.55	75.12	19.70
1 L E	79.43	74.95	18.82
1 C E	80.28	76.59	17.97
1 R E	80.88	77.04	17.37

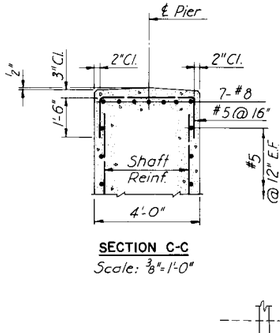
1 = Pier No.
L-C-R = Left - Center - Right
W-E = West - East



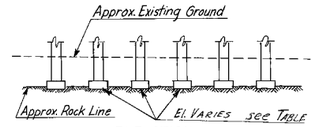
SECTION A-A
Scale: 3/8"=1'-0"



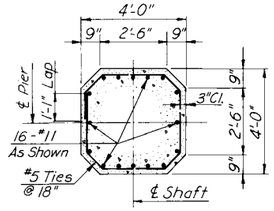
SECTION B-B
Scale: 3/8"=1'-0"



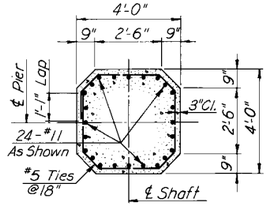
SECTION C-C
Scale: 3/8"=1'-0"



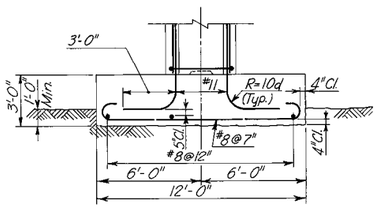
ELEVATION
Scale: 1"=30'-0"



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



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



FOOTING END VIEW
Scale: 1/4"=1'-0"

NOTES:

AS BUILT

Pier foundations are designed for an allowable bearing pressure of 7 Tons/S.F.

	BY	DATE				
MADE	L.B.P.	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	2-68	△	Complete	J.G.V.	2-2071
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

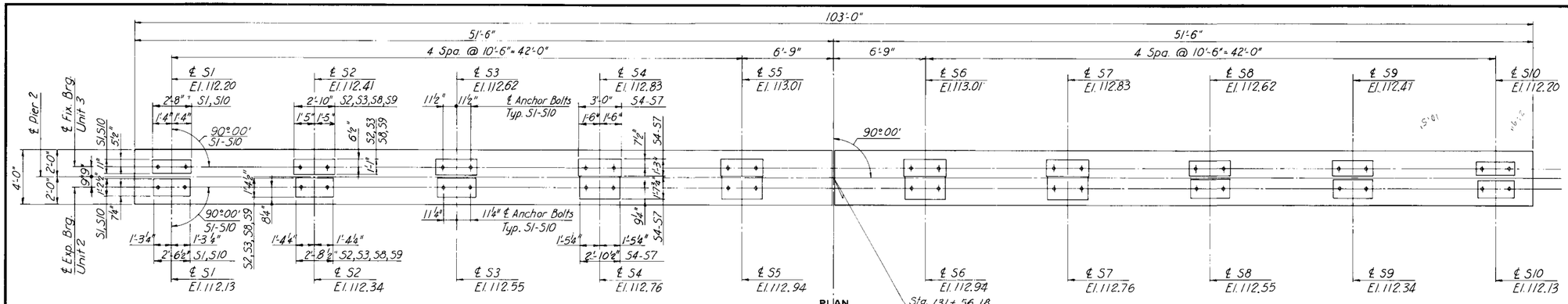
JAMES RIVER BRIDGE

PIER 1

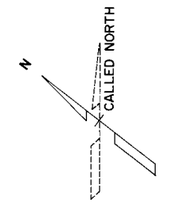
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

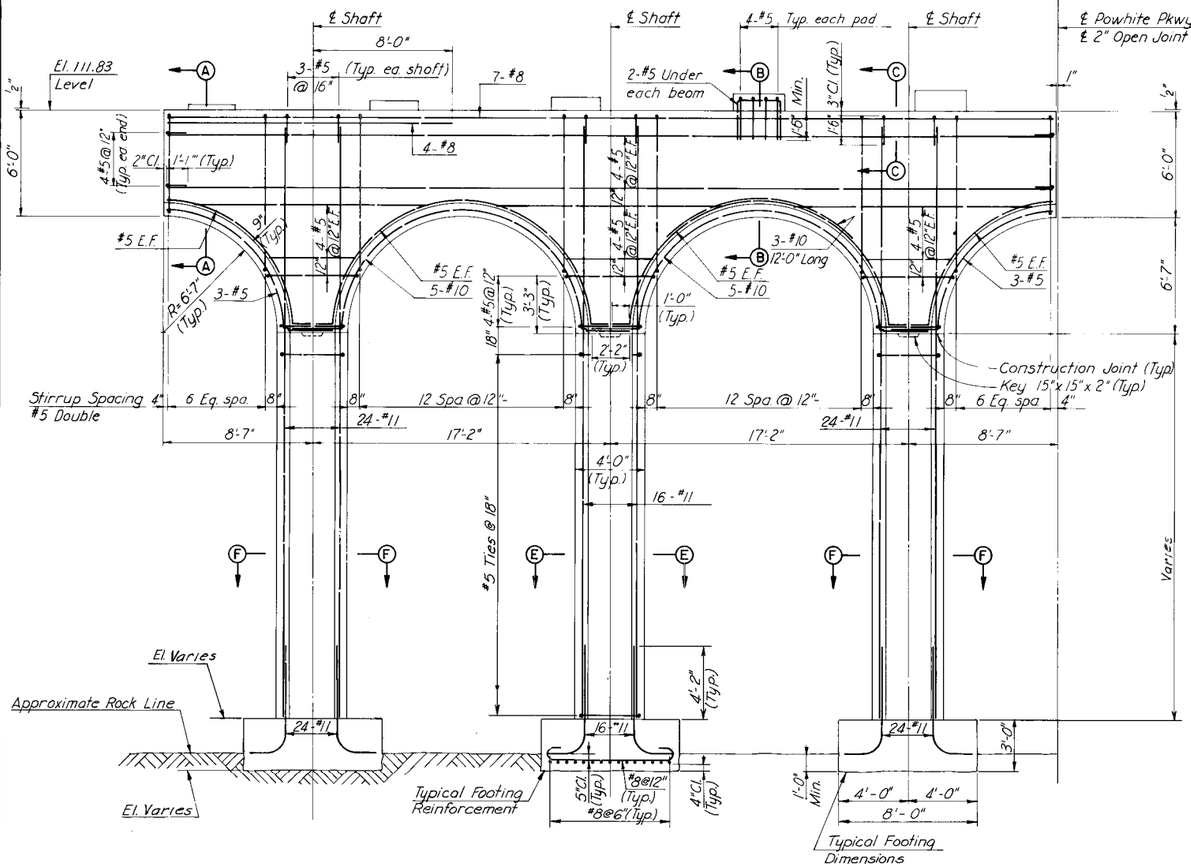
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 9 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	10	53



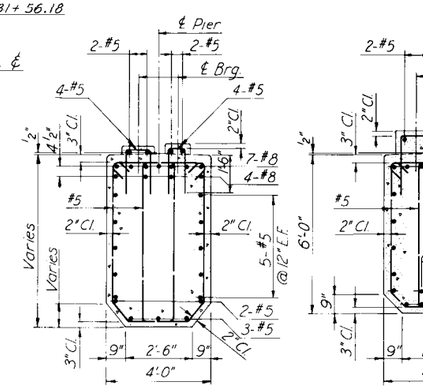
PLAN
Scale: 1/4"=1'-0"



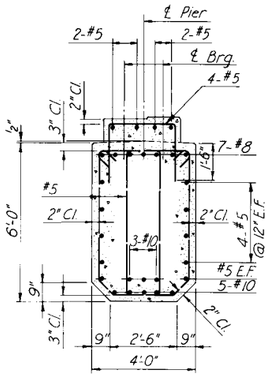


HALF ELEVATION
Scale: 1/4"=1'-0"

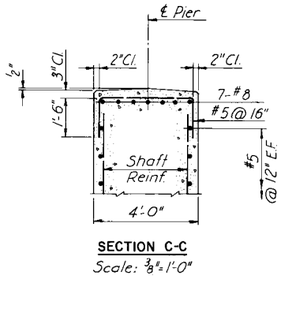
Note:
Pier symmetrical about ℄ Powhite Pkwy.



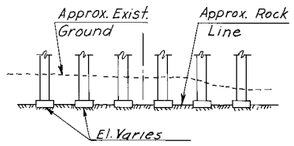
SECTION A-A
Scale: 3/8"=1'-0"



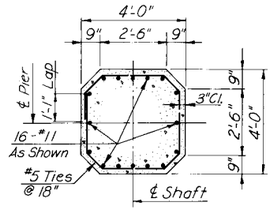
SECTION B-B
Scale: 3/8"=1'-0"



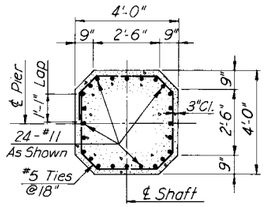
SECTION C-C
Scale: 3/8"=1'-0"



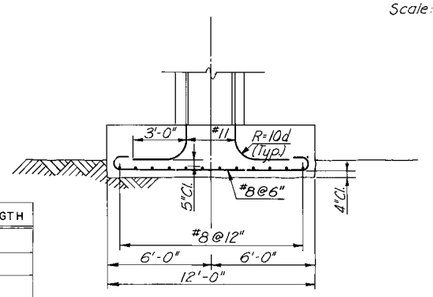
ELEVATION
Scale: 1"=30'-0"



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



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



FOOTING END VIEW
Scale: 1/4"=1'-0"

FOOTING NO.	TOP ELEV.	AVE. BOTTOM ELEV.	STEM LENGTH
2 LW	82.81	78.95	16.44
2 CW	84.21	80.62	15.04
2 RW	81.24	77.77	18.01
2 LE	81.81	78.30	17.44
2 CE	81.17	77.33	18.08
2 RE	80.36	76.84	18.89

NOTES:

AS BUILT

Pier foundations are designed for an allowable bearing pressure of 10 Tons/S.F.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	L.B.P.	7-67	2	AS BUILT	J.R.C.	12-72
CHECKED	F.X.H.	2-68	1	Complete	H.B.W.	2/20/71
IN CHARGE	F.X.H.					

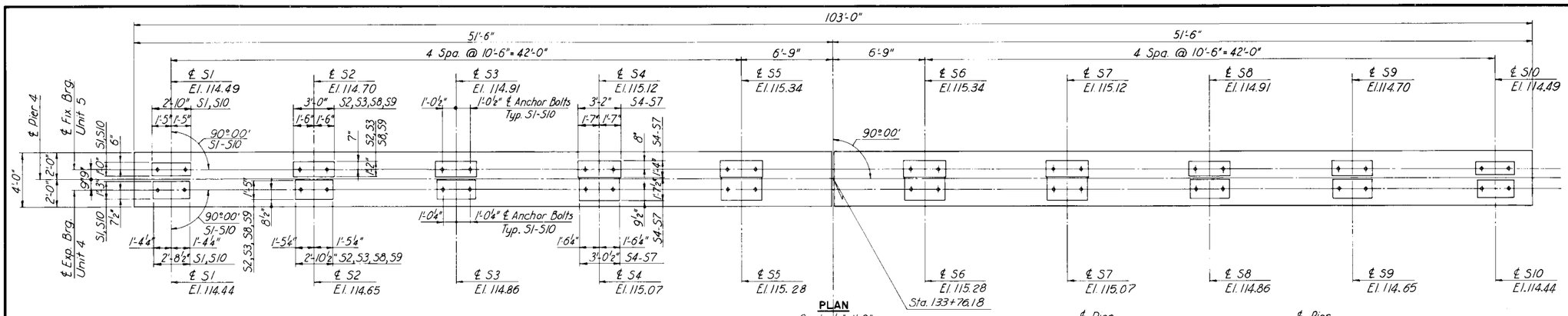
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
PIER 2

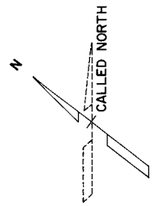
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

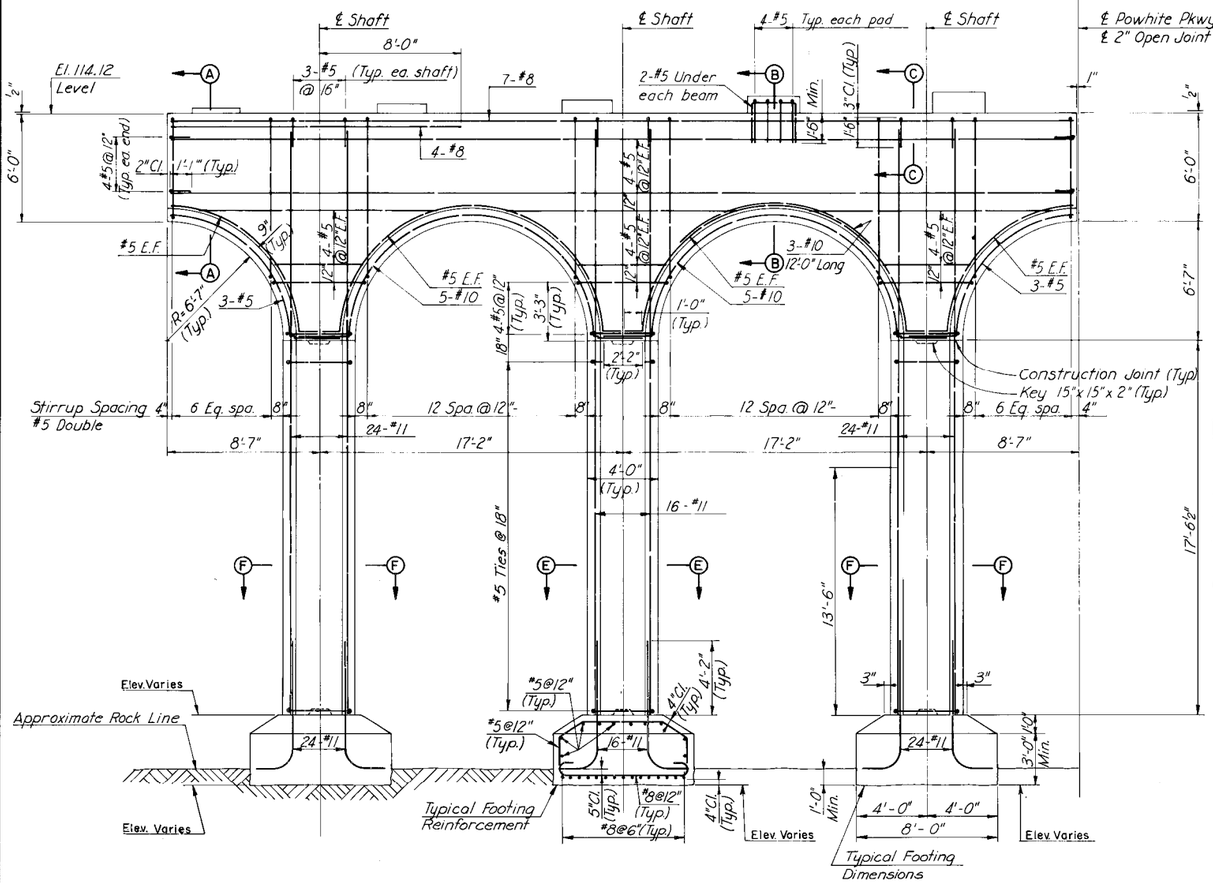
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 10 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	13	53



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

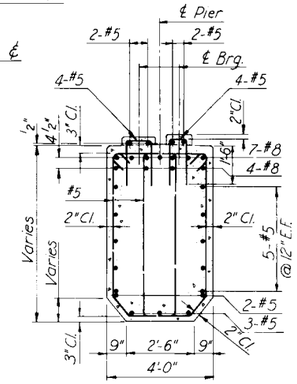




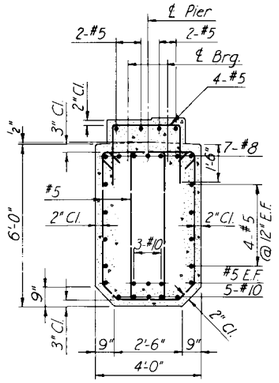
HALF ELEVATION
Scale: 1/4"=1'-0"

Note:
Pier symmetrical about ℄ Powhite Pkwy. except for bottom of Footing Elevations.

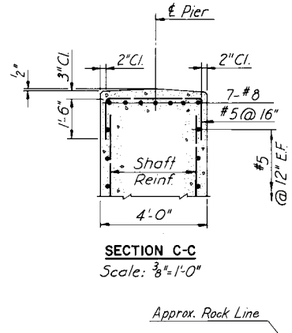
FOOTING NO.	AVE. BOTTOM ELEV.
4 L W	77.83
4 C W	77.24
4 R W	77.57
4 L E	77.86
4 C E	77.79
4 R E	77.93



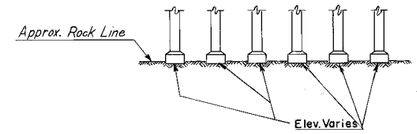
SECTION A-A
Scale: 3/8"=1'-0"



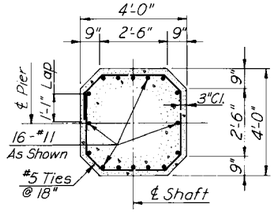
SECTION B-B
Scale: 3/8"=1'-0"



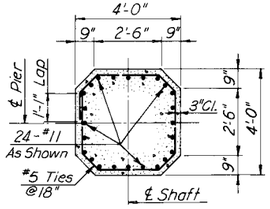
SECTION C-C
Scale: 3/8"=1'-0"



ELEVATION
Scale: 1"=30'-0"



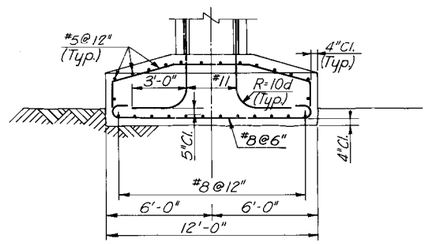
SECTION E-E
Scale: 3/8"=1'-0"



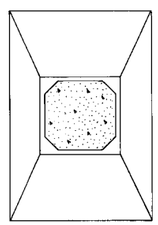
SECTION F-F
Scale: 3/8"=1'-0"

AS BUILT

NOTES:



FOOTING END VIEW
Scale: 1/4"=1'-0"



FOOTING PLAN
Scale: 1/4"=1'-0"

Pier foundations are designed for an allowable bearing pressure of 10 Tons/S.F.

	BY	DATE				
MADE	L.B.P.	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	2-68	1	Complete	J.G.V.	2-20-71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

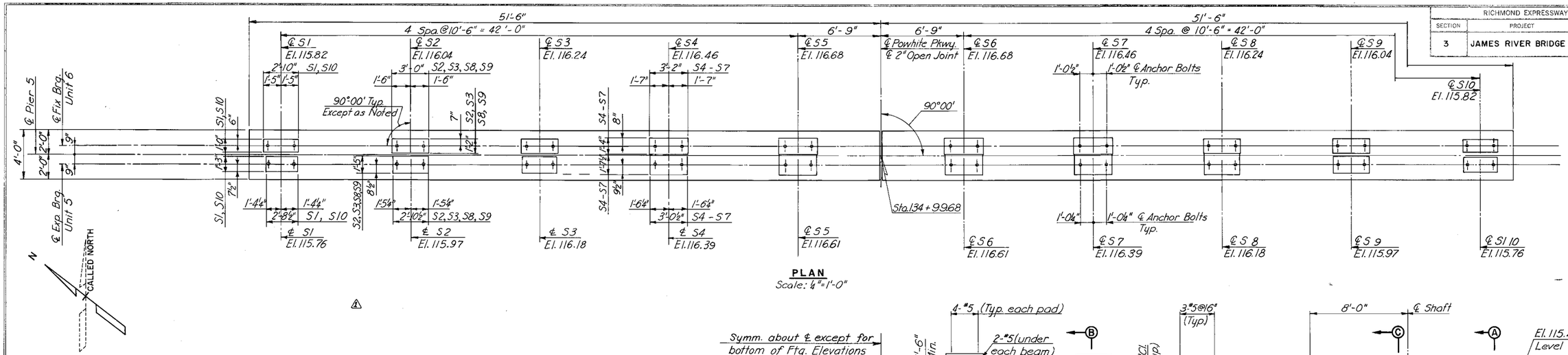
JAMES RIVER BRIDGE

PIER 4

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

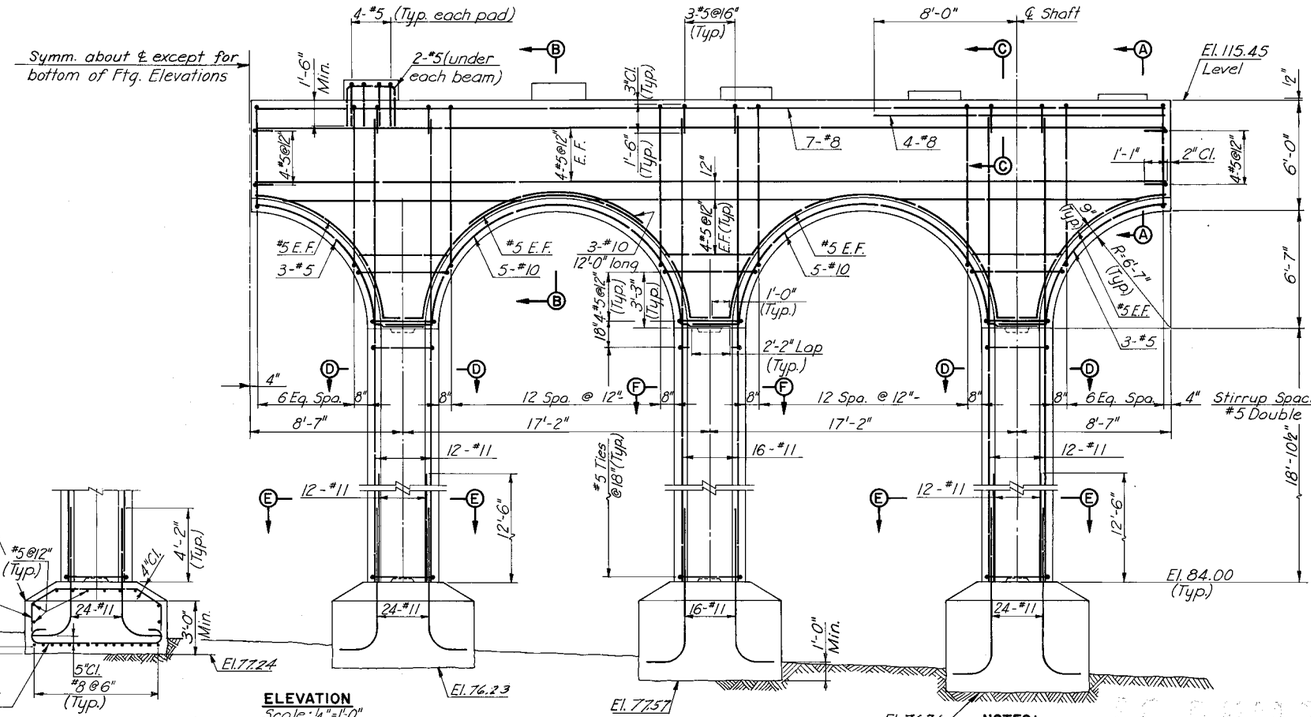
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 13 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	15	53



PLAN
Scale: ¼"=1'-0"

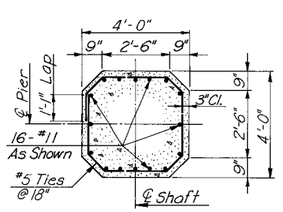
FOOTING NO.	AVE. BOTTOM ELEV.
5 L W	78.56
5 C W	77.78
5 R W	77.24
5 L E	76.23
5 C E	77.57
5 R E	76.71



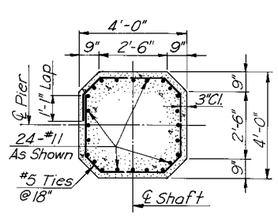
ELEVATION
Scale: ¼"=1'-0"

NOTES:

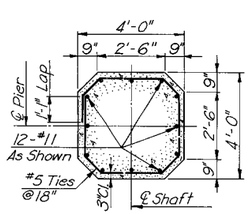
Pier foundations are designed for an allowable bearing pressure of 10 Tons/S.F.



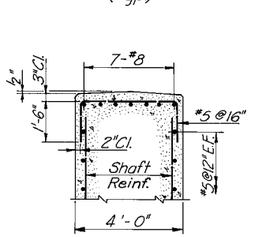
SECTION F-F
Scale: ⅜"=1'-0"



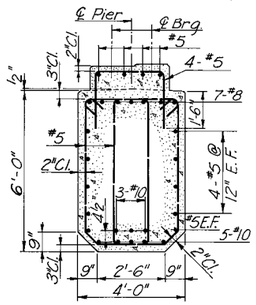
SECTION E-E
Scale: ⅜"=1'-0"



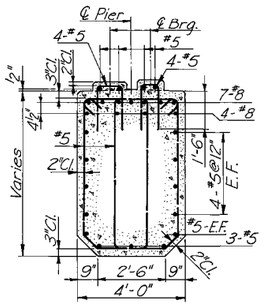
SECTION D-D
Scale: ⅜"=1'-0"



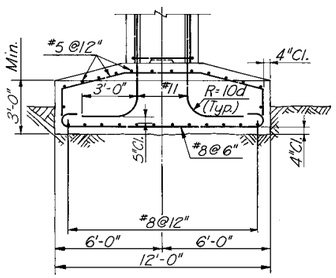
SECTION C-C
Scale: ⅜"=1'-0"



SECTION B-B
Scale: ⅜"=1'-0"



SECTION A-A
Scale: ⅜"=1'-0"



FOOTING END VIEW
Scale: 4"=1'-0"

	BY	DATE				
MADE	HBW	11-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	2-68	⚠	Pier made Symm. about ℄	E.R.	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

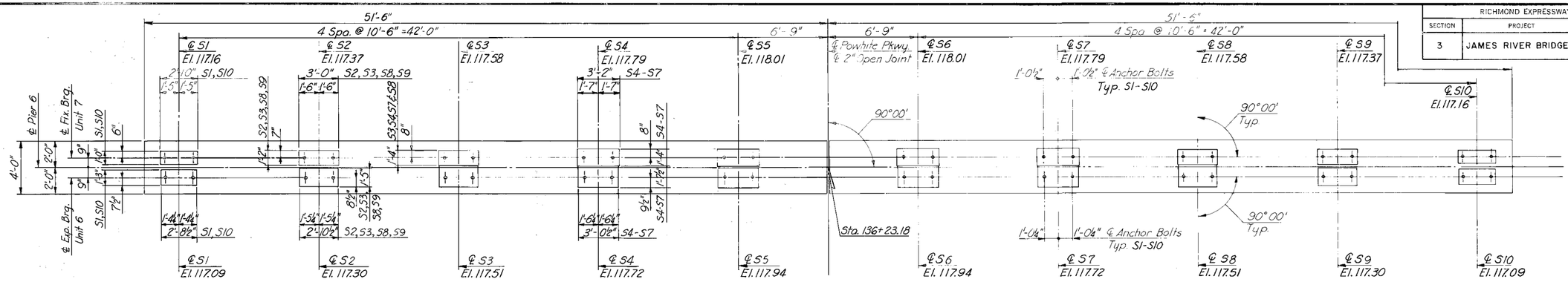
JAMES RIVER BRIDGE

PIER 5

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

SCALE: AS SHOWN
CONTRACT NO. C-3
SHEET NO. 15 OF 53

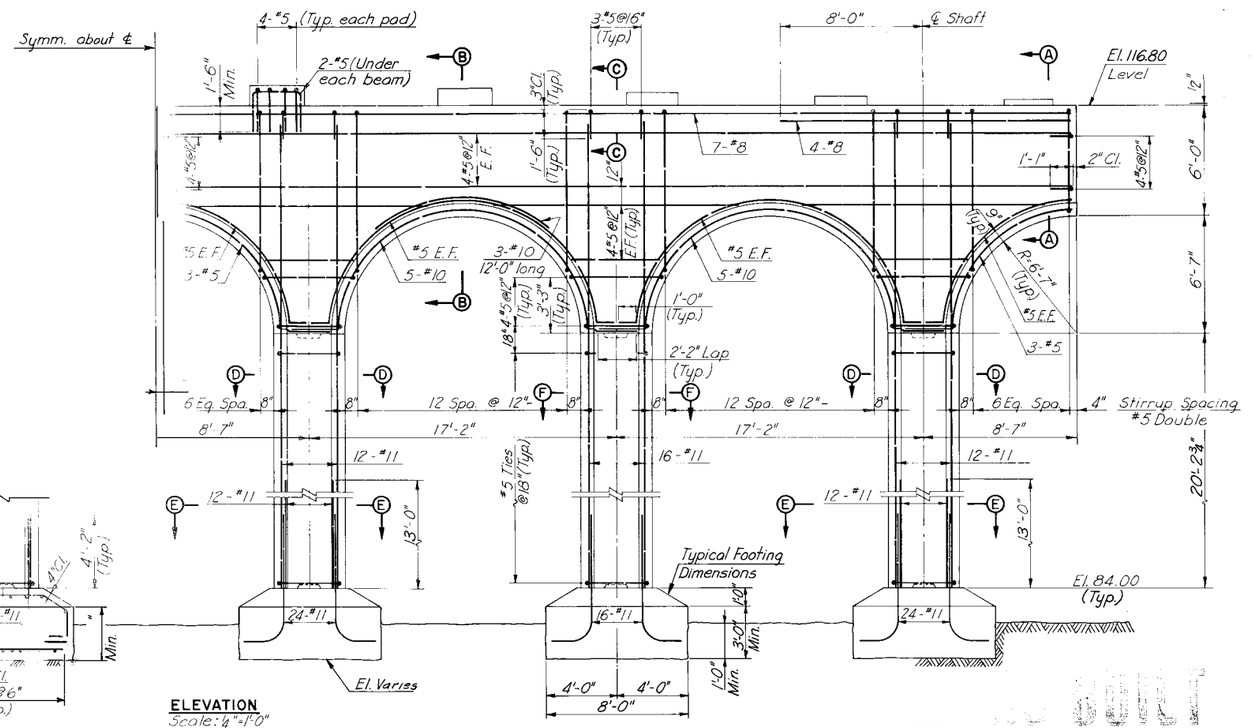
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	16	53



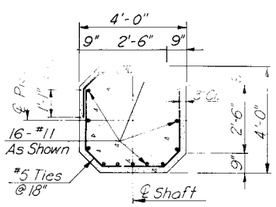
PLAN
Scale: 1" = 1'-0"

FOOTING NO.	AVE. BOTTOM ELEV.
6 L W	79.30
6 C W	79.05
6 R W	79.90
6 L E	79.02
6 C E	78.36
6 R E	78.36

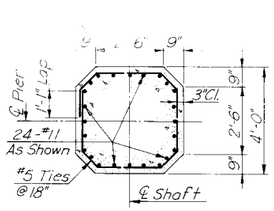
⚠



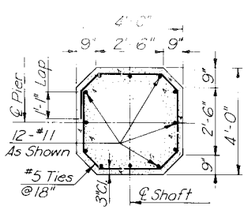
ELEVATION
Scale: 1" = 1'-0"



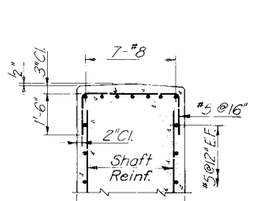
SECTION F-F
Scale: 3/8" = 1'-0"



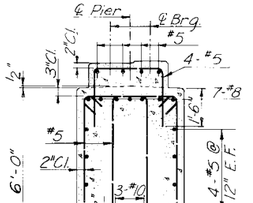
SECTION E-E
Scale: 3/8" = 1'-0"



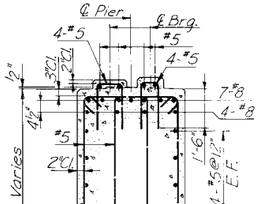
SECTION D-D
Scale: 3/8" = 1'-0"



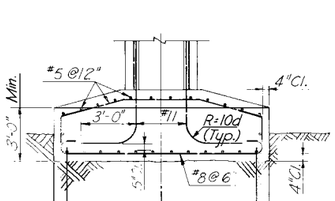
SECTION C-C
Scale: 3/8" = 1'-0"



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



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



FOOTING END VIEW
Scale: 1" = 1'-0"

	BY	DATE				
MADE	HBW	11-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	2-68	⚠	Pier Symm. about ℄	J.G.V.	2-20-71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

NOTES:

Pier foundations are designed for an allowable bearing pressure of 10 Tons/S.F.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

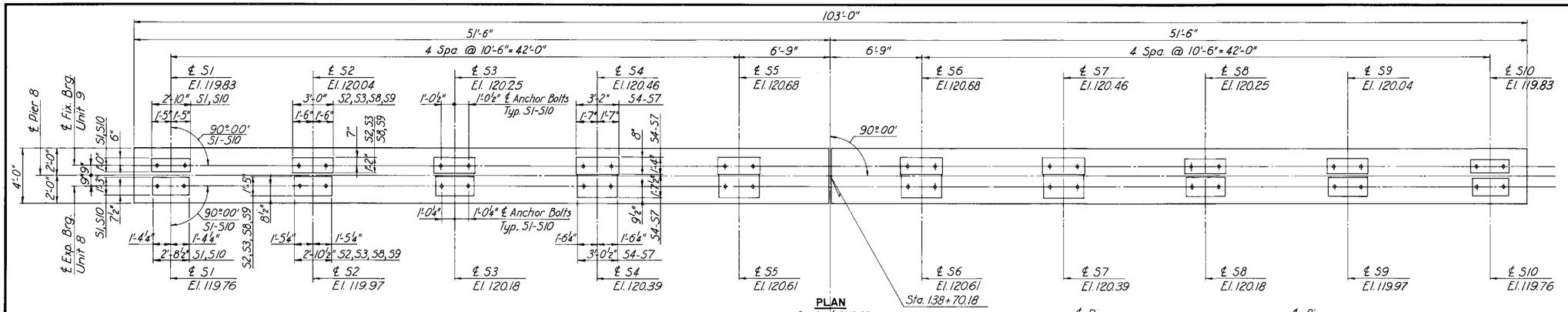
JAMES RIVER BRIDGE

PIER 6

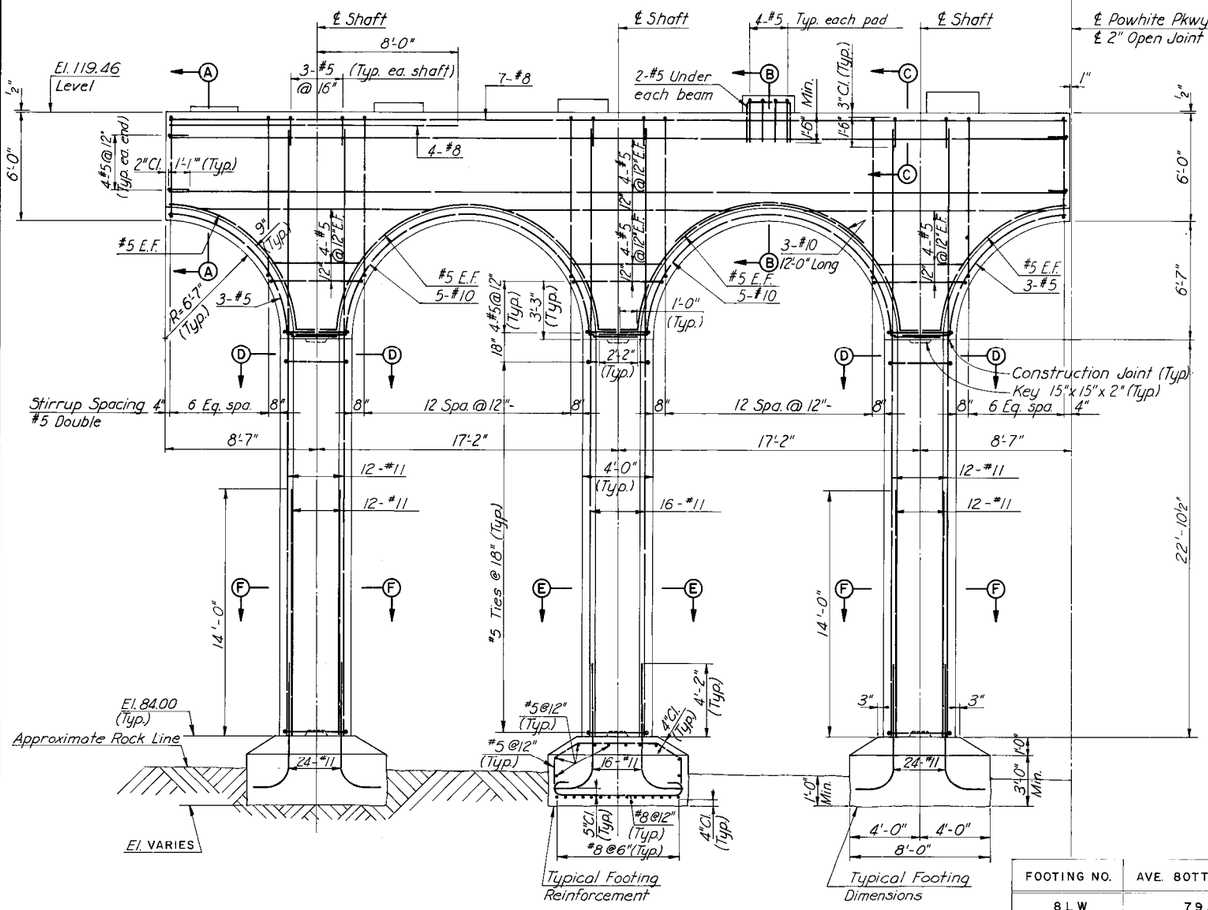
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. C-3
SHEET NO. 16 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	18	53



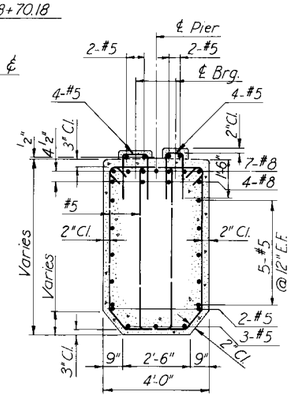
PLAN
Scale: 1/4"=1'-0"



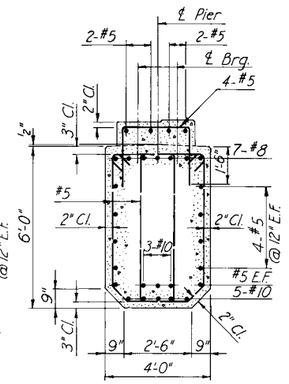
HALF ELEVATION
Scale: 1/4"=1'-0"

Note:
Pier symmetrical about ℄ Powhite Pkwy.

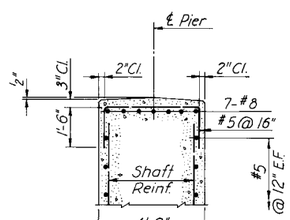
FOOTING NO.	AVE. BOTTOM ELEV.
8LW	79.3
8CW	78.4
8RW	78.3
8LE	76.8
8CE	76.7
8RE	74.4



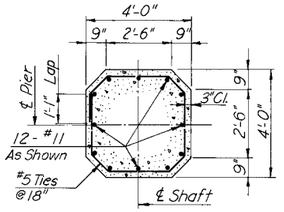
SECTION A-A
Scale: 3/8"=1'-0"



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



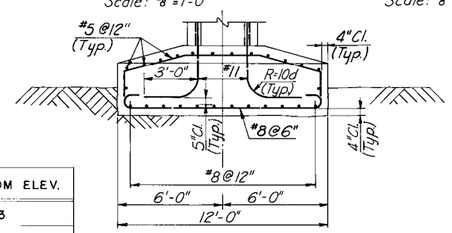
SECTION C-C
Scale: 3/8"=1'-0"



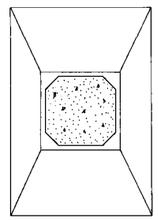
SECTION D-D
Scale: 3/8"=1'-0"

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

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



FOOTING END VIEW
Scale: 1/4"=1'-0"



FOOTING PLAN
Scale: 1/4"=1'-0"

NOTES:

Pier foundations are designed for an allowable bearing pressure of 10 Tons/S.F.

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	2-68	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

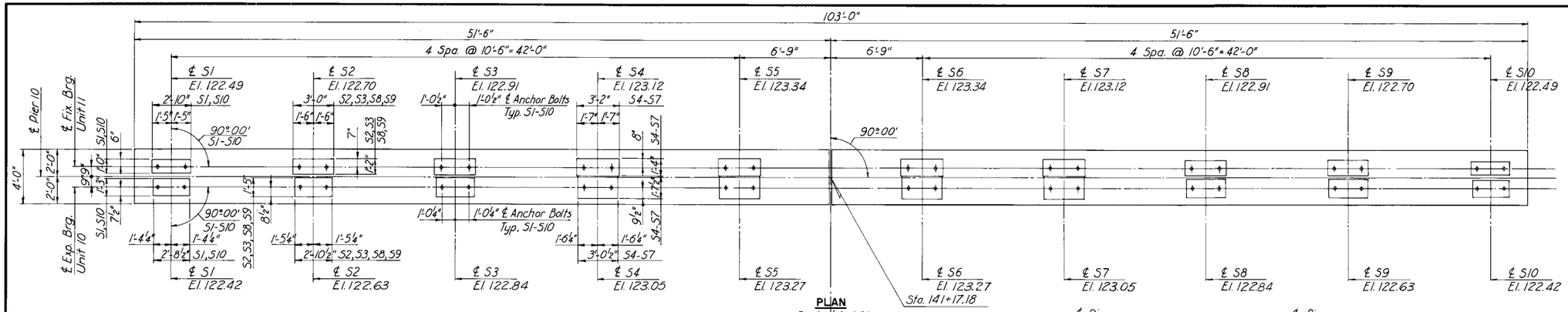
JAMES RIVER BRIDGE

PIER 8

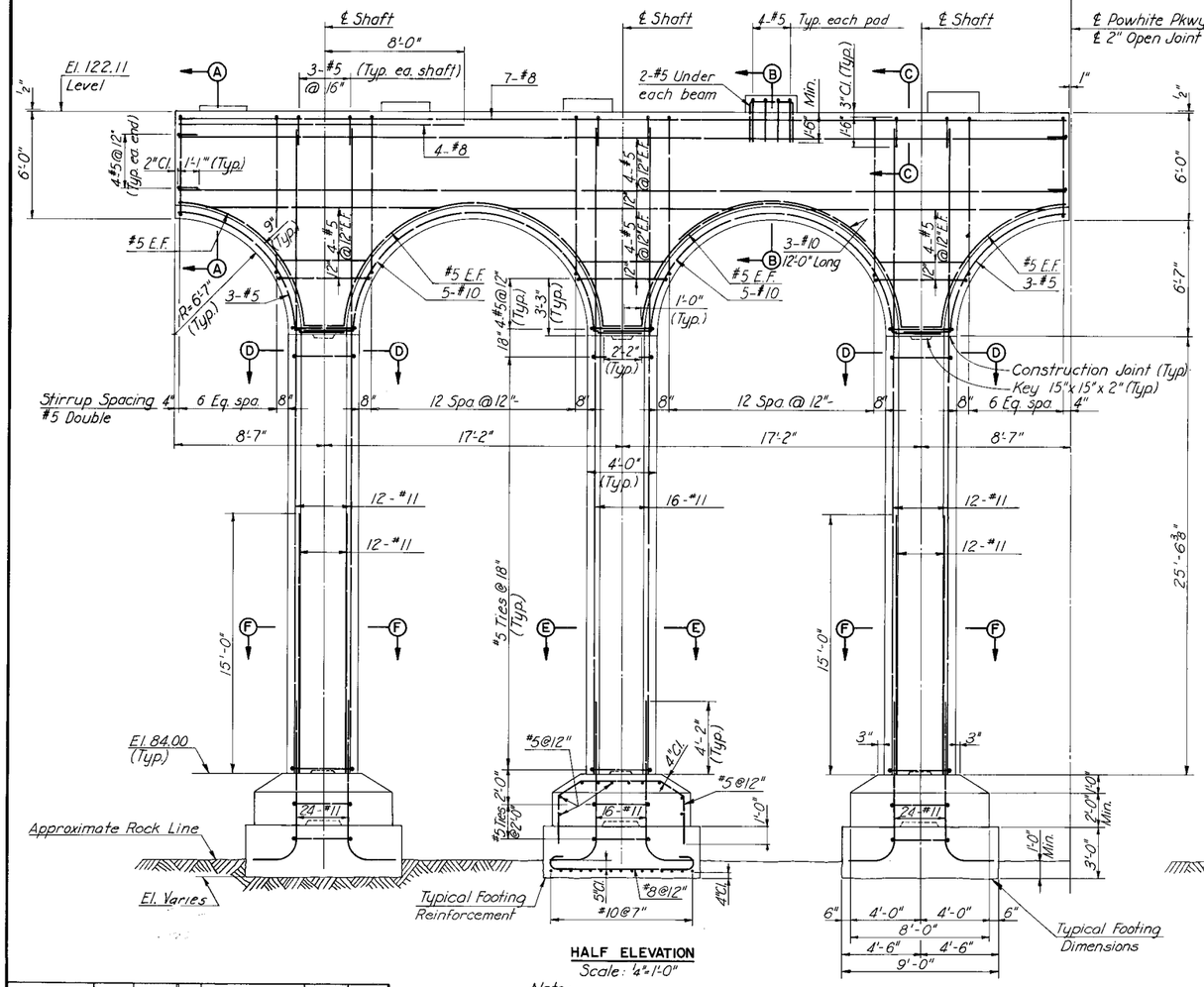
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 18 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	20	53

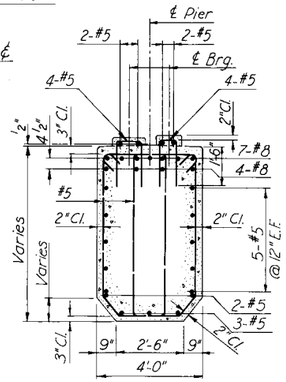


PLAN
Scale: 1/4"=1'-0"

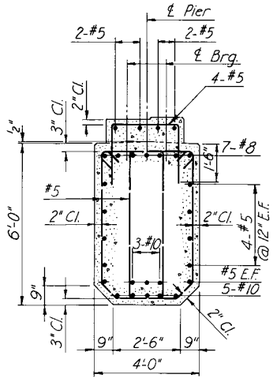


HALF ELEVATION
Scale: 1/4"=1'-0"

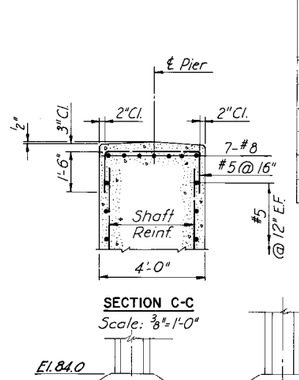
Note:
Pier symmetrical about ℄ Powhite Pkwy.



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

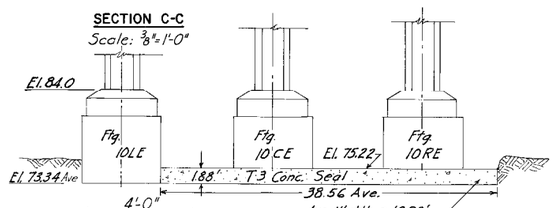


SECTION B-B
Scale: 3/8"=1'-0"

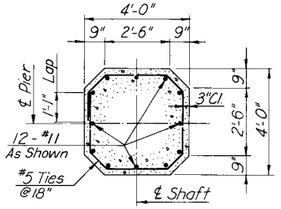


SECTION C-C
Scale: 3/8"=1'-0"

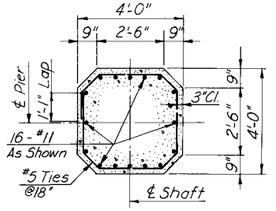
FOOTING NO.	AVE. BOTTOM ELEV.
10 L W	77.78
10 C W	76.95
10 R W	76.24
10 L E	73.34
10 C E	See Below
10 R E	" "



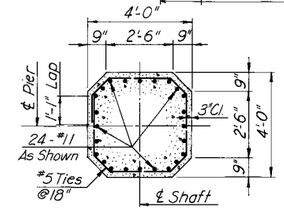
FOOTING EAST SIDE ONLY
Scale 1/8" = 1'



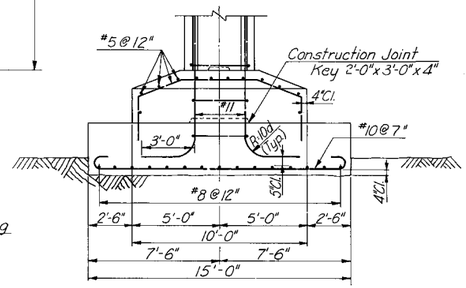
SECTION D-D
Scale: 3/8"=1'-0"



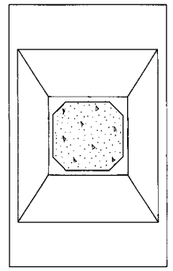
SECTION E-E
Scale: 3/8"=1'-0"



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



FOOTING END VIEW
Scale: 1/4"=1'-0"



FOOTING PLAN
Scale: 1/4"=1'-0"

AS BUILT

NOTES:

Pier foundations are designed for an allowable bearing pressure of 5 Tons/S.F.

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	2-68	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

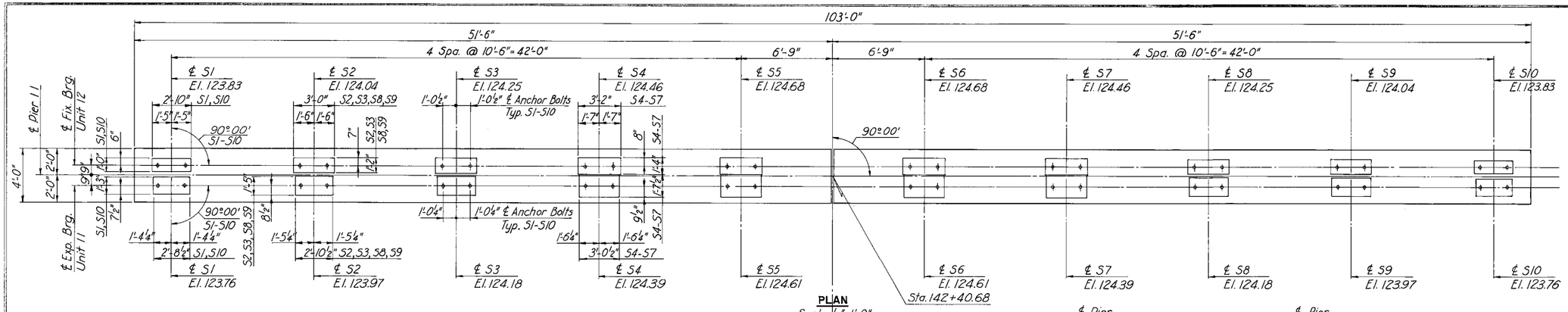
JAMES RIVER BRIDGE

PIER 10

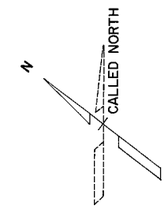
HOWARD, NEEDLES, TAMMEN & BERGENDOEF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

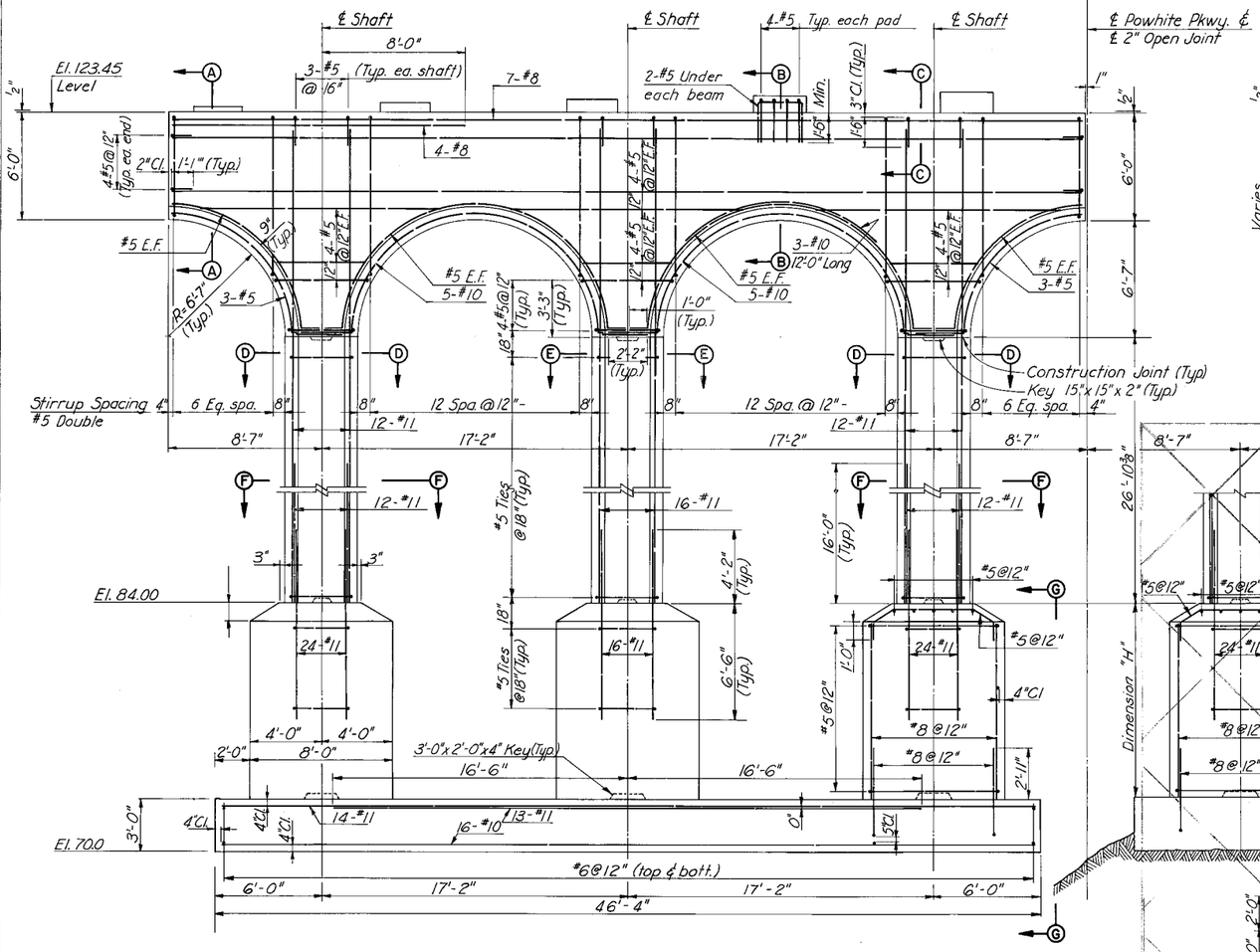
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 20 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	21	53

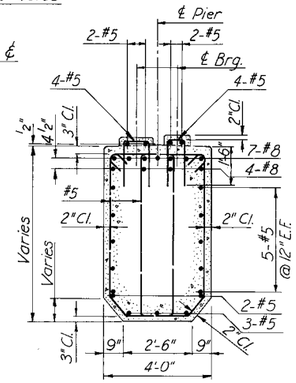


PLAN
Scale: 1/4"=1'-0"

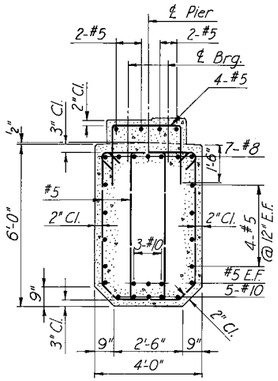




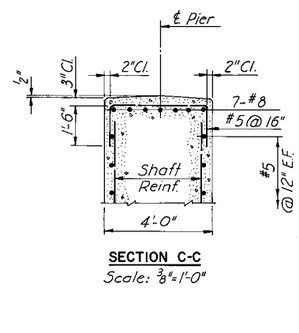
ELEVATION
Scale: 1/4"=1'-0"



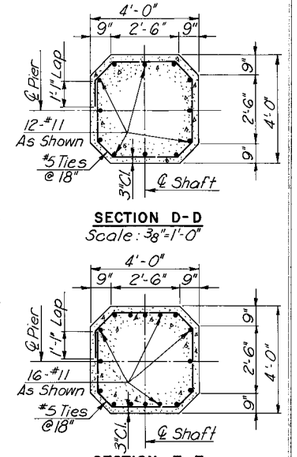
SECTION A-A
Scale: 3/8"=1'-0"



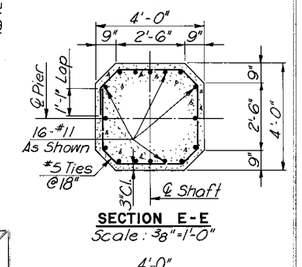
SECTION B-B
Scale: 3/8"=1'-0"



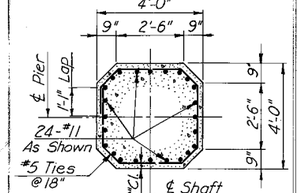
SECTION C-C
Scale: 3/8"=1'-0"



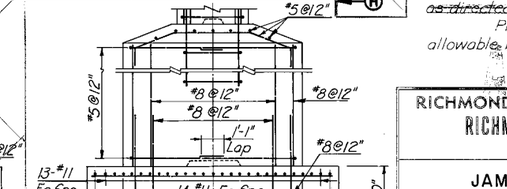
SECTION D-D
Scale: 3/8"=1'-0"



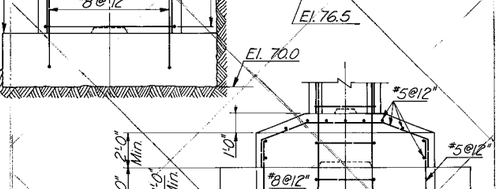
SECTION E-E
Scale: 3/8"=1'-0"



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



VIEW G-G
Scale: 1/4"=1'-0"



VIEW H-H
Scale: 1/4"=1'-0"

NOTES:
~~Foundation elevations are approximate only and may be varied to suit field conditions as directed by the Engineer.~~
Pier foundations are designed for an allowable bearing pressure of 3.5 Tons/S.F.

Note:
Pier symmetrical about ℄ Powhite Pkwy. except as shown.

	BY	DATE				
MADE	L.B.P.	7-67	2	AS BUILT	JRC	12-72
CHECKED	F.X.H.	2-68	1	Elim. Sheet Pilg. & Ftg	JRC	9-3-71
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

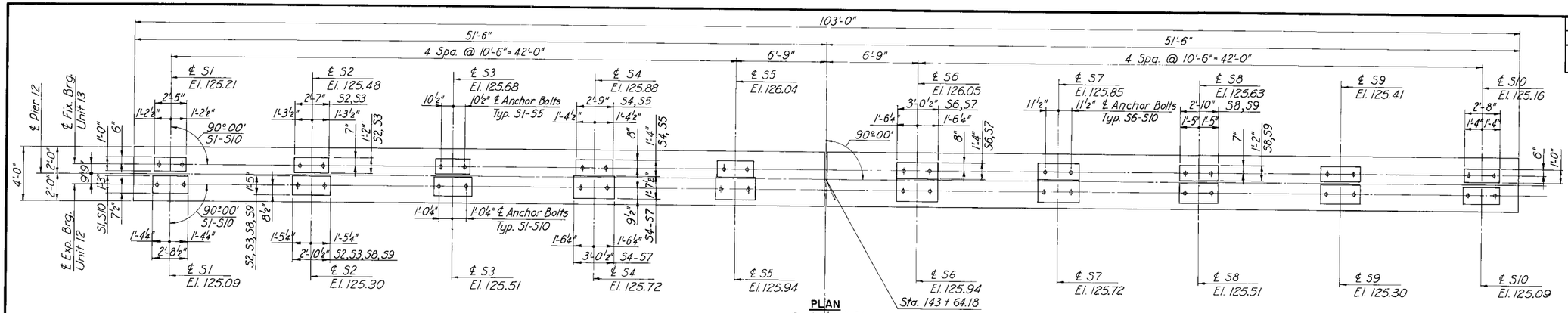
JAMES RIVER BRIDGE

PIER 11

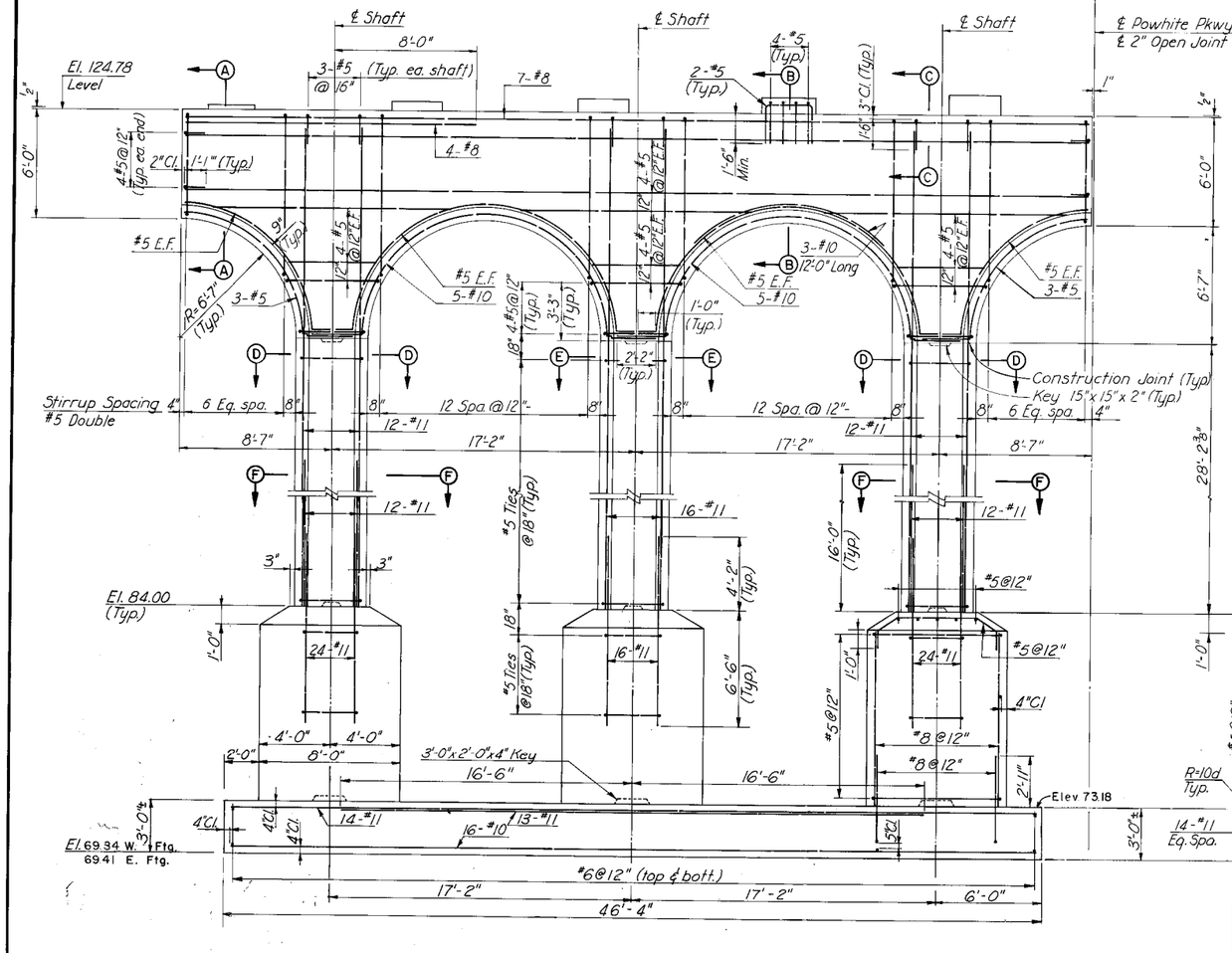
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

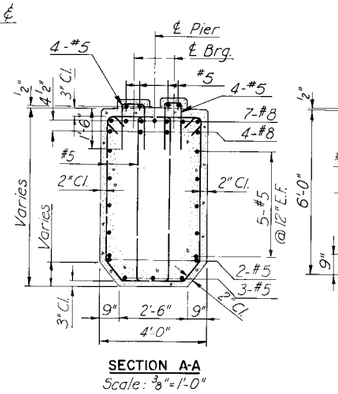
SCALE: AS SHOWN
CONTRACT NO. C-3
SHEET NO. 21 OF 53

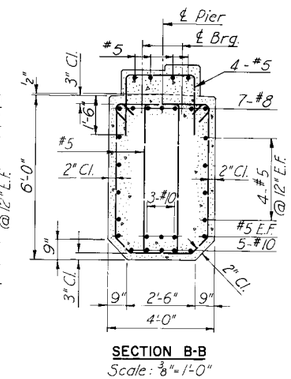
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	22	53

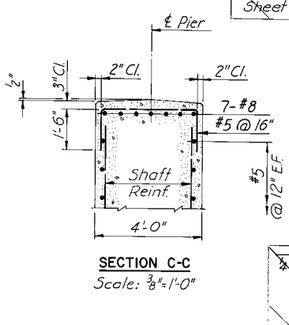


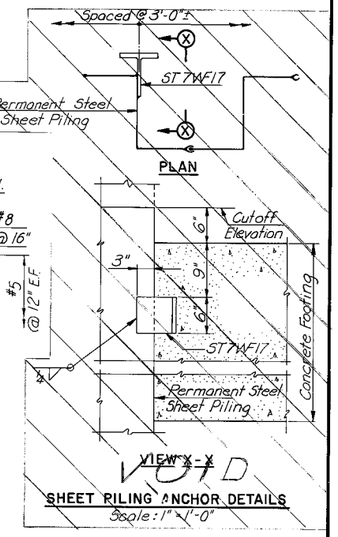
PLAN
Scale: 1/4"=1'-0"

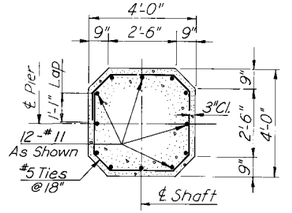


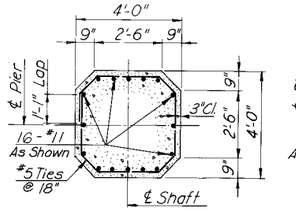


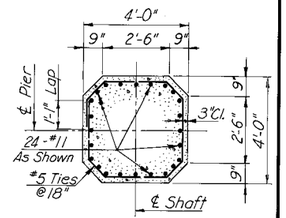


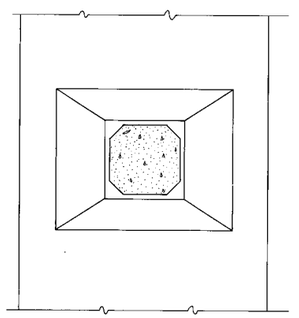


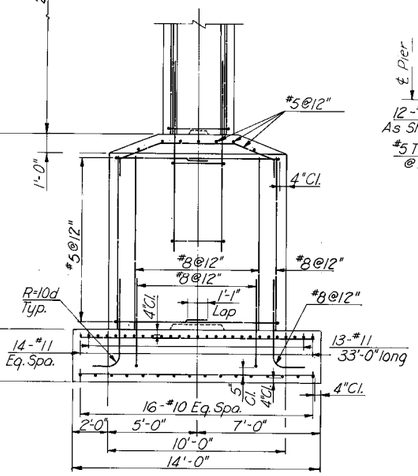









PART FOOTING PLAN
Scale: 1/4"=1'-0"



NOTES:

AS BUILT

Pier foundations are designed for an allowable bearing pressure of 3½ Tons/S.F.

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	3-68	1	AS BUILT	JRC	12-72
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

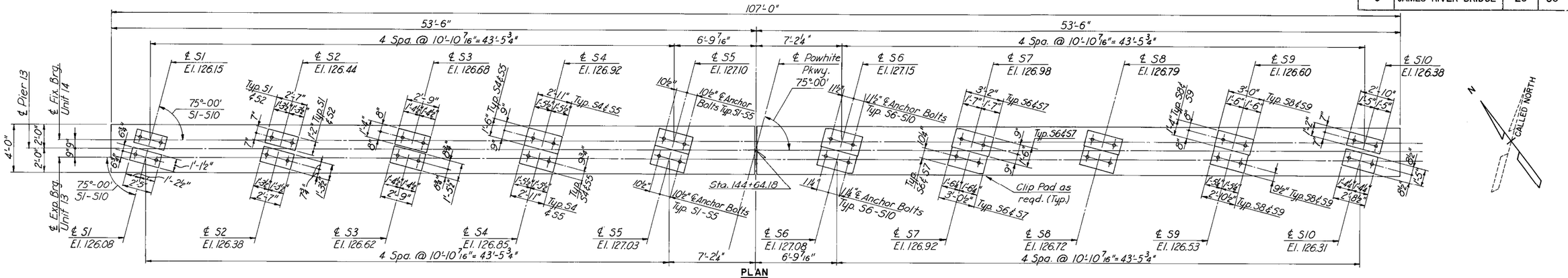
JAMES RIVER BRIDGE

PIER 12

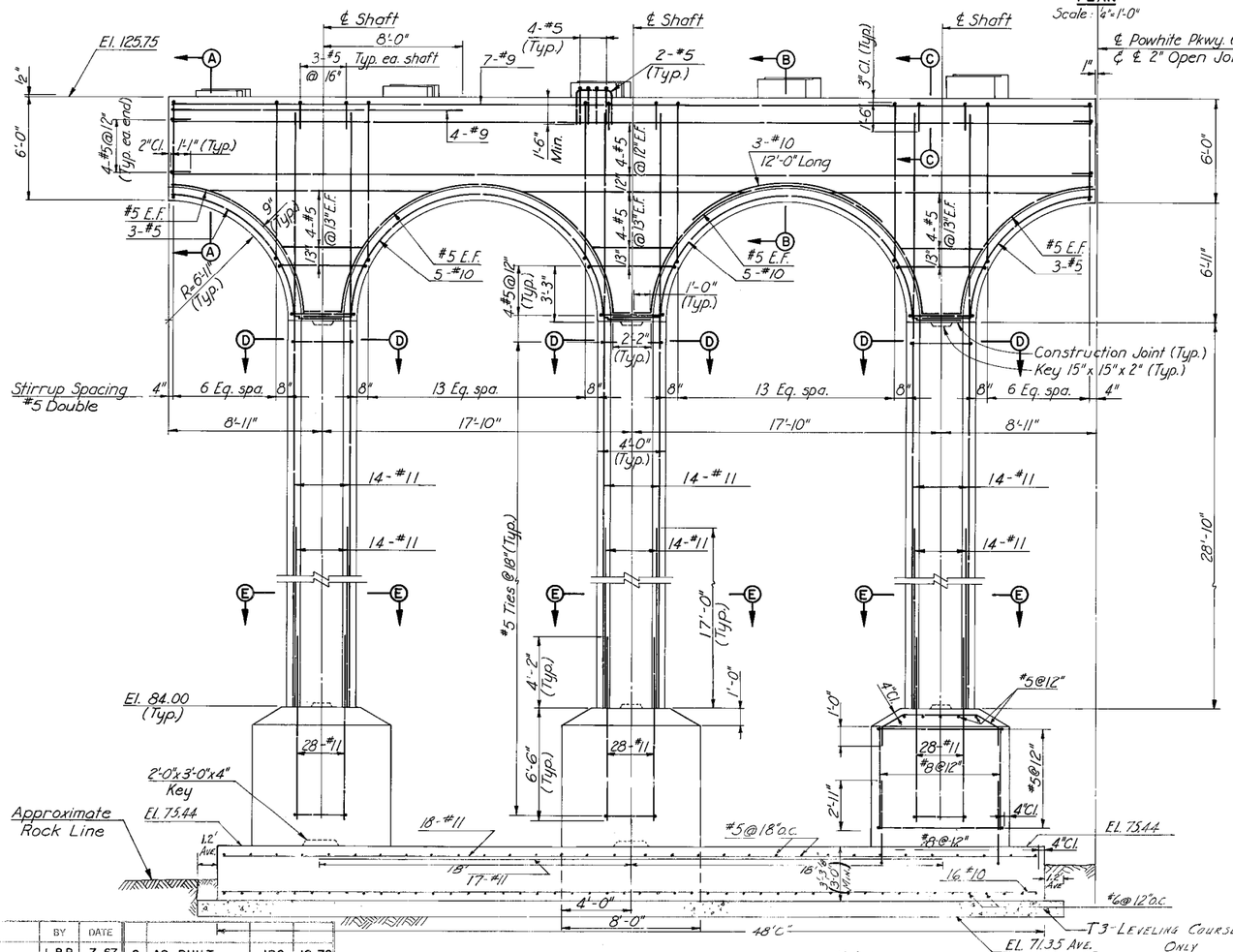
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 22 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	23	53

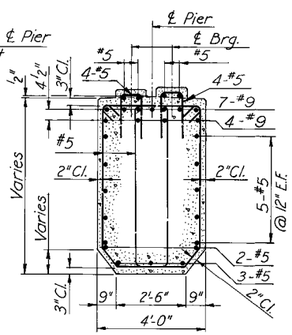


PLAN
Scale: 1/4"=1'-0"

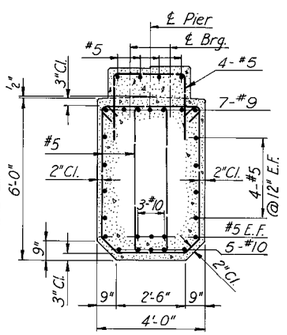


HALF ELEVATION
Scale: 1/4"=1'-0"

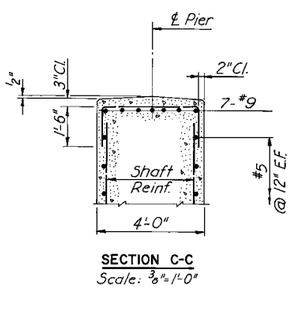
Note:
Pier symmetrical about ℄ 2" Open Joint except as shown.



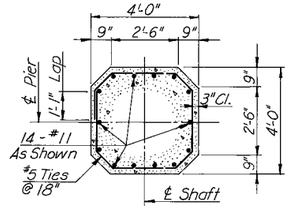
SECTION A-A
Scale: 3/8"=1'-0"



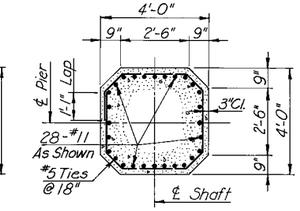
SECTION B-B
Scale: 3/8"=1'-0"



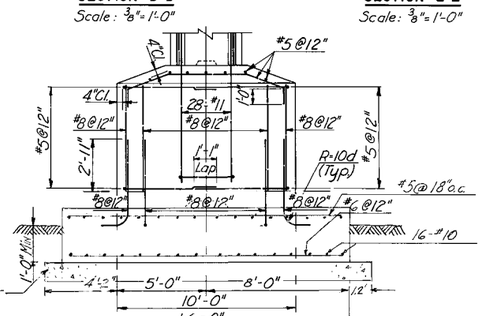
SECTION C-C
Scale: 3/8"=1'-0"



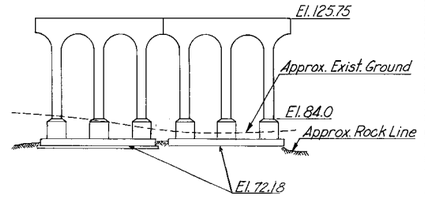
SECTION D-D
Scale: 3/8"=1'-0"



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



FOOTING END VIEW
Scale: 1/4"=1'-0"



ELEVATION
Scale: 1"=30'

NOTES:
~~Foundation elevations are approximate only and may be varied to suit field conditions as directed by the Engineer.~~
Pier foundations are designed for an allowable bearing pressure of 5 Tons/S.F.

AS BUILT
RICHMOND METROPOLITAN AUTHORITY
EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE

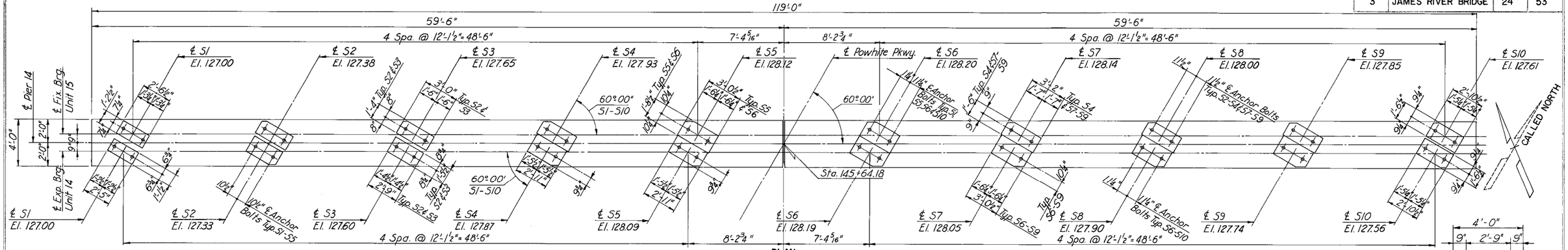
PIER 13

	BY	DATE				
MADE	L.B.P.	7-67	2	AS BUILT	JRC	12-72
CHECKED	F.X.H.	3-68	1	Rev. Footings	JRC	4-12-72
IN CHARGE	F.X.H		NO.	REVISION	BY	DATE

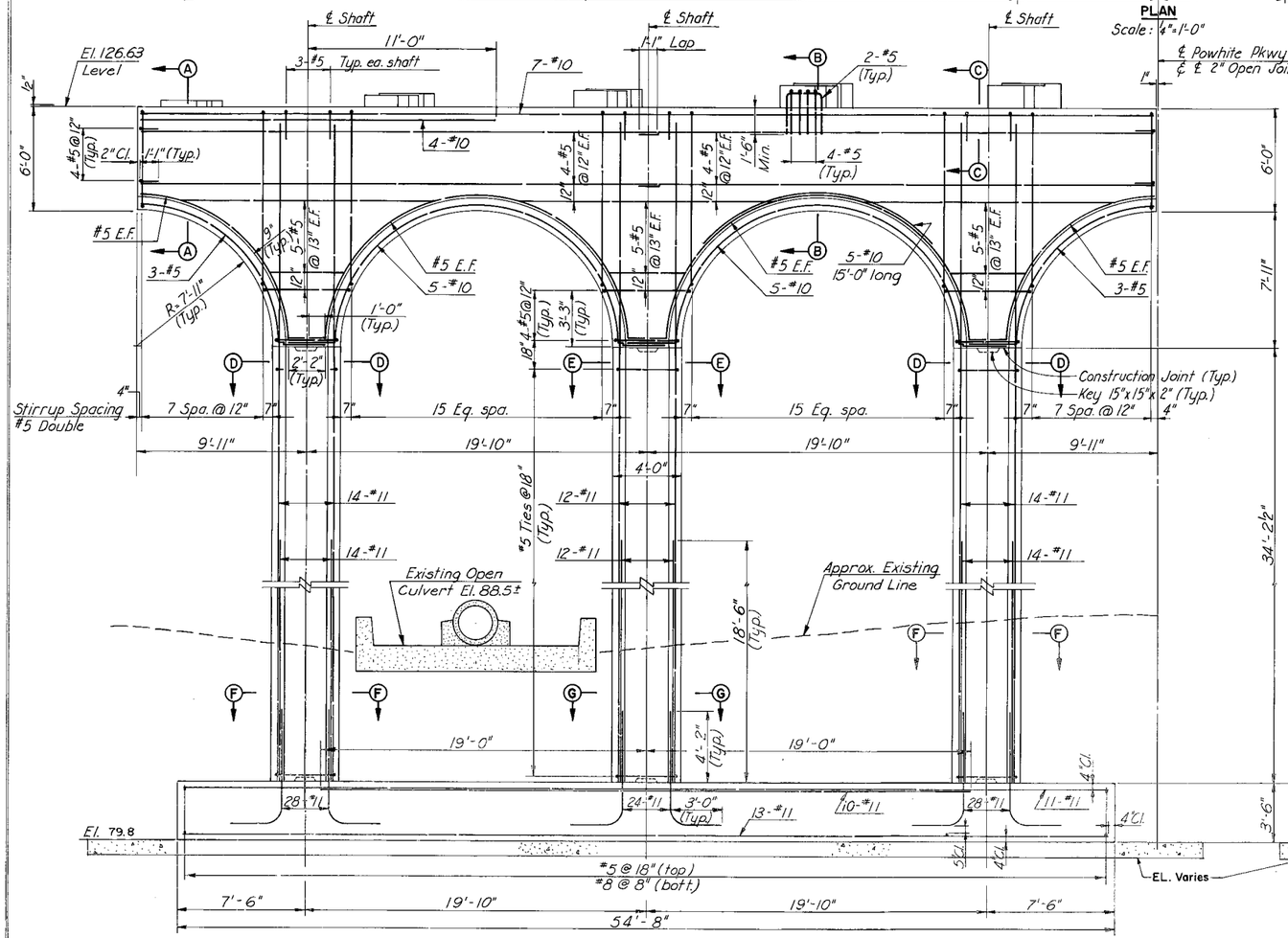
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. C-3
SHEET NO. 23 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	24	53

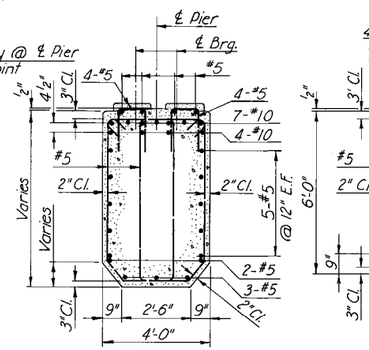


PLAN
Scale: 1/4"=1'-0"

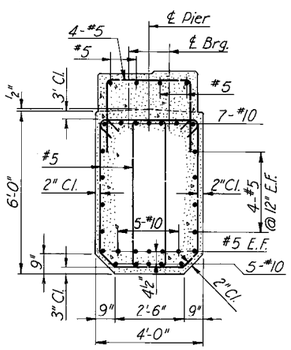


HALF ELEVATION
Scale: 1/4"=1'-0"

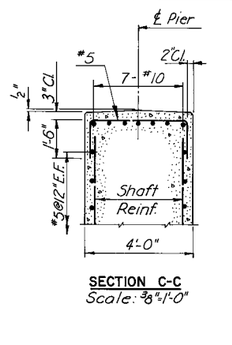
Note: Pier symmetrical about ℄ 2" open joint.



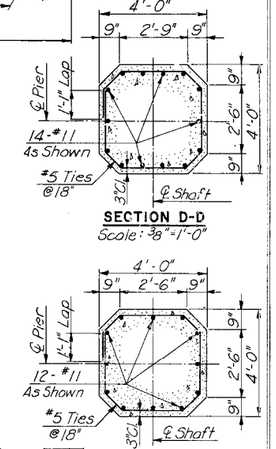
SECTION A-A
Scale: 3/8"=1'-0"



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

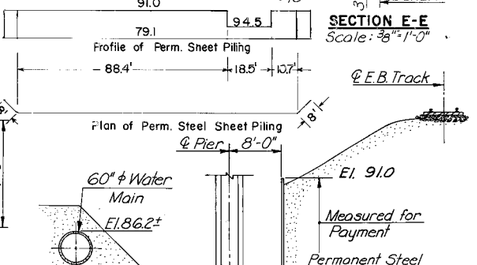


SECTION C-C
Scale: 3/8"=1'-0"

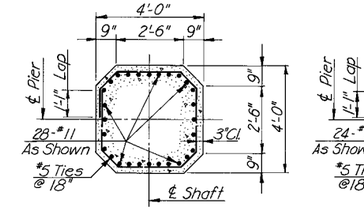


SECTION D-D
Scale: 3/8"=1'-0"

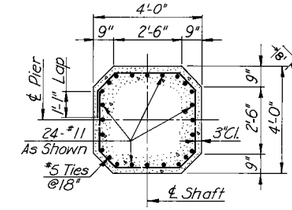
SECTION E-E
Scale: 3/8"=1'-0"



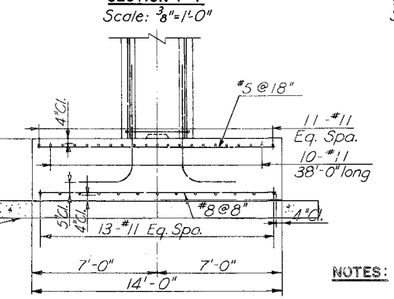
END ELEVATION
NOT TO SCALE



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



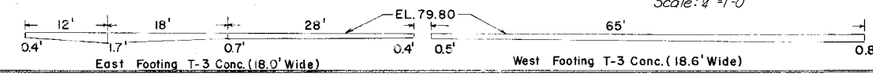
SECTION G-G
Scale: 3/8"=1'-0"



FOOTING END VIEW
Scale: 1/4"=1'-0"

NOTES:

Pier foundations are designed for an allowable bearing pressure of 3½ Tons/S.F.



	BY	DATE				
MADE	L.B.P.	7-67				
CHECKED	F.X.H.	3-68	1	AS BUILT	JRC	12-72
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

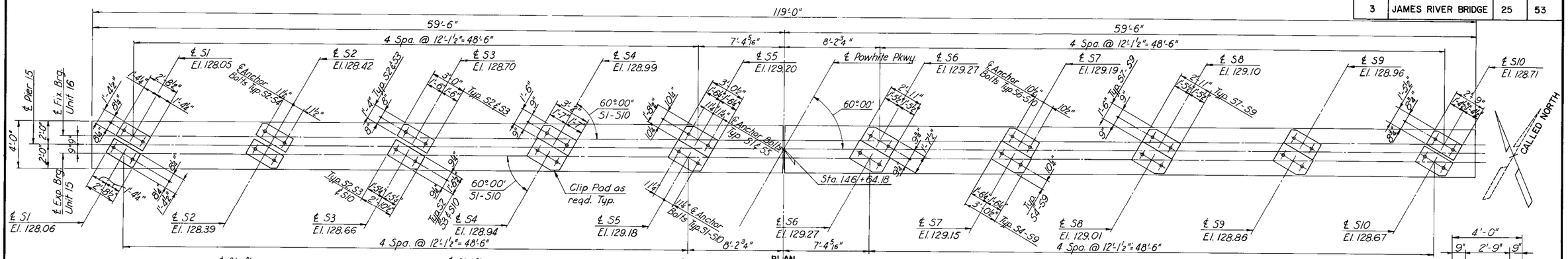
JAMES RIVER BRIDGE

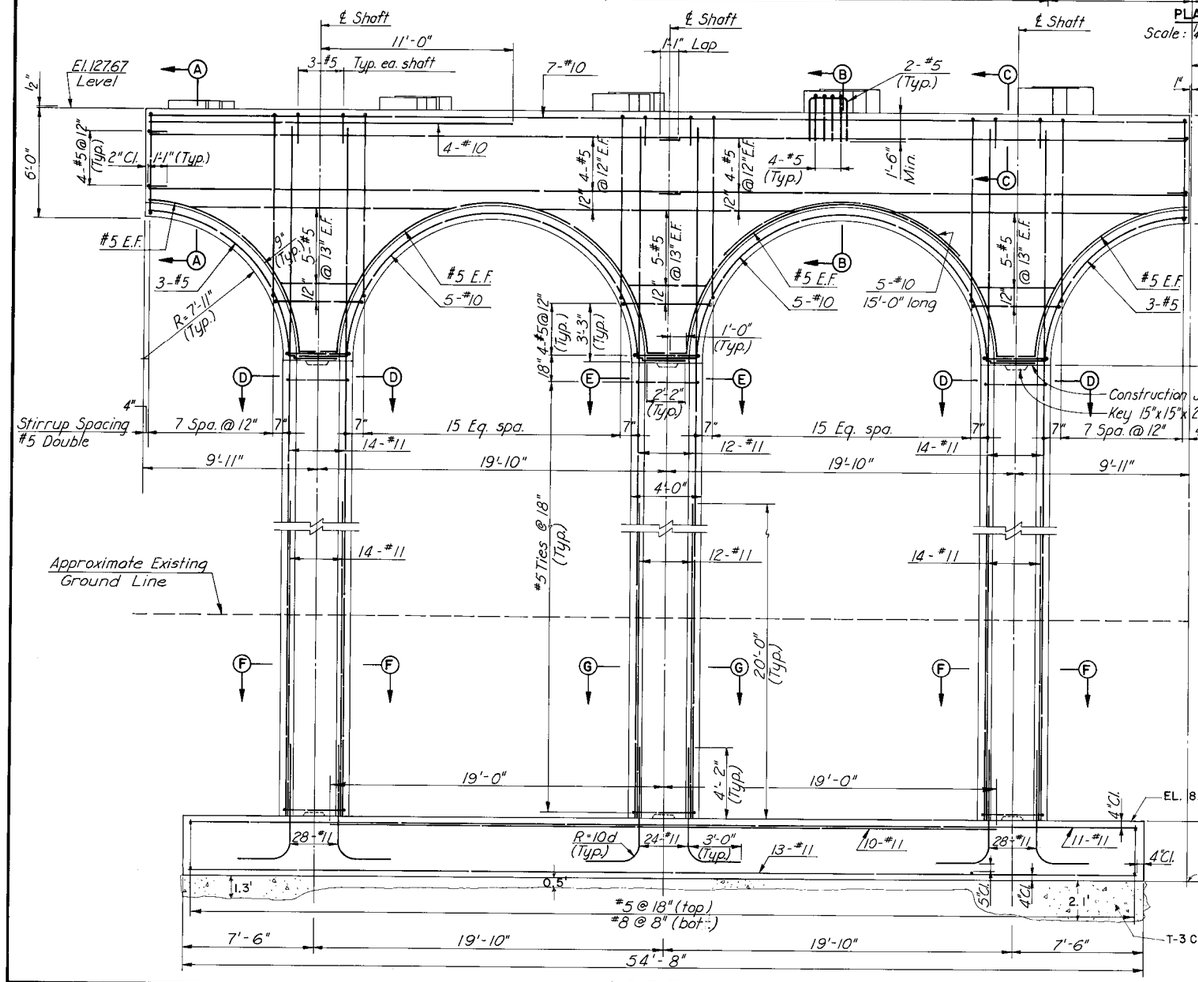
PIER 14

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

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 24 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	25	53

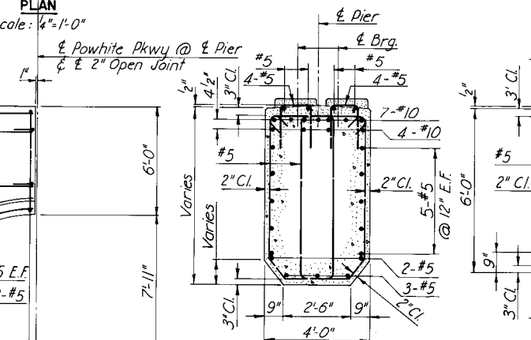




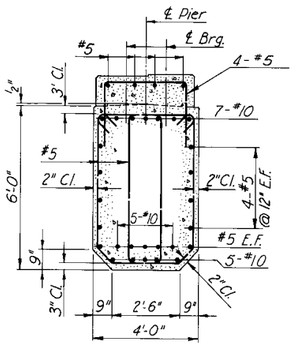
HALF ELEVATION
Scale: ¼"=1'-0"

Note:
Pier symmetrical about ℄ 2" open joint.

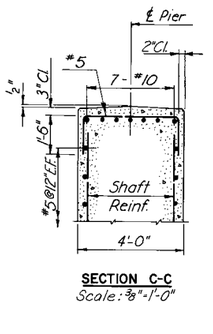
PLAN
Scale: ¼"=1'-0"



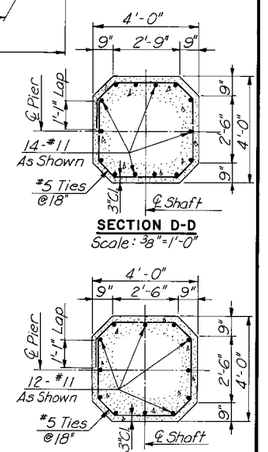
SECTION A-A
Scale: ⅜"=1'-0"



SECTION B-B
Scale: ⅜"=1'-0"

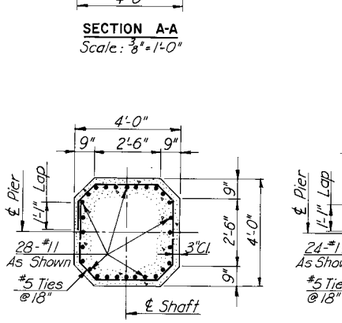


SECTION C-C
Scale: ⅜"=1'-0"

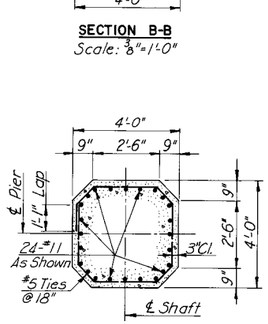


SECTION D-D
Scale: ⅜"=1'-0"

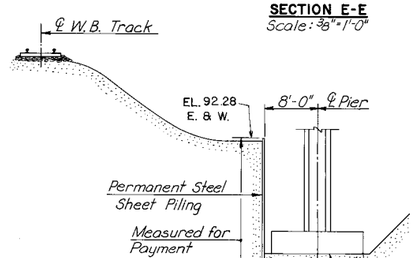
SECTION E-E
Scale: ⅜"=1'-0"



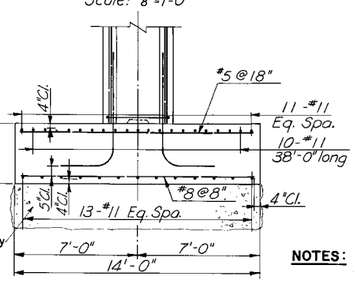
SECTION F-F
Scale: ⅜"=1'-0"



SECTION G-G
Scale: ⅜"=1'-0"



END ELEVATION
Scale: 3/32"=1'-0"



FOOTING END VIEW
Scale: 4"=1'-0"

NOTES:

Pier foundations are designed for an allowable bearing pressure of 3½ Tons/S.F.

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	3-68	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

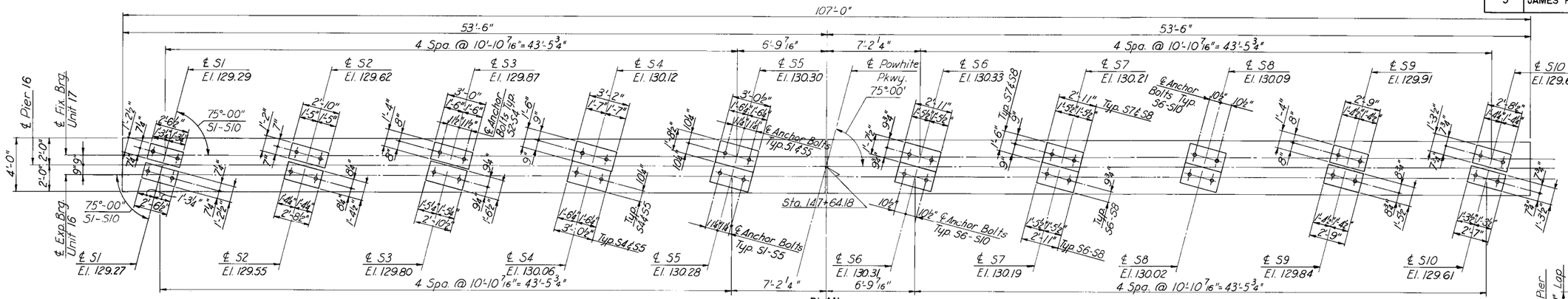
JAMES RIVER BRIDGE

PIER 15

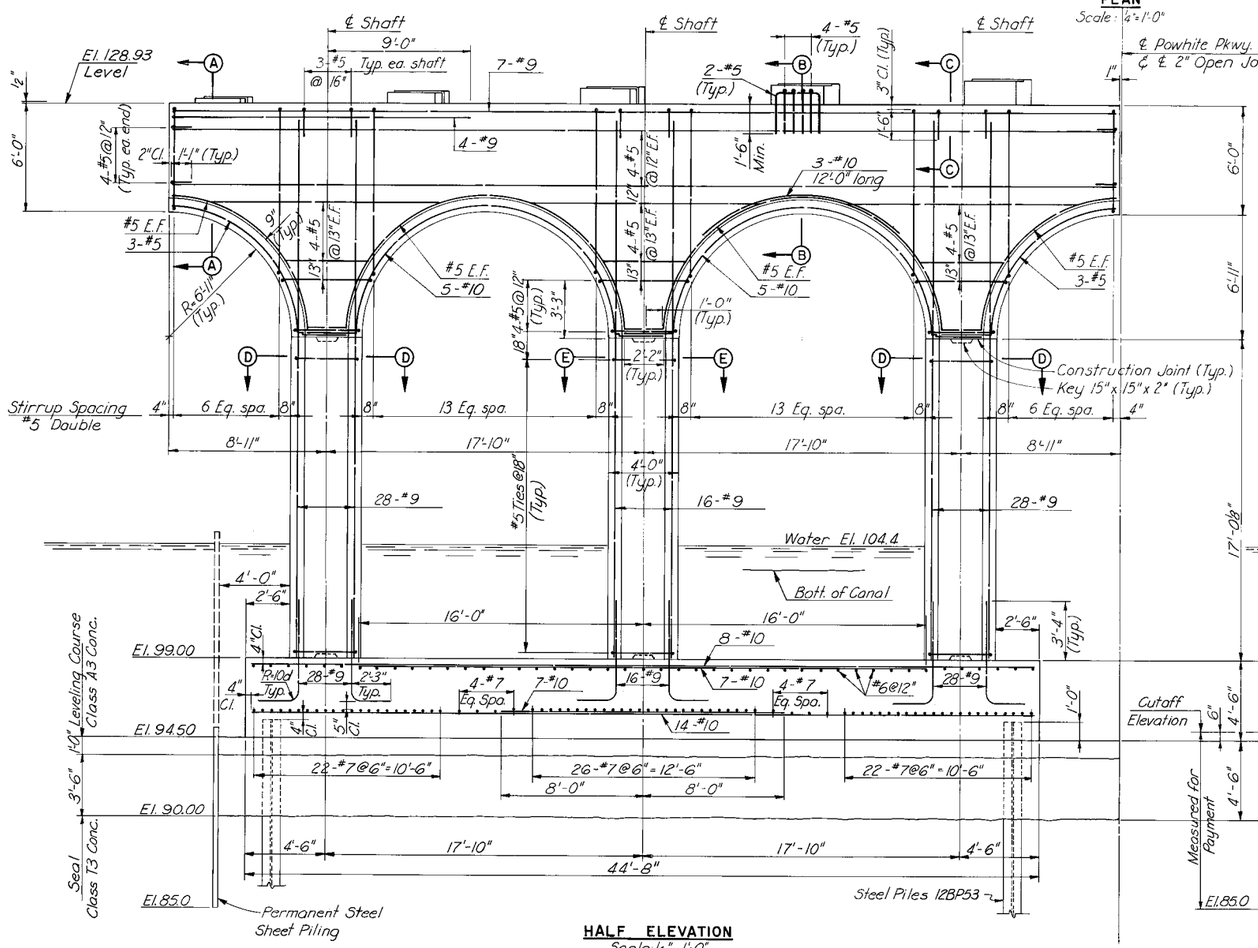
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 25 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	26	53

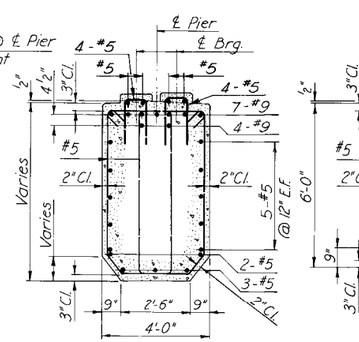


PLAN
Scale: 1/4"=1'-0"

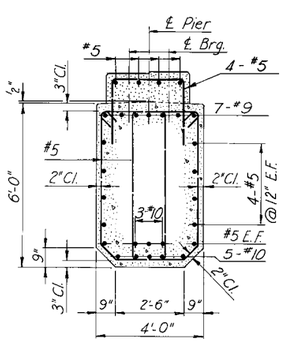


HALF ELEVATION
Scale: 1/4"=1'-0"

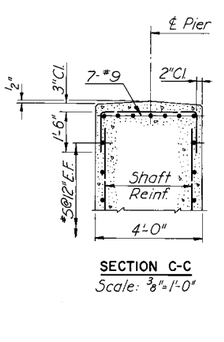
Note:
Pier symmetrical about ℄ 2" Open Joint.



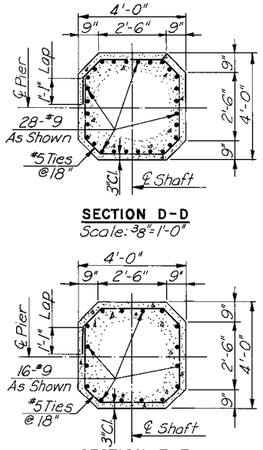
SECTION A-A
Scale: 3/8"=1'-0"



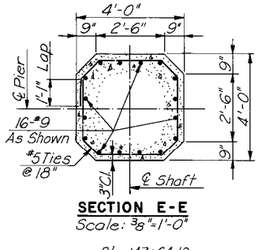
SECTION B-B
Scale: 3/8"=1'-0"



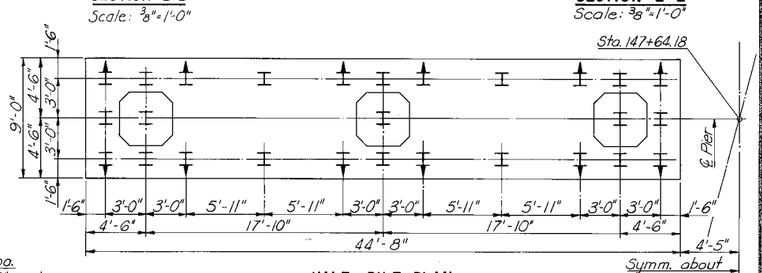
SECTION C-C
Scale: 3/8"=1'-0"



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

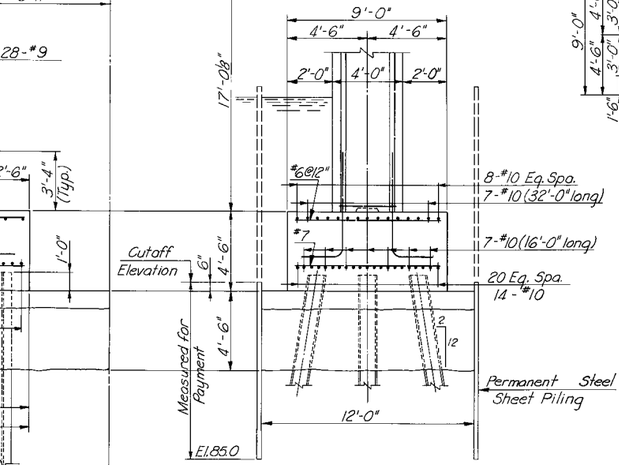


SECTION E-E
Scale: 3/8"=1'-0"



HALF PILE PLAN
Scale: 3/16"=1'-0"

Pile Notes:
I denotes vertical piles.
T denotes battered pile. Battered 2:12 in direction of arrow.
All piles steel H (12BP53). 55T capacity.
Average pile tip West Fig = 75.7
East Fig = 61.4



FOOTING END VIEW
Scale: 1/4"=1'-0"

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	3-68	1	AS BUILT		12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

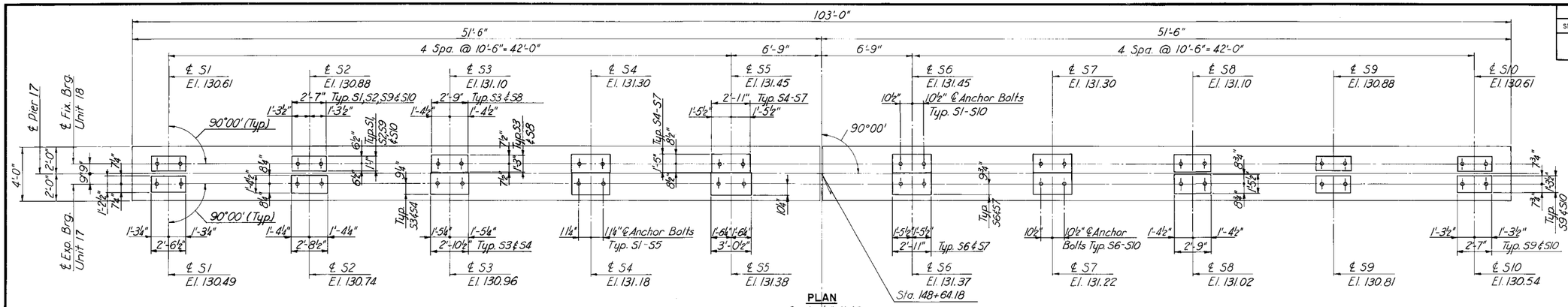
JAMES RIVER BRIDGE

PIER 16

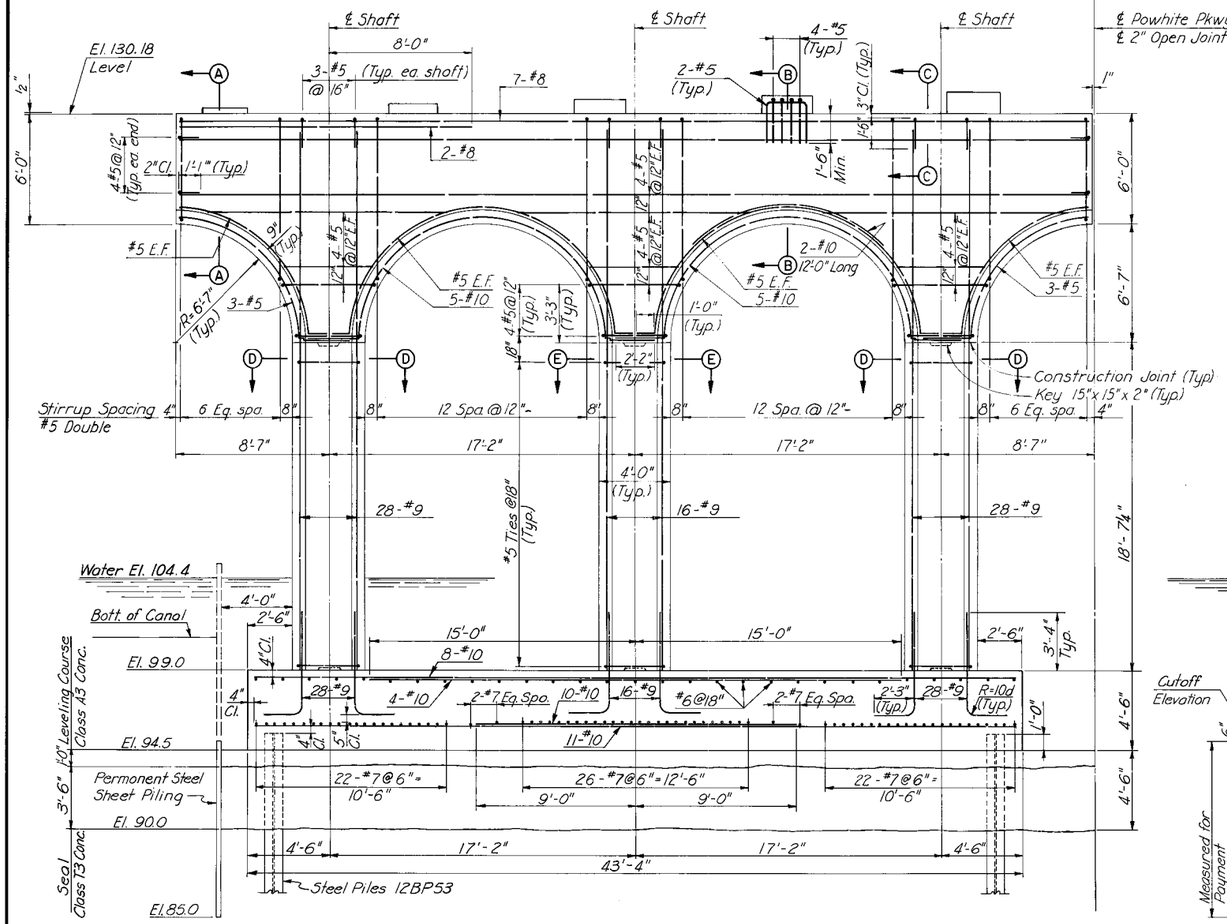
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 26 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	27	53

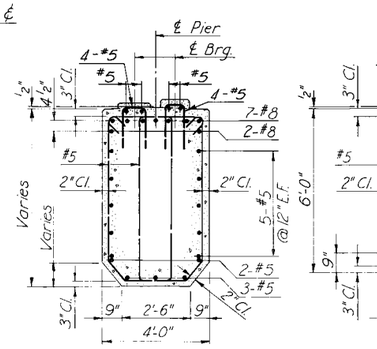


PLAN
Scale: ¼"=1'-0"

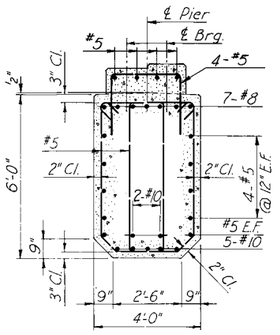


HALF ELEVATION
Scale: ¼"=1'-0"

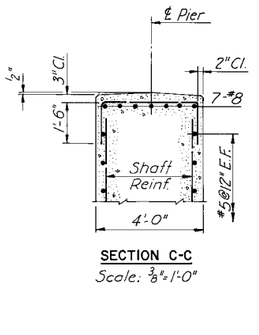
Note:
Pier symmetrical about ℄ Powhite Pkwy.



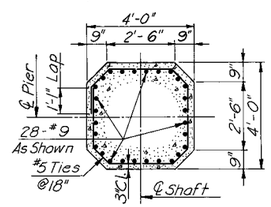
SECTION A-A
Scale: ⅜"=1'-0"



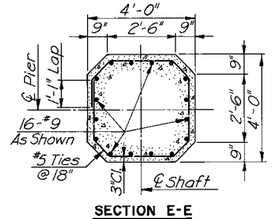
SECTION B-B
Scale: ⅜"=1'-0"



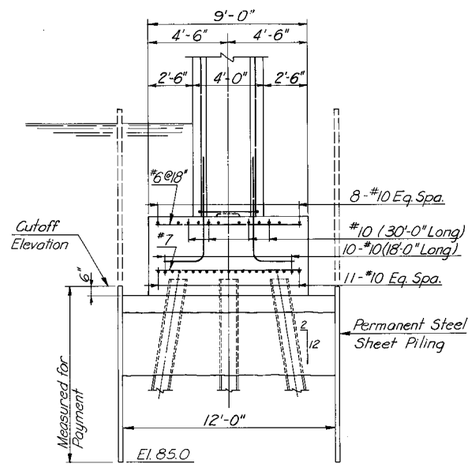
SECTION C-C
Scale: ⅜"=1'-0"



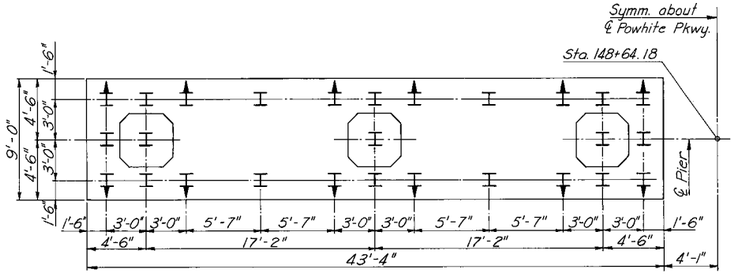
SECTION D-D
Scale: ⅜"=1'-0"



SECTION E-E
Scale: ⅜"=1'-0"



FOOTING END VIEW
Scale: ¼" = 1'-0"



HALF PILE PLAN
Scale: 3/16"=1'-0"

Pile Notes:
I denotes vertical pile.
Ŧ denotes battered pile. Batter 2:12 in direction of arrow.
All piles are steel H (12BP53). 55T capacity.
Average pile tip: El. **47.5** (N.B. Roadway Pier)
El. **68.0** (S.B. Roadway Pier)

AS BUILT

	BY	DATE				
MADE	HBW	7-67				
CHECKED	FXH	3-68	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

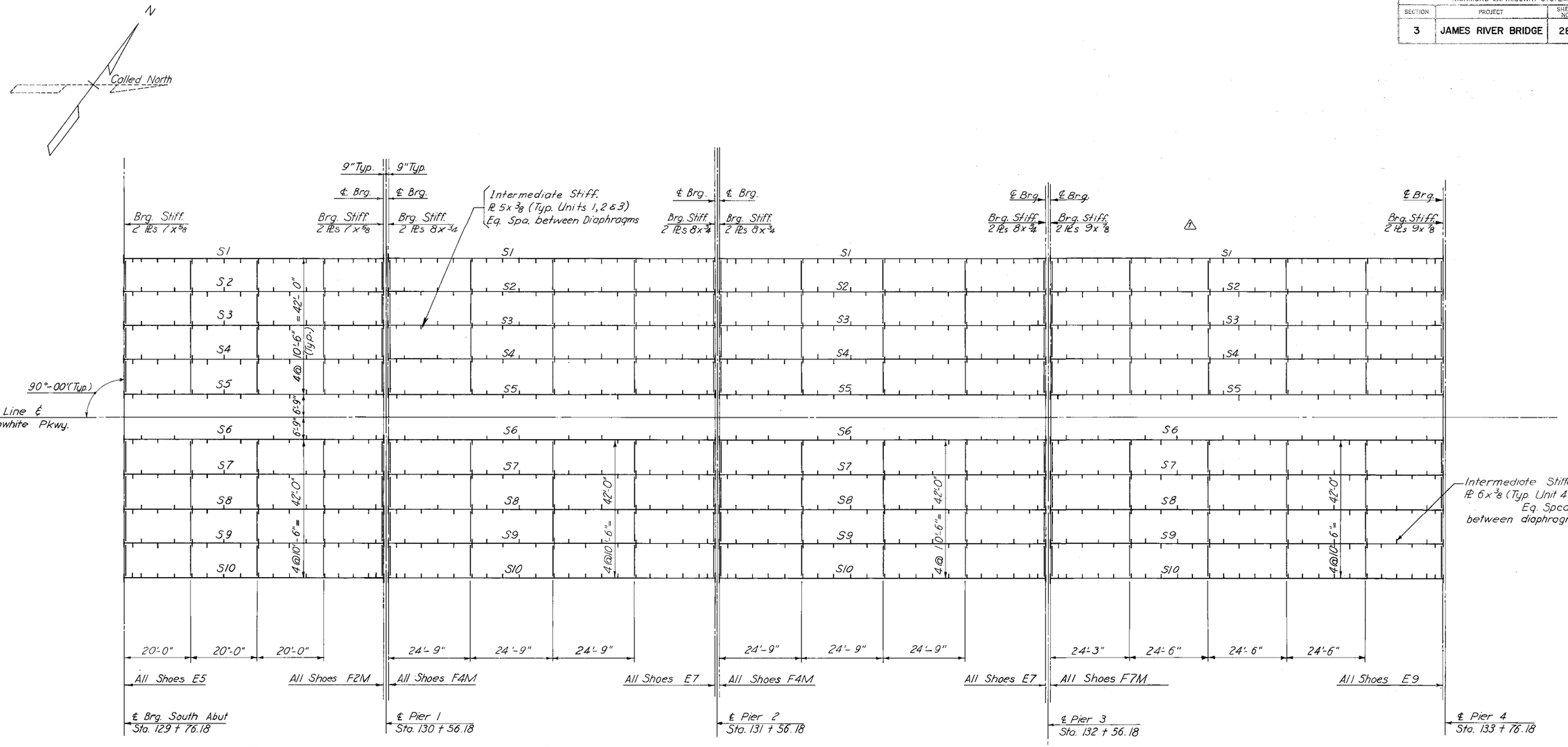
JAMES RIVER BRIDGE

PIER 17

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

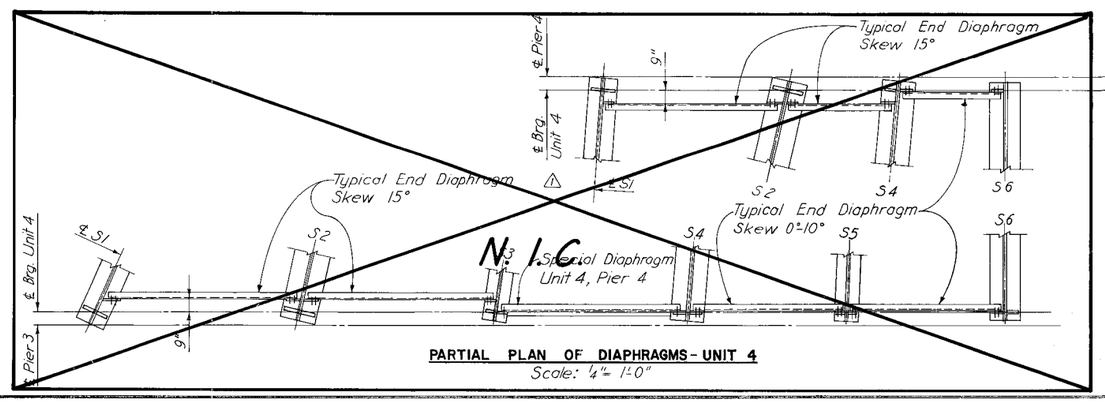
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 27 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	28	53



STRINGER LENGTHS (c to c Bearing)					
Unit	Stringer	Length	Unit	Stringer	Length
1	S1-S10	79'-3"	3	S1-S10	98'-6"
2	S1-S10	98'-6"	4	S1-S10	118'-6"

⚠



PARTIAL PLAN OF DIAPHRAGMS - UNIT 4
Scale: 1/4" = 1'-0"

N.I.C.

	BY	DATE				
MADE	EVR	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	8-67	⚠1	Remove Ramp Taper	H.B.W.	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

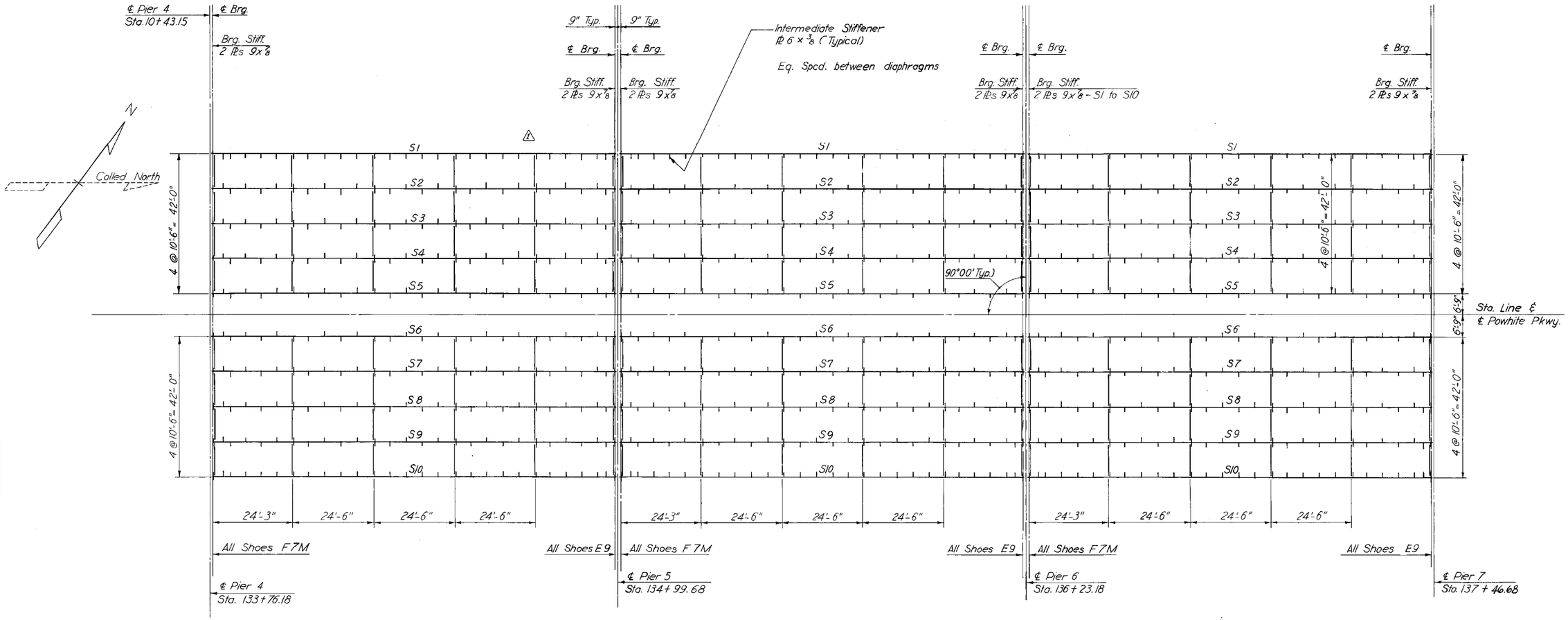
JAMES RIVER BRIDGE

FRAMING PLAN UNITS 1, 2, 3 & 4

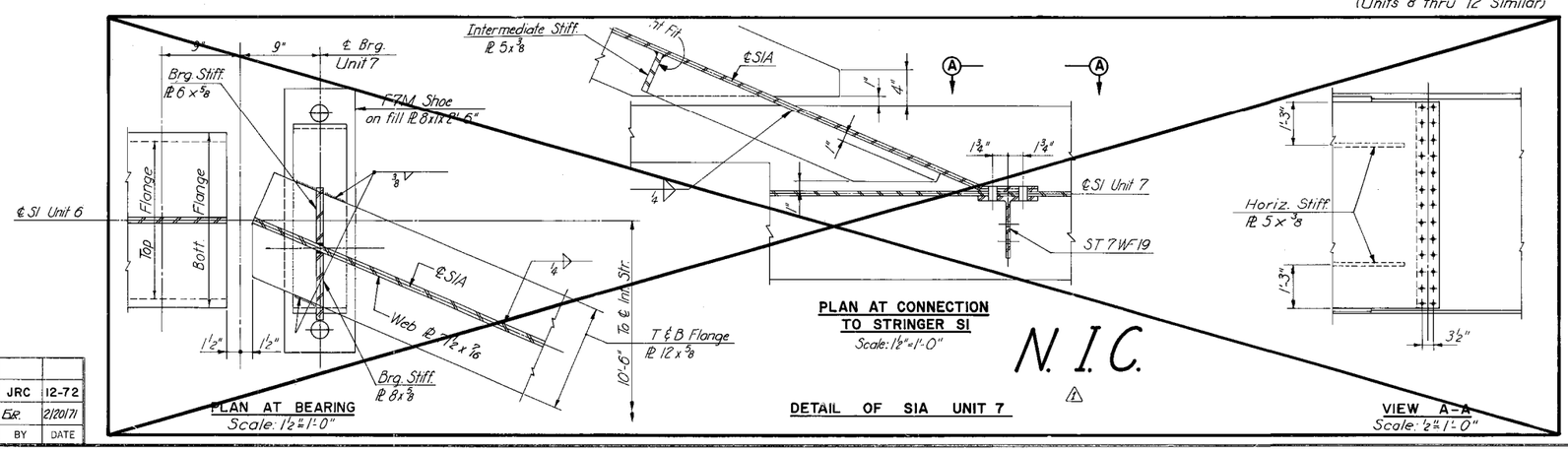
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=15' (Unless Noted)
CONTRACT NO.: C-3
SHEET NO. 28 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	29	53



STRINGER LENGTHS (C.C. Bearing)		
Unit	Stringer	Length
5-12	S1-S10	122-0"



	BY	DATE				
MADE	EVR	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	8-67	1	Removed Ramp Widening	EJR	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

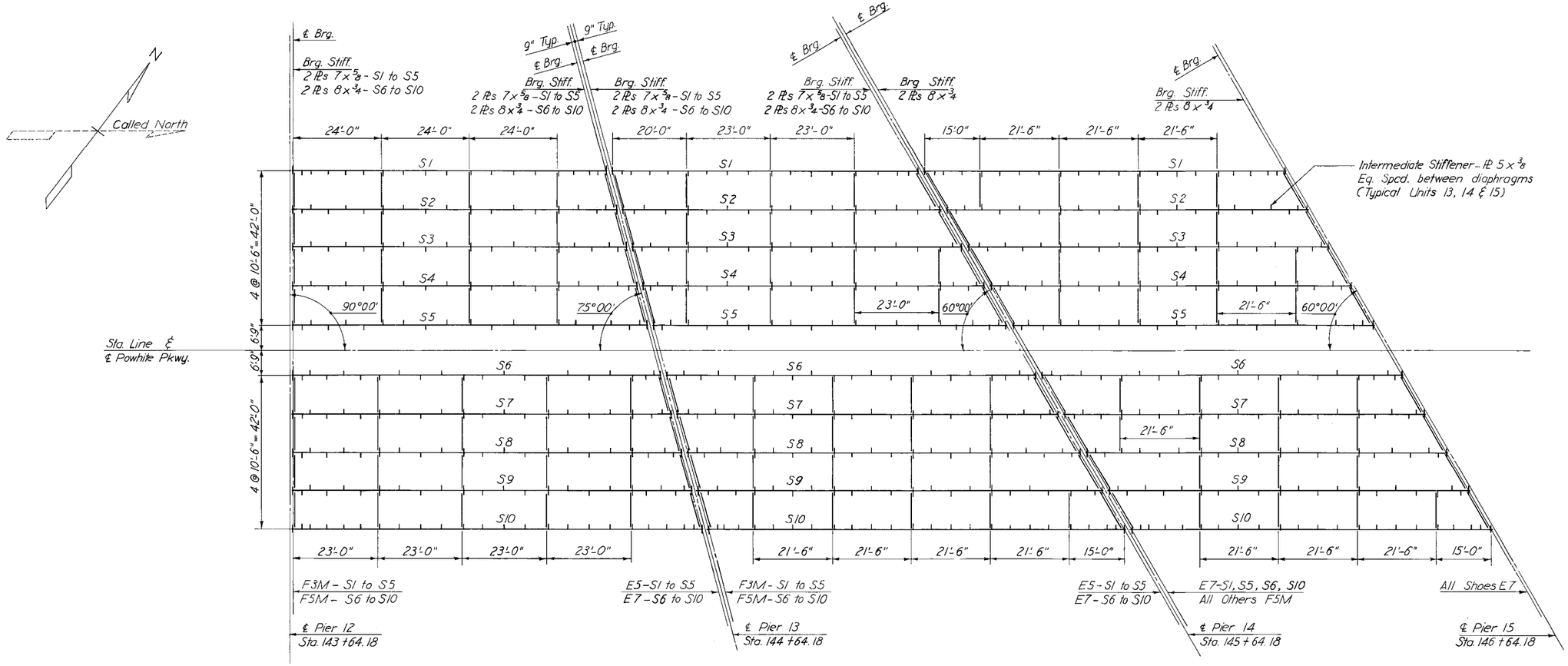
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
FRAMING PLAN UNITS 5 THRU 12

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

SCALE: 1"=15' (Unless Noted)
CONTRACT NO: C-3
SHEET NO. 29 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	30	53



UNIT 13 UNIT 14 UNIT 15

STRINGER LENGTHS
(c to c Bearing)

Unit	Stringer	Length	Unit	Stringer	Length	Unit	Stringer	Length
13	S1	85'-4 15/16"	13 (cont'd)	S8	105'-10 7/8"	14 (cont'd)	S5	96'-3 1/4"
	S2	88'-2 11/16"		S9	108'-8 11/16"		S6	100'-5 3/8"
	S3	91'-0 7/16"		S10	111'-6 7/16"		S7	103'-8 5/16"
	S4	93'-10 3/16"	14	S1	83'-3 5/16"		S8	106'-11 5/16"
	S5	96'-8"		S2	85'-6 1/4"		S9	110'-2 5/16"
	S6	100'-3 3/8"		S3	89'-9 1/4"		S10	113'-5 5/16"
	S7	103'-1 1/8"		S4	93'-0 1/4"	15	S1 - S10	98'-3 3/16"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EVR	7-67				
CHECKED	FXH	8-67	1	AS BUILT	JRC	12-72
IN CHARGE	FXH					

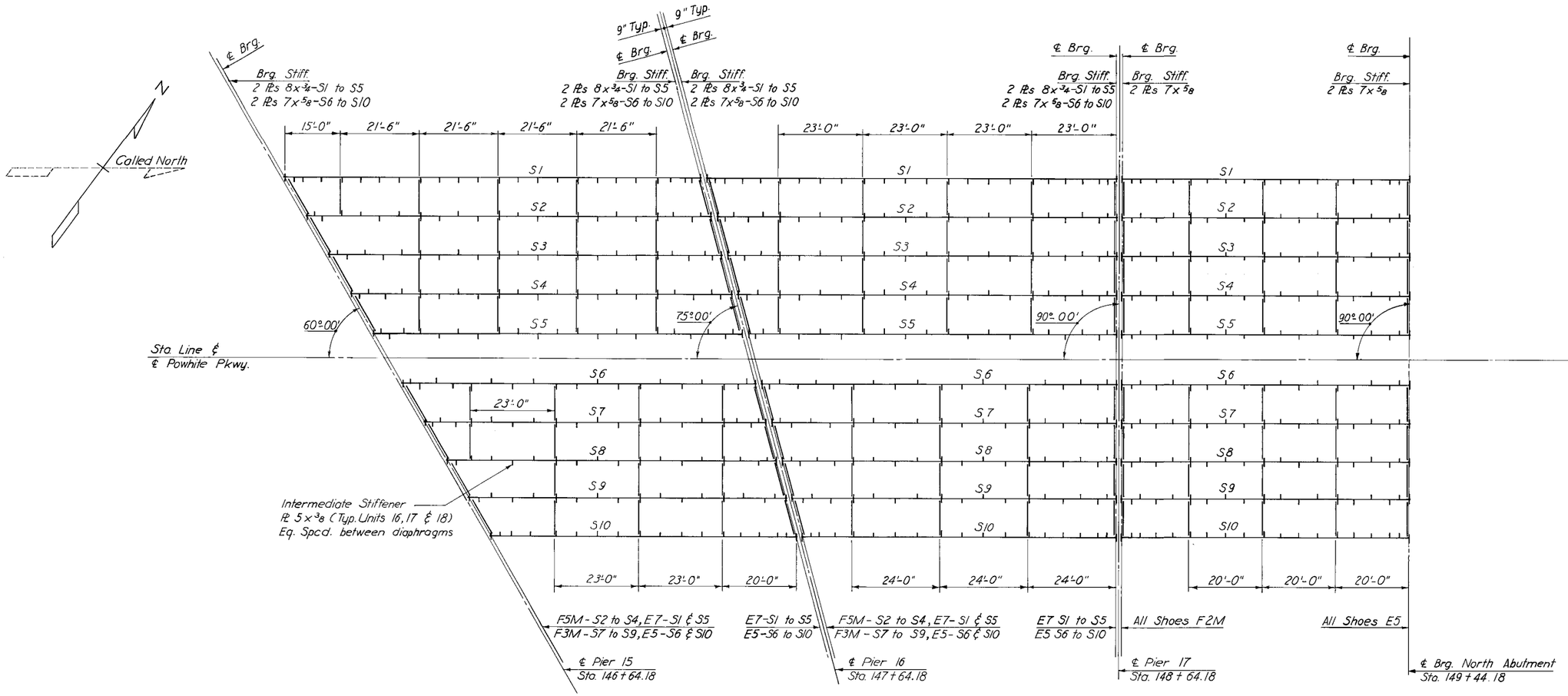
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
FRAMING PLAN UNITS 13,14 & 15

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

SCALE: 1" = 15'-0"
CONTRACT NO.: C-3
SHEET NO. 30 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	31	53



UNIT 16 UNIT 17 UNIT 18

STRINGER LENGTHS
(c to c Bearing)

Unit	Stringer	Length	Unit	Stringer	Length	Unit	Stringer	Length
16	S1	113'-5 5/16"	16 (cont'd)	S8	89'-9¼"	17 (cont'd)	S5	100'-3 3/8"
	S2	110'-2 5/16"		S9	85'-6¼"		S6	96'-8"
	S3	106'-11 5/16"		S10	83'-3 5/16"		S7	93'-10 3/16"
	S4	103'-8 5/16"	17	S1	111'-6 7/16"		S8	91'-0 7/16"
	S5	100'-5 3/8"		S2	108'-8 11/16"		S9	88'-2 11/16"
	S6	96'-3¼"		S3	105'-10 7/8"		S10	85'-4 15/16"
	S7	93'-0¼"		S4	103'-1⅞"	18	S1-S10	79'-3"

	BY	DATE				
MADE	EVR	7-67				
CHECKED	FXH	8-67	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

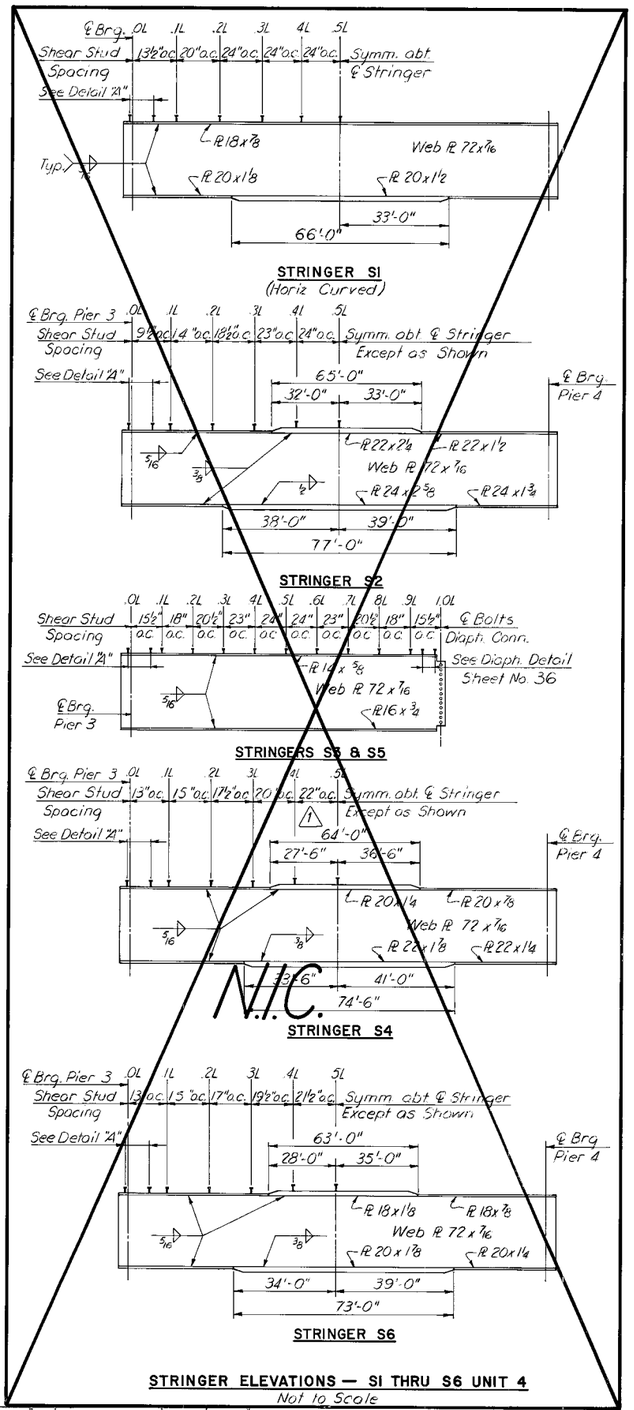
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

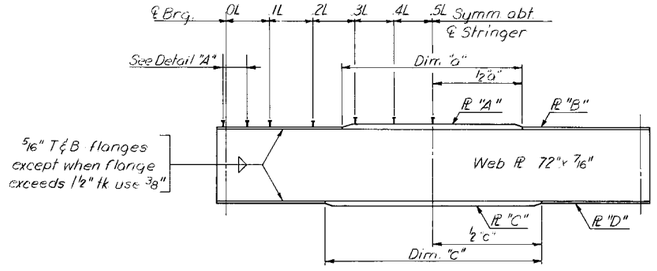
JAMES RIVER BRIDGE
FRAMING PLAN UNITS 16, 17 & 18

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

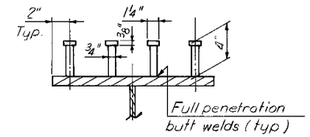
SCALE: 1" = 15'-0"
CONTRACT NO.: C-3
SHEET NO. 31 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	32	53

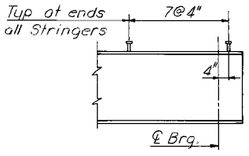




TYPICAL STRINGER ELEVATION
Not to Scale



SHEAR STUD DETAIL
Not to Scale



DETAIL "A"
Not to Scale

SHEAR STUD NOTE:

Capacity = 3400lbs. per stud.

The contractor may, if he elects, use three ⅞" diameter studs of the same longitudinal spacing in lieu of four ¾" diameter studs shown.

Stud rows shall be placed parallel to the main deck reinforcing.

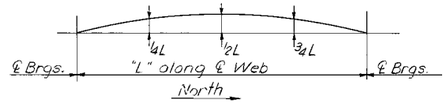
Shear stud spacing shown is maximum spacing.

STRINGER SCHEDULE

UNIT	STRINGER	PL "A"	Dim. "a"	PL "B"	PL "C"	Dim. "c"	PL "D"	SHEAR STUD SPACING 0L-1L	1L-2L	2L-3L	3L-4L	4L-5L
1	S5&S6	14 x ⅝	F. L.	—	16 x ⅞	F. L.	—	12"	13½"	16"	18½"	20½"
	S1-S4,S7-S10	14 x ⅝	F. L.	—	16 x 1	40'-6"	16 x ¾	11½"	13½"	15½"	18"	20"
2	~~—~~	~~16 x ⅜~~	~~F. L.~~	~~—~~	~~18 x 1⅛~~	~~54'-0"~~	~~18 x ⅞~~	~~13½"~~	~~15½"~~	~~19½"~~	~~24"~~	~~24"~~
	~~—~~	~~16 x ⅜~~	~~F. L.~~	~~—~~	~~18 x 1⅛~~	~~52'-6"~~	~~18 x ⅞~~	~~13½"~~	~~16"~~	~~19½"~~	~~24"~~	~~24"~~
	S5 & S6	16 x ¾	F. L.	—	18 x 1⅜	60'-6"	18 x ⅞	12"	14"	18"	22"	24"
	S1-S4,S7-S10	16 x ¾	F. L.	—	18 x 1½	58'-6"	18 x 1	12"	14"	16"	19"	21"
3	~~—~~	~~16 x ¾~~	~~F. L.~~	~~—~~	~~18 x 1½~~	~~56'-6"~~	~~18 x ⅞~~	~~13"~~	~~15"~~	~~17½"~~	~~20½"~~	~~22½"~~
	S5 & S6	16 x ¾	F. L.	—	18 x 1⅜	60'-6"	18 x ⅞	12"	14"	18"	22"	24"
	S1-S4,S7-S10	16 x ¾	F. L.	—	18 x 1½	58'-6"	18 x 1	12"	14"	16"	19"	21"
4	See Elevations this Sheet											
	S1-S4,S7-S10	18 x 1½	62'-0"	18 x ⅞	20 x 1⅞	74'-6"	20 x 1¼	12½"	14½"	17½"	21"	23"
	S5 & S6	18 x 1½	59'-0"	18 x ⅞	20 x 1⅞	71'-0"	20 x 1¼	12½"	14½"	18½"	23½"	24"
5	~~—~~	~~18 x 1⅜~~	~~60'-0"~~	~~18 x ⅞~~	~~20 x 1¾~~	~~72'-0"~~	~~20 x 1⅛~~	~~13½"~~	~~15½"~~	~~20"~~	~~24"~~	~~24"~~
	~~—~~	~~18 x 1~~	~~F. L.~~	~~—~~	~~20 x 1⅜~~	~~75'-0"~~	~~20 x 1⅜~~	~~14½"~~	~~16½"~~	~~20½"~~	~~23½"~~	~~24"~~
	S5&S6	18 x 1¼	66'-0"	18 x ⅞	20 x 2	73'-0"	20 x 1⅜	12½"	14½"	17½"	24"	24"
	S1-S4,S7-S10	18 x 1⅜	68'-6"	18 x ⅞	20 x 2	75'-6"	20 x 1⅜	12½"	14½"	17½"	21½"	23½"
6	S5&S6	18 x 1¼	66'-0"	18 x ⅞	20 x 2	73'-0"	20 x 1⅜	12½"	14½"	17½"	24"	24"
	S1-S4,S7-S10	18 x 1½	68'-6"	18 x ⅞	20 x 2	75'-6"	20 x 1⅜	12½"	14½"	17½"	21½"	23½"
7 Thru 12	S1-S4,S7-S10	18 x 1⅜	68'-6"	18 x ⅞	20 x 2	75'-6"	20 x 1⅜	12½"	14½"	17½"	21½"	23½"
	S5&S6	18 x 1¼	66'-0"	18 x ⅞	20 x 2	73'-0"	20 x 1⅜	12½"	14½"	17½"	24"	24"
13 & 14	S1	14 x ⅝	F. L.	—	16 x 1⅛	51'-0"	16 x ¾	11½"	13"	15½"	18"	20"
	S2	14 x ⅝	F. L.	—	16 x 1¼	51'-0"	16 x ⅞	11½"	13½"	15½"	18"	20"
	S3	14 x ⅝	F. L.	—	16 x 1⅜	55'-6"	16 x ⅞	11½"	13½"	16½"	18½"	20"
	S4	14 x ⅝	F. L.	—	16 x 1½	55'-6"	16 x 1	12"	13½"	15½"	18½"	20"
	S5	14 x ¾	F. L.	—	16 x 1½	57'-0"	16 x 1	12"	14"	16½"	21"	24"
	S6	16 x ¾	F. L.	—	18 x 1⅜	62'-6"	18 x ⅞	12"	14"	17½"	22"	24"
	S7	16 x ⅞	F. L.	—	18 x 1⅝	61'-0"	18 x 1½	12"	14"	16"	19½"	21"
	S8	16 x 1	51'-0"	16 x ¾	18 x 1¾	66'-6"	18 x 1½	12"	14"	17"	19½"	22"
	S9	16 x 1	57'-0"	16 x ¾	18 x 1⅞	67'-0"	18 x 1¼	12"	14"	17"	20"	22"
	S10	16 x 1⅛	63'-6"	16 x ¾	18 x 2	68'-6"	18 x 1⅜	12½"	14"	16½"	20½"	22½"
15	S1-S4,S7-S10	16 x ¾	F. L.	—	16 x 1½	58'-6"	18 x 1	12"	14"	16"	19"	21"
	S5&S6	16 x ¾	F. L.	—	18 x 1⅜	60'-6"	16 x ⅞	12"	14"	18"	22"	24"
16 & 17	S1	16 x 1⅛	63'-6"	16 x ¾	18 x 2	68'-6"	18 x 1⅜	12½"	14"	16½"	20½"	22½"
	S2	16 x 1	57'-0"	16 x ¾	18 x 1⅞	67'-0"	18 x 1¼	12"	14"	17"	20"	22"
	S3	16 x 1	51'-0"	16 x ¾	18 x 1¾	66'-6"	18 x 1½	12"	14"	17"	19½"	21½"
	S4	16 x ⅞	F. L.	—	18 x 1⅜	61'-0"	18 x 1½	12"	14"	16"	19½"	21"
	S5	16 x ¾	F. L.	—	18 x 1⅜	62'-6"	18 x ⅞	12"	14"	17½"	22"	24"
	S6	14 x ¾	F. L.	—	16 x 1½	57'-0"	16 x 1	12"	14"	16½"	21"	24"
	S7	14 x ⅝	F. L.	—	16 x 1½	55'-6"	16 x 1	12"	13½"	15½"	18½"	20"
	S8	14 x ⅝	F. L.	—	16 x 1⅜	55'-6"	16 x ⅞	11½"	13½"	16½"	18½"	20"
	S9	14 x ⅝	F. L.	—	16 x 1¼	51'-0"	16 x ⅞	11½"	13½"	15½"	18"	20"
	S10	14 x ⅝	F. L.	—	16 x 1⅛	51'-0"	16 x ¾	11½"	13"	15½"	18"	20"
18	S1-S4,S7-S10	14 x ⅝	F. L.	—	16 x 1	40'-6"	16 x ¾	11½"	13½"	15½"	18"	20"
	S5&S6	14 x ⅝	F. L.	—	16 x ⅞	F. L.	—	12"	13½"	16"	18½"	20½"

NOTES:

For General Notes see sheet no. 4.
For Joint Details see sheet no. 35.
For Shoe Details see sheet no. 34.
Scupper locations shown on Deck Plans. For Scupper Details see sheet no. 36.
For stringer lengths see Framing Plans.



CAMBER DIAGRAM

NOTE TO FABRICATOR:

Stringers fabricated with an upword camber amounting to (see table). This will provide approximate compensation for deflection under full dead load.

CAMBER SCHEDULE

UNIT	STRINGER	4 & 3¾	½	UNIT	STRINGER	4 & 3¾	½
1	S1 - S10	¾"	1"	13 & 14	S6	1¾"	1⅞"
2	~~—~~	~~1¼"~~	~~1⅜"~~		S7	1½"	2⅛"
	~~—~~	~~1¼"~~	~~1⅝"~~		S8	1⅝"	2¼"
	S1 - S10	1⅜"	1¾"		S9	1⅝"	2¼"
3	~~—~~	~~1¼"~~	~~1⅜"~~		S10	1⅞"	2½"
	S1-S10	1⅜"	1⅞"	15	S1-S10	1⅜"	1⅞"
4	S1 - S10	2"	2¾"	16 & 17	S1	1⅞"	2⅛"
5	S5&S6	2⅛"	3"		S2	1¾"	2⅜"
	S1-S4,S7-S10	2⅛"	2⅞"		S3	1⅝"	2¼"
6	S5&S6	2⅛"	3"		S4	1½"	2⅛"
	S1-S4,S7-S10	2⅛"	2⅞"		S5	1⅜"	1⅞"
7 Thru 12	S1-S4,S7-S10	2⅛"	2⅞"		S6&S7	1¼"	1¾"
	S5&S6	2⅛"	3"		S8	1⅛"	1½"
13 & 14	S1	⅞"	1⅛"		S9	1"	1⅜"
	S2	1"	1⅜"		S10	⅞"	1⅛"
	S3	1⅛"	1½"	18	S1-S10	¾"	1"
	S4&S5	¼"	1¾"				

	BY	DATE				
MADE	HBW	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	8-67	1	Remove Ramp Taper Strs.	H.B.W.	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

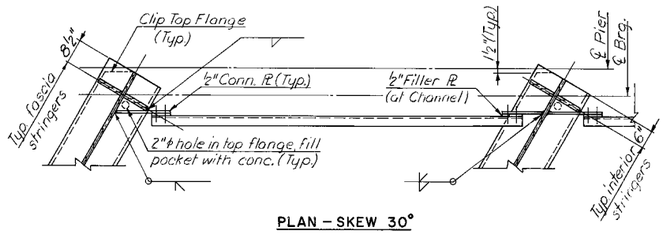
JAMES RIVER BRIDGE

STRUCTURAL STEEL DETAILS

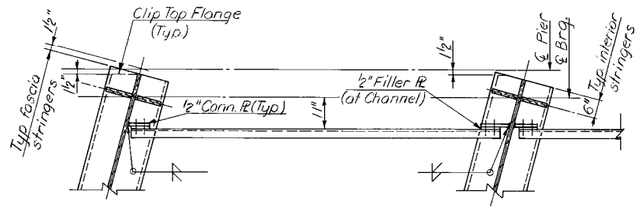
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO: C-3
SHEET NO. 32 OF 53

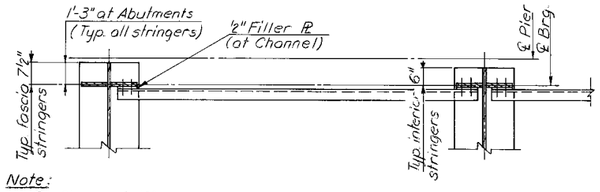
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	33	53



PLAN – SKEW 30°

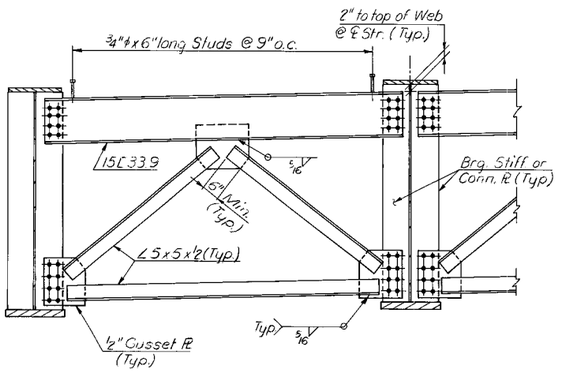


PLAN – SKEW 15°



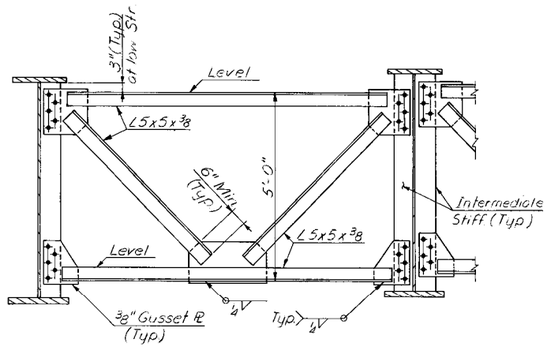
Note:
For Skew up to 10° Bearing Stiffeners to be parallel to ℄ Brg.

PLAN – SKEW 0° THRU 10°

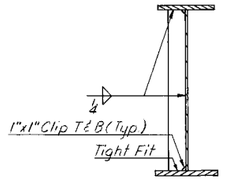


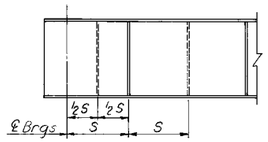
ELEVATION

TYPICAL END DIAPHRAGM DETAILS
Scale: ½" = 1'-0"



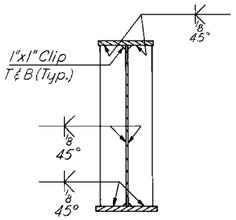
TYPICAL INTERMEDIATE DIAPHRAGM
Scale: ½" = 1'-0"



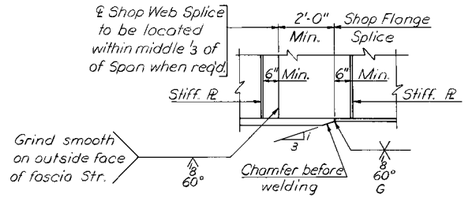


Note:
Equal Spaces "S" between diaphragms as shown in Framing Plan.

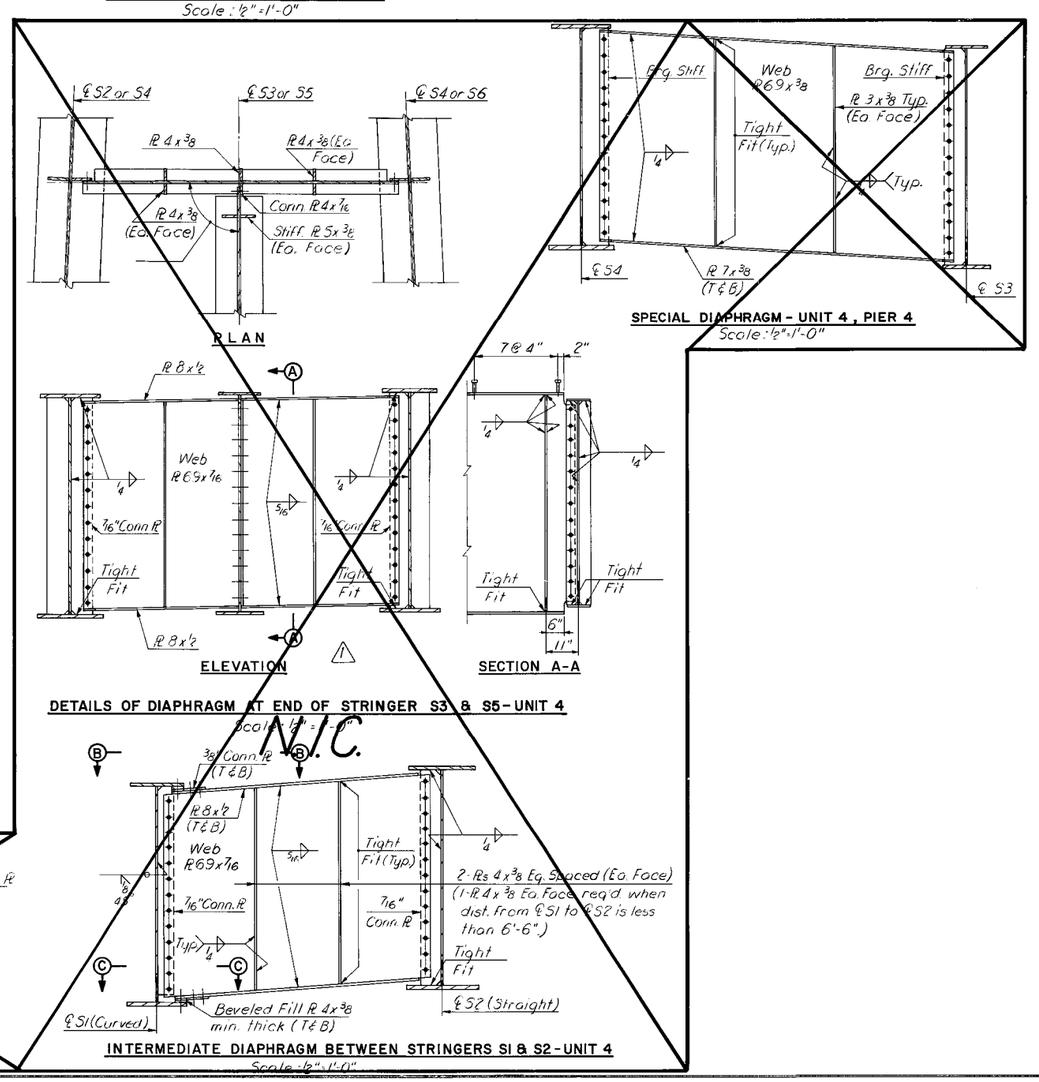
INTERMEDIATE STIFFENER DETAILS
Not to Scale



BEARING STIFFENER DETAIL
Not to Scale



SHOP SPLICE DETAIL
Not to Scale



N.C.

AS BUILT

	BY	DATE				
MADE	HBW	7-67	2	AS BUILT	JRC	12-72
CHECKED	FXH	8-67	1	Remove Ramp Framing	J.G.V.	2-20-71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

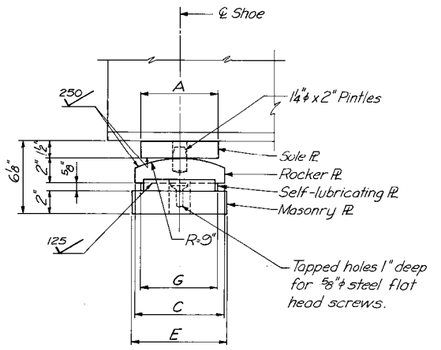
JAMES RIVER BRIDGE

STRUCTURAL STEEL DETAILS

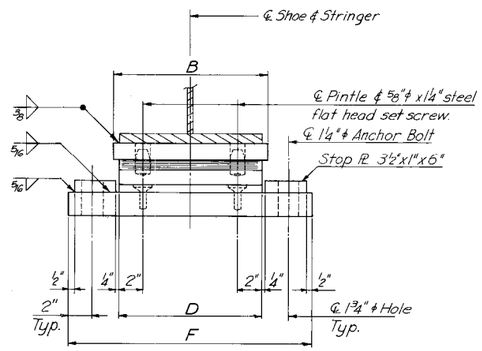
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 33 OF 53

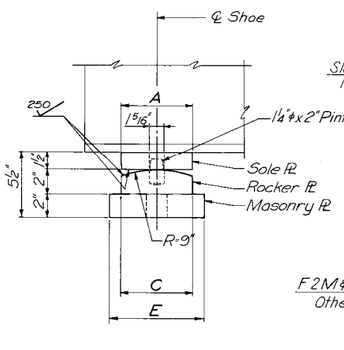
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	34	53



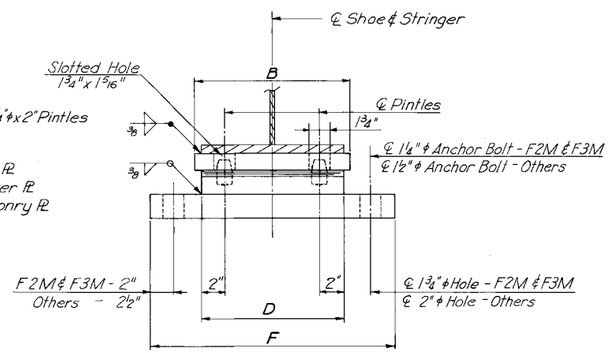
SIDE ELEVATION



END ELEVATION



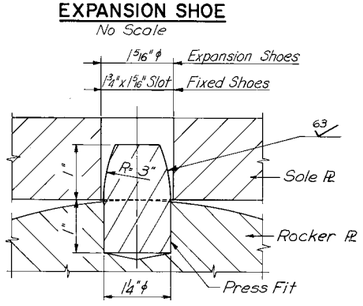
SIDE ELEVATION



END ELEVATION

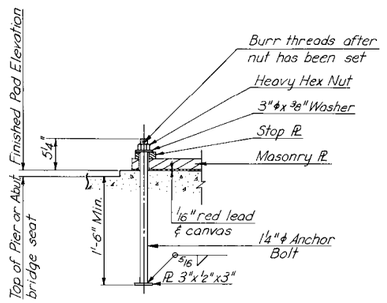
EXPANSION SHOE

No Scale



PINTLE DETAIL

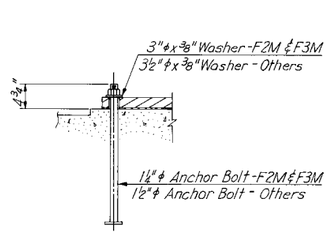
Scale: ¾"=1"



EXPANSION SHOE

ANCHOR BOLT DETAIL

No Scale



FIXED SHOE

Note:
Anchor Bolt for Fixed Shoes same as Anchor Bolt for Exp. Shoes except as shown.

FIXED SHOE

No Scale

Shoe Notes:

Top of masonry plates, bottom of rocker plates and top and bottom of sole plates planed, straightened or otherwise treated to secure true level surfaces.

Contact surfaces noted on the plans with finish symbols shall be finished in accordance with the American National Standards Institute surface roughness requirement, as defined in ASA B46.1 Surface Roughness, Waviness and Lay, Part I.

The plates comprising the expansion shoes shall be set so as to be truly centered under full dead load at a temperture of 68°F.

Concrete pads shall be formed integral with abutment or pier and not less than ⅛" or more than ¼" above finished elevotion. Dress down pads by rubbing, grinding or as otherwise approved by the Engineer, to true level surfaces at the finished elevation.

Anchor bolt assemblies shall conform to A.S.T.M. A-307 and shall be hot-dip galvanized conforming to A.S.T.M. A-153.

Templates shall be used to accurately set the anchor bolts.

Material for shoes (exclusive of self-lubricating plates) shall be high strength low alloy structural steel conforming to A.S.T.M. Specification A-588.

Material for self-lubricating plates shall be Leaded Tin Bronze conforming to A.S.T.M. Specification B22, alloy D modified to the extent that 1.5 to 2.5 percent lead is allowable.

Shoes shall be included with structural steel item for payment.

SHOE DIMENSIONS

EXPANSION SHOES	A	B	C	D	E	F	G
E4	6"	1'-5½"	9"	1'-4½"	9½"	2'-1"	6"
E5	6"	1'-5½"	9"	1'-4½"	9½"	2'-1"	7"
E6	6"	1'-7"	9"	1'-6"	10½"	2'-2½"	6"
E7	6"	1'-7"	9½"	1'-6"	10½"	2'-2½"	7½"
E8	6"	1'-9"	9"	1'-8"	11"	2'-4½"	6½"
E9	6"	1'-9"	10"	1'-8"	11"	2'-4½"	7½"
~~E11~~	~~6"~~	~~1'-11"~~	~~10"~~	~~1'-10"~~	~~11"~~	~~2'-6½"~~	~~7½"~~
E12	6"	2'-1"	9½"	2'-0"	9½"	2'-4½"	6½"
~~E14~~	~~6"~~	~~2'-1"~~	~~1'-0"~~	~~2'-0"~~	~~1'-1"~~	~~2'-8½"~~	~~9½"~~

FIXED SHOES	A	B	C	D	E	F
F2M	6"	1'-5½"	6"	1'-4½"	7"	2'-1"
F3M	6"	1'-5½"	6"	1'-4½"	8"	2'-1"
F4M	6"	1'-7"	6"	1'-6"	7"	2'-4"
F5M	6"	1'-7"	6"	1'-6"	8"	2'-4"
F6M	6"	1'-9"	6"	1'-8"	7"	2'-6"
F7M	6"	1'-9"	6"	1'-8"	8"	2'-6"
~~F9M~~	~~6"~~	~~1'-11"~~	~~6"~~	~~1'-10"~~	~~8"~~	~~2'-8½"~~
F10M	6"	2'-1"	6"	2'-0"	7"	2'-10½"

	BY	DATE
MADE	HBW	5-67
CHECKED	FXH	8-67
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
2	AS BUILT	JRC	12-72
⚠	Delete Shoes.	H.B.W.	2/20/71

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

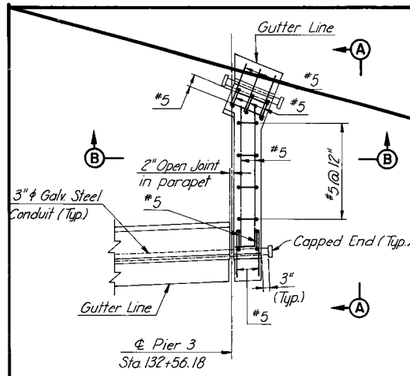
JAMES RIVER BRIDGE

SHOES

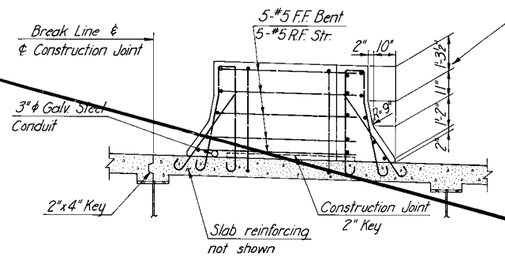
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO: C-3
SHEET NO. 34 OF 53

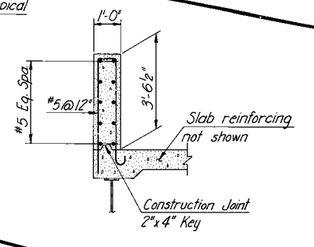
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	37	53



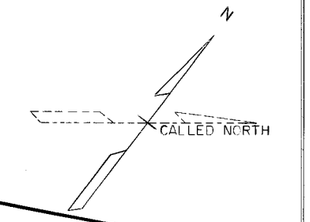
NOSE DETAIL
Scale: $\frac{3}{8}$"=1'-0"

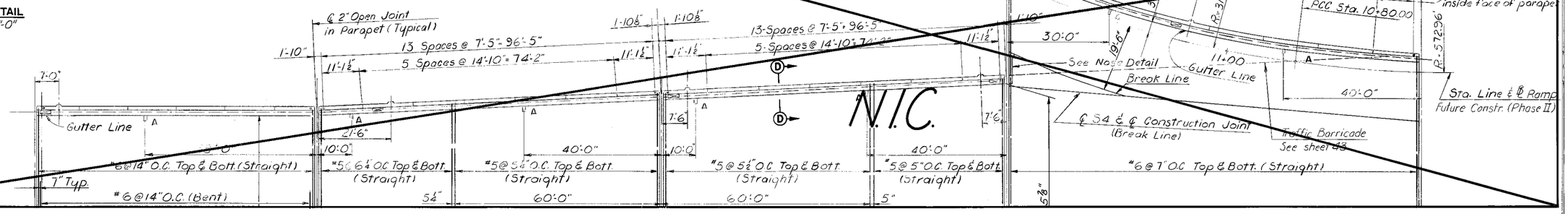


SECTION A-A
Scale: $\frac{3}{8}$"=1'-0"

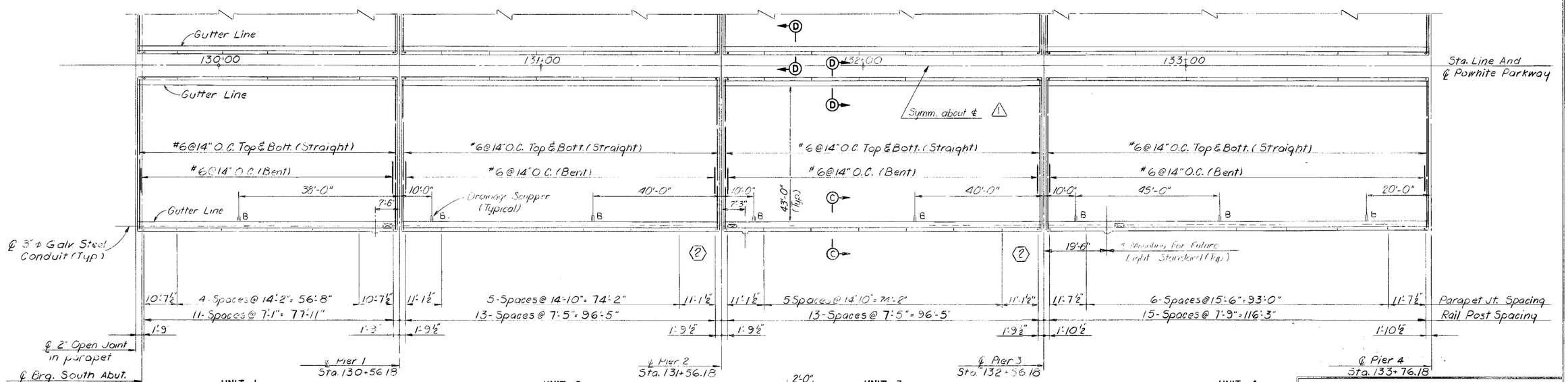


SECTION B-B
Scale: $\frac{3}{8}$"=1'-0"

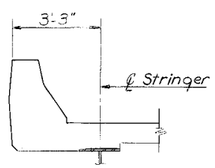




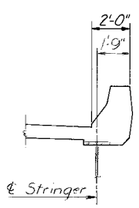
N.I.C.



UNIT 1 UNIT 2 UNIT 3 UNIT 4



SECTION D-D
NO SCALE



SECTION C-C
NO SCALE

Notes:
For General Notes see Sheet No. 4.
For Longitudinal Reinforcement, additional reinforcement at Deck Joints, additional Details and Cross Section see Sheet No. 41.
For Details of Mounting For Future Lighting Standard see Sheet No. 44.
For Joint Details see Sheet No. 35.
For Scupper Details see Sheet No. 36.

	BY	DATE
MADE	D.E.K.	7-67
CHECKED	H.B.W.	9-67
IN CHARGE	F.X.H.	

NO.	REVISION	BY	DATE
3	AS BUILT	JRC	12-72
②	Light Std. Location	J.G.V.	3/9/71
⚠	Remove Ramp Taper	J.G.V.	2-20-71

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

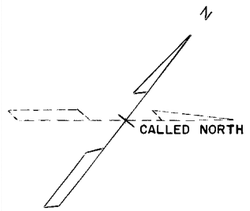
JAMES RIVER BRIDGE

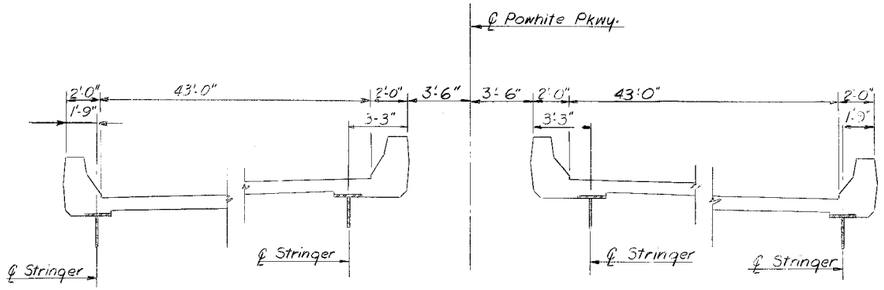
DECK PLAN - UNITS 1,2,3&4

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

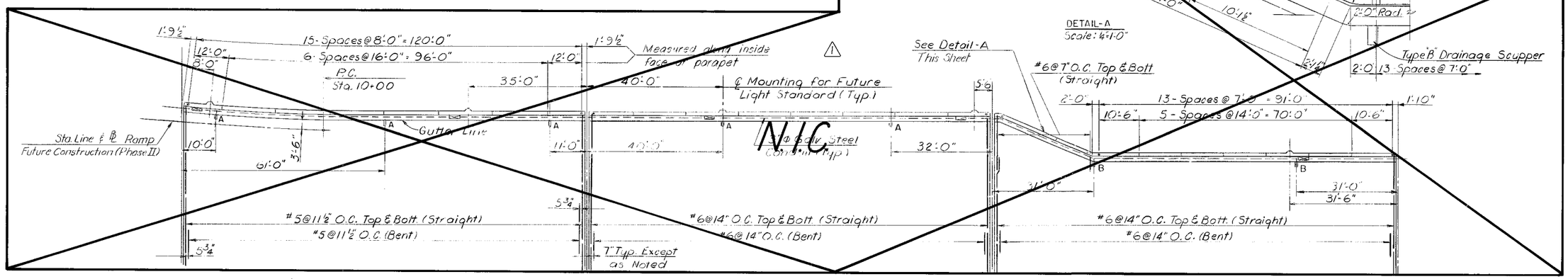
SCALE: 1"=15' UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 37 OF 53

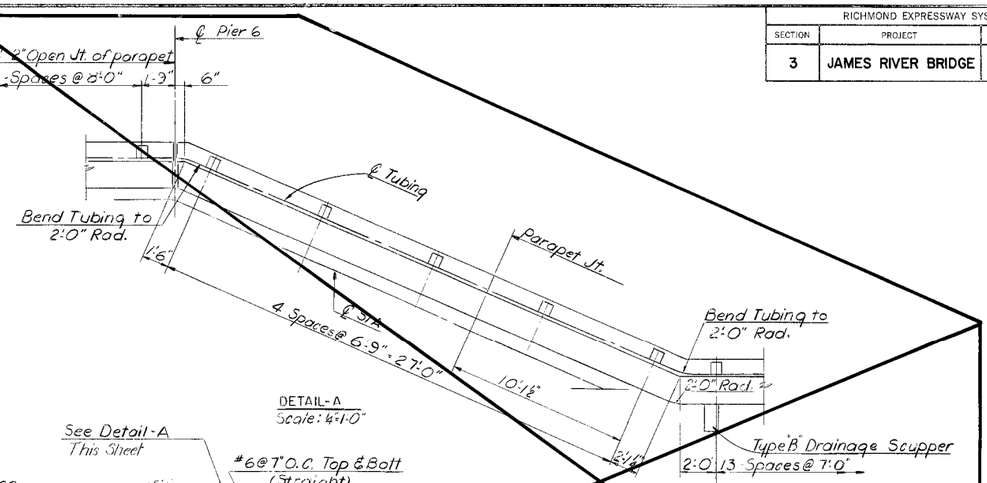
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	38	53



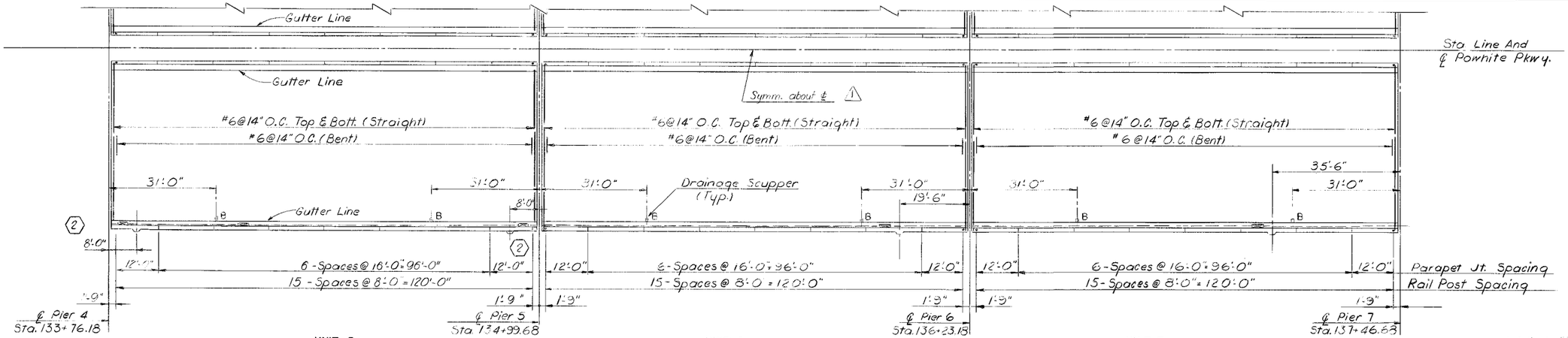


TYPICAL SECTION
LOOKING NORTH
NO SCALE



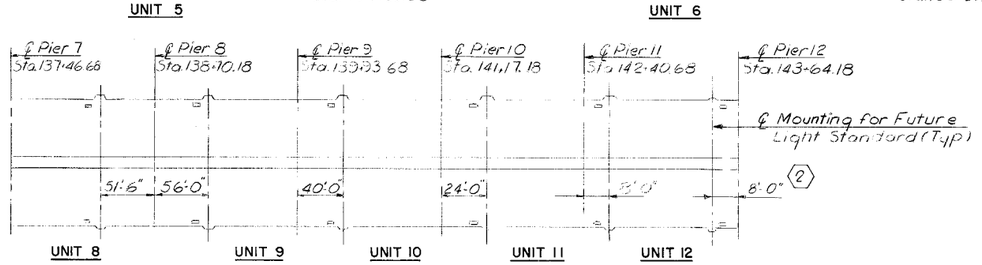


DETAIL-A
Scale: 4"=1'-0"



UNIT 5 — UNIT 6 — UNIT 7

UNIT 7
SCUPPER LOCATIONS AND REINFORCEMENT FOR UNITS 8 THRU 12 SIMILAR TO UNIT 7



LIGHTING STANDARD LOCATIONS FOR UNITS 8 THRU 12
NO SCALE

Notes:
For Notes see Sheet No. 37

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.K.	7-67	3	AS BUILT	JRC	12-72
CHECKED	H.B.W.	9-67	②	Light Std. Location	J.G.V.	3/9/71
IN CHARGE	F.X.H.		⚠	Remove Ramp Widening	J.G.V.	2-20-71

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

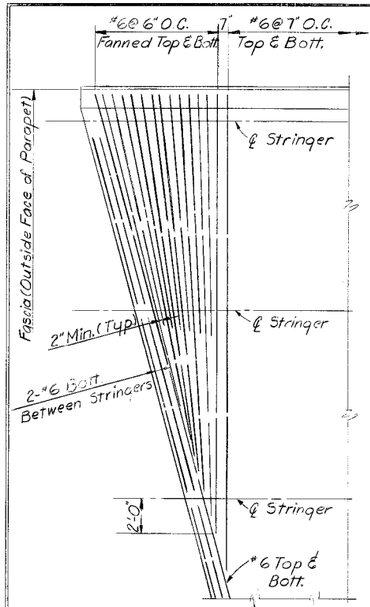
JAMES RIVER BRIDGE

DECK PLAN-UNITS 5 THRU 12

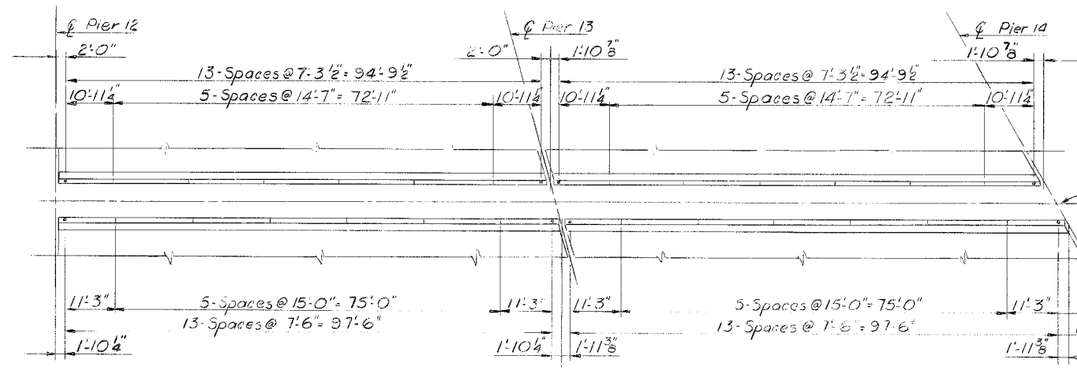
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=15' UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 38 OF 53

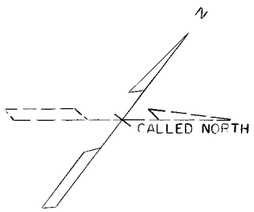
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	39	53

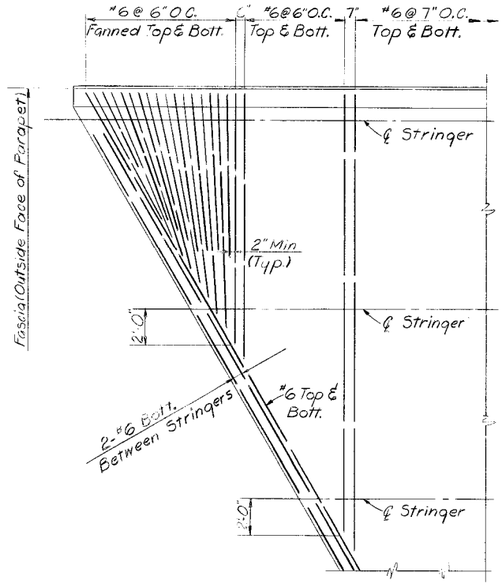


CORNER DETAIL
15° SKEW
Scale: 1/4"=1'-0"

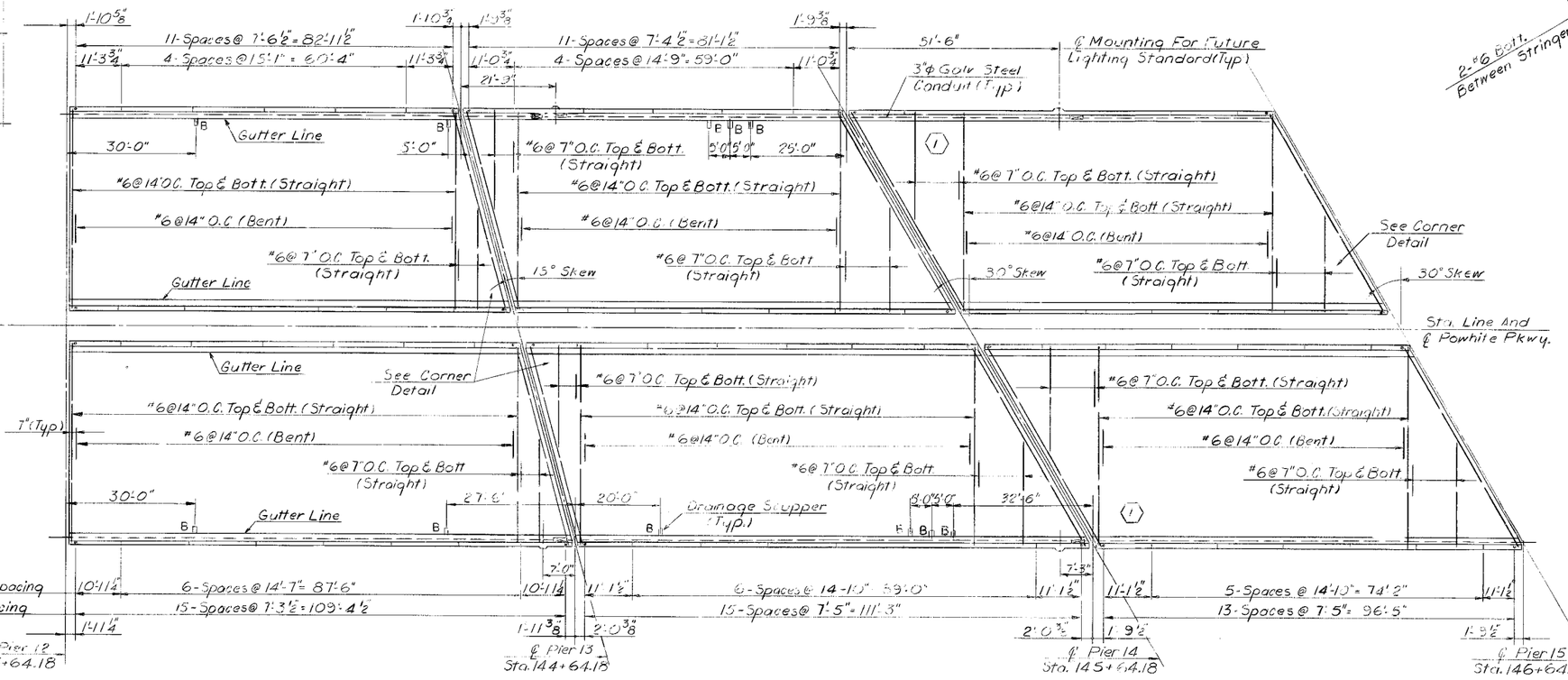


RAIL POST & JOINT SPACING AT MEDIAN

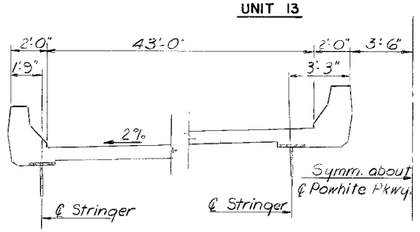




CORNER DETAIL
30° SKEW
Scale: 1/4"=1'-0"



UNIT 13 UNIT 14 UNIT 15



TYPICAL SECTION
LOOKING NORTH
NO SCALE

Notes:
For Notes See Sheet No. 37

	BY	DATE				
MADE	D.E.K.	7-67	2	AS BUILT	JRC	12-72
CHECKED	H.B.W.	9-67	1	Light Std. & Scupper Location	J.G.V.	3/9/71
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

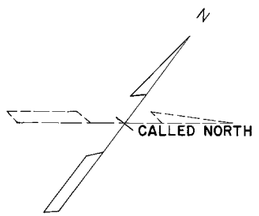
JAMES RIVER BRIDGE

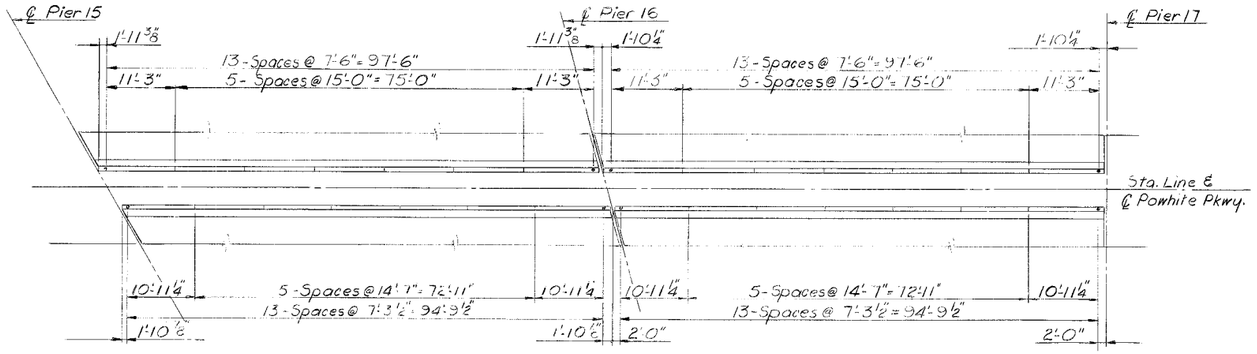
DECK PLAN – UNITS 13, 14 & 15

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

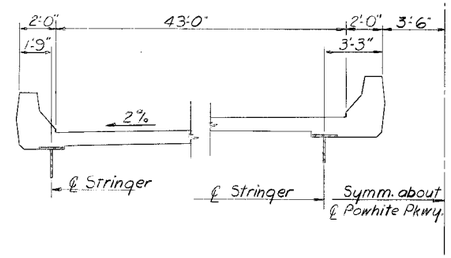
SCALE: 1"=5' UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 39 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	40	53

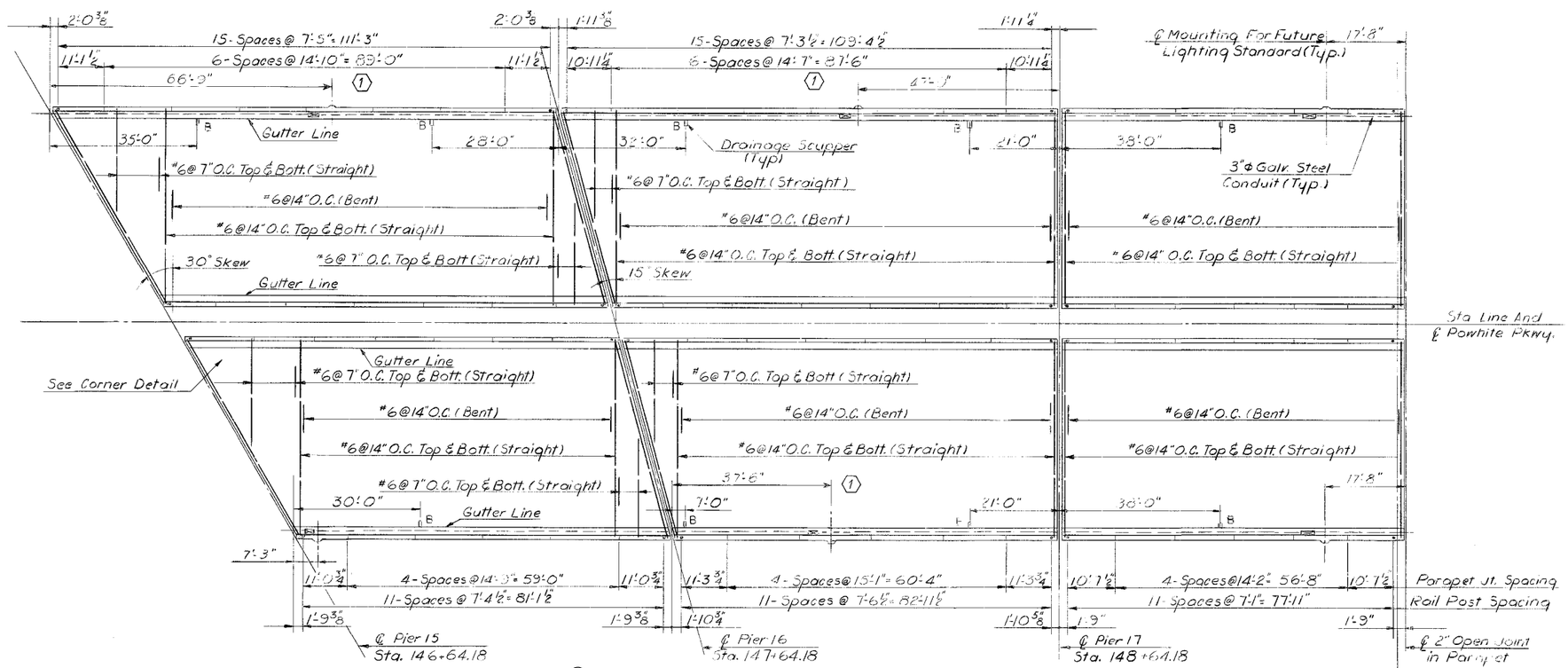


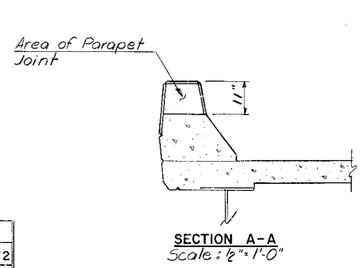


RAIL POST & JOINT SPACING AT MEDIAN

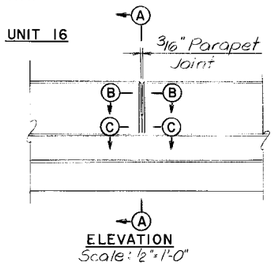


TYPICAL SECTION
SCALE: 1/4"=1'-0"

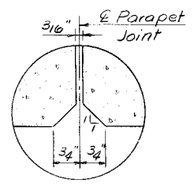




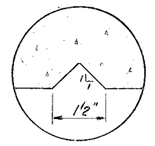
SECTION A-A
Scale: 1/2"=1'-0"



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



SECTION B-B
Half Size



SECTION C-C
Half Size

PARAPET JOINT DETAILS

Notes:
For Notes See Sheet No. 37
For Corner Details See Sheet No. 39

	BY	DATE				
MADE	DE.K.	7-67	2	AS BUILT	JRC	12-72
CHECKED	H.B.W.	9-67	1	Light Std. Location	H.B.W.	3/9/71
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

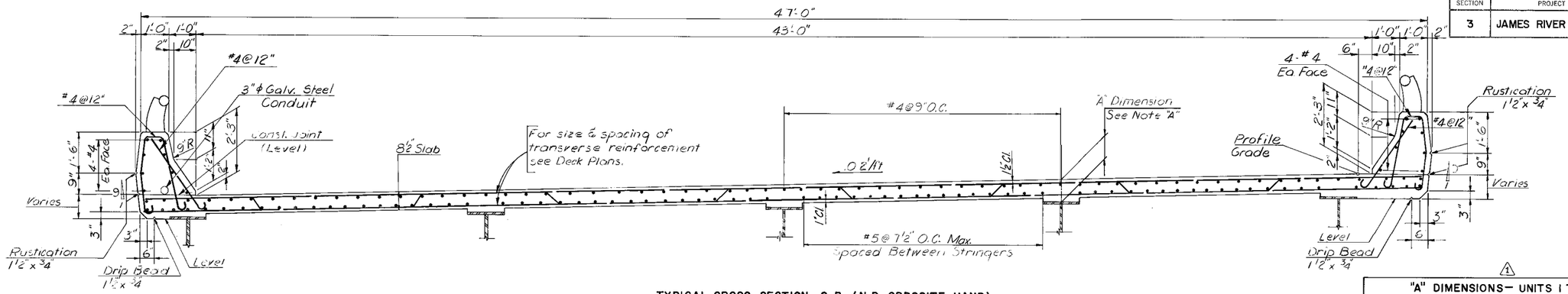
JAMES RIVER BRIDGE

DECK PLAN - UNITS 16, 17 & 18

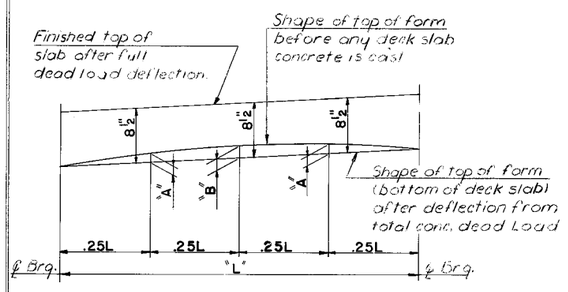
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=15' UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 40 OF 53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	41	53



TYPICAL CROSS SECTION S.B. (N.B. OPPOSITE HAND)
SCALE: ½"= 1'-0"
⚠1



DEAD LOAD DEFLECTION DIAGRAM
NO SCALE

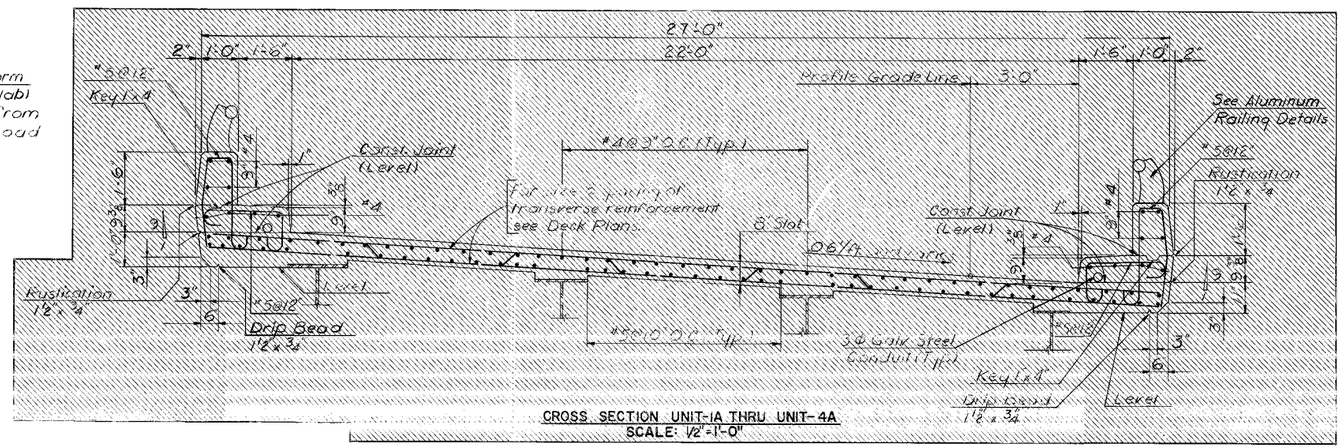
NOTE TO CONTRACTOR

The deflections noted are those anticipated to occur in the stringer upon placement of the total concrete dead load. In practice the stringers, in place, are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided for by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab & the top of stringer, without alteration of the slab thickness.

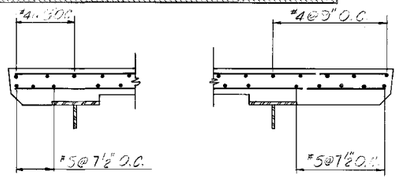
⚠1

DEFLECTION SCHEDULE

UNIT	STRINGER	A	B	UNIT	STRINGER	A	B	UNIT	STRINGER	A	B
1	S1-S10	5/8"	7/8"	7-12	S1-S10	1 5/8"	2¼"		S1	1 3/8"	2"
2	~~S1-S6~~	~~1"~~	~~1 3/8"~~		S1	¾"	1"		S2	1 3/8"	1 7/8"
	S1-S10	1⅛"	1½"		S2	7/8"	1⅛"		S3	1¼"	1 3/4"
3	~~S1-S6~~	~~1"~~	~~1 3/8"~~		S3	7/8"	1¼"		S4	1¼"	1 5/8"
	S1-S10	1⅛"	1½"		S4	1"	1 3/8"		S5	1⅛"	1 5/8"
4	~~S1~~	~~1 5/8"~~	~~2¼"~~	13 & 14	S5	1"	1½"	16 & 17	S6	1"	1½"
	~~S2&S4~~	~~1 3/8"~~	~~2⅛"~~		S6	1⅛"	1 5/8"		S7	1"	1 3/8"
	~~S3&S5~~	~~1½"~~	~~2 3/4"~~		S7	1¼"	1 5/8"		S8	⅞"	1¼"
	~~S6~~	~~1½"~~	~~2¼"~~		S8	1¼"	1 3/4"		S9	⅞"	1⅛"
	S1-S10	1½"	2⅛"		S9	1 3/8"	1 7/8"		S10	¾"	1"
5	S1-S10	1 5/8"	2¼"		S10	1 3/8"	2"	18	S1-S10	5/8"	⅞"
6	S1-S10	1 5/8"	2¼"	15	S1-S10	1⅛"	1½"				



CROSS SECTION UNIT-1A THRU UNIT-4A
SCALE: ½"=1'-0"



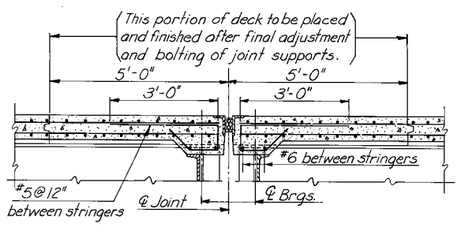
LONGITUDINAL REINFORCEMENT AT FASCIA

"A" DIMENSIONS — UNITS 1 THRU 18			
UNIT 1		UNIT 7	
S5 & S6	10 3/8"	~~S1A~~	~~10 3/8"~~
S1-S4 & S7-S10	9¾"	S2-S4 & S7-S9	10¼"
UNIT 2 & 3		S5 & S6	10⅛"
S5 & S6	10¼"	S1 & S10	10½"
S1-S4 & S7-S10	9¾"	UNIT 8 THRU 12	
UNIT 4		S2-S4 & S7-S9	10¼"
~~S1 (AT PIER 3)~~	~~10"~~	S5 & S6	10⅛"
~~S1 (AT PIER 4)~~	~~10⅛"~~	S1 & S10	10½"
~~S2~~	~~11"~~	UNIT 13 & 14	
~~S3~~	~~10"~~	S1	10¾"
~~S4~~	~~10¼"~~	S2, S3, S4 & S7	9¾"
~~S5~~	~~9¾"~~	S5 & S6	10¼"
~~S6~~	~~10"~~	S8 & S9	10"
S1-S10	10⅛"	S10	10½"
UNIT 5		UNIT 15	
~~S1~~	~~10⅛"~~	S2-S4 & S7-S9	9¾"
~~S2~~	~~9¾"~~	S5 & S6	10¼"
~~S3-S6~~	~~9¾"~~	S1 & S10	10½"
S5 & S6	10⅛"	UNIT 16 & 17	
S2-S4 & S7-S9	10¼"	S1	10½"
S1 & S10	10½"	S2 & S3	10"
		S4, S7, S8 & S9	9¾"
UNIT 6		S5 & S6	10¼"
S5 & S6	10⅛"	S10	10¾"
S2-S4 & S7-S9	10¼"	UNIT 18	
S1 & S10	10½"	S2-S4 & S7-S9	9¾"
		S5 & S6	10⅜"
		S1 & S10	10¾"

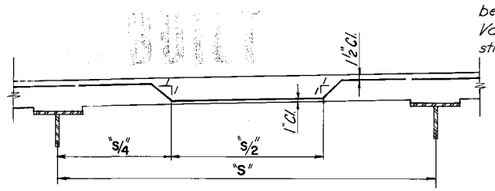
"A" DIMENSIONS — UNITS 1A THRU 4A			
UNIT 1A		UNIT 4A	
S1, S2 & S3	9½"	S1 (AT PIER 3A)	9½"
S4	10"	S1 (AT PIER 3)	10¼"
UNITS 2A & 3A		S2 & S3	9½"
S1, S2 & S3	9½"	S4	10"
S4	9¾"		

Note A

"A" Dimension is given at the intersection of the ℄ Stringer and ℄ Bearing. Dimension shown is measured from top of top flange to construction joint for Fascia Stringers with 1'-3" overhang (see deck plan) and from top of top flange to top of deck for all other stringers. This dimension may vary between bearings due to change in top flange thickness or Variation in Camber, except that no portion of the stringer flange may fall within the slab.



TYPICAL SECTION AT JOINT



TYPICAL BENT BAR DETAIL

Notes:
For Notes see Sheet No. 37.
All Bar clearances to conc. face are 2" unless noted.

	BY	DATE				
MADE	D.E.K.	7-67	2	AS BUILT	JRC	12-72
CHECKED	H.B.W.	9-67	⚠1	X-Sections & Deflections	EJR	2/20/71
IN CHARGE	F.X.H.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE

DECK DETAILS

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

SCALE: 1" = 1'-0" UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 41 OF 53

LIMITED ACCESS HIGHWAY

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	1	106

RICHMOND METROPOLITAN AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

PROPOSED WIDENING

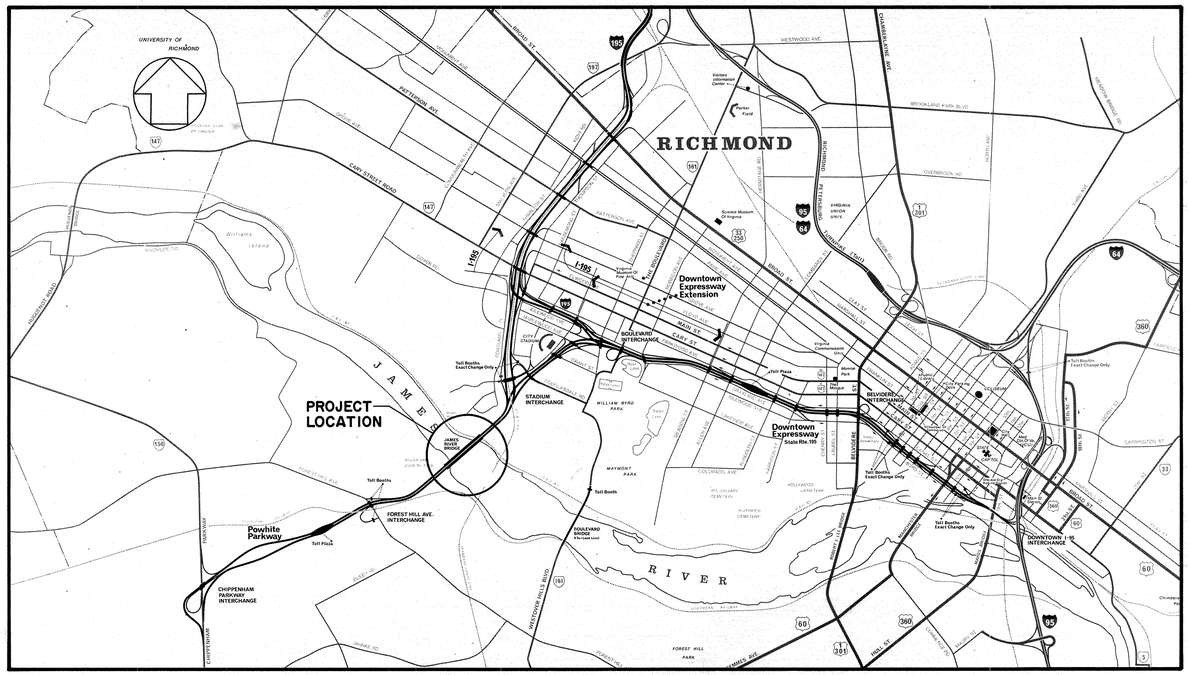
JAMES RIVER BRIDGE

REVISED BY

DESIGNED BY

INDEX OF SHEETS

SHEET NO.	TITLE
1	COVER SHEET
2-3	GENERAL PLAN AND ELEVATION
4	GENERAL NOTES AND ESTIMATED QUANTITIES
5-7	SOUTH ABUTMENT DETAILS
8-10	NORTH ABUTMENT DETAILS
11	FLARED TERMINAL WALL DETAILS
12-28	PIER DETAILS
29	MISCELLANEOUS SUBSTRUCTURE DETAILS
30-44	FRAMING PLANS
45	STEEL DETAILS
46	SHOE DETAILS
47	CAMBER DIAGRAMS AND SCHEDULE
48-49	DECK SLAB ELEVATIONS
50	TYPICAL CROSS SECTION AND PARAPET DETAILS
51-65	DECK PLANS
66-67	LIGHTING STANDARD AND ELECTRICAL DETAILS
68	DEAD LOAD DEFLECTION DIAGRAM AND SCHEDULE
69	JOINT DETAILS
70	DRAIN ASSEMBLY DETAILS
71	ALUMINUM RAILING DETAILS
72-89	BAR LIST
90	BAR BENDS
91	SLOPE PROTECTION
92	APPROACH SLAB DETAILS
93-99	BORING LOGS
100	CONSTRUCTION SEQUENCE AND METHOD
101	MAINTENANCE AND PROTECTION OF TRAFFIC
102	PARTIAL EMBANKMENT PLAN
103	TYPICAL ROADWAY SECTION
104-105	EMBANKMENT CROSS SECTION
106	EROSION CONTROL



CONVENTIONAL SIGNS

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

CONTRACT C-13

COMMONWEALTH OF VIRGINIA
DANIEL J. APPEL
CIVIL ENGINEER
No. 2437
CERTIFIED PROFESSIONAL ENGINEER

SUBMITTED BY	
Date	
2-16-87	
Date	HOWARD, NEEDLES, TAMMEN & BERGENDOFF general consultant

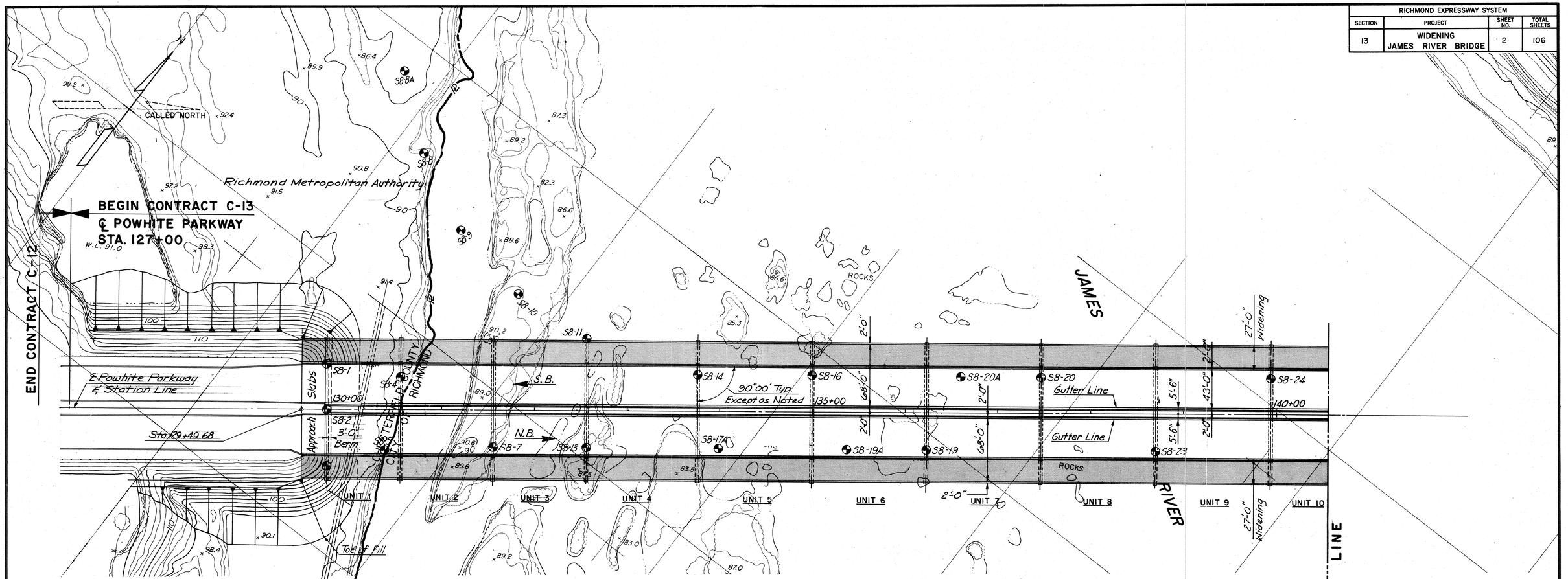
RECOMMENDED BY	
Date	
3-29-87	
Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

APPROVED BY	
3-29-87	
Date	CHAIRMAN, RICHMOND METROPOLITAN AUTHORITY

Plans Revised			
Sheet No.	Date	Sheet No.	Date

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	2	106



	BY	DATE	NO.	REVISION	BY	DATE
MADE	A.L.C.	3-87		As Built	TEM	3-89
CHECKED	T.F.P.	3-87	⚠	Property Line	ALC	4-87
IN CHARGE	S.R.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

GENERAL PLAN AND ELEVATION

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

SCALE: 1" - 50'
CONTRACT NO.: C-13
SHEET NO. 2 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	3	106

N

CALLED NORTH

JAMES RIVER

MATCH LINE

AND KANAWHA CANAL

CSX Transportation

CHESAPEAKE & OHIO RAILROAD

Robert & Bessie B. Carter

Fitzgerald Bemiss

John C. & Elizabeth M. Hogan

Elizabeth S. Brock

Jack Cabsino

C. Merle Luck Jr.

END CONTRACT C-13
℄ POWHITE PARKWAY
STA. 151+50.0

BEGIN CONTRACT C-14

Temporary Construction Easement

Point of Min. Vert. Clear.

Richmond Metropolitan Authority

℄ Existing 60" Water Main

24.5'± Min. Horiz. Cl.

39.5' Min. Horiz. Cl.

150'-0"

27'-0" Widening

2'-0"

5'-6"

68'-0"

2'-0"

Gutter Line

S8-27 S8-28 S8-30 S8-31 S8-32 S8-33 S8-34 S8-35 S8-36 S8-37 S8-38 S8-39 S8-40 S8-41 S8-42 S8-43 S8-44

90°00' Typ. Except as Noted

75°00' 60°00' 60°00' 75°00'

145+00 150+00

BX-3 3'-0" Berm S8-46

Approach Slabs

S.B.

N.B.

℄ Powhite Parkway ℄ Station Line

Sta. 149+70.68

UNIT 10 UNIT 11 UNIT 12 UNIT 13 UNIT 14 UNIT 15 UNIT 16 UNIT 17 UNIT 18

28.5' Min. Horiz. Cl.

43.5' Min. Horiz. Cl.

PLAN

Total Length = 1971'-0"

8 Spans @ 123'-6" = 988'-0"

5 Spans @ 100'-0" = 500'-0"

End of Bridge
Front Face of Backwall
Sta. 149+45.68

80'-0" Span

℄ Bearing North Abutment

1'-6"

+1.08 %

Lighting Standard (Typ.)

Finished Grade

23'-2" Vert. Clear

℄ Tracks

PIER 10 PIER 11 PIER 12 PIER 13 PIER 14 PIER 15 PIER 16 PIER 17 NORTH ABUTMENT

ELEVATION

	BY	DATE
MADE	A.L.C.	3-87
CHECKED	T.F.P.	3-87
IN CHARGE	S.R.	

As Built TEM 3-89

NO.	REVISION	BY	DATE
2	Added Horiz. Cl.	EJM	7-87
2	Vert. Clear	A.L.C.	5-87
1	Property Line	A.L.C.	4-87

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

GENERAL PLAN AND ELEVATION

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

SCALE: 1" = 50'
CONTRACT NO.: C-13
SHEET NO. 3 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	4	106

⚠4 ESTIMATE OF QUANTITIES *

	CONSTRUCTION SURVEY ⚠	EMBANKMENT	TEMPORARY SILT FENCE	FILTER CLOTH	STRUCTURE EXCAVATION AT PIERS	STRUCTURE EXCAVATION	POROUS BACKFILL	STEEL SHEET PILING	STEEL PILES 10BP42	DRIVING TEST FOR STEEL PILE 10BP42	CONCRETE CLASS A3 SUBSTRUCTURE	CONCRETE CLASS A4 APPROACH SLABS	CONCRETE CLASS A4		CONCRETE BRIDGE PARAPET	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL	STRUCTURAL STEEL **	DRY RIPRAP CLASS I	RIPRAP FILTER CLOTH BEDDING		DAMPPROOFING	UNDERDRAIN 6" DIA.		MOBILIZATION	FIELD OFFICE				PARTIAL DEMOLITION OF EXISTING SUBSTRUCTURE	PARTIAL DEMOLITION OF EXISTING SUPERSTRUCTURE	TEMPORARY CAUSEWAYS AND ACCESS ROADS		ELASTOMETRIC EXPANSION DAM, 0-2"							
	L.S.	C.Y.	L.F.	S.Y.	C.Y.	C.Y.	C.Y.	S.F.	L.F.	L.F.	C.Y.	C.Y.	C.Y.		L.F.	LBS.	LBS.	L.S.	S.Y.	S.Y.		S.Y.	L.F.		L.S.	MTH.				L.S.	L.S.	L.S.		L.F.						
SUPERSTRUCTURE													309.6		4038		604,840	1																2750						
SOUTH ABUT.		2670	635	23		423	29		794	48	157.2					9100	590		1399	216		87	92																	
NORTH ABUT.		2000	1100			305	28		1865		167.6					8410	590		942	120		93	98																	
PIER 1					105						113.6					15750																								
PIER 2					75						113.1					14900																								
PIER 3					30						131.0					14890																								
PIER 4					37						124.7					13710																								
PIER 5					30						132.7					17250																								
PIER 6					47						124.3					14420																								
PIER 7					34						132.6					17610																								
PIER 8					45						151.4					19170																								
PIER 9					20						130.5					16170																								
PIER 10					51						165.7					20760																								
PIER 11					134						220.4					26080																								
PIER 12					95						226.0					26640																								
PIER 13					142						197.9					24480																								
PIER 14					403			640			158.0					21120																								
PIER 15					534			647			161.8					21700																								
PIER 16					443			1540	976		180.4					19220	⚠																							
PIER 17					417			1627	1080		180.8					19580	⚠																							
APPROACH SLAB												99.2				15100																								
TOTALS	1	4670	1735	23	2540	728	57	4454	4715	48	2946.6	99.2	309.6		4038	356,060	606,020	1	2341	336		180	190		1	17				1	1	1		2750						

⚠2 ⚠2 ⚠3 ⚠3 ⚠2 ⚠3 ⚠3 ⚠3 ⚠4 ⚠1 ⚠3 ⚠1

* For additional quantities see Sheet Nos. 67 & 101.

** The total weight of structural steel, 3,541,900 lbs, includes the shoes.

GENERAL NOTES

WIDTH: WIDENING OF 27'-0" TO THE EAST AND WEST OF THE EXISTING STRUCTURE.

SPAN LAYOUT: 18-SIMPLE SPAN, STEEL PLATE GIRDER WITH SPANS OF 2-80 FEET, 7-100 FEET, 1-100 FEET AND 8-123.5 FEET.

CAPACITY: HS20-44 LOADING AND ALTERNATE MILITARY LOADING. DESIGN LOADING INCLUDES 15 P.S.F. FOR FUTURE WEARING SURFACE AND 20 P.S.F. ALLOWANCE FOR CONSTRUCTION TOLERANCES AND CONSTRUCTION METHODS.

SPECIFICATIONS:

CONSTRUCTION: VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS, 1982.

DESIGN: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1983, INCLUDING INTERIM SPECIFICATIONS, 1984, AND VDHT MODIFICATIONS.

STANDARDS: VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION ROAD AND BRIDGE STANDARDS, 1982.

ALL DIMENSIONS ARE MEASURED HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED.

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

ALL STRUCTURAL STEEL SHALL BE A36, EXCEPT AS NOTED.

FINISH PAINT SHALL BE LIGHT GREEN, FEDERAL STANDARD 595-24227.

CONCRETE IN SUPERSTRUCTURE SHALL BE CLASS A4. ALL OTHER CONCRETE, EXCEPT TREMIE SEAL CONCRETE, SHALL BE CLASS A3.

ALL DEFORMED REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60.

ALL REINFORCING BAR DIMENSIONS ON THE DETAILED DRAWINGS ARE TO CENTER OF BARS EXCEPT WHERE OTHERWISE NOTED AND ARE SUBJECT TO FABRICATION AND CONSTRUCTION TOLERANCES.

ALL FOOTING CONCRETE SHALL BE PLACED IN THE DRY EXCEPT WHERE CLASS T3 CONCRETE IS INDICATED ON THE PLANS OR APPROVED BY THE ENGINEER.

BECAUSE OF THE ERRATIC NATURE OF THE GROUND CONDITIONS AT THE SITE, ELEVATIONS OF THE BOTTOM OF THE FOOTINGS SHOWN ON THE PLANS SHALL BE CONSIDERED APPROXIMATE ONLY. DURING CONSTRUCTION SHOULD EXCAVATION OPERATIONS REVEAL THAT THE FOUNDATION IS INADEQUATE, REDESIGN MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER.

STEEL PILES 10BP42 ARE DESIGNED FOR A CAPACITY OF 55 TONS PER PILE. ALL PILES SHALL BE DRIVEN TO PRACTICAL REFUSAL.

PRIOR TO THE COMMENCEMENT OF ANY WORK THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF THE EXISTING STRUCTURE AND REPORT TO THE ENGINEER ANY DISCREPANCIES BETWEEN FIELD MEASUREMENTS AND MEASUREMENTS SHOWN ON THE CONTRACT PLANS.

⚠1 ELEVATIONS TAKEN FROM CITY OF RICHMOND DATUM.

⚠4 As Built TEM 3-89

	BY	DATE
MADE	ALC	3-87
CHECKED	TFP	3-87
IN CHARGE S.R.		

NO.	REVISION	BY	DATE
⚠3	Quantities	ALC	4-87
⚠2	Quantities	ALC	4-87
⚠1	Quantities & Added Note	ALC	4-87

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

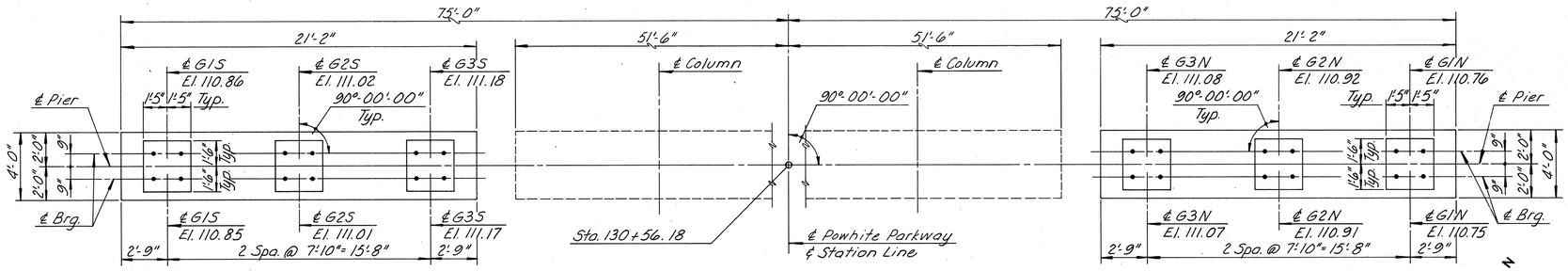
GENERAL NOTES AND ESTIMATED QUANTITES

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

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 4 OF 106

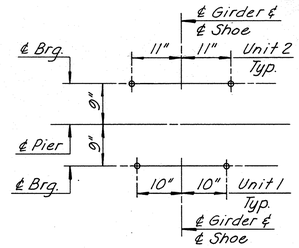
N87090

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	12	106

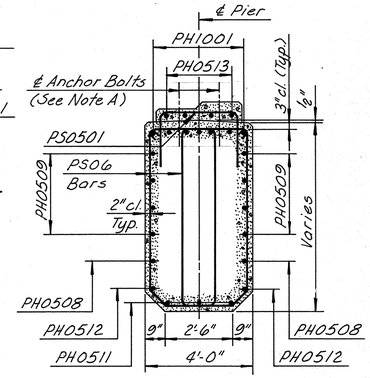


PLAN - SOUTHBOUND
Scale: 1/4" = 1'-0"

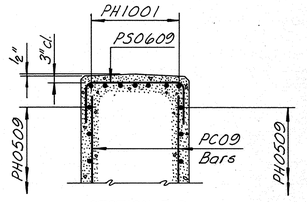
PLAN - NORTHBOUND
Scale: 1/4" = 1'-0"



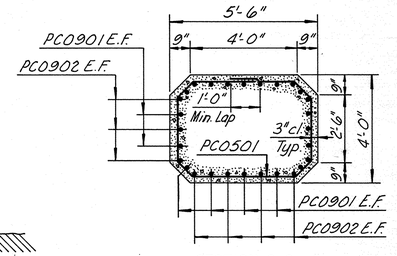
ANCHOR BOLT SETTING PLAN
No Scale



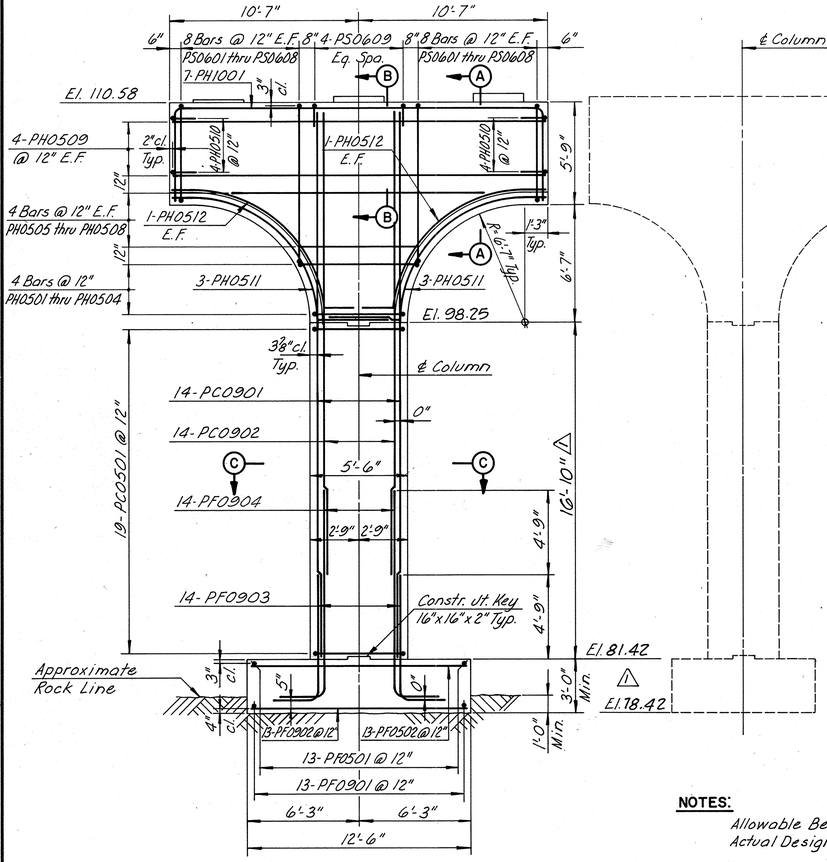
SECTION A-A
Scale: 3/8" = 1'-0"



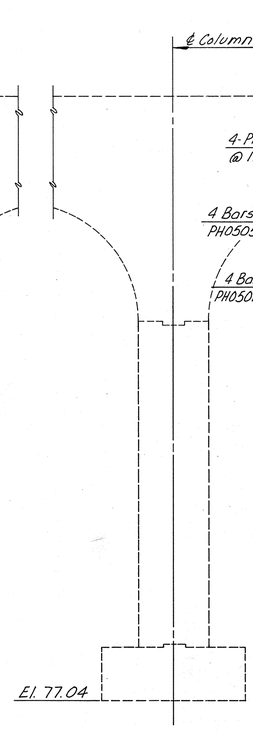
SECTION B-B
Scale: 3/8" = 1'-0"



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

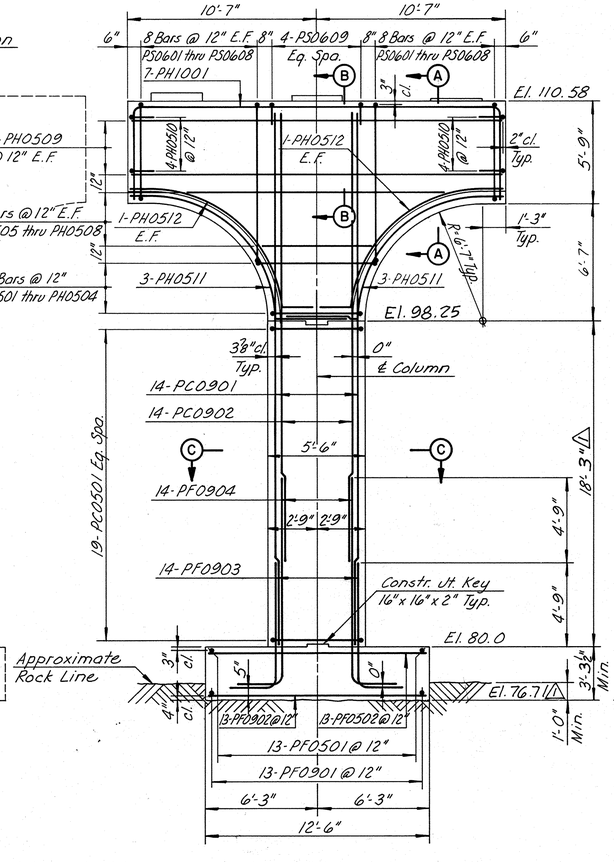


ELEVATION - SOUTHBOUND
Scale: 4" = 1'-0"

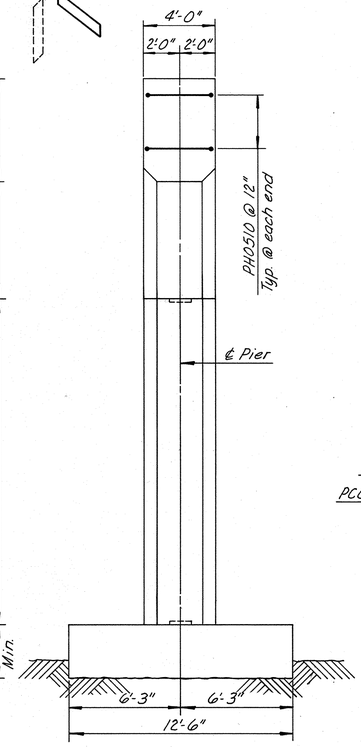


NOTES:

Allowable Bearing Pressure - 7 tons/s.f.
Actual Design Bearing Pressure - 4.7 tons/s.f.



ELEVATION - NORTHBOUND
Scale: 4" = 1'-0"



TYPICAL END VIEW
Scale: 4" = 1'-0"

NOTE A:

Pad reinforcing bars are to be spaced to clear Anchor Bolts.

	BY	DATE
MADE	EUM	2-87
CHECKED	TFP	3-87
IN CHARGE	S.R	

NO.	REVISION	BY	DATE
1	As Built	TEM	3-89

AS BUILT

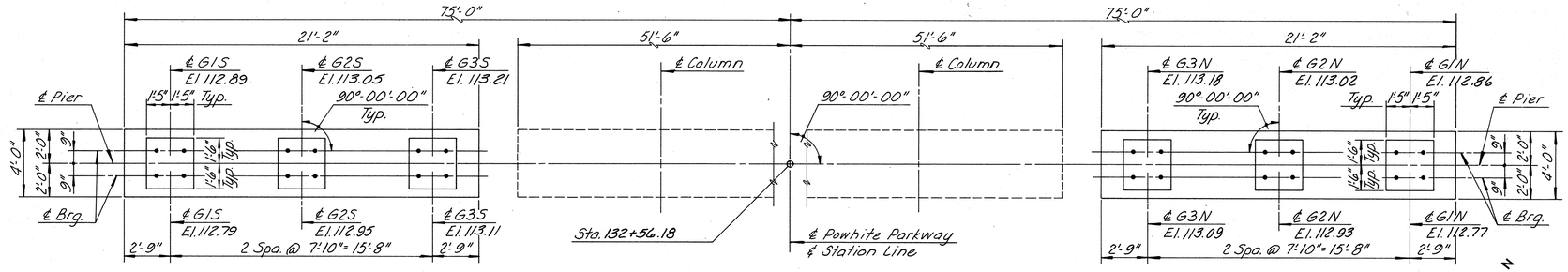
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER I DETAILS

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

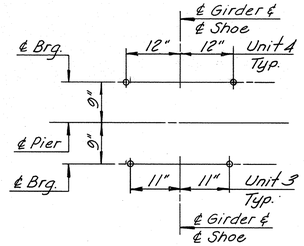
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 12 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	14	106

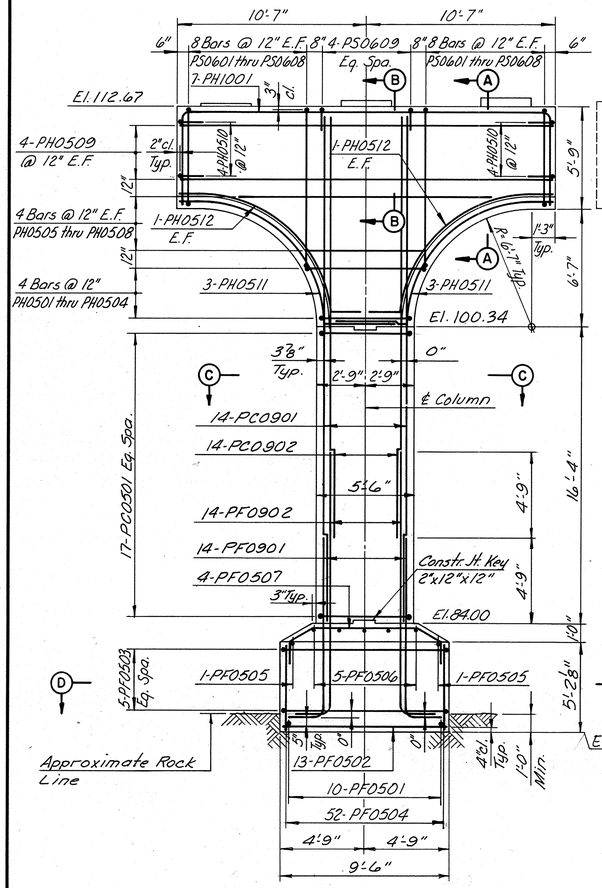


PLAN - SOUTHBOUND
Scale: 4" = 1'-0"

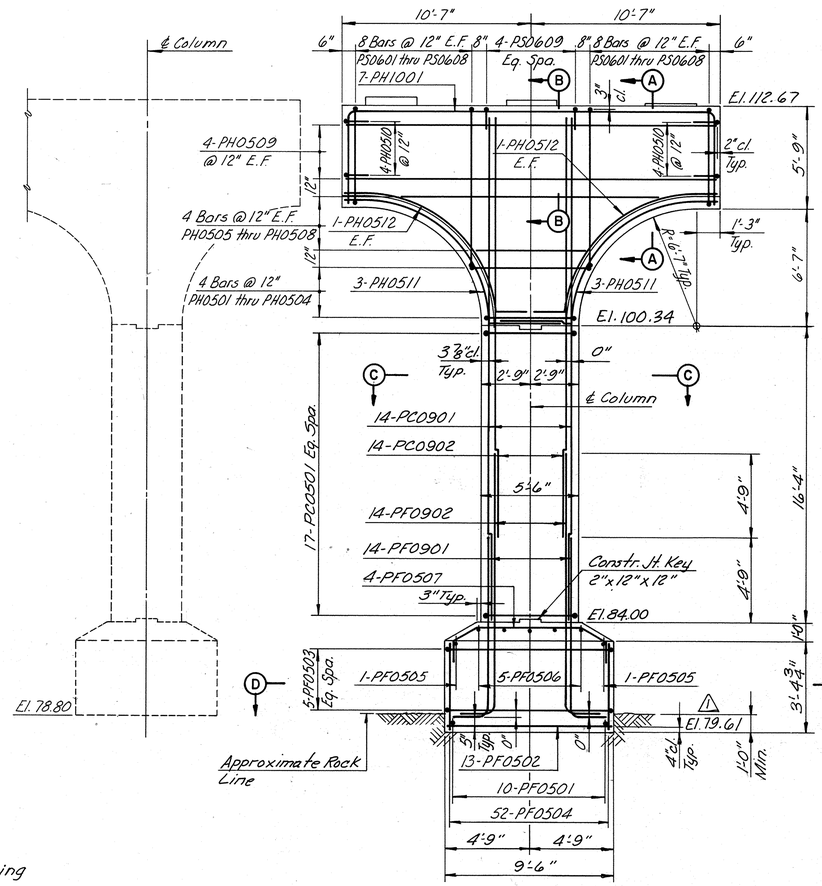
PLAN - NORTHBOUND
Scale: 4" = 1'-0"



ANCHOR BOLT SETTING PLAN
No Scale



ELEVATION - SOUTHBOUND
Scale: 4" = 1'-0"



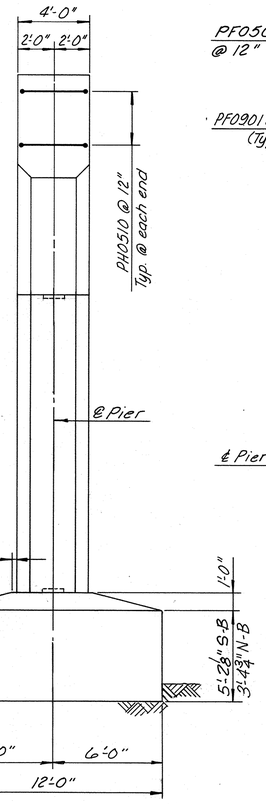
ELEVATION - NORTHBOUND
Scale: 4" = 1'-0"

NOTES:

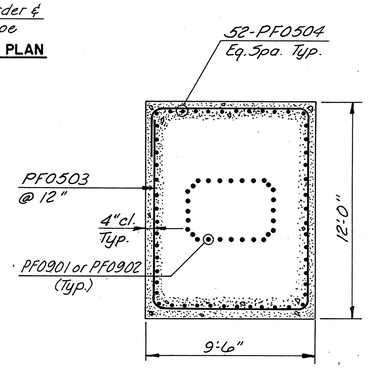
For Sections A-A, B-B and C-C, see Sheet No. 12

Maximum Allowable Bearing Pressure - 10 tons / s.f.

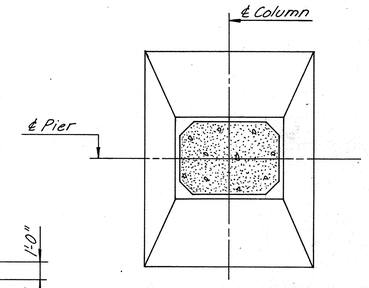
Actual Design Bearing Pressure - 7.9 tons / s.f.



TYPICAL END VIEW
Scale: 4" = 1'-0"



SECTION D-D
Scale: 4" = 1'-0"



FOOTING PLAN
Scale: 4" = 1'-0"

	BY	DATE
MADE	T.A.L	3-87
CHECKED	T.F.P	3-87
IN CHARGE	S.R.	

NO.	REVISION	BY	DATE
1	As Built	T.E.M.	3-89

AS BUILT

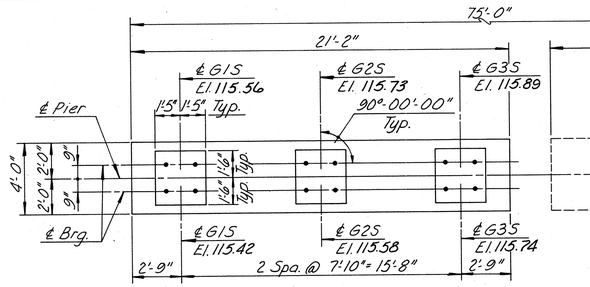
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 3 DETAILS

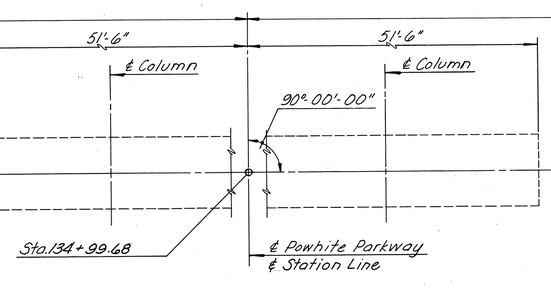
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

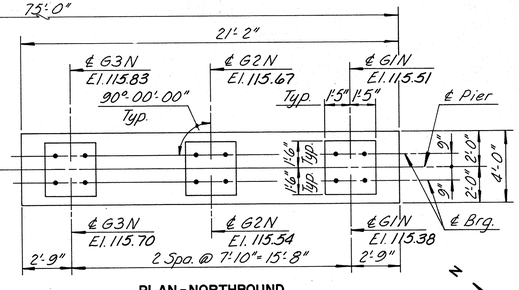
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 14 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	16	106

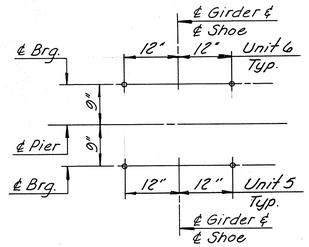


PLAN - SOUTHBOUND
Scale: 4" = 1'-0"

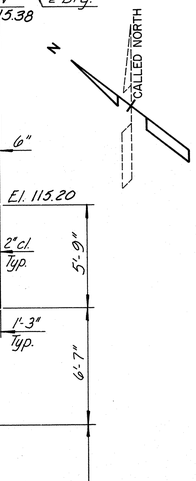


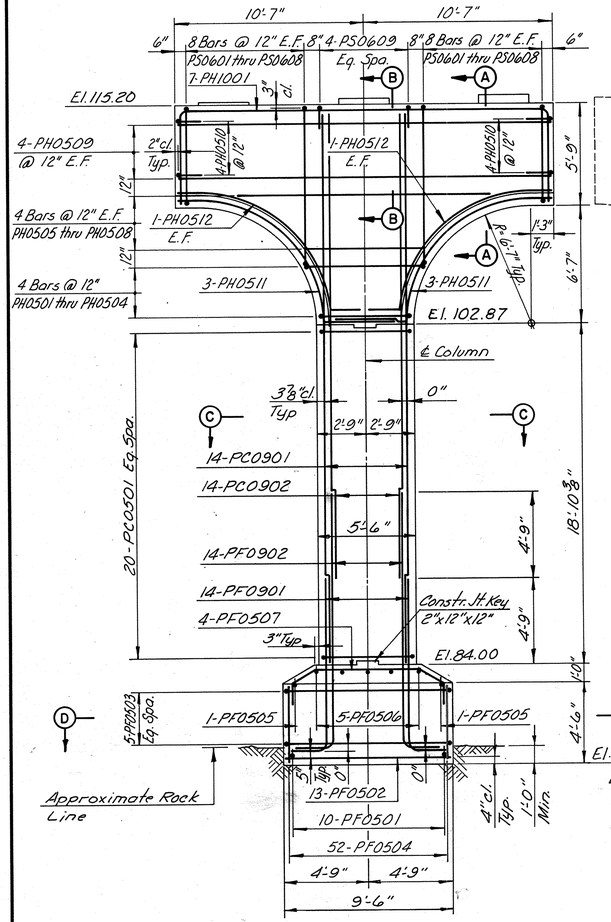


PLAN - NORTHBOUND
Scale: 4" = 1'-0"



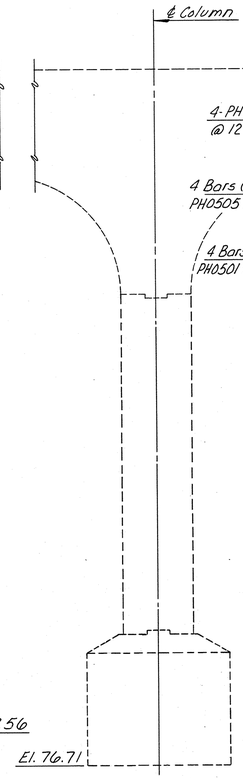
ANCHOR BOLT SETTING PLAN
No Scale





ELEVATION - SOUTHBOUND
Scale: 4" = 1'-0"

Approximate Rock Line



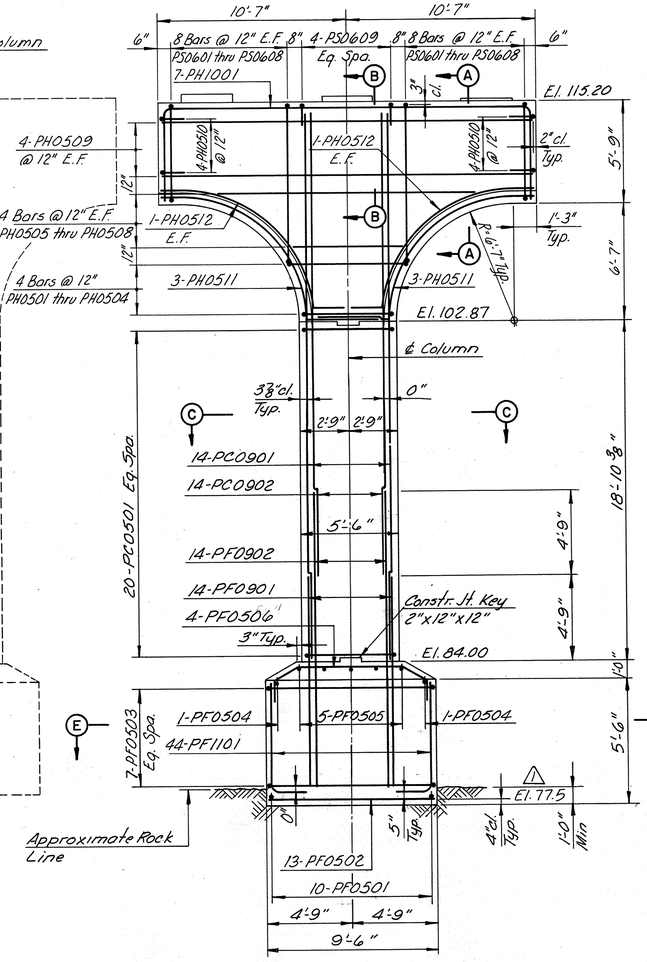
NOTES:

For Sections A-A, B-B and C-C, see Sheet No. 12

For Section D-D, see Sheet No. 14

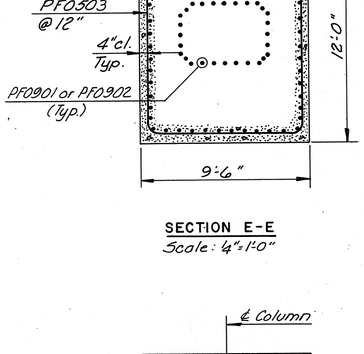
Maximum Allowable Bearing Pressure - 10 tons/s.f.

Actual Design Bearing Pressure - 8.4 tons/s.f.

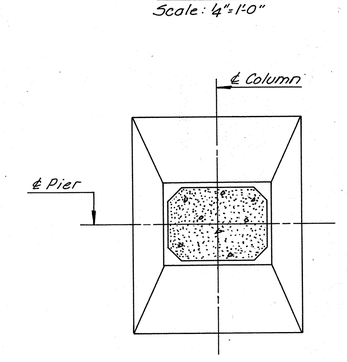


ELEVATION - NORTHBOUND
Scale: 4" = 1'-0"

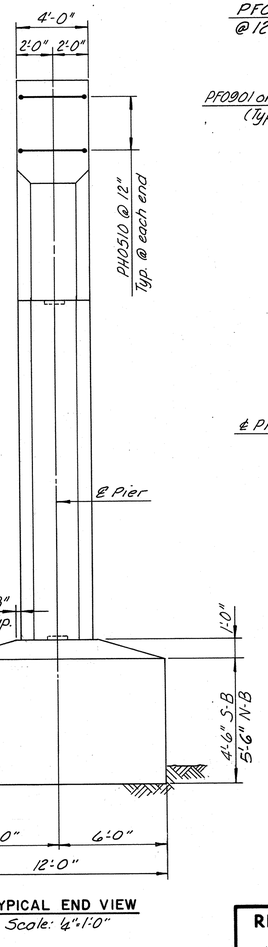
Approximate Rock Line



SECTION E-E
Scale: 4" = 1'-0"



FOOTING PLAN
Scale: 4" = 1'-0"



TYPICAL END VIEW
Scale: 4" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.A.L.	3-87				
CHECKED	T.F.P.	3-87	1	As Built	TEM	3-89
IN CHARGE	S.R.					

N87490

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

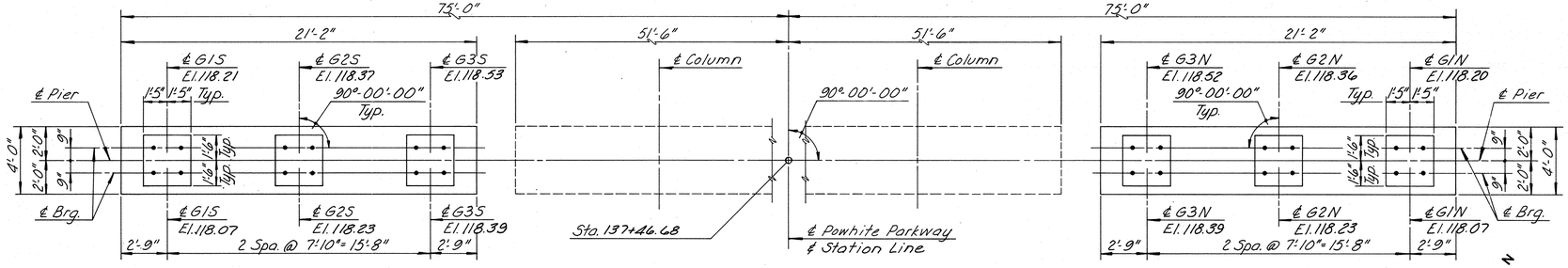
PIER 5 DETAILS

AS BUILT

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

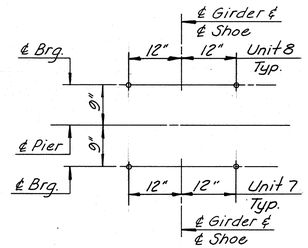
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 16 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	18	106

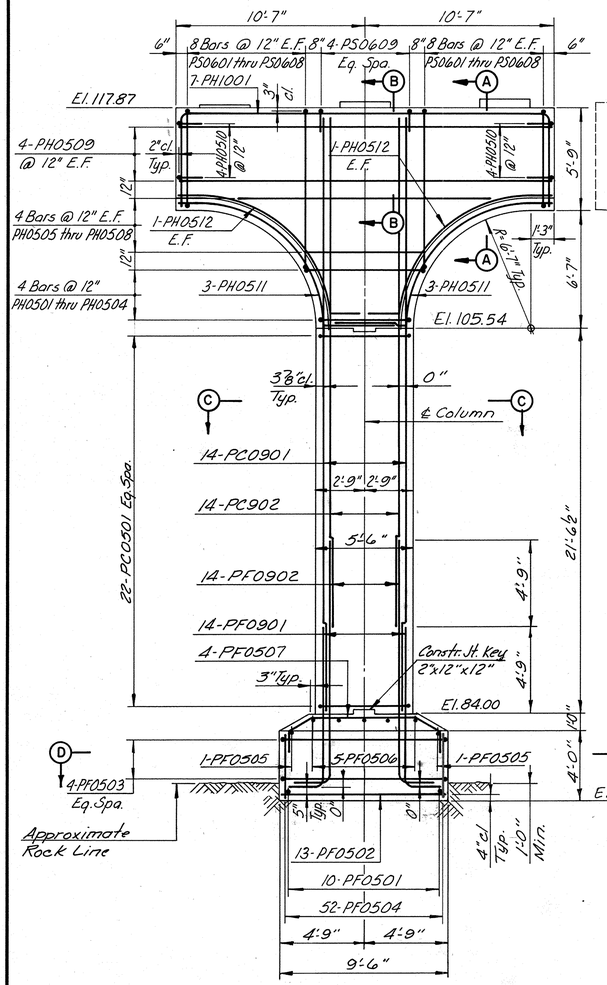


PLAN - SOUTHBOUND
Scale: 1/4"=1'-0"

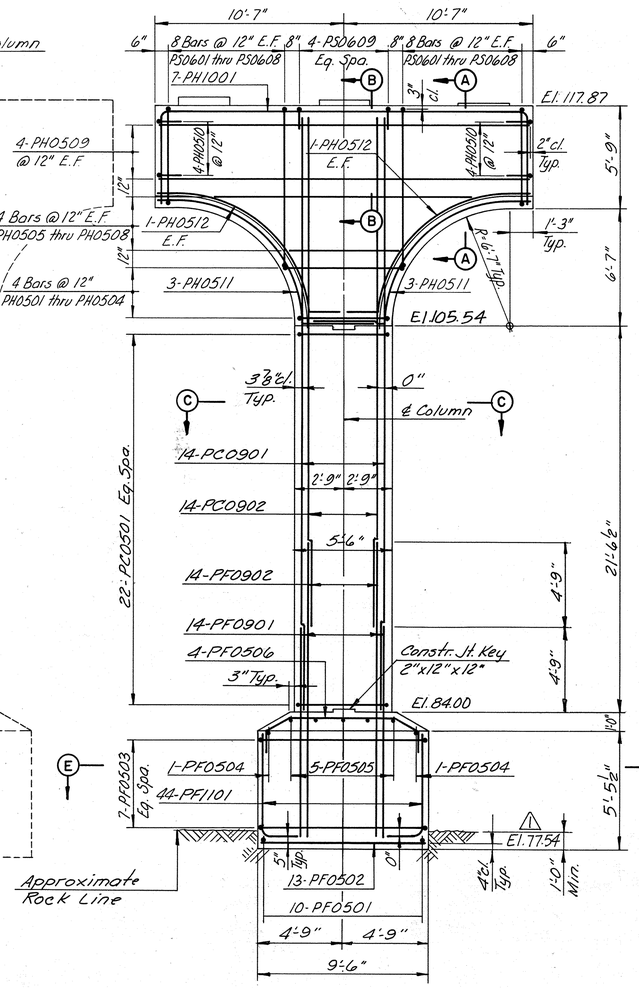
PLAN - NORTHBOUND
Scale: 1/4"=1'-0"



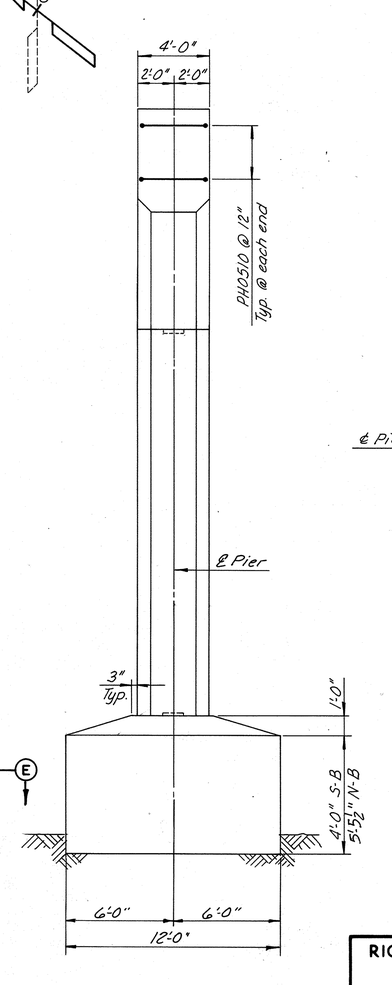
ANCHOR BOLT SETTING PLAN
No Scale



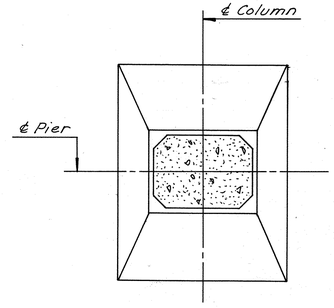
ELEVATION - SOUTHBOUND
Scale: 4"=1'-0"



ELEVATION - NORTHBOUND
Scale: 4"=1'-0"



TYPICAL END VIEW
Scale: 4"=1'-0"



FOOTING PLAN
Scale: 1/4"=1'-0"

NOTES:

For Sections A-A, B-B and C-C, see Sheet No.12
For Section D-D, see Sheet No.14
For Section E-E, see Sheet No.16
Maximum Allowable Bearing Pressure - 10 tons/s.f.
Actual Design Bearing Pressure - Southbound 7.9 tons/s.f.
Northbound 8.3 tons/s.f.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.A.L.	3-87				
CHECKED	T.F.P.	3-87	1	As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

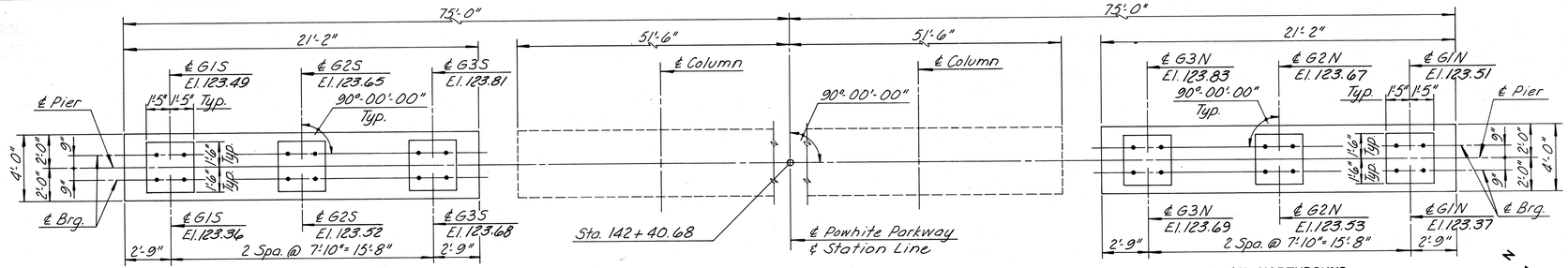
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 7 DETAILS

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

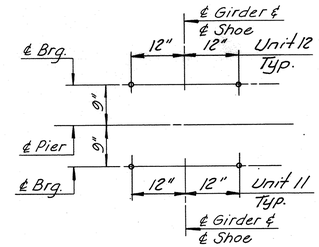
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 18 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	22	106

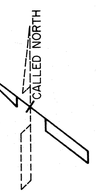


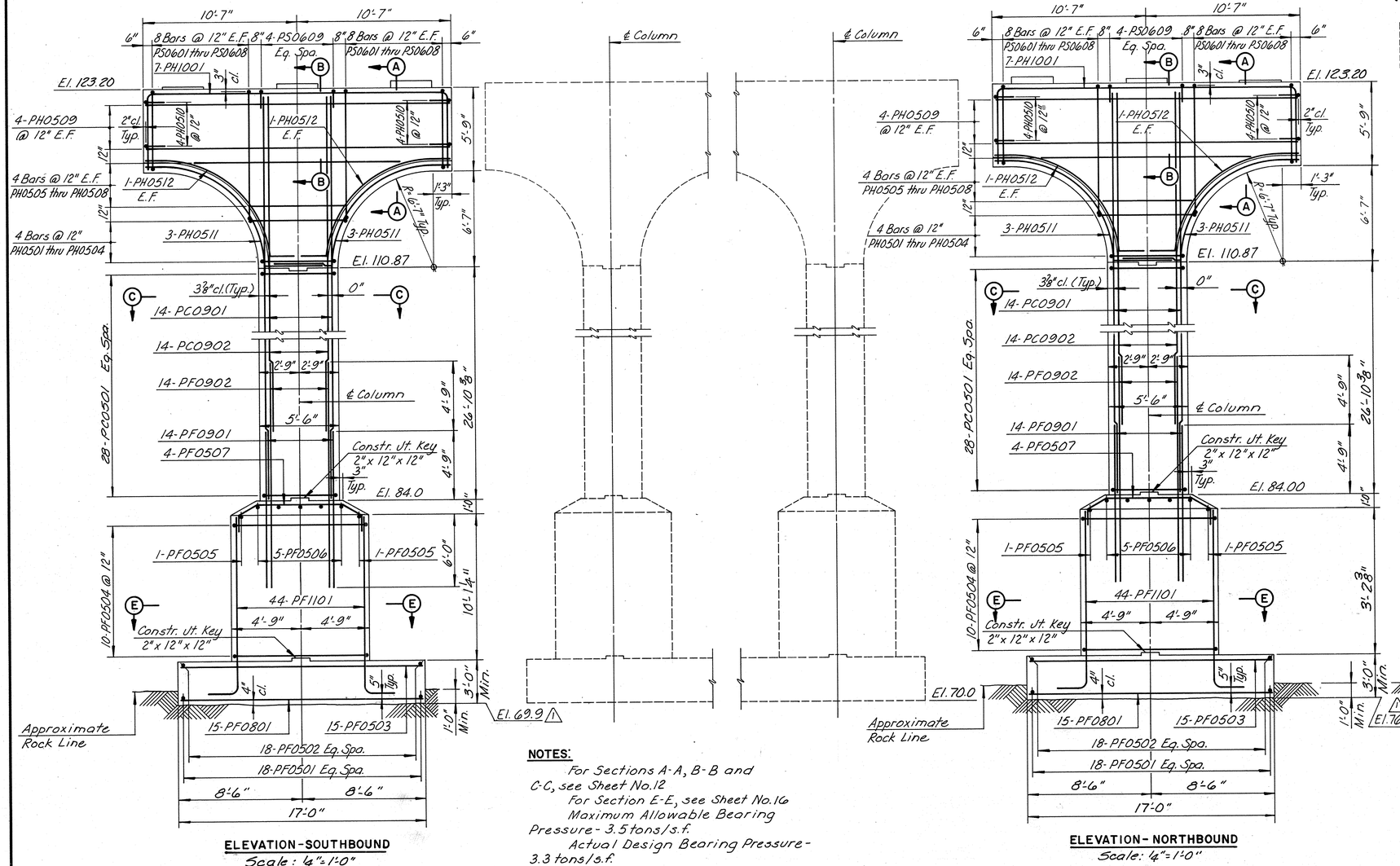
PLAN - SOUTHBOUND
Scale: 4" = 1'-0"

PLAN - NORTHBOUND
Scale: 4" = 1'-0"



ANCHOR BOLT SETTING PLAN
No Scale





ELEVATION - SOUTHBOUND
Scale: 4" = 1'-0"

ELEVATION - NORTHBOUND
Scale: 4" = 1'-0"

TYPICAL END VIEW
Scale: 4" = 1'-0"

FOOTING PLAN
Scale: 4" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	3-87				
CHECKED	T.F.P	3-87	1	As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

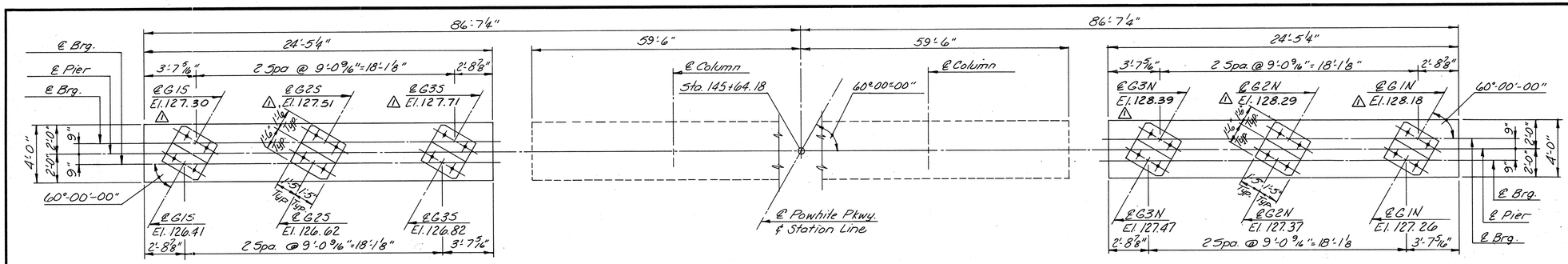
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER II DETAILS

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

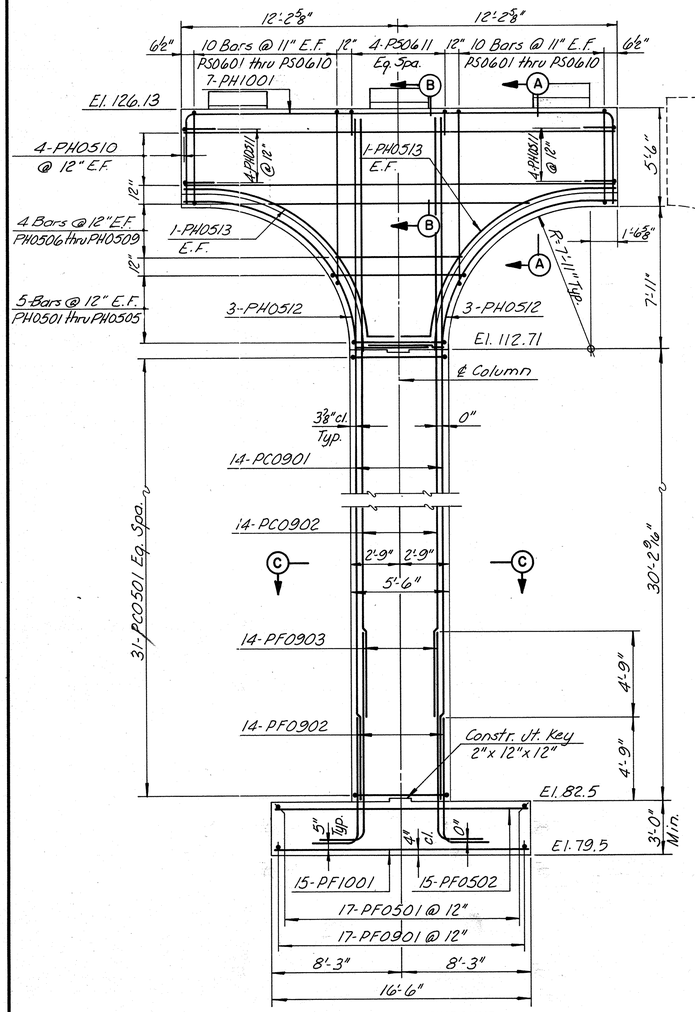
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 22 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	25	106

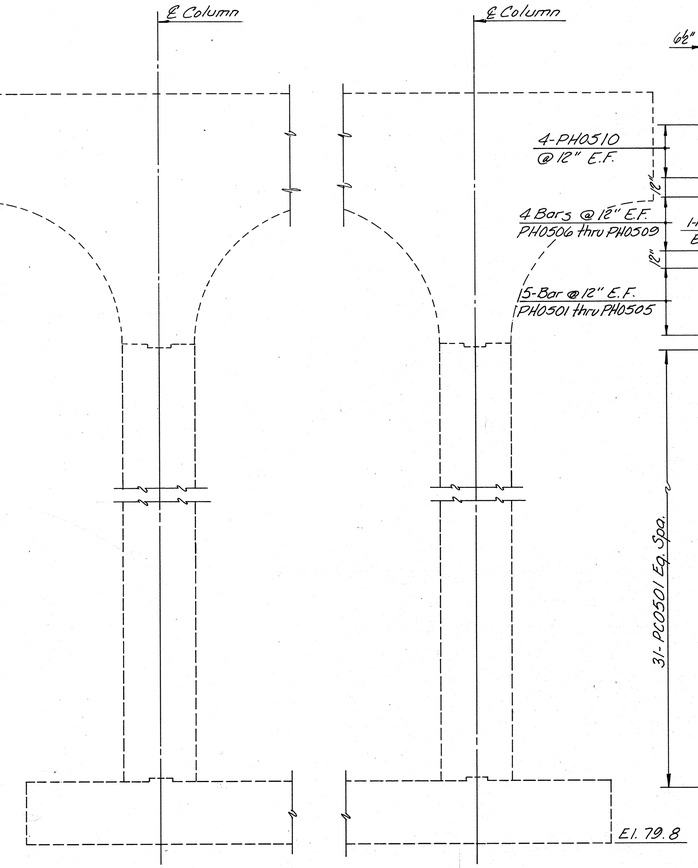


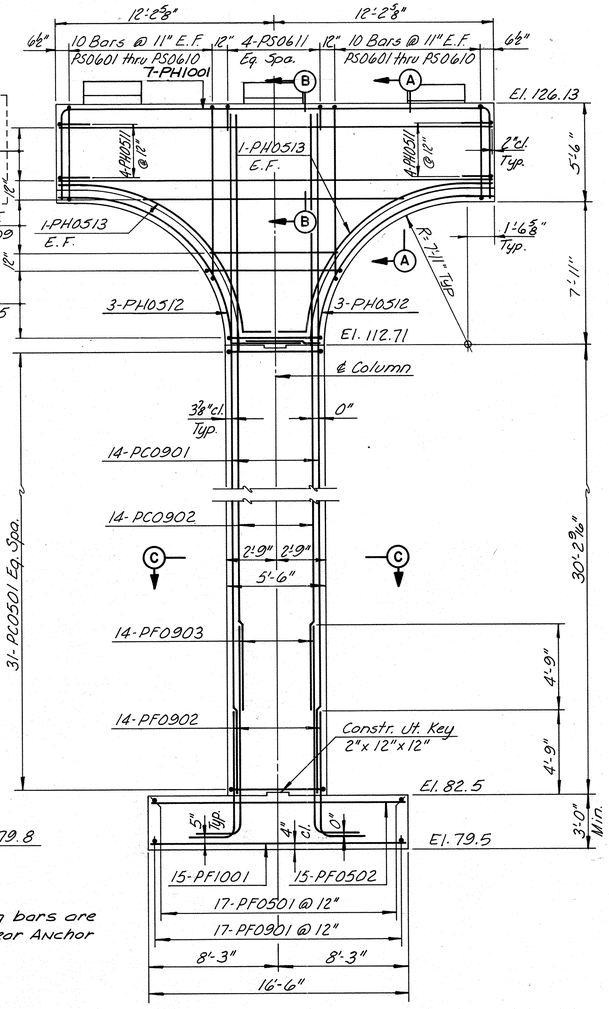
PLAN - SOUTHBOUND
Scale: 4"=1'-0"

PLAN - NORTHBOUND
Scale: 4"=1'-0"

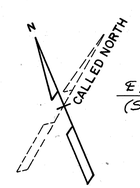


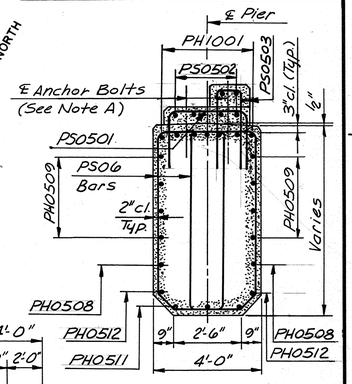
ELEVATION - SOUTHBOUND
Scale: 4"=1'-0"



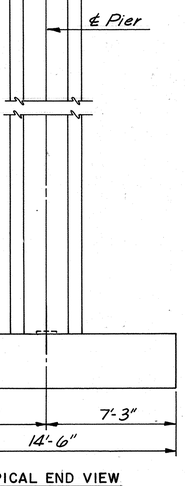


ELEVATION - NORTHBOUND
Scale: 4"=1'-0"





SECTION A-A
Scale: ⅜"=1'-0"
⚠



TYPICAL END VIEW
Scale: ¼"=1'-0"

NOTES:

⚠ For Sections B-B and C-C see Sheet No. 12
For Anchor Bolt Setting Plan, see Sheet No. 29
For Steel Sheet Piling requirements, see Sheet No. 29
Maximum Allowable Bearing Pressure - 3.5 tons/s.f.
Actual Design Bearing Pressure - Southbound - 3.3 tons/s.f.
Northbound - 3.0 tons/s.f.

⚠ **NOTE A:**
Pad reinforcing bars are to be spaced to clear Anchor Bolts.

	BY	DATE
MADE	EUM	2-87
CHECKED	T.F.P.	3-87
IN CHARGE	S.R.	

NO.	REVISION	BY	DATE
⚠2	As Built	TEM	3-89
⚠1	EL.'D Plans Added Sect. A-A	ALC	5-87

AS BUILT

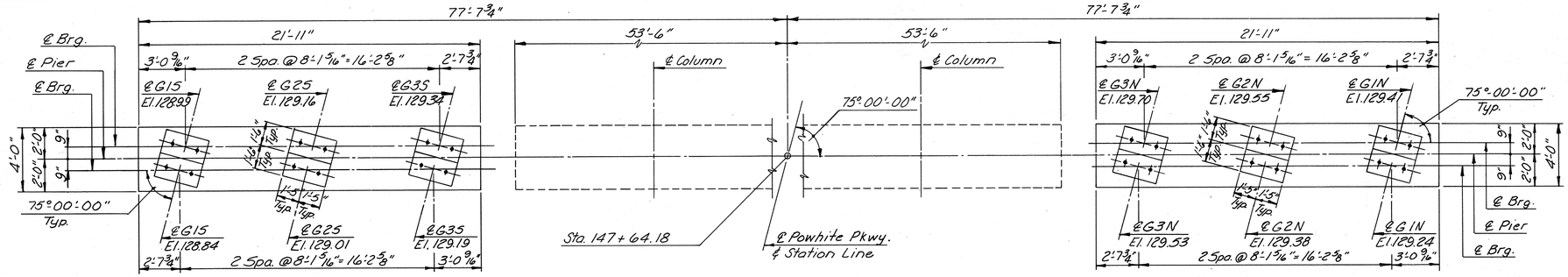
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 14 DETAILS

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

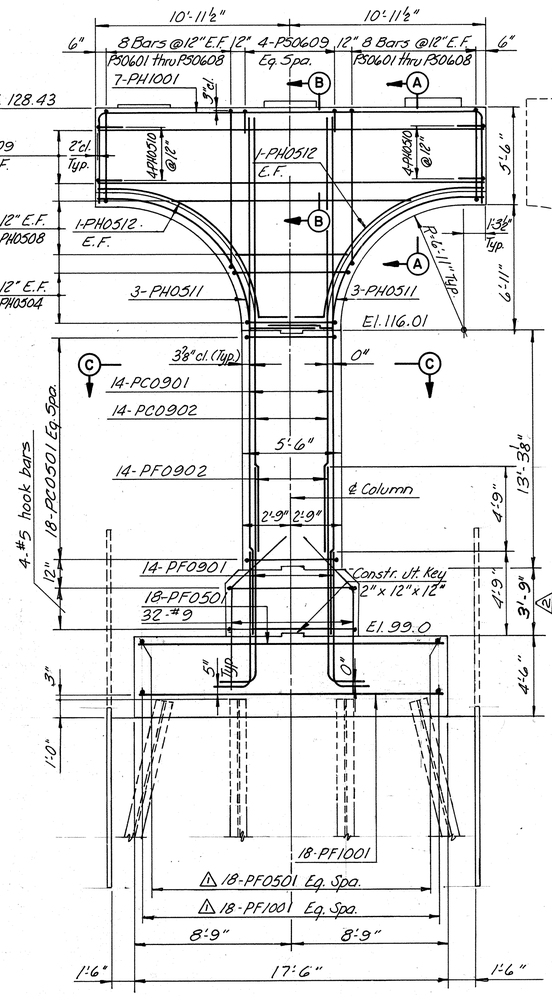
SCALE: AS SHOWN
CONTRACT NO: C-13
SHEET NO. 25 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGING	27	106

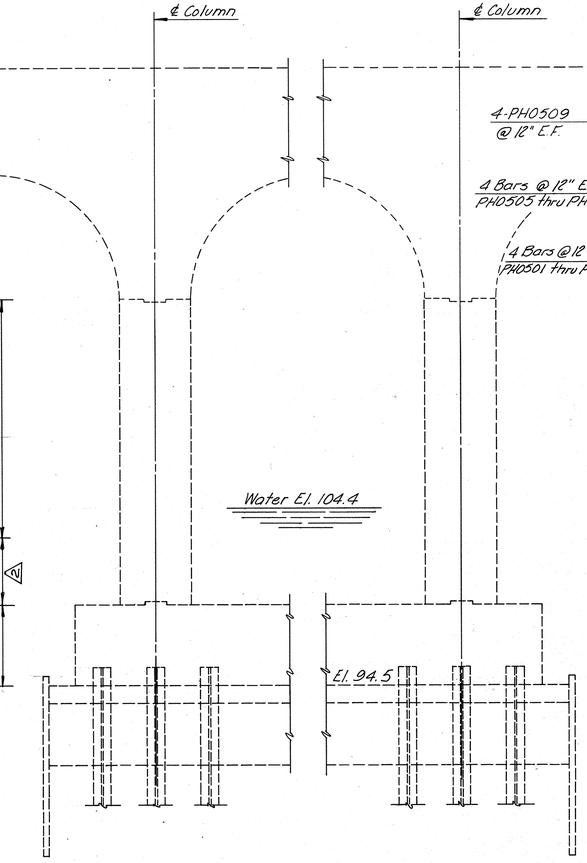


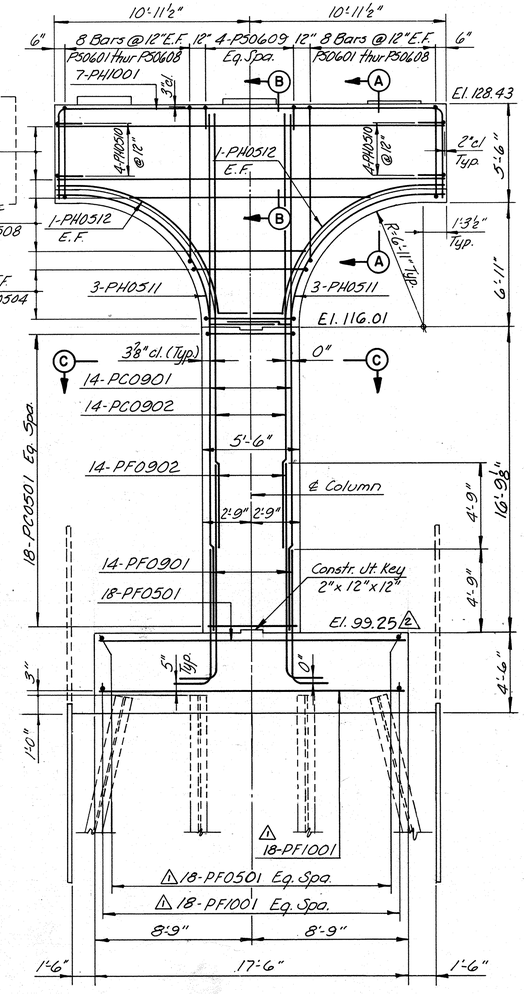
PLAN - SOUTHBOUND
Scale: 4"=1'-0"

PLAN - NORTHBOUND
Scale: 4"=1'-0"

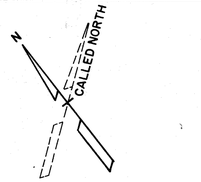


ELEVATION - SOUTHBOUND
Scale: 4"=1'-0"

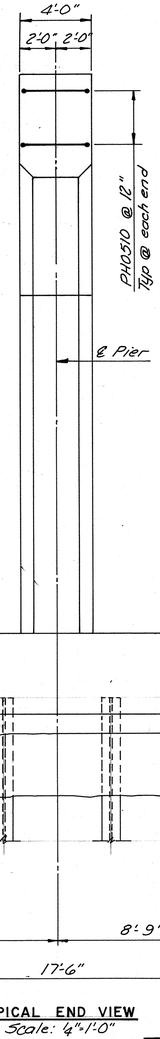


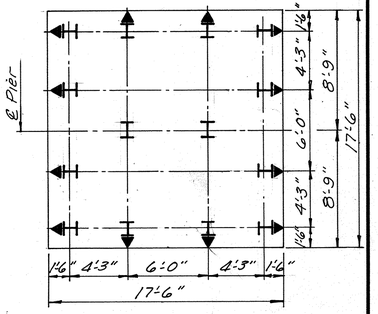


ELEVATION - NORTHBOUND
Scale: 4"=1'-0"



NOTE:
For Sections A-A, B-B and C-C, see Sheet No. 12.
For Anchor Bolt Setting Plan, see Sheet No. 29.



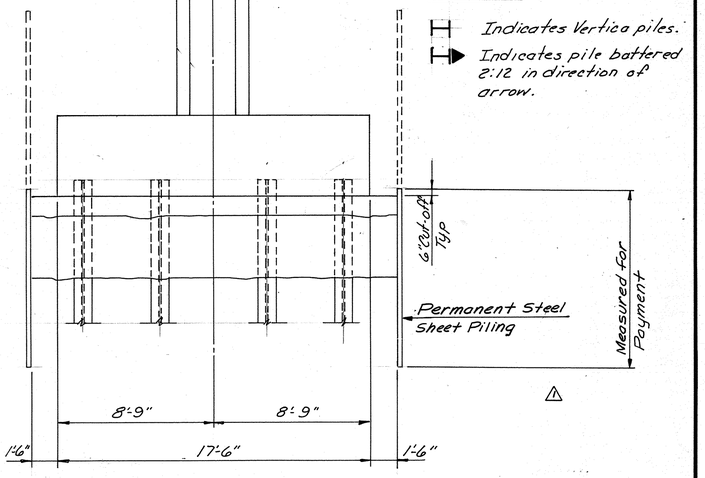


TYPICAL PILE PLAN
Scale: 3/16"=1'-0"

PILE NOTES:

Indicates Vertica piles.

Indicates pile battered 2:12 in direction of arrow.



TYPICAL END VIEW
Scale: 4"=1'-0"

	BY	DATE
MADE	EJM	3-87
CHECKED	T.F.P.	3-87
IN CHARGE	S.R.	

NO.	REVISION	BY	DATE
⚠2	As Built	TEM	3-89
⚠	Both Elevation & END View	ALC	4-87

N37X10

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

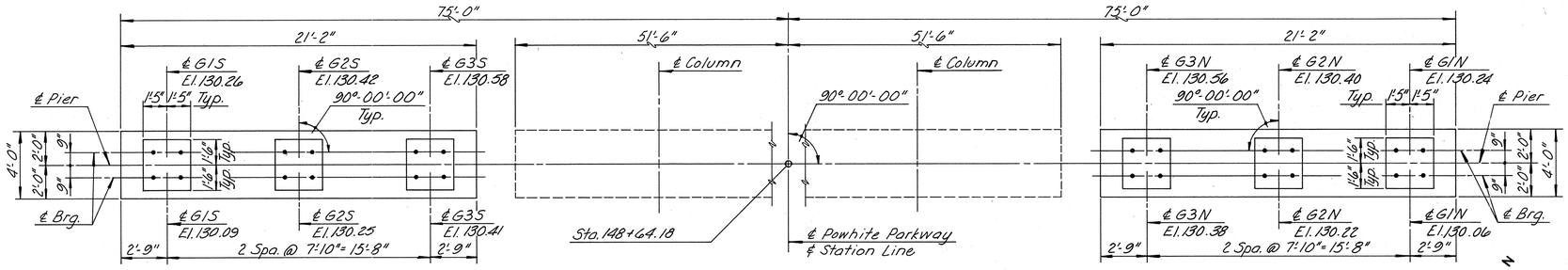
PIER 16 DETAILS

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

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 27 OF 106

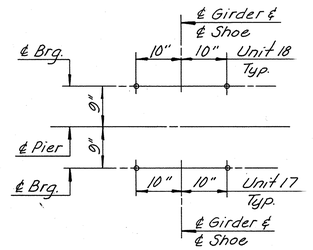
AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGING	28	106

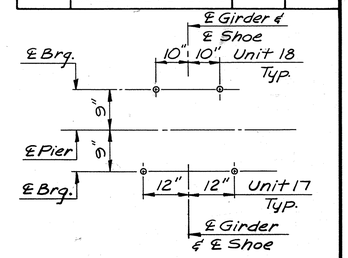


PLAN - SOUTHBOUND
Scale: 1/4" = 1'-0"

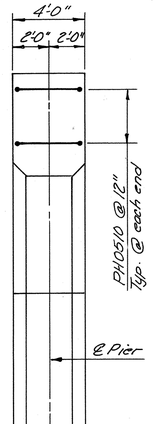
PLAN - NORTHBOUND
Scale: 1/4" = 1'-0"

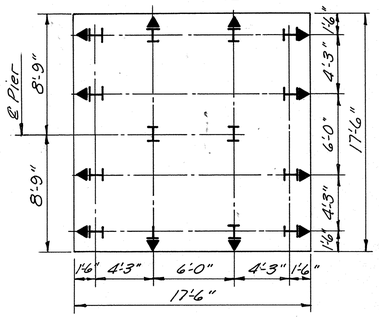


ANCHOR BOLT SETTING PLAN
△2 NORTHBOUND (No Scale)



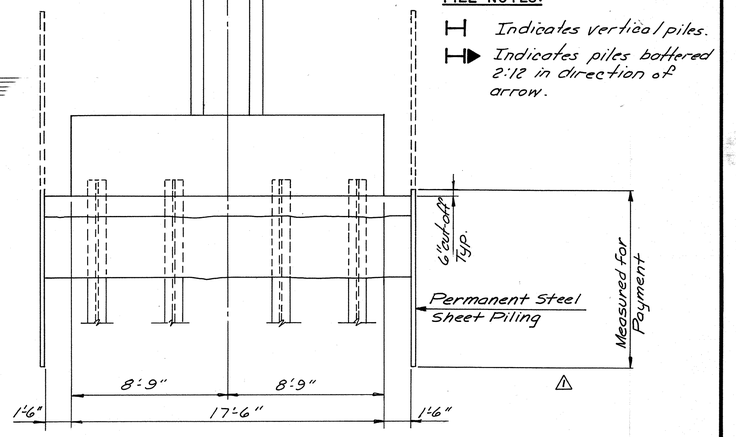
ANCHOR BOLT SETTING PLAN
△2 SOUTHBOUND
No Scale



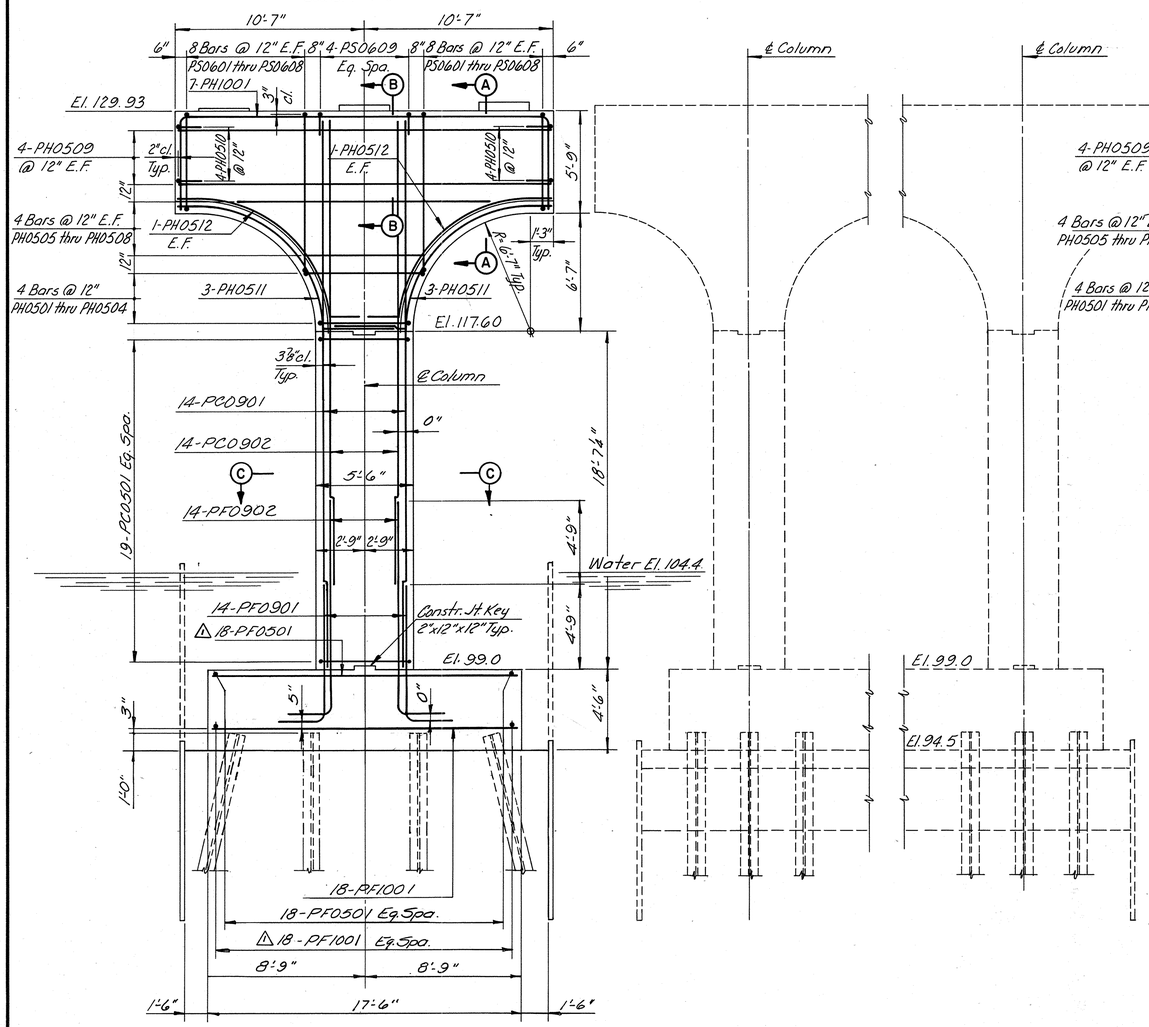


TYPICAL PILE PLAN
Scale: 3/16" = 1'-0"

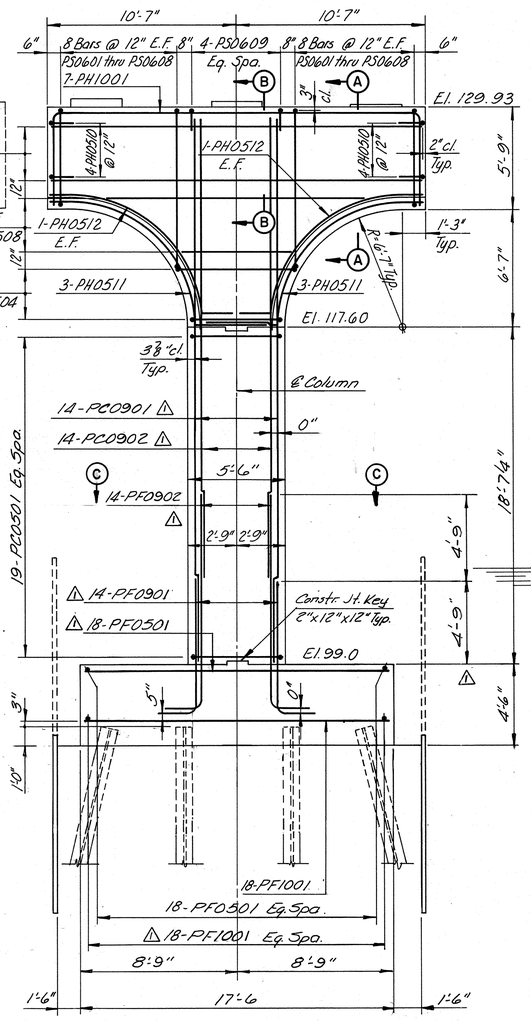
PILE NOTES:
- Indicates vertical piles.
- Indicates piles battered 2:12 in direction of arrow.



TYPICAL END VIEW
Scale: 1/4" = 1'-0"



ELEVATION – SOUTHBOUND
Scale: 1/4" = 1'-0"



ELEVATION – NORTHBOUND
Scale: 1/4" = 1'-0"

NOTE:
For Section A-A, B-B, and C-C see Sheet No. 12.

	BY	DATE				
				As Built	TEM	3-89
MADE	TAL.	3-87	△2	Rev. Anchor Bolt	ALC	6-87
CHECKED	T.F.P.	3-87	△1	Both Elevation & End View	ALC	4-87
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

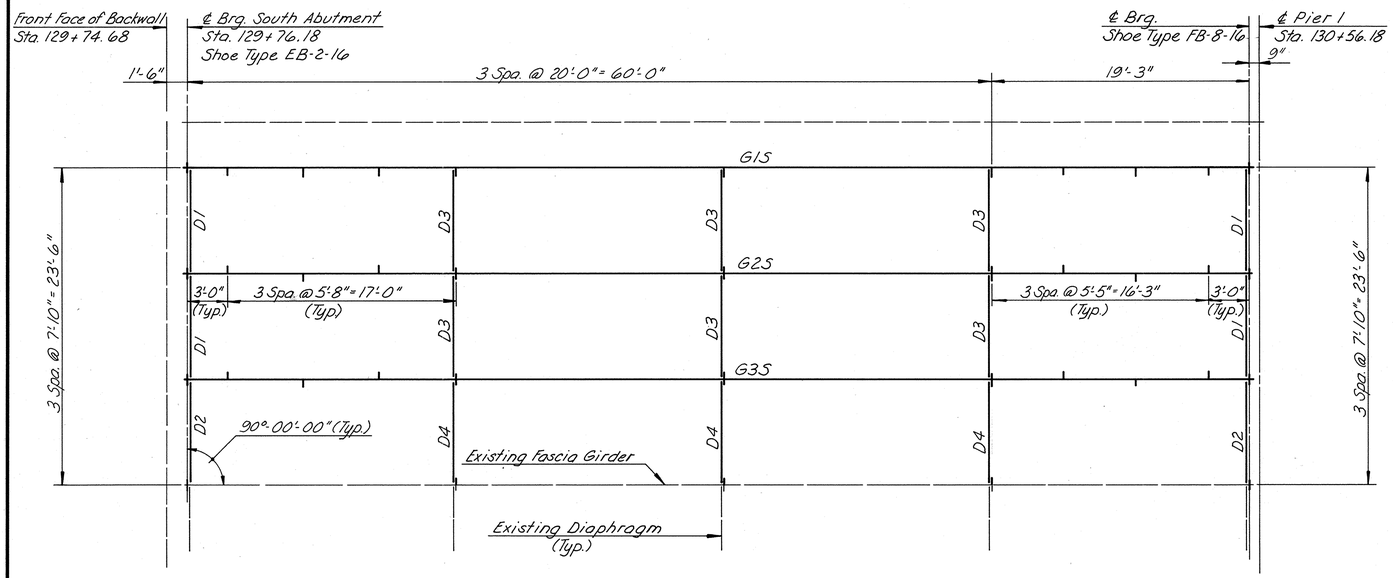
PIER 17 DETAILS

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

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 28 OF 106

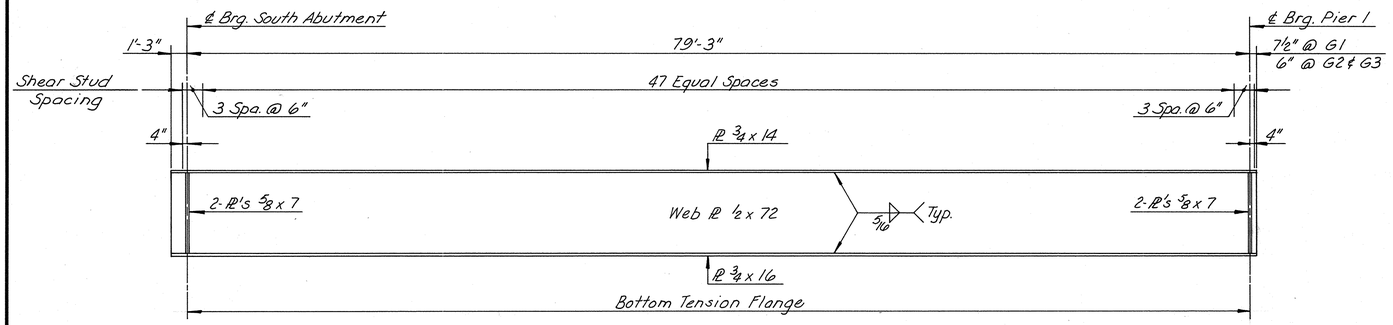
AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	30	106



FRAMING PLAN - UNIT I SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION - UNIT I SOUTHBOUND & NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EUM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

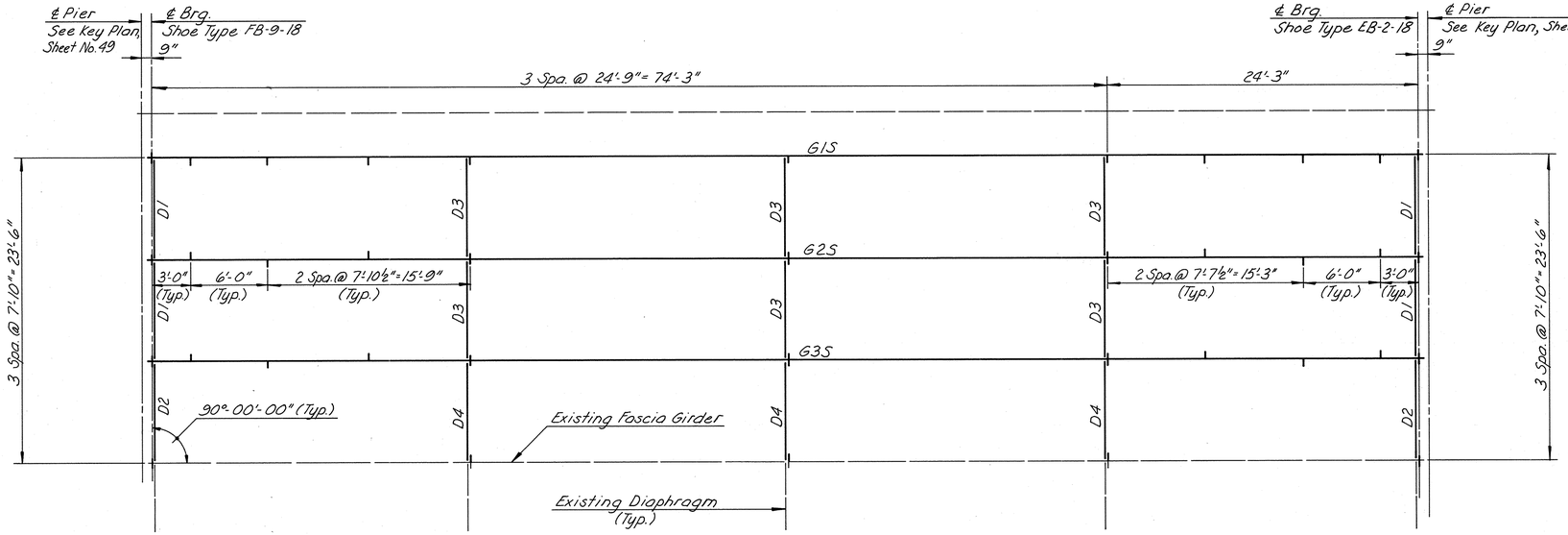
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT I SOUTHBOUND & NORTHBOUND

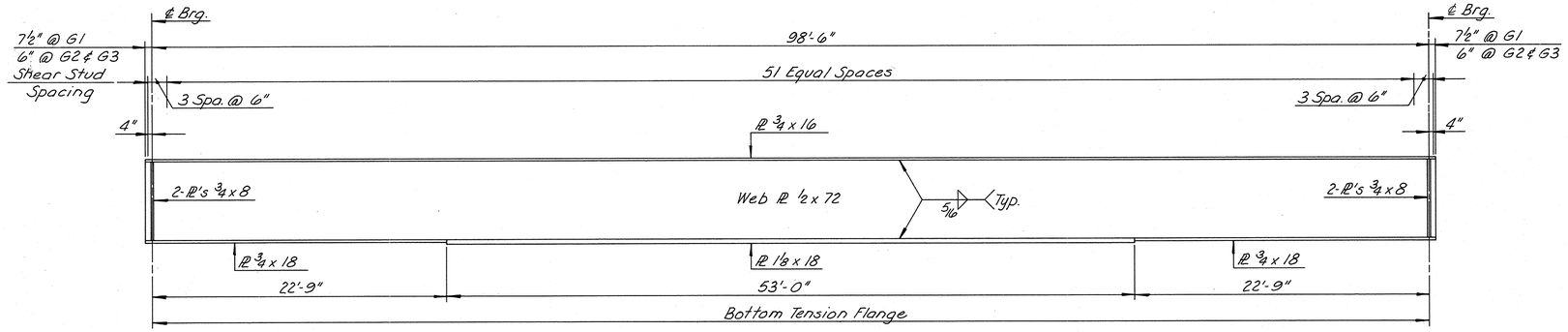
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 30 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	31	106



FRAMING PLAN - UNITS 2 & 3 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNITS 2 & 3 SOUTHBOUND & NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

N12599

AS BUILT

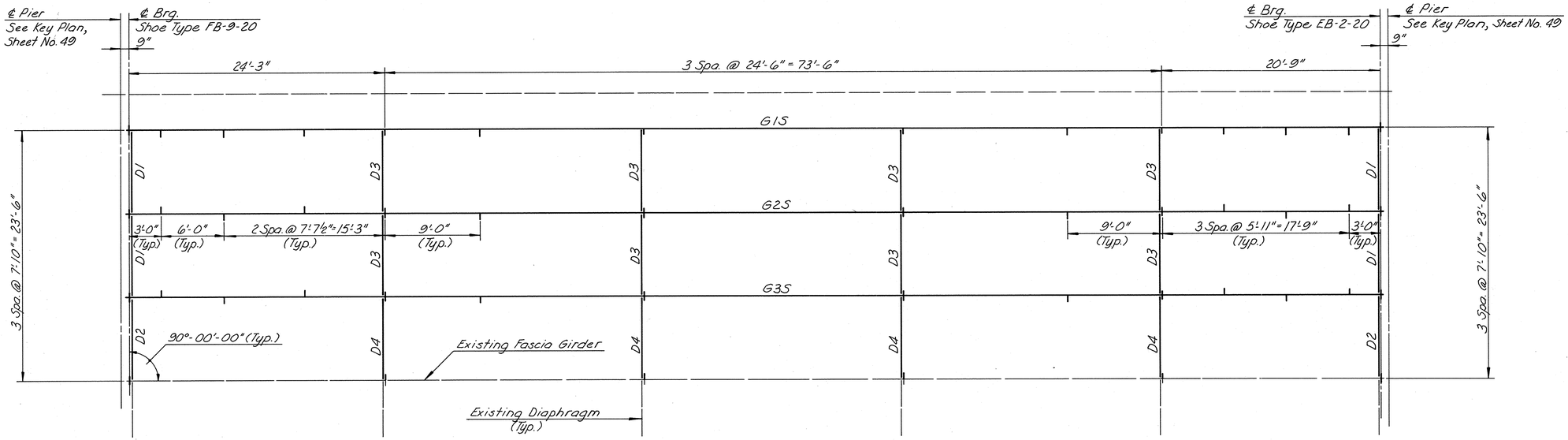
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNITS 2 & 3 SOUTHBOUND & NORTHBOUND

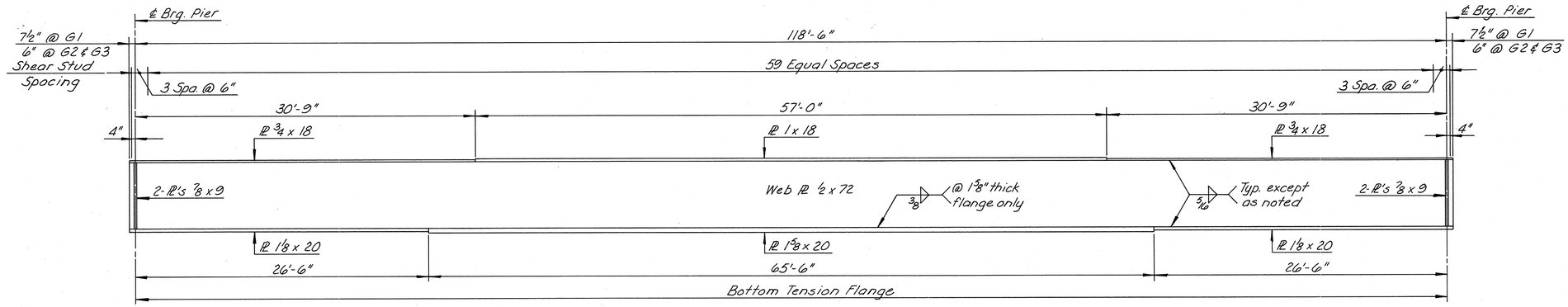
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 31 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	32	106



FRAMING PLAN - UNIT 4 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNIT 4 SOUTHBOUND & NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As-Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

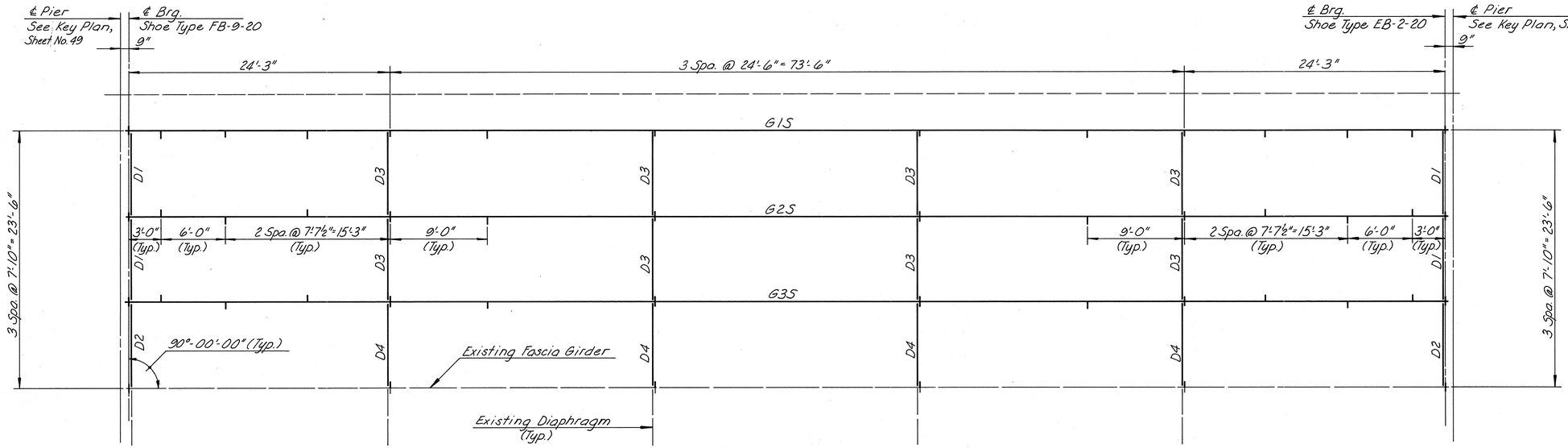
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 4 SOUTHBOUND & NORTHBOUND

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

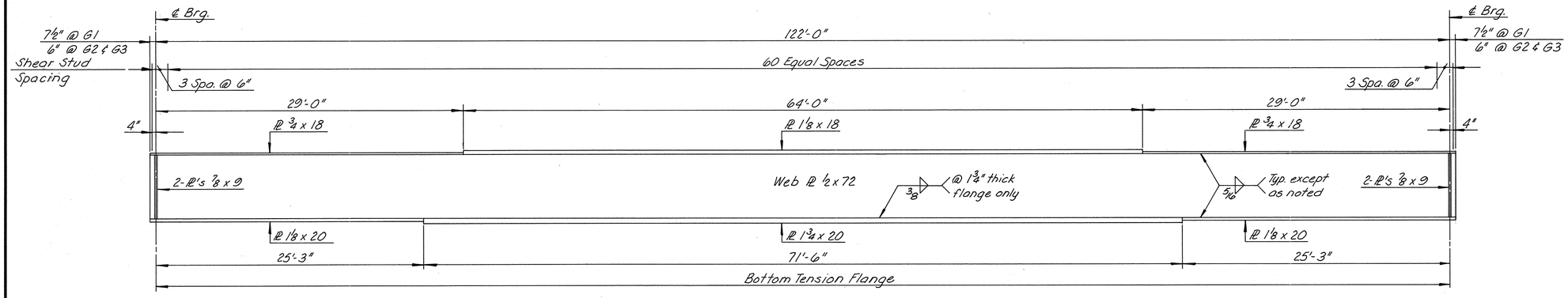
SCALE: AS SHOWS
CONTRACT NO.: C-13
SHEET NO. 32 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	33	106



NOTE:
For Steel Details, see Sheet No. 45.

FRAMING PLAN - UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE				
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR		NO.	REVISION	BY	DATE

N2599

AS BUILT

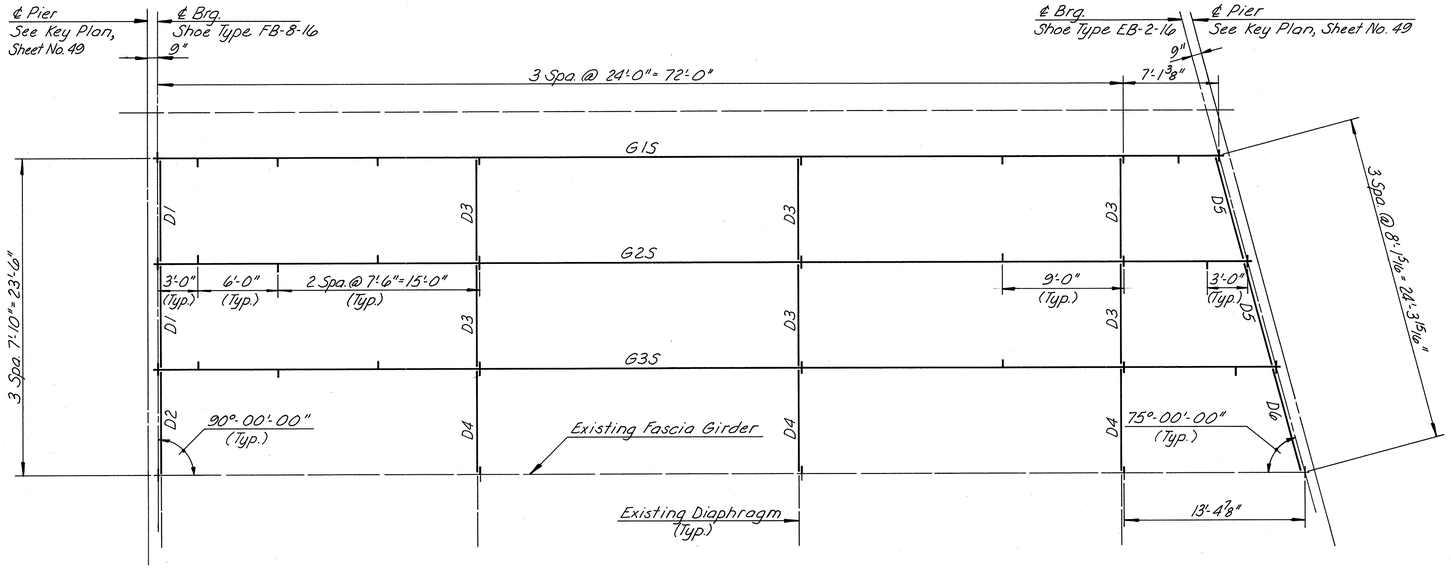
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND

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

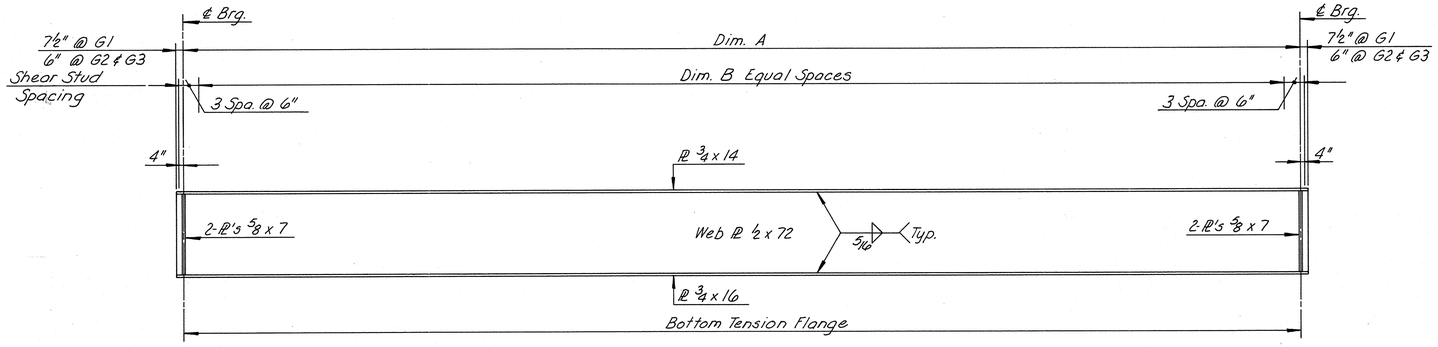
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 33 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	34	106



FRAMING PLAN-UNIT 13 SOUTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION-UNIT 13 SOUTHBOUND
Scale: 3/16" = 1'-0"

GIRDER	DIM. A	DIM. B
G1	79'-1 3/8"	43
G2	81'-2½"	44
G3	83'-3 3/4"	45

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

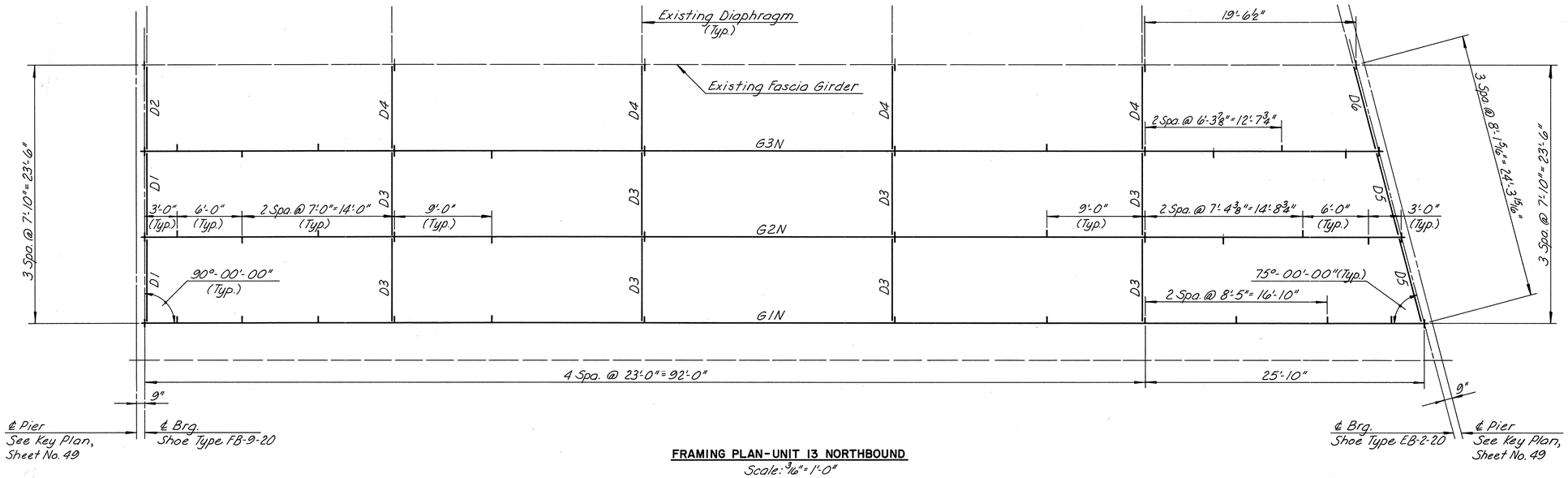
FRAMING PLAN & GIRDER ELEVATION
UNIT 13 SOUTHBOUND

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

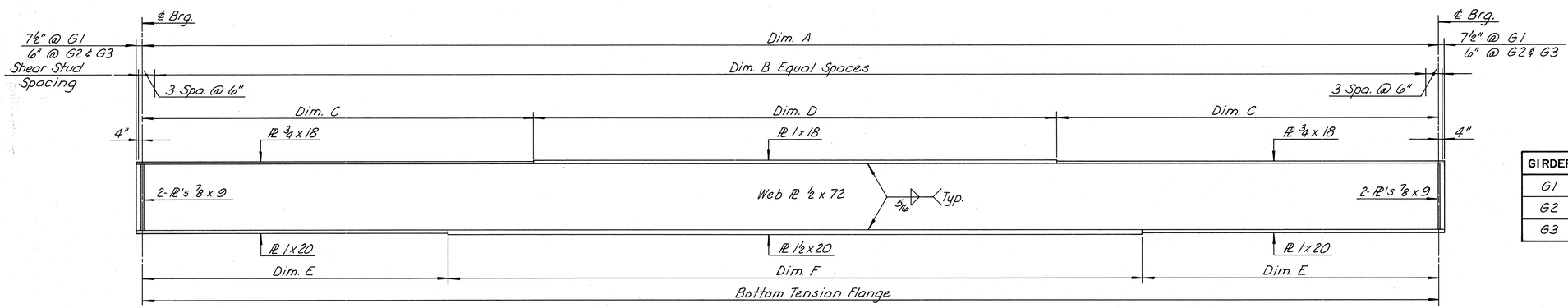
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 34 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	35	106

NOTE:
For Steel Details, see Sheet No. 45



FRAMING PLAN - UNIT 13 NORTHBOUND
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNIT 13 NORTHBOUND
Scale: 3/16" = 1'-0"

GIRDER	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E	DIM. F
G1	117'-10"	58	32'-11"	52'-0"	25'-8"	66'-6"
G2	115'-8¾"	57	32'-1⅜"	51'-6"	24'-7⅜"	66'-6"
G3	113'-7⅝"	56	33'-9 13/16"	46'-0"	25'-6 3/16"	62'-6"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

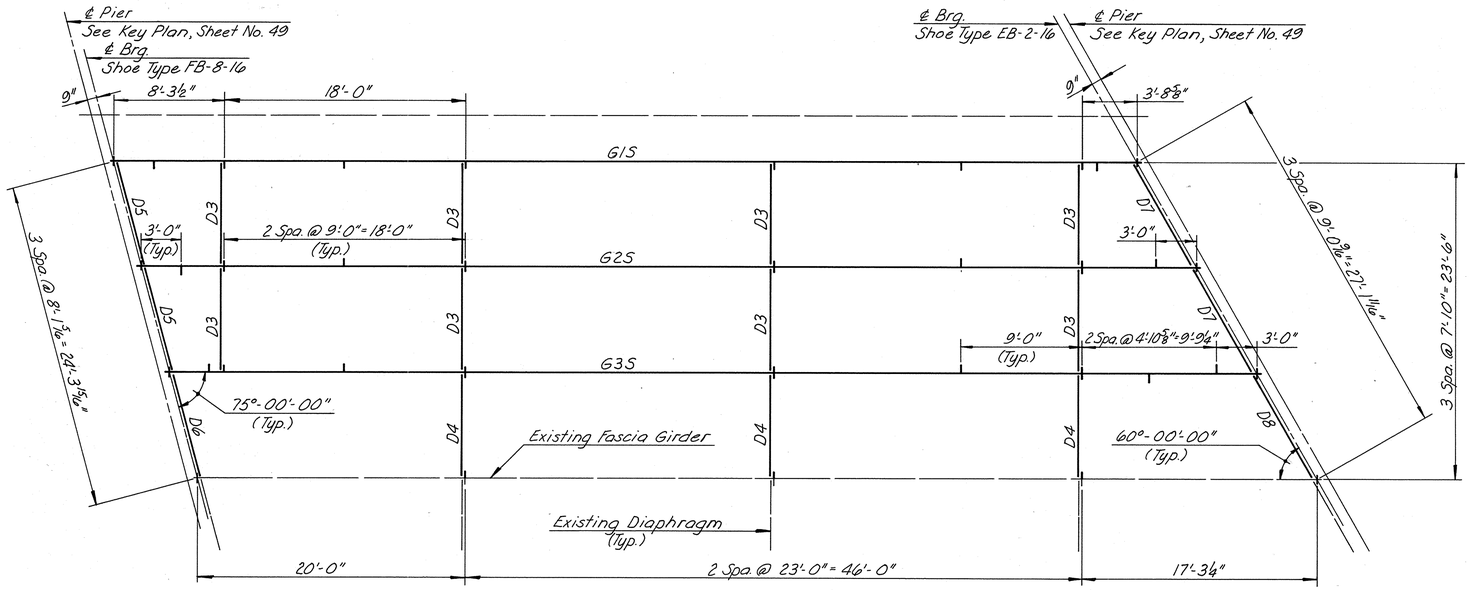
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 13 NORTHBOUND

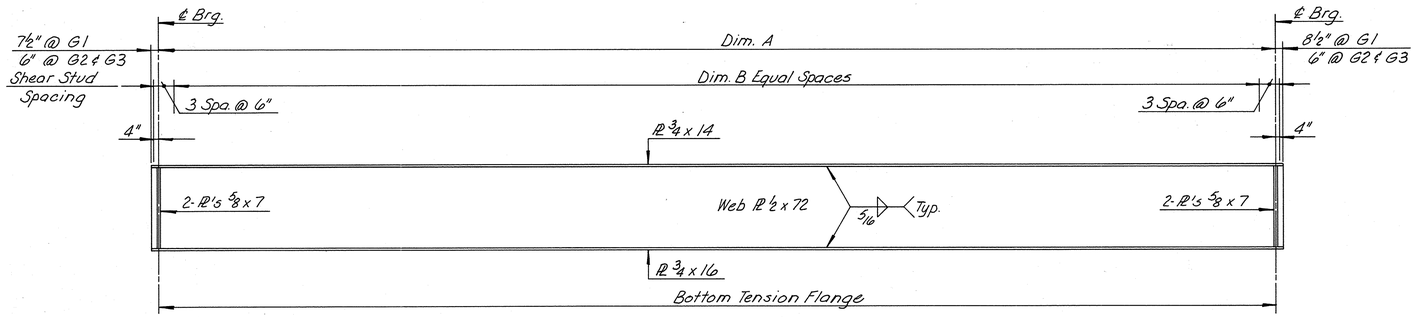
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 35 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	36	106



FRAMING PLAN - UNIT 14 SOUTHBOUND
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNIT 14 SOUTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.

GIRDER	DIM. A	DIM. B
G1	76'-0"	43
G2	78'-5⅛"	44
G3	80'-10¼"	46

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

N25099

AS BUILT

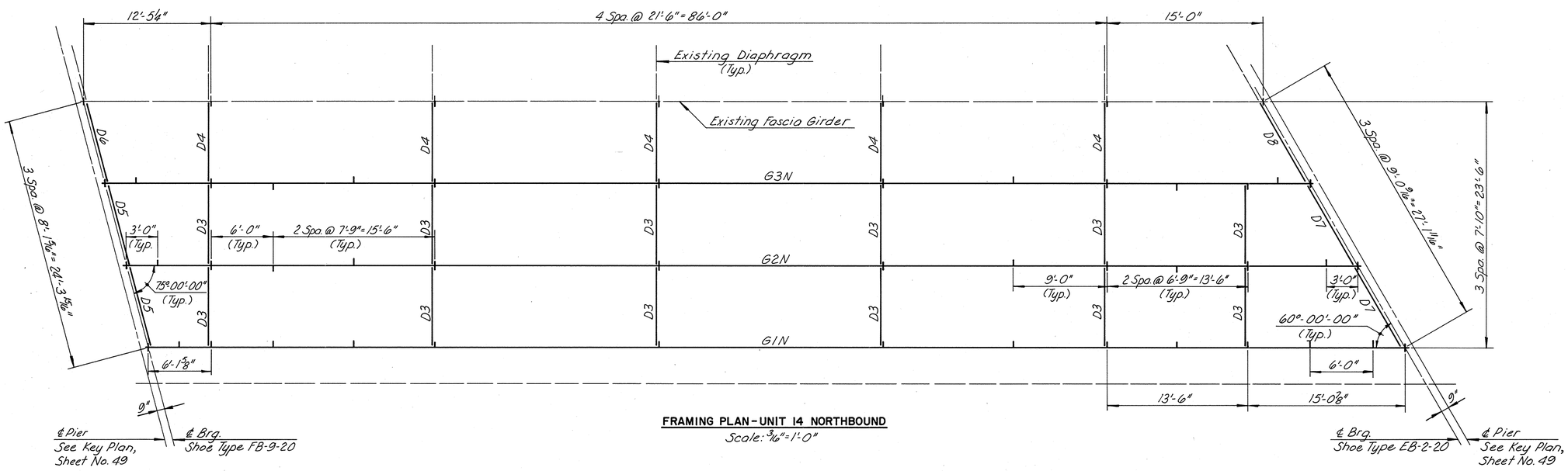
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 14 SOUTHBOUND

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

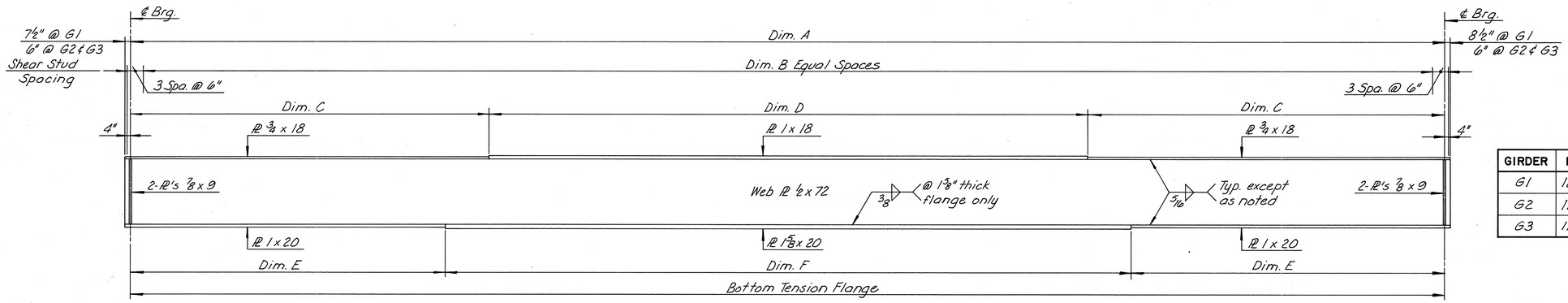
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 36 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	37	106



FRAMING PLAN - UNIT 14 NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION - UNIT 14 NORTHBOUND
Scale: 3/16" = 1'-0"

GIRDER	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E	DIM. F
G1	120'-8½"	60	32'-10¼"	55'-0"	26'-1¼"	68'-6"
G2	118'-3½"	59	30'-10¾"	56'-6"	26'-7¾"	65'-0"
G3	115'-10⅜"	58	31'-11⅜"	52'-0"	24'-8⅜"	66'-6"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

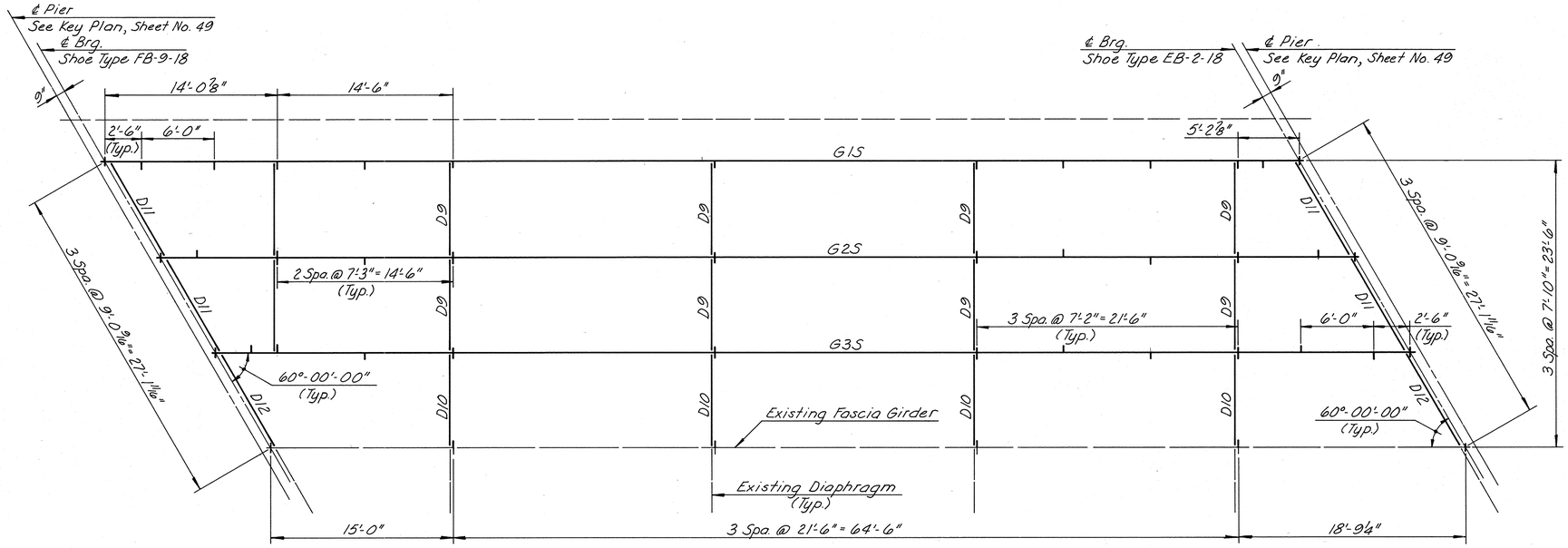
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 14 NORTHBOUND

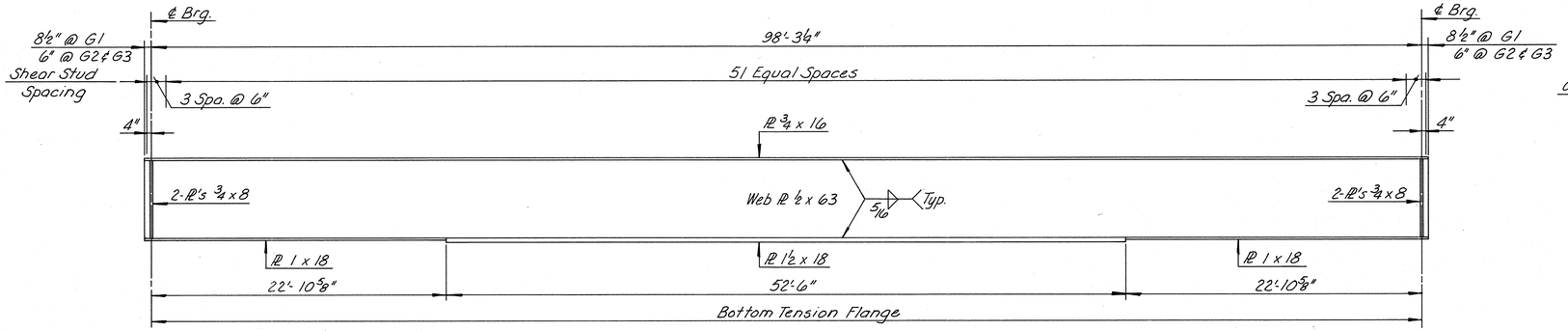
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 37 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	38	106

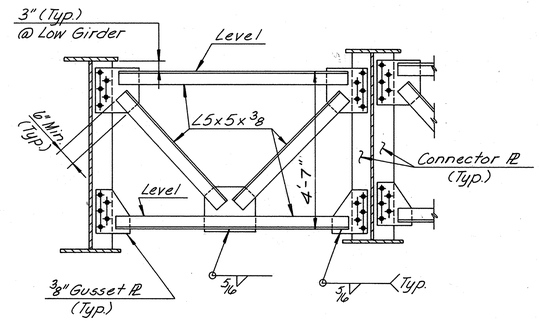


⚠ **FRAMING PLAN - UNIT I5 SOUTHBOUND**
Scale: $\frac{3}{16}$" = 1'-0"

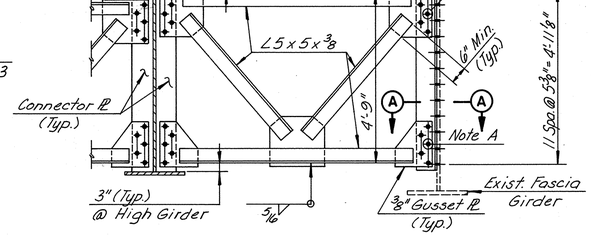


⚠ **GIRDER ELEVATION - UNIT I5 SOUTHBOUND**
Scale: $\frac{3}{16}$" = 1'-0"

NOTE:
For Section A-A, see Sheet No. 45.
For Diaphragms 11 & 12, see Sheet No. 39.
For Additional Steel Details, see Sheet No. 45.



⚠ **INTERMEDIATE DIAPHRAGM D9**
Scale: ½" = 1'-0"



⚠ **INTERMEDIATE DIAPHRAGM D10**
Scale: ½" = 1'-0"

	BY	DATE				
MADE	EJM	1-87		As Built	TEM	3-89
CHECKED	TFP	3-87	⚠	Diaphragm & Girder Rev.	EJM	5-87
IN CHARGE	SR		NO.	REVISION	BY	DATE

N23599

AS BUILT

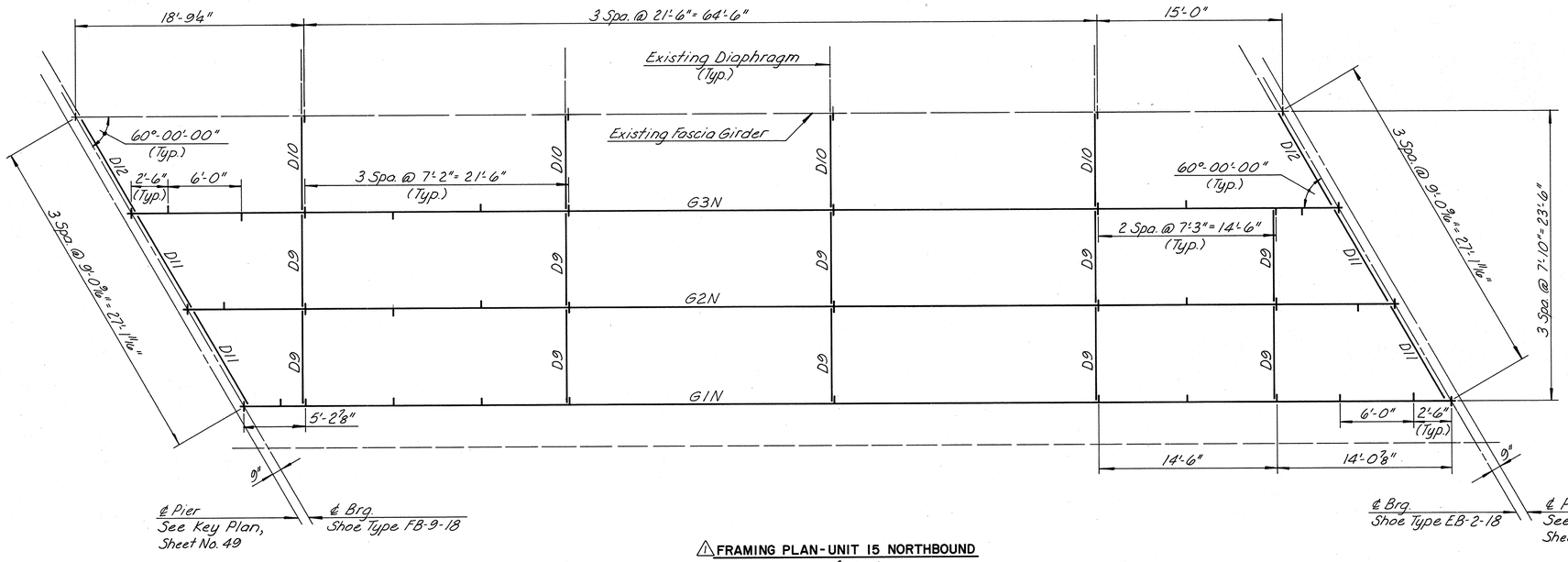
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT I5 SOUTHBOUND

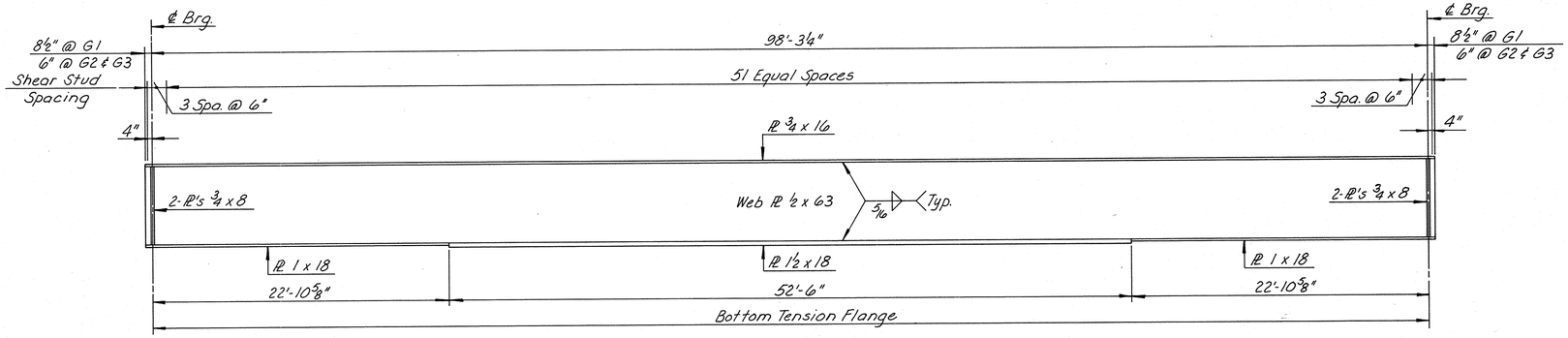
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 38 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	39	106

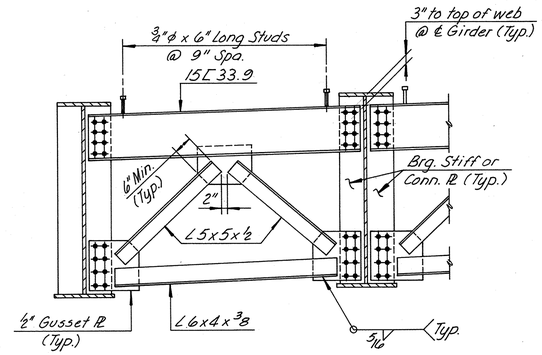


⚠ FRAMING PLAN - UNIT 15 NORTHBOUND
Scale: 3/16" = 1'-0"

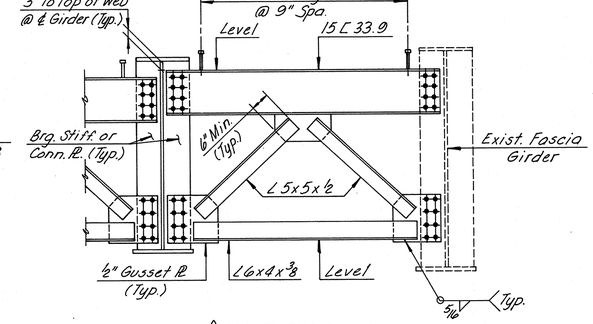


⚠ GIRDER ELEVATION - UNIT 15 NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



⚠ END DIAPHRAGM D11
Scale: ½" = 1'-0"



⚠ END DIAPHRAGM D12
Scale: ½" = 1'-0"

	BY	DATE
MADE	EJM	1-87
CHECKED	TFP	3-87
IN CHARGE	SR	

NO.	REVISION	BY	DATE
⚠	Rev. Diaph. & Girder	EJM	5-87

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

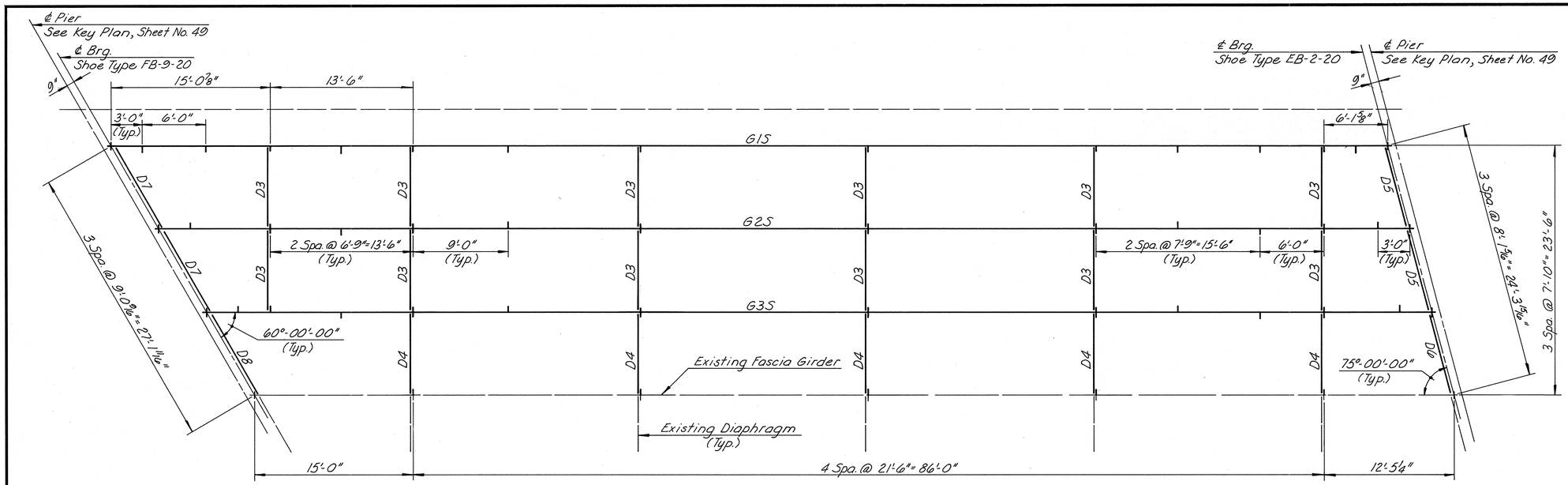
FRAMING PLAN & GIRDER ELEVATION
UNIT 15 NORTHBOUND

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

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 39 OF 106

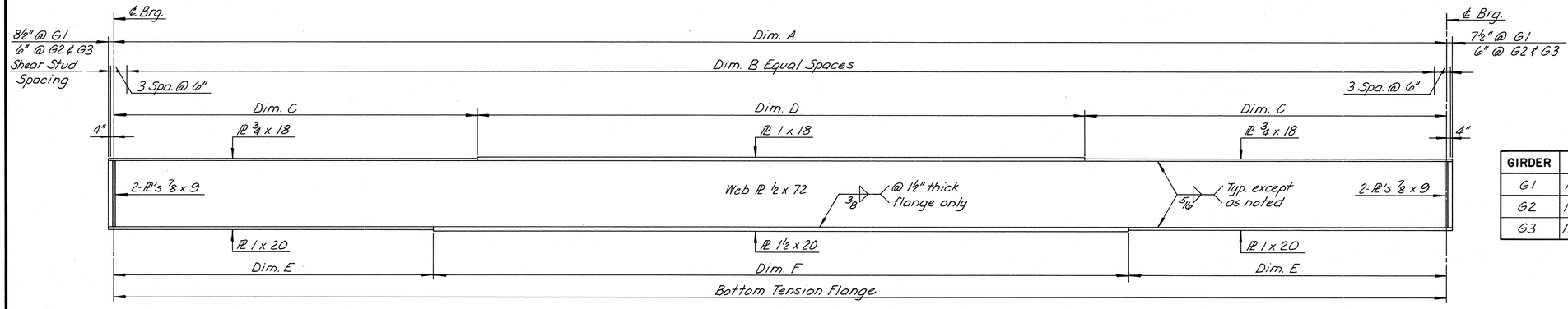
N75399

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	40	106



FRAMING PLAN - UNIT 16 SOUTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION - UNIT 16 SOUTHBOUND
Scale: 3/16" = 1'-0"

GIRDER	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E	DIM. F
G1	120'-8½"	60	32'-10¼"	55'-0"	26'-1¼"	68'-6"
G2	118'-3½"	59	30'-10¾"	56'-6"	26'-7¾"	65'-0"
G3	115'-10⅜"	58	31'-11⅜"	52'-0"	24'-8⅜"	66'-6"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

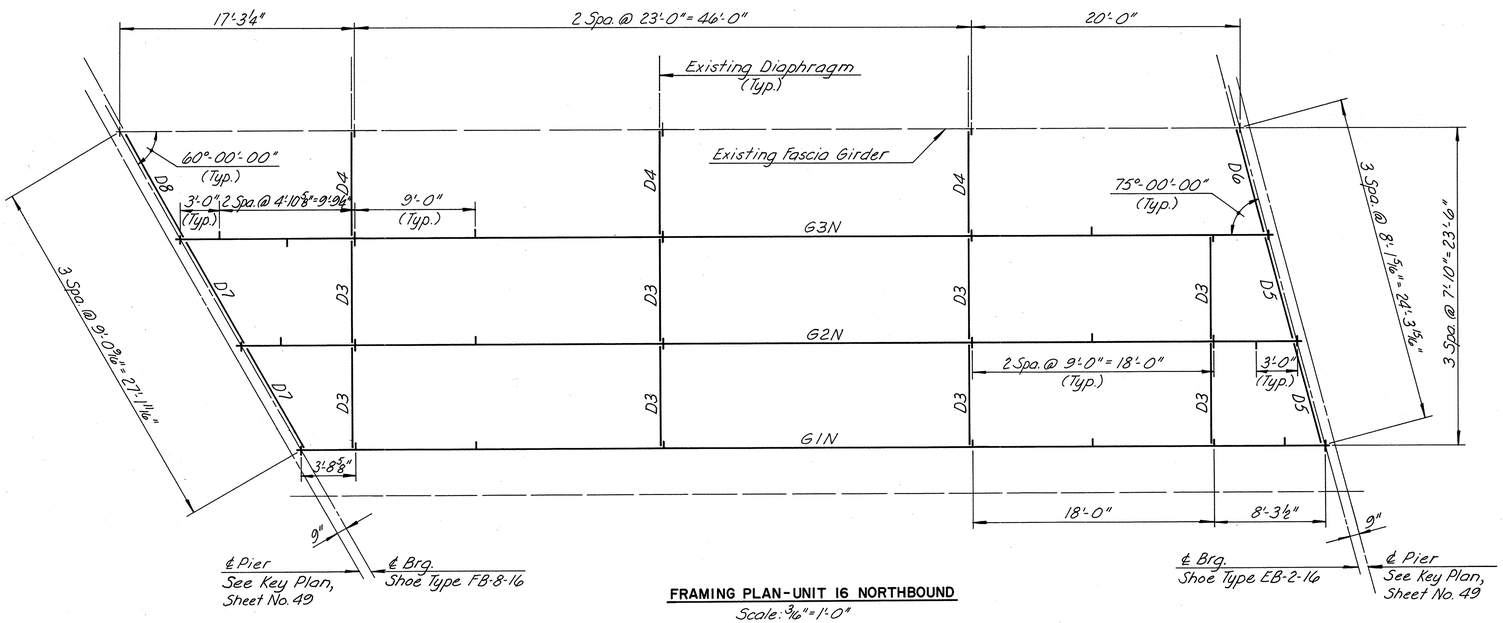
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 16 SOUTHBOUND

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

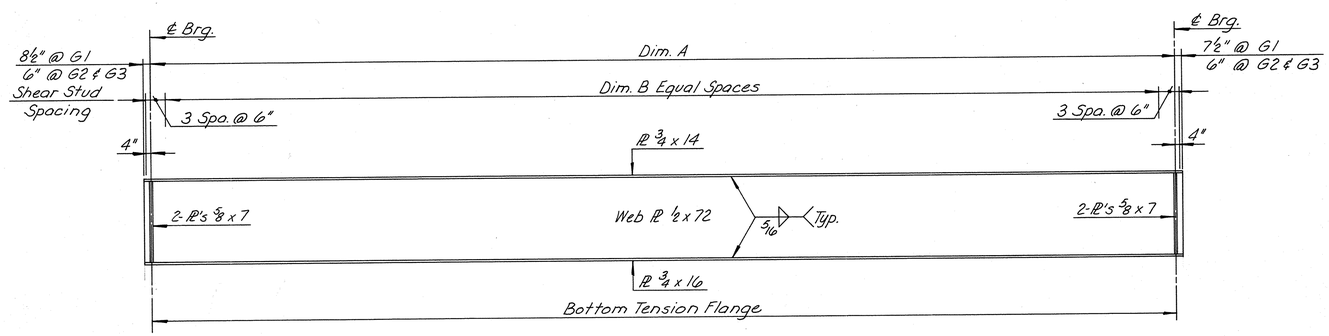
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 40 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	41	106



FRAMING PLAN - UNIT 16 NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION - UNIT 16 NORTHBOUND
Scale: 3/16" = 1'-0"

GIRDER	DIM. A	DIM. B
G1	76'-0"	43
G2	78'-5⅛"	44
G3	80'-10¼"	46

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

N7539

AS BUILT

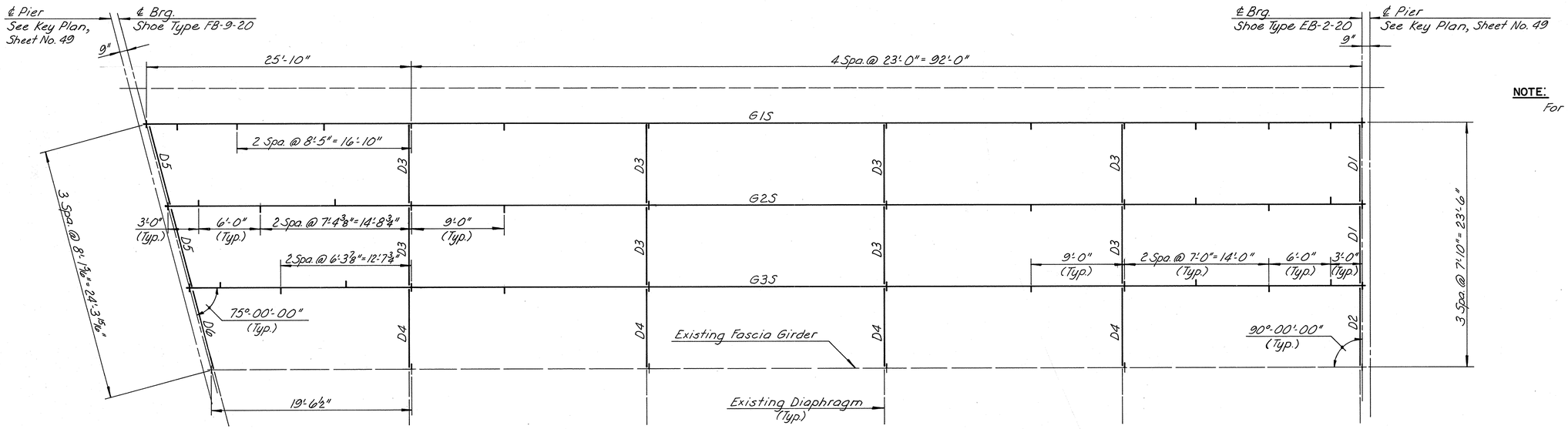
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 16 NORTHBOUND

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

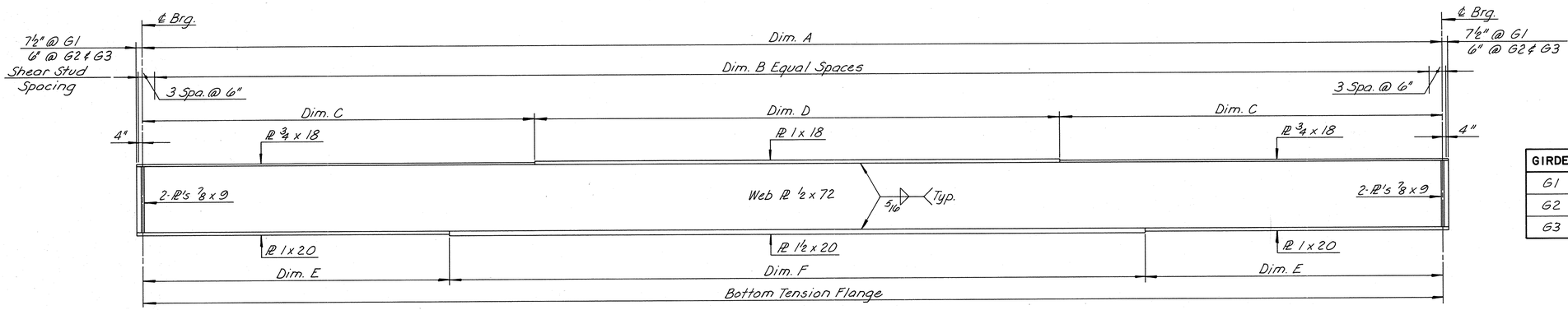
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 41 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	42	106



NOTE:
For Steel Details, see Sheet No. 45.

FRAMING PLAN - UNIT 17 SOUTHBOUND
Scale: 3/16" = 1'-0"



GIRDER	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E	DIM. F
G1	117'-10"	58	32'-11"	52'-0"	25'-8"	66'-6"
G2	115'-8 3/4"	57	32'-1 3/8"	51'-6"	24'-7 3/8"	66'-6"
G3	113'-7 5/8"	56	33'-9 13/16"	46'-0"	25'-6 13/16"	62'-6"

GIRDER ELEVATION - UNIT 17 SOUTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

N7339

AS BUILT

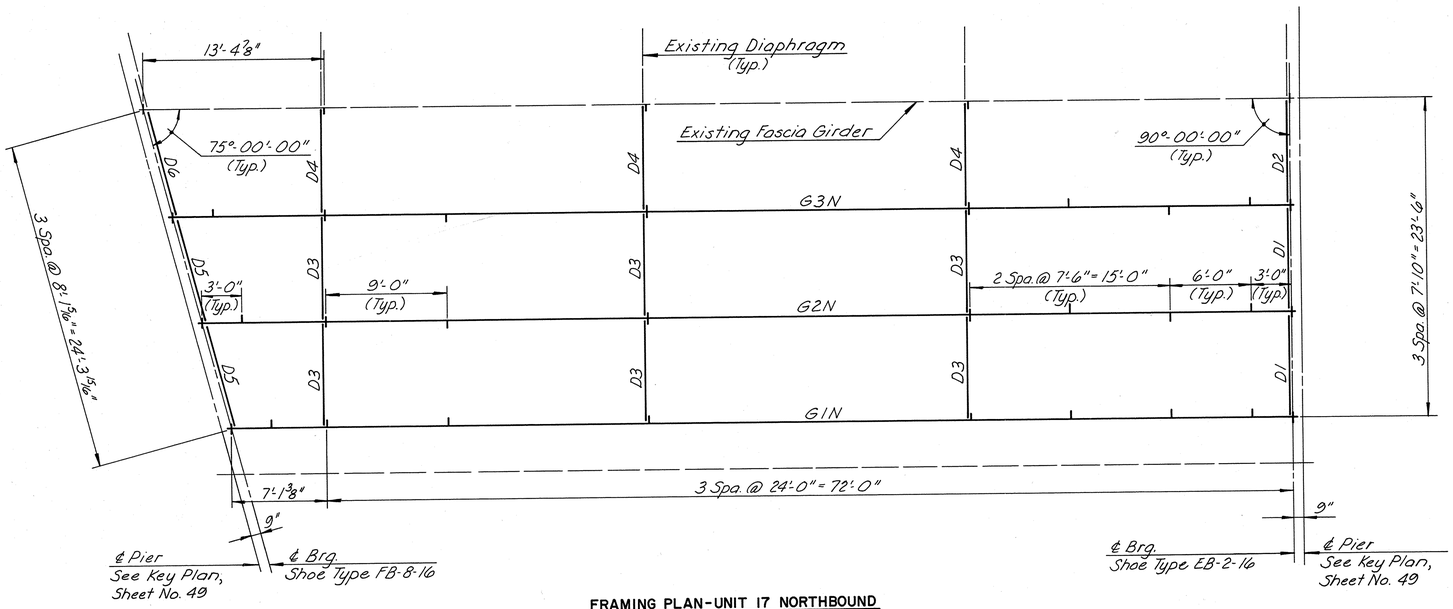
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 17 SOUTHBOUND

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

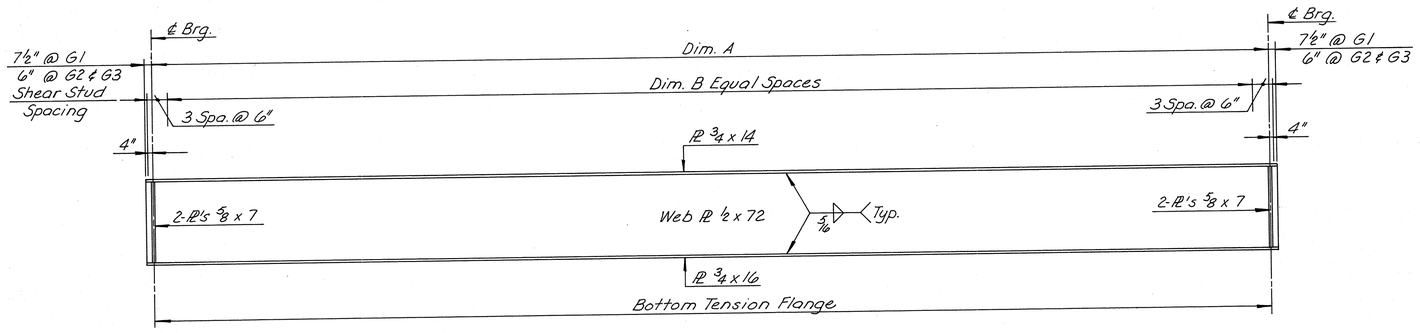
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 42 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	43	106



FRAMING PLAN-UNIT 17 NORTHBOUND
Scale: 3/16"=1'-0"

NOTE:
For Steel Details, see Sheet No. 45.



GIRDER ELEVATION-UNIT 17 NORTHBOUND
Scale: 3/16"=1'-0"

GIRDER	DIM. A	DIM. B
G1	79'-1 3/8"	43
G2	81'-2½"	44
G3	83'-3¾"	45

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

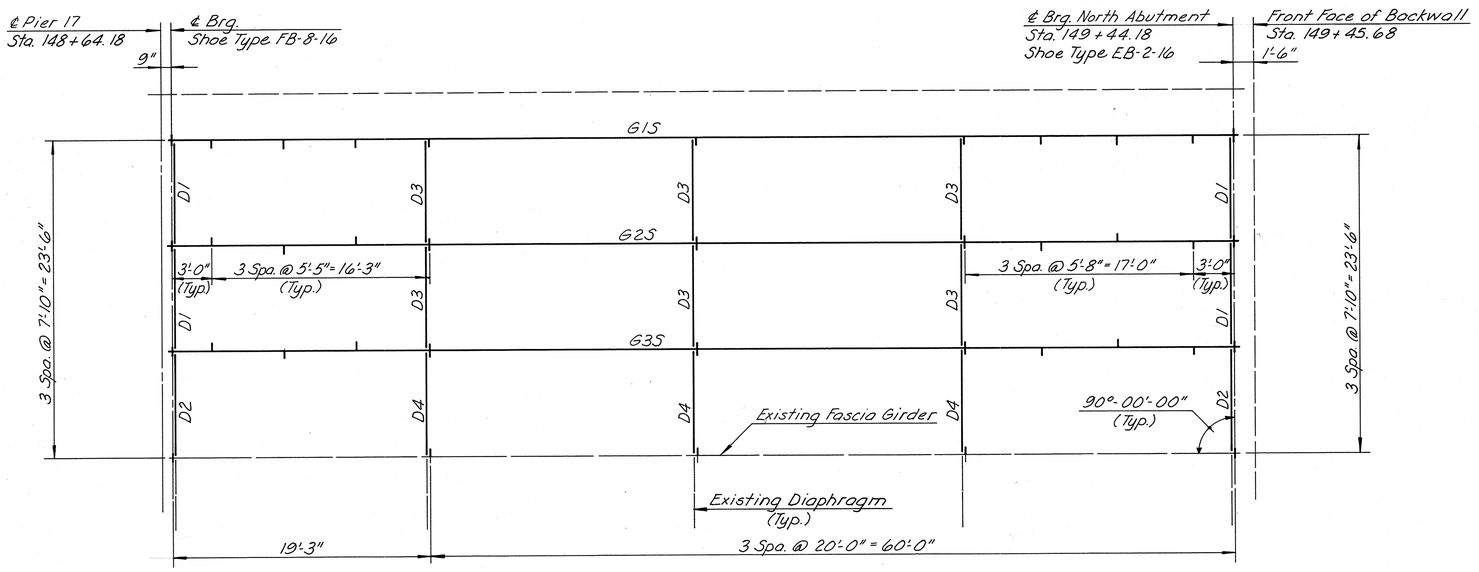
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 17 NORTHBOUND

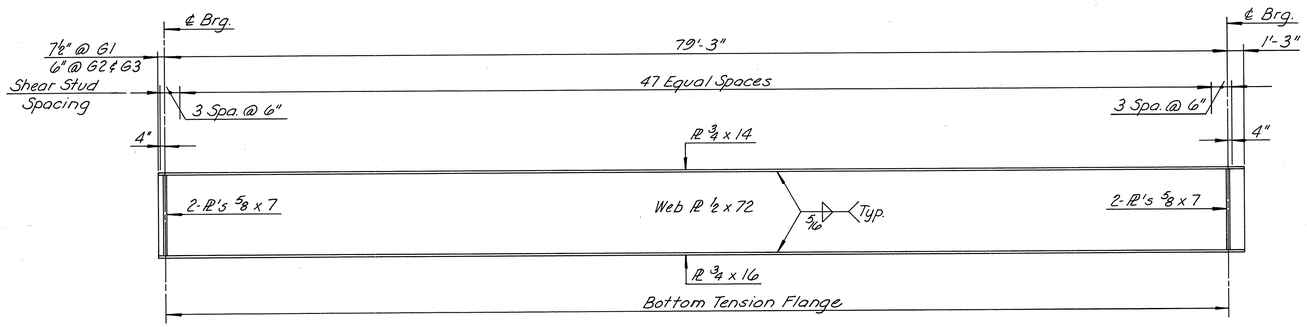
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 43 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	44	106



FRAMING PLAN - UNIT 18 SOUTHBOUND & NORTHBOUND (SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"



GIRDER ELEVATION - UNIT 18 SOUTHBOUND & NORTHBOUND
Scale: 3/16" = 1'-0"

NOTE:
For Steel Details, see Sheet No. 45.

	BY	DATE
MADE	EJM	1-87
CHECKED	TFP	3-87
IN CHARGE	SR	

NO.	REVISION	BY	DATE
	As Built	TEM	3-89

AS BUILT

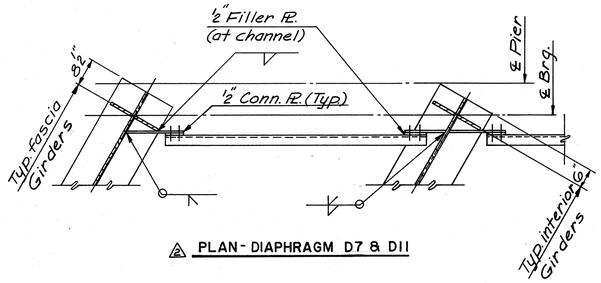
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 18 SOUTHBOUND & NORTHBOUND

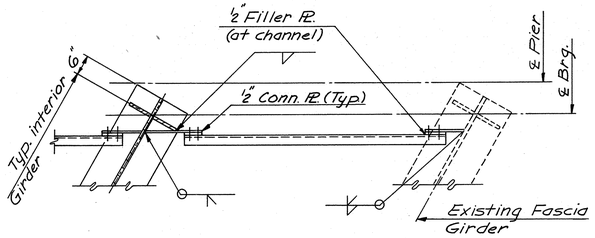
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 44 OF 106

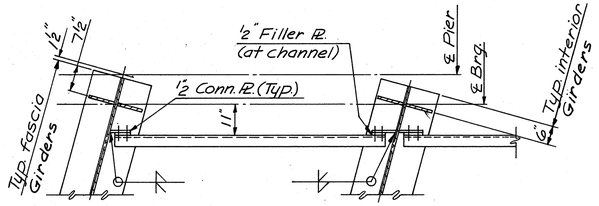
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	45	106



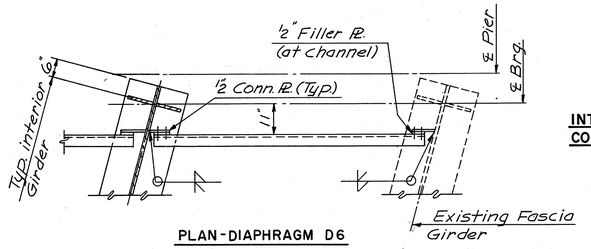
△2 PLAN - DIAPHRAGM D7 & D11



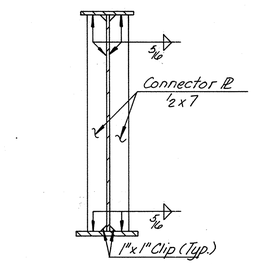
△2 PLAN - DIAPHRAGM D8 & D12



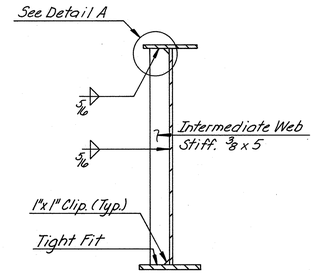
PLAN - DIAPHRAGM D5



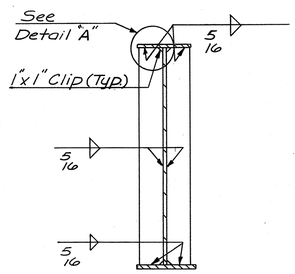
PLAN - DIAPHRAGM D6



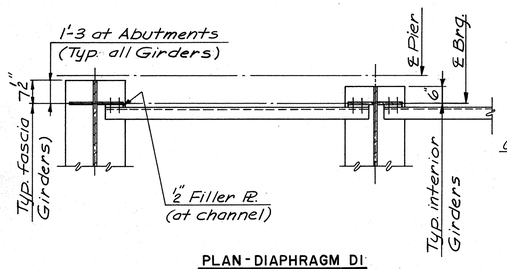
INTERMEDIATE DIAPHRAGM CONNECTOR PLATE DETAIL
No Scale



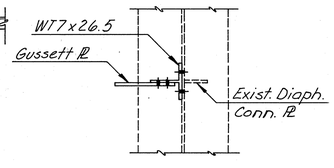
INTERMEDIATE WEB STIFFENER DETAIL
No Scale



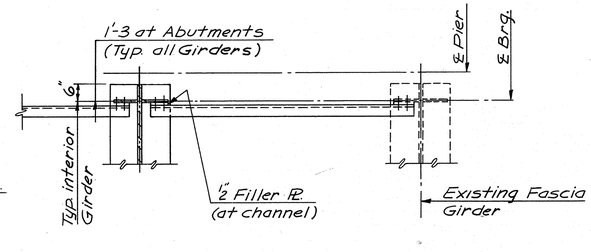
BEARING STIFFENER DETAIL
No Scale



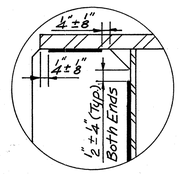
PLAN - DIAPHRAGM D1



△SECTION A-A
Scale: ¾"=1'-0"

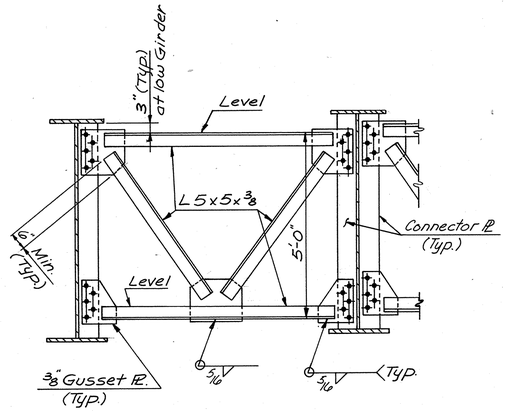


PLAN - DIAPHRAGM D2

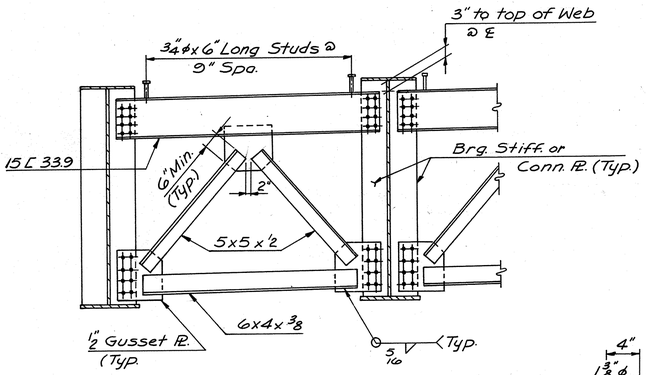


DETAIL "A"
No Scale

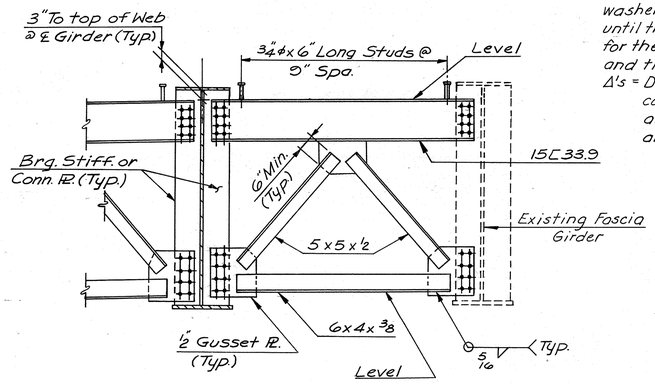
NOTE A:
Provide slotted hole in Conn. Pl. for Δ's deflection and 1"ϕ erection bolt with 3"ϕ washers. The bolt shall remain snug tight until the deck slab is placed, then the holes for the remaining bolts shall be field drilled and tightened.
Δ's = Deflection of girder from dead load of concrete deck slab, bolster and 20 p.s.f. allowance for construction tolerance and construction methods. See Sheets No. 68



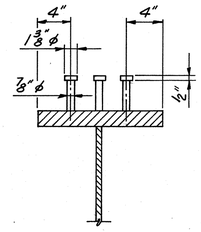
INTERMEDIATE DIAPHRAGM D3,
Scale: ½"=1'-0"



ELEVATION
END DIAPHRAGM DETAILS - D1, D5, D7
Scale: ½"=1'-0"

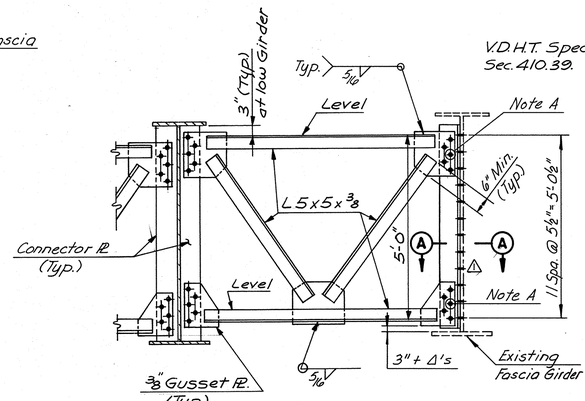


ELEVATION
END DIAPHRAGM DETAILS - D2, D6, D8
Scale: ½"=1'-0"

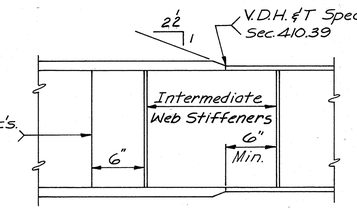


SHEAR STUD DETAIL
No Scale

NOTES:
Capacity = 6010 lbs. per stud shear spacing shown is maximum spacing.
All connections shall be made with ⅞"ϕ H.S. Bolts and shall conform to ASTM A-325.



INTERMEDIATE DIAPHRAGM D4
Scale: ½"=1'-0"



WELDED SPLICE DETAIL
No Scale

	BY	DATE
MADE	ALC	3-87
CHECKED	T.F.P.	3-87
IN CHARGE	S.R.	

NO.	REVISION	BY	DATE
	As Built	TEM	3-89
△2	Added Diaph's.	ALC	5-87
△1	Revised Conn. Pl.	T.F.P.	4-87

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

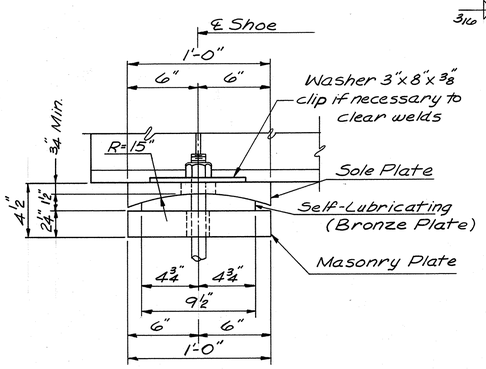
STEEL DETAILS

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

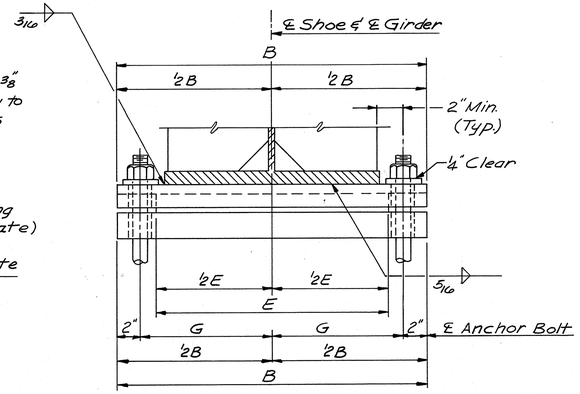
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 45 OF 106

N20V6

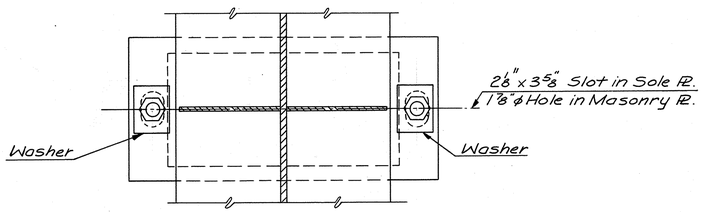
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	46	106



SIDE ELEVATION

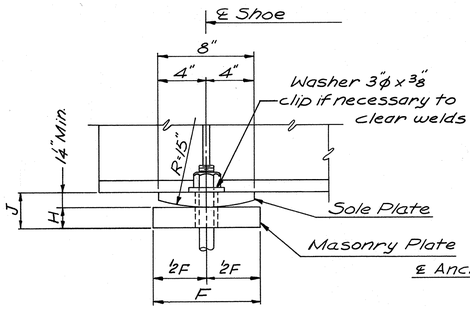


END ELEVATION

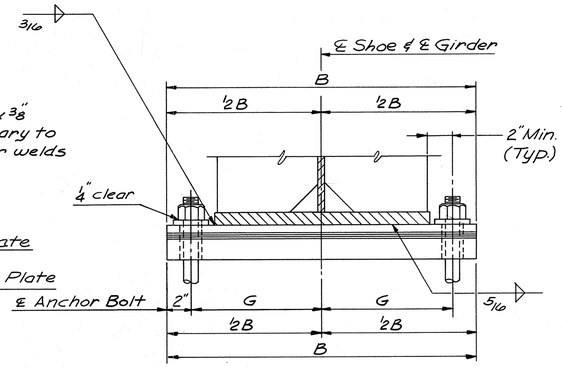


PLAN

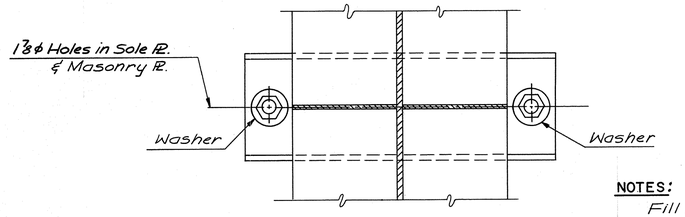
EXPANSION SHOE EB-2
No Scale



SIDE ELEVATION



END ELEVATION

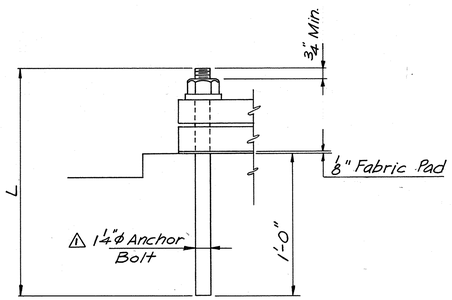


PLAN

FIXED SHOE
No Scale

EXPANSION SHOES														
SHOE TYPE	NO. REQ'D	A	B	C	D	E	F	G	H	J	L			
EB-2-16	24		2'-0"			1'-5 1/2"		10"			1'-7"			
EB-2-18	18		2'-2"			1'-7 1/2"		11"			1'-7"			
EB-2-20	66		2'-4"			1'-9 1/2"		1'-0"			1'-7"			

FIXED SHOES														
SHOE TYPE	NO. REQ'D	A	B	C	D	E	F	G	H	J	L			
FB-8-16	24		2'-0"				8"	10"	1 1/2"	2 3/4"	1'-2"			
FB-9-18	18		2'-2"				9"	11"	1 3/4"	4 1/2"	1'-2 1/4"			
FB-9-20	66		2'-4"				9"	1'-0"	1 3/4"	4 1/2"	1'-2 1/4"			



ANCHOR BOLT DETAIL
No Scale

NOTES:

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

For expansion bearing, bevel sole plate to match grade.

Steel in bearing may be ASTM A36, A572, Grade 50, or A588 and shall be painted. Surface of sole plate and masonry plate in contact with bronze plates shall not be painted, but coated with multipurpose grease before shipment. Prior to assembly in place these surfaces shall be thoroughly coated with additional antioxidant lubricant furnished by the manufacturer.

Radius may be machined to compensate for grade.

Bearing shall be set so that at 68°F, it is at the midpoint of its movement.

For Expansion bearing, 15" Radius tolerances:
Sole Plate -0", +.01"
Bronze Plate -.01", +0"

	BY	DATE				
MADE	A.L.C.	2-87		As Built	TEM	3-89
CHECKED	T.F.P.	3-87	⚠	1 1/4 ϕ Anchor Bolt	ALC	4-87
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

N8295

AS BUILT

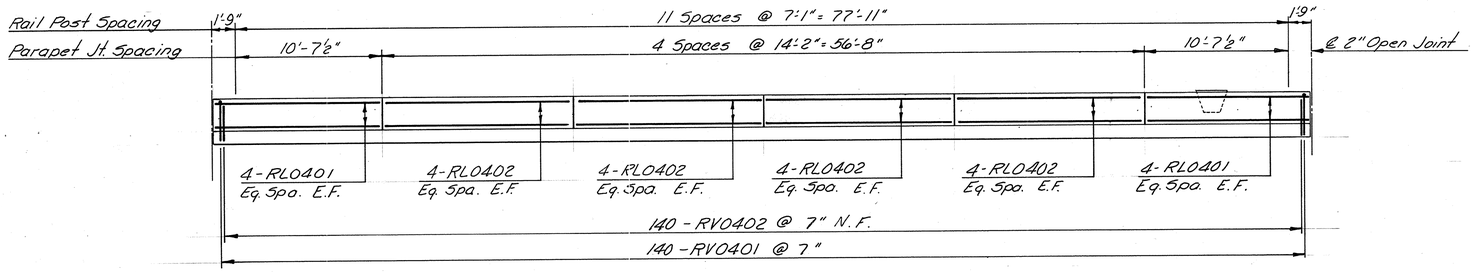
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

SHOE DETAILS

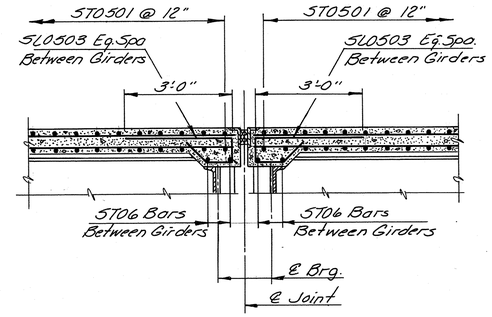
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 46 OF 106

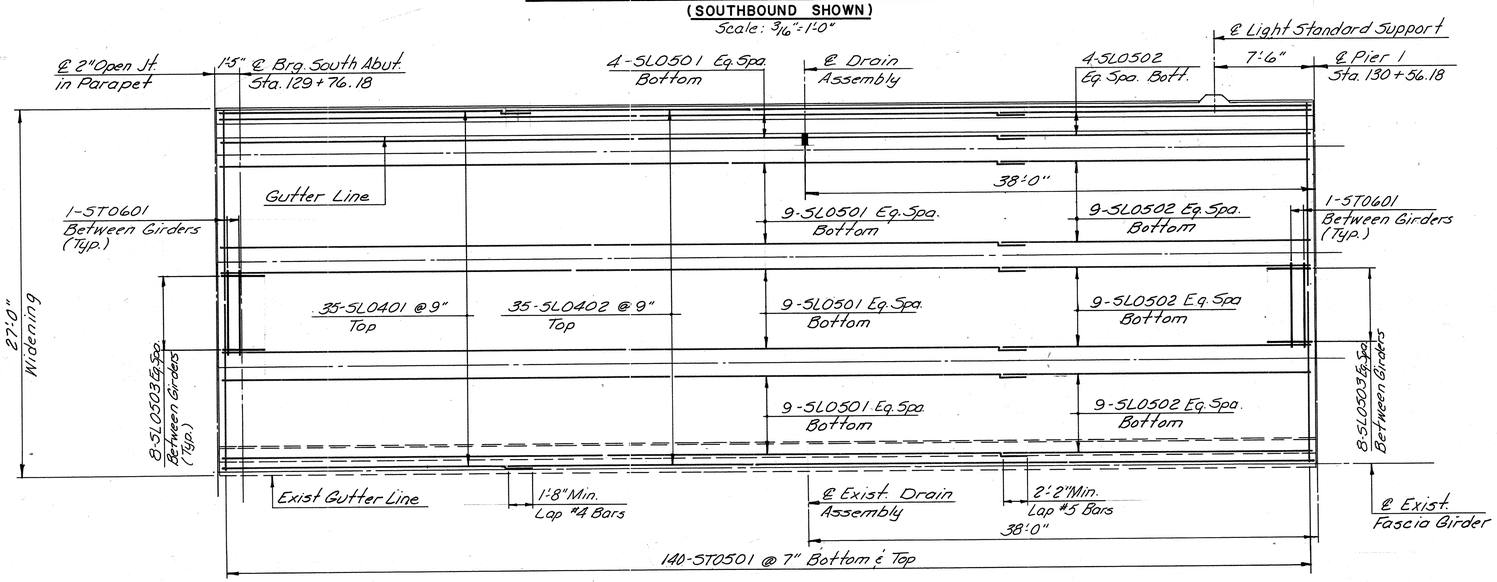
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	51	106



PARAPET ELEVATION - UNIT I SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"



TYPICAL SECTION AT JOINT
Scale: ½"=1'-0"



DECK PLAN - UNIT I SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"

	BY	DATE
MADE	TAL	3-87
CHECKED	T.F.R.	3-87
IN CHARGE	S.R.	

NO.	REVISION	BY	DATE
	As Built	TEM	3-89

AS BUILT

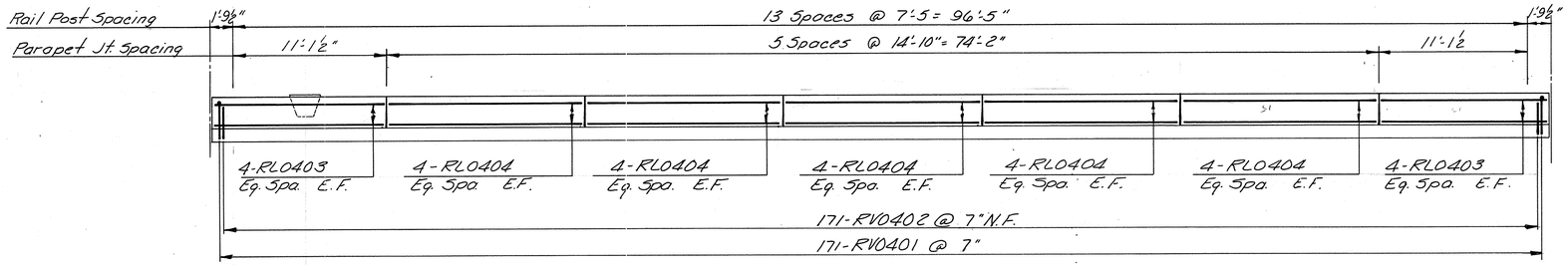
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNIT I SOUTHBOUND & NORTHBOUND

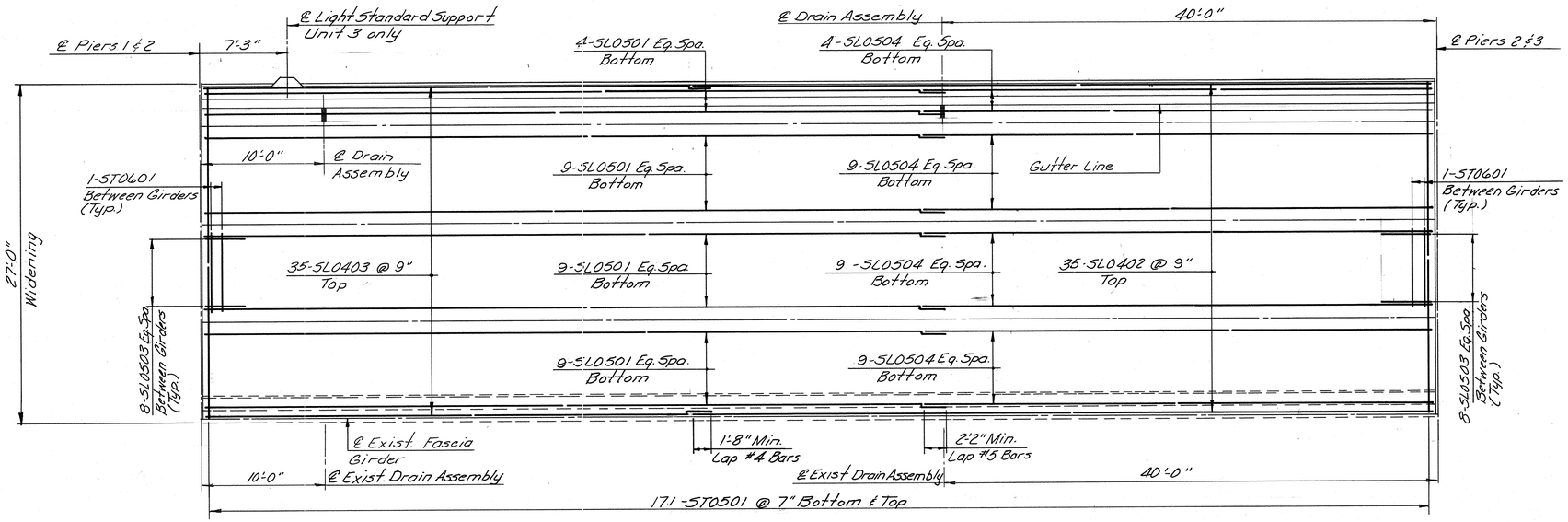
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 51 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	52	106



PARAPET ELEVATION – UNITS 2 & 3 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"



DECK PLAN – UNITS 2 & 3 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TRP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

N7599

AS BUILT

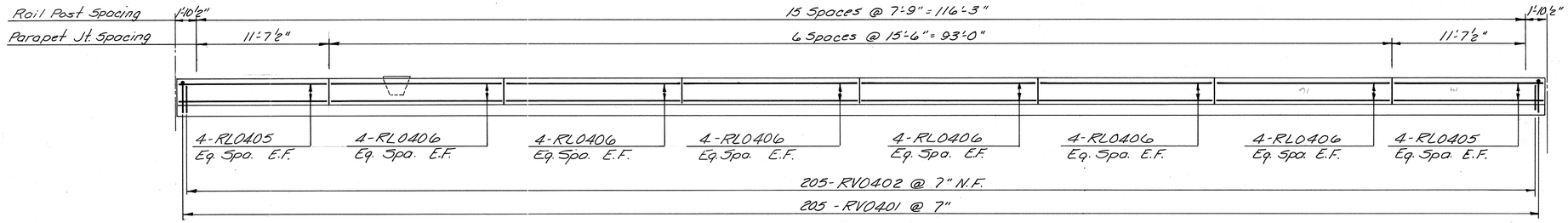
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNITS 2 & 3 SOUTHBOUND & NORTHBOUND

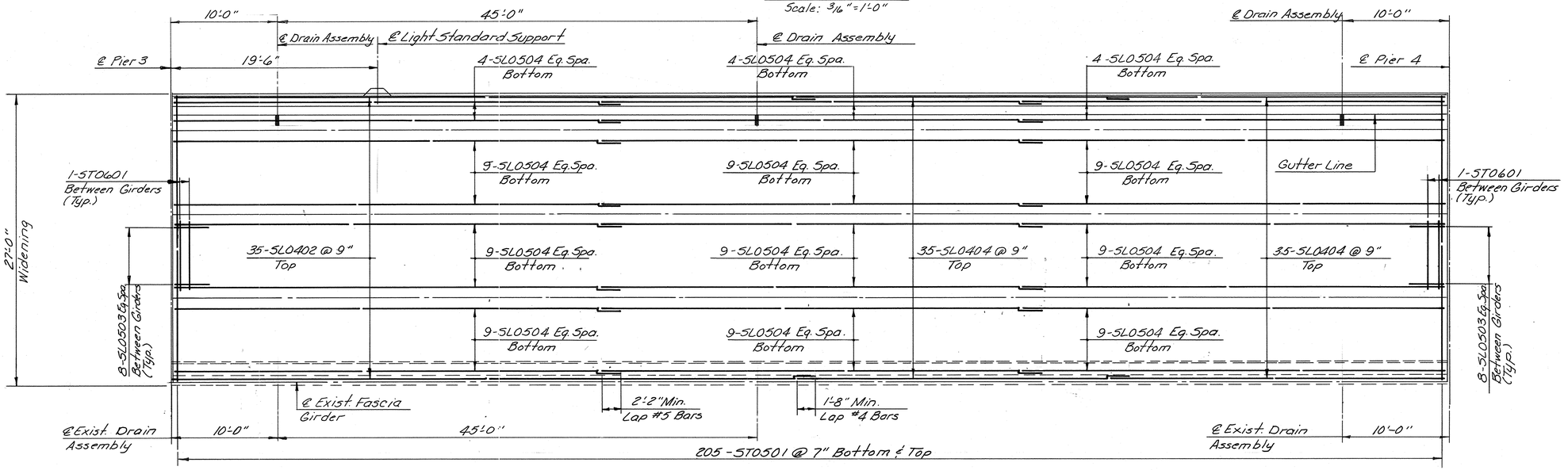
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 52 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	53	106



PARAPET ELEVATION – UNIT 4 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"



DECK PLAN – UNIT 4 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	T.F.P.	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

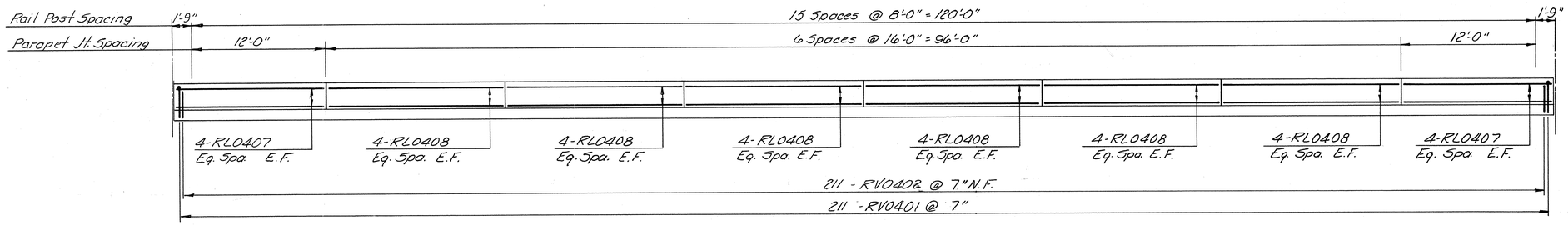
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNIT 4 SOUTHBOUND & NORTHBOUND

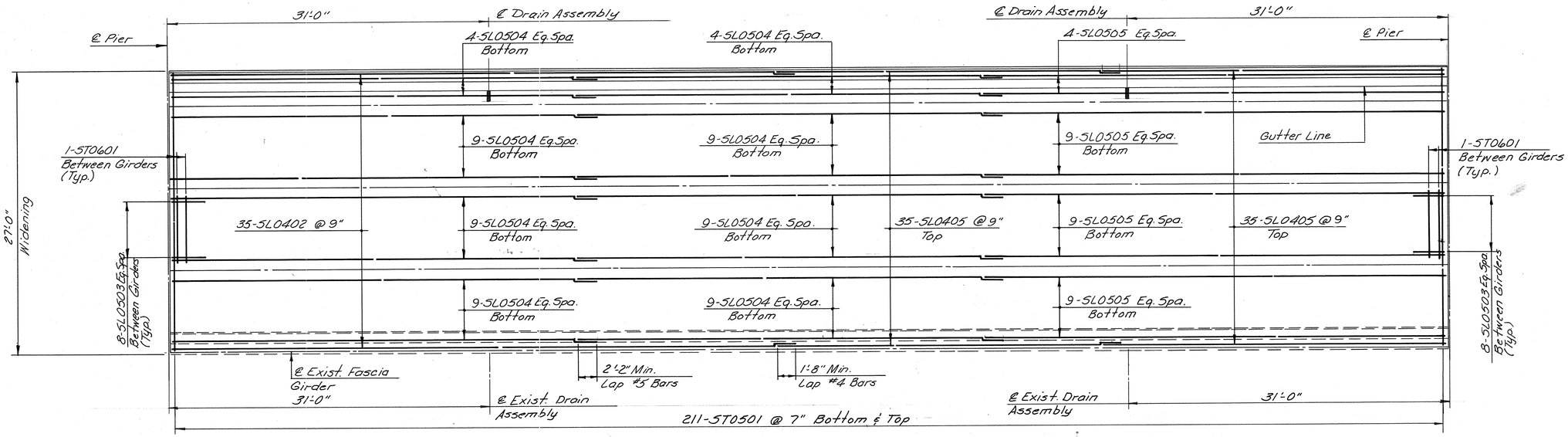
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 53 OF 106

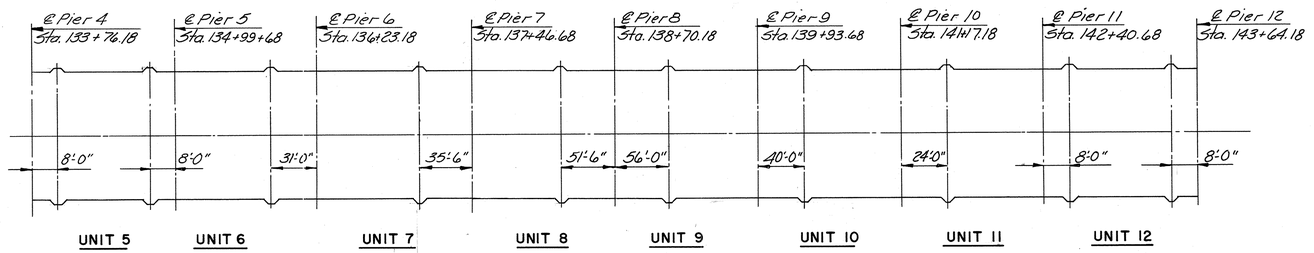
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	54	106



PARAPET ELEVATION - UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"



DECK PLAN - UNITS 5 THRU 12 SOUTBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"



LIGHTING STANDARD LOCATIONS FOR UNITS 5 THRU 12
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TRP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

N2599

AS BUILT

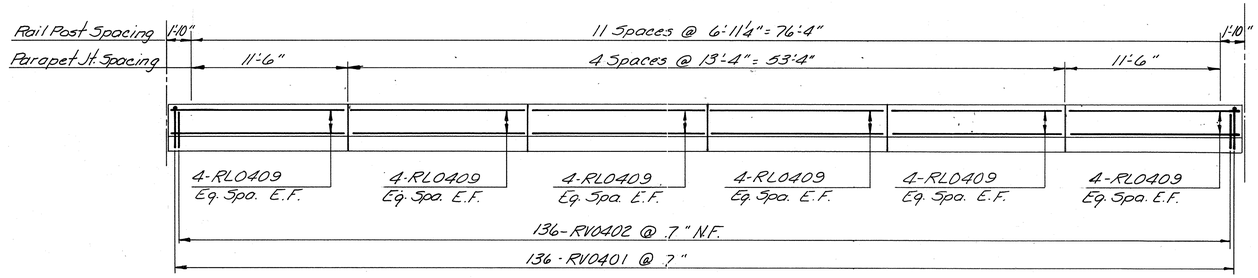
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND

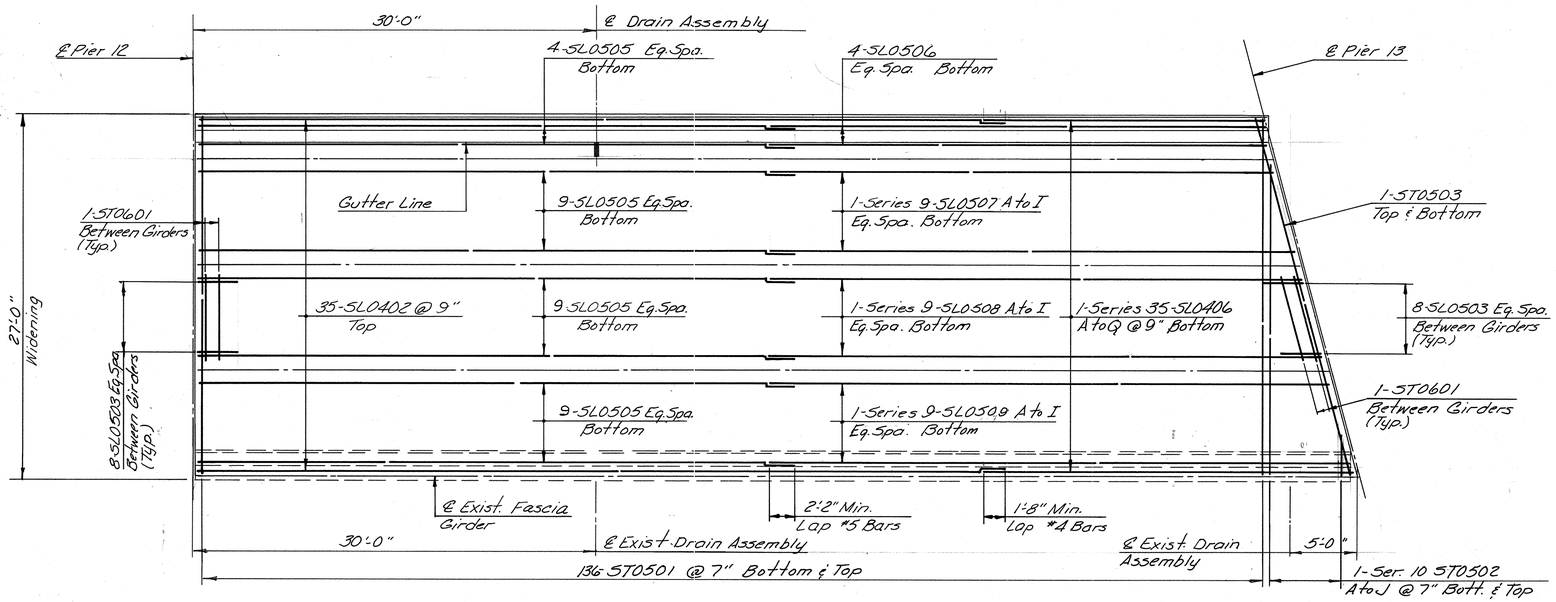
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 54 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	55	106



PARAPET ELEVATION – UNIT 13 SOUTHBOUND
Scale: 3/16"=1'-0"



DECK PLAN – UNIT 13 SOUTHBOUND
Scale: 3/16"=1'-0"

	BY	DATE				
MADE	TAL	3-87				
CHECKED	TRP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

N75899

AS BUILT

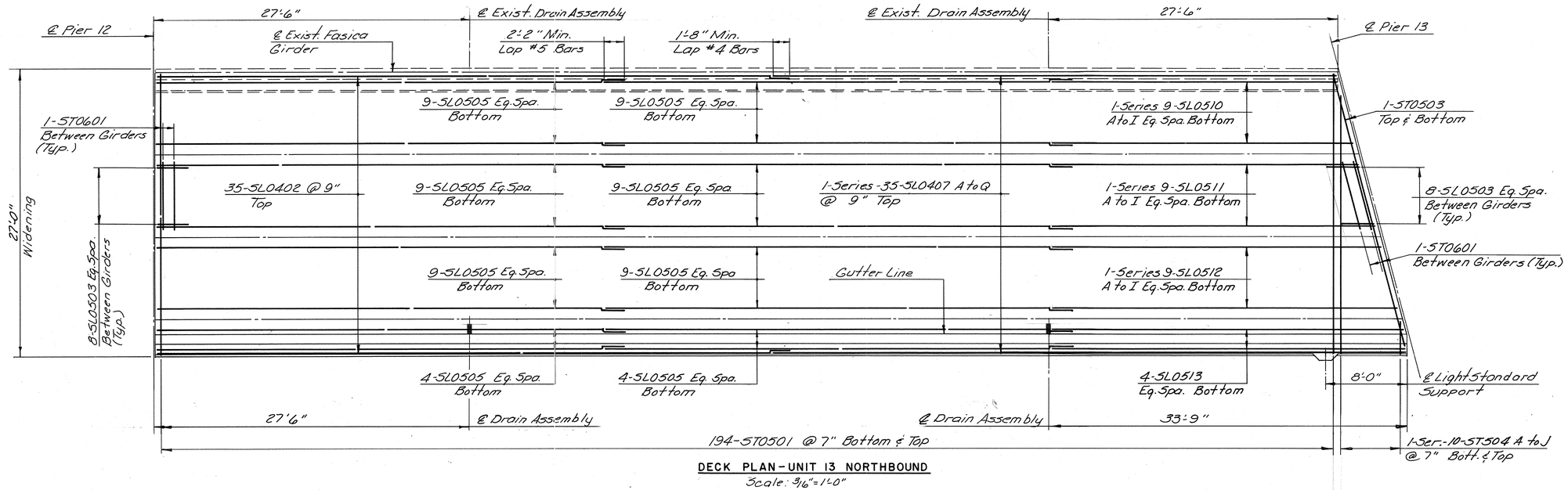
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 13 SOUTHBOUND

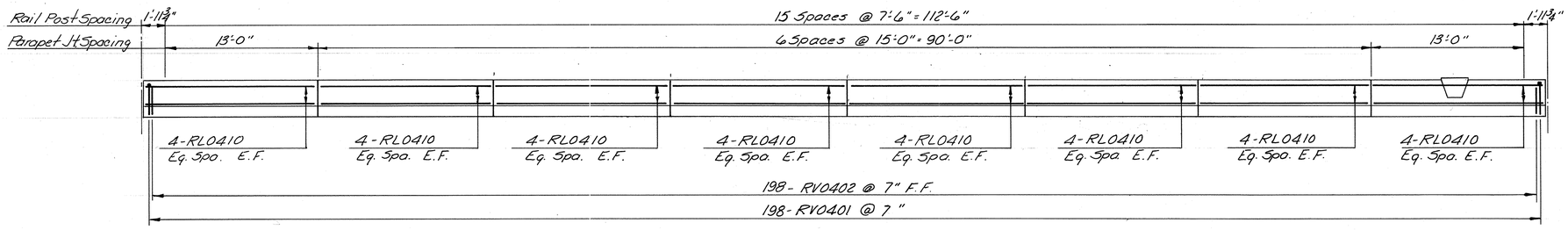
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 55 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	56	106



DECK PLAN - UNIT 13 NORTHBOUND
Scale: 3/16" = 1'-0"



PARAPET ELEVATION - UNIT 13 NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	T.F.P.	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

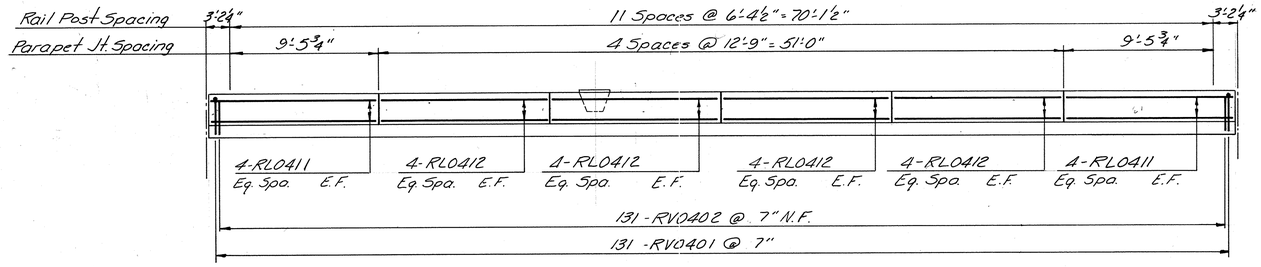
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 13 NORTHBOUND

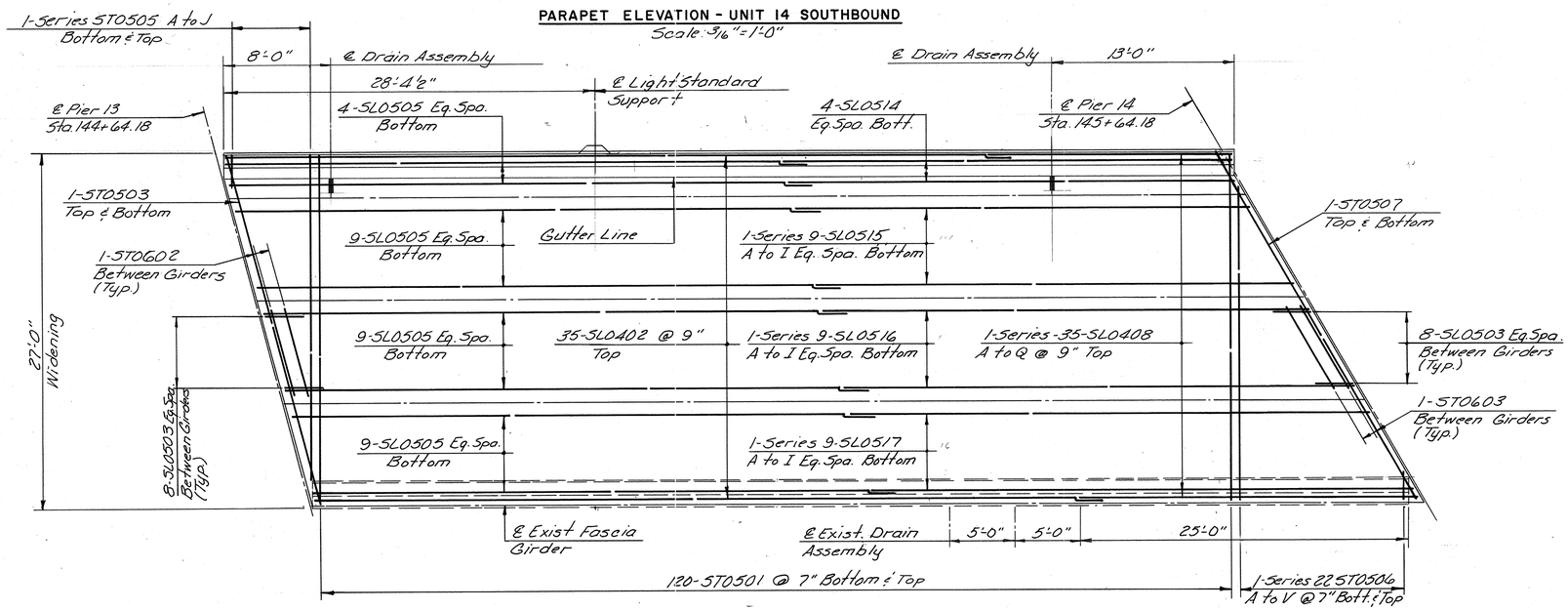
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 56 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	57	106



PARAPET ELEVATION - UNIT 14 SOUTHBOUND
Scale: 3/16" = 1'-0"



DECK PLAN - UNIT 14 SOUTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

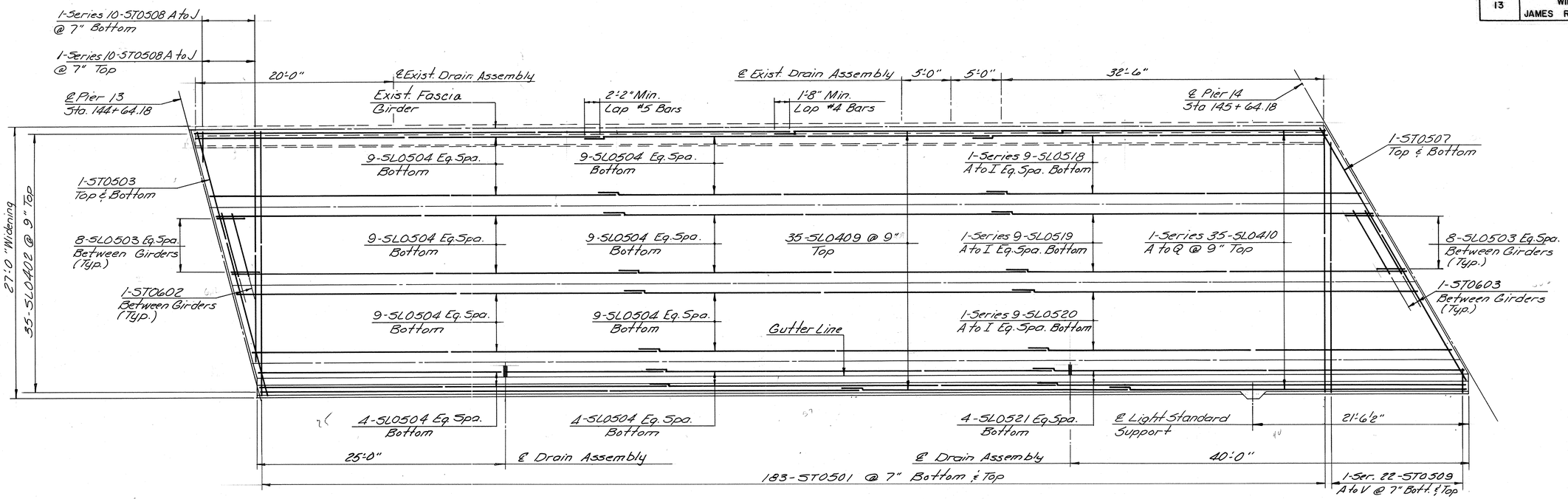
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 14 SOUTHBOUND

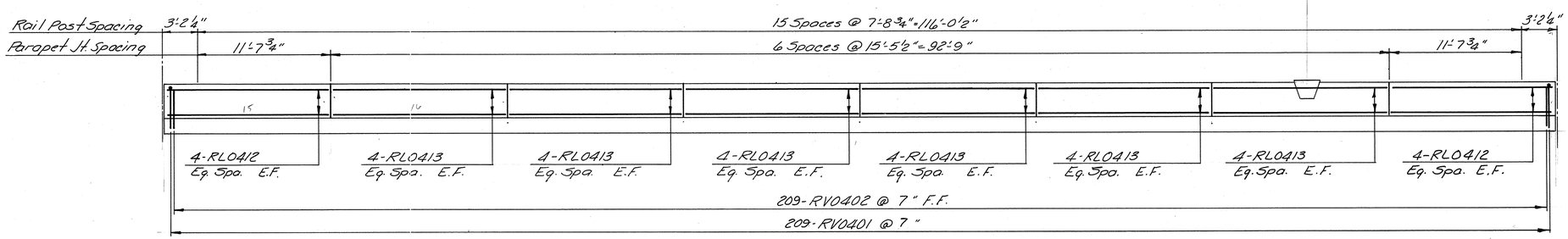
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 57 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	58	106



DECK PLAN - UNIT 14 NORTHBOUND
Scale: 3/16" = 1'-0"



PARAPET ELEVATION - UNIT 14 NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	T.F.P.	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

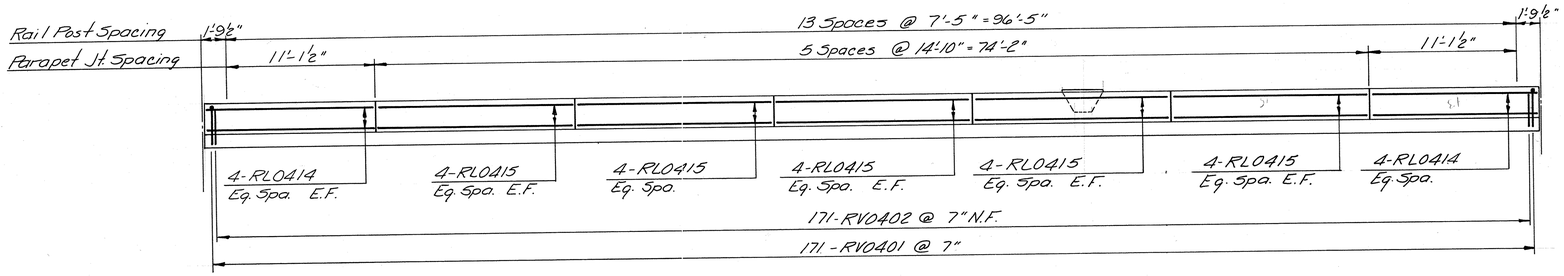
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 14 NORTHBOUND

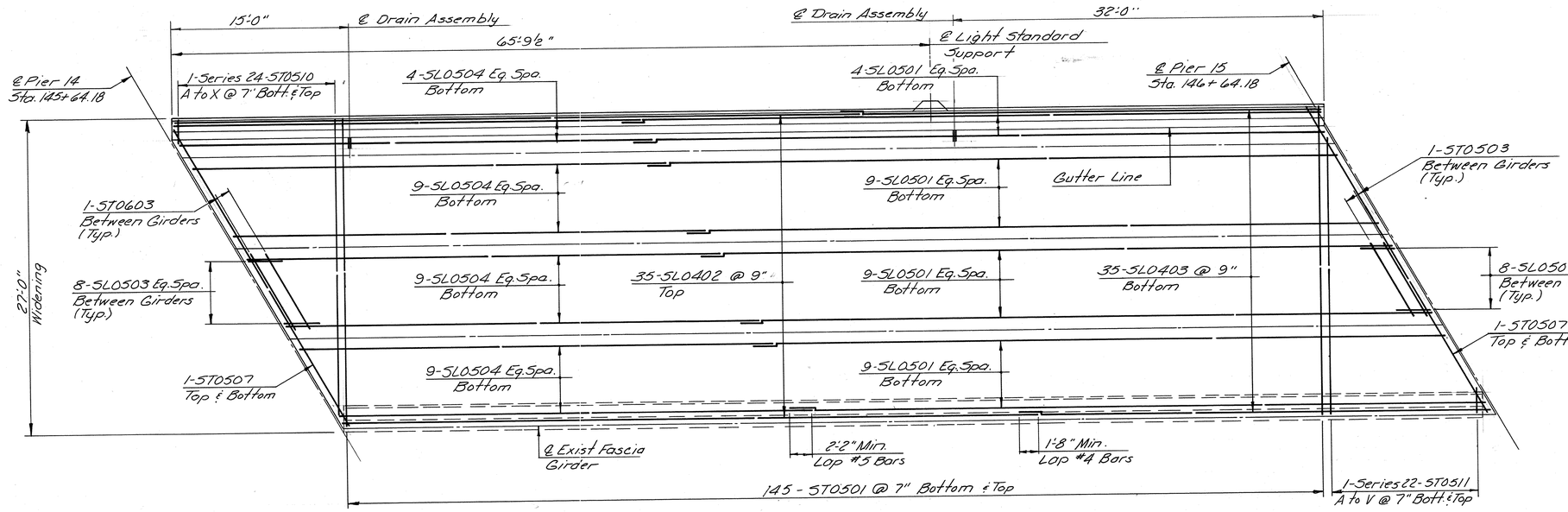
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 58 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	59	106



PARAPET ELEVATION – UNIT 15 SOUTHBOUND
Scale: 3/16" = 1'-0"



DECK PLAN – UNIT 15 SOUTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE				
MADE	TAL	3-87				
CHECKED	T.F.P.	3-87		As Built	TEM	3-89
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

AS BUILT

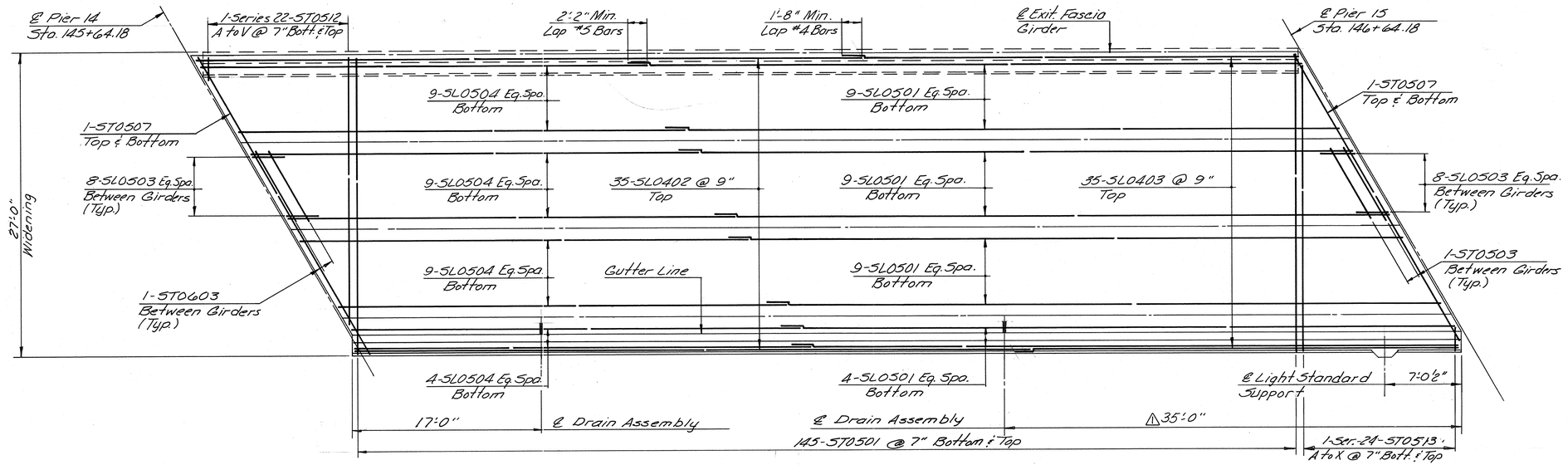
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 15 SOUTHBOUND

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

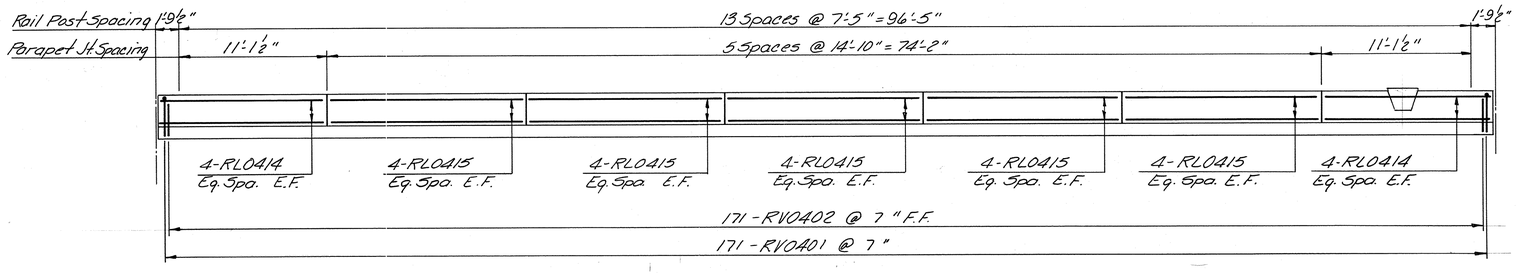
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 59 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	60	106



DECK PLAN - UNIT 15 NORTHBOUND

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



PARAPET ELEVATION - UNIT 15 NORTHBOUND

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87		As Built	TEM	3-89
CHECKED	TFP	3-87	△	Rel. Drain Assbly.	EJM	7-87
IN CHARGE	S.R.					

AS BUILT

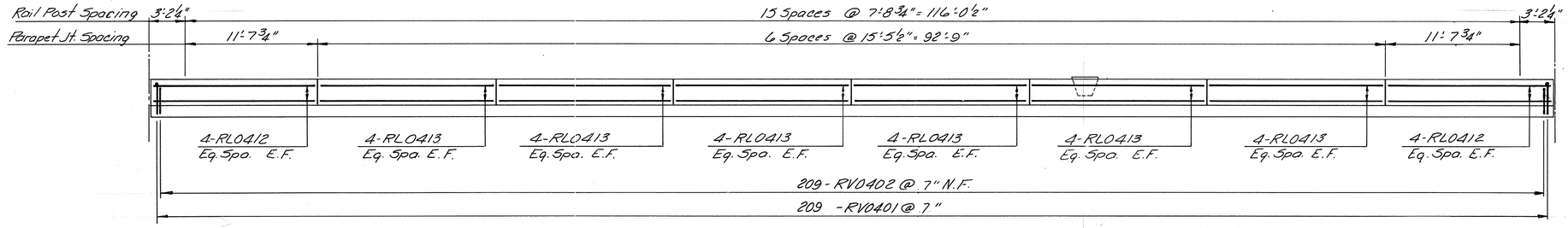
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 15 NORTHBOUND

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

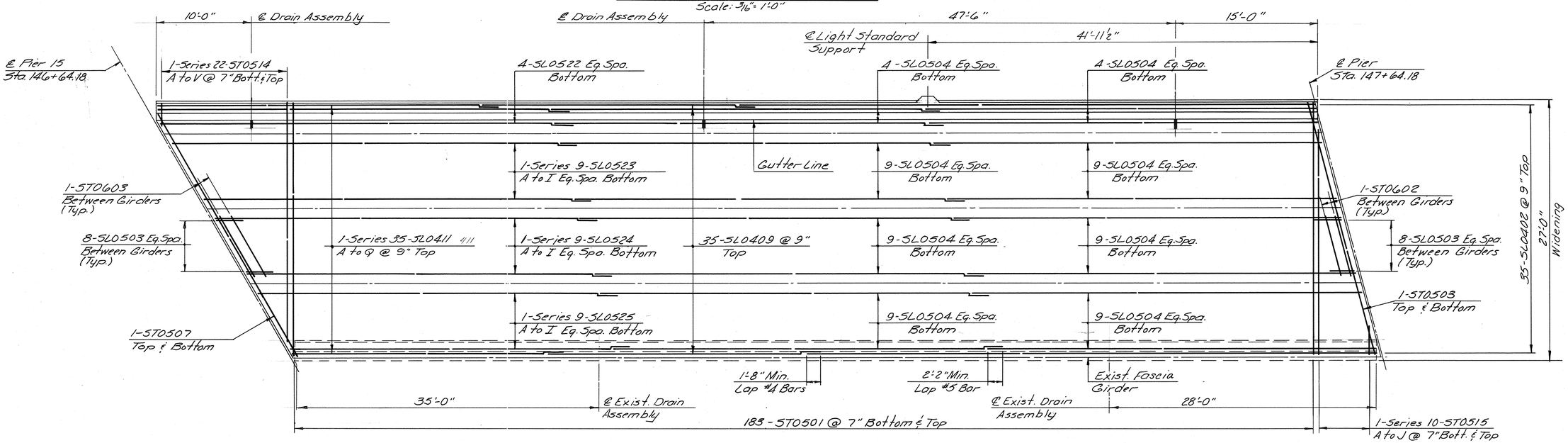
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 60 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	61	106



PARAPET ELEVATION - UNIT 16 SOUTHBOUND

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



DECK PLAN - UNIT 16 SOUTHBOUND

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TRP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

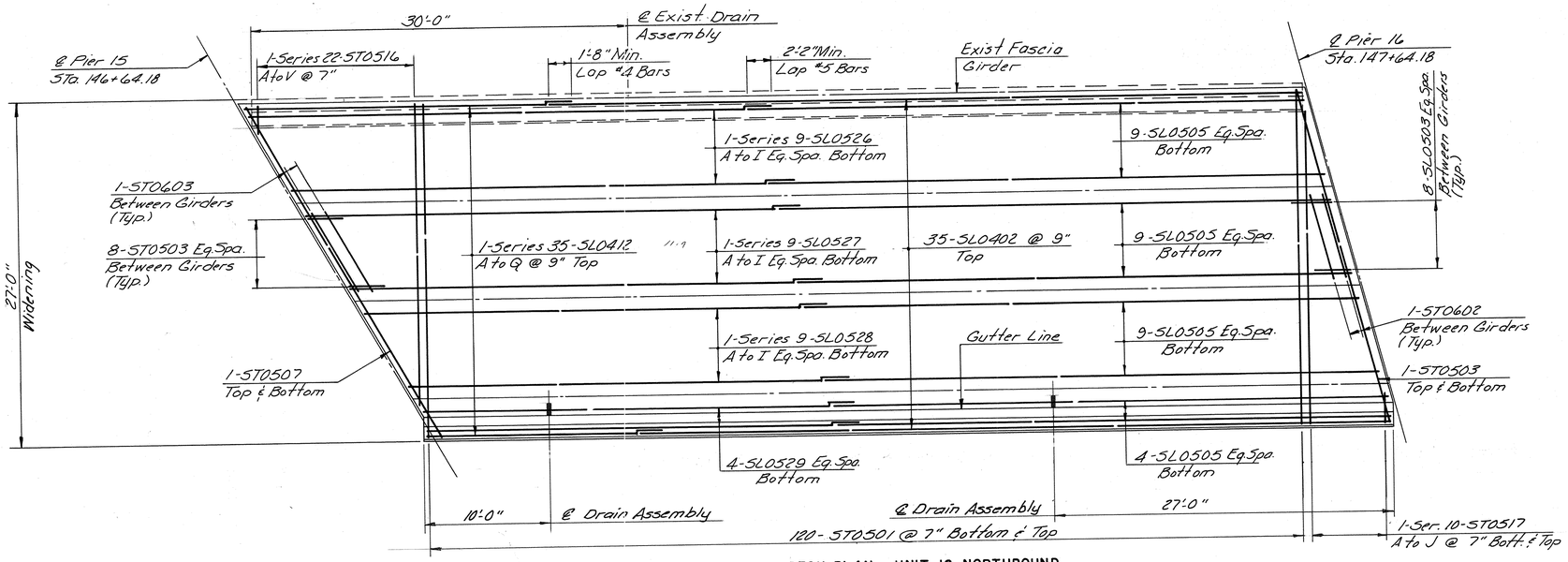
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 16 SOUTHBOUND

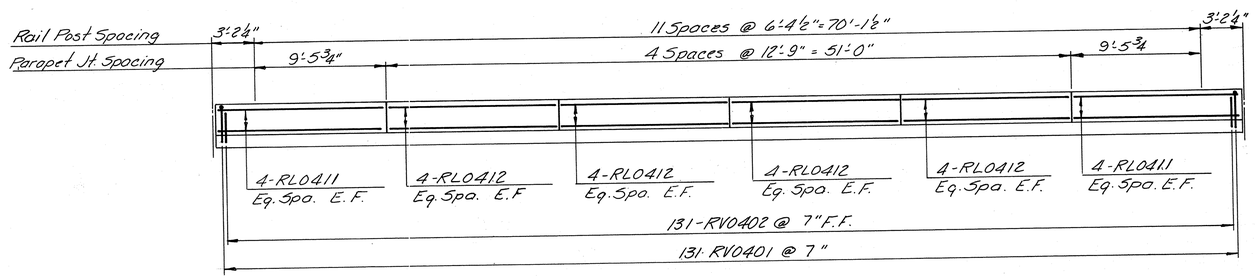
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 61 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	62	106



DECK PLAN – UNIT 16 NORTHBOUND
Scale: 3/16" = 1'-0"



PARAPET ELEVATION – UNIT 16 NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

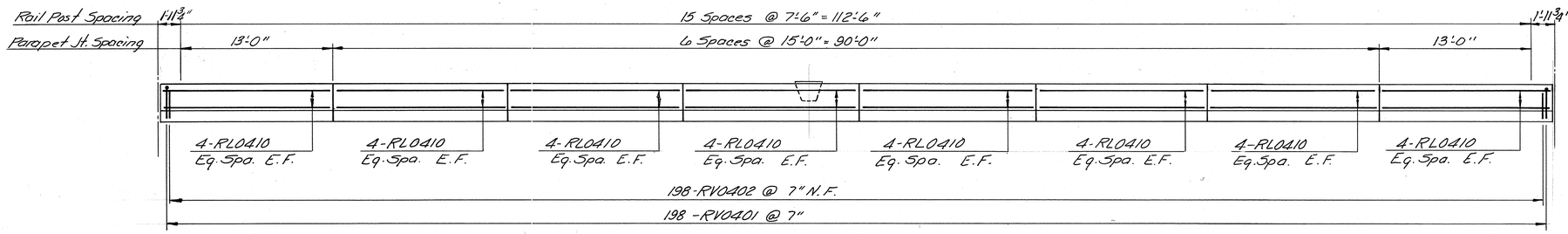
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 16 NORTHBOUND

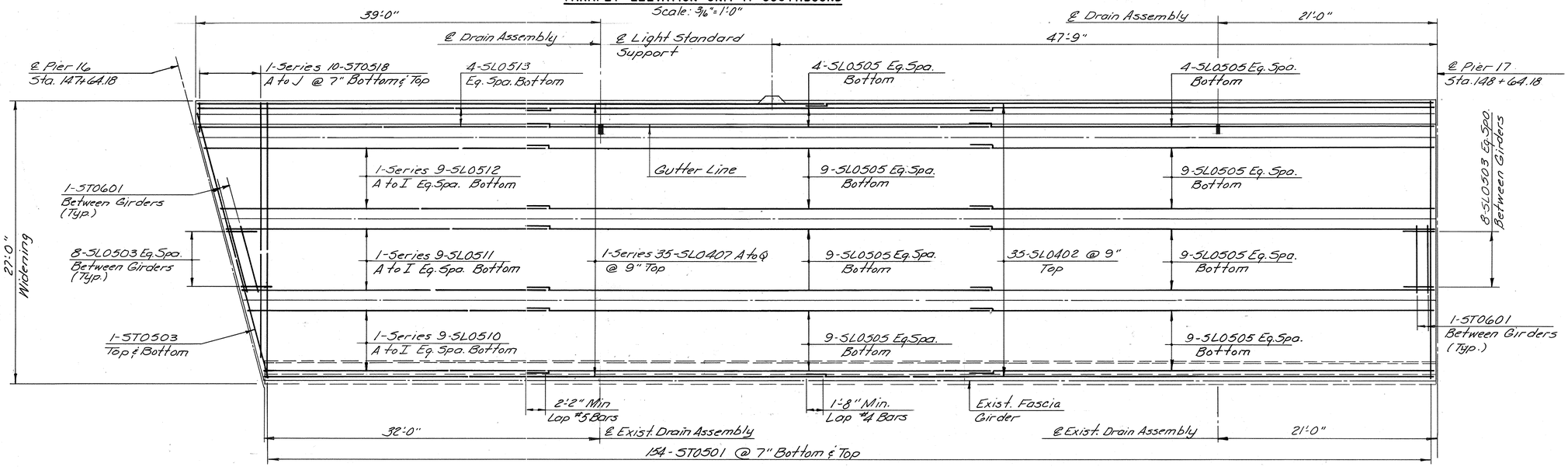
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 62 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	63	106



PARAPET ELEVATION - UNIT 17 SOUTHBOUND
Scale: 3/16" = 1'-0"



DECK PLAN - UNIT 17 SOUTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	T.F.P.	3-87		As Built	T.E.M	3-89
IN CHARGE S.R.						

AS BUILT

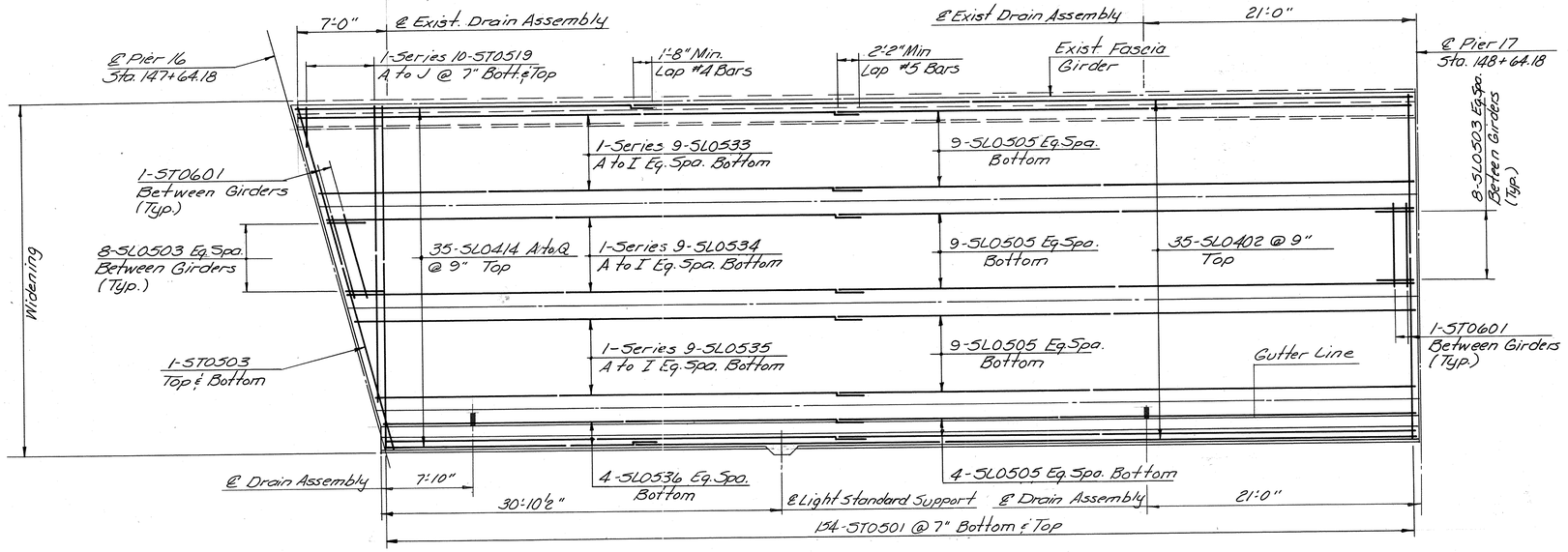
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 17 SOUTHBOUND

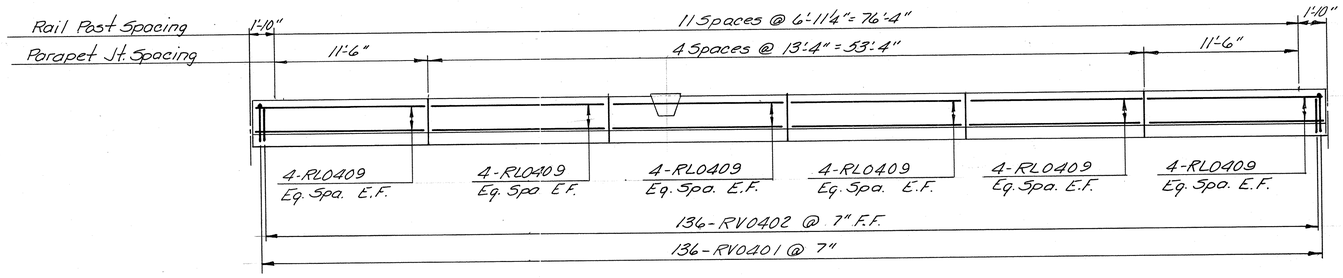
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 63 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	64	106



DECK PLAN - UNIT 17 NORTHBOUND
Scale: 3/16" = 1'-0"



PARAPET ELEVATION - UNIT 17 NORTHBOUND
Scale: 3/16" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

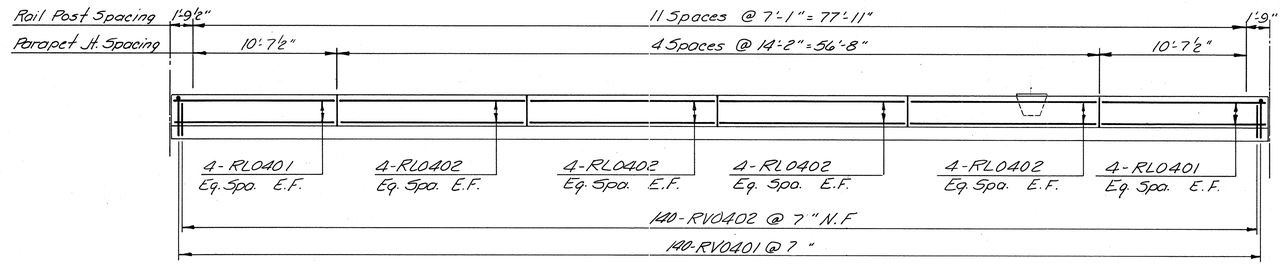
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 17 NORTHBOUND

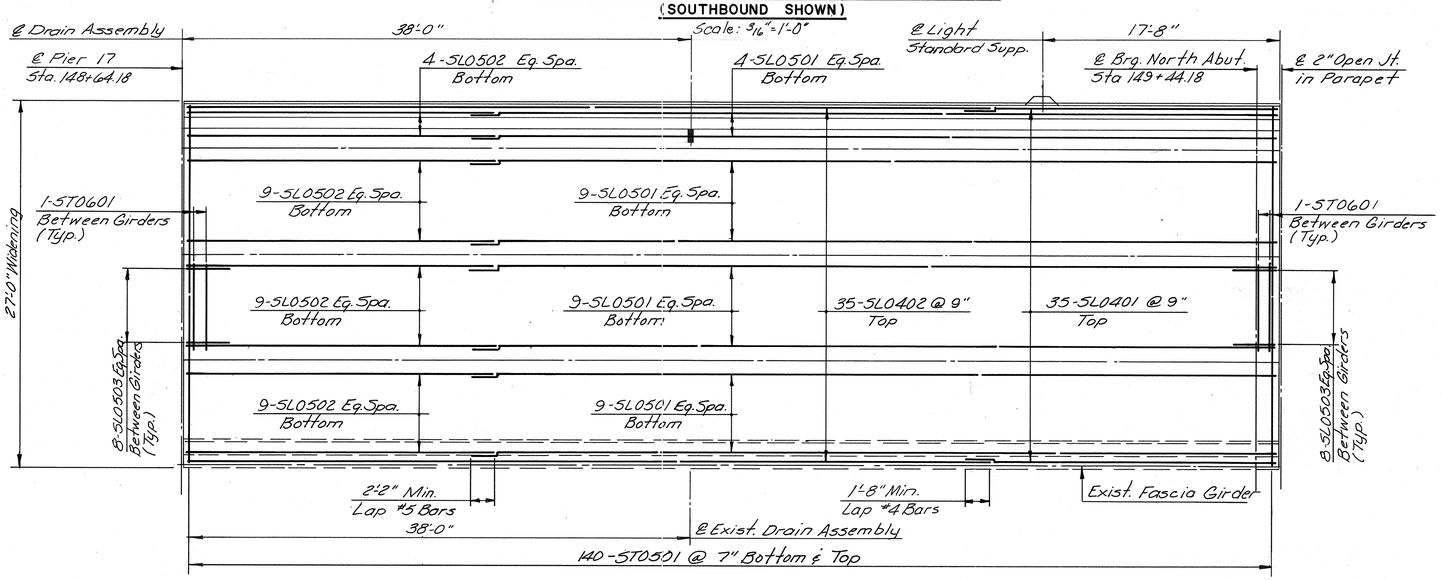
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 64 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	65	106



PARAPET ELEVATION - UNIT 18 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"



DECK PLAN - UNIT 18 SOUTHBOUND & NORTHBOUND
(SOUTHBOUND SHOWN)
Scale: 3/16"=1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	TAL	3-87				
CHECKED	TRP	3-87		As Built	TEM	3-89
IN CHARGE S.R.						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNIT 18 SOUTHBOUND & NORTHBOUND

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

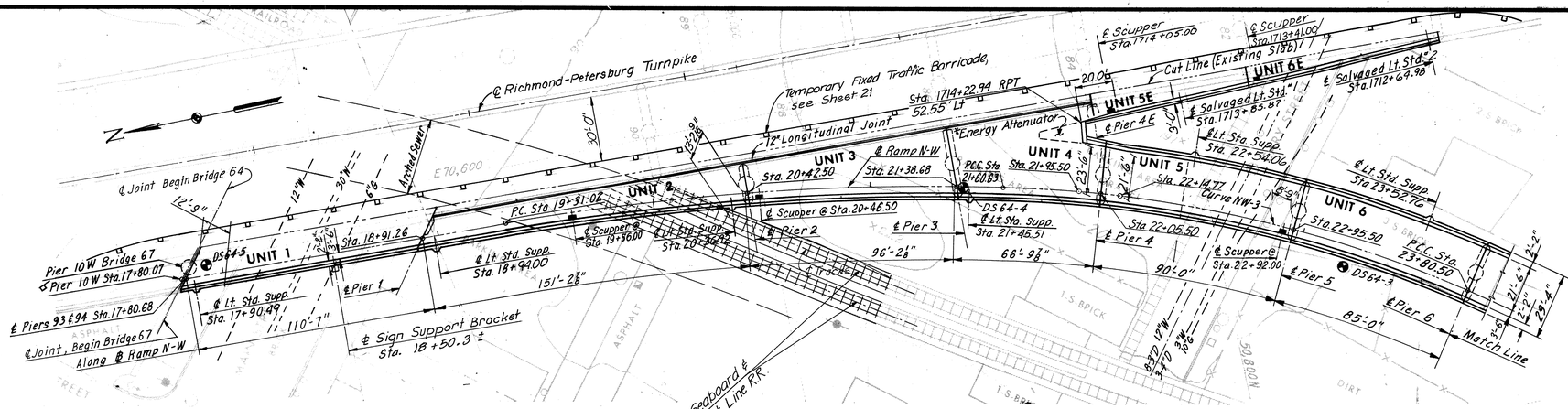
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 65 OF 106

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	99	265

INDEX

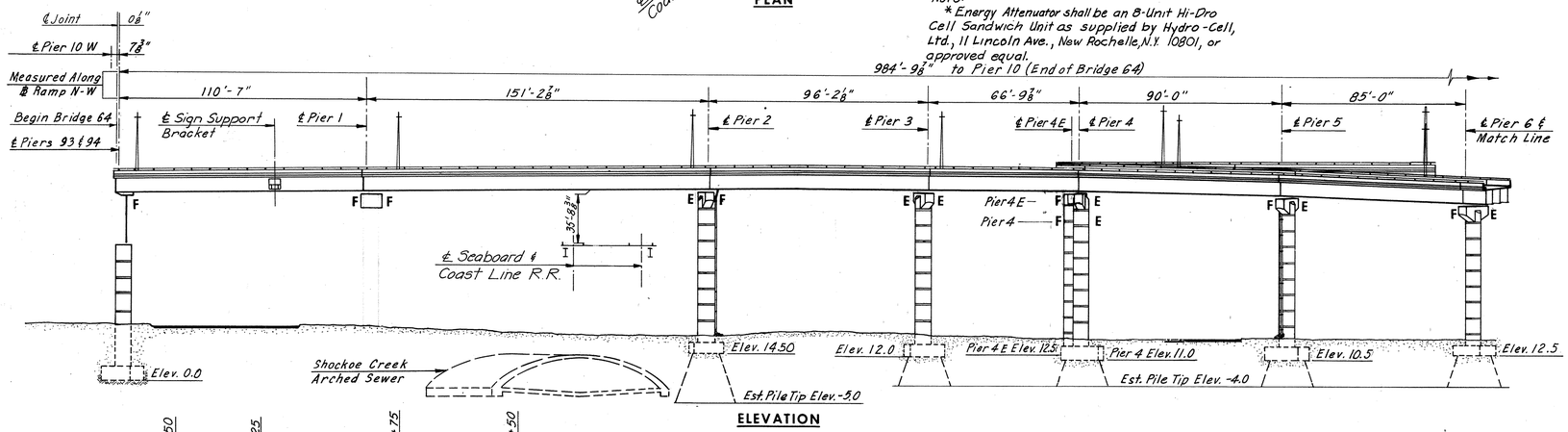
	SHEET
GENERAL PLAN AND ELEVATION	1
GENERAL PLAN AND ELEVATION	2
LAYOUT PLAN	3
PIERS 1 AND 2	4
PIERS 3 AND 4E	5
PIER 4	6
PIER 5	7
PIERS 6 AND 7	8
PIER 8	9
PIER 9	10
PIER 10	11
FRAMING PLAN - UNITS 1 AND 2	12 & 12a
FRAMING PLAN - UNITS 3 AND 4	13
FRAMING PLAN AND DECK PLAN - UNITS 5E AND 6E	14
FRAMING PLAN - UNITS 5 AND 6	15
FRAMING PLAN - UNITS 7 AND 8	16
FRAMING PLAN - UNITS 9 AND 10	17
FRAMING DETAILS	18
DECK PLAN - UNITS 1 AND 2	19
DECK PLAN - UNITS 3 AND 4	20
DECK PLAN - UNITS 5 AND 6	21
DECK PLAN - UNITS 7 AND 8	22
DECK PLAN - UNITS 9 AND 10	23
SUPERSTRUCTURE DETAILS	24
JOINT DETAILS	25
JOINT DETAILS	26
BORING LOGS	27
BORING LOGS	28
STANDARD DETAILS	S1 THRU S7

Note:
For General Notes, see Sheet 2.
For Quantity Table, see Sheet 2.

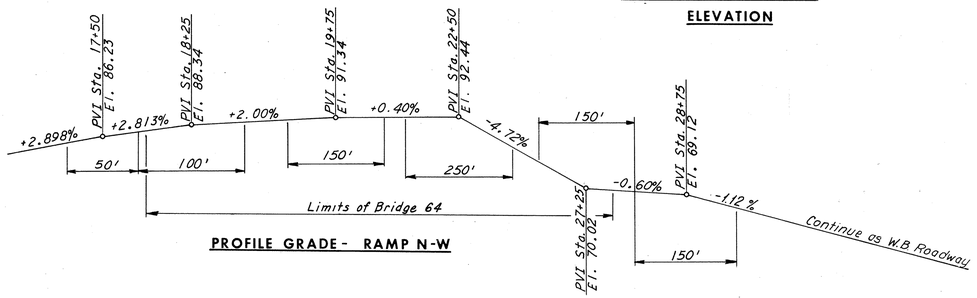


PLAN

Note:
* Energy Attenuator shall be an 8-Unit Hi-Dro Cell Sandwich Unit as supplied by Hydro-Cell, Ltd., 11 Lincoln Ave., New Rochelle, N.Y. 10801, or approved equal.



ELEVATION



PROFILE GRADE - RAMP N-W

HORIZONTAL CURVE DATA

℄ R. P. Turnpike

Curve: R.P.T.-1
P.I. = Sta. 1704+68.83
Δ = 15° 03' 56.2"
D = 1° 00' 00"
T = 757.65'
L = 1,506.56'
R = 5,729.58

Curve: R.P.T.-2
P.I. = Sta. 1723+07.01
Δ = 33° 27' 06.8"
D = 4° 00' 00"
T = 430.45'
L = 836.30'
R = 1,432.39'

℄ Ramp N-W

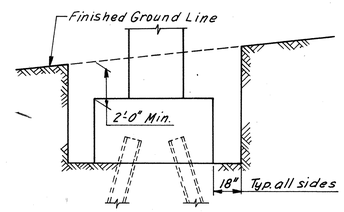
Curve: NW-1
P.I. = Sta. 13+42.50
Δ = 32° 01' 34"
D = 3° 51' 35.6"
T = 426.01'
L = 829.72'
R = 1,484.39

Curve: NW-2
P.I. = Sta. 20+46.21
Δ = 11° 28' 49.9"
D = 5° 00'
T = 115.19'
L = 229.61'
R = 1,145.92'

Curve: NW-3
P.I. = Sta 22+71.93
Δ = 21° 59' 14.9"
D = 10° 00' 00"
T = 111.31'
L = 219.88'
R = 572.96'

Curve: NW-4
P.I. = 25+55.02
Δ = 64° 43' 04"
D = 20° 50' 05.4"
T = 174.52'
L = 311.02'
R = 275.00'

Curve: NW-5
P.I. = Sta. 28+25.38
Δ = 26° 18' 00"
D = 10° 00' 00"
T = 133.86'
L = 263.00'
R = 572.96'



LIMITS OF STRUCTURE EXCAVATION
No Scale

	BY	DATE
MADE	AMH	1-6-69
CHECKED	G.C.C.	4-26-69
IN CHARGE		

NO.	REVISION	BY	DATE
4	As Built	TEM	G-77
3	℄ Seaboard & Coast Line Add To Plant El	K.D.P.	6-74
2	Sign Support Bracket & Sheet 12a added	L.B.P.	8-74
1	Added Sta.	REG	1-13-75

AS BUILT

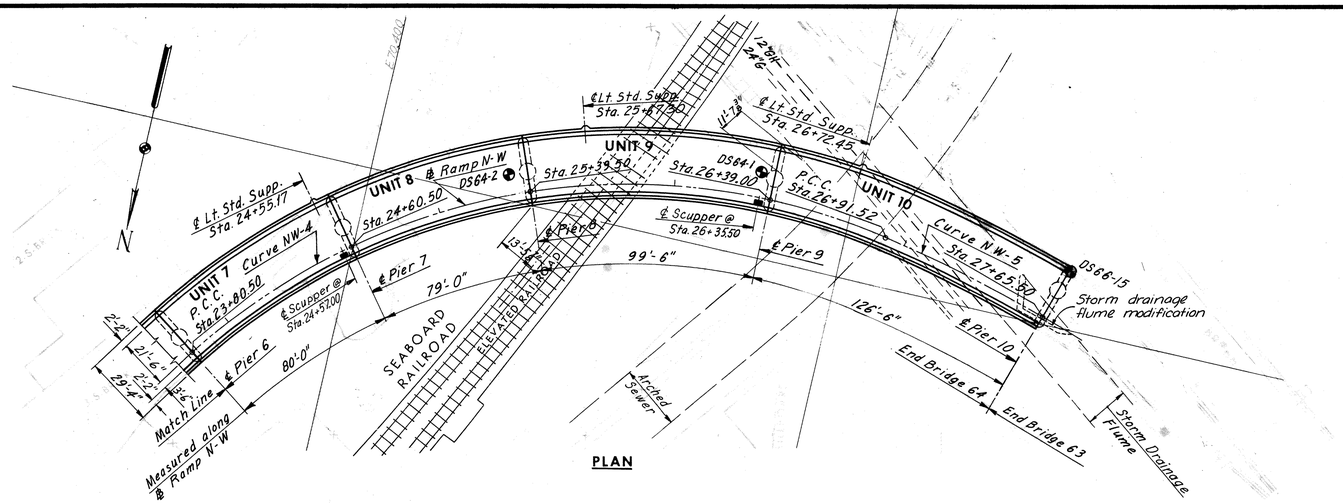
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

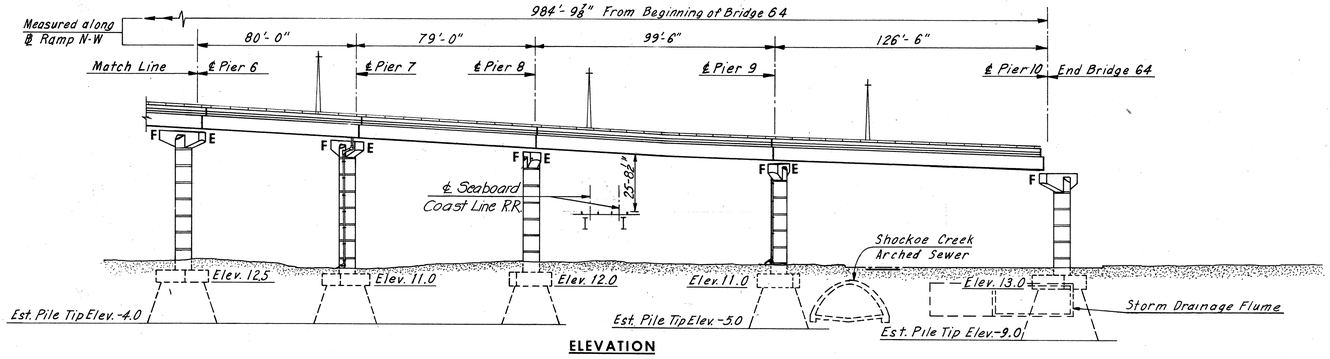
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 30'-0"
CONTRACT NO.: 10
SHEET NO. 1 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	100	265



PLAN



ELEVATION

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (T-Rail) Lin. Ft.	Steel Piles 10BP42 Lin. Ft.
Superstructure	--	1,023.8	213,790	768,100	413,900	1,600	---
Substructure	1,125	1,484.1	236,580	2,000	---	---	145
Total	1,125	2,507.9	450,370	770,100	413,900	1,600	145

	Steel Piles 12BP53 Lin. Ft.	Sheet Piling Lump Sum	Metal Conduit Lin. Ft.	Energy Attenuator 8-Unit Each	Bridge Drainage Metal Work Lbs.	Modifications to R.P. Turnpike Bridge Lump Sum	Modifications to Storm Drainage Flume Cu. Yds.
Superstructure	---	--	1,075	1	13,030	1	--
Substructure	3,035	1	--	--	--	-	116
Total	3,035	1	1,075	1	13,030	1	116

‡ All Concrete for Sucerstructure shall be Class A4 and for Substructure Class A3.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	1-13-69	1	Seaboard & Coast Line Algt. To Plantel	K.D.P.	6-74
CHECKED	GCC	4-28-69	2	Str. Steel Quantity	R.B.H.	9-74
IN CHARGE			3	As Built	TEM	6-77

GENERAL NOTES:

ROADWAY: One variable width roadway transitioning from a widening of Southbound roadway of Richmond-Petersburg turnpike to a ramp with 25'-0" clear roadway connecting with W.B. Roadway (Br. 63).

CAPACITY: Dead load includes 15 lbs. per sq. ft. for future wearing surface. Live load. HS 20-44 loading and alternate mlitary loading.

SPECIFICATIONS:
GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
WELDING: 1972 Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society.
CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete.

DATUM: City of Richmond

TEMPERATURE: The normal temperature referred to in the plans is 60°F. The temperature range for movement is 0° F. to 120° F.

DIMENSIONS: All dimensions are measured horizontally and vertically unless otherwise noted.

EXCAVATION: Excavation below subgrade and cut slope template shall be classified as Structure Excavation. All excavation above these limits shall be classified as Regular Excavation and is not included in the Structural Quantities.

FOUNDATIONS: Footings shall rest on firm material. Foundation material shall be dry and special attention is called to Section 401.05 of Standard Specifications and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A 4. All other concrete shall be Class A 3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and orother means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face to concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted. All reinforcing steel shall conform to ASTM A615 Grade 40.

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572 - Grade 50 and A588 as noted. See Special Provisions.
All field connections shall be made with high strength bolts. High strength bolts shall be ⅞" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

Note: For Curve Data and Profile Grade, see Sheet 1. For Layout Plan, see Sheet 3.

AS BUILT

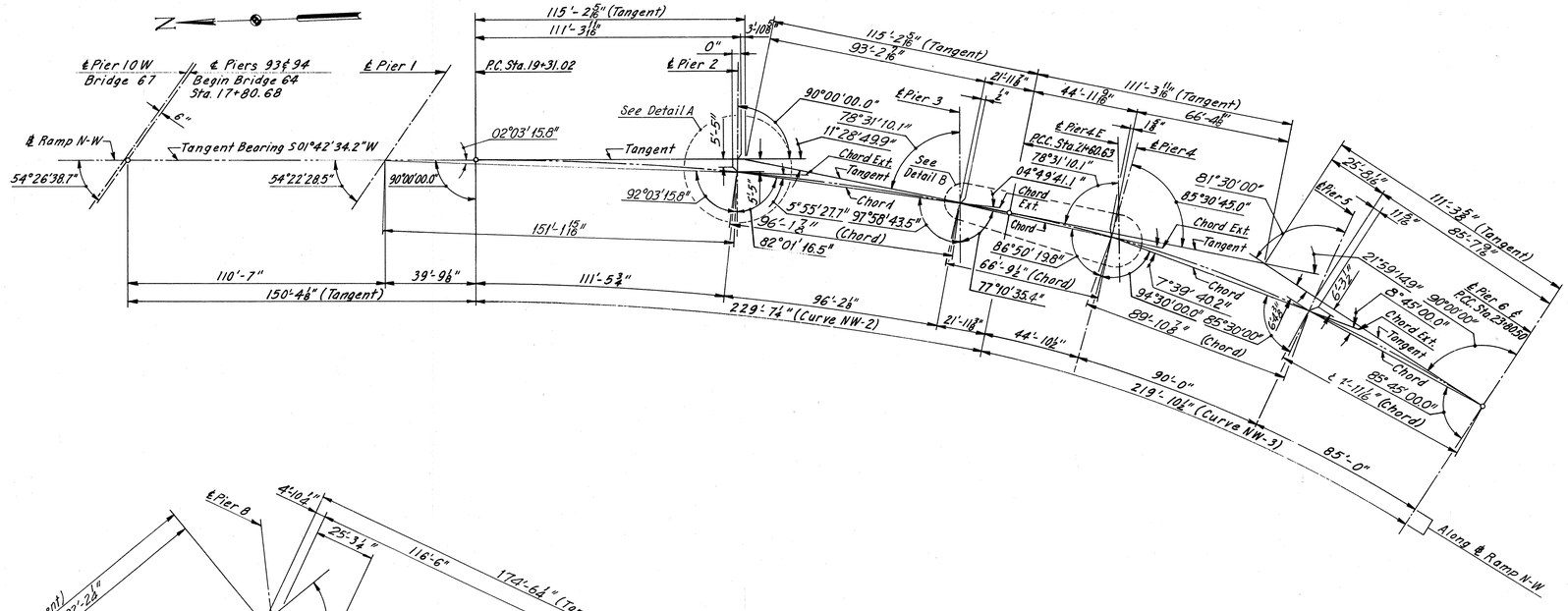
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

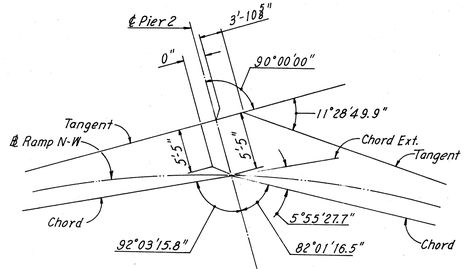
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

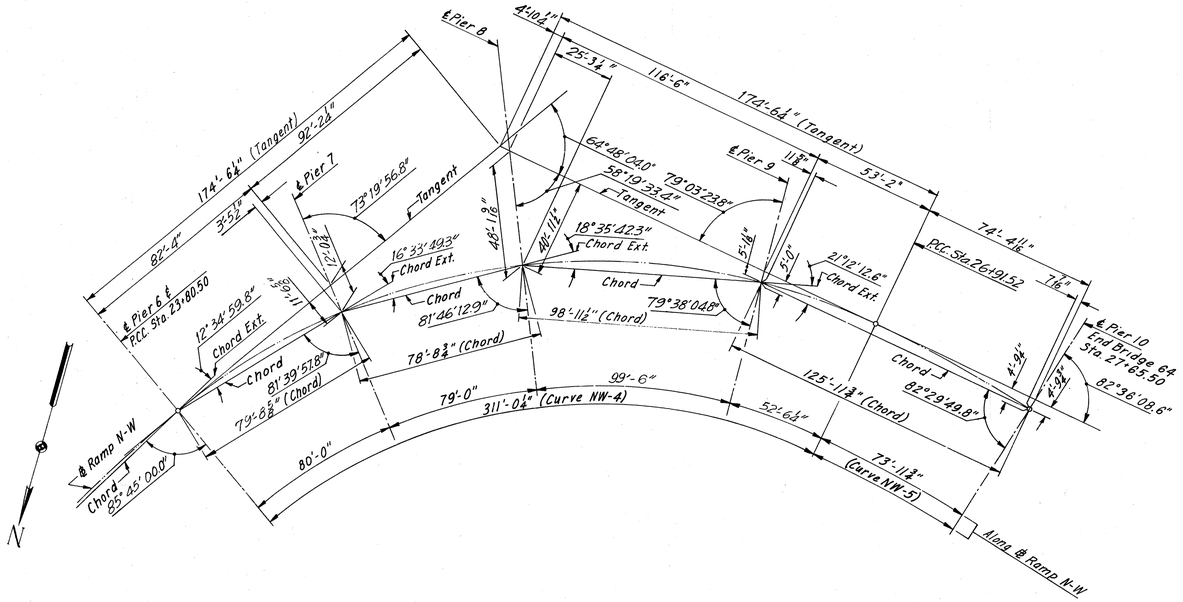
SCALE: 1" = 30'-0"
CONTRACT NO. 10
SHEET NO. 2 OF 28

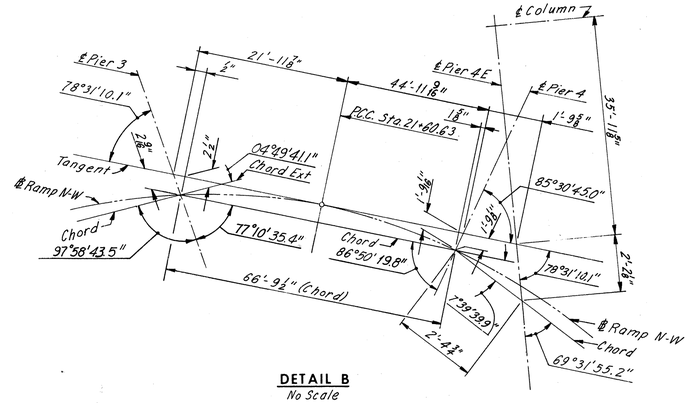
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	101	265





DETAIL A
No Scale





DETAIL B
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	3-31-69	1	As Built	TEM	6-77
CHECKED	GCC	4-21-69				
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
LAYOUT PLAN

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

SCALE: 1" = 30'-0"
CONTRACT NO.: 10
SHEET NO. 3 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	102	265

Bottom flange and web of beam to be cut to clear existing masonry plate. (see Detail B)

℄ Pier 1 Normal to Brg. Beam

#6 Anchor hook into new concrete Along ℄ Bearing Beam

Existing Stringer

℄ S1-2 (F6M Typ.)

℄ S2-2

℄ S3-2

Remove existing Brace

For Details, see Detail A

Stiffener R. 4½"

Masonry R. 7 x 1'-9" Weld to Brg. Beam

℄ Bearing Beam (30WF99)

Masonry R. 7 x 1'-9" Weld to bearing beam ℄ FB13

Drainage Pipe Support Type II

Existing FB13

Sta. 18+91.26 ℄ Pier

Masonry R. 7 x 1'-9" Weld to bearing beam

℄ FB14

Existing FB14

Existing Concrete Pad

Extension FB14

54°29'00"

℄ R.P.T.

Sta. 17+17+28.137

Collar concrete placing sequence Constr. Jt.

℄ Existing Shoes

℄ Ramp N-W

℄ S1-1

℄ S2-1

Along ℄ FB14

Fill with sealant

CAP PLAN PIER 1

Scale: ½"=1'-0"

℄ Stringer

** Nominal thickness

Cut Area

Typ.

℄ Bearing Beam 30WF99

Elevation at bott. of bott. flange at ℄ stringers.

Note: Cut both Masonry R. and Rocker R. of F6M Shoes to provide minimum 2" for welding the Masonry R. to the Flange.

54°29'00" (Typ.)

DETAIL A

Scale: 1½"=1'-0"

Bottom Flange of Bearing Beam

Saw cut chip to this line

Edge of Existing Masonry R.

℄ 30WF99

℄ Pier 1 Normal to Bearing Beam

DETAIL B

Scale: 1½"=1'-0"

℄ Pier 1 & ℄ Existing Pier 92

℄ Bearing Beam (30WF99)

Top of Existing Col. 92

Mill to Bear (typ.)

#6 Anchor Bolt @ 12" Ctrs.

Existing tie bars

Drip Bead ½ x ¾"

Chip to expose existing tie bars

1" Saw cut around existing column

Remove 2" ± concrete, apply epoxy and place new concrete

℄ S3-2

℄ S2-2

℄ S1-2

Bott. of S1-2, S2-2 & S3-2

Top of Brg. Beam

Typ

#6 Anchors @ 6"

Existing Column

Level

Elev. 79.81 ±

9'-6" Diameter

7'-6" Diameter (Existing Column)

℄ Existing Column 92

Note: 30WF99 Bearing Beam to be set level on a pad prepared as required for shoes. Provide 8-#6 anchors hook into new concrete.

Note: Dimensions given to tie the new structure to the existing are based on the drawings for the original construction. The Contractor shall therefore verify all necessary dimensions of existing structural work.

Note: Elevation 79.81 @ top of existing Pier 92 is based on the original construction plans. If Elevation established in field is found to exceed 79.81 the concrete surface on top of Pier 92 is to be chipped and finished as required for shoes. If below, the difference is to be added to the nominal thickness of bearing plates under the shoes. All elevations of existing steel structures are to be verified in field by contractor.

SECTION G-G

Scale: ⅜"=1'-0"

VIEW F-F

Scale: ⅜"=1'-0"

	BY	DATE				
			4	As Built	TEM	6-77
MADE	K.C.T.	3-16-69	3	Angle of Beam	REF	1-6-75
CHECKED	Y.C.P	4-24-69	2	Number of Girders	REF	12-30-74
IN CHARGE			1	Note Change	T.E.M	5-74
			NO.	REVISION	BY	DATE

Note to Fabricator: All Structural Steel for Pier 1 shall be A-36. Fabricate top of cap beam flat.

℄ Column & ℄ Pier

Local tangent to ℄ @ ℄ Pier 2

℄ Ramp N-W

*Elev. 84.09

84°25'33"

Sta. 20+42.50

℄ Bearing

℄ Pier 2

℄ Bearing

*Elev. 83.90

*Elev. 84.60

*Elev. 84.44

*Elev. 84.27

*Elev. 84.40

*Elev. 84.15

℄ S1-3 (F1 Typ.)

℄ S2-3

℄ S4-3

℄ S5-3

℄ S1-2 (E12 Typ.)

℄ S2-2

℄ S3-2

CAP PLAN PIER 2

Scale: ½"=1'-0"

* Elevation at top of concrete pad.

Optional Constr. Jt. permitted. See Note A.

Elev. 84.34

Elev. 84.00

Elev. 83.66 Extend 6-#11 each side 4'-0" into cap beam

1-#6 Tie

2-#6 Ties

2-#6 Bars

10-#11

1-#6 Bars

2-#6 Ties

4-#9 Bars

6-#5 Ties Each face

Elev. 78.87

Drainage Pipe Support Type 3

36-#11 Col. Bars

#5 Tie @ 12"

Finished Ground Line

36-#11 Dowels Stagger Spliced To Match Col. Bars

3'-6"x3'-6"x3" Key (Typ.)

#8 1'-0"

R=1'-9"

Elev. 14.50

12 BP53 Piles, Batter 3" per 1'-0" as shown

ELEVATION PIER 2

Scale: ¼"=1'-0"

NOTE A

A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.

℄ Column & ℄ Pier

#5 Stirrups

#11 Column Bars

#6 Ties

℄ Pier 2

#5 Ties

#11 bar extend 4'-0" into cap beam

#6 Bar

SECTION A-A

Scale: ¼"=1'-0"

4'-0"

9 Spa. @ 4½" = 3'-4½"

10-#11 Bars

#5 Stirrups

#6 Bars

4-#9 Bars

Varies

3@13½" = 3'-4½"

SECTION B-B

Scale: ½"=1'-0"

RUSTICATION DETAIL

Full Scale

℄ Pier 2 & ℄ Column

℄ Brg.

1-#6 Tie

1-#6 bar

Rustication, see Detail

Rustication @ 8'-0"

1'-7"

℄ Pier & ℄ Column

2" Clear

#5 Tie

#11 Bars equally spaced

℄ Column

SECTION C-C

Scale: ⅜"=1'-0"

℄ 1¼" Φ Anchor bolts

℄ Bearing

℄ Pier 2

℄ Stringer

Masonry R.

PAD AND ANCHOR BOLT SETTING PLAN

No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN												
Pier	Stringer	∠	B	A	B	C	D	E	F	G	H	I	J
2	S1-3	—	90°00'00"	4½"	8"	0	12½"	12½"	5⅜"	5⅜"	11½"	25"	8"
	S2-3	—	90°00'00"	4½"	8"	0	12½"	12½"	5⅜"	5⅜"	11½"	25"	8"
	S4-3	—	83°42'49"	4½"	7 15/16"	1/16"	13⅛"	11¼"	7"	4⅜"	11½"	25"	8"
	S5-3	—	82°00'00"	4½"	7 15/16"	1½"	13⅛"	11⅝"	7⅜"	4"	11½"	25"	8"
	S1-2	90°00'00"	—	4"	14½"	0	18½"	18½"	6⅜"	6⅜"	13½"	36½"	14½"
	S2-2	87°14'17"	—	4"	14⅛"	0	18½"	17 7/16"	6 1/16"	6"	13½"	36½"	14½"
	S3-2	84°26'56"	—	4"	14⅜"	1½"	18¾"	17⅜"	8⅜"	5¼"	13½"	36½"	14¼"

Note: For Standard Shoe Details, see Sheets S1 & S2. For Framing Plan, see Sheets 12 & 13. For Steel and Concrete Quantities, see Sheet 2. All piles shall be 12BP53 Steel Pile. (Design Capacity = 57 Tons.) Estimated pile tip elevation. Pier 2 = -5.0 For Pile Details, see Sheet 7. For Details of Extension FB 14, See Sheet 18. For Standard Drainage Details, see Sheet 56.

4½" 18 Spa. @ 8½" 4½"

Footing Reinforcement

Pile Spacing @ Ramp N-W

1'-6" 3'-6" 3'-6" 3'-6" 1'-6"

4½" 3'-6" 3'-6" 3'-6" 4½"

18 Spa. @ 8½"

℄ Footing ℄ Column

6"

84°25'33"

Sta. 20+42.50

12 BP53 Piles

℄ Pier 2 & ℄ Footing

6'-9" 6'-9"

4'-9⅜"

6'-9" 6" 4'-3⅜" 1'-11⅜"

13'-6"

Local tangent to ℄ @ Sta. 20+42.50

FOOTING PLAN PIER 2

Scale: ¼"=1'-0"

FOOTING FOR PIER 2 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

Varies 4'-0" Varies

3¾" 9 Spa. @ 4½" = 3'-4½" 3¾"

#11 Bars

#5 Stirrup

#5 Tie

#5 Col. Tie

#6 Bars

#9 Bars

#11 Column Bar

Varies (6" Max.)

1'-6"

1'-11" (Typ.)

Varies

#5 Tie @ 12"

3¾" 3@13½" = 3'-4½" 3¾"

SECTION D-D

Scale: ½"=1'-0"

AS BUILT

RICHMOND METROPOLITAN AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

DOWNTOWN EXPRESSWAY

BRIDGE NO. 64

RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIERS 1 AND 2

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

consulting engineers

NEW YORK ALEXANDRIA KANSAS CITY

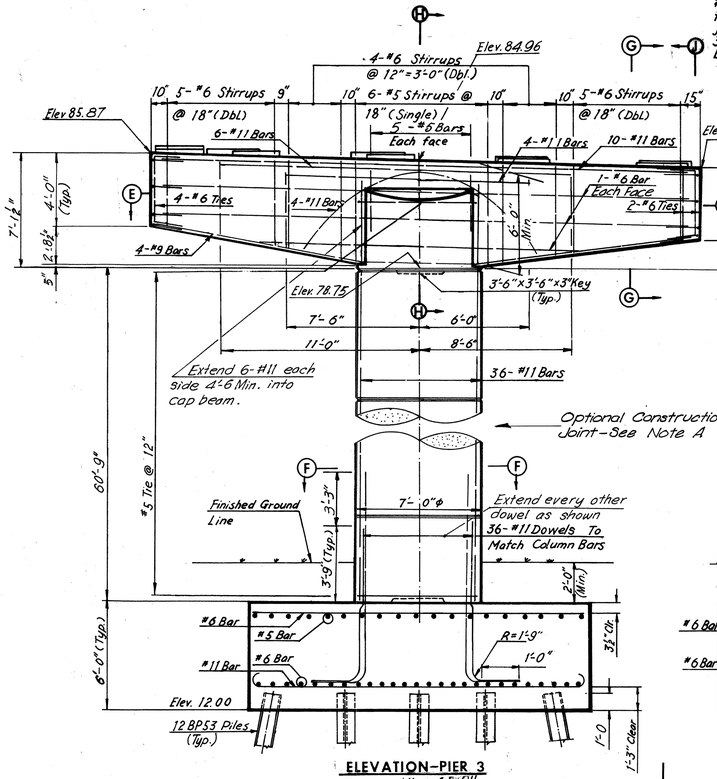
SCALE: As Noted

CONTRACT NO.: 10

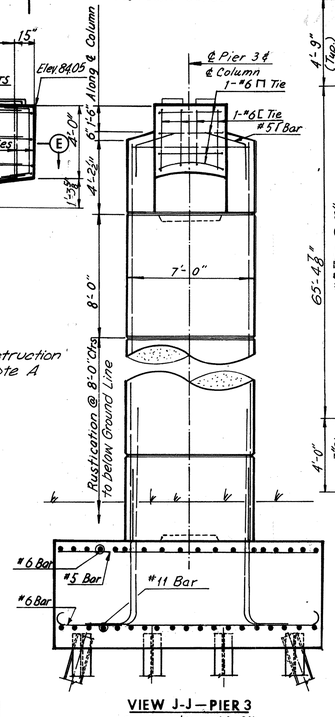
SHEET NO. 4 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	103	265

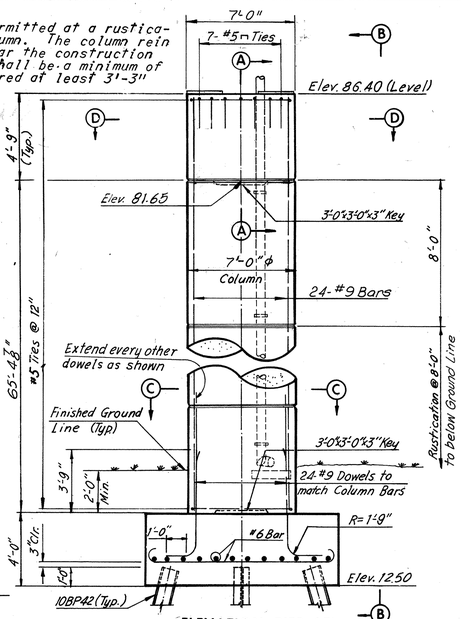
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap of the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



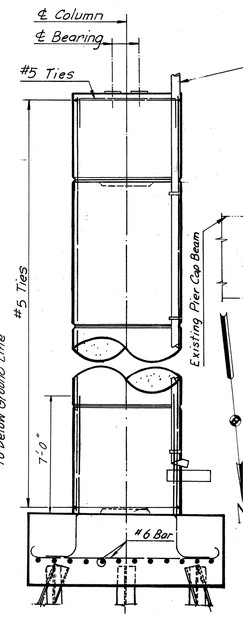
ELEVATION–PIER 3
Scale: 1" = 1'-0"



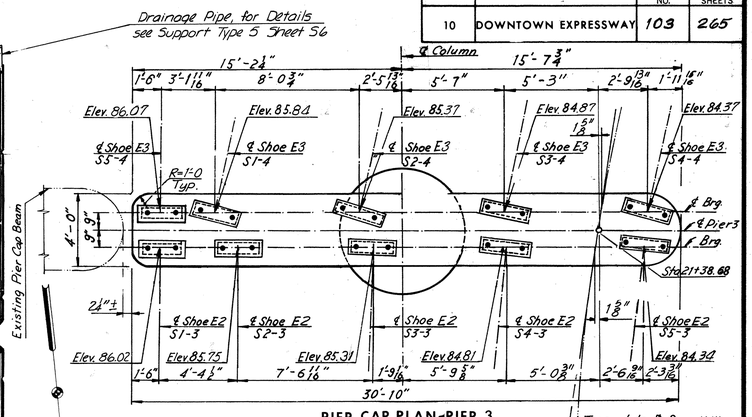
VIEW J-J–PIER 3
Scale: 1" = 1'-0"



ELEVATION–PIER 4E
Scale: 1" = 1'-0"

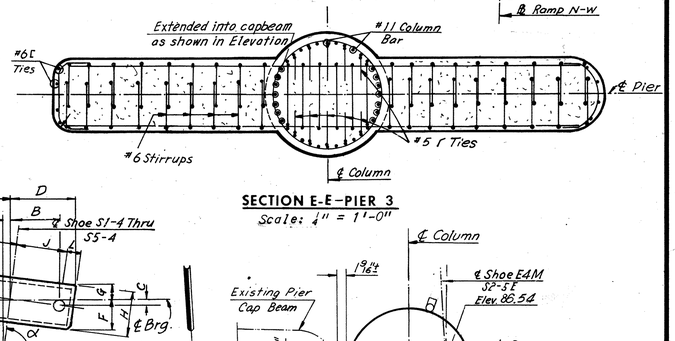


VIEW B-B–PIER 4E
Scale: 1" = 1'-0"

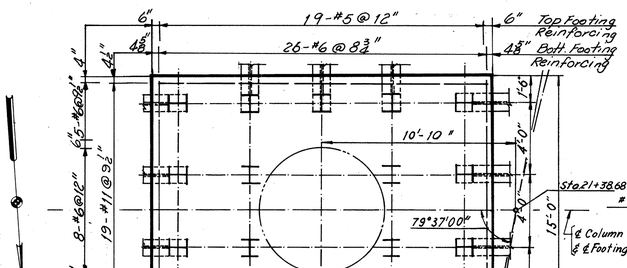


PIER CAP PLAN–PIER 3
Scale: 1" = 1'-0"

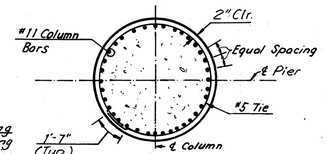
Tangent to ℄ Ramp N-W @ Sta. 21+38.68
℄ Ramp N-W



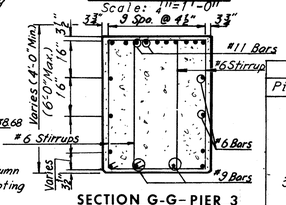
SECTION E-E–PIER 3
Scale: 1" = 1'-0"



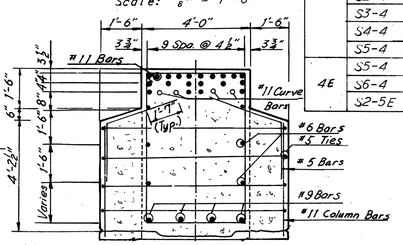
FOOTING PLAN–PIER 3
Scale: 1" = 1'-0"



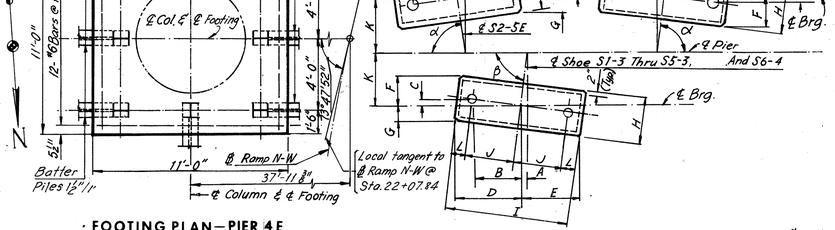
SECTION F-F–PIER 3
Scale: 1" = 1'-0"



SECTION G-G–PIER 3
Scale: 3/8" = 1'-0"

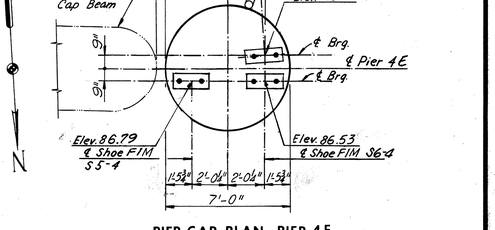


SECTION H-H–PIER 3
Scale: 3/8" = 1'-0"



FOOTING PLAN–PIER 4E
Scale: 1" = 1'-0"

ANCHOR BOLT SETTING PLAN
No Scale



PIER CAP PLAN–PIER 4E
Scale: 1" = 1'-0"

DIMENSIONS OF ANCHOR BOLT SETTING PLAN

Pier	Stringer	α	B	A	B	C	D	E	F	G	H	I	J	K	L
3	S1-3	--	90°00'00"	--	8¼"	--	12¼"	12¼"	6½"	6½"	13"	24½"	8¼"	9"	4"
	S2-3	--	90°00'00"	--	8¼"	--	12¼"	12¼"	6½"	6½"	13"	24½"	8¼"	9"	4"
	S3-3	--	86°50'50"	1/2"	8¼"	7/16"	12 9/16"	11 15/16"	7⅛"	5⅞"	13"	24½"	8¼"	9"	4"
	S4-3	--	83°42'49"	1"	8⅛"	⅜"	12⅞"	11⅜"	7¾"	5⅜"	13"	24½"	8¼"	9"	4"
	S5-3	--	82°00'00"	1¼"	8⅛"	1⅛"	13"	11¼"	8¼"	4¾"	13"	24½"	8¼"	9"	4"
	S1-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9 7/16"	3¾"	13½"	25½"	8¾"	9"	4"
	S2-4	77°09'40"	--	6½"	8½"	1⅛"	14"	11"	9 7/16"	3¾"	13½"	25½"	8¾"	9"	4"
	S3-4	77°09'40"	--	6½"	8½"	1⅛"	14"	11"	9⅛"	3¾"	13½"	25½"	8¾"	9"	4"
	S4-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9⅛"	3¾"	13½"	25½"	8¾"	9"	4"
	S5-4	90°00'00"	--	--	8¾"	--	12¾"	12¾"	6¾"	6¾"	13½"	25½"	8¾"	9"	4"
4E	S5-4	--	90°00'00"	--	8"	--	12½"	12½"	5¾"	5¾"	11½"	25"	8"	9"	4½"
	S6-4	--	90°00'00"	--	8"	--	12½"	12½"	5¾"	5¾"	11½"	25"	8"	9"	4½"
	S2-5E	87°05'14"	--	7/16"	10½"	9/16"	14 15/16"	14 3/16"	7"	5½"	12½"	29"	10½"	9"	4"

Notes:
Pier 3 and Pier 4E are made to match existing Pier 86 and 84 respectively, the contracter shall verify the stations.
Overexcavation will not be permitted between existing pier and new pier.
Estimated pile tip elevations are:
Pier 3: -4.0
Pier 4E: -4.0

Notes:
Piles shall be 2BP53 (Design Capacity = 57 tons), and 10BP42 (Design Capacity = 45 tons) Steel Piles, Location as shown.
Batter all piles 3" per foot where shown.
For Standard Shoe Detail, see Sheets S1 & S2.
For Framing Plan, see Sheets 13 & 14.
For Rustication Detail, see Sheet 4.
For Steel Pile Details, see Sheet 7.
For Quantities of Concrete and Steel, see Sheet 2.

	BY	DATE
MADE	R.C.	3.11.69
CHECKED	Y.C.P	4-25-69
IN CHARGE		

NO.	REVISION	BY	DATE
4	As Built	TEM	6-77
3	Revised Shoe Size.	RGH	12-30-74
2	Revise Pad Elev. Piers-3 & 4E	EJM	10-11-74
1	Col. size-Pier 4E	T.E.M.	9-11-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

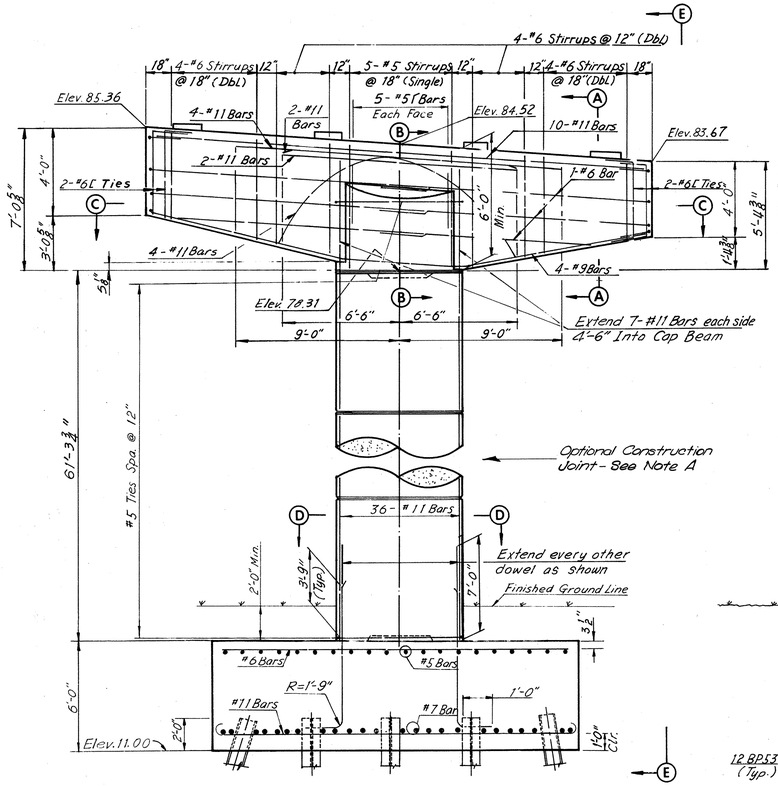
PIERS 3 AND 4E

AS BUILT

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

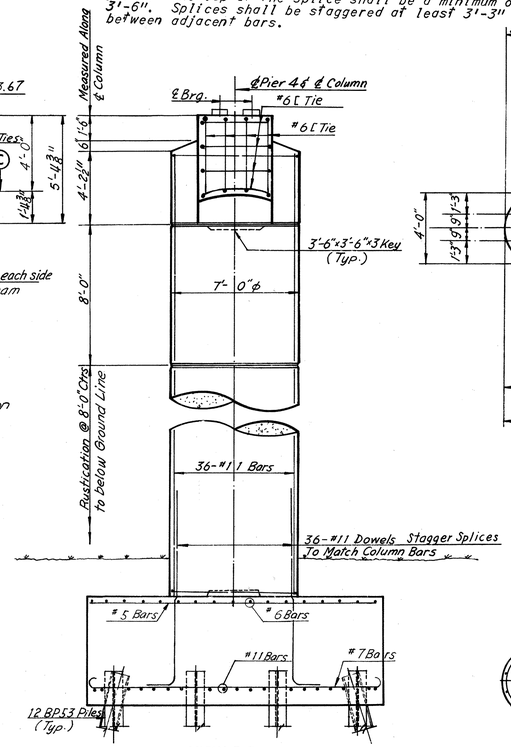
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10.	DOWNTOWN EXPRESSWAY	104	265

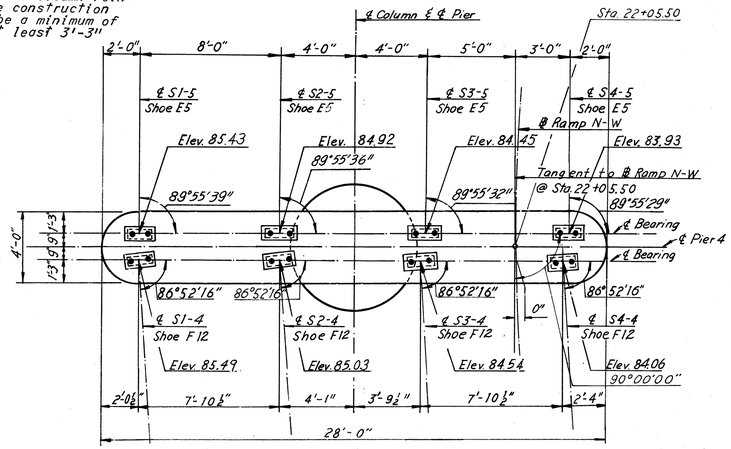


ELEVATION
Scale: 1/4" = 1'-0"

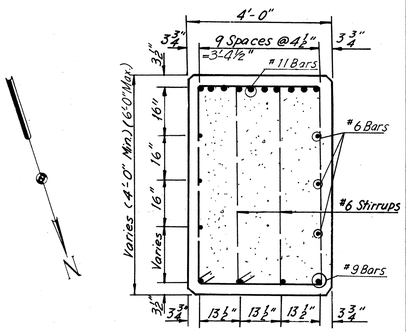
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



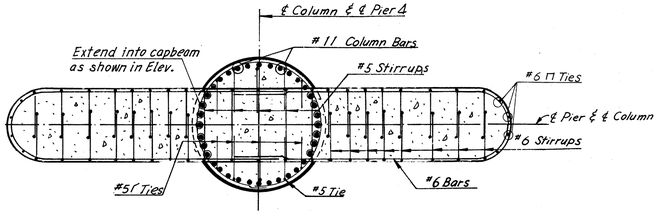
VIEW E-E
Scale: 1/4" = 1'-0"



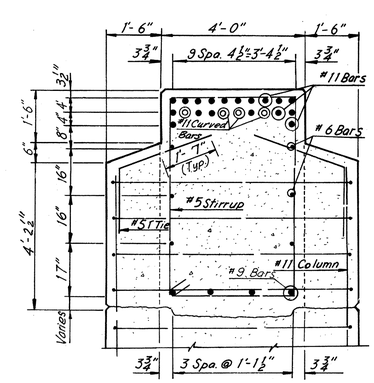
CAP PLAN
Scale: 1/4" = 1'-0"



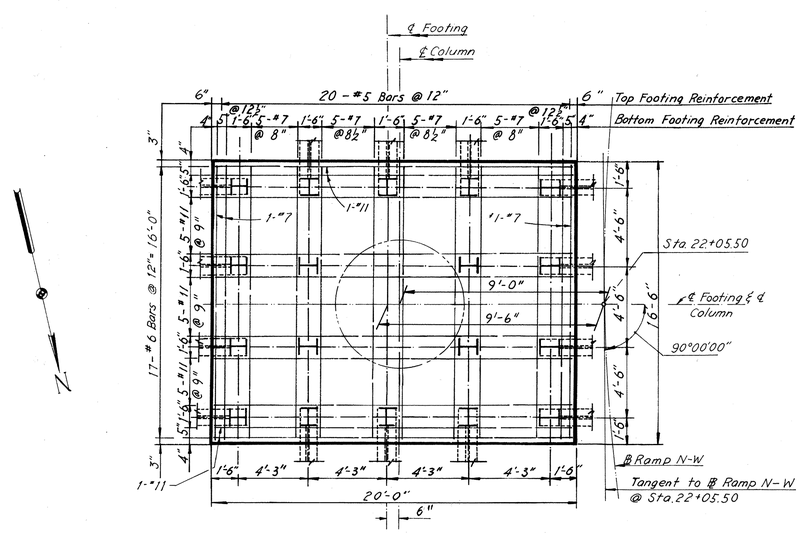
SECTION A-A
Scale: 1/4" = 1'-0"



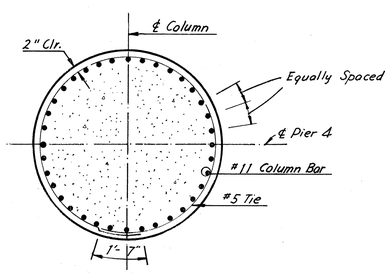
SECTION C-C
Scale: 1/4" = 1'-0"



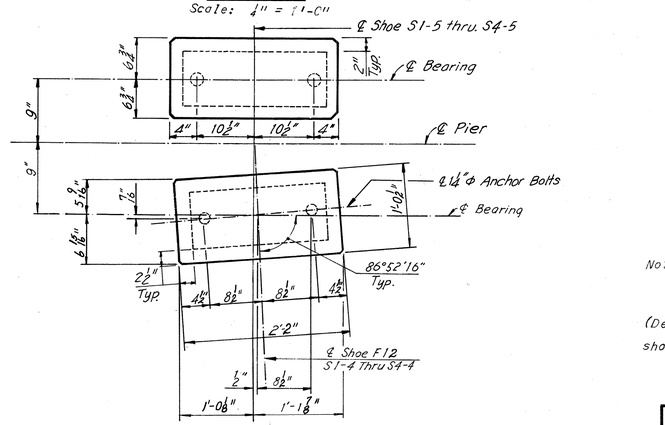
SECTION B-B
Scale: 1/2" = 1'-0"



FOOTING PLAN
Scale: 1/4" = 1'-0"



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



ANCHOR BOLT SETTING PLAN
No Scale

Notes:
For Shoe Details, see Sheets S1 and S2.
For Framing Plan, see Sheets 13 and 15.
For Substructure Quantities, see Sheet 2.
All Piles shall be 12BP53 Steel Piles (Design Capacity = 57 tons).
Batter all Piles 3" per foot, where shown.
For Rustication and Pile Details, see Sheet 7.
Estimated Pile Tip Elevation -4.0

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

FOOTING FOR PIER 4 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

	BY	DATE				
MADE	R.C.	3.13.69	3	As Built	TEM	6-77
CHECKED	SCC	4.21.69	2	Revised Shoe Size	REG	12-30-74
IN CHARGE			1	Pad Elev. Revised	EJM	10-11-74
			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

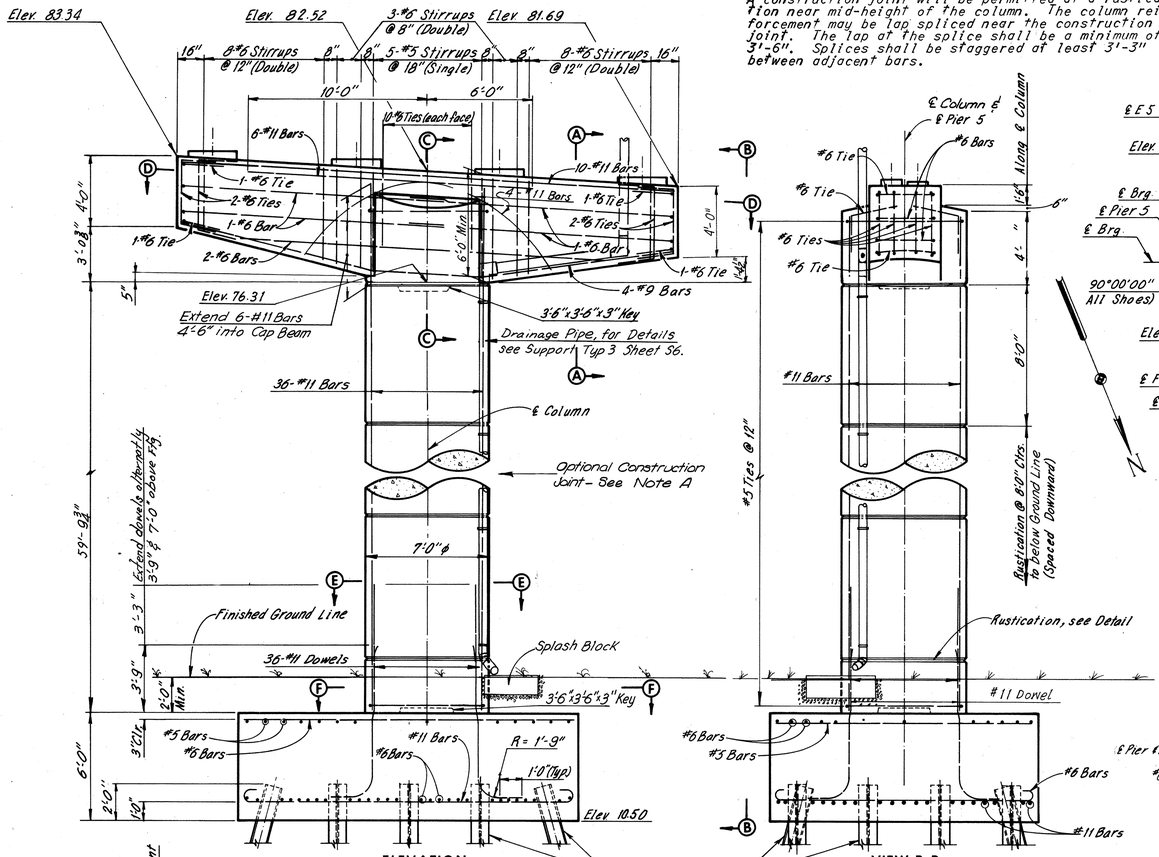
PIER 4

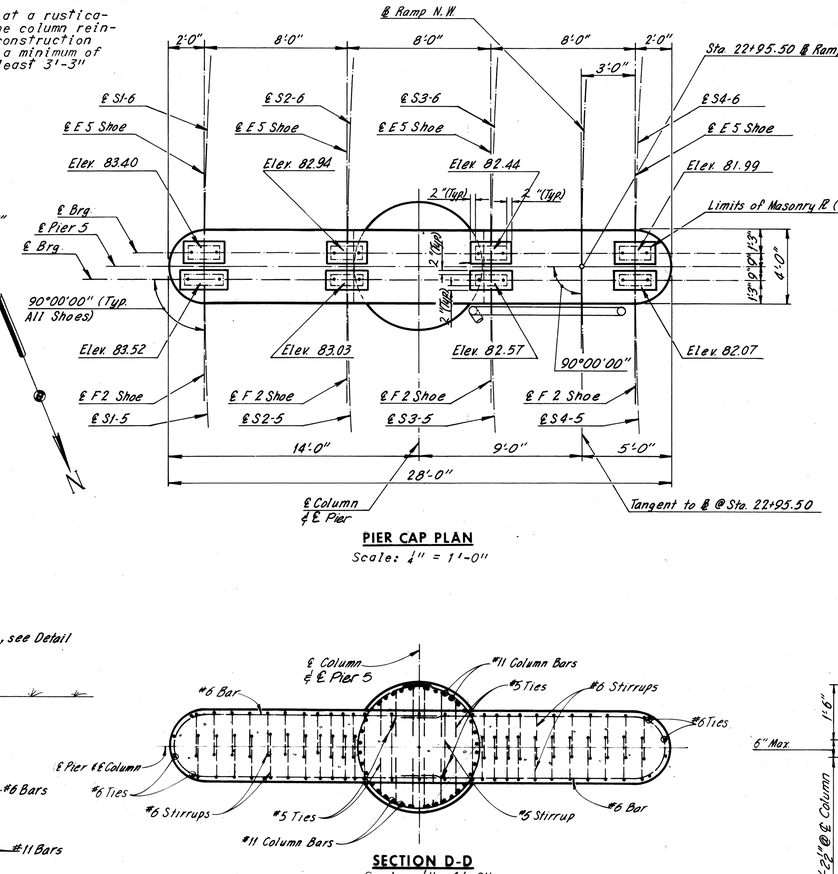
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

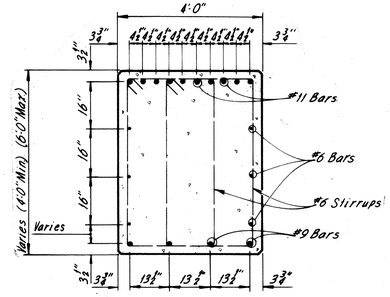
SCALE: AS Noted
CONTRACT NO.: 10
SHEET NO. 6 OF 28

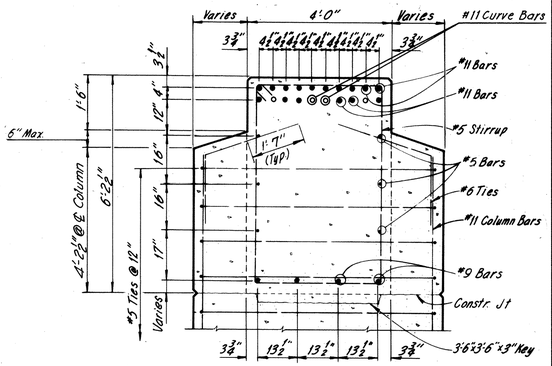
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	105	205

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

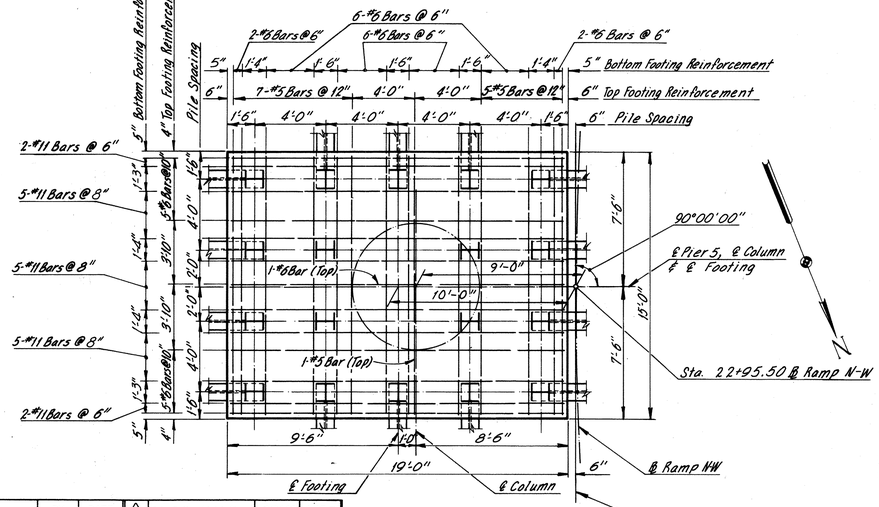


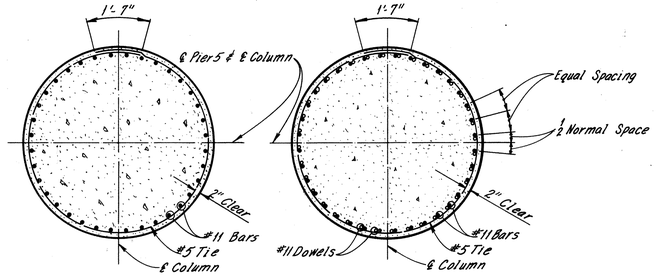


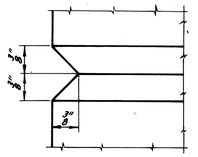




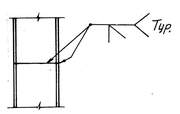
Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S7 & S8.
For Framing Plan, see Sheet 15.
Estimated Pile Tip Elevation -4.0







Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



PILE SPLICE DETAILS
No Scale

FOOTING FOR PIER 5 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

	BY	DATE
MADE	D.E.S.	9-20-68
CHECKED	SCC.	4-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	6-77
1	Pile Splice Weld Change	PRMS	4-19-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 5

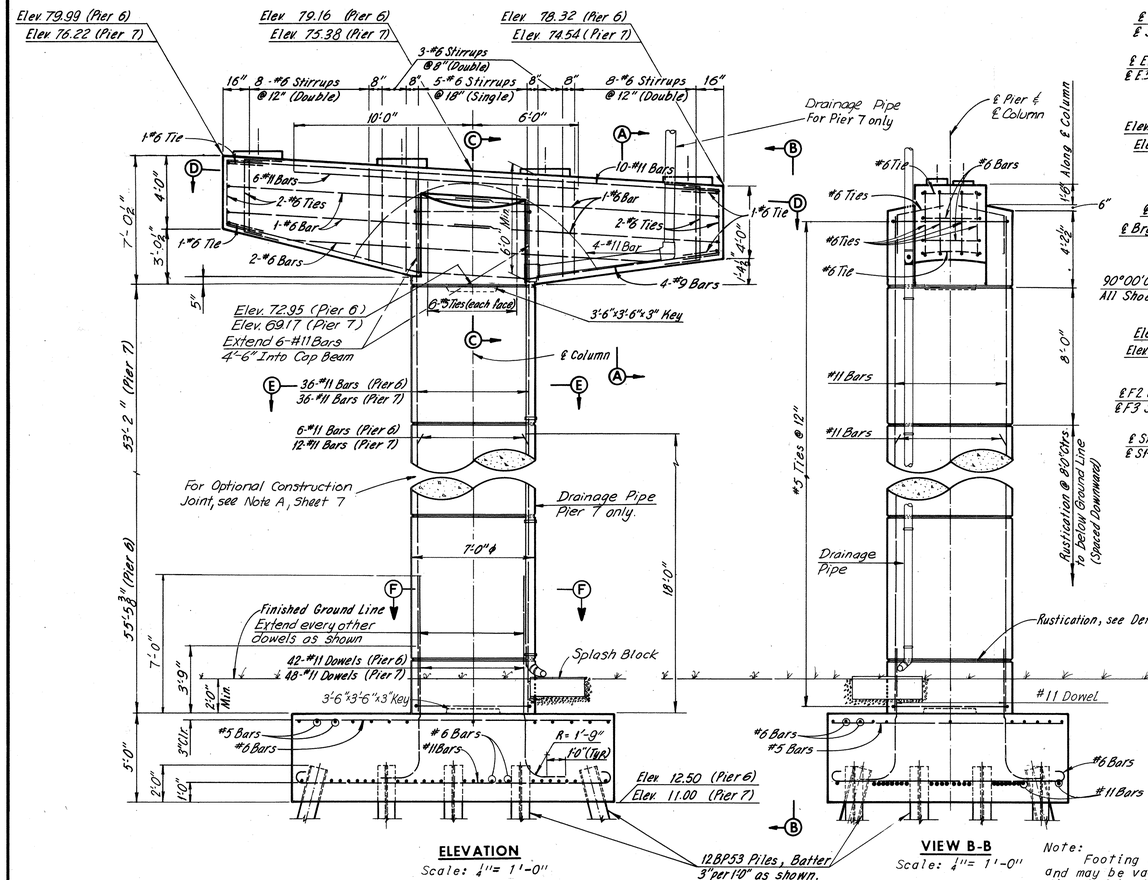
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 28

AS BUILT

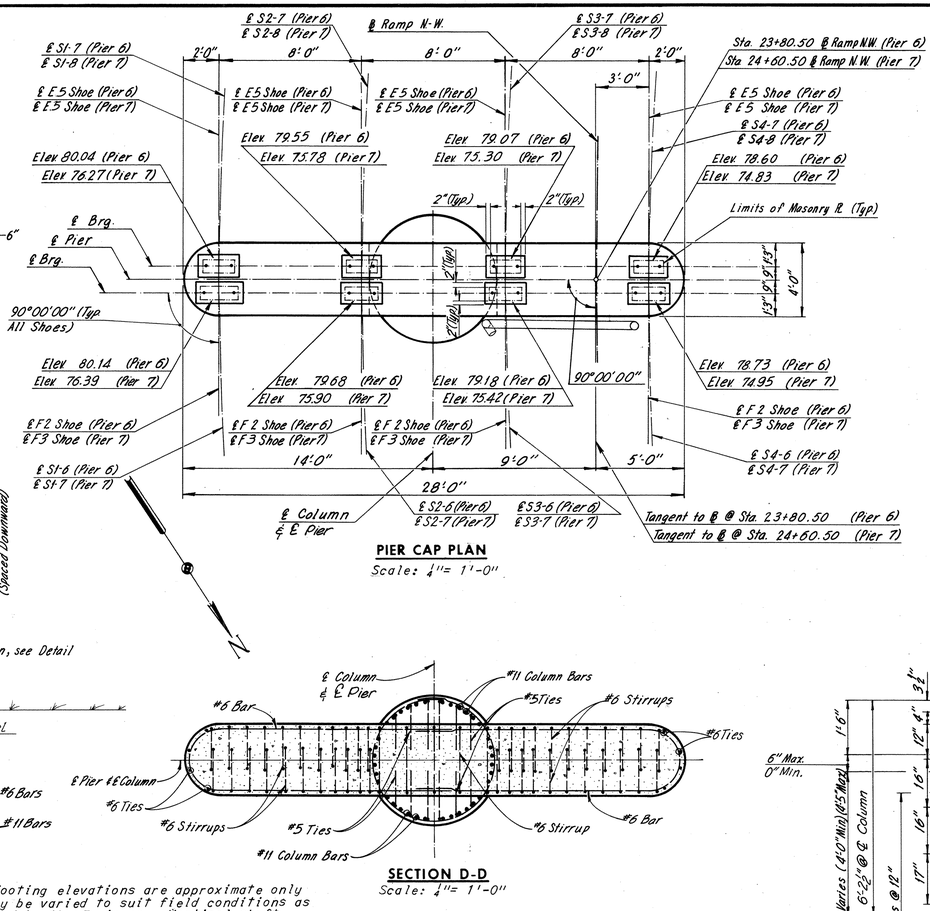
1028-22-10-004-B53

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	106	265

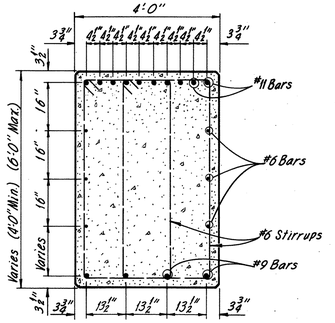


ELEVATION
Scale: ¼"= 1'-0"

VIEW B-B
Scale: ¼"= 1'-0"

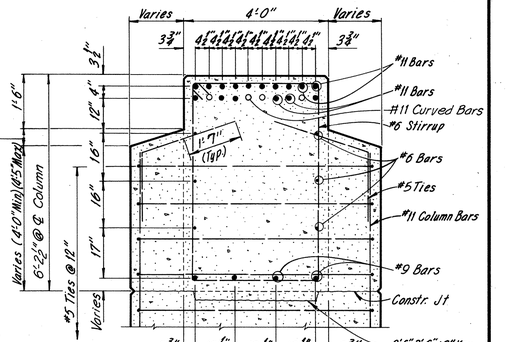


PIER CAP PLAN
Scale: ¼"= 1'-0"



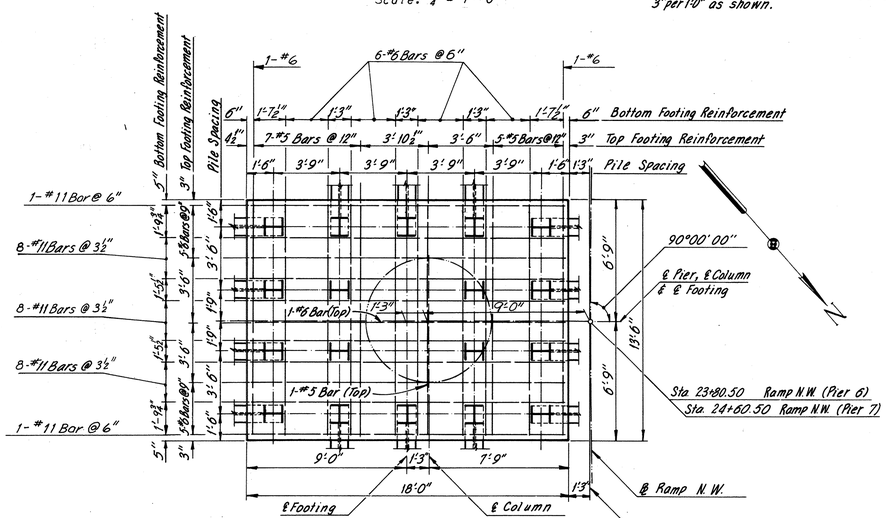
SECTION A-A
Scale: ½"= 1'-0"

SECTION D-D
Scale: ¼"= 1'-0"



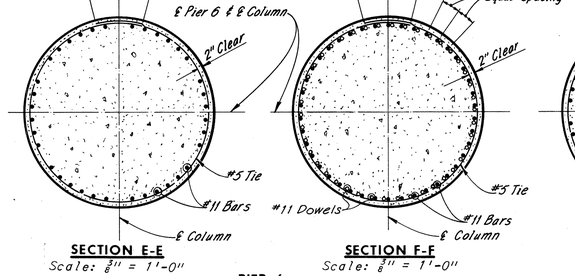
SECTION C-C
Scale: ½"= 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



FOOTING PLAN
Scale: ¼" = 1'-0"

FOOTINGS FOR PIERS 6 AND 7 ARE ECCENTRIC AS SHOWN ON FOOTING PLAN



SECTION E-E
Scale: ⅜" = 1'-0"

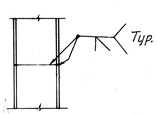
SECTION F-F
Scale: ⅜" = 1'-0"

SECTION E-E
Scale: ⅜"= 1'-0"

SECTION F-F
Scale: ⅜"= 1'-0"

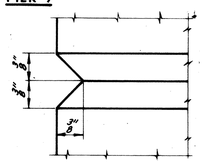
PIER 6

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 ES2
For Framing Plan, see Sheets 15 & 16.
Estimated Pile Tip Elevation -4.0
For Standard Drainage Details, see Support Type 3, Sheet S6.



PILE SPLICE DETAILS
No Scale

PIER 7



RUSTICATION DETAIL
Full Scale

	BY	DATE	△	Pile Splice Weld Chngd & Note Added	PRMS	4-19-74
MADE	D.E.S.	9-12-68	2	As Built	TEM	6-77
CHECKED	K.C.T.	9-17-68				
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

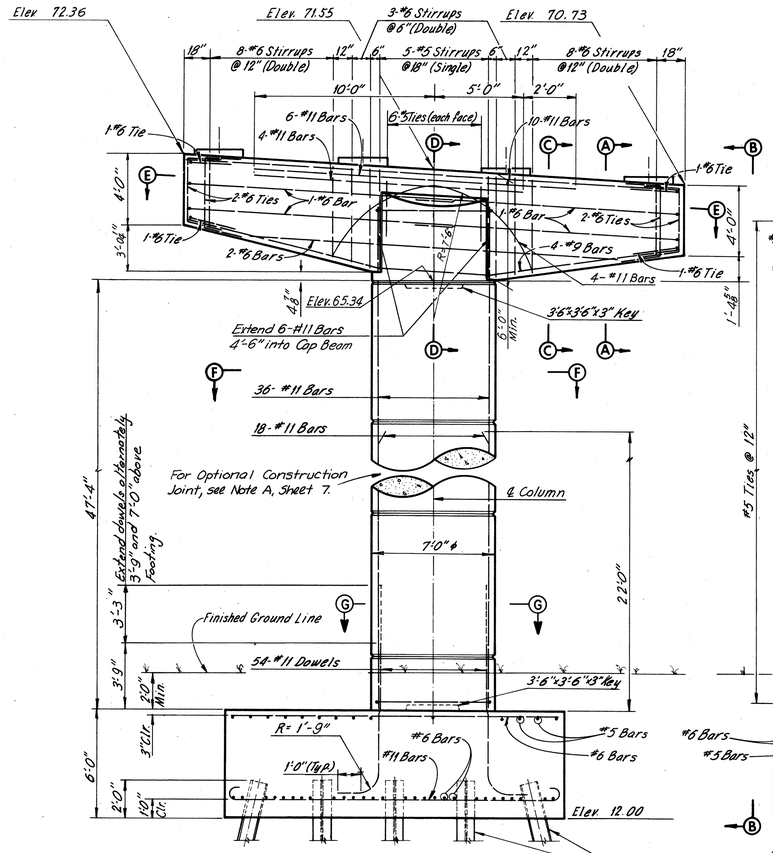
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIERS 6 AND 7

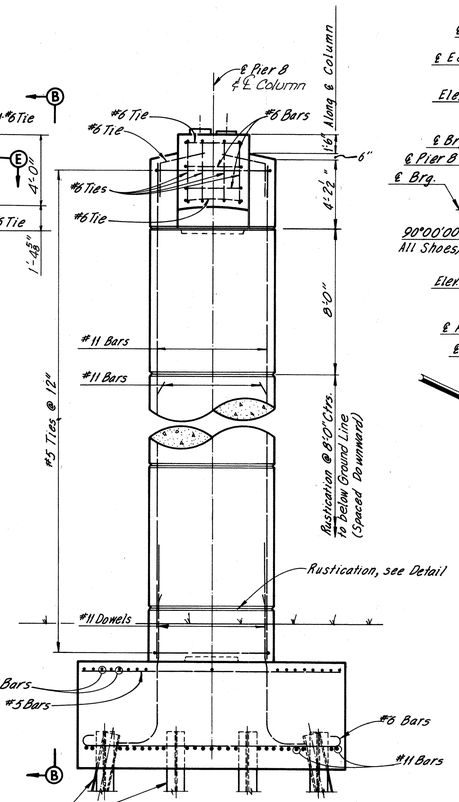
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 8 OF 28

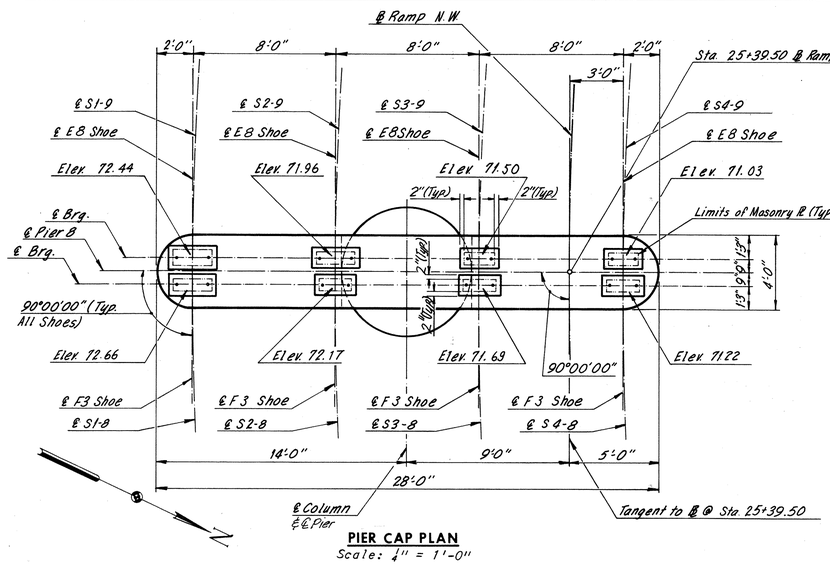
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	107	265



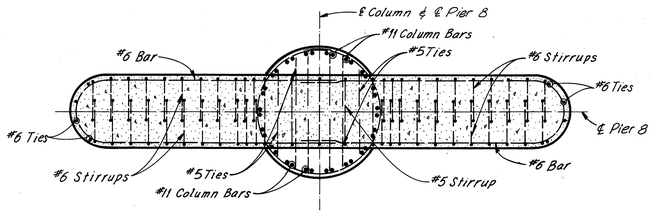
ELEVATION
Scale: $\frac{1}{4}$" = 1'-0"



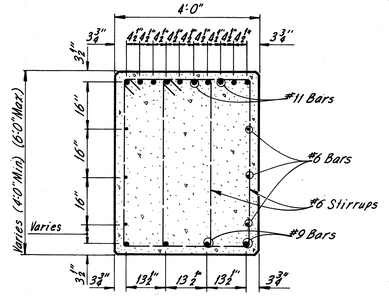
VIEW B-B
Scale: $\frac{1}{4}$" = 1'-0"



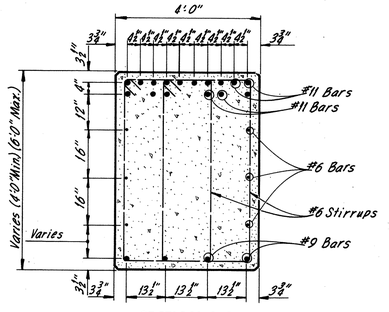
PIER CAP PLAN
Scale: $\frac{1}{4}$" = 1'-0"



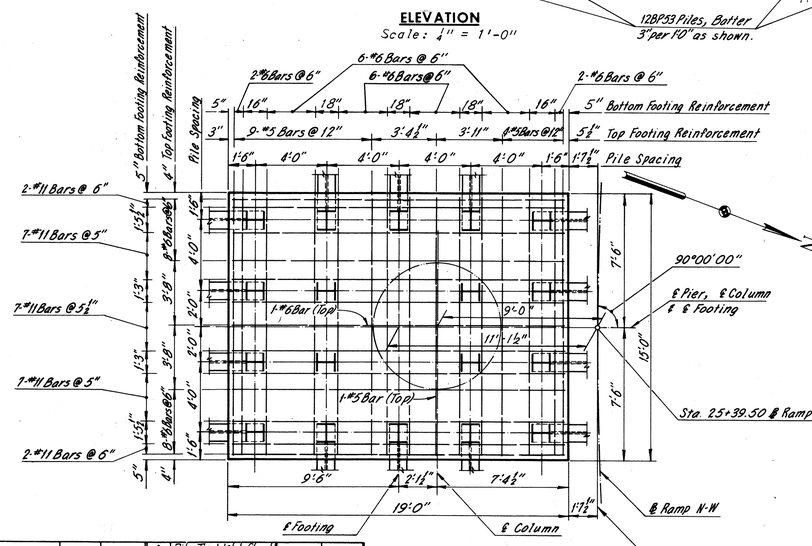
SECTION E-E
Scale: $\frac{1}{4}$" = 1'-0"



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

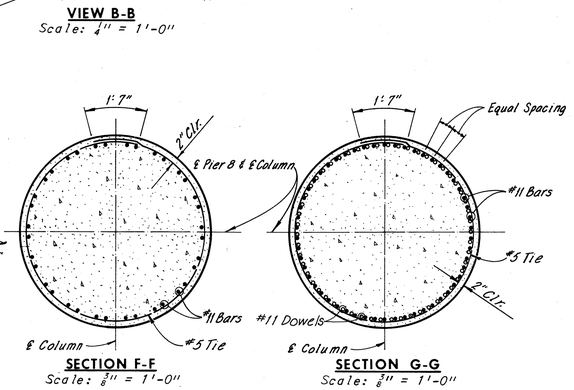


SECTION C-C
Scale: $\frac{1}{2}$" = 1'-0"



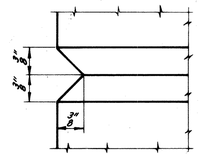
FOOTING PLAN
Scale: $\frac{1}{4}$" = 1'-0"

FOOTING FOR PIER 8 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



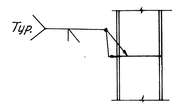
SECTION F-F
Scale: $\frac{3}{8}$" = 1'-0"

SECTION G-G
Scale: $\frac{3}{8}$" = 1'-0"



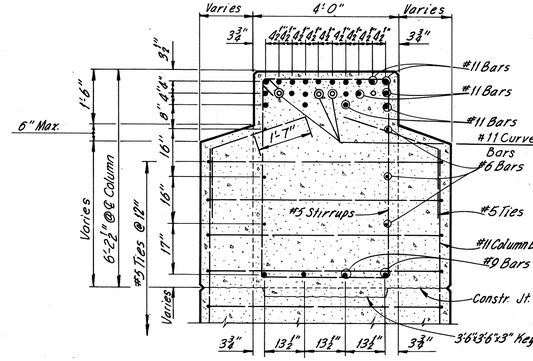
RUSTICATION DETAIL
Full Scale

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



PILE SPLICE
No Scale

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet S1
For Framing Plan, see Sheets 16 & 17
Estimated Pile Tip Elevation -4.0



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

	BY	DATE				
MADE	DES	9-1868	2	Pile Tip Weld Chngd & Note Added	PRMS	4-19-70
CHECKED	SCC.	4-15-69		As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

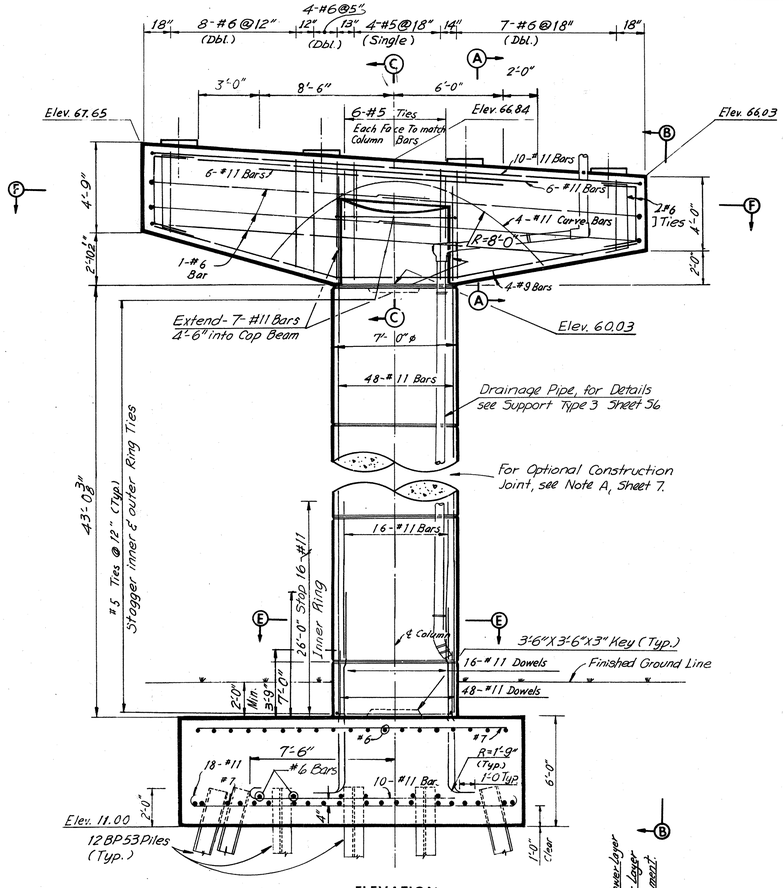
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 8

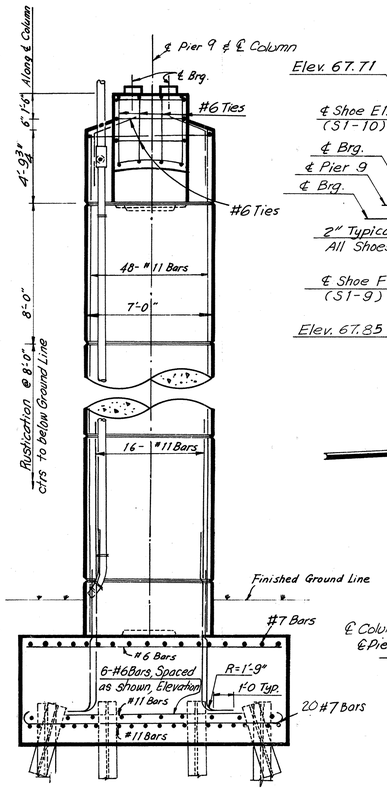
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO. 10
SHEET NO. 9 OF 28

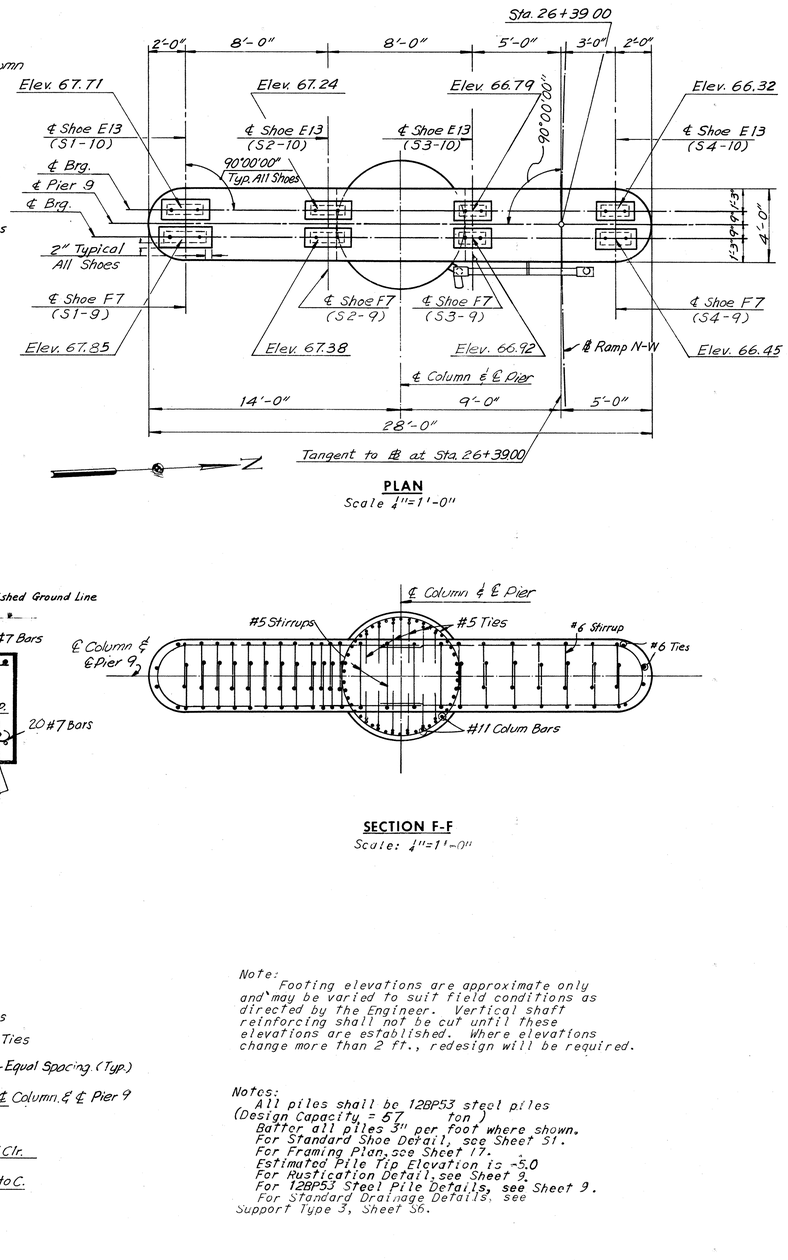
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	108	265



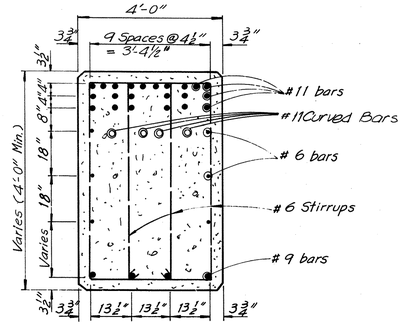
ELEVATION
Scale: 1/4"=1'-0"



VIEW B-B
Scale: 1/4"=1'-0"

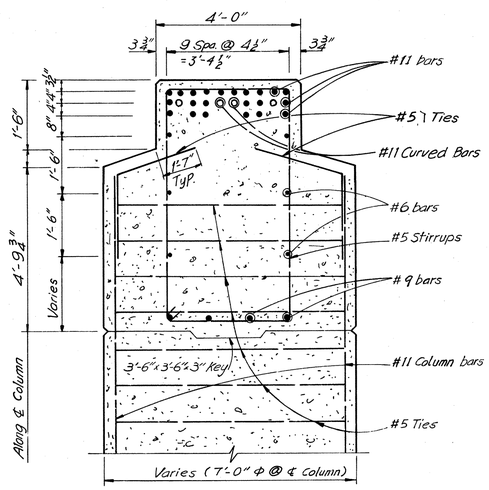


PLAN
Scale 1"=1'-0"

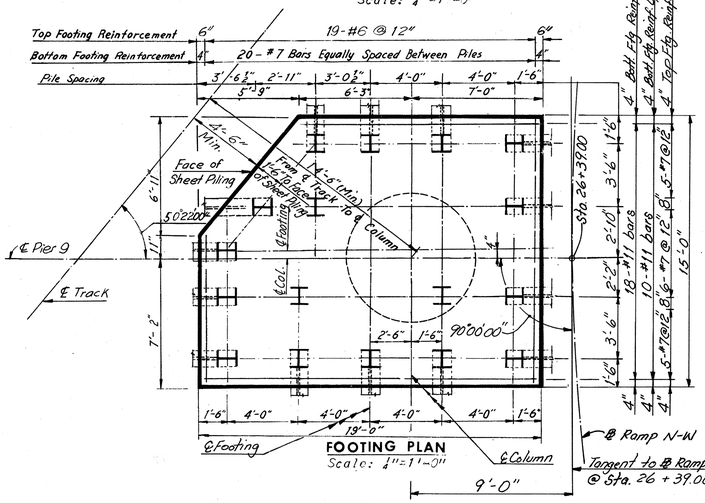


SECTION A-A
Scale 1/2"=1'-0"

SECTION F-F
Scale: 1/4"=1'-0"

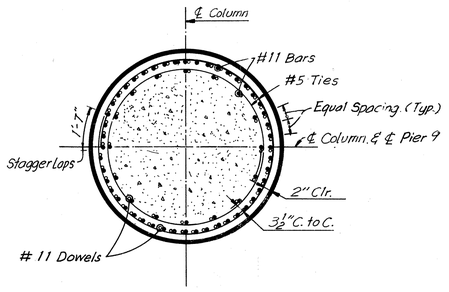


SECTION C-C
Scale: 1/2"=1'-0"



FOOTING PLAN
Scale: 1/4"=1'-0"

FOOTING FOR PIER 9 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



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

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 12BP53 steel piles (Design Capacity = 57 ton)
Batter all piles 3" per foot where shown.
For Standard Shoe Detail, see Sheet 51.
For Framing Plan, see Sheet 17.
Estimated Pile Tip Elevation is -5.0
For Rustication Detail, see Sheet 9.
For 12BP53 Steel Pile Details, see Sheet 9.
For Standard Drainage Details, see Support Type 3, Sheet 36.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	R.C.	2.5.69	2	As Built	TEM	6-77
CHECKED	Y.C.D	4-17-69	1	Note Added	PRMS	4-19-79
IN CHARGE						

AS BUILT

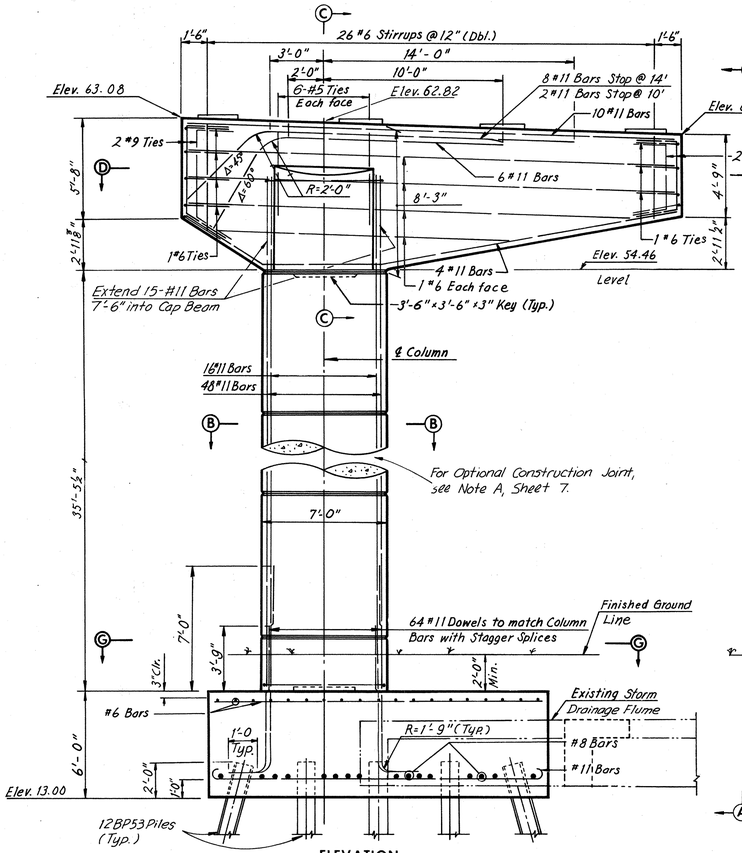
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 9

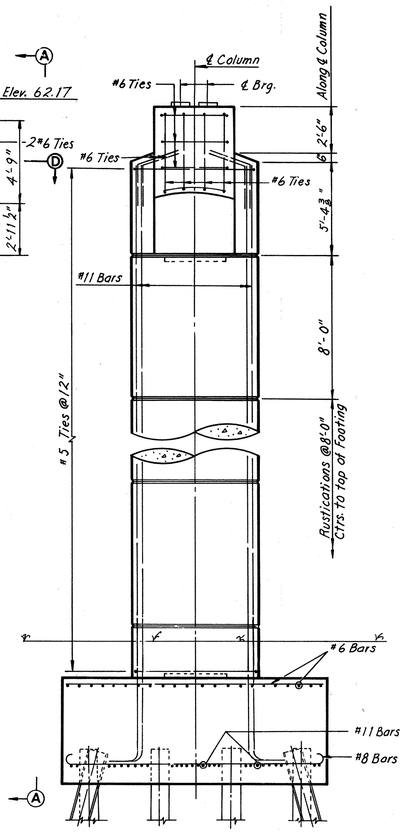
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 28

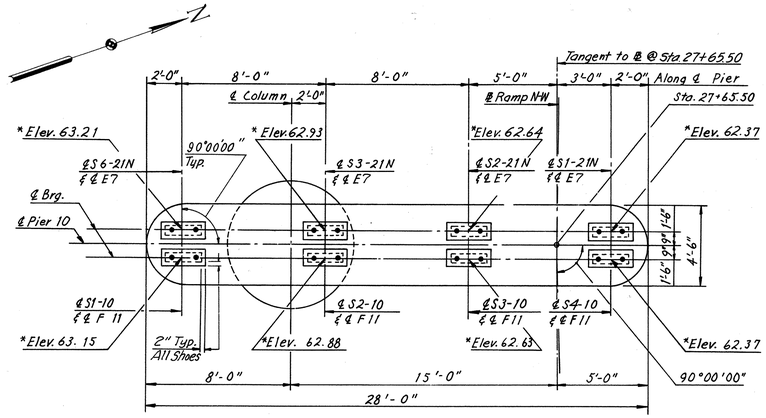
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	109	265



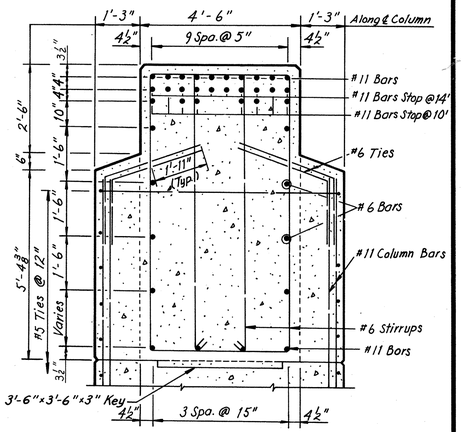
ELEVATION
Scale: 1/4" = 1'-0"



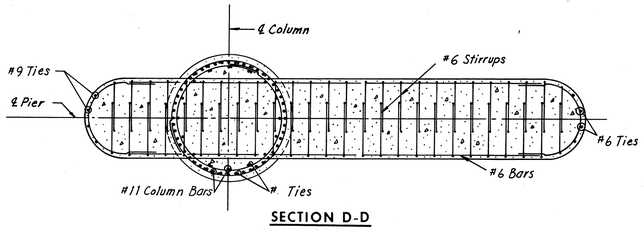
VIEW A-A
Scale: 1/4"=1'-0"



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



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



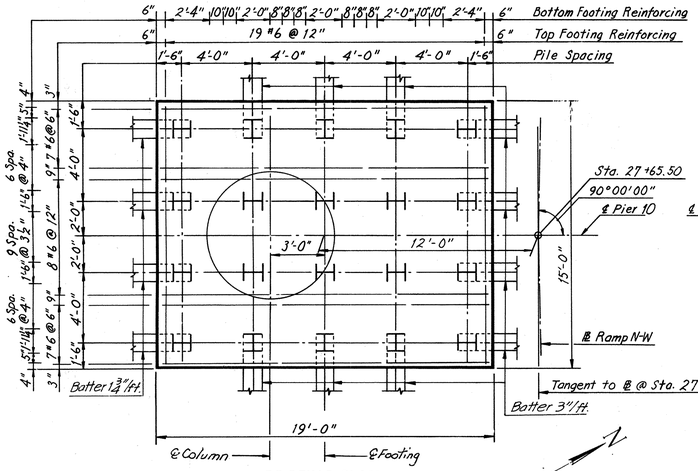
SECTION D-D
Scale: 1/4" = 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by The Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.
Denotes the top Pad Elevation.

Notes:
All piles shall be 12BP53 Steel Piles (Design Capacity= 57 tons)

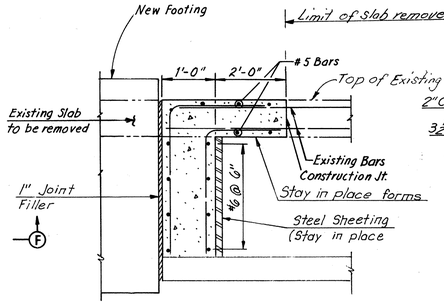
For Standard Shoe Details, see Sheet 31.
For Framing Plan, see Sheet 17.
Estimated Pile Tip Elevation is - 9.0 feet.
For Rustication Details, see Sheet 9.
For 12BP53 Steel Pile Details, see Sheet 9.

Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume shall be pre-bored to an Elevation 5 ft. below bottom of sewer.

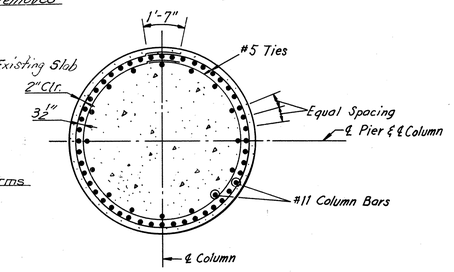


FOOTING PLAN
Scale: 1/4" = 1'-0"

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



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



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

FOOTING FOR PIER 10 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	3-10-69	2	As Built	TEM	6-77
CHECKED	K.C.T.	4-17-69				
IN CHARGE				Note Added	PRMc	4-19-74

AS BUILT

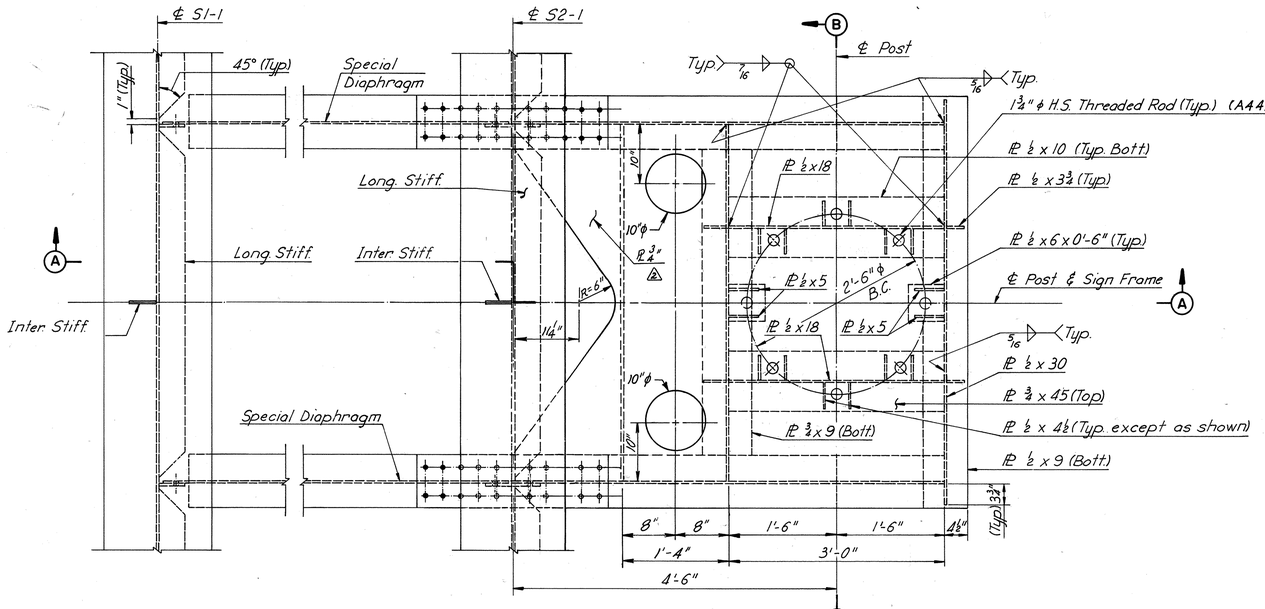
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 10

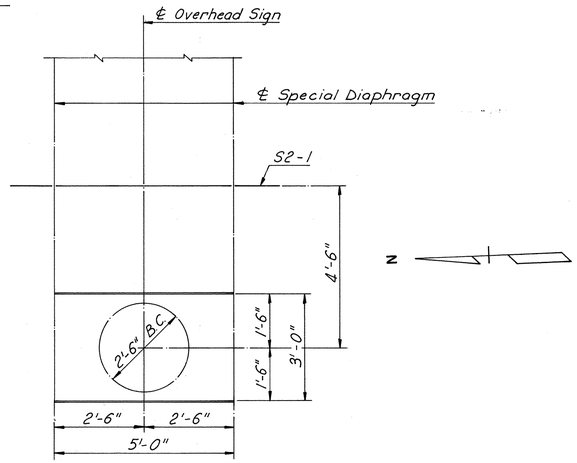
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 11 OF 28

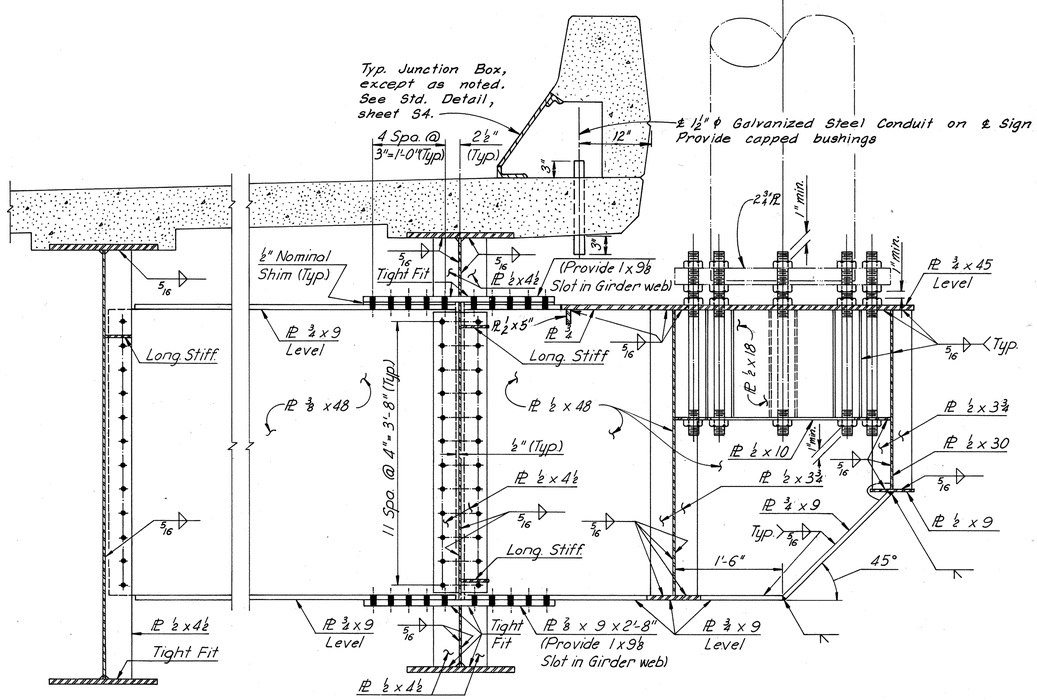
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110a	265



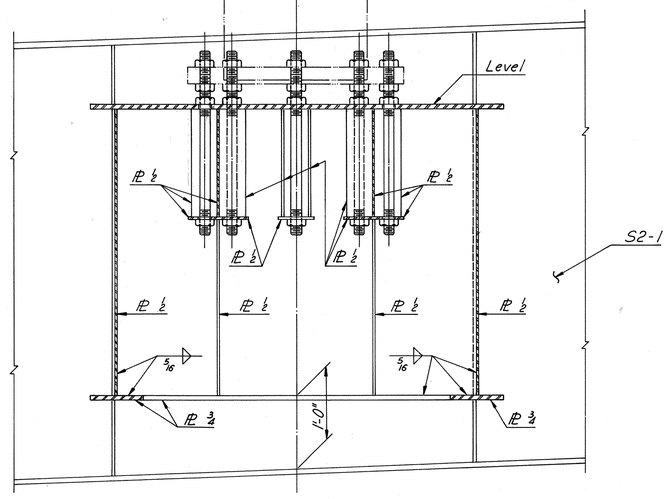
PLAN
Scale: 1" = 1'-0"



LAYOUT PLAN
Scale: ½" = 1'-0"



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



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

NOTES:

1. See Framing Plan Sheet 12 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞" φ H.S. unless noted otherwise.
6. B.C. indicates Bolt Circle.

			NO.	REVISION	BY	DATE
DESIGNED			3	As Built	TEM	6-77
DRAWN	N.L.B.	8-74	2	Replaced 4x4 L with PL ½	REF	1-16-75
CHECKED	R.B.H.	9-74	1	New Sheet Added	R.B.H.	9-74
IN CHARGE	P.R.Y.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

SIGN SUPPORT BRACKET DETAILS-UNIT I

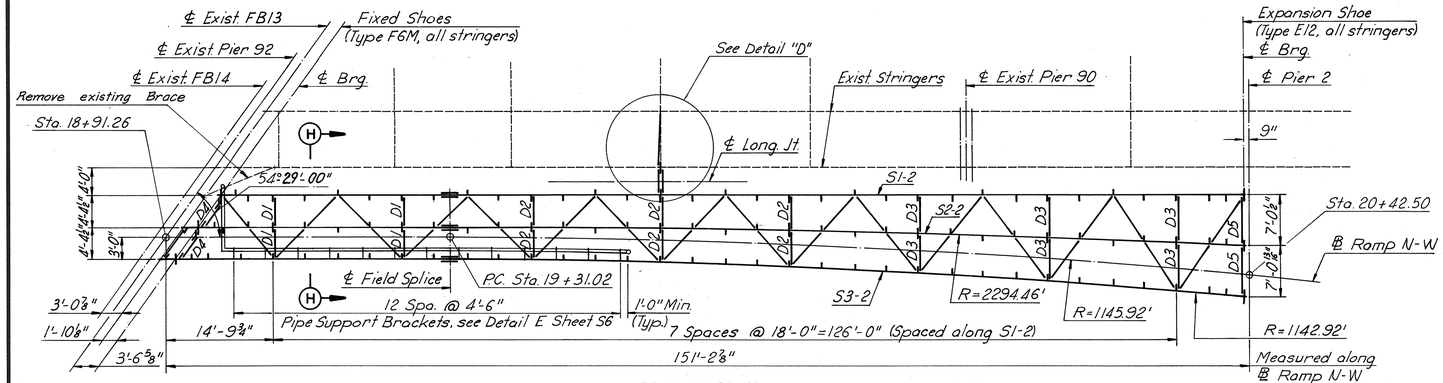
SCALE AS SHOWN
DATE

SHEET 12a OF 28

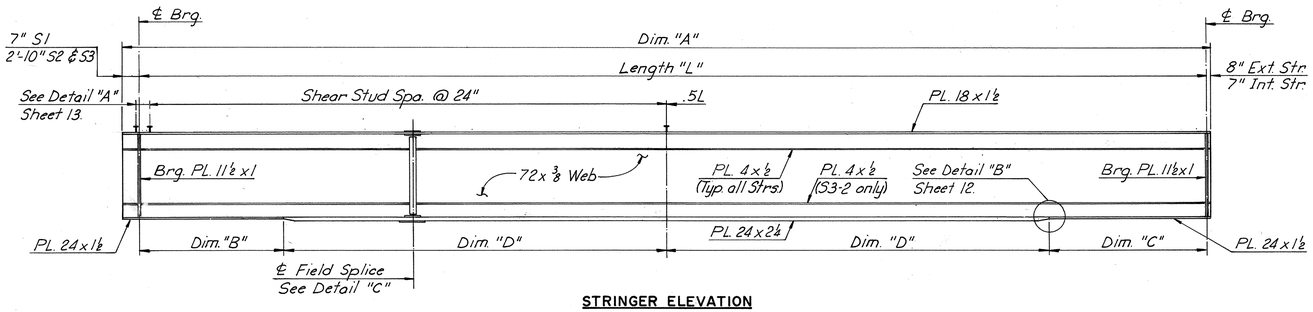
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia

HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110b	265

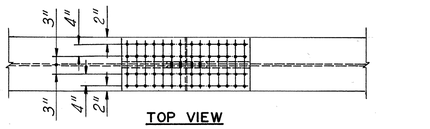


FRAMING PLAN
Scale: 1"=10'-0"

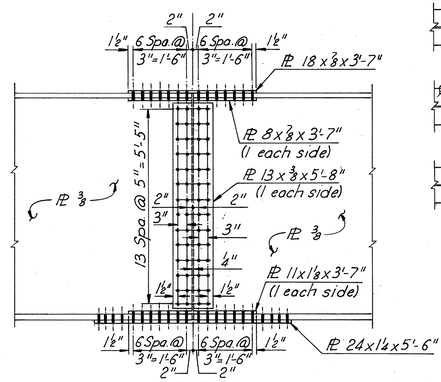


STRINGER ELEVATION
Scale: None

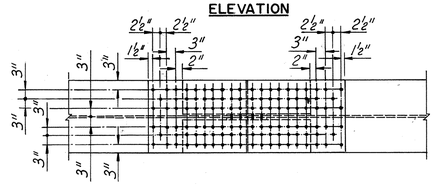
STRINGER SCHEDULE						DEAD LOAD DEFLECTION SCHEDULE						CAMBER SCHEDULE		
						DUE TO CONCRETE			DUE TO STEEL					
STRINGER	LENGTH "L"	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"	1/4L	1/2L	3/4L	1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
S1-2	142'-7 11/16"	143'-9 13/16"	19'-0"	19'-7 11/16"	52'-0"	1 5/16"	1 15/16"	1 3/8"	3/4"	1 1/16"	3/4"	3 3/8"	4 5/8"	3 3/16"
S2-2	145'-9 3/8"	149'-2 3/8"	20'-0"	20'-9 3/8"	52'-6"	1 9/16"	2 1/4"	1 5/8"	7/8"	1 3/16"	7/8"	4 1/2"	6 1/4"	4 5/8"
S3-2	149'-1"	152'-6 15/16"	20'-0"	22'-1"	53'-6"	1 3/4"	2 1/2"	1 3/4"	15/16"	1 1/4"	15/16"	5 1/16"	7 1/2"	5 1/2"



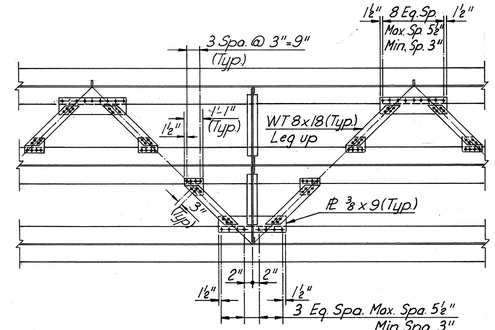
TOP VIEW



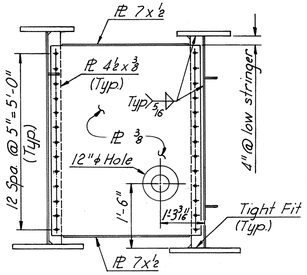
ELEVATION



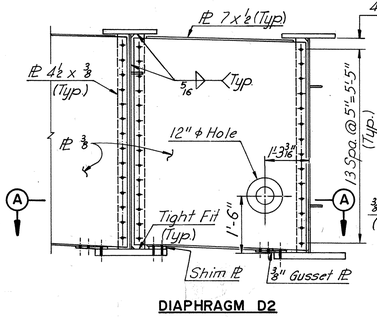
BOTTOM VIEW



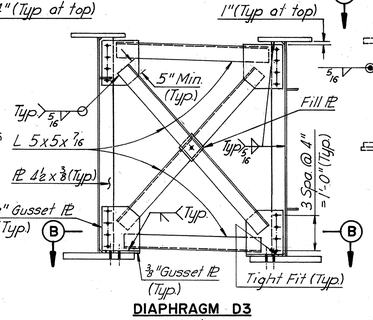
TYPICAL LATERAL BRACING
Scale: 1/4"=1'-0"



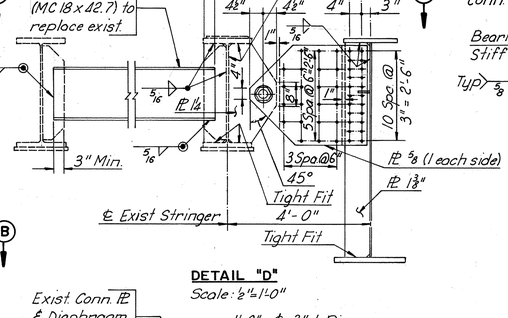
DIAPHRAGM D1
Scale: 1/2"=1'-0"



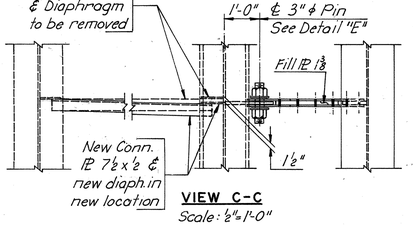
DIAPHRAGM D2
Scale: 1/2"=1'-0"



DIAPHRAGM D3
Scale: 1/2"=1'-0"

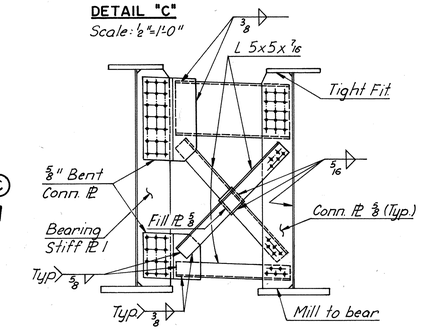


DETAIL "D"
Scale: 1/2"=1'-0"

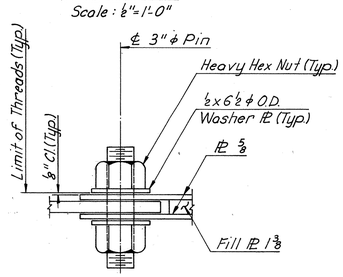


VIEW C-C
Scale: 1/2"=1'-0"

These holes to be shop sub-punched. Ream and connect in field after full dead load deflection has occurred.



DIAPHRAGM D4
Scale: 1/2"=1'-0"



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

NOTE: Spot weld nut to pin upon completion of assembly.

NOTE:
1. For Diaphragm D5 use type shown as end diaphragm section B-B, Sheet 20.
2. For notes not shown, see Sheet 12.
3. For Section H-H see Sheet 19.

AS BUILT

DESIGNED			3	As Built	TEM	6-77
DRAWN	N.L.B.	10-7-74	2	Remove Brace & change angle	NLB	12-30-74
CHECKED	R.B.H.	11-4-74	1	New Sheet Added	N.L.B	10-7-74
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

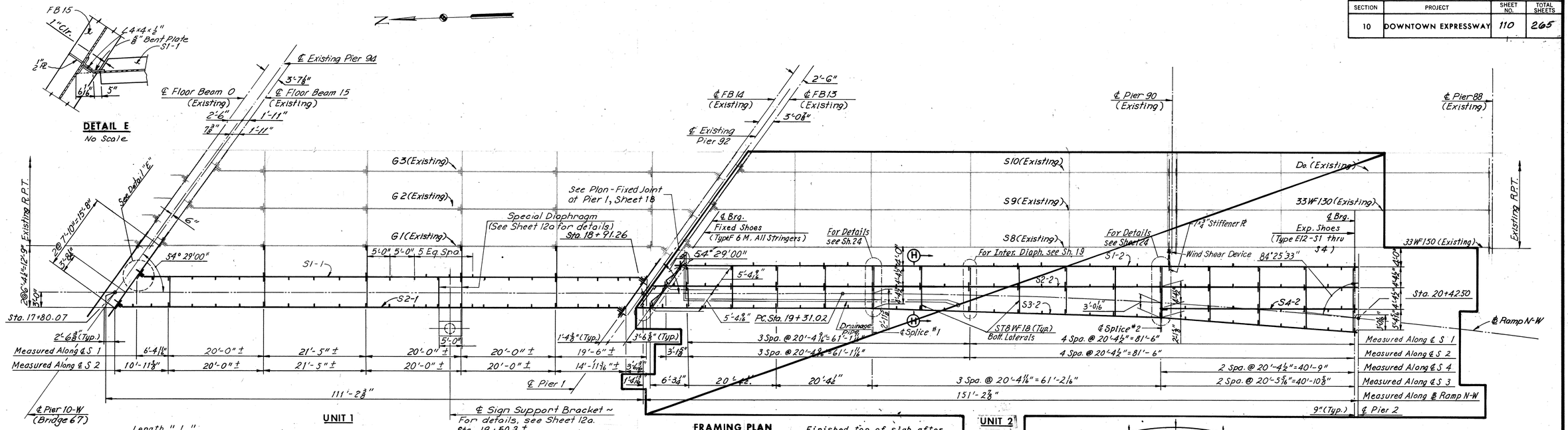
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

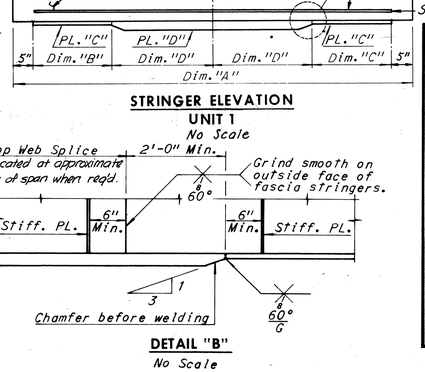
FRAMING PLAN - UNIT 2

SCALE AS NOTED
DATE
SHEET 12b OF 28

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

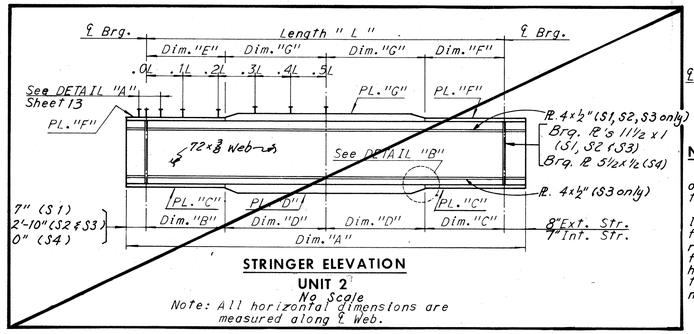
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110	265





STRINGER ELEVATION
UNIT 1
No Scale

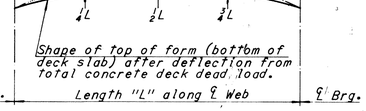
DETAIL "B"
No Scale



STRINGER ELEVATION
UNIT 2
No Scale
Note: All horizontal dimensions are measured along ℄ Web.

FRAMING PLAN
Scale: 1"=10'-0"

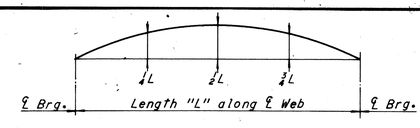
Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms in Unit 1.



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 19

⊕ Except as shown otherwise

Note:
Intermediate stiffener P.s 4½x⅜" shall be equally spaced between diaphragms @ ~~as shown~~. The first two stiffener spaced at the ends of stringers shall be one-half normal spacing within the panel.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragm.

Note:
For Deck Plan, see Sheet 19.
For Joint Details, see Sheets 18 & 25
For Joint Details of Pier 10W, see Sheet 42, Bridge 67.
For Standard Shoe Details, see Sheet 51.
For Details of FB 14 and FB 15, see Sheet 18.

See Sheet 4 for special modifications of masonry plate, FBM @ Pier 1.

For Section H-H, see Sheet 19.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOE	
TYPE	NO. REQD.	TYPE	NO. REQD.
E 12	4	F 6 M	3

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
1	S1-1	106'-3⅜"	105'-5⅜"	23'-0⅛"	23'-0"	29'-8⅜"	23'-0⅛"	23'-0"	29'-8¾"	18x⅞"	18x1⅛"	18x⅞"	18x1⅛"	—	—	—	—	—
	S2-1	106'-3⅜"	105'-5⅜"	23'-0⅛"	23'-0"	29'-8⅜"	23'-0⅛"	23'-0"	29'-8⅛"	18x⅞"	18x1¼"	18x⅞"	18x1¼"	—	—	—	—	—
2	S1-2	149'-2⅜"	148'-7⅛"	13'-0"	19'-7⅛"	52'-0"	—	—	71'-3⅞"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S2-2	149'-2⅜"	148'-7⅛"	13'-0"	19'-7⅛"	52'-0"	—	—	71'-3⅞"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S3-2	152'-6⅛"	149'-0⅝"	20'-0"	20'-9⅛"	52'-6"	—	—	72'-10⅛"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S4-2	152'-6⅛"	149'-0⅝"	20'-0"	22'-0⅝"	53'-6"	—	—	74'-0⅞"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S1-1	41'-4"	40'-9"	—	—	20'-4½"	—	—	20'-4½"	—	12x⅝"	—	12x⅝"	24"	24"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
7/8"	1 1/4"	7/8"	2 3/16"	2 15/16"	2 1/8"
7/8"	1 1/4"	7/8"	2 31/64"	3"	2 31/64"
13/16"	2"	1 3/16"	3 9/16"	5"	3 11/16"
1 13/16"	2 9/16"	1 13/16"	4 3/4"	6 41/64"	4 1/4"
2 1/4"	3 1/8"	2 1/4"	6 1/8"	8 7/16"	6 1/8"
0	7/16"	0	1/16"	1/16"	1/16"

Note : * Spacing begins at termination of 6 spaces @ 4".
All steel shall be A36 unless otherwise shown.

Note: For revisions to Unit 2, see Sheet 12a.

	BY	DATE
MADE	Y.C.P	2-11-69
CHECKED	S.C.C.	4-24-69
IN CHARGE		

5 As Built TEM G-77

NO.	REVISION	BY	DATE
4	Pier Angle Chg.	R&J	1-13-75
1	Note changed, added	PRM's	4-19-74
2	Sign Support Bracket & Intern. Diaph. Spa. added	L.N.B.	9-9-74
3	Unit 2 Deleted	L.N.B.	10-1-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

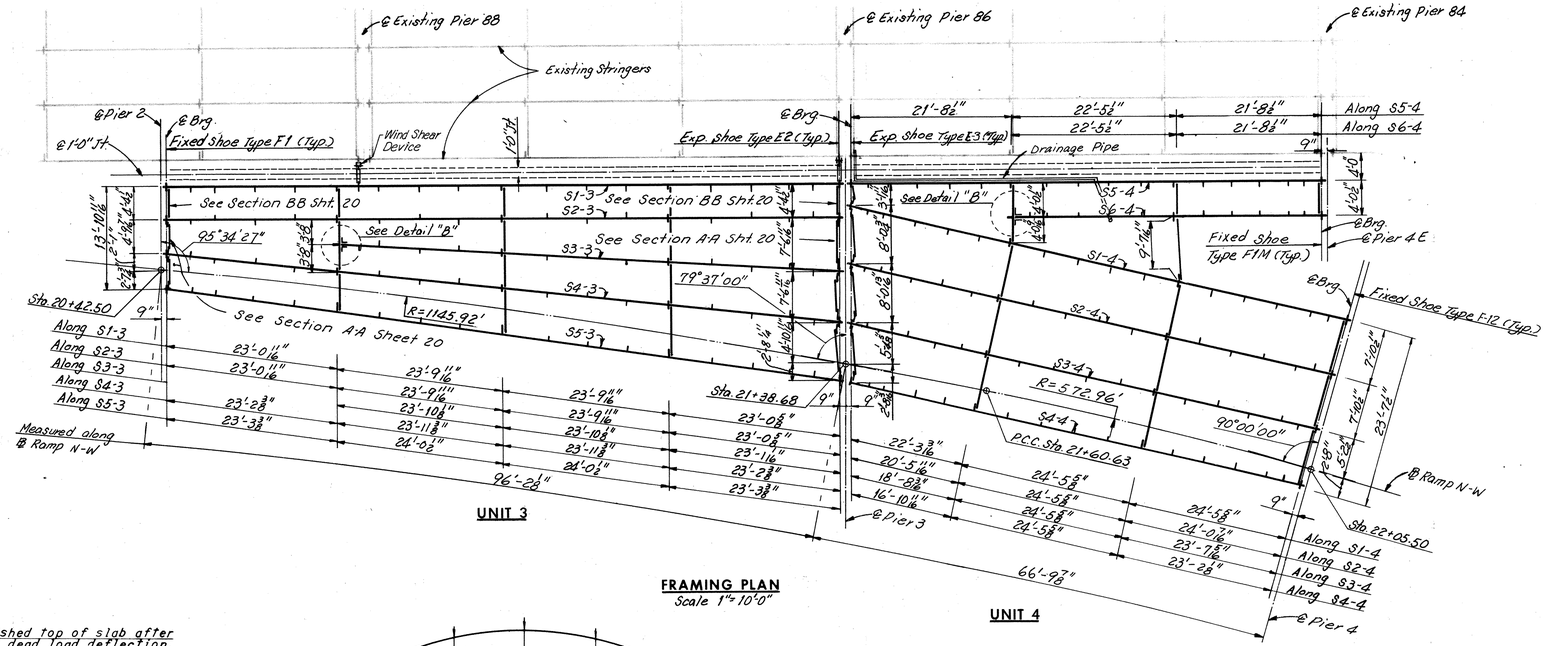
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN - UNITS 1

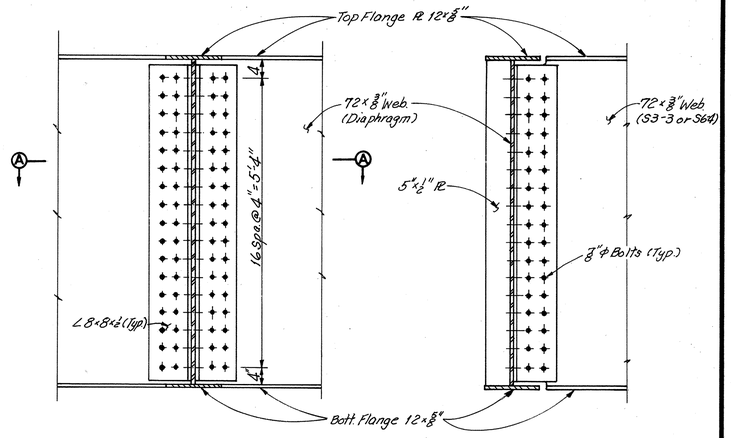
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 12 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	111	265

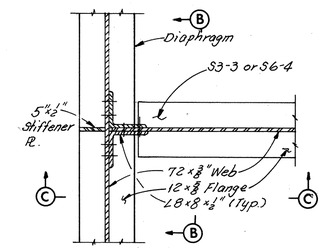


FRAMING PLAN
Scale 1"=10'-0"

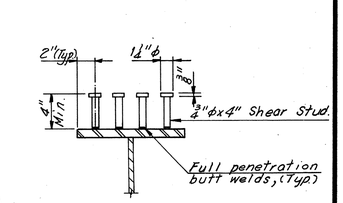


VIEW B-B
Scale 3/4"=1'-0"

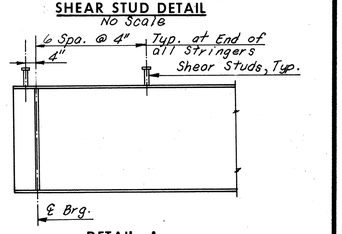
VIEW C-C
Scale 3/4"=1'-0"



DETAIL B
SECTION A-A
Scale 3/4"=1'-0"



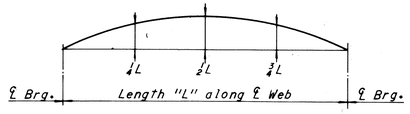
SHEAR STUD DETAIL
No Scale



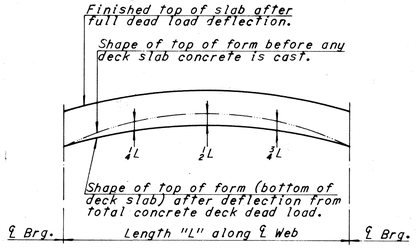
DETAIL A
No Scale

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.
Contractor may, if he elects, use three 3/4" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown.
Stud rows shall be placed parallel to the main deck reinforcement.



CAMBER DIAGRAM



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO FABRICATOR

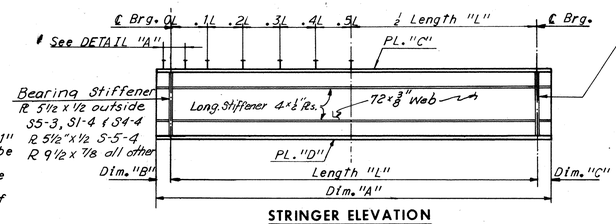
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 20.

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Note:
Intermediate stiffener Pls. 4x3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.



STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

Note:
All Steel shall be A-36 unless denoted otherwise.

Brg. Stiffener
PL 5 1/2 x 1/2 outside
S5-3, S1-4, S4-4
S5-4 (S6-4
PL 9 1/2 x 7/8 All others

Note:
For Shoe Details, see Sheet 51.
For Deck Plan, see Sheet 20.
For Joint Details, see Sheet 25 & 26.
For Diaphragm Details, see Sheet 20.
It may be necessary to increase Bearing Stiffener size to accomdate erection of end diaphragms.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	5	F1	4
E3	5	F1M	2
		F12	4

	BY	DATE			PRMS	4-19-74
MADE	G.C.C.	2-1969	2	Revised DL. Defl. & Camber Schedule.	EJM	10-11-74
CHECKED	S.C.C.	2-2869	3	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

STRINGER SCHEDULE									DEAD LOAD DEFLECTION SCHEDULE						CAMBER SCHEDULE		
UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	PL. "C"	PL. "D"	MAX. SHEAR STUD SPACING					DUE TO TOTAL CONCRETE			DUE TO STEEL					
								0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	1/4 L	1/2 L	3/4 L	1/4 L	1/2 L	3/4 L	1/4 L	1/2 L	3/4 L
3	S1-3	94'-10 11/16"	93'-8 11/16"	7"	7"	12x5/8"	12x1"	19"	22"	24"	24"	24"	1/2"	11/16"	1/2"	1/4"	3/8"	1/4"	1"	1 3/8"	1"
	S2-3	94'-10 11/16"	93'-8 11/16"	7"	7"	12x5/8"	12x1"	19"	22"	24"	24"	24"	3/4"	1"	3/4"	3/4"	3/8"	1/4"	1"	1 3/8"	1"
	S3-3	71'- 4 5/8"	70'-3 5/8"	0	7"	12x5/8"	12x5/8"	19"	22"	24"	24"	24"	1/4"	3/8"	1/4"	1/16"	3/8"	1/16"	5/16"	1/2"	5/16"
	S4-3	95'- 5 5/8"	94'-3 1/2"	7 1/8"	7 1/8"	12x5/8"	12x1"	19"	22"	24"	24"	24"	15/16"	1 5/16"	15/16"	1/4"	3/8"	1/4"	1 3/16"	1 5/8"	1 3/16"
	S5-3	95'-11 7/8"	94'-7 3/4"	8 1/8"	8 1/8"	12x5/8"	12x1"	19"	22"	24"	24"	24"	13/16"	1/8"	13/16"	3/16"	5/16"	3/16"	1"	1 1/16"	1"
4	S1-4	72'- 4 5/8"	71'-2 3/4"	7 1/4"	7"	12x5/8"	12x1"	12"	13"	15"	16"	24"	3/8"	1/2"	3/8"	1/16"	1/16"	1/16"	1 1/16"	1 3/8"	1 1/16"
	S2-4	70'- 2"	68'-11 3/8"	7 1/4"	7"	12x5/8"	12x5/8"	13"	15"	17"	20"	24"	5/16"	7/16"	5/16"	1/4"	1/16"	1/16"	1 1/16"	1 1/16"	1"
	S3-4	67'-11 3/4"	66'-9 5/8"	7 1/4"	7"	12x5/8"	12x5/8"	13"	15"	17"	20"	24"	5/16"	7/16"	5/16"	1/16"	1/16"	1/16"	1"	1 1/4"	15/16"
	S4-4 —	65'-10 11/16"	64'-6 7/8"	8 1/4"	8"	12x5/8"	12x5/8"	13"	15"	17"	20"	24"	1/4"	5/16"	1/4"	1/16"	1/16"	1/16"	3/4"	1"	3/4"
	S5-4	67'- 0 1/2"	65'-10 1/2"	7"	7"	12x5/8"	12x5/8"	13"	15"	17"	20"	24"	5/16"	3/8"	1/4"	1/16"	1/16"	1/16"	3/4"	1"	7/16"
	S6-4	44'- 9"	44'- 2"	0	7"	12x5/8"	12x5/8"	24"	24"	24"	24"	24"	1/16"	1/16"	1/16"	—	—	—	3/16"	3/16"	1/16"

* Spacing begins at termination of 6 spaces @ 4".

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

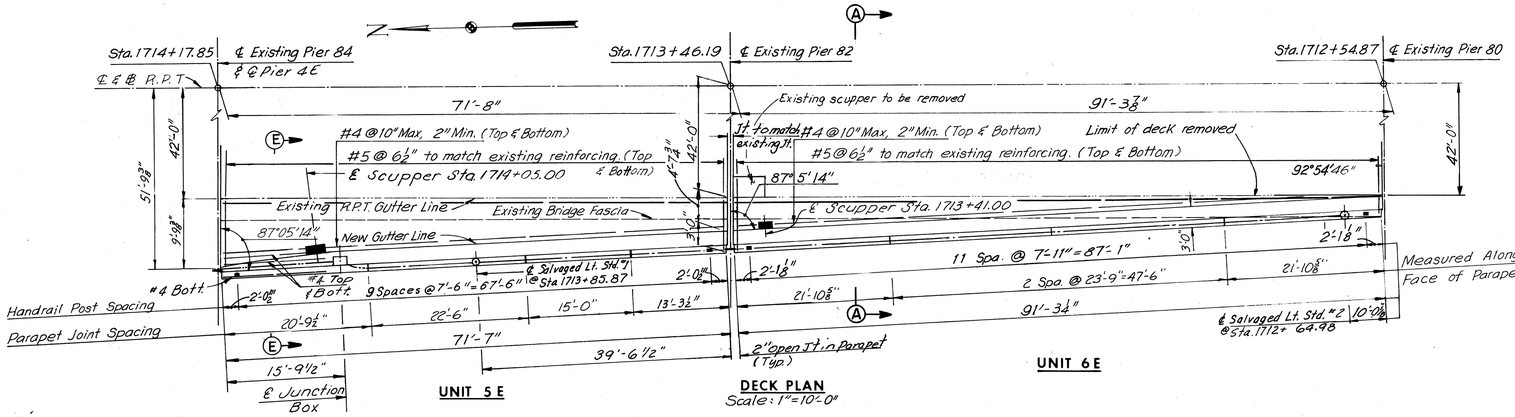
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 3 AND 4

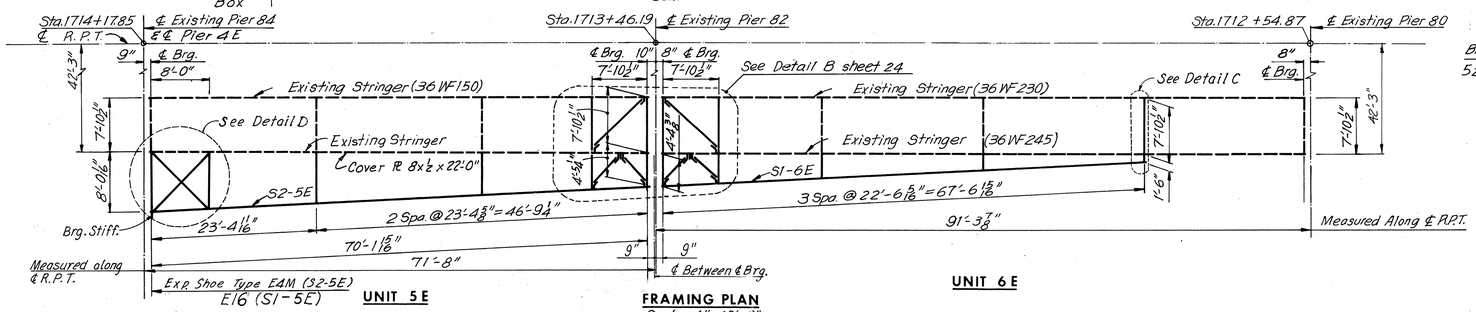
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 13 OF 28

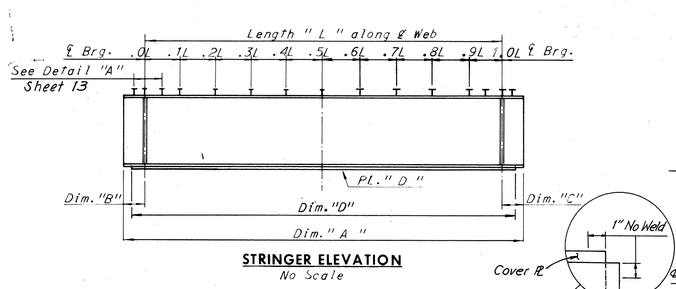
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	112	265



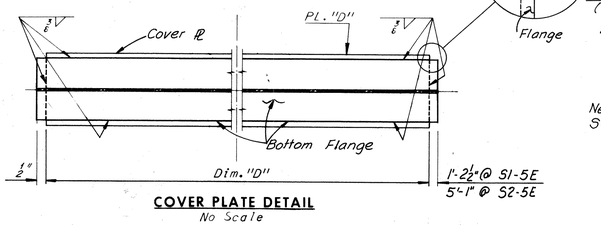
DECK PLAN
Scale: 1"=10'-0"



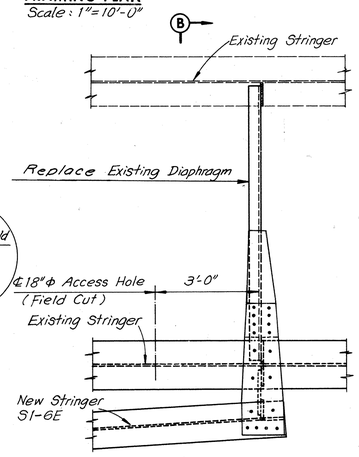
FRAMING PLAN
Scale: 1"=10'-0"



STRINGER ELEVATION
No Scale

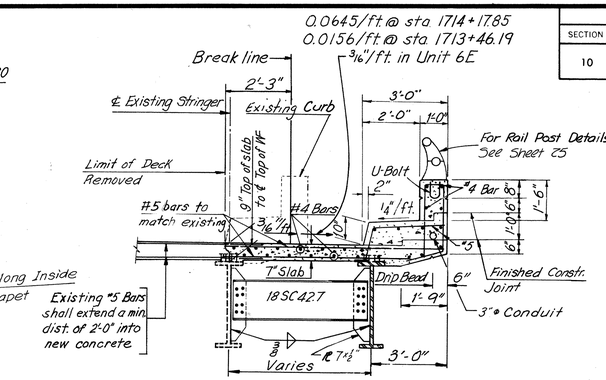


COVER PLATE DETAIL
No Scale

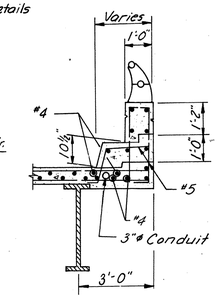


DETAIL C
Scale: 1/2"=1'-0"

NOTE:
Contractor shall remove the minimum amount of deck necessary to perform the work shown on this sheet.

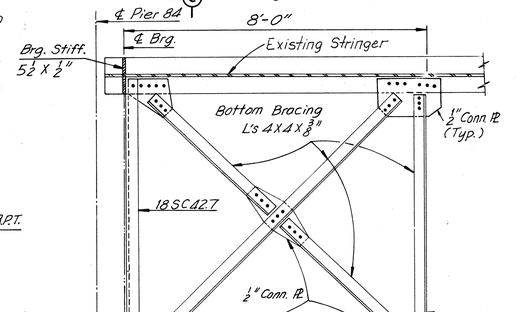


SECTION A-A—INTERMEDIATE DIAPHRAGM



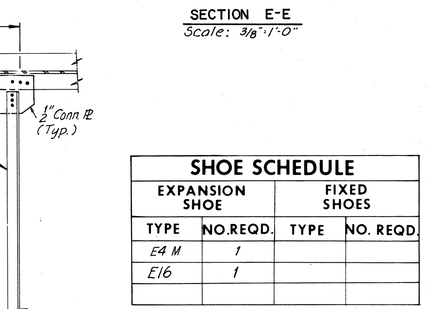
SECTION E-E
Scale: 3/8"=1'-0"

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



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

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



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

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4 M	1		
E16	1		

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L*
5E	S2-5E	36W 150	71'-5 15/16"	70'-1 15/16"	8"	8"	61'-4"	14 x 5/8"	9 1/2"	10 1/2"	12"	15"	18 1/2"	19"	17"	14 1/2"	6"	6"
6E	S1-6E	36W 150	68'-9"	67'-6 15/16"	7"	7/8"	--	--	24"	24"	24"	24"	24"	24"	24"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

DUE TO TOTAL CONC.			DUE TO STEEL		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
7/8"	1 3/16"	7/8"	1/4"	5/16"	1/4"
3/4"	1 1/16"	3/4"	3/16"	5/16"	1/4"

CAMBER SCHEDULE

1/4L	1/2L	3/4L
1 7/8"	2 7/16"	1 3/4"
1 5/16"	1 1/16"	15/16"

* Spacing begins at termination of 6 spaces @ 4".

	BY	DATE				
MADE	SCC	3.12.69	2	As Built	TEM	6-77
CHECKED	GCC	4.28.69	1	Deck Plan & Section A-A	TEM	10-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

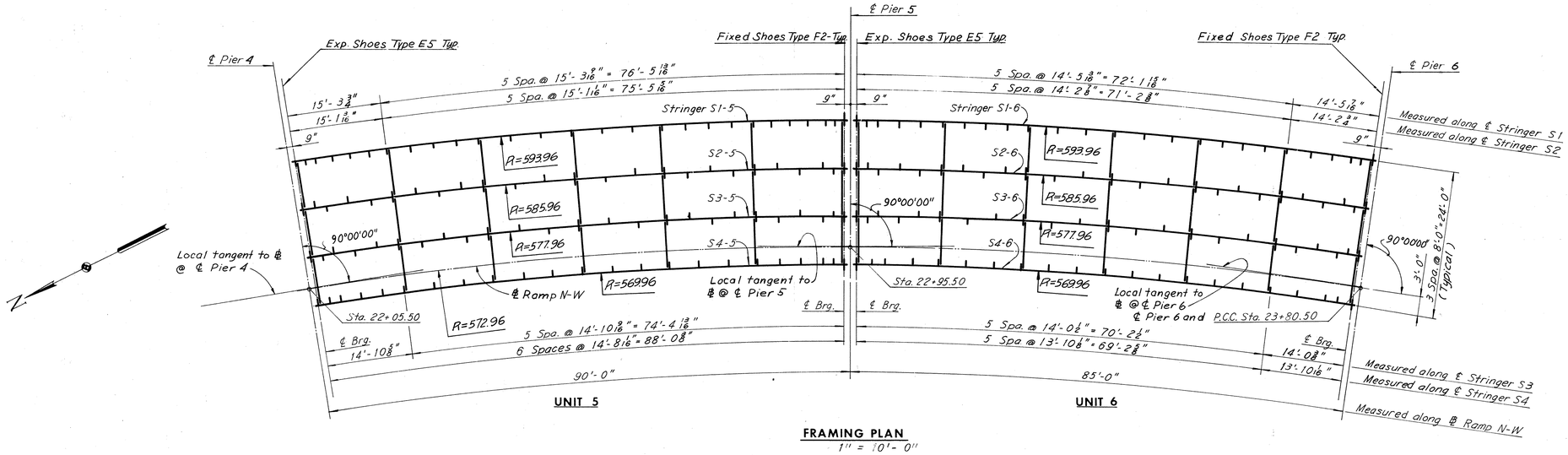
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN AND DECK PLAN
UNITS 5E AND 6E

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

SCALE As Noted
CONTRACT NO 10
SHEET NO 14 OF 28

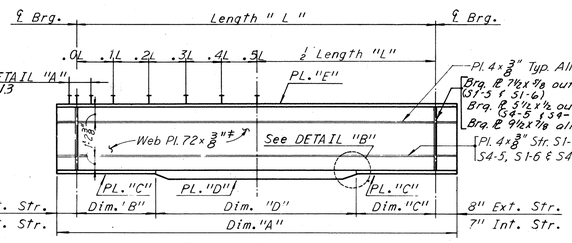
Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms.

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	113	265



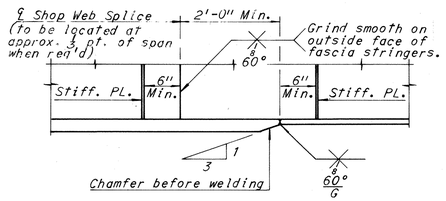
FRAMING PLAN
1" = 10'-0"

CAMBER SCHEDULE				
UNIT	STRINGER	¼L	½L	¾L
5	S1-5	2 5/8"	3 15/16"	2 7/8"
	S2-5	2 5/8"	3 11/16"	2 3/4"
	S3-5	2 5/8"	3 7/16"	2 11/16"
	S4-5	2 5/8"	3 1/2"	2 7/16"
6	S1-6	2 9/16"	3 7/16"	2 1/2"
	S2-6	2 7/16"	3 5/16"	2 7/16"
	S3-6	2 5/16"	3 3/16"	2 5/16"
	S4-6	2 1/4"	3 1/16"	2 1/4"

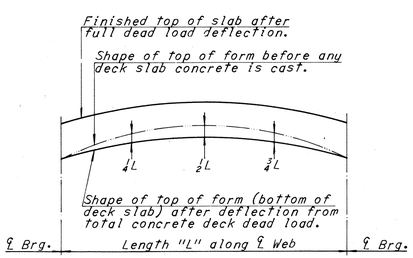


STRINGER ELEVATION
No Scale

FLANGE PLATE SPLICE DETAIL
No Scale



DETAIL "B"
No Scale

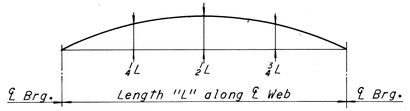


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 21 .

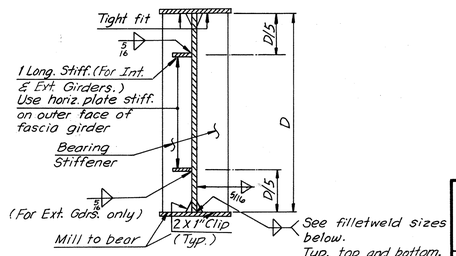
SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	8	F2	8

Notes:
For Joint details see Sheet 26.
For Superstructure steel quantities see Sheet 2
For Diaphragm details see Sheet 21.
For Shoe details see Sheet 51
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE											DEAD LOAD DEFLECTION SCHEDULE					
											DUE TO TOTAL CONC.			DUE TO STEEL		
UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"#	PL. "D"#	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	¼L	½L	¾L	¼L	½L	¾L
5	S1-5	93'- 1 3/16"	91'-9 5/16"	17'-11 11/16"	17'-11 3/8"	55'-10"	16x 7/8"	16x 1 3/8"	12x 3/4" ±	10 1/2"	12 1/2"	15 1/2"	20"	24"	15/16"	15/16"	15/16"	1/4"	5/16"	1/4"
	S2-5	91'- 8 2/16"	90'-6 2/16"	18'- 0 4/16"	18'- 0 4/16"	54'- 6"	12x 1"	12x 1 3/8"	12x 3/4" ‡	13"	14 1/2"	17"	21 1/2"	24"	13/16"	1/8"	13/16"	3/16"	1/4"	3/16"
	S3-5	90'- 5 6/16"	89'-3 3/16"	17'- 4 12/16"	17'- 4 12/16"	54'-6"	12x 3/4"	12x 1 3/8"	12x 3/4" ‡	14 1/2"	16 1/2"	19"	23 1/2"	24"	3/4"	1"	3/4"	3/16"	1/4"	3/16"
	S4-5	89'- 4 3/16"	88'-0 5/16"	44'- 0 8/16"	44'- 0 8/16"	-	12x 1"	-	12x 3/4"	15 1/2"	18"	21 1/2"	24"	24"	5/8"	7/8"	5/8"	1/8"	3/16"	1/8"
6	S1-6	37'- 11 3/8"	86'-7 5/16"	43'- 3 11/16"	43'- 3 11/16"	-	16x 1 1/8"	-	12x 3/4" ‡	11"	13"	15 1/2"	20"	24"	3/4"	1 1/16"	3/4"	3/16"	1/4"	3/16"
	S2-6	86'- 7 8/16"	85'-5 8/16"	16'-11 15/16"	16'-11 15/16"	51'-6"	12x 7/8"	12x 1 3/8"	12x 3/4" ‡	13"	14 1/2"	17"	21 1/2"	24"	11/16"	1"	11/16"	3/16"	1/4"	3/16"
	S3-6	85'- 4 8/16"	84'-2 8/16"	42'- 1 8/16"	42'- 1 8/16"	-	12x 7/8"	-	12x 3/4" ‡	15"	16 1/2"	19"	23"	24"	5/8"	7/8"	5/8"	1/8"	3/16"	1/8"
	S4-6	84'- 4 11/16"	83'-0 11/16"	41'- 6 13/16"	41'- 6 13/16"	-	12x 3/4"	-	12x 3/4"	15 1/2"	18"	21 1/2"	24"	24"	9/16"	13/16"	9/16"	1/8"	3/16"	1/8"

* Spacing begins at termination of 6 spaces @ 4".
\# Denotes A572-Grade 50 steel for thickness of ¾" and under, and A588 steel for thickness over ¾".

Notes:
All steel shall be A36 unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL. 4½ x ⅜".



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
No Scale

Note:
Web to flange weld size shall be determined by flange thickness as follows:
To 1 2" ..... 5/16" weld
Over 1 2" to 2 4" .... 3/8" weld
Over 2'4" .... ½" weld

	BY	DATE
MADE	MHH	8-29-68
CHECKED		
IN CHARGE		

NO.	REVISION	BY	DATE
1	Detail Changed	PRMS	4-19-74
2	Revised D.L. Defl. & Camber Schedule	EJM	10-11-74
3	As Built	TEM	6-77

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

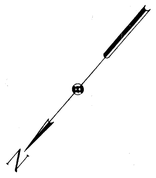
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

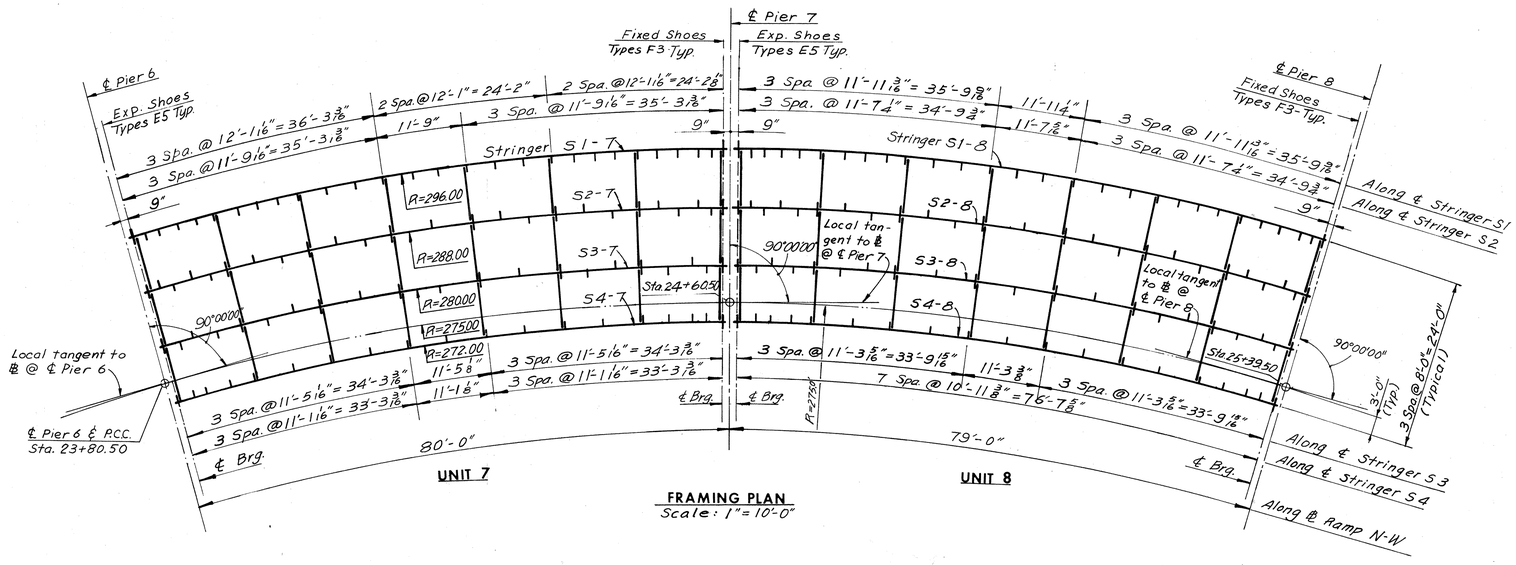
FRAMING PLAN - UNITS 5 AND 6

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

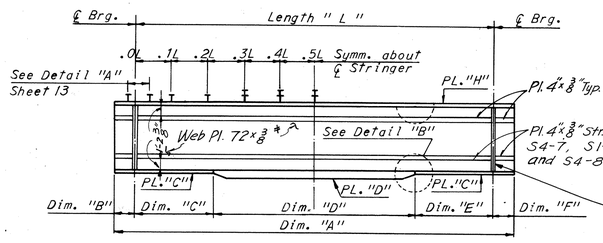
SCALE: 1" = Noted
CONTRACT NO. 10
SHEET NO. 15 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	114	265



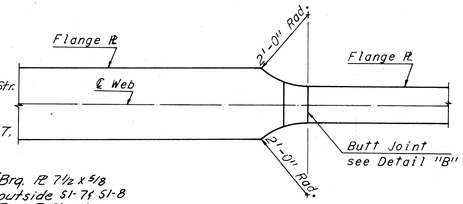


FRAMING PLAN
Scale: 1" = 10'-0"



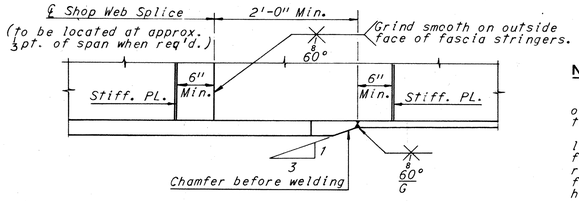
STRINGER ELEVATION
No Scale

Note: For Web Pl. S4-7 and S4-8 use A36.

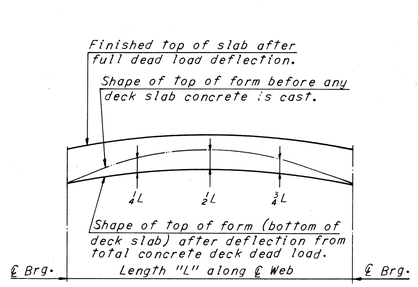


Brg. PL 7½ x 5/8 outside S1-7 & S1-8
Brg. PL 5½ x ½ outside S4-7 & S4-8
Brg. PL 9½ x ⅞ other locations

FLANGE PLATE SPLICE DETAIL
No Scale



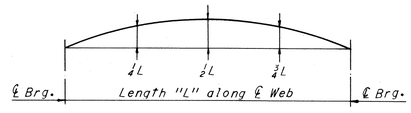
DETAIL "B"
No scale



DEAD LOAD DEFLECTION DIAGRAM
No Scale

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM
No Scale

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with a minimum distance as shown in cross-section on Sheet 22.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	8	F3	8

Notes:
For Joint details see Sheet 26.
For Superstructure steel quantities see Sheet 2
For Diaphragm details see Sheet 22
For Shoe details see Sheet 51
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragm.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	PL. "C"	PL. "D"	PL. "H"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
7	S1-7	85'-11 31/16"	84'-7 5/16"	8"	15'-6 11/16"	53'-6"	15'-6 3/8"	8"	16"x⅞" *	16"x1 1/2" *	12"x⅜" *	10"	12"	14½"	19"	24"
	S2-7	83'-5 9/16"	82'-3 3/16"	7"	15'-10 11/16"	50'-6"	15'-10 11/16"	7"	12"x1 1/2" *	16"x1 1/4" *	12"x⅜" *	12"	13"	16½"	21"	24"
	S3-7	81'-1 2 1/16"	79'-11 3/16"	7"	39'-11 3/16"	-	39'-11 3/16"	7"	12"x1" *	-	12"x⅜" *	15½"	17"	20"	24"	24"
	S4-7	78'-11 1/2"	77'-7 1/16"	8"	38'-9 3/4"	-	38'-9 3/4"	8"	12"x⅞"	-	12"x⅜"	17"	19"	23"	24"	24"
8	S1-8	84'-10 3/16"	83'-6 5/16"	8"	15'-0 3/16"	53'-6"	15'-0 3/16"	8"	16"x⅞" *	16"x1 1/2" *	12"x⅜" *	10"	12"	14½"	19"	24"
	S2-8	82'-4 5/16"	81'-2 13/16"	7"	15'-4 7/16"	50'-6"	15'-4 7/16"	7"	12"x1" *	16"x1 1/8" *	12"x⅜" *	12"	13"	16½"	21"	24"
	S3-8	80'-1 7/16"	78'-11 1/4"	7"	39'-5 5/8"	-	39'-5 5/8"	7"	12"x1" *	-	12"x⅜" *	15½"	17"	20"	24"	24"
	S4-8	77'-11 5/16"	76'-7 5/16"	8"	38'-3 15/16"	-	38'-3 15/16"	8"	12"x⅞"	-	12"x⅜"	17"	19"	23"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

UNIT	STRINGER	DUE TO TOTAL CONCRETE ¼L	½L	¾L	DUE TO STEEL ¼L	½L	¾L
7	S1-7	¾"	1"	1 3/16"	3/16"	¼"	3/16"
	S2-7	5/8"	⅞"	1 1/16"	⅛"	3/16"	⅛"
	S3-7	7/16"	11/16"	1"	⅛"	⅛"	⅛"
	S4-7	5/16"	⅜"	9/16"	1/16"	⅛"	1/16"
8	S1-8	11/16"	1"	1 1/16"	3/16"	¼"	3/16"
	S2-8	5/8"	⅞"	1 1/16"	⅛"	3/16"	⅛"
	S3-8	7/16"	11/16"	1"	1/16"	⅛"	1/16"
	S4-8	¼"	⅜"	9/16"	1/16"	⅛"	1/16"

CAMBER SCHEDULE

UNIT	STRINGER	¼L	½L	¾L
7	S1-7	15/16"	1¼"	15/16"
	S2-7	⅝"	1 1/16"	⅝"
	S3-7	7/16"	13/16"	7/16"
	S4-7	⅜"	1"	⅜"
8	S1-8	⅝"	¼"	⅝"
	S2-8	7/16"	11/16"	7/16"
	S3-8	⅜"	⅞"	⅜"
	S4-8	5/16"	½"	5/16"

Notes:
All steel shall be A36 unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener Pls. 4½x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

* Spacing begins at termination of 6 spaces @ 4".

# Denotes A572-Grade 50 Steel for thicknesses of 3" and under and A588 steel for thicknesses over 3".

	BY	DATE			PRM^c	4-19-74
MADE	SCC	8-23-68	2	Revised D.L. Defl. Sch. & Camber Sch.	E.J.M.	10-11-74
CHECKED			3	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

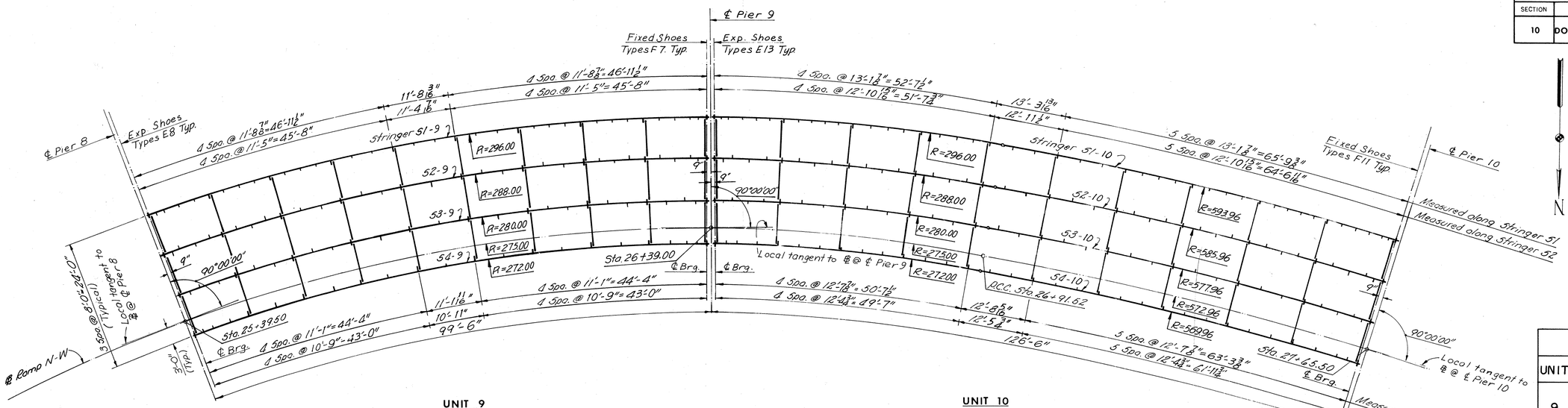
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7 AND 8

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

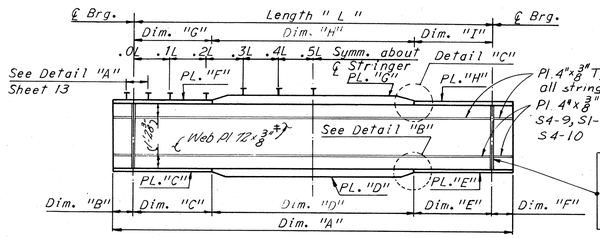
SCALE As Noted
CONTRACT NO. 10
SHEET NO. 16 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	115	265



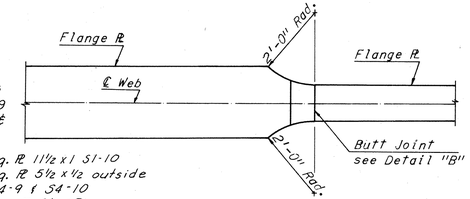
FRAMING PLAN
Scale 1" = 10'-0"

CAMBER SCHEDULE				
UNIT	STRINGER	¼L	½L	¾L
9	S1-9	1 9/16"	2 1/8"	1 9/16"
	S2-9	1 9/16"	1 13/16"	1 5/16"
	S3-9	1 1/8"	1 1/16"	1 1/2"
	S4-9	7/16"	5/8"	7/16"
10	S1-10	-⅛"	-¾"	-7/16"
	S2-10	-1¼"	-1⅛"	-1½"
	S3-10	-2 3/16"	-2 1/16"	-2 5/16"
	S4-10	-3⅜"	-3 1/16"	-3⅜"

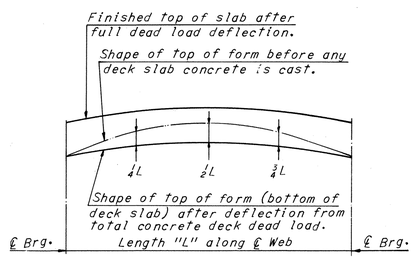


STRINGER ELEVATION
No Scale

Note:
Web Plate for Stringer S4-9 use A-36.

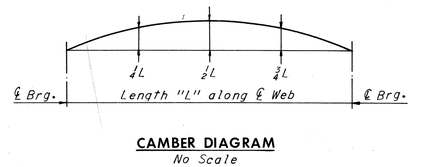


FLANGE PLATE SPLICE DETAIL
No Scale



DEAD LOAD DEFLECTION DIAGRAM
No Scale

NOTE TO CONTRACTOR
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



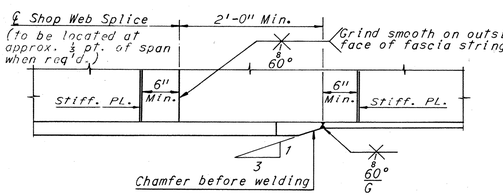
CAMBER DIAGRAM
No Scale

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with a minimum distance as shown in cross-section on Sheet 23.

Note:
Minus (-) sign in camber denotes a downward camber.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD	TYPE	NO. REQD.
E8	4	F7	4
E13	4	F11	4



DETAIL "B"
No scale
(Detail "C" similar)

Notes:
For Diaphragm and Connection Details see Sheet 23.
For Shoe details see Sheet 51
For Joint details see Sheet 26
For Superstructure Steel quantities see Sheet 2
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragm.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "I"	PL. "C"	PL. "D"	PL. "E"	PL. "F"	PL. "G"	PL. "H"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE DUE TO TOTAL CONC. ¼L	½L	¾L	DUE TO STEEL ¼L	½L	¾L
9	S1-9	106'-11 3/16"	105'-7 7/16"	8"	20'-2 5/16"	65'-2 9/16"	20'-2 5/16"	8"	20'-2 5/16"	65'-2 9/16"	20'-2 5/16"	20"x1 3/16"‡	20"x 2"‡	20" x 1 5/16"‡	16"x⅝"‡	16"x1 3/16"‡	16"x 2"‡	7½"	10½"	14"	18½"	24"	1 3/16"	1 1/16"	1 3/16"	3/8"	7/16"	3/8"
	S2-9	103'-10 5/16"	102'-8 7/16"	7"	19'-3"	64'-2 7/16"	19'-3"	7"	19'-3"	64'-2 7/16"	19'-3"	16"x1 1/4"‡	16"x1 3/16"‡	16"x1 1/4"‡	12"x⅝"‡	12"x1 3/16"‡	12"x 3/16"‡	11½"	12½"	17"	22"	24"	1"	1 3/8"	1"	5/16"	7/16"	5/16"
	S3-9	100'-11 11/16"	99'-9 11/16"	7"	19'-2 15/16"	61'-4 1/16"	19'-2 15/16"	7"	19'-2 15/16"	---	19'-2 15/16"	12"x1" ‡	12"x1 1/8"‡	12"x1"‡	12"x⅝"‡	---	12"x 3/16"‡	15½"	17½"	20½"	24"	24"	⅞"	1¼"	⅞"	¼"	5/16"	¼"
	S4-9	98'-3"	96'-11"	8"	48'-5½"	---	48'-5½"	8"	48'-5½"	---	48'-5½"	12"x⅜"	---	12"x⅜"	12"x⅜"	---	12"x 3/16"	18½"	21"	24"	24"	24"	⅞"	1 3/16"	⅞"	5/16"	7/16"	5/16"
10	S1-10	133'-0 1/16"	131'-8 1/16"	8"	25'-0"	82'-8 1/16"	24'-0"	8"	25'-0"	82'-8 1/16"	24'-0"	24"x1 5/16"‡	24"x2 1/16"‡	24"x 1 9/16"‡	20"x1 1/16"‡	20"x1 3/16"‡	20"x 1"‡	8½"	10½"	14½"	19½"	24"	1 15/16"	2 1/16"	1 1/16"	5/8"	⅞"	5/8"
	S2-10	130'-3 5/16"	129'-1 7/16"	7"	24'-6"	80'-1 1/16"	24'-6"	7"	24'-5"	80'-1 1/16"	24'-6"	20"x2"‡	20"x2"‡	20"x 1 9/16"‡	12"x1 1/16"‡	16"x1 1/16"‡	12"x 1 1/16"‡	11"	12½"	17"	22"	24"	1 5/8"	2 5/16"	1 1/16"	9/16"	3/4"	9/16"
	S3-10	127'-9 3/16"	126'-7 7/16"	7"	23'-0"	78'-7 5/16"	25'-0"	7"	24'-0"	78'-7 5/16"	32'-0"	16"x1 1/16"‡	16"x1 5/16"‡	16"x1"‡	12"x 3/16"‡	12"x1 1/16"‡	12"x 3/16"‡	15"	17"	20½"	24"	24"	1 5/8"	2 1/4"	1 5/8"	7/16"	5/8"	7/16"
	S4-10	125'-4 1/16"	124'-0 1/16"	8"	22'-0"	78'-0 7/16"	24'-0"	8"	62'-0 1/4"	---	62'-0 1/4"	12"x1" ‡	12"x1 5/16"‡	12"x⅝"‡	12"x 3/16"‡	---	12"x 3/16"‡	14½"	16½"	21"	24"	24"	1 11/16"	1 15/16"	1 1/16"	5/16"	1/4"	5/16"

	BY	DATE
MADE	HJC	8-20-68
CHECKED	RC	10-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note Added	PRMS	4-19-74
2	Dim 'D' S4-10 Revised DL Defl. & Camber Sch.	E.J.M.	10-11-74
3	As Built	TEM	6-77

Note:
All steel shall be A36 unless denoted otherwise.
Exterior stringer longitudinal stifferers shall be located on the exterior face of the stringer.

Intermediate stiffener Pls. 4"x⅜" for top flange width of 12" and 16" and Pls. 5x 5/16" for top flange width of 20", shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

* Spacing begins at termination of 6 space.

# Denotes A572 Grade 50 steel for thicknesses of ¾" and under, and A588 for thicknesse over ¾".

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

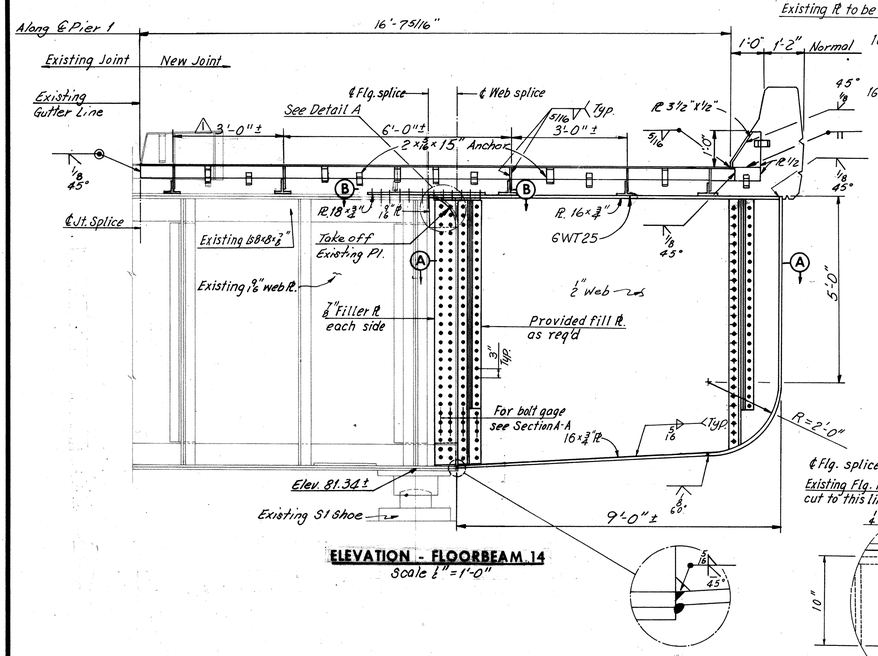
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN— UNITS 9 AND 10

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

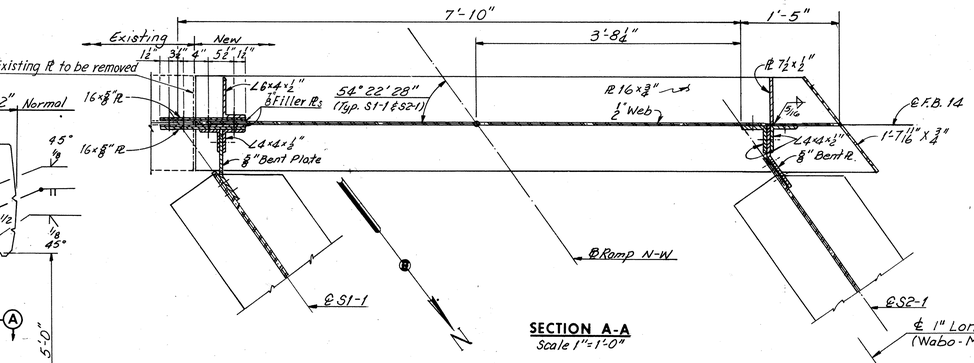
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 17 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10.	DOWNTOWN EXPRESSWAY	116	265

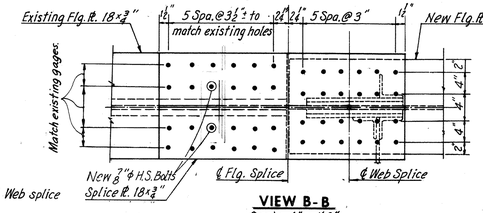


ELEVATION - FLOORBEAM 14
Scale 1" = 1'-0"

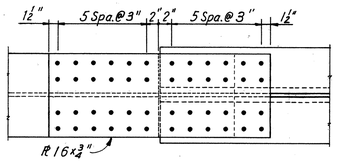
Bolts - 7/8" ϕ H. S. Bolts, ASTM Spec. A-325 unless otherwise noted.



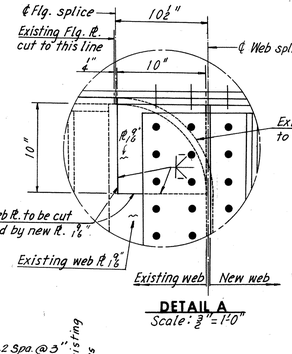
SECTION A-A
Scale 1" = 1'-0"



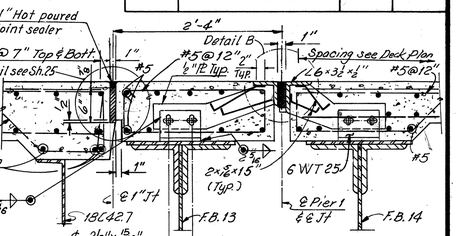
VIEW B-B
Scale 1" = 1'-0"



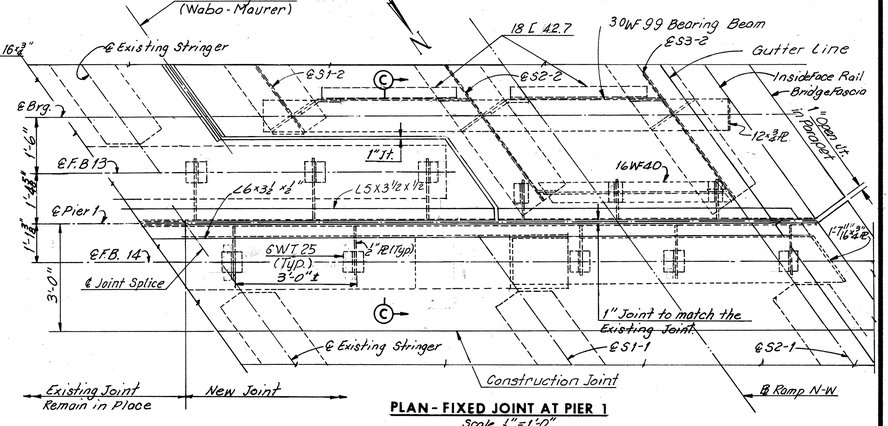
VIEW F-F
Scale: 1" = 1'-0"



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

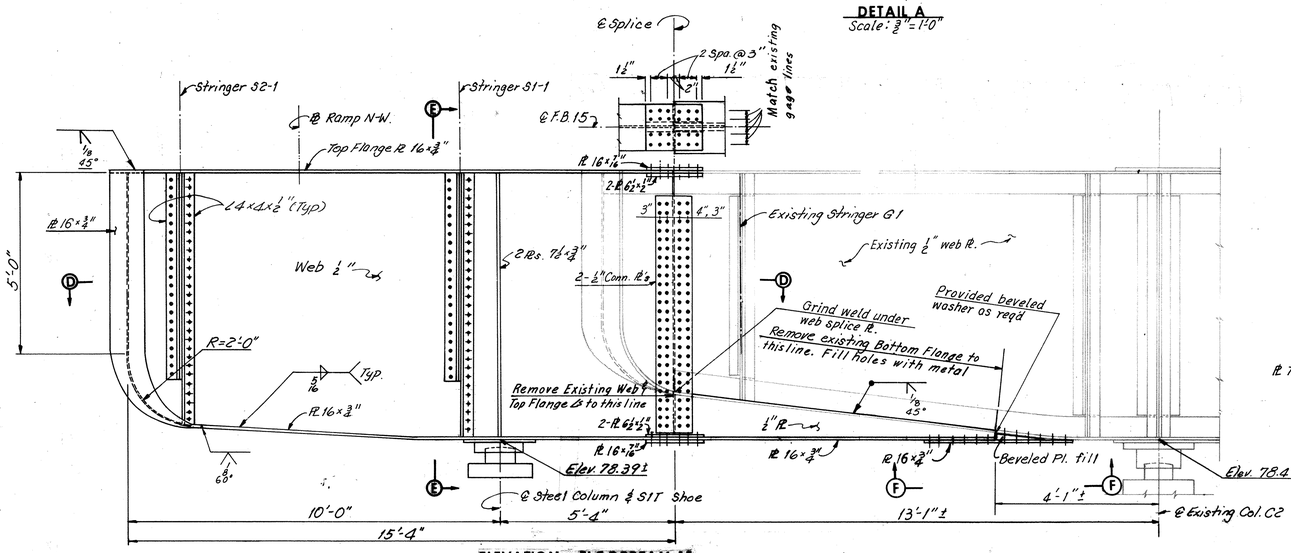


SECTION C-C
Scale 1" = 1'-0"

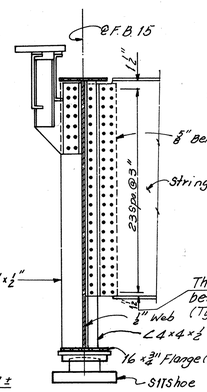


PLAN - FIXED JOINT AT PIER 1
Scale 1" = 1'-0"

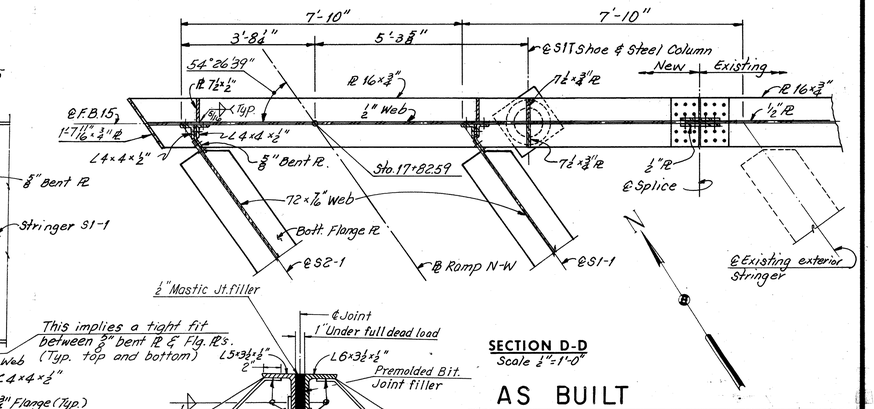
Note:
1" Joint at pier 1 is to match the existing Joint. The Contractor shall verify the location of Joint.



ELEVATION - FLOORBEAM 15
Scale 1/2" = 1'-0"



SECTION E-E
Scale 1/2" = 1'-0"



SECTION D-D
Scale 1/2" = 1'-0"

DETAIL B
No Scale

Note:
For Joint Details at F.B. 15, see Sheet 42 Bridge 67.
For Framing plan, see Sheet 12.
For Steel Column Details, see Sheet 28 Bridge 67.
For S1T Shoe Details, see Sheet 47 Bridge 67.
All Elevations are to be verified by the Contractor.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.

	BY	DATE
MADE	G.C.C.	3-13-69
CHECKED	Y.C.P.	4-25-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	T.E.M.	6-77
1	Unit 2" End Diaph. @ Pier 1 revised L 3 1/2 x 3 1/2 x 1/2 Support Changed to L 6 x 3 1/2 x 1/2	L.B.P.	10-31-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

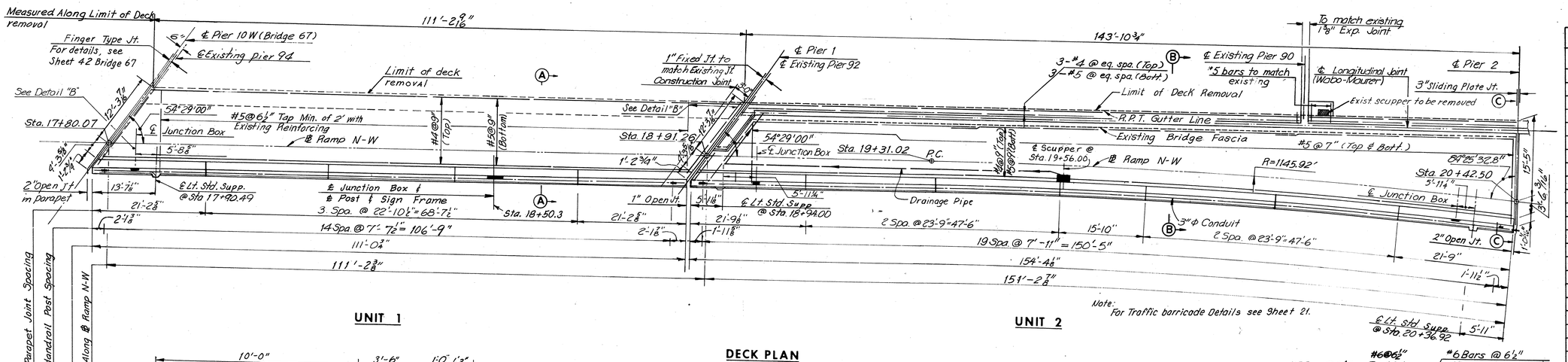
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING DETAILS

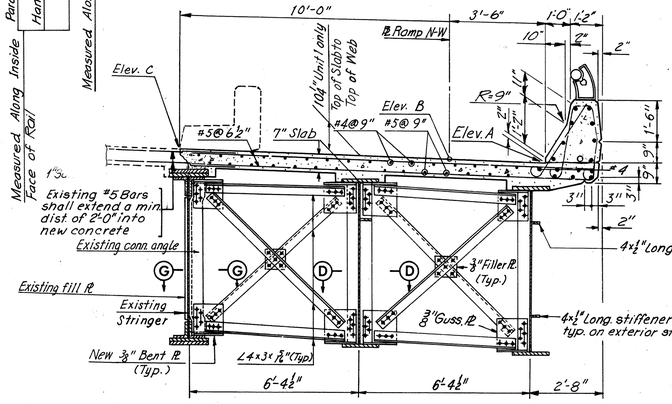
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	117	265

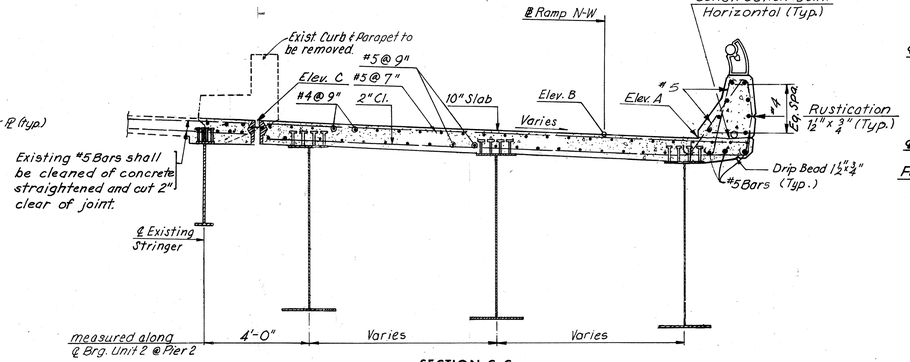


DECK PLAN
Scale: 1"=10'-0"

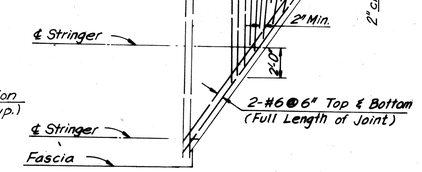


(Showing Intermediate Diaphragm)

SECTION A-A
Scale: ⅜" = 1'-0"



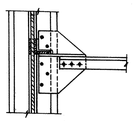
SECTION C-C
Scale ⅜" = 1'-0"



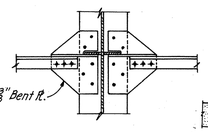
DETAIL B
Pier 1 shown Pier 10W similar.

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
17+77.57	87.11	"	"
17+80	87.17	87.07	86.73
17+80.07	"	87.07	"
17+87.21	"	"	87.00
17+90	87.44	87.35	87.07
18+00	87.70	87.61	87.35
18+10	87.95	87.87	87.63
18+20	88.19	88.12	87.90
18+30	88.43	88.36	88.15
18+40	88.66	88.59	88.40
18+50	88.88	88.81	88.64
18+60	89.09	89.03	88.87
18+70	89.29	89.24	89.10
18+80	89.49	89.44	89.32
18+88.75	89.65	"	"
18+90	89.67	89.64	89.57
18+91.26	"	89.66	"
18+98.42	"	"	89.72
19+00	89.87	89.84	89.78
19+10	90.06	90.03	89.98
19+20	90.23	90.22	90.18
19+30	90.40	90.39	90.37
19+40	90.56	90.55	90.54
19+50	90.71	90.71	90.71
19+60	90.84	90.85	90.88
19+70	90.95	90.98	91.04
19+80	91.05	91.10	91.20
19+90	91.15	91.21	91.35
20+00	91.24	91.31	91.49
20+10	91.31	91.39	91.64
20+20	91.38	91.47	91.77
20+30	91.43	91.54	91.91
20+40	91.47	91.59	92.04
20+41.28	-	-	92.06
20+42.50	-	91.60	-
20+42.84	91.49	" -	-

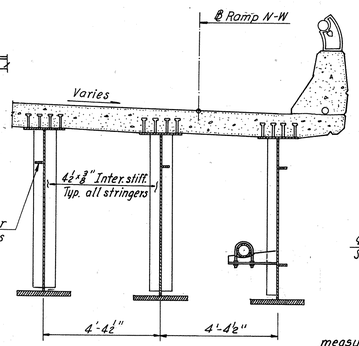
Elevations given in the Elevation Table may require adjustment in the field.



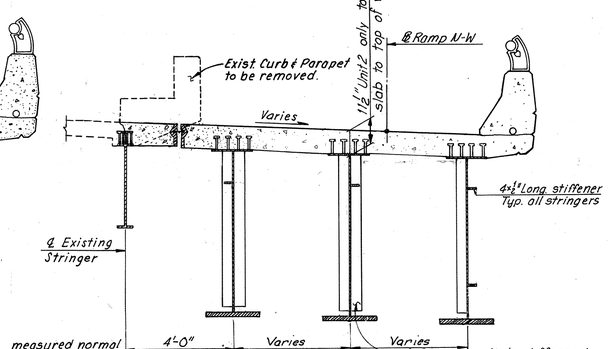
SECTION G-G
Scale: ½" = 1'-0"



SECTION D-D
Scale: ½" = 1'-0"



SECTION H-H
Scale: ⅛" = 1'-0"
For location of Section H-H, see Sheet 12b.



SECTION B-B
Scale: ⅜" = 1'-0"

Notes:
For Joint Details, see Sheet 18, 25 and Sheet 42 Bridge 67.
Elevation C is to be confirmed by by contractor.
For Framing Plan, see Sheet 12.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet 53.
For Lighting Details, see Sheet 54.
For Standard Drainage Details, see Support Type 11 Sheet 56.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	2-12-69	4	As Built	TEM	6-77
CHECKED	SCC.	4-24-69	3	Note for Table of Elevations	DWB	1-28-75
IN CHARGE			2	Chg. of Pier Angle Added Jun. Box	AEJ	1-13-75
			1	Deck Plan Sect A-A, B-B, C-C, H-H, Det B	TEM	10-31-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

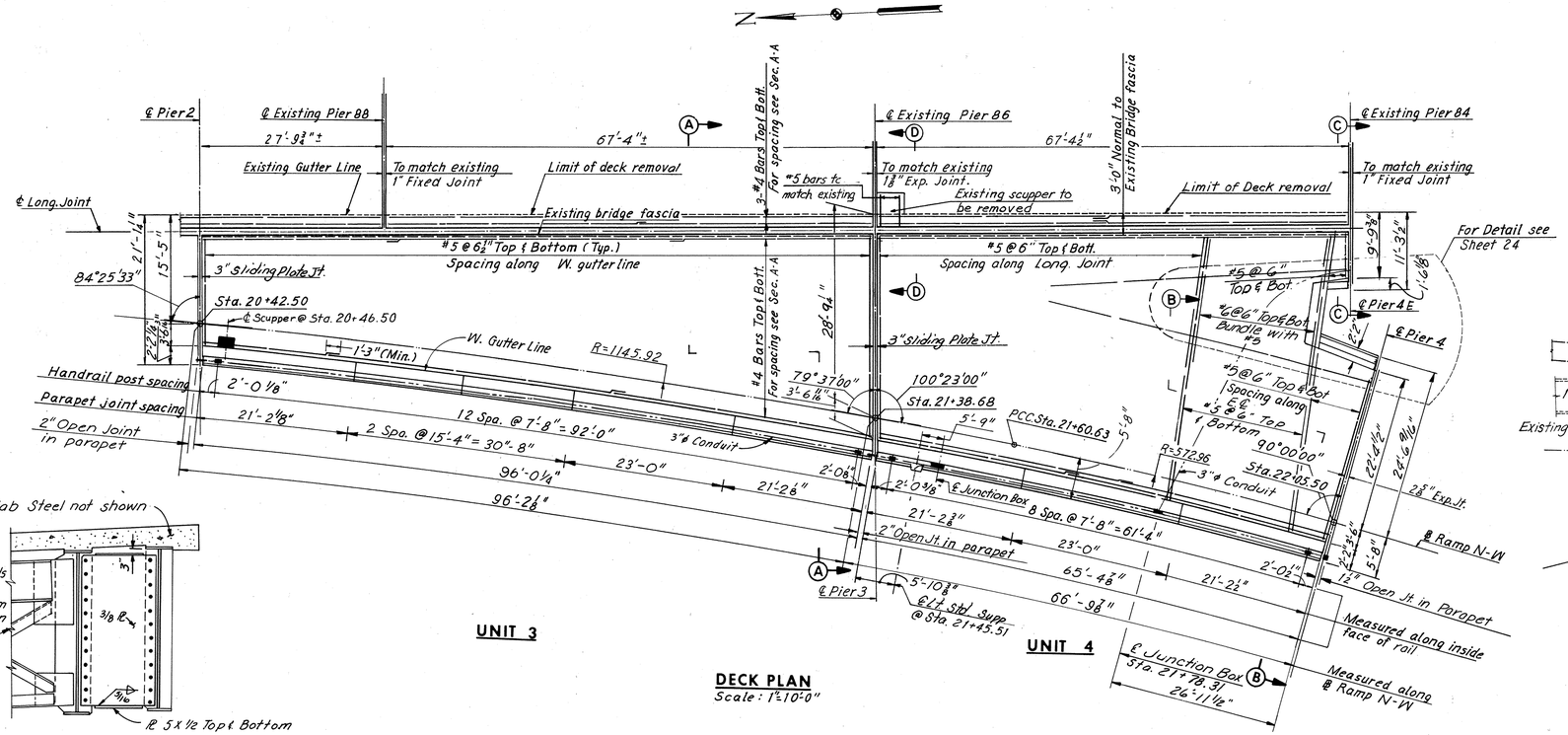
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 1 AND 2

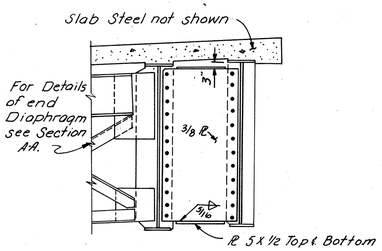
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK · ALEXANDRIA · KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 28

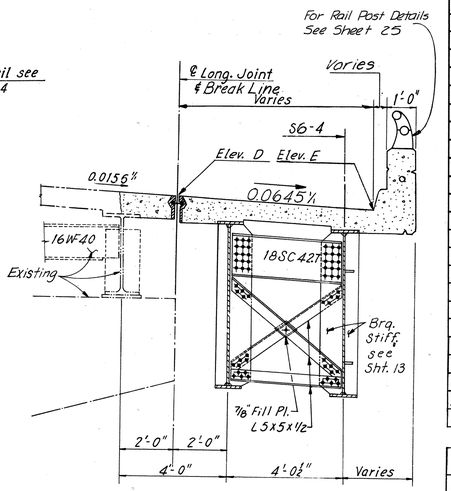
AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	118	265





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



SECTION C-C
Scale: ⅜"=1'-0"

(For Reinforcing Steel see Section A-A Sheet 24)

Elevations given in the Elevation Table may require adjustment in the field.

ELEVATION TABLE

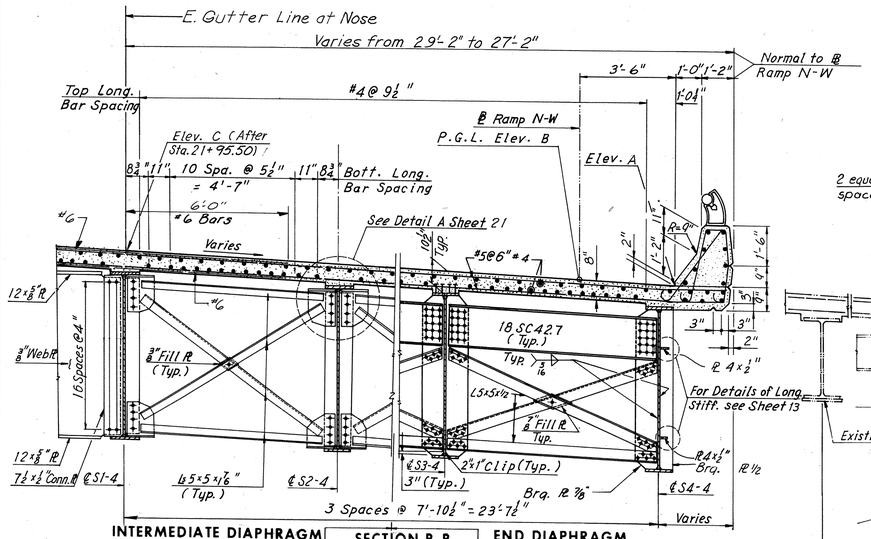
*STATION	ELEV. A	ELEV. B	ELEV. C
20+41.28	---	---	92.06
+42.50	---	91.61	---
+42.49	91.49	---	---
+50.00	91.49	91.64	92.21
+60.00	91.52	91.68	92.34
+70.00	91.54	91.72	92.52
+80.00	91.58	91.76	92.65
+90.00	91.61	91.80	92.80
21+00.00	91.64	91.84	93.00
+10.00	91.66	91.88	93.22
+20.00	91.70	91.92	93.38
+30.00	91.74	91.96	93.53
21+34.10	---	---	93.59
21+38.68	---	91.98	---
21+39.33	91.76	---	---
+40.00	91.76	91.98	93.67
+50.00	91.76	91.98	93.80
+60.00	91.73	91.95	93.92
+70.00	91.69	91.91	94.01
+80.00	91.63	91.85	94.09
+90.00	91.55	91.77	94.14
21+95.50	———	———	93.18
22+00.00	91.44	91.66	93.05
+05.50	91.39	91.60	92.91

GUTTER LINE ELEVATION

STATION	ELEV. D	ELEV. E	———
1714+22.95	94.22	93.73	———
1714+17.85	94.27	93.85	———

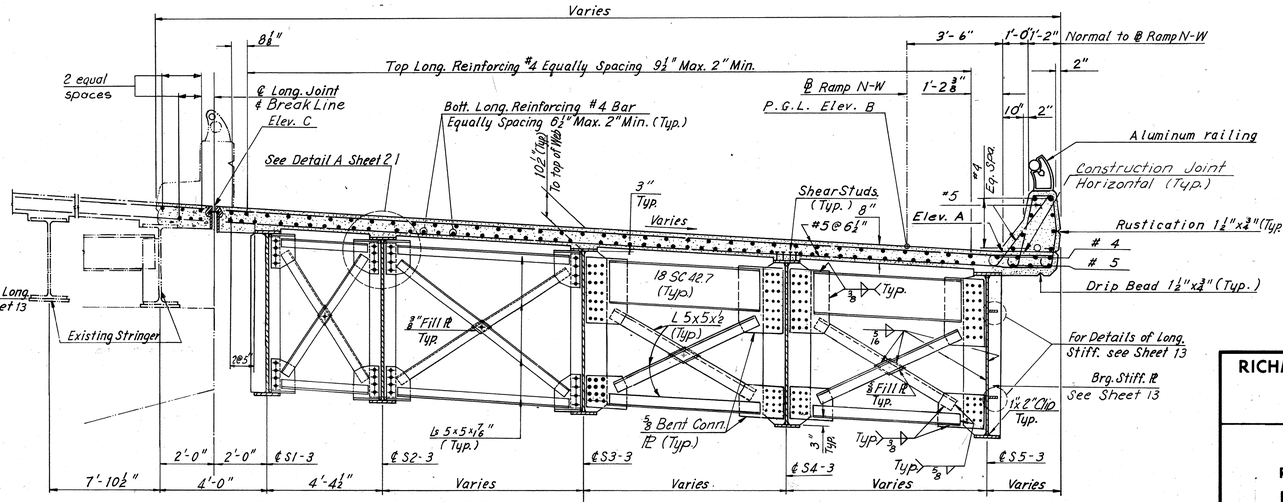
* Station along ℄ Ramp N-W.

** Station along ℄ R.P.T..



INTERMEDIATE DIAPHRAGM | SECTION B-B | END DIAPHRAGM
Scale: ⅜"=1'-0"

Note:
For Standard Drainage Details for Unit 3 see Support Type 3, and for Nose see Support Type 9 (connect to existing Pier 86) Sheet S6.



INTERMEDIATE DIAPHRAGM | END DIAPHRAGM

SECTION A-A
Scale: ⅜"=1'-0"

Notes:
Elevation C is along W. edge of longitudinal joint before Sta. 21+60.00 and along W. Nose Gutter line after Sta. 21+60.00.
For elevation D and elevation E, see Section C-C.
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 13.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet 53.
For Lighting Details, see Sheet 54.
For Superstructure details, see Sheet 24.
For Traffic Barricade Detail, see sheet 21.

	BY	DATE		NO.	REVISION	BY	DATE
MADE	K.C.T.	2-19-69		3	As Built Deck Elev. Table, Gutt. Line Elev. Table, Sect. A-A, Sect. B-B & Sect. CC.	TEM	6-77
CHECKED	G.C.C.	4-17-69		2	Note for Table of Elevations	EJM	10-11-74
IN CHARGE				1		DWB	1-28-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

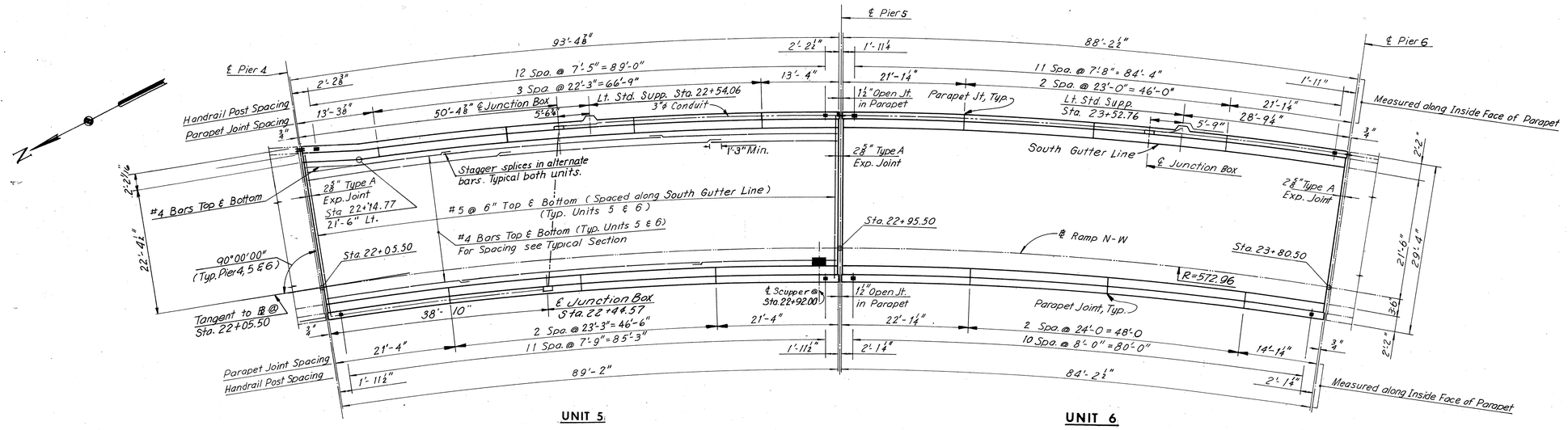
DECK PLAN - UNITS 3 AND 4

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

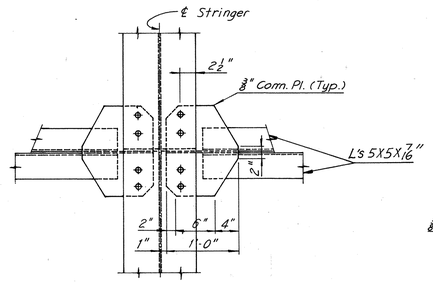
SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 20 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	119	265

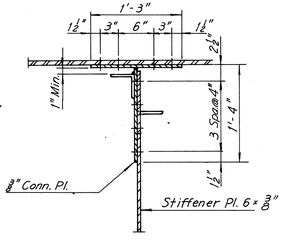
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
22+00.00	91.47	91.66	92.97
05.50	91.41	91.60	92.90
10.00	91.36	91.54	92.83
20.00	91.22	91.40	92.67
30.00	91.02	91.23	92.52
40.00	90.84	91.05	92.34
50.00	90.63	90.84	92.13
60.00	90.40	90.61	91.90
70.00	90.16	90.37	91.66
80.00	89.89	90.10	91.39
90.00	89.60	89.81	91.10
95.50	89.43	89.64	90.93
23+00.00	89.29	89.50	90.79
10.00	88.97	89.18	90.47
20.00	88.62	88.83	90.12
30.00	88.25	88.46	89.75
40.00	87.86	88.07	89.36
50.00	87.45	87.66	88.95
60.00	87.01	87.22	88.51
70.00	86.56	86.77	88.06
80.00	86.09	86.30	87.59
80.50	86.07	86.28	87.47
90.00	85.62	85.83	87.12



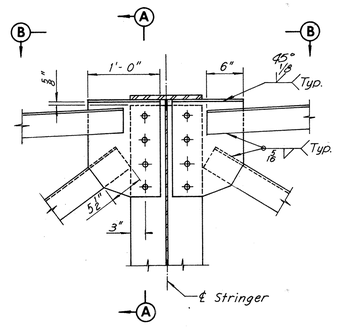
DECK PLAN
Scale: 1" = 10'-0"



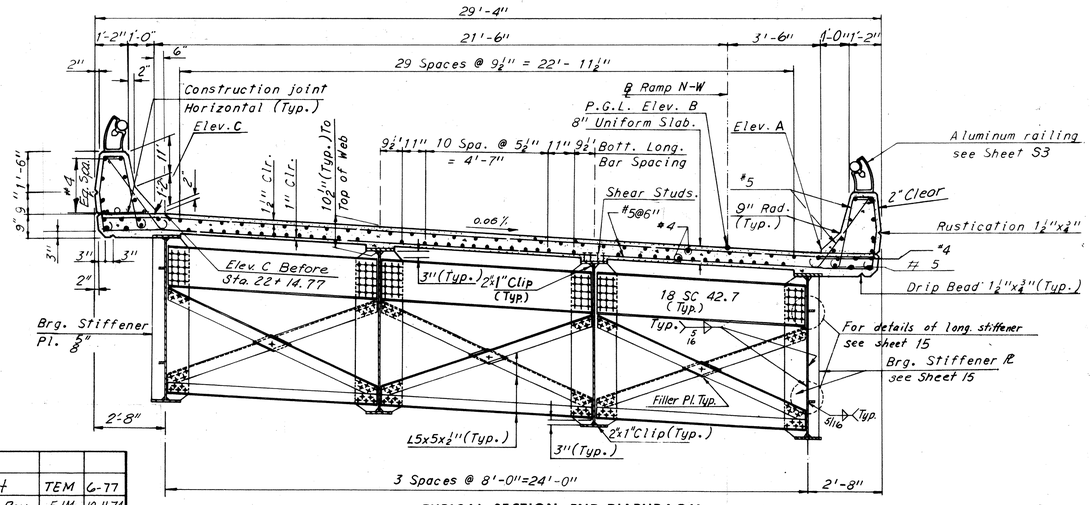
VIEW B-B
Scale: 1"=1'-0"



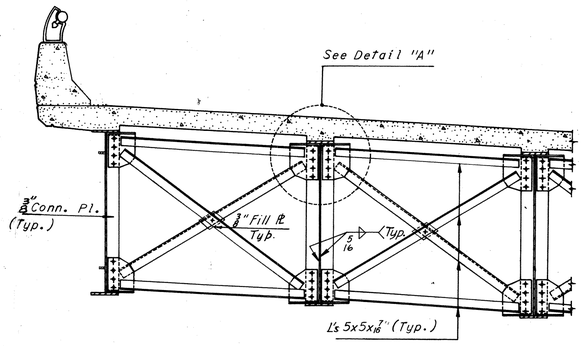
SECTION A-A
Scale: 1"=1'-0"



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



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 15.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE				
MADE	MHH	9-4-68	2	As Built	TEM	6-77
CHECKED	R. C.	10-17-68	1	Deck Elev. Rev.	EJM	10-11-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

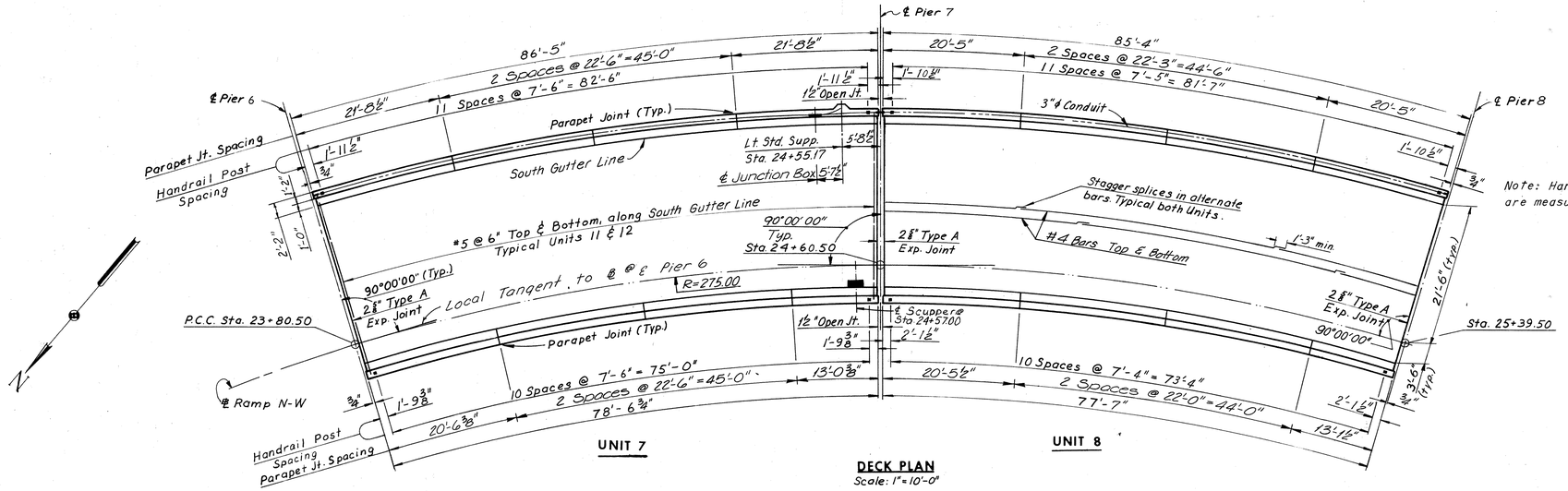
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN-UNITS 5 AND 6

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

SCALE: As shown
CONTRACT NO.: 10
SHEET NO. 21 OF 28

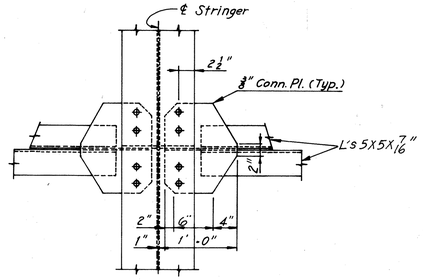
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	120	265



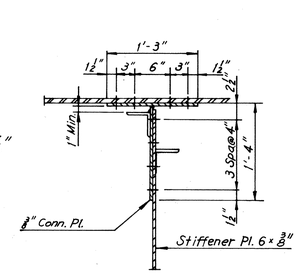
DECK PLAN
Scale: 1"=10'-0"

Note: Handrail and Parapet Joint Spacings are measured along inside face of parapet.

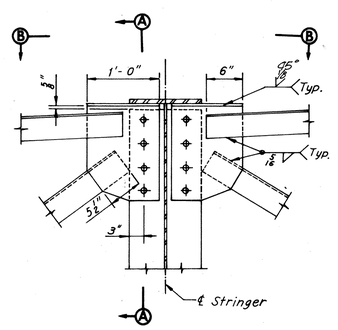
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
23+80.00	86.09	86.30	87.59
+80.50	86.07	86.28	87.57
+90.00	85.62	85.83	87.12
24+00.00	85.15	85.36	86.65
+10.00	84.68	84.89	86.18
+20.00	84.21	84.42	85.71
+30.00	83.73	83.94	85.23
+40.00	83.26	83.47	84.76
+50.00	82.79	83.00	84.29
+60.00	82.32	82.53	83.82
+60.50	82.29	82.50	83.79
+70.00	81.85	82.06	83.35
+80.00	81.37	81.58	82.87
+90.00	80.90	81.11	82.40
25+00.00	80.43	80.64	81.93
+10.00	79.96	80.17	81.46
+20.00	79.49	79.70	80.99
+30.00	79.01	79.22	80.51
+39.50	78.57	78.78	80.07
+40.00	78.54	78.75	80.04



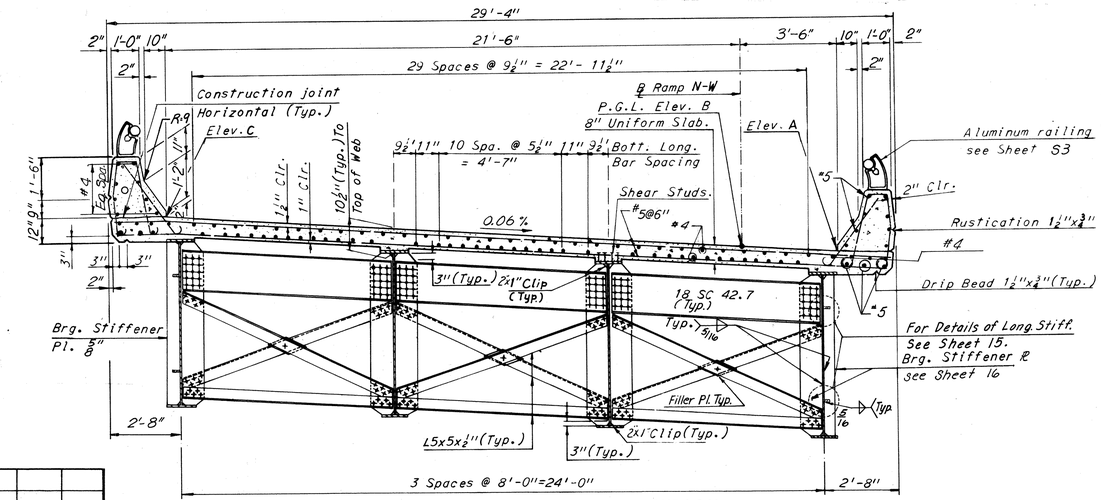
VIEW B-B
Scale: 1"=1'-0"



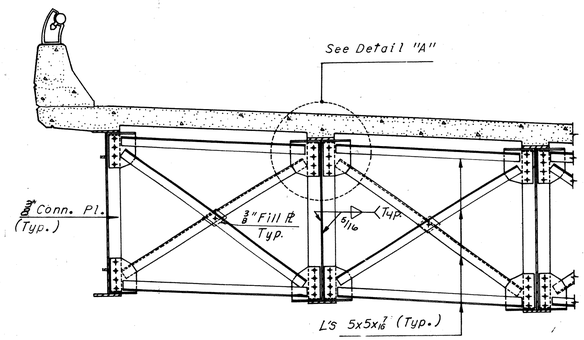
SECTION A-A
Scale: 1"=1'-0"



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



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 16.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE				
MADE	J.D.	8-20-68				
CHECKED	R.C.	10-17-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

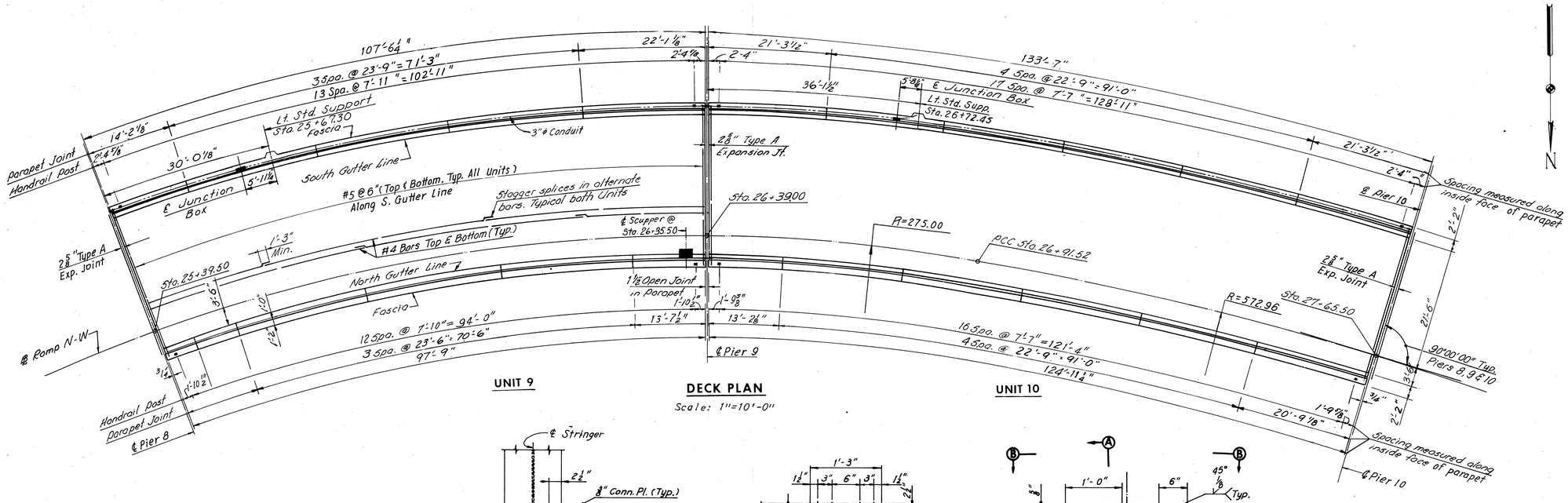
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 7 AND 8

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

SCALE As shown
CONTRACT NO. 10
SHEET NO. 22 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	121	265

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
25+30.00	79.01	79.22	80.51
25+39.50	78.57	78.78	80.07
25+40.00	78.54	78.75	80.04
25+50.00	78.07	78.28	79.57
25+60.00	77.60	77.81	79.10
25+70.00	77.13	77.34	78.63
25+80.00	76.65	76.86	78.15
25+90.00	76.18	76.39	77.68
26+00.00	75.71	75.92	77.21
26+10.00	75.24	75.45	76.74
26+20.00	74.77	74.98	76.27
26+30.00	74.29	74.50	75.79
26+39.00	73.87	**74.08**	**75.37**
26+40.00	**73.82**	**74.03**	**75.32**
26+50.00	73.35	73.56	74.85
26+60.00	72.89	73.10	74.39
26+70.00	72.46	72.67	73.96
26+80.00	72.06	72.27	73.56
26+90.00	71.68	71.89	73.18
27+00.00	71.33'	71.54	72.83
27+10.00	71.02'	71.22	72.43
27+20.00	70.75	70.93	72.05
27+30.00	70.49	70.66	71.69
27+40.00	70.27	70.42	71.37
27+50.00	70.07	70.21	71.07
27+60.00	69.90	70.03	70.40
27+65.50	69.82	69.94	70.67
27+70.00	69.76	69.87	70.56

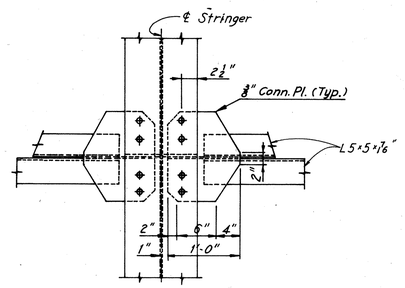


UNIT 9

DECK PLAN

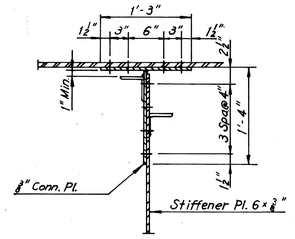
Scale: 1"=10'-0"

UNIT 10



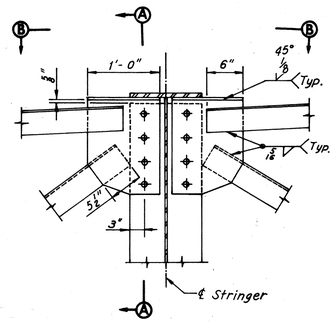
VIEW B-B

Scale: 1"=1'-0"



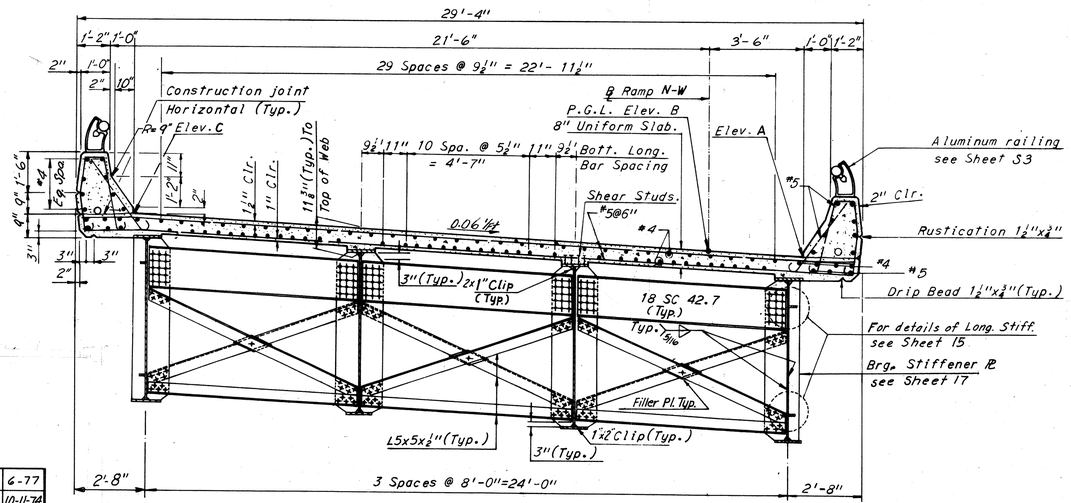
SECTION A-A

Scale: 1"=1'-0"



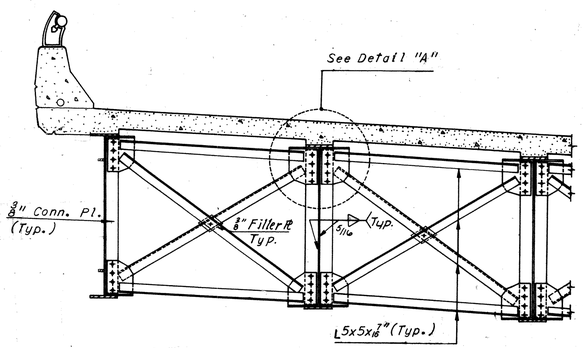
DETAIL A

Scale: 1"=1'-0"



TYPICAL SECTION—END DIAPHRAGM

Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM

Scale: ⅜"=1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 17.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	MJC	8-13-68	2	As Built	TEM	6-77
CHECKED	G.C.C.	4-1869	1	Changed Deck Elev.	EJM	10-11-74
IN CHARGE			1	Revised Fascia to Stringer Dimension	TEM	10-11-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

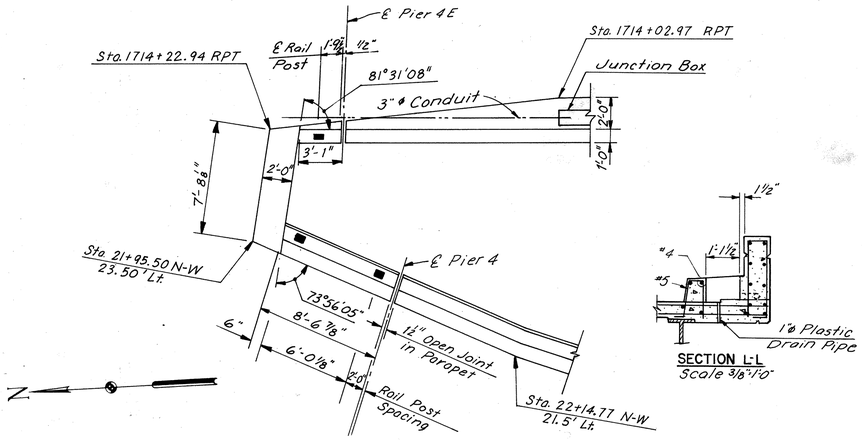
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN - UNITS 9 AND 10

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

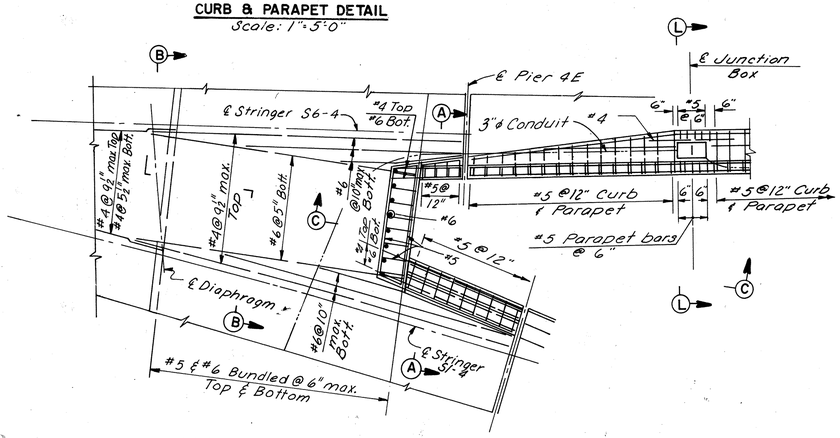
SCALE: As shown
CONTRACT NO.: 10
SHEET NO. 23 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	122	265

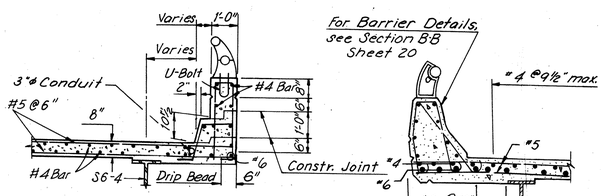


SECTION L-L
Scale 3/8"=1'-0"

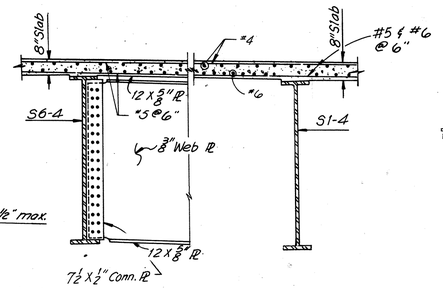
CURB & PARAPET DETAIL
Scale: 1"=5'-0"



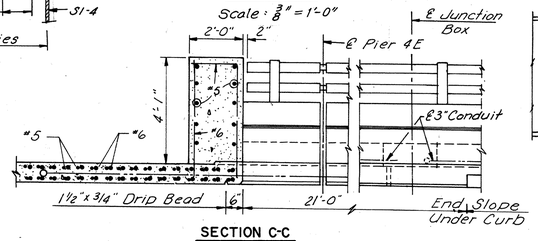
NOSE AND SLAB DETAIL
Scale: 1"=5'-0"



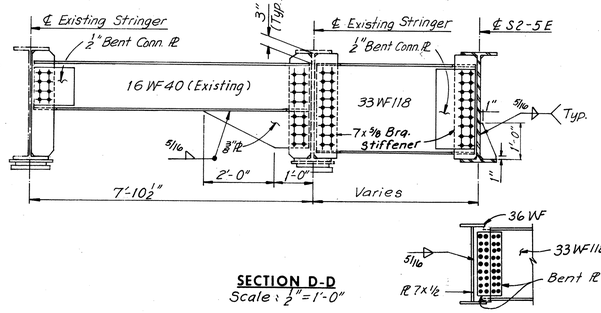
SECTION A-A
Scale: 3/8"=1'-0"



SECTION B-B
Scale: ⅜"=1'-0"

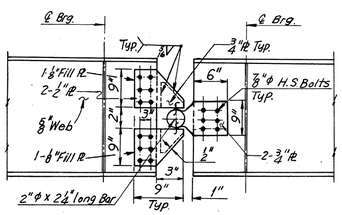


SECTION C-C
Scale 3/8"=1'-0"

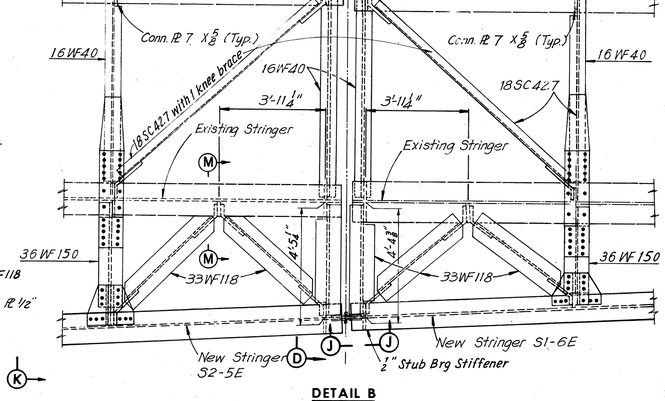


SECTION D-D
Scale: ½"=1'-0"

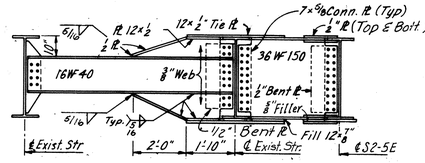
SECTION M-M
Scale: 3/8"=1'-0"



VIEW J-J
No Scale



DETAIL B
Scale: ⅜"=1'-0"



SECTION K-K
Scale: ⅜"=1'-0"

	BY	DATE				
MADE	SCC K.C.T.	2.28.69 3.24.69	2	As Built	TEM	6-77
CHECKED	G.C.C.	4-2169	⚠	Unit 2 Details Deleted	TEM	10-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

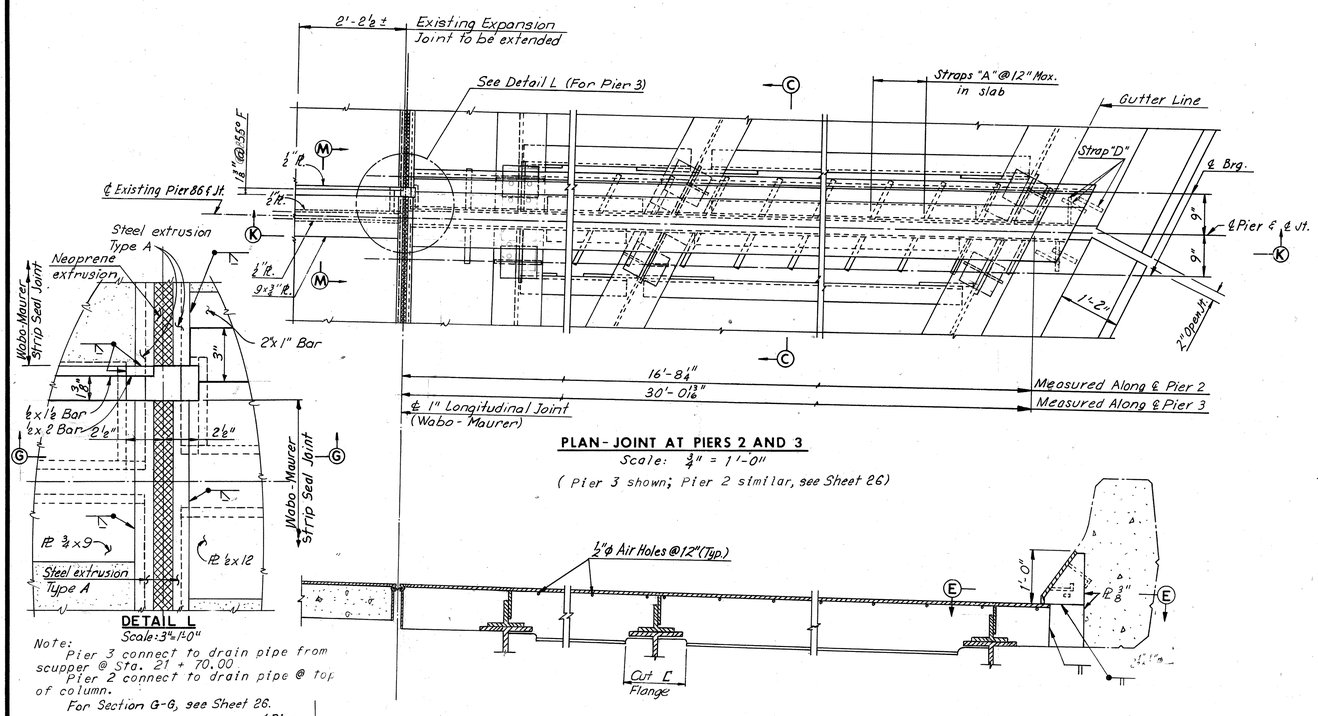
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

SUPERSTRUCTURE DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	123	265

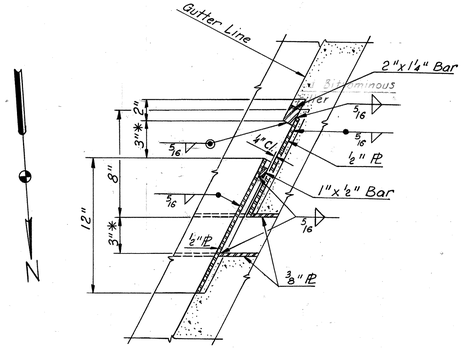


DETAIL L
Scale: 3"=1'-0"

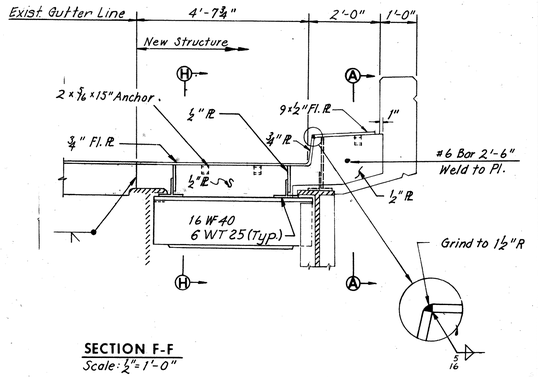
Note:
Pier 3 connect to drain pipe from scupper @ Sta. 21 + 70.00
Pier 2 connect to drain pipe @ top of column.
For Section G-G, see Sheet 26.

PLAN - JOINT AT PIERS 2 AND 3
Scale: ¾" = 1'-0"
(Pier 3 shown; Pier 2 similar, see Sheet 26)

SECTION K-K
Scale: ¾" = 1'-0"

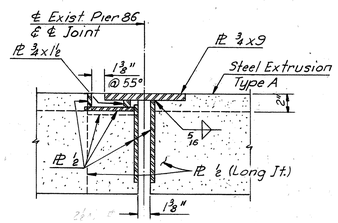


SECTION E-E
Scale: ½"=1'-0"

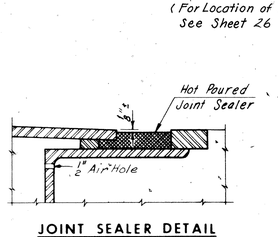


SECTION F-F
Scale: ½"=1'-0"

(For Location of Section F-F, See Sheet 26)

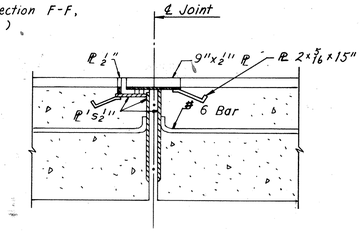


SECTION M-M
Scale: 1½"=1'-0"

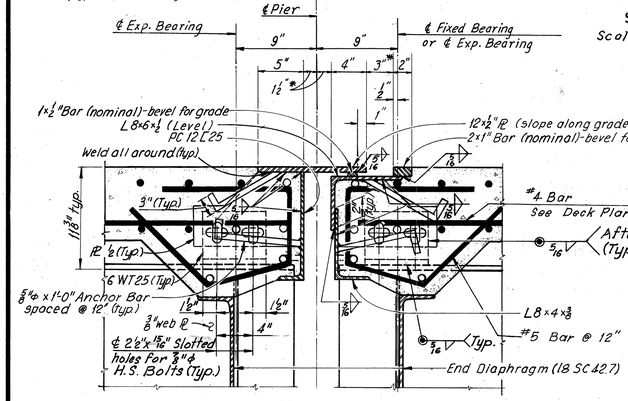


JOINT SEALER DETAIL
Scale: 3" = 1'-0"

Note:
Throughly clean joint and fill with Hot Poured Joint Sealer. Trowel into curb joint.



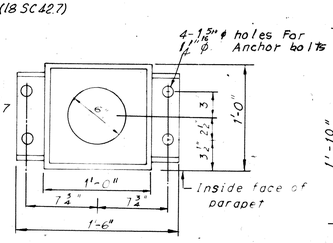
SECTION A-A
Scale: 1"=1'-0"



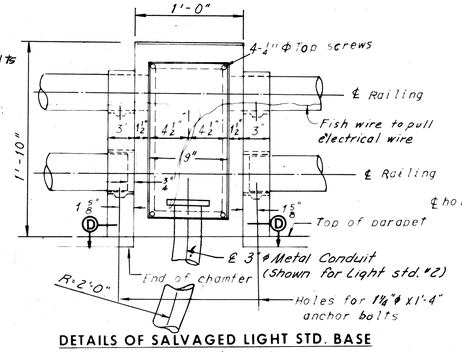
SECTION C-C
Scale: 1½"=1'-0"

Section above is shown for Pier 3. Section thru Joint @ Pier 2 is similar except for End Diaphragm in Unit 2, which consists of a ⅜" web Pl and a 4½"x⅝" Fl. Pl instead of 18SC42.7 as shown above

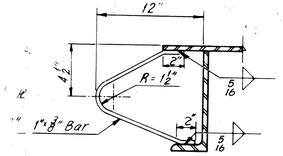
LEGEND
- ● Denotes transverse #5 Bar spaced as shown on Sheets 19 and 20.
- ○ Denotes transverse #6 Bar between stringers.
- * Denotes dimension shown @ 60°F.



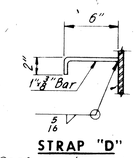
SECTION D-D
Scale: 1½"=1'-0"



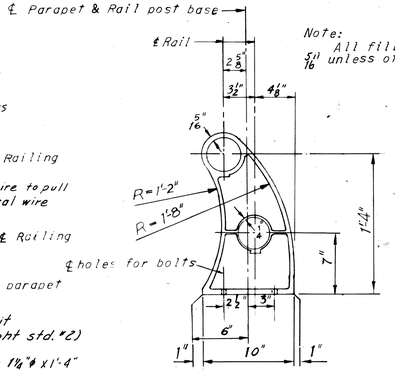
DETAILS OF SALVAGED LIGHT STD. BASE
Scale: 1½"=1'-0"



STRAP "A"
Scale: 1½" = 1'-0"

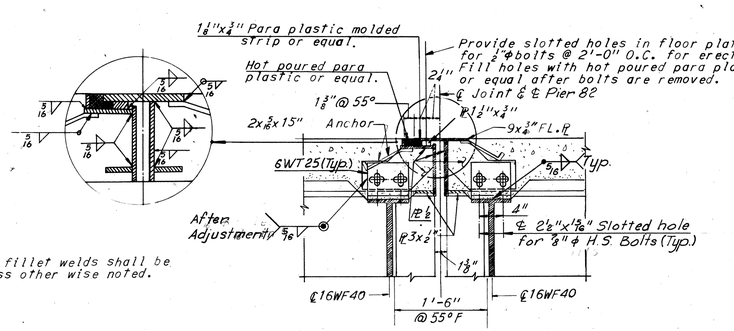


STRAP "D"
Scale: 1½" = 1'-0"

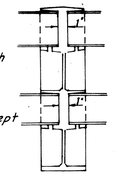


SALVAGED RAIL POST
Scale: 1½"=1'-0"

Note:
All fillet welds shall be 5/16" unless other wise noted.



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



TYPICAL JOINT
No Scale

Hand tighten north set screws at joint

Provide joint at every other post except end post.

Note
All metal work in joints is to be included in Superstr. A36 Str. Steel.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P.	3-20-69	2	Sect. G-G & Det. A moved to Sh. 26. Long. Jt. changed to Wabo-Maurer. Std'g Pl. Jt. Supports changed to 6 WT 25.	NLB	10-31-74
CHECKED	G.C.C.	4-21-69		As Built TEM G-77		
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

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

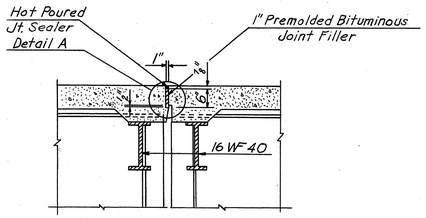
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 25 OF 28

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	124	265

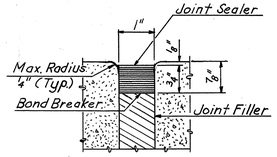
NOTES FOR FILLED JOINTS:

Joints shall be free of cracked and spalled areas and their faces shall be free of all foreign matter, curing compound, oils, greases and dirt. All faces must be sandblasted or brushed with a mechanical rotary wire brush, just prior to sealing, the joint shall be blown out with oil-free and water-free compressed air.

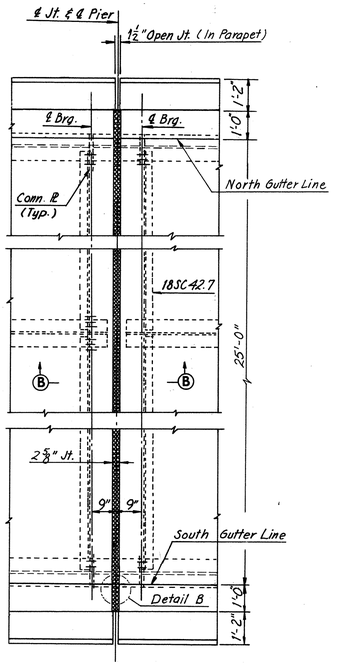


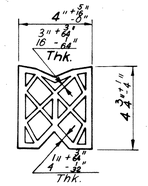
TYPICAL SECTION THRU 1" FIXED JOINT
Scale: 1½"=1'-0"

Note:
Joint filler material and copper flashing to be included in price bid for Superstr. Concrete

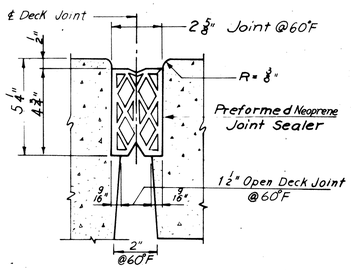


DETAIL A
No Scale



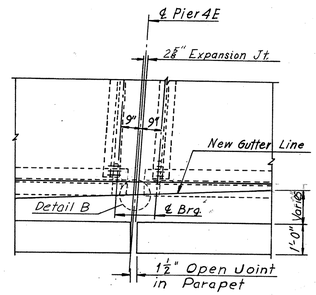


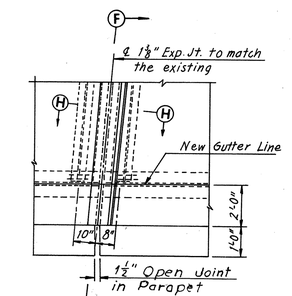
PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT

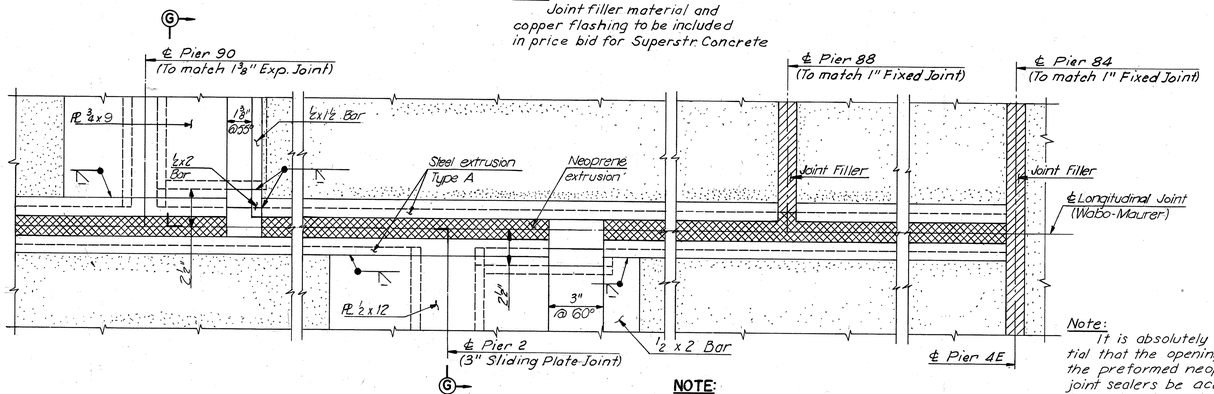


2⅝" TYPE "A" JOINT

EXPANSION JOINT DETAILS







PLAN - LONGITUDINAL JOINT
Scale: 3"=1'-0"

NOTE:
For Plan of Pier 3 & existing Pier 86, see Sheet 25.

Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

PLAN - JOINT AT PIERS 4,5,6,7,8 AND 9
Scale: ⅜" = 1'-0"

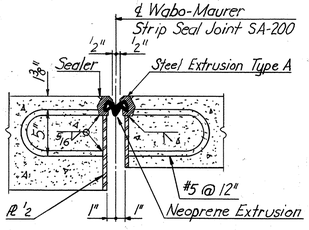
PLAN - JOINT AT PIER 4E
Scale: ⅜" = 1'-0"

PLAN - JOINT AT EXISTING PIER 82
Scale: ⅜" = 1'-0"
(For Section F-F & Section H-H, See Sheet 25)

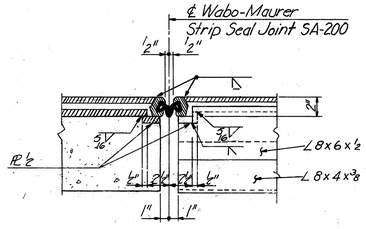
NOTES FOR WABO-MAURER JOINT:

Do not use steel extrusions as screed support.
Steel extrusion shall conform to ASTM A36.
Structural steel shall conform to ASTM A588.
Steel assembly shall be shop welded to convenient lengths and butt welded in the field to desired length. Joint shall conform to grade of deck slab.
Steel assembly shall be sandblasted in the shop prior to painting.
Steel assembly shall receive one shop coat of epoxy zinc paint.

Neoprene extrusion shall be roughened with a wire brush before bonding to steel extrusion with Bon Lastic Adhesive. Groove in steel extrusion to be blown out with oil-free and water-free compressed air prior to installation of Neoprene extrusion.
The Wabo-Maurer joint assembly shall be installed in accordance with manufacturer's recommended construction methods.

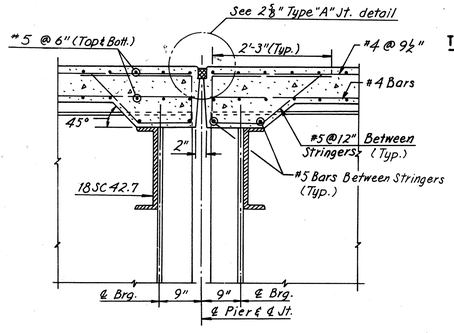


TYPICAL SECTION THRU WABO-MAURER JOINT
Scale: 1½"=1'-0"

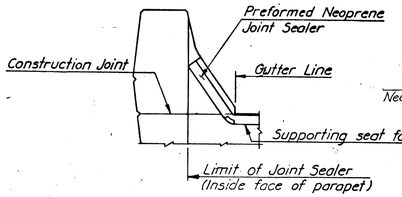


SECTION G-G
Scale: 1½"=1'-0"

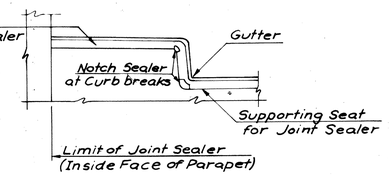
NOTE: Steel extrusion of Wabo-Maurer Joint to rest & Slide on PL ½.
For location of Sect. G-G, see Plan-Long. Joint above & Detail L. Sheet 25.



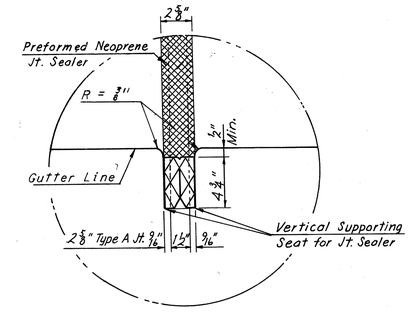
SECTION B-B
Scale: ¾"=1'-0"



TREATMENT OF TYPE "A" JOINT AT GUTTER
PIERS 4,5,6,7,8 AND 9
No Scale



TREATMENT OF TYPE "A" JOINT AT CURB
PIER 4E
No Scale



DETAIL B
No Scale

	BY	DATE
MADE	Y.C.P.	3-18-69
CHECKED	G.C.C.	4-21-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built Notes, Typ. Sect. thru Joint, Det. A, Typ. Sect. thru Wabo-Maurer Joint, Sect. E-E add'd.	TEM	6-77
1		E.J.M.	10-31-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

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

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 26 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	125	265

BORING DS64-1

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.0						20.0	
	10	10	12	S-1	0-2		
	12	14	12				
	20						
	81						
15.0	97	100		S-2	4-4		
	126						
	20						
	26						
	28						
10.0	31						
	11	8	5	S-3	10-12		Brown Black C-f Sand
	10	4	4				Some Cinders, Little C-f Gravel
	6						(FILL)
	9						
(0) 5.0	9	2	2	S-4	14-16		
	13	3	4				
	14	2	4	S-5	16-18		
	19	14	15				
	23						
0.0	22						
	19						
	6	8	10	S-6	21-23		
	15	12	12				
	130/.5	100		S-7	24-24		
-5.0						-5.0	
	4Min			C-1	25-30		(C-1: 76% Rec.)
	5Min						
	12Min						
	14Min						Gray Hard Granite
-10.0	15Min						
	5Min			C-2	30-35		(C-2: 90% Rec.)
	4Min						
	5Min						
	6Min						
-15.0	7Min						
							Bottom of Hole Elev. -15.0'

BORING DS64-2

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
21.3	3	7	9	S-1	0-1	21.3	
	12						
	38						
	28						
16.3	16	3	6	S-2	4-6		
	50	8	30				
	90						
	20						
	11						
(0) 11.3	12						
	20	9	27	S-3	10-12		Black Cinders, Some M-f
	19	17	10				Sand Trace Bricks FILL)
	19						
	50						
6.3	24						
	13						
	2	2	2	S-4	16-18		
	7	4	6				
	11						
1.3	10						
	12						
	18	4	32	S-5	21-23		
	37	21	12				
	140					-2.7'	
-3.7	OPEN						
	4Min			C-1	25-27		(C-1: 12% Rec.)
	4Min						
	OPEN						Gray Weathered Granite
-8.7						-8.7'	
	4Min			C-2	30-35		(C-2: 70% Rec.)
	5Min						
	7Min						Gray Hard Granite
	12Min						
-13.7	15Min						
							Bottom Of Hole Elev. -13.7'

BORING DS64-3

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.1	10	9	9	S-1	0-2	20.1	
	10	8	7				
	8						
	6						
15.1	8	6	3	S-2	4-6		Brown C-f Sand Some Bricks,
	17	5	6				Cinders (FILL)
	15						
	14						
	10						
10.1	13	7	7	S-3	9-11		
	19	6	7				
	16						
	8						
	6					8.1	
(0) 5.1	5	3	1	S-4	14-16		
	24	1	8				Brown Black C-f Sand, Little
	41						Silt, Trace Organic Matter (FILL)
	38						
	63						
0.1	16	6	7	S-5	19-21		
	27	4	9				
	38						
	770					-4.4	
	OPEN						Brown Grey Decomposed Granite
-4.9	6Min	100	100	$66	24-24.5	-4.4	(C-1: 11% Rec.)
	8Min			C-1	24.5-		(C-1: 11% Rec.)
	8Min				29.5		
	10Min						
	7Min						Grey Weathered Granite
-9.9	5Min			C-2	29.5-		Some Quartz
	30Min				33.5		(C-2: 20% Rec.)
	22Min						
	25Min						
	30Min			C-3	33.5-		(C-3: 12% Rec.)
-14.9	35Min				36.5		Gray Pink Hard Granite
	20Min						
	18Min			C-4	36.5-		(C-4: 71% Rec.)
	20Min				40.0		
	25Min						
-19.9	20Min						
							Bottom of Hole Elev. -19.9'

BORING DS64-4

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.6						20.6	
	12	12	20	S-1	0-2		
	20	20	13				
	20						
	24						Brown Black C-f Sand Some
15.6	17	10	8	S-2	4-6		Cinders Little Clayey Silt
	16	8	8				Trace Bricks (FILL)
	17						
	20						
	25					12.1	
10.6	13	6	9	S-3	9-11		
	17	9	11				Brown Clayey Silt, Some
	17						M-f Sand, Trace M-f Gravel
	16						
	20					8.6	
(1) 5.6	18	10	15	S-4	14-16		
	23	15	15				
	27						
	30						Gray Brown Decomposed Granite
	116						
0.6	29	9	12	S-5	19-21		
	27	17	18				
	35						
	45						
	300					-3.4	
-4.4	15Min			C-1	24.0-		(C-1: 83% Rec.)
	20Min				28.5		
	15Min						Gray Hard Granite
	55Min						
	45Min						
							Bottom of Hole Elev. -7.9'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞" ϕ).
(c) Samples designated by a "C" number indicate 1⅞" ϕ (AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 64
RAMP N-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 27 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	126	265

BORING DS64-5

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
27.7					27.7	
	5				25.9'	1.8' Asphalt and Brick
	7	12	S-1	18-3.8		
	9	11 8				
	11	6				
22.7	6	5 5	S-2	4'-6'		
	8	5 5				
	11					
	13					
	15					
17.7	9	13 9	S-3	9'-11'		Gray-Tan-Black C-f Sand, Some Silt, Little M-f Gravel, Trace Brick (FILL)
	12	7 5				
	17					
	27					
	27					
12.7	17	15 19	S-4	14-16		
	33	25 27				
	43					
	55					
	57				8.7	
7.7	29	25 100	S-5	19-20.5		
	59	100				
	51					
	69					Gray-Pink Decomposed Granite
	135					
2.7	OPEN	11 8	S-6	24-26		
(0)	▼	10 21				
	9Min		C-1	27-32	0.7	(C-1: 86%)
	11Min					
+2.3	10Min					Gray Hard Granite
	13Min					
	9Min					
						Bottom of Hole Elev. -4.3'

BORING DS66-15

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
21'	17	21 20	S-1	0'-2'	21.0'	.5 Gravel Fill
	15	15 12				
	6					
	4					
16'	2	5 5	S-2	4'-6'		Brown-Red Clayey Silt, Some C-f Sand, Trace M-f Gravel, Brick, Cinders (FILL)
	2	5 4				
	4					
	4					
	2					
(16) 11	1	1 1	S-3	9'-11'	10.5'	
	1	1 2				
	2				8.0'	Gray C-f Sand, Little Silt, Trace Brick, Cinders (FILL)
	2					
	12					
6'	3	6 7	S-4	14'-16'		
	3	4 2				
	2					Black Organic Silt, Some Wood, Trace F Sand, Trace F Gravel, Cinders (FILL)
	2					
	5					
1'	2	3 1	S-5	19'-21'		
	2	1 2				
	3				-2'	
	4					
	8					
-4'	6	6 12	S-6	24'-26'		Gray C-f Sand and C-f Gravel, Little Silt
	20	18 26				
	16					
	22					
	14				-8.0	
-9'	5Min		C-1	29-33.2		(C-1: 66% Rec.)
	6Min					
	6Min					
	7Min					Gray Hard Granite
	8Min		C-2	33.2'-		(C-2: 84% Rec.)
-14'	8Min			38.2'		
	10Min					
	12Min					
	15Min					
						Bottom Of Hole Elev. -17.2'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞" ϕ)
(c) Samples designated by a "C" number indicate 1⅝" ϕ(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

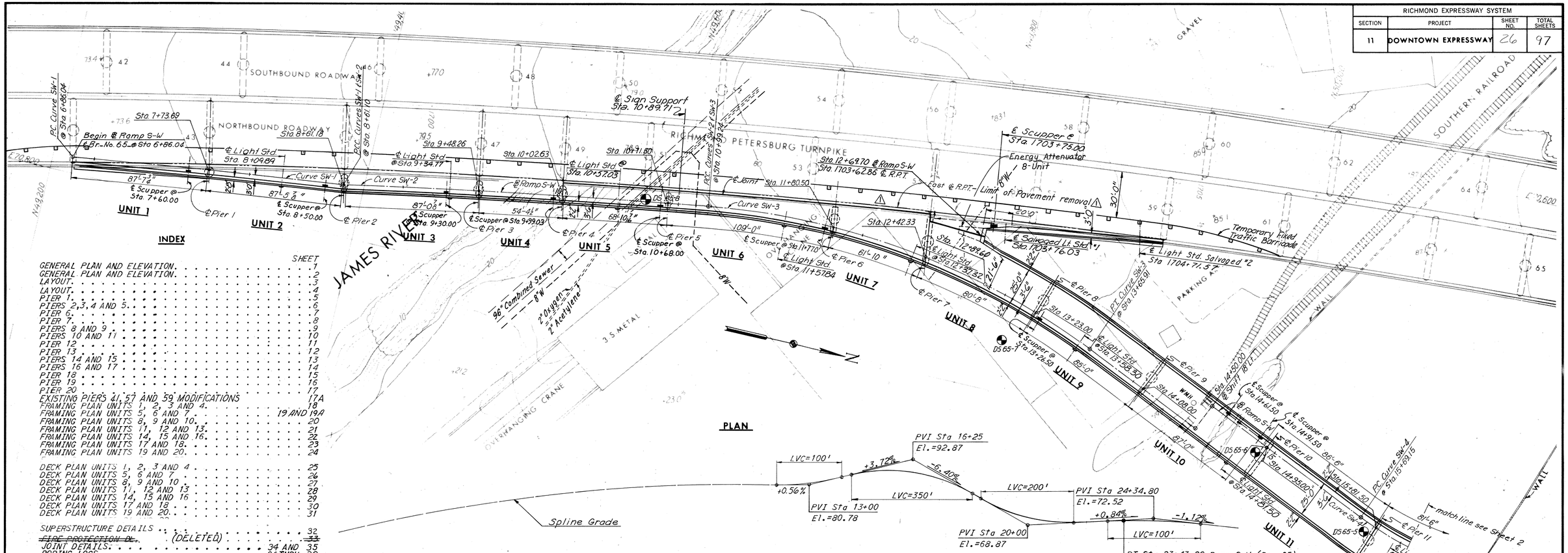
BORING LOGS

BRIDGE NO. 64
RAMP N-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 28 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	26	97



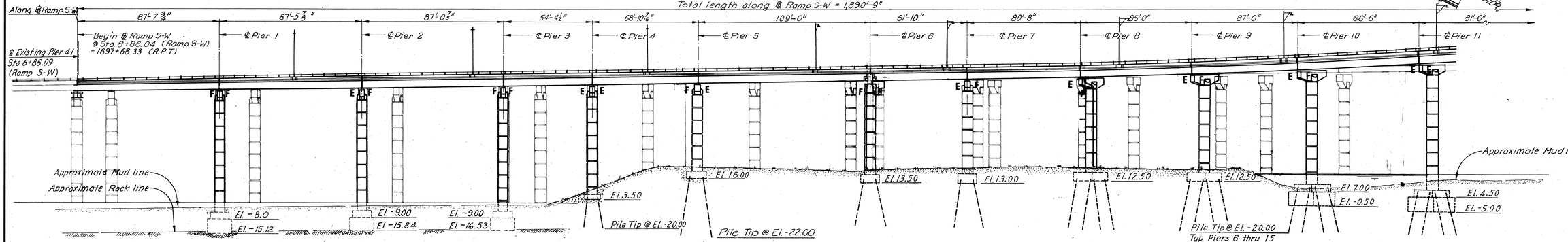
INDEX

	SHEET
GENERAL PLAN AND ELEVATION	1
GENERAL PLAN AND ELEVATION	2
LAYOUT	3
LAYOUT	4
PIER 1	5
PIERS 2,3,4 AND 5	6
PIER 6	7
PIER 7	8
PIERS 8 AND 9	9
PIERS 10 AND 11	10
PIER 12	11
PIER 13	12
PIERS 14 AND 15	13
PIERS 16 AND 17	14
PIER 18	15
PIER 19	16
PIER 20	17
EXISTING PIERS 41, 57 AND 59 MODIFICATIONS	17A
FRAMING PLAN UNITS 1, 2, 3 AND 4	18
FRAMING PLAN UNITS 5, 6 AND 7	19 AND 19A
FRAMING PLAN UNITS 8, 9 AND 10	20
FRAMING PLAN UNITS 11, 12 AND 13	21
FRAMING PLAN UNITS 14, 15 AND 16	22
FRAMING PLAN UNITS 17 AND 18	23
FRAMING PLAN UNITS 19 AND 20	24
DECK PLAN UNITS 1, 2, 3 AND 4	25
DECK PLAN UNITS 5, 6 AND 7	26
DECK PLAN UNITS 8, 9 AND 10	27
DECK PLAN UNITS 11, 12 AND 13	28
DECK PLAN UNITS 14, 15 AND 16	29
DECK PLAN UNITS 17 AND 18	30
DECK PLAN UNITS 19 AND 20	31
SUPERSTRUCTURE DETAILS	32
~~FIRE PROTECTION DET.~~ (DELETED)	~~33~~
JOINT DETAILS	34 AND 35
BORING LOGS	36THRU 38
FRAMING PLAN UNITS 8 AND 8W	20A

PLAN

PROFILE GRADE DATA

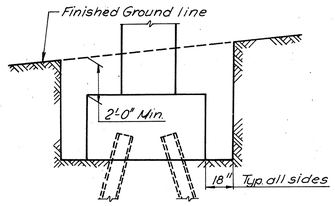
Total length along ℄ Ramp S-W = 1,890'-9"



ELEVATION

Notes:
For General Plan and Elevation Units 12 thru 20 see Sheet 2.
For Layout of Ramp S-W, see Sheets 3 and 4.
For Estimated Quantities, see Sheet 4.
For Boring Logs, see Sheets 36 thru 38.
For General Notes, see Sheet 4.

Substructure Note: Footings for Piers 1, 2 and 3 shall be founded on concrete seals socketed 1'-0" into solid rock.



LIMITS OF STRUCTURE EXCAVATION

no scale

NO.	REVISION	BY	DATE
⚠	Sheet 20a Added	TEM	9-9-75
⚠	Profile Ramp W-S	TEM	9-8-75
⚠	Limit of pavement removal & Sheet 17A added	G.B.P.	8-25-75

	BY	DATE
MADE	J.V. JLK	4-2-69 6-25-75
CHECKED	V.C.P. D.W.B.	3-28-69 7-7-75
IN CHARGE		

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

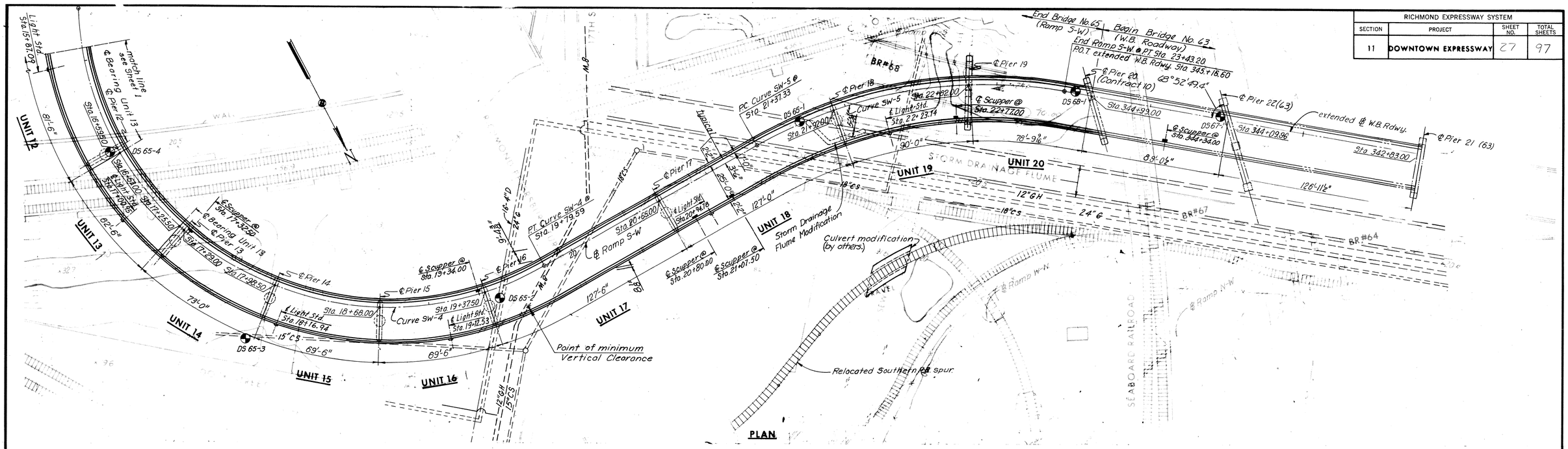
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

SCALE: 1"=30'-0"
CONTRACT NO. 11
SHEET NO. 1 OF 38

26

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	27	97



℄ Ramp S-W

Curve: SW-1
P.I. = Sta. 7+73.58
Δ = 1°45'10.2"
D = 1°00'
T = 87.53'
L = 175.05'
R = 5,729.58'

Curve: SW-2
P.I. = Sta. 9+80.19
Δ = 2°24'12"
D = 1°00'33"
T = 119.09'
L = 238.14'
R = 5,677.58'

Curve: SW-3
P.I. = Sta. 12+36.15
Δ = 32°00'00"
D = 12°00'
T = 136'91'
L = 266.67'
R = 477.47'

Curve: SW-4
P.I. = Sta. 18+95.05
Δ = 116°25'03"
D = 28°27'51"
T = 325.90'
L = 410.44'
R = 202.00'

Curve: SW-5
P.I. = Sta. 22+44.51
Δ = 39°19'04"
D = 19°05'55"
T = 107.17'
L = 205.87'
R = 300.00'

℄ Richmond-Petersburg Turnpike

Curve: R.P.T.-1
P.I. = Sta. 1704+68.83
Δ = 15°03'56"
D = 1°00'
T = 757.65'
L = 1,506.56'
R = 5,729.58

Curve: R.P.T.-2
P.I. = Sta. 1723+07.01
Δ = 33°27'07"
D = 4°00'
T = 430.45'
L = 836.30'
R = 1,432.39'

HORIZONTAL CURVE DATA

Notes:
For General Plan and Elevation Units 1 thru 11, see Sheet 1.
For Layout of Ramp S-W, see Sheets 3 and 4.
For Estimated Quantities, see Sheet 4.
For Boring Logs, see Sheets 34 thru 38.
For General Notes, see Sheet 4.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.V.	4-2-69				
CHECKED	Y.C.P.	5-28-69				
IN CHARGE						

AS BUILT

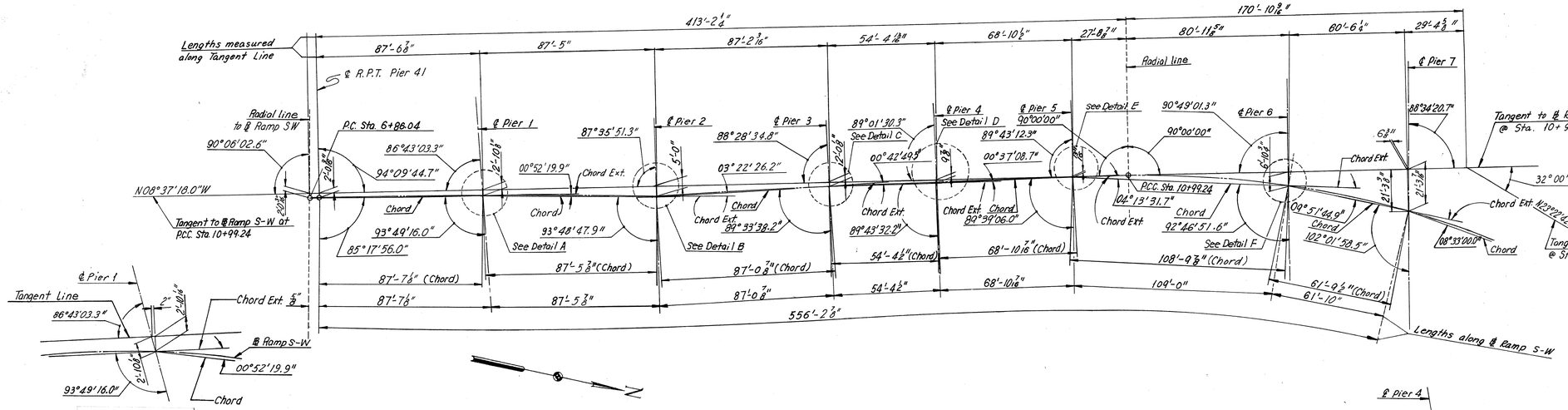
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

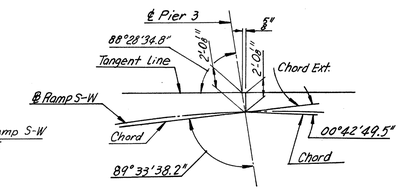
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=30'-0"
CONTRACT NO. 11
SHEET NO. 2 OF 38

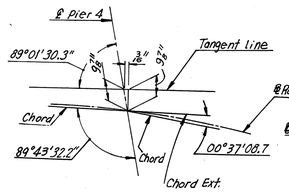
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	28	97



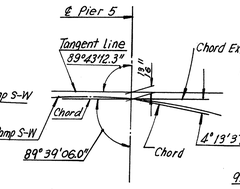
DETAIL A
No Scale



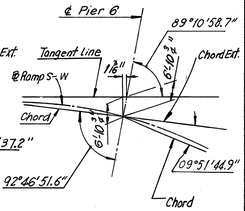
DETAIL C
No Scale



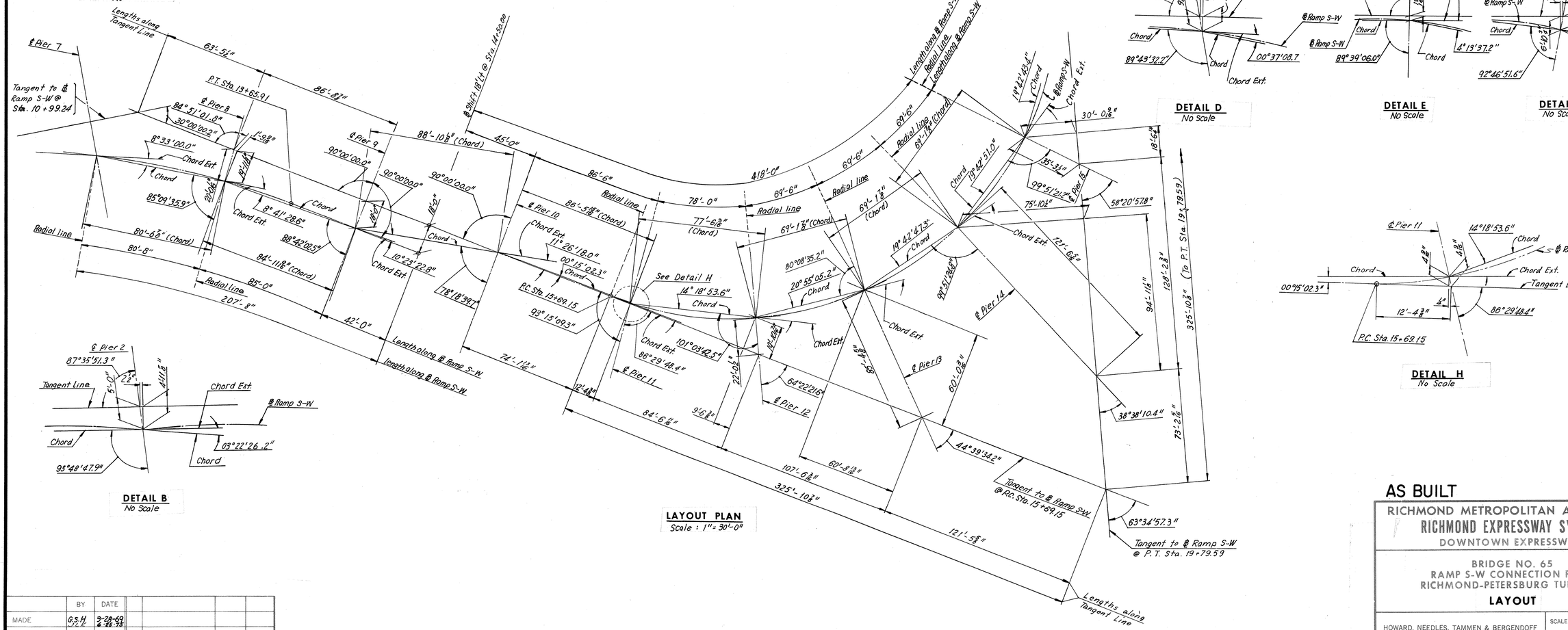
DETAIL D
No Scale



DETAIL E
No Scale

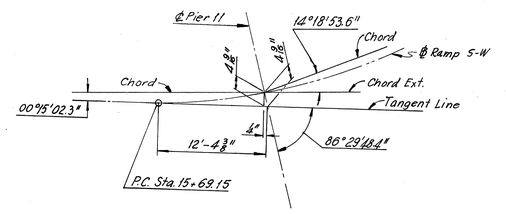


DETAIL F
No Scale



DETAIL B
No Scale

LAYOUT PLAN
Scale : 1"= 30'-0"



DETAIL H
No Scale

	BY	DATE
MADE	G.S.H	3-28-69 & 8-28-75
CHECKED	K.C.T. Dwd	5-7-69 7-7-75
IN CHARGE		

NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

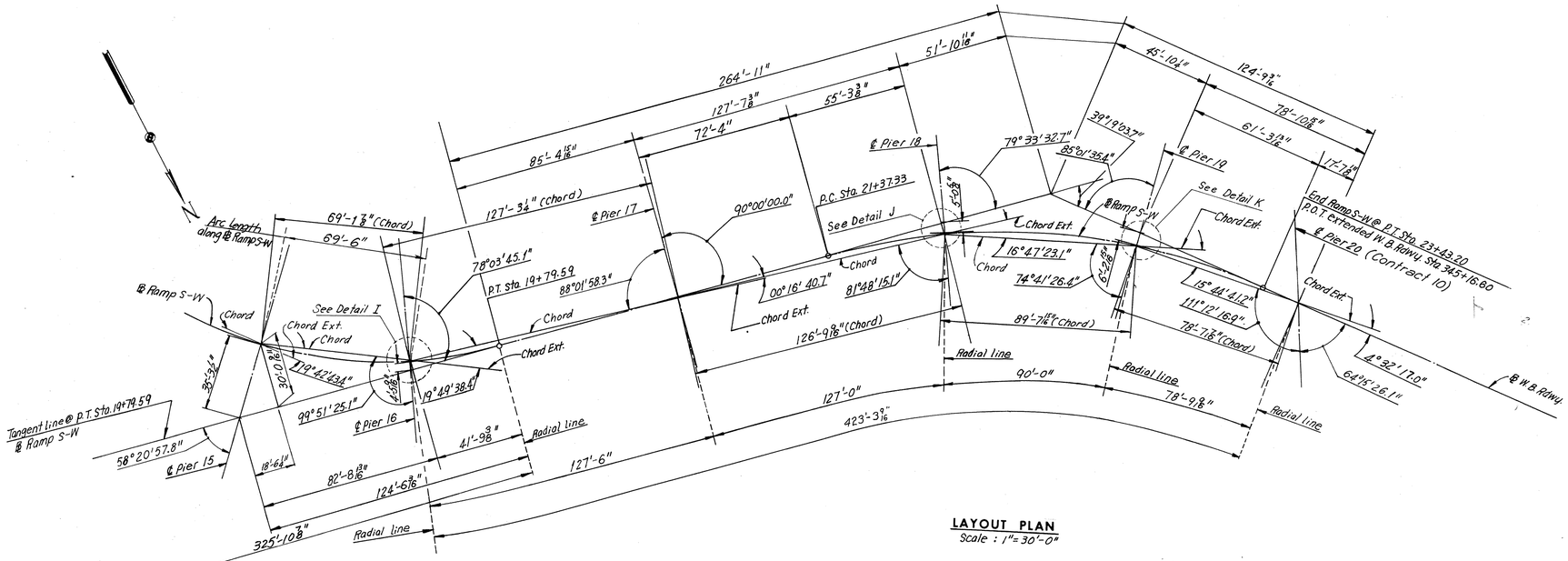
LAYOUT

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

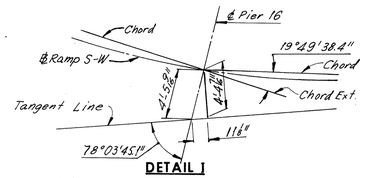
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 3 OF 38

28

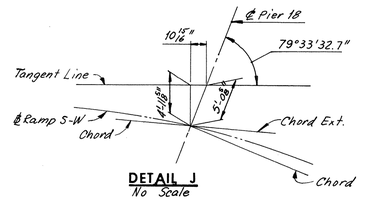
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	29	97



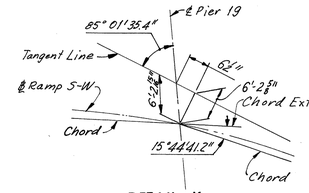
LAYOUT PLAN
Scale : 1"=30'-0"



DETAIL I



DETAIL J
No Scale



DETAIL K
No Scale

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Steel Piles 10BP42 Lin. Ft.	Steel Piles 12BP53 Lin. Ft.
Superstructure	---	1454.8	340,730	1,074,600	476,400	2,820	---	---
Substructure	2,741 *	2,702.8	386,910	15,100	12,000	---	1,152	7,497
Total	2,741 *	4157.6 ‡	727,640	1,089,700	488,400	2,820	1,152	7,497

	Temporary Barricade Lin. Ft.	Tremie Concrete Class T3 Cu. Yds.	Metal Conduit Lin. Ft.	Energy Attenuator 8-Unit Each	Modifications to R.P. Turnpike Bridge Lump Sum	Bridge Drainage Metal Work Lbs.	Modifications to Storm Drain. Flume Cu Yds.	Pipe Support @ Pier 16 Lump Sum
Superstructure		---	1800	1	1	19,960	---	---
Substructure		472.6	---	---	---	---	48	1
Total	840	472.6	1800	1	1	19,960	48	1

* Including 757 Cu. Yds. of "Underwater" Excavation for Piers 1, 2, 3, 10 and 11.

‡ All Concrete for Superstructure shall be Class A4 and for Substructure Class A3. Concrete for footing seals shall be Tremie Concrete Class T3 and is listed separately.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H	3-28-69	3	Conc.℄ Reinf Quant.	TEM	9-7-76
CHECKED	K.C.T.	5-7-69	2	Layout Dim. and ℄ at Pier 16	TEM	7-76
IN CHARGE			1	Concrete ‡ Strug. Steel Quan.	TEM	8-75

GENERAL NOTES :

ROADWAY : One 25'-0" clear roadway transitioning into a 13'-6" widening of existing Richmond-Petersburg Turnpike.

CAPACITY : Dead load includes 15 lbs. per sq. ft. for future wearing surface. Live load HS 20-44 loading and alternate military loading.

SPECIFICATIONS : GENERAL : Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN : A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
WELDING : 1972 Structural Welding Code of the American Welding Society.
CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete.

DATUM : City of Richmond

TEMPERATURE : The normal temperature referred to in the plans is 60°F. The temperature range for movement is 0°F to 120°F.

DIMENSIONS : All dimensions are measured horizontally and vertically unless otherwise noted.

EXCAVATION : Excavation below subgrade and cut slope template shall be classified as Structure Excavation. All excavation above these limits shall be classified as Regular Excavation and is not included in the Structural Quantities.

Foundations: Footings shall rest on firm material. Foundation material shall be dry and special attention is called to Section 401.05 of General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

Concrete: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3 except that footing seals shall be Tremie Concrete Class T3 as indicated on the detailed drawings. All exposed edges and corners shall have a 4" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces : See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing steel shall be deformed bars conforming to ASTM A615 Grade 40. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted.

Steel Notes: Structural steel shall conform to A.S.T.M. Designations A36, A572-Grade 50 and A588 as noted. See Special Provisions. All field connections shall be made with high strength bolts. High strength bolts shall be ⅞" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

AS BUILT

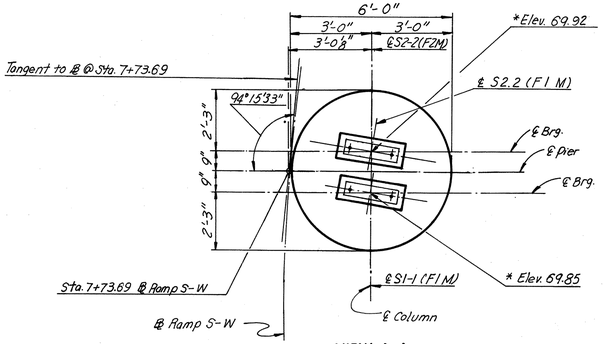
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
LAYOUT

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

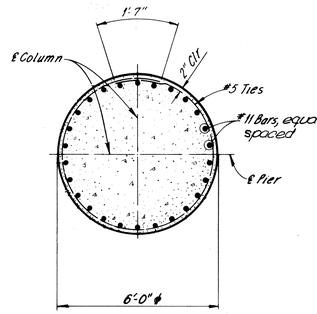
SCALE As Noted
CONTRACT NO. 11
SHEET NO. 4 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	30	97

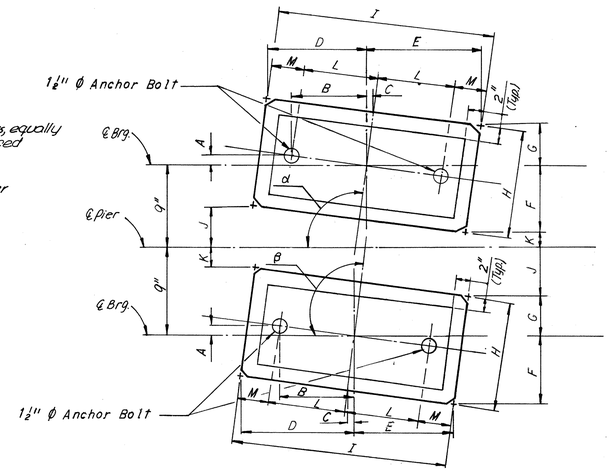


VIEW A-A
Scale : ⅜" = 1'-0"

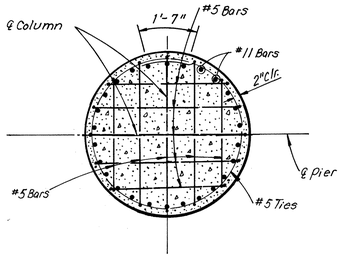
* Denotes top elevations of pad.



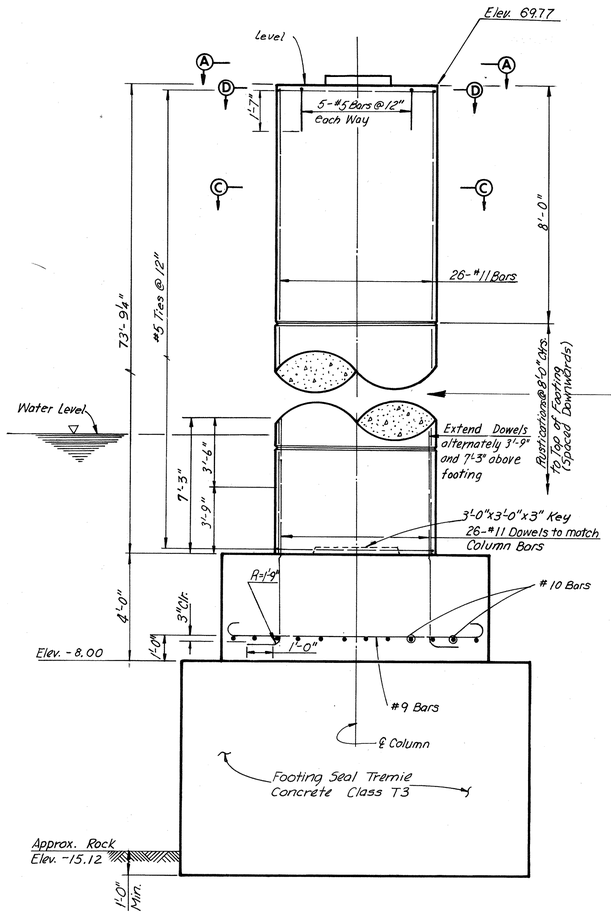
SECTION C-C
Scale: ⅜" = 1'-0"



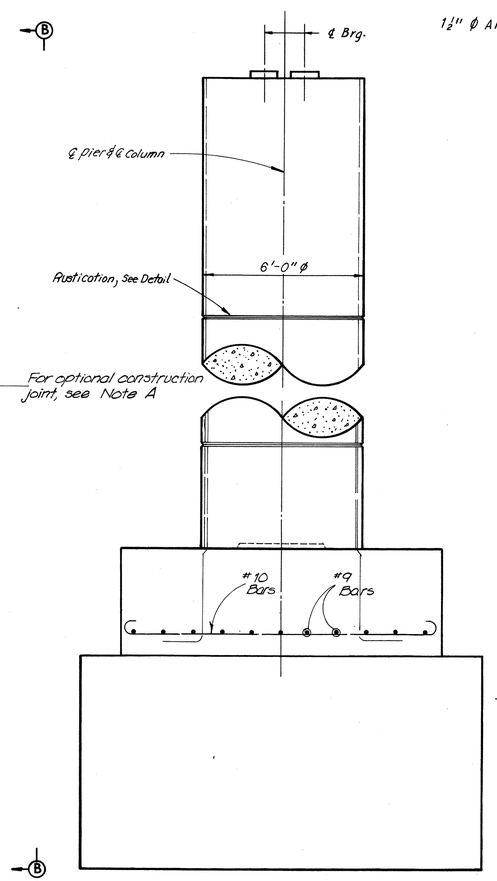
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



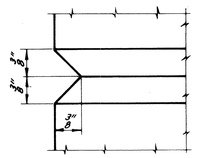
SECTION D-D
Scale : ⅜" = 1'-0"



ELEVATION PLAN
Scale : ⅜" = 1'-0"

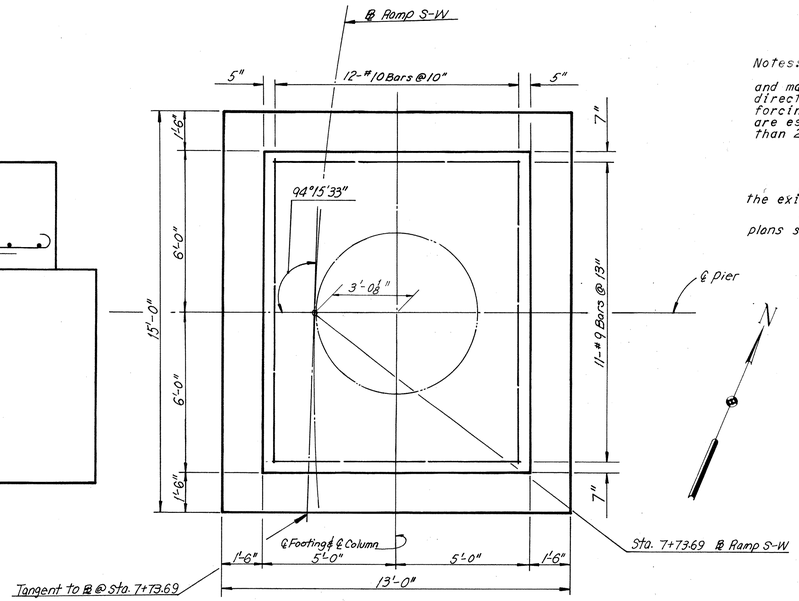


VIEW B-B
Scale : ⅜" = 1'-0"



RUSTICATION DETAIL
Full Scale

DIMENSIONS FOR PAD ANCHOR BOLT SETTING PLAN														
Stringer	d	B	A	B	C	D	E	F	G	H	I	J	K	L	M
S1-1	—	92°00'58"	5/16"	8"	3/16"	12 11/16"	12 5/16"	6 3/16"	5 5/16"	1 1/2"	2'-1"	3 11/16"	2 13/16"	8"	4½"
S2-2	94°41'20"	—	⅝"	8"	½"	12"	12 15/16"	6 3/16"	4 11/16"	1 1/2"	2'-1"	4 5/16"	2¼"	8"	4½"



FOOTING PLAN
Scale : ⅜" = 1'-0"

Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 Ft., redesign will be required.
For Standard Shoe Details, see Sheet S1 & S2.
For Framing Plan, see Framing Plan Sheets 18.
For Quantities of Steel and Concrete, see Sheet 4.
Overexcavation will not be permitted between the existing pier and new pier.
Pier 1 is to match existing Pier 43. Station shown on plans shall be verified by the Contractor in the field.

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

	BY	DATE
MADE	G.S.H.	2-10-89
	J.L.K.	6-25-75
CHECKED	K.C.T.	2-18-89
IN CHARGE		

NO.	REVISION	BY	DATE
2	Pad Elev Shoe Type & Anchor Bolt set. Dim.	T.E.M.	4-76
1	Pad Elev., Str. no. & column height	T.E.M.	9-5-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

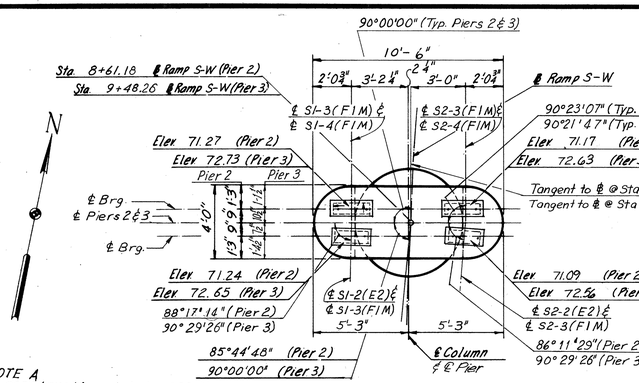
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 1

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

SCALE. As Noted
CONTRACT NO. 11
SHEET NO. 5 OF 38

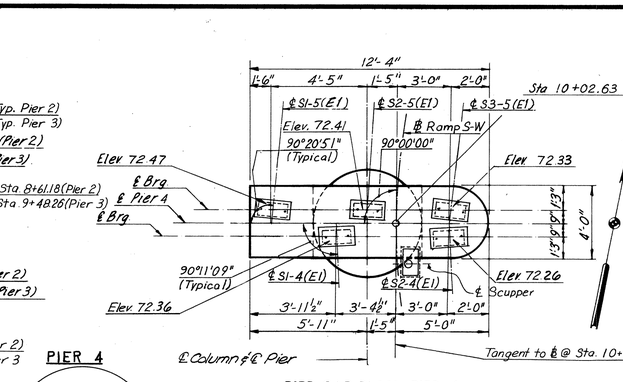
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	31	97



NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.

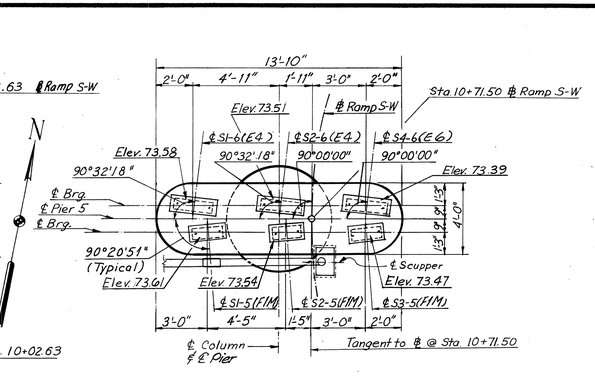
PIER CAP PLAN-PIERS 2 AND 3

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



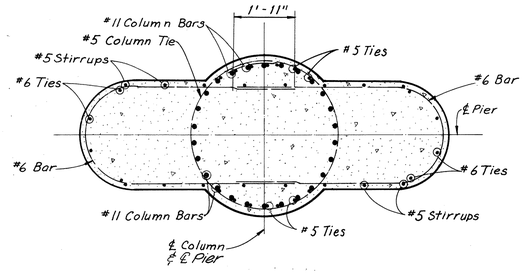
PIER CAP PLAN- PIER 4

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



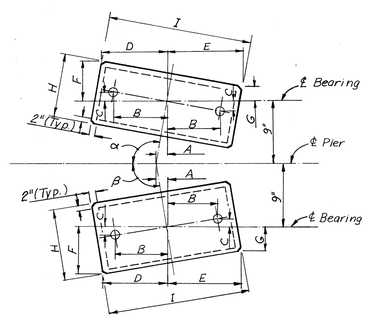
PIER CAP PLAN - PIER 5

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



TYPICAL SECTION THRU CAP BEAM

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

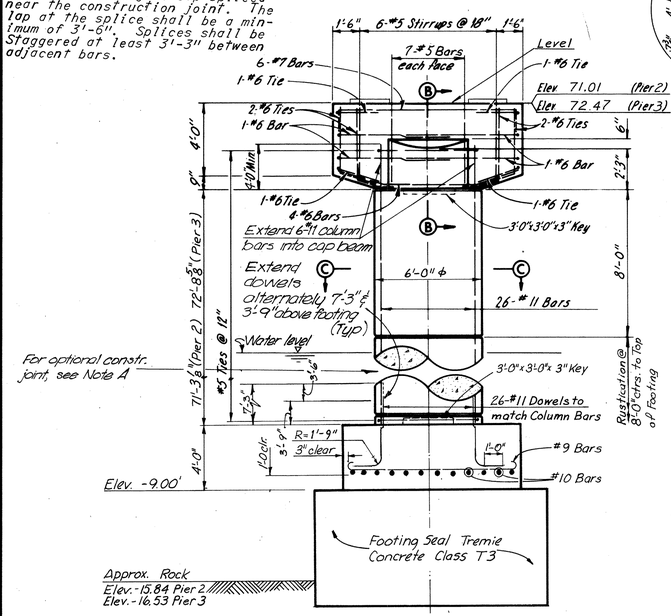


PAD AND ANCHOR BOLT SETTING PLAN

No Scale

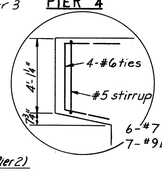
DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN											
Pier	Stringer	∝	B	A	B	C	D	E	F	G	H	I
2	S1 & S2-3	90°29'26"	-	1/16"	8"	1/16"	12 7/16"	12 9/16"	5 7/8"	5 5/8"	11 1/2"	2'-1"
2	S1-2	-	88°17'14"	1/4"	8 1/4"	1/4"	12 7/16"	12 1/16"	6 3/8"	6 3/8"	1'-1"	2'-0 1/2"
2	S2-2	-	86°11'29"	5/16"	8 1/4"	9/16"	12 5/16"	11 13/16"	5 11/16"	7 1/16"	1'-1"	2'-0 1/2"
3	S1 & S2-4	90°21'47"	-	1/16"	8"	1/16"	12 1/16"	12 9/16"	5 11/16"	5 11/16"	11 1/2"	2'-1"
3	S1 & S2-3	-	90°29'26"	1/16"	8"	1/16"	12 1/16"	12 1/16"	5 1/16"	5 3/16"	11 1/2"	2'-1"
4	S1, S2 & S3-5	90°20'51"	-	1/16"	8 1/4"	1/16"	12 3/16"	12 5/16"	6 1/16"	5 13/16"	1'-0"	2'-0 1/2"
4	S1 & S2-4	-	90°11'09"	1/16"	8 1/4"	1/16"	12 1/4"	12 1/4"	6 1/16"	5 11/16"	1'-0"	2'-0 1/2"
5	S1 & S2-6	90°32'18"	-	1/16"	10 1/2"	1/8"	14 1/2"	14 9/16"	6 1/8"	6 1/16"	1'-0 1/2"	2'-5"
5	S4-6	90°00'00"	-	0"	11 1/4"	0"	15 1/4"	15 1/4"	6 1/4"	6 1/4"	1'-0 1/2"	2'-6 1/2"
5	S1, S2 & S3-5	-	90°20'51"	1/16"	8"	1/16"	12 1/16"	12 1/16"	5 1/16"	5 1/16"	11 1/2"	2'-1"

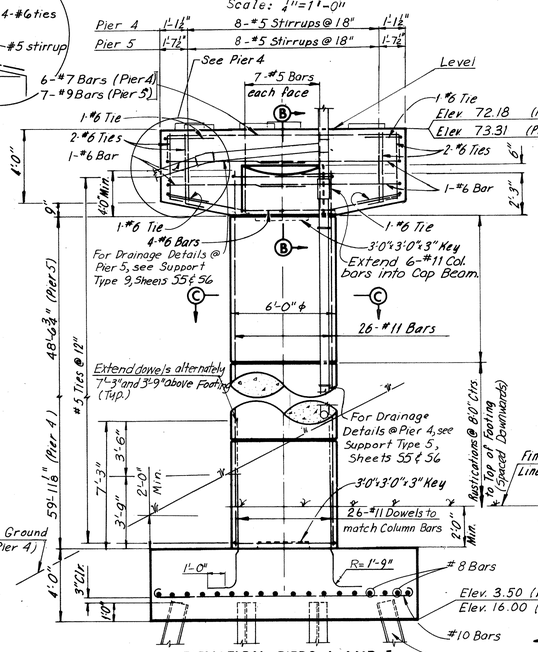
Notes:
Overexcavation will not be permitted between existing piers and new piers.
Piers 2, 3 & 4 are to match existing Piers 45, 47 and 49 respectively. Stations shown on the plans shall be verified by the Contractor in the field.
All piles shall be 10BP42 Steel Piles (Design Capacity = 45 tons).
For Framing Plans, see Sheets 18 & 19.
Estimated Pile tip elevation - 20.0
Pier 4 and - 22.0 Pier 5
Batter piles 3" per foot where shown
For Rustication Detail, see Sheet 10.
For Pile Detail, see Sheet 9.
For Quantities of Steel and Concrete, see Sheet 4.



ELEVATION- PIERS 2 AND 3

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



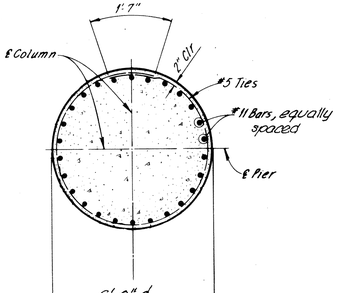


ELEVATION- PIERS 4 AND 5

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

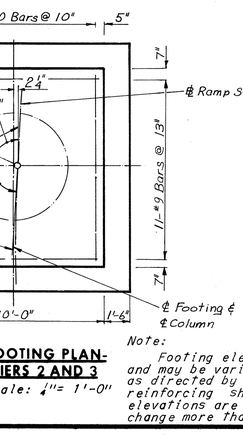
VIEW E-E

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



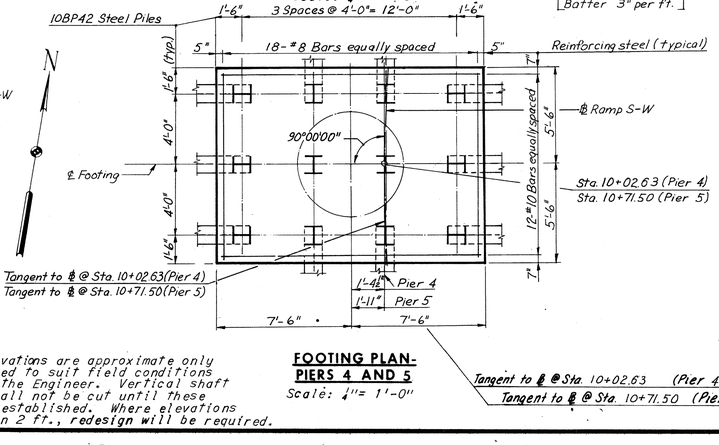
SECTION C-C

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



FOOTING PLAN- PIERS 2 AND 3

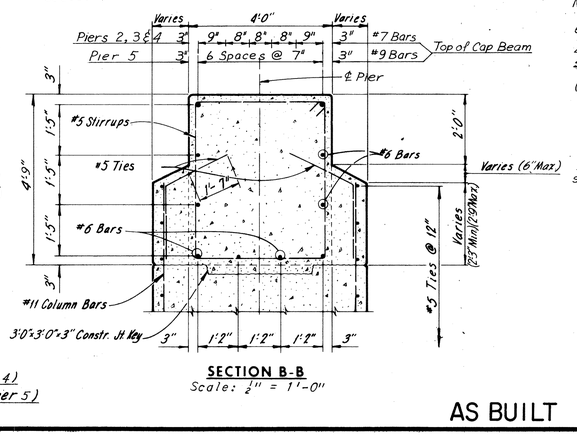
Scale: 1/4"= 1'-0"



FOOTING PLAN- PIERS 4 AND 5

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

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



SECTION B-B

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

Tangent to ℄ @ Sta. 10+02.63 (Pier 4)
Tangent to ℄ @ Sta. 10+71.50 (Pier 5)

Col. Reinf. embedment	TEM	9-30-76
	BY	DATE
MADE	J.D. J.L.K.	2-8-89 6-25-75
CHECKED	G.S.H.	2-20-89
IN CHARGE		

NO.	REVISION	BY	DATE
3	Pad Dim. & Shoe Type	T.E.M.	6-7-76
2	Pad Elev.	T.E.M.	5-7-76
2	Pad Elev. Shoe Type & Anchor Bolt set. Plan	TEM	4-7-76
1	Pad Elev. & Col. Dim.	T.E.M.	9-8-75

AS BUILT

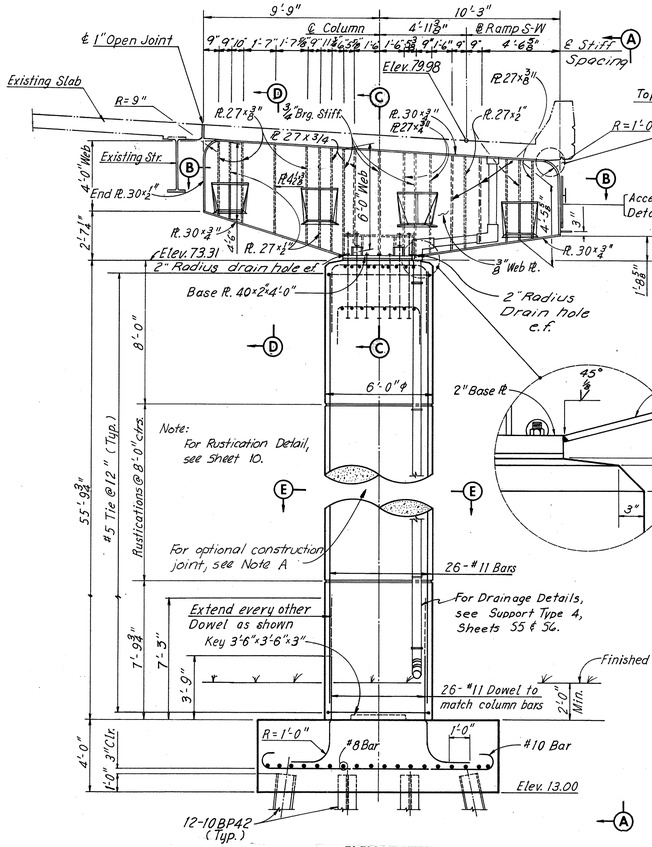
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 2, 3, 4 AND 5

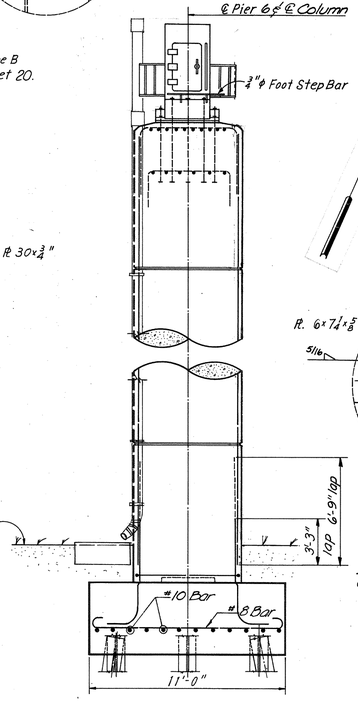
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 6 OF 38

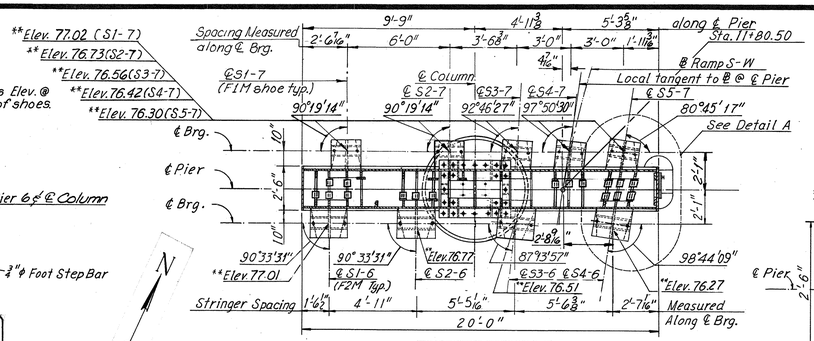
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	32	97



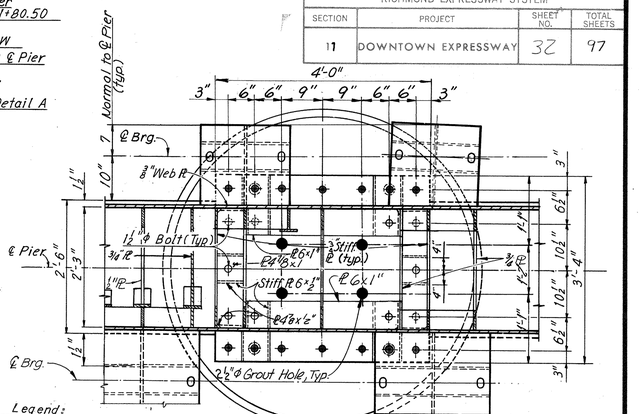
ELEVATION
Scale: 1/4"=1'-0"

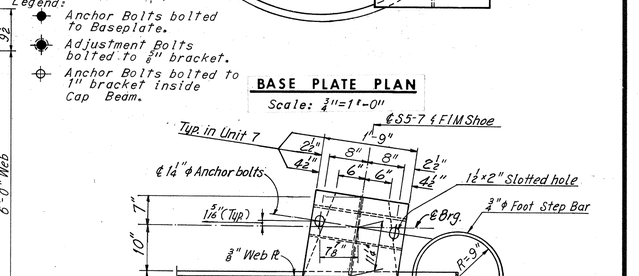


VIEW A-A
Scale: 1/4"=1'-0"

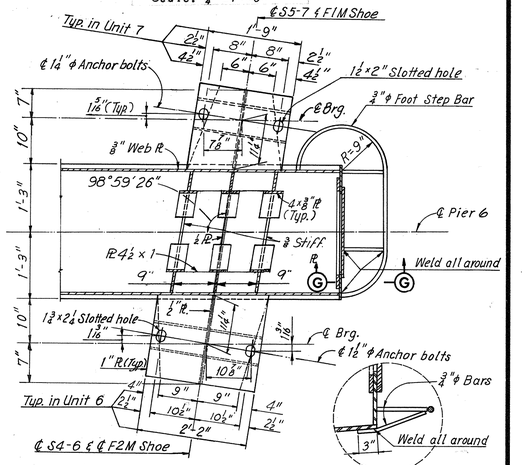


SECTION B-B
Scale: 1/4"=1'-0"

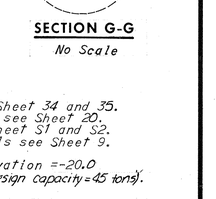




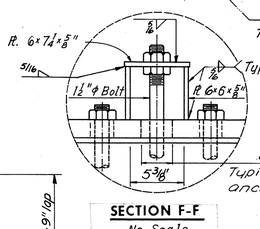
BASE PLATE PLAN
Scale: 3/4"=1'-0"



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

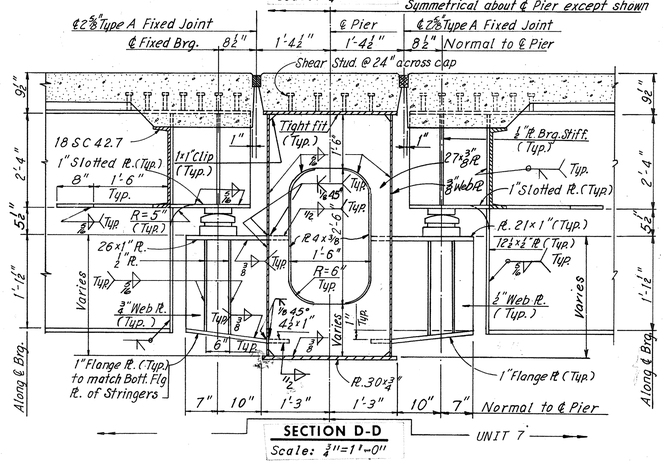


SECTION G-G
No Scale

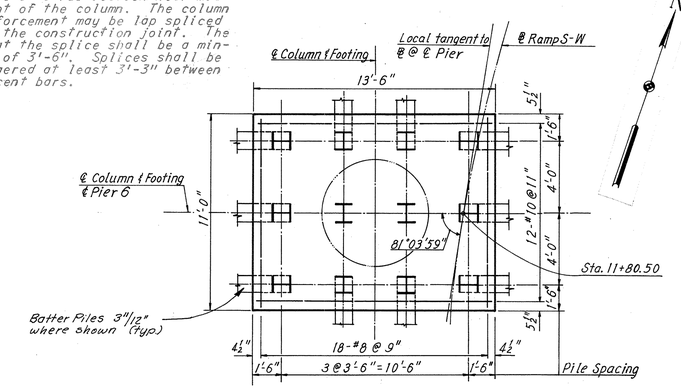


SECTION C-C
Scale: 3/4"=1'-0"

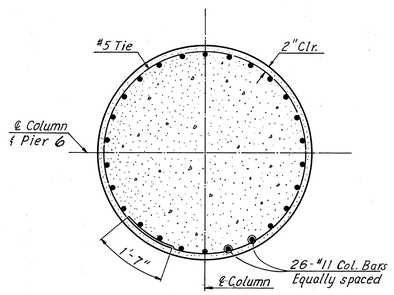
*. Fill with nonshrinking Grout after Cap beam is in final position.



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



FOOTING PLAN
Scale: 1/4"=1'-0"



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

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.

Note: Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note: All Structural Steel for Pier 6 shall be A36. Top of cap beam, Pier 6, need not be cambered.

Notes:
For Joint Details see Sheet 34 and 35.
For Shear Stud Details see Sheet 20.
For Shoe Details see Sheet S1 and S2.
For Bearing Pile Details see Sheet 9.

Estimated Pile tip Elevation =-20.0
All piles shall be 10BP42 (Design capacity=45 tons).

Note: All anchor bolts connecting cap beam to column shall be 1 1/2" in Dia. and each nut shall have washer (not shown on details)

	BY	DATE
MADE	K.C.T. / J.L.K.	8-13-69 / 6-25-75
CHECKED	S.C.C.	5-27-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Shoe Plate Dim. in Detail A	T.E.M.	8-76
2	Pier Cap Dim.	T.E.M.	3-76
1	Pad Elev & Col. Dim.	T.E.M	9-8-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 6

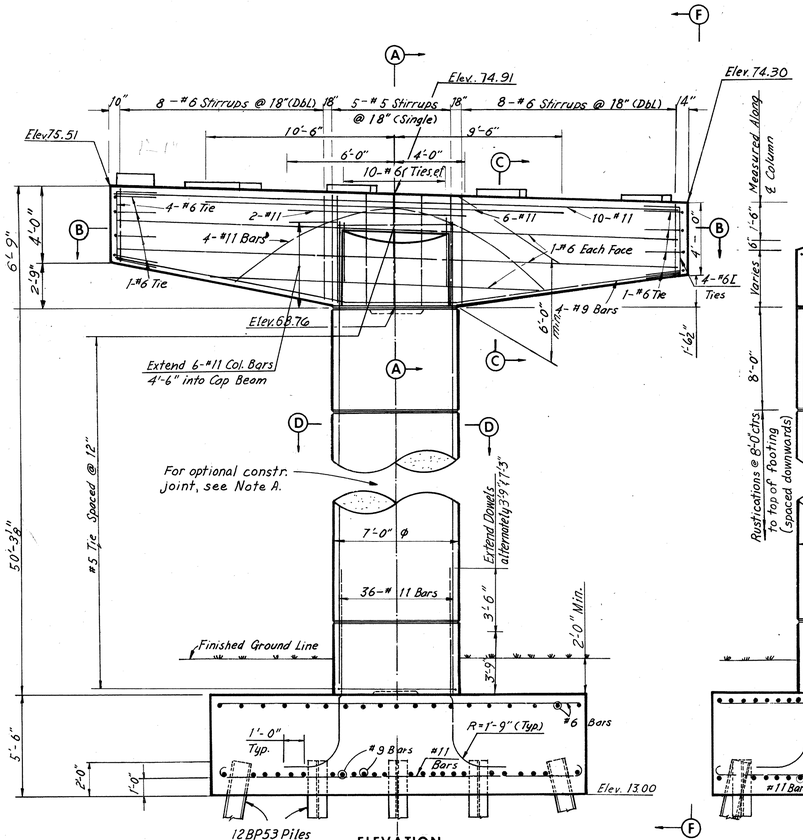
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 7 OF 38

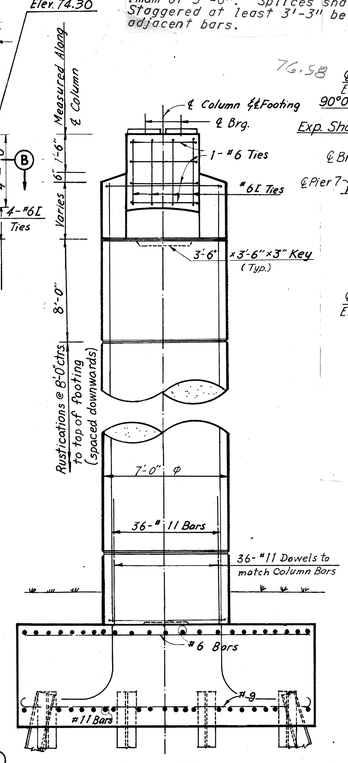
32

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	33	97

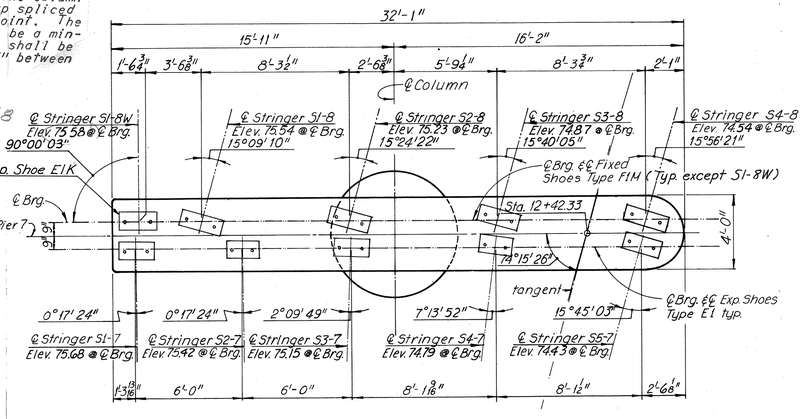
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



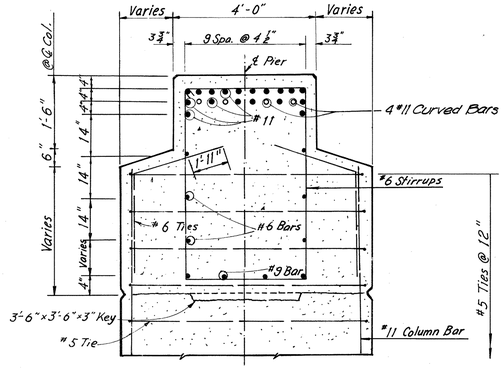
ELEVATION
Scale: 1/4"=1'-0"



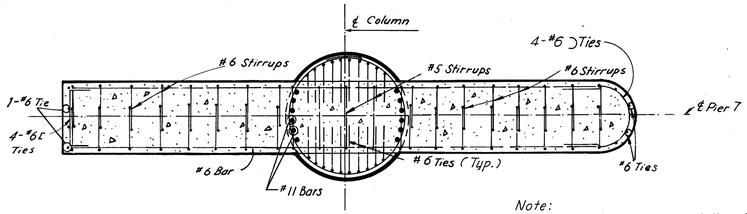
VIEW F-F
Scale: 1/4"=1'-0"



PIER CAP PLAN
Scale: 1/4" = 1'-0"

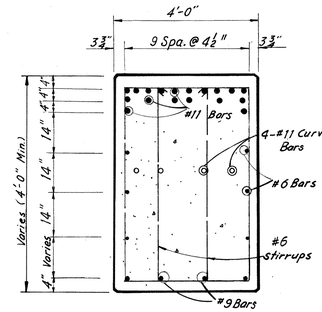


SECTION A-A
Scale: 1/2"=1'-0"

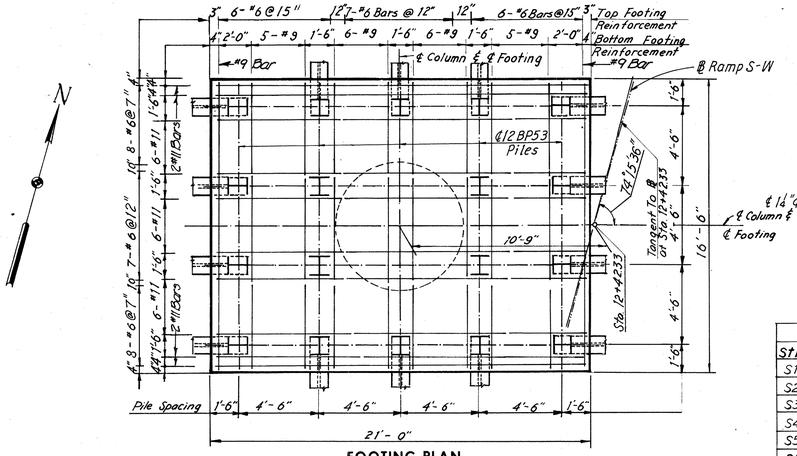


SECTION B-B
Scale: 1/4"=1'-0"

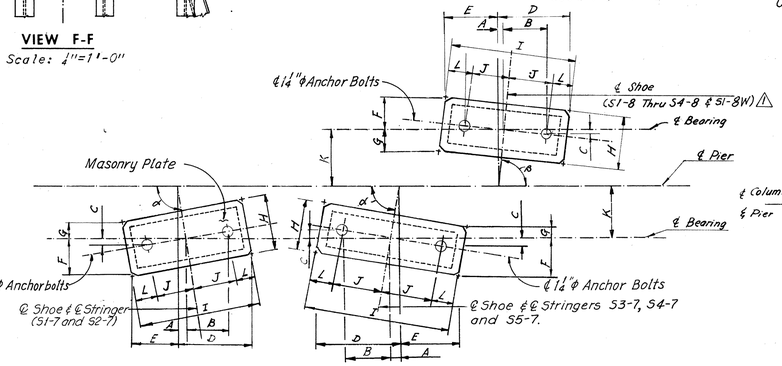
Note:
Pier 7 is to match existing Pier 55. Station shown shall be verified by the Contractor in the field.



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



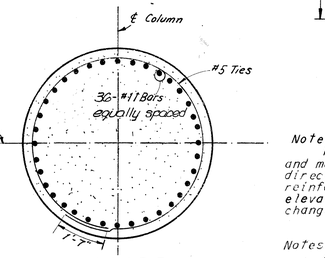
FOOTING PLAN
Scale: 1/4"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS OF ANCHOR BOLT SETTING PLAN

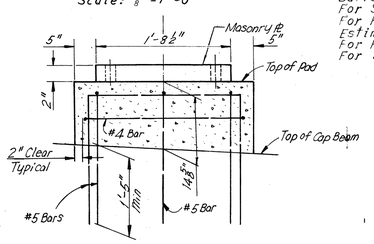
Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
S1-7	90°17'24"	--	1 1/16"	8 1/4"	1 1/16"	1'-0 5/16"	1'-0 3/16"	6 1/16"	5 5/16"	1'-0"	2'-0 1/4"	8 1/4"	9"	4"
S2-7	90°17'24"	--	1 5/16"	8 1/4"	1 5/16"	1'-0 5/16"	1'-0 5/16"	6 1/16"	5 5/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S3-7	87°50'11"	--	1 5/16"	8 1/4"	1 5/16"	1'-0 5/16"	1'-1 1/16"	6 1/16"	5 5/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S4-7	82°46'08"	--	1 1/16"	8 3/16"	1 1/16"	1'-2 1/16"	1'-0 1/4"	7 1/16"	4 15/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S5-7	74°14'57"	--	2 3/16"	7 15/16"	2 1/4"	1'-3 15/16"	7 5/16"	9 1/16"	2 13/16"	1'-0"	2'-0 7/16"	8 1/4"	9"	4"
S1-8	--	74°50'50"	2 1/16"	10 1/16"	2 3/16"	1'-6 3/16"	10 5/16"	9 1/4"	1 3/16"	11"	2'-6"	10 1/16"	9"	4 1/2"
S2-8	--	74°35'38"	2 1/16"	10 1/16"	2 15/16"	1'-6 3/16"	10 1/16"	9 5/16"	1 3/16"	11"	2'-6"	10 1/16"	9"	4 1/2"
S3-8	--	74°19'55"	2 1/16"	10 1/16"	2 15/16"	1'-6 7/16"	10 5/16"	9 3/16"	1 1/4"	11"	2'-6"	10 1/16"	9"	4 1/2"
S4-8	--	74°03'39"	2 3/16"	10 1/16"	2 3/16"	1'-6 1/2"	10 5/16"	9 1/8"	1 1/16"	11"	2'-6"	10 1/16"	9"	4 1/2"
S1-8W		89°59'57"	--	8 1/4"	--	1'-0 1/4"	1'-0 1/4"	6"	6"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"



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

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 12BP53 steel piles (Design Capacity = 57 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet S1 & S2.
For Framing Plan, see Sheet 19 & 20.
Estimated Pile Tip Elevation is -20.0
For Rustication Details, see Sheet 10.
For 12BP53 Steel Pile Details, see Sheet 9.



REINFORCING PAD DETAIL OF S1-8W
No Scale

	BY	DATE
MADE	R.C.	2-17-69
CHECKED	J.L.K.	6-26-75
IN CHARGE	Y.C.P.	3-3-69

NO.	REVISION	BY	DATE
3	Cap Dimensions	PRY	10-76
2	Pad Elev. Col. Dim.	TEM	9-8-75
1	S1-8W Angle & Pad. Dim.	TEM.	9-2-75

AS BUILT

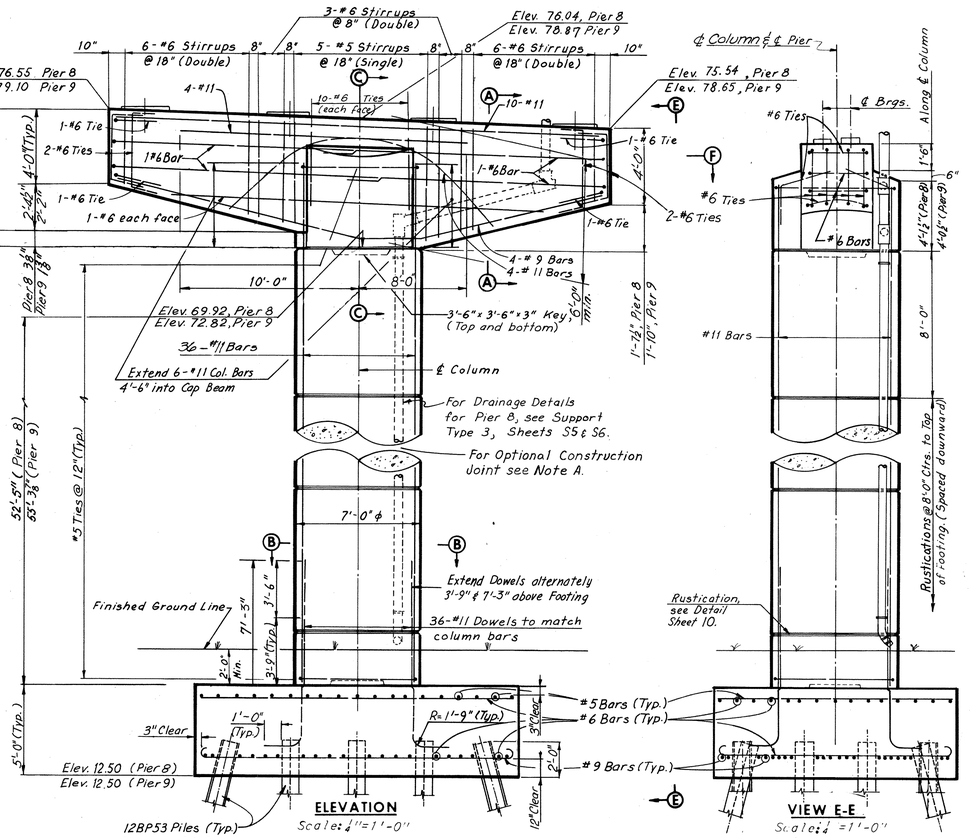
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

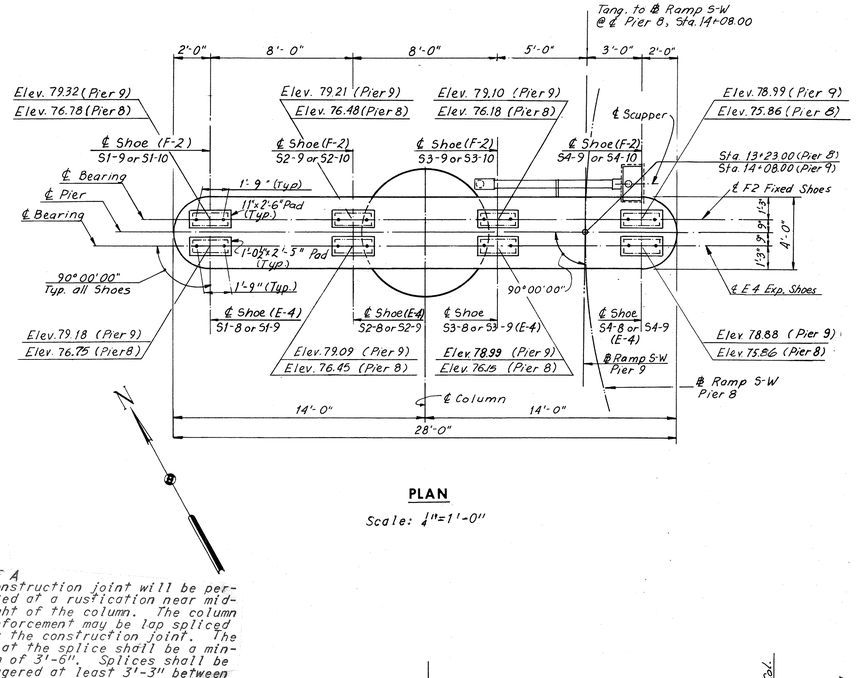
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 7

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 8 OF 38

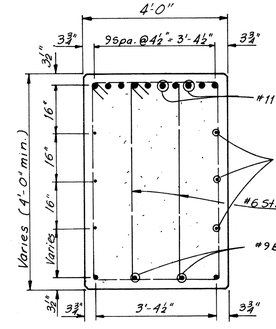
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	34	97





PLAN

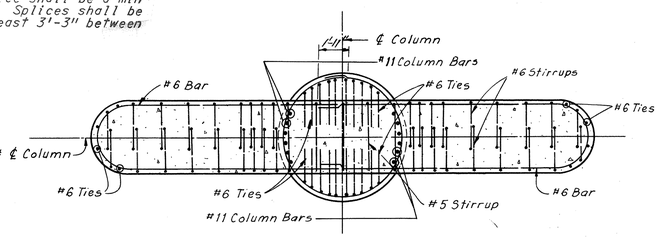
Scale: 1"=1'-0"



SECTION A-A

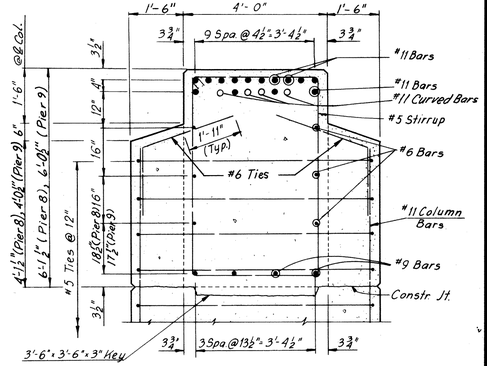
Scale: ½"=1'-0"

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



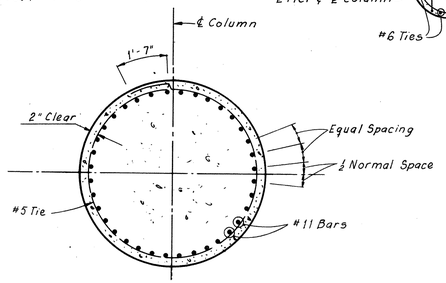
SECTION F-F

Scale: ¼"=1'-0"



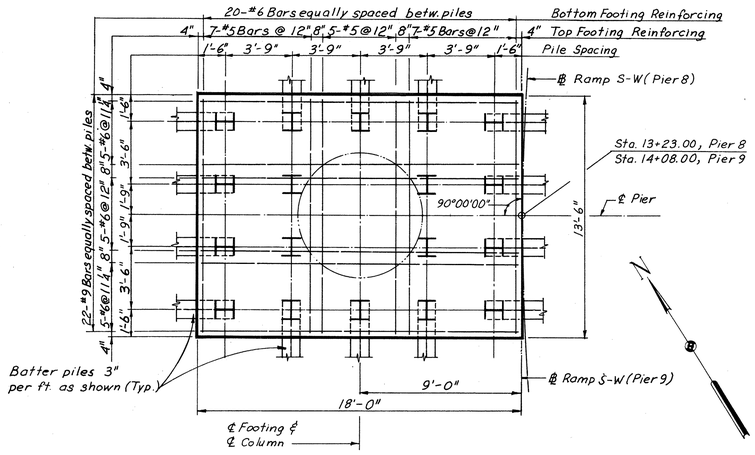
SECTION C-C

Scale: 1" = 1'-0"



SECTION B-B

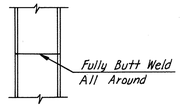
Scale: 3"=1'-0"



FOOTING PLAN

Scale: ¼"=1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



STEEL PILE SPLICE DETAIL

No Scale

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity= 57 Tons).
Batter piles 3" per ft. as shown.
For Standard Shoe Details see Sheet S1 & S2.
For Framing Plans see Sheet 20.
Estimated Pile Tip elevation -20.0

	BY	DATE	NO.	REVISION	BY	DATE
MADE	CEB/JD	12-17-68				
CHECKED	PTA	01-07-69				
IN CHARGE						

AS BUILT

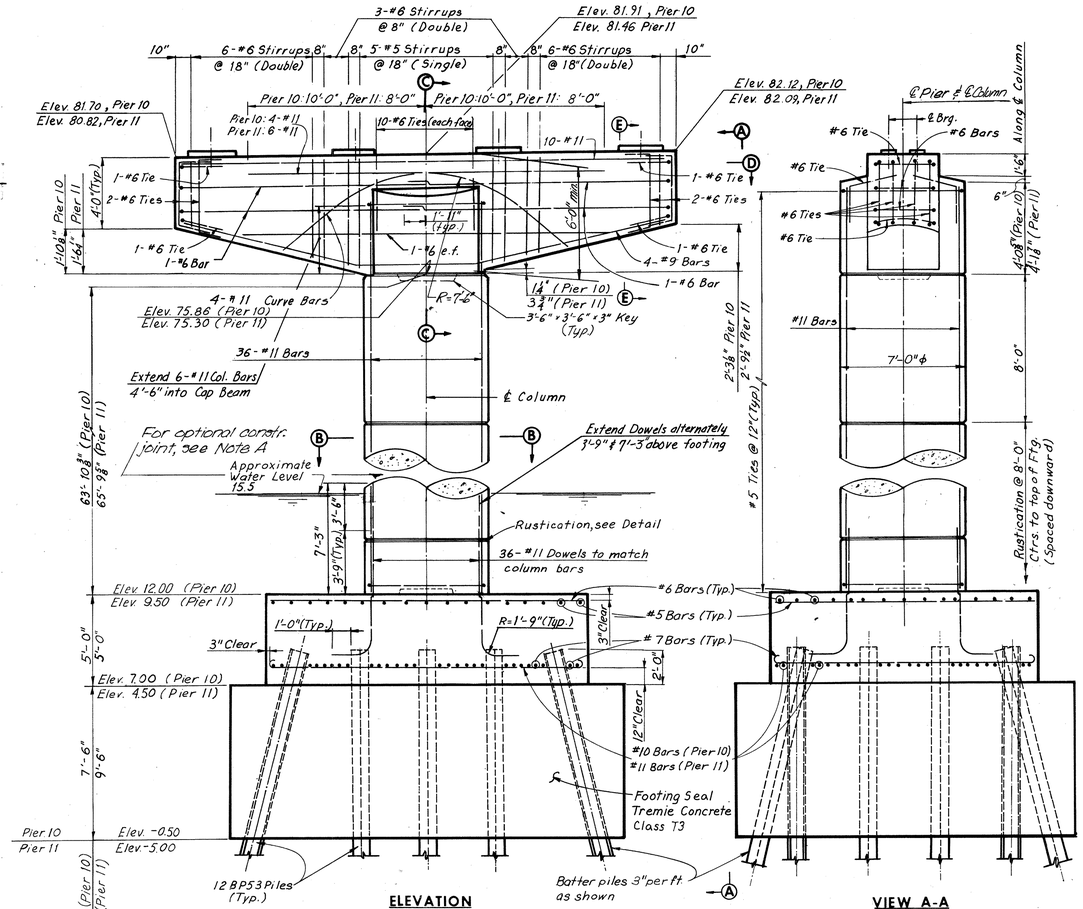
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 8 AND 9

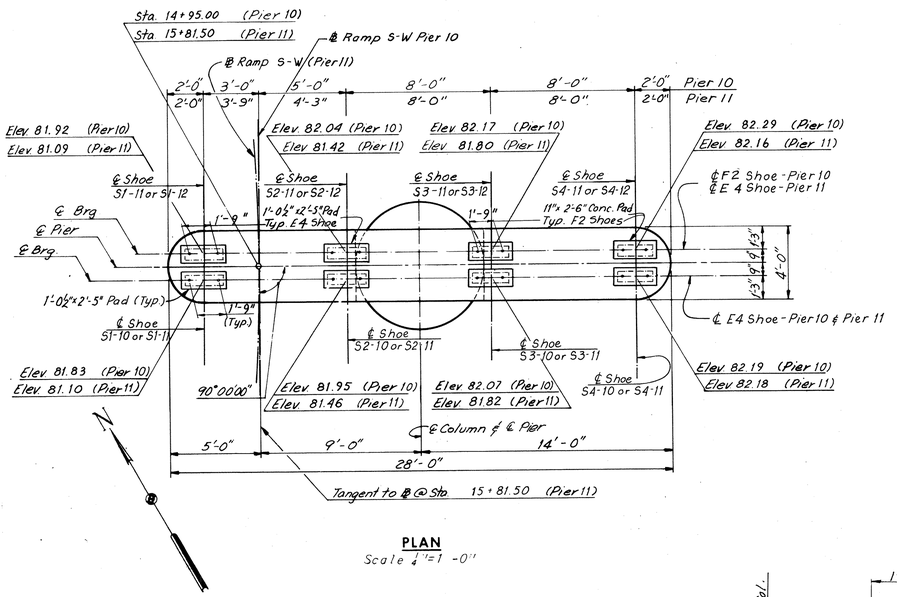
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 9 OF 38

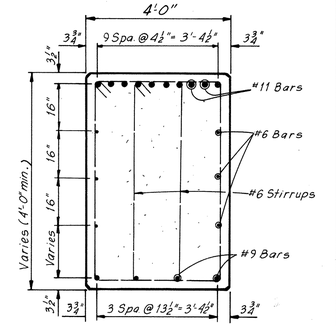
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	35	97



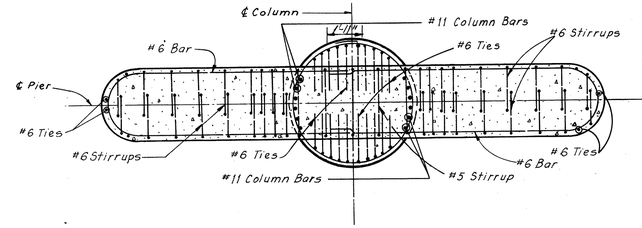
ELEVATION
Scale: ¼" = 1'-0"



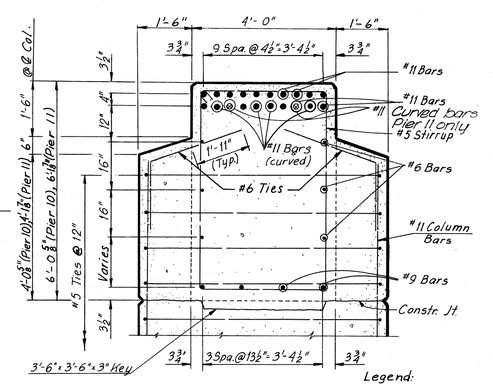
PLAN
Scale ¼"=1'-0"



SECTION E-E
Scale ½"=1'-0"

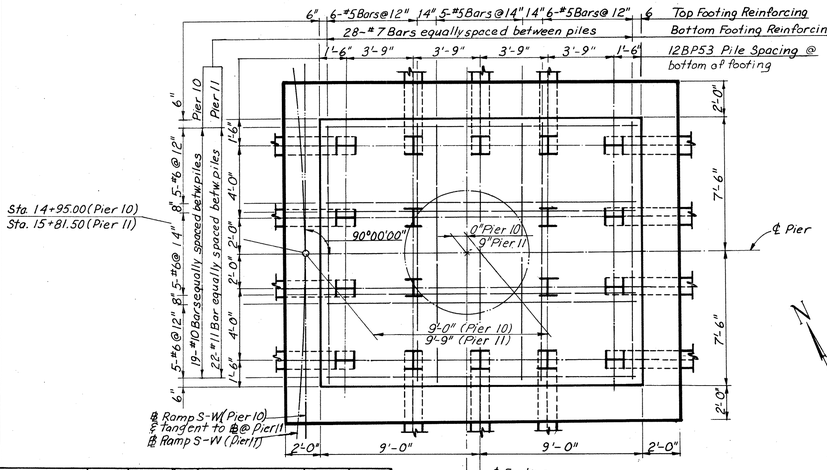


SECTION D-D
Scale: ½"= 1'- 0"



SECTION C-C
Scale: ½" = 1'- 0"

Legend:
- Piers 10 & 11
- Pier 11 only

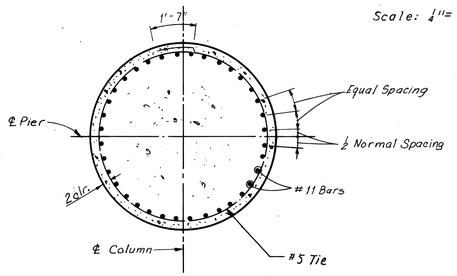


FOOTING PLAN
Scale: ¼" = 1'-0"

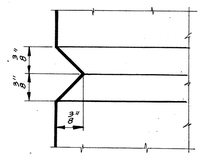
FOOTING FOR PIER 11 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
Bottom reinforcement shown in View A-A is for Pier 11 only. Bottom reinforcement for pier 10 is similar except in size & number.

Note:
For layout of piers 10 and 11 See Sheet 3.
Pile dimensions given on Footing Plan are measured at bottom of Footing (Elev. 7.00 Pier 10 and Elev. 4.50 Pier 11).



SECTION B-B
Scale: ¾" = 1'-0"



RUSTICATION DETAIL
Full Scale

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap of the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes;
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter piles 3" per ft. as shown.
For Standard Shoe Details see Sheet S1 & S2.
For Framing Plans see Sheet 20 & 21
Estimated Pile Tip elevation -20.0

AS BUILT

	BY	DATE
MADE	CEB/JD	12-18-68
CHECKED	GSH	1-24-69
IN CHARGE		

NO.	REVISION	BY	DATE

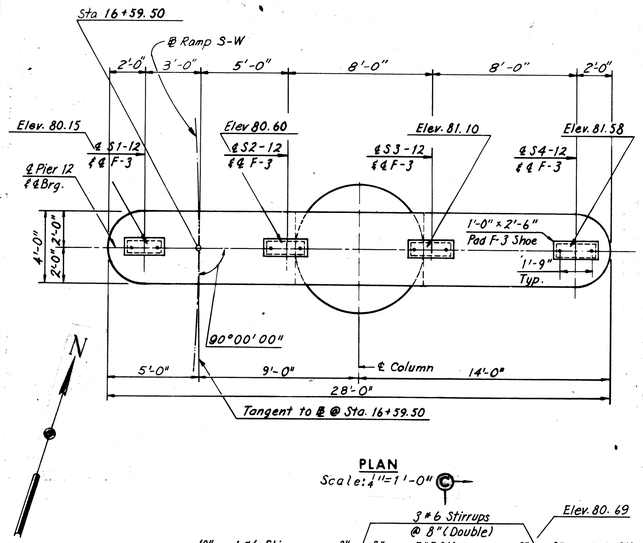
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 10 AND 11

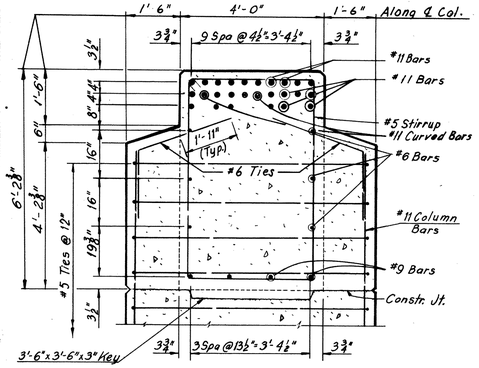
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 10 OF 38

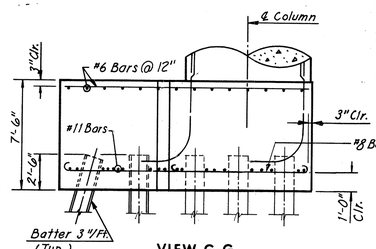
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	36	97



PLAN
Scale: 1" = 1'-0"



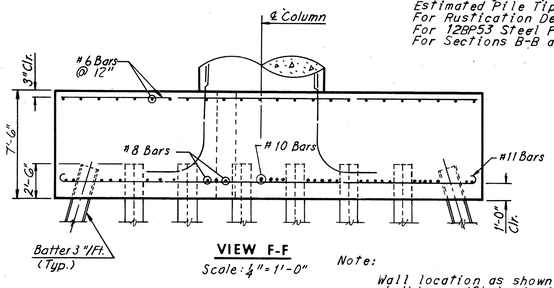
SECTION C-C
Scale: 1" = 1'-0"



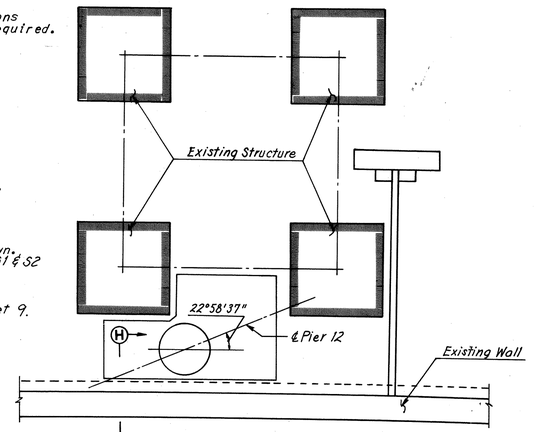
VIEW G-G
Scale: ¼" = 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

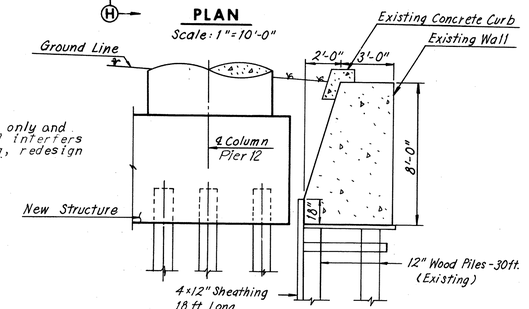
Notes:
All piles shall be 12BP53 steel piles (Design Capacity= 57 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 & S2
For Framing Plan, see Sheet 21.
Estimated Pile Tip Elevation is -20.0.
For Rustication Details, see Sheet 5.
For 12BP53 Steel Pile Details, see Sheet 9.
For Sections B-B and D-D, see Sheet 12.



VIEW F-F
Scale: ¼" = 1'-0"

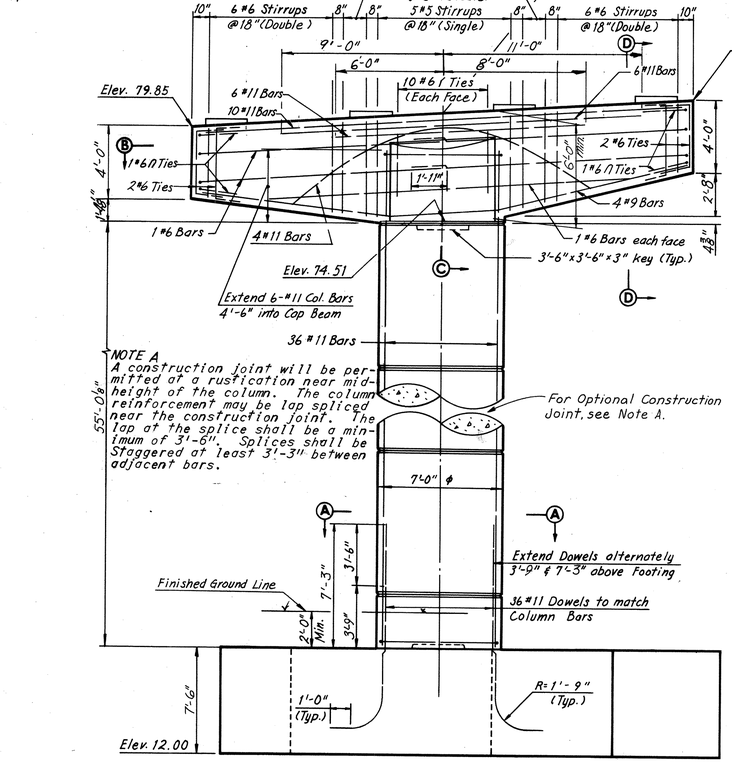


PLAN
Scale: 1" = 10'-0"



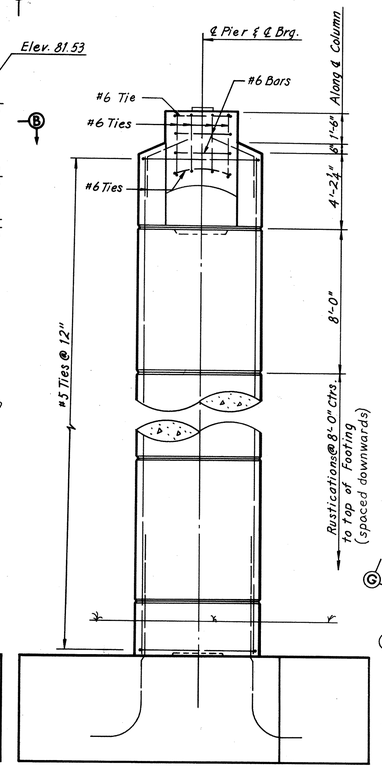
SECTION H-H
Scale: ¼" = 1'-0"

Note:
Wall location as shown on Plan is approximate only and shall be verified in field. If existing wall interfers with the piling or parts of the new footing, redesign of footing will be required



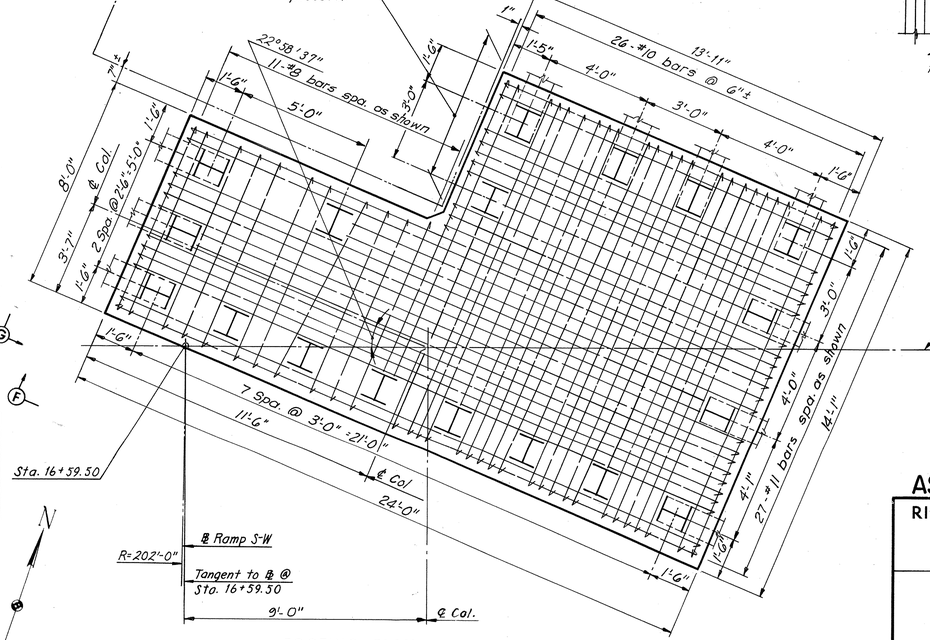
ELEVATION
Scale: ¼" = 1'-0"

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



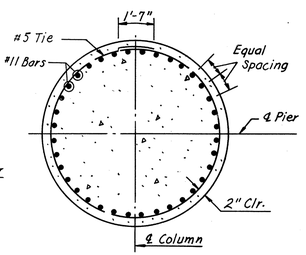
VIEW E-E
Scale: ¼" = 1'-0"

Note:
12 BP 53 Bearing Piles and Footing Reinforcing Steel in "ELEVATION" or "VIEW E-E" are not shown.



FOOTING PLAN
Scale: ⅛" = 1'-0"

FOOTING FOR PIER 12 IS ECCENTRIC AS SHOWN ON FOOTING PLAN (Showing Bottom Reinforcing)



SECTION A-A
Scale: ⅜" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	3-29-69				
CHECKED	K C T	5-6-69				
IN CHARGE						

AS BUILT

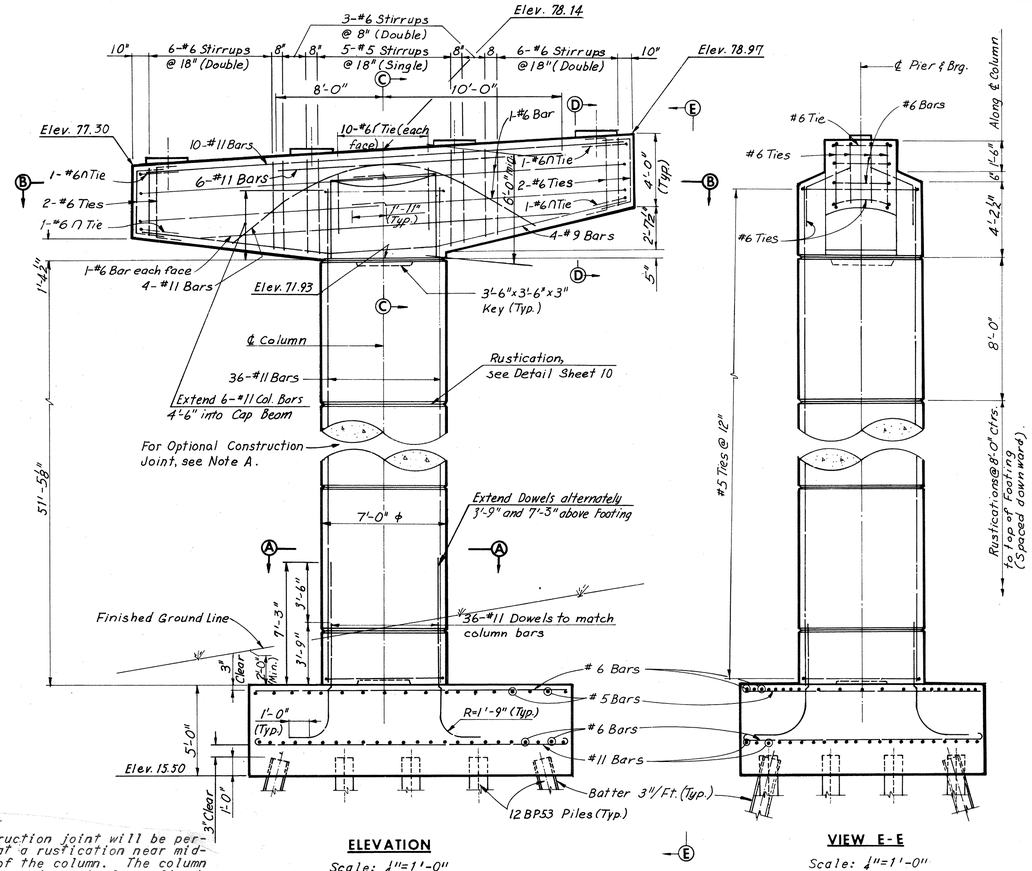
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 12

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 11 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	37	97

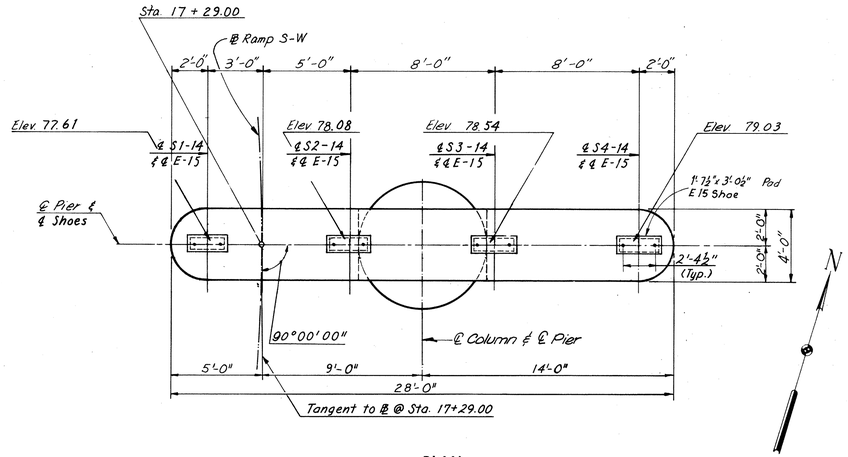


ELEVATION

Scale: ¼"=1'-0"

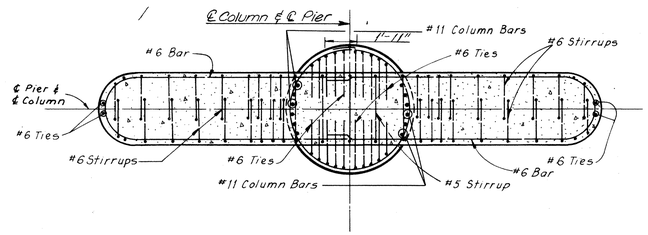
VIEW E-E

Scale: ¼"=1'-0"



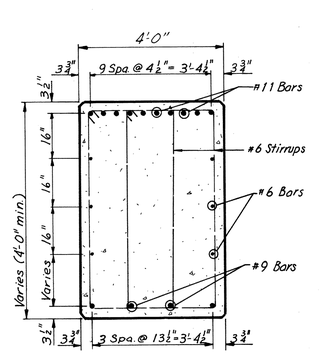
PLAN

Scale ¼"=1'-0"



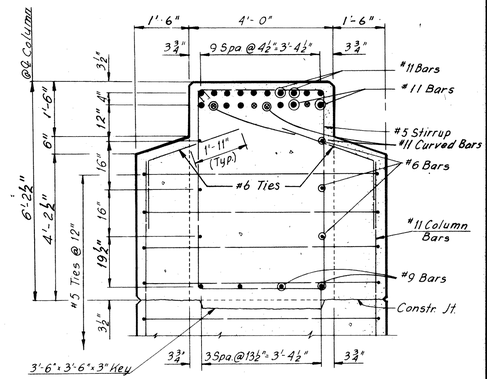
SECTION B-B

Scale: ¼"= 1'- 0"



SECTION D-D

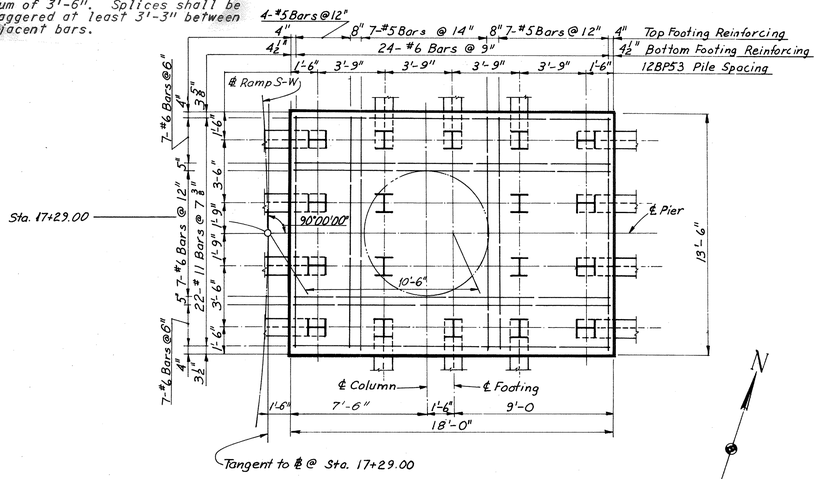
Scale ½"=1'-0"



SECTION C-C

Scale: ½" = 1'- 0"

NOTE A.
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



FOOTING PLAN

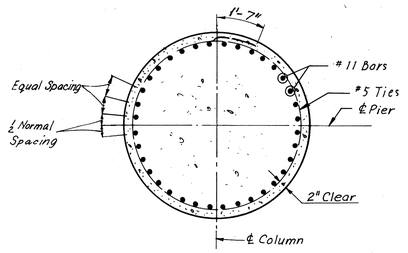
Scale: ¼"=1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by The Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 12BP53 steel piles (Design Capacity= 57 ton)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets 51 & 52.
For Framing Plan, see Sheet 22
Estimated Pile Tip Elevation is - 20.0.
For Rustication Details, see Sheet 10.
For 12BP53 Steel Pile Details, see Sheet 9.

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

FOOTING FOR PIER 13 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



SECTION A-A

Scale: ¾"=1'-0"

	BY	DATE
MADE	JD/PTA	1-6-69
CHECKED	GSH	1-20-69
IN CHARGE		

NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

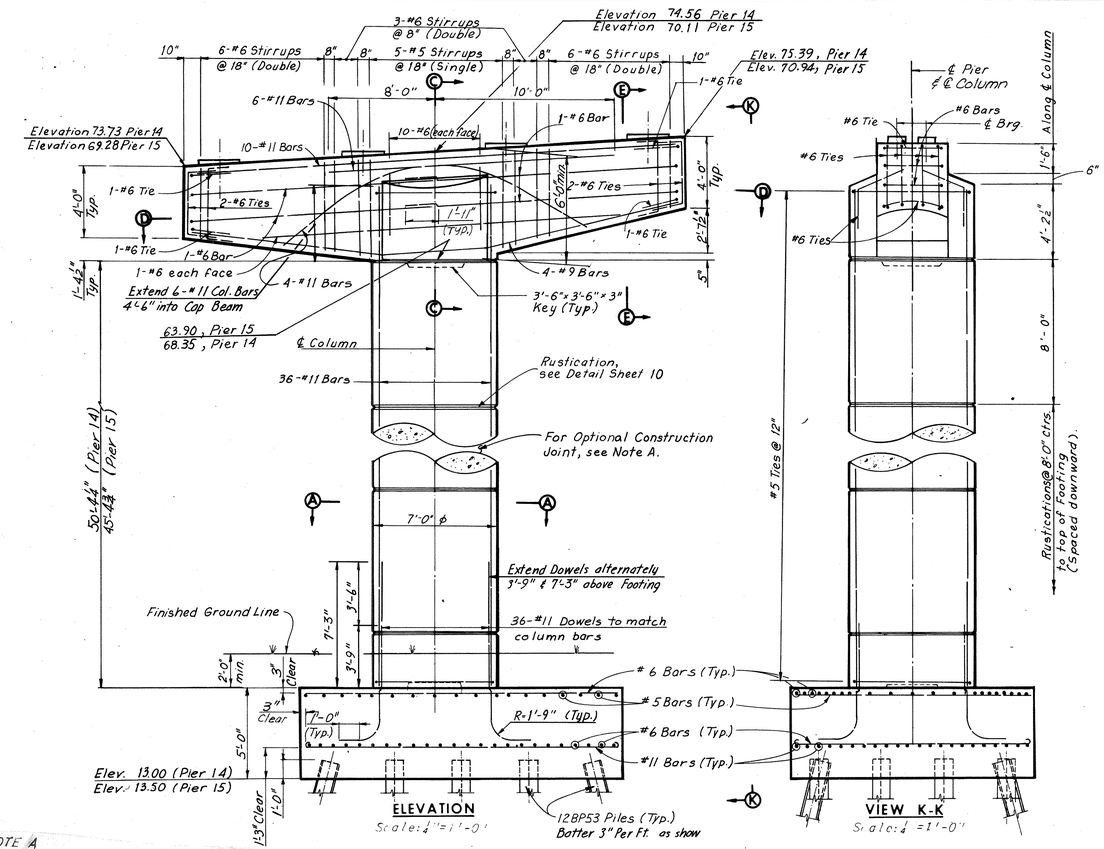
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 13

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 12 OF 38

37

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	38	97



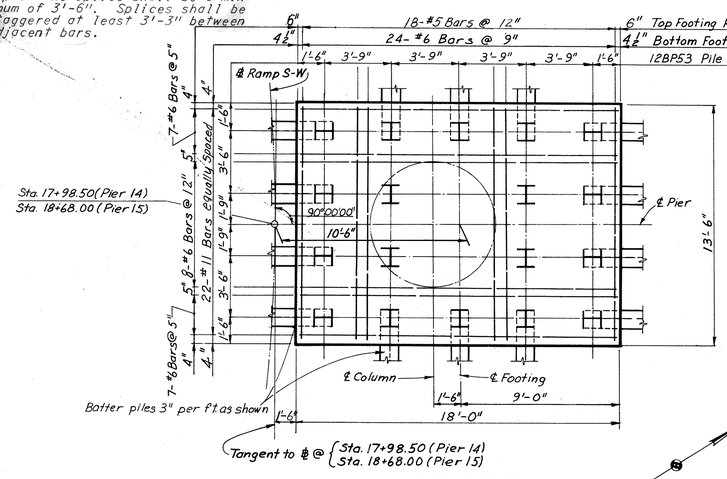
ELEVATION

Scale: ¼"=1'-0"

VIEW K-K

Scale: ¼"=1'-0"

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



FOOTING PLAN

Scale: ¼" = 1'-0"

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

Note:
For layout of Piers 14 and 15 See Sheet 3.

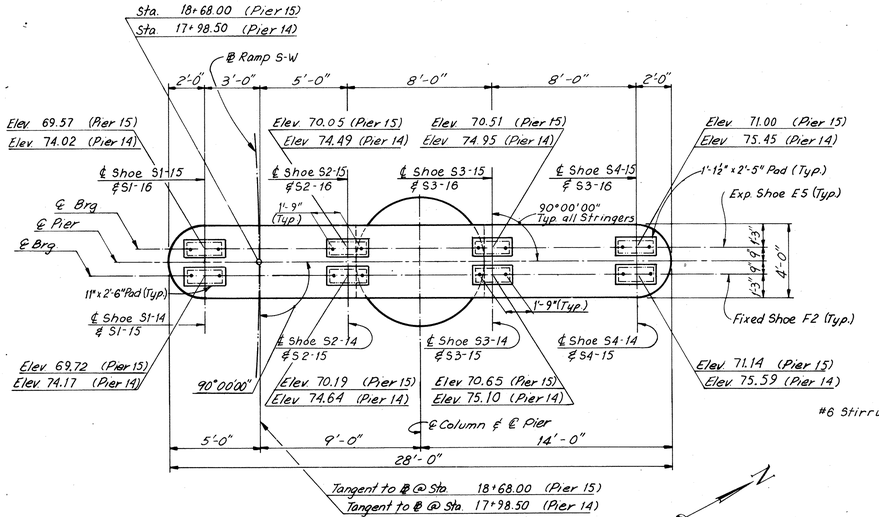
FOOTINGS FOR PIERS 14 AND 15 ARE ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
Dimensions given in Footing Plan are measured at bottom of Footing.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

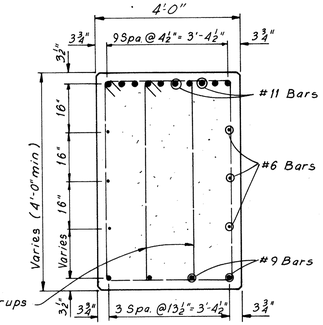
	BY	DATE
MADE	CEB/JD	12-19-68
CHECKED	RC	1.20.69
IN CHARGE		

NO.	REVISION	BY	DATE



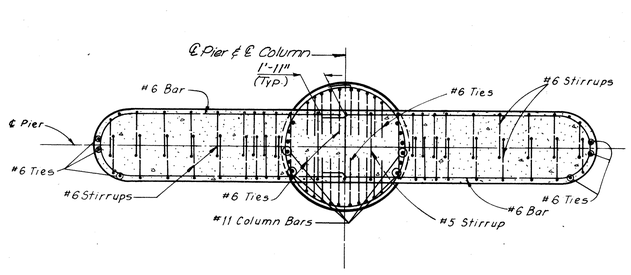
PLAN

Scale: ¼"=1'-0"



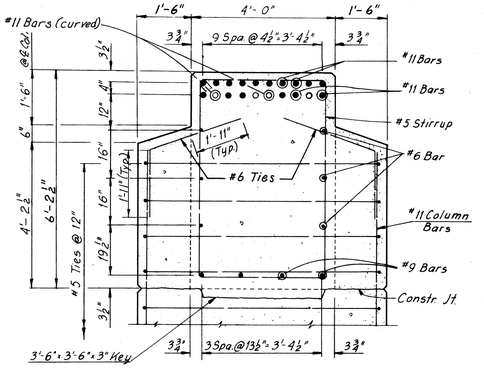
SECTION E-E

Scale: ½"=1'-0"



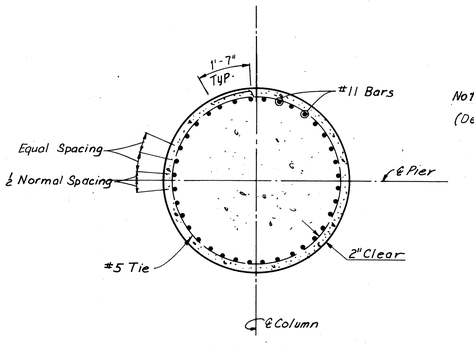
SECTION D-D

Scale: ¼"= 1'-0"



SECTION C-C

Scale: ½" = 1'-0"



SECTION A-A

Scale: ½" =1'-0"

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter piles 3" per ft. as shown.
For Shoe Details see Sheet S1 & S2.

For Steel Pile Details see Sheet 9.
For Framing Plans see Sheet 22.
Estimated Pile Tip elevations -20.0.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

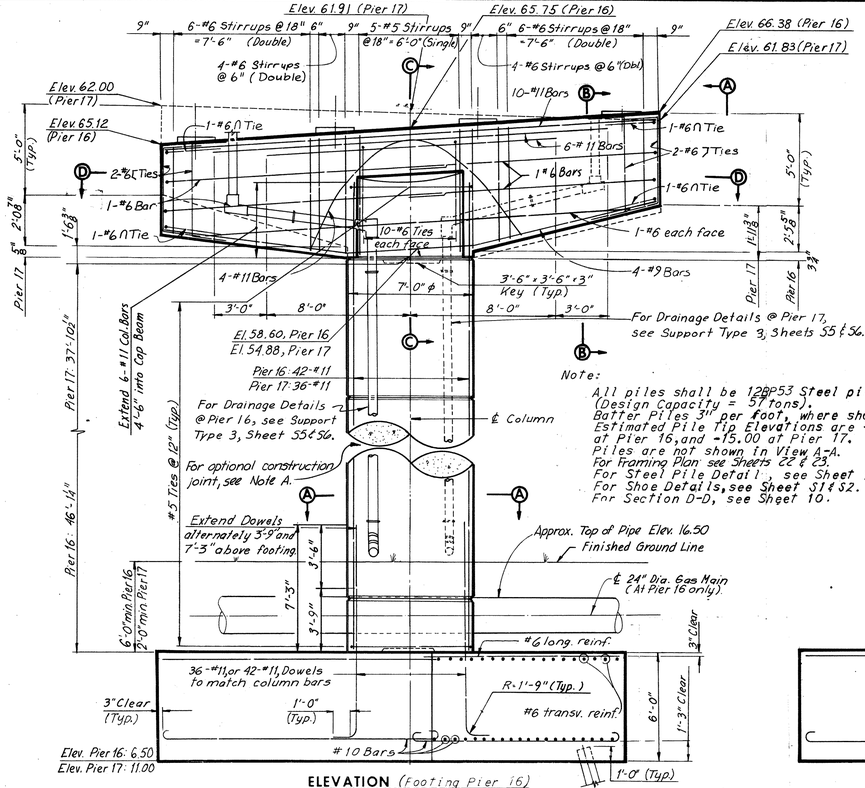
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 14 AND 15

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 13 OF 38

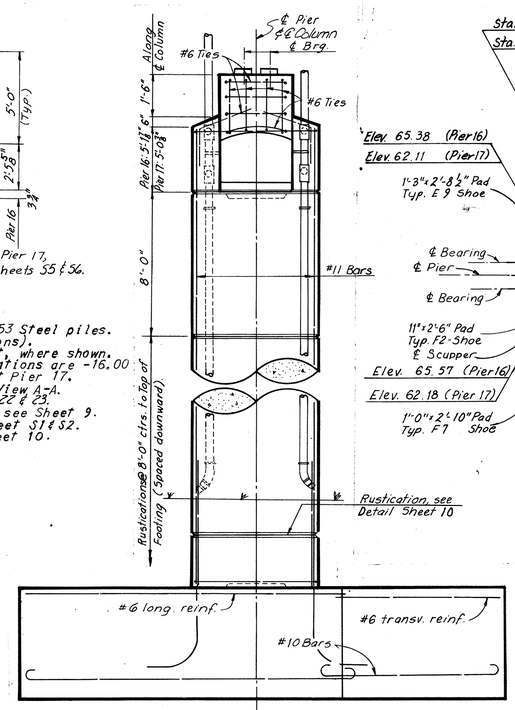
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	39	97

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



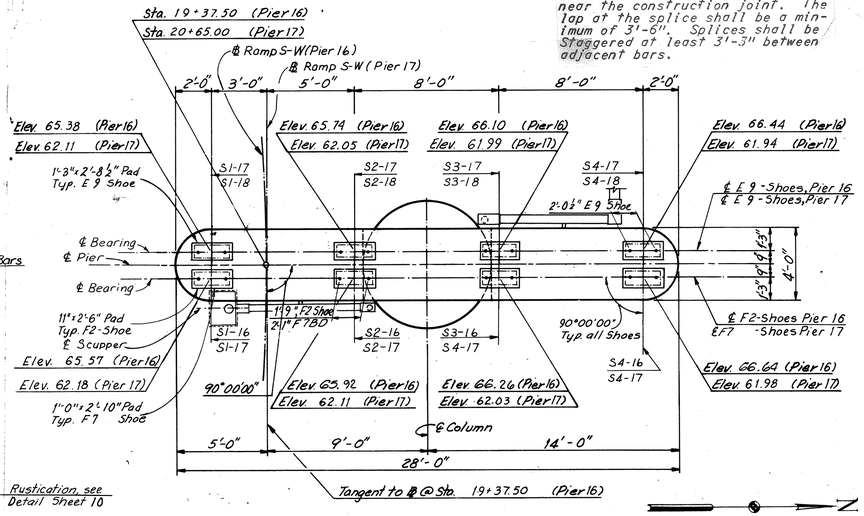
ELEVATION (Footing Pier 16)

Note:
All piles shall be 12BP53 Steel piles. (Design Capacity = 57 tons). Batter Piles 3" per Foot, where shown. Estimated Pile Tip Elevations are -16.00 at Pier 16, and -15.00 at Pier 17. Piles are not shown in View A-A. For Framing Plan see Sheets 22 & 23. For Steel Pile Detail, see Sheet 9. For Shoe Details, see Sheet 51 & 52. For Section D-D, see Sheet 10.

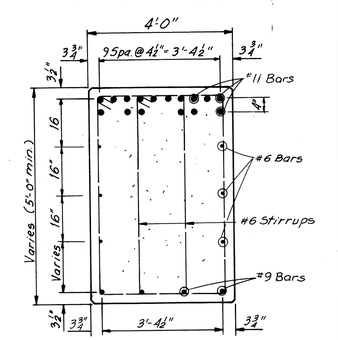


VIEW A-A
Scale: 1/4" = 1'-0"

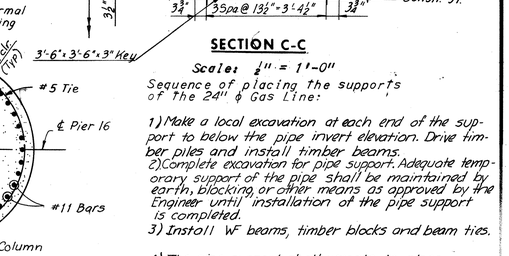
Note:
Piles to be battered 3:12 Pier 17 Footing.



PLAN
Scale 1/4"=1'-0"



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

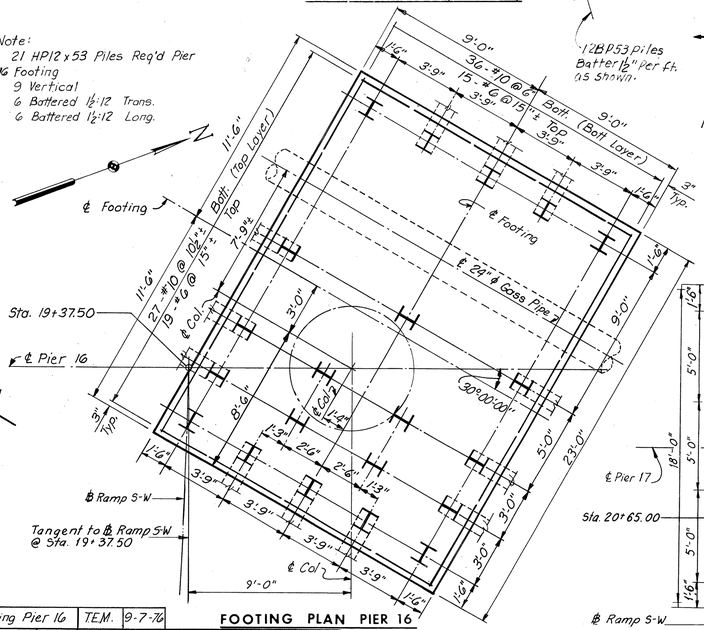


SECTION C-C
Scale: 1" = 1'-0"

Sequence of placing the supports of the 24" ϕ Gas Line:

1) Make a local excavation at each end of the support to below the pipe invert elevation. Drive timber piles and install timber beams.
2) Complete excavation for pipe support. Adequate temporary support of the pipe shall be maintained by earth, blocking or other means as approved by the Engineer until installation of the pipe support is completed.
3) Install W beams, timber blocks and beam ties.
4) The pipe support shall remain in place.
5) Payment will be made at the Lump Sum Bid price for "Pipe Support at Pier 16".

Note:
21 HP12 x 53 Piles Req'd Pier 16 Footing
9 Vertical
6 Battered 1/2:12 Trans.
6 Battered 1/2:12 Long.

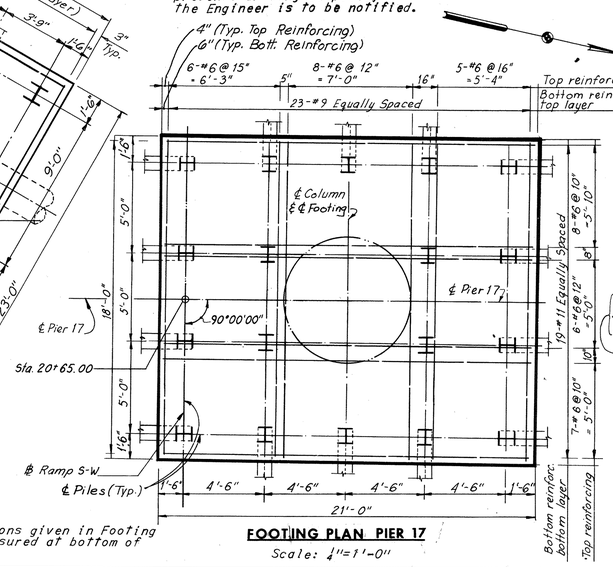


FOOTING PLAN PIER 16

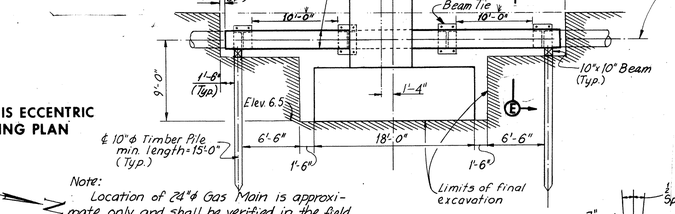
Note:
Dimensions given in Footing Plan are measured at bottom of footing.

FOOTING FOR PIER 16 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
If location of Gas Line prevents driving of piles, the Engineer is to be notified.

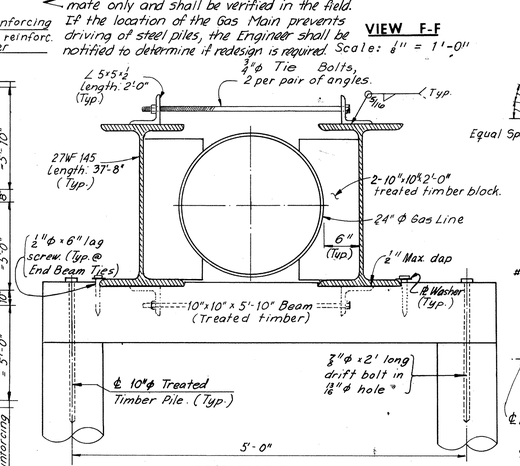


FOOTING PLAN PIER 17
Scale: 1/4"=1'-0"

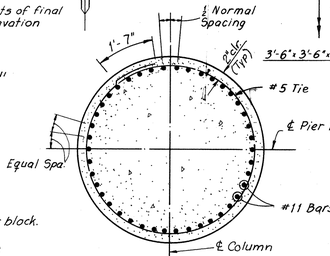


Note:
Location of 24" ϕ Gas Main is approximate only and shall be verified in the field. If the location of the Gas Main prevents driving of steel piles, the Engineer shall be notified to determine if redesign is required.

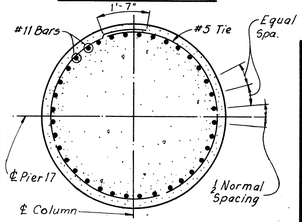
VIEW F-F
Scale: 1/8" = 1'-0"



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



SECTION A-A PIER 16



SECTION A-A PIER 17
Scale: 3/8" = 1'-0"

AS BUILT

⚠	Footing Pier 16	T.E.M.	9-7-76

	BY	DATE
MADE	C.E.B.	1-16-69
CHECKED	J.D.	1-23-69
IN CHARGE		

NO.	REVISION	BY	DATE
⚠	Pier Dim Pier 17	T.E.M.	8-26-76
⚠	Pad Elev. Pier 16	T.E.M.	5-76
⚠	Shoe Type revised	S.B.P.	9-25-75

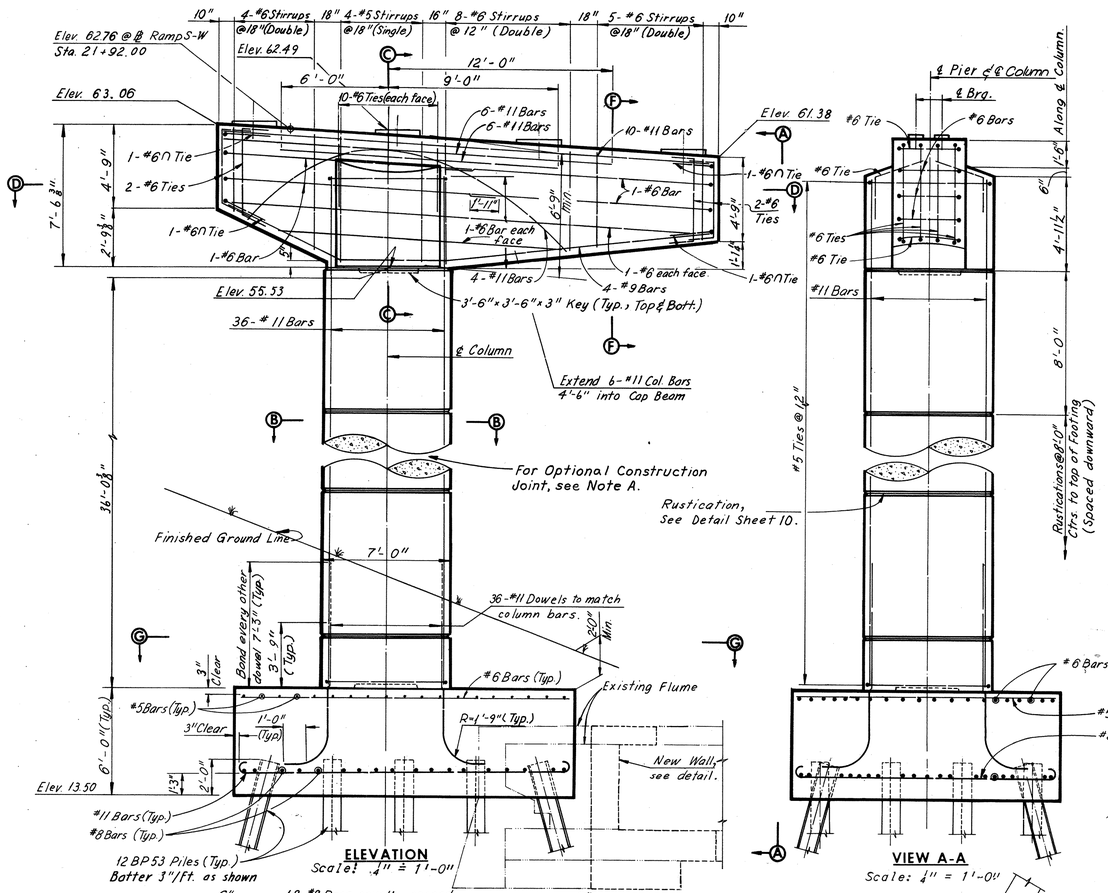
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 16 AND 17

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

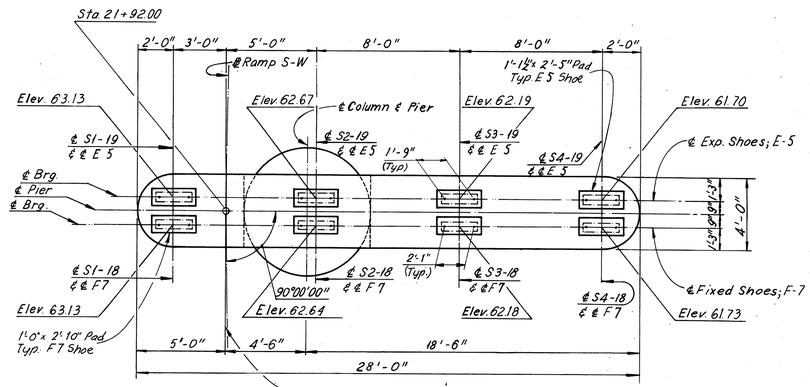
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 14 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	40	97



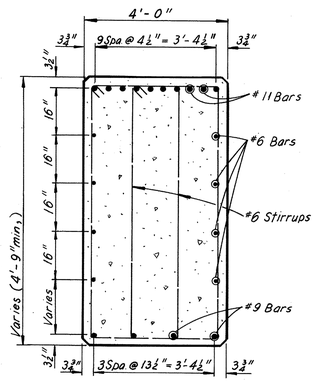
ELEVATION
Scale: 1/4" = 1'-0"

VIEW A-A
Scale: 1/4" = 1'-0"



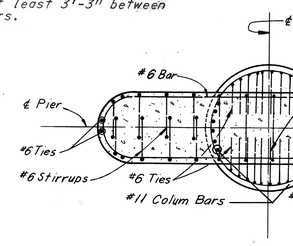
PLAN
Scale: 1/4" = 1'-0"

Note:
Pads with heights of 4" or less shall not be reinforced.

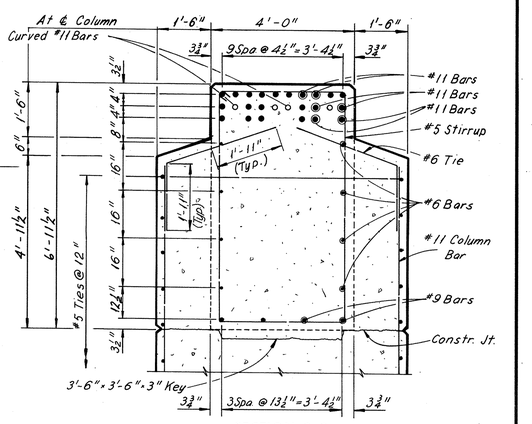


SECTION F-F
Scale: 1/2" = 1'-0"

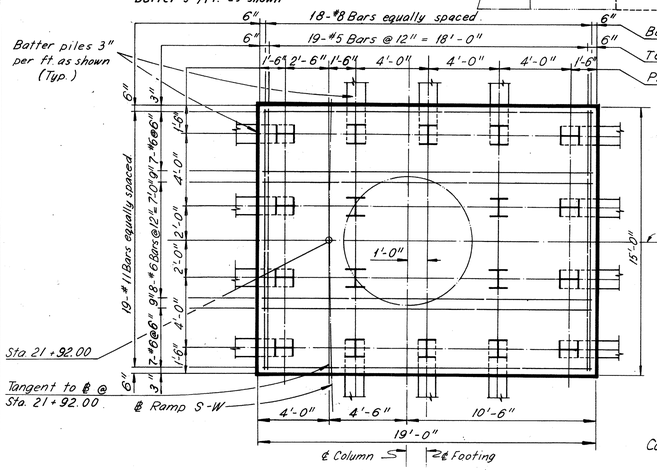
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



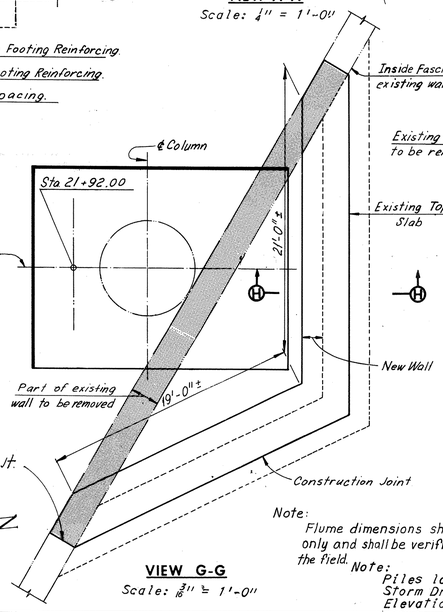
SECTION D-D
Scale: 1/4" = 1'-0"



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

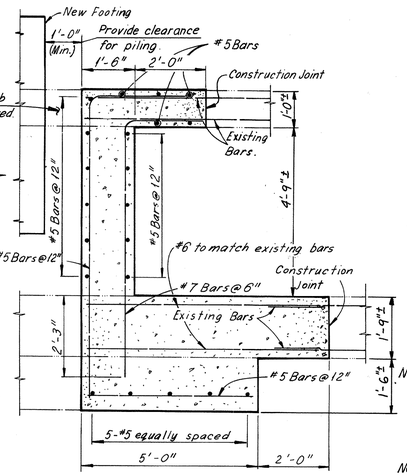


FOOTING PLAN
Scale: 1/4" = 1'-0"



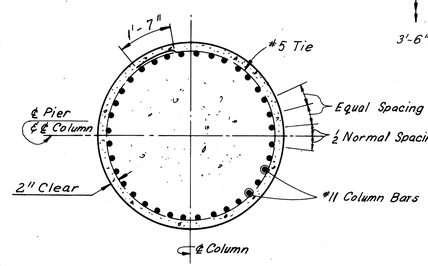
VIEW G-G
Scale: 3/16" = 1'-0"

Note:
Flume dimensions shown are approximate only and shall be verified by the Contractor in the field.



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

Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume shall be pre-bored to an Elevation 5 ft. below bottom of Flume.



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

Note:
All piles shall be 12BP53 Steel Piles (Design Capacity = 57 tons) Batter piles 3" per foot where shown.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical Shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required. Bottom elevation of Flume must be established by field inspection.

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

Notes:
For Steel Pile Details, see Sheet 9.
For Shoe Details, see Sheet S1 & S2.
Estimated Pile Tip elevation -14.0.

	BY	DATE
MADE	PTA	12-20-68
CHECKED	J.D.	1-15-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Rev. Footing Reinf.	TEM	9-8-75

FOOTING FOR PIER 18 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

AS BUILT

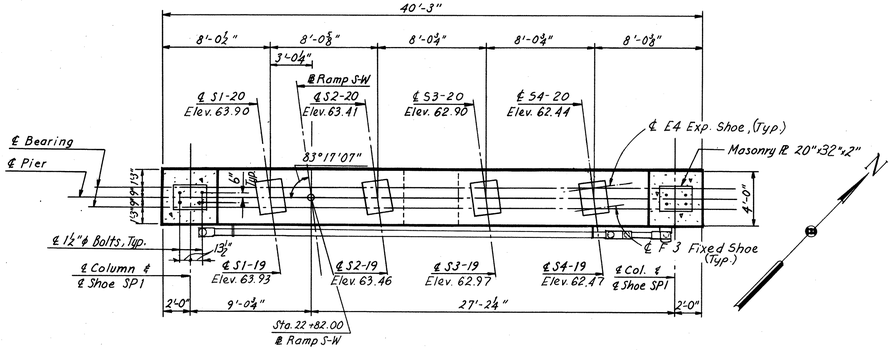
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 18

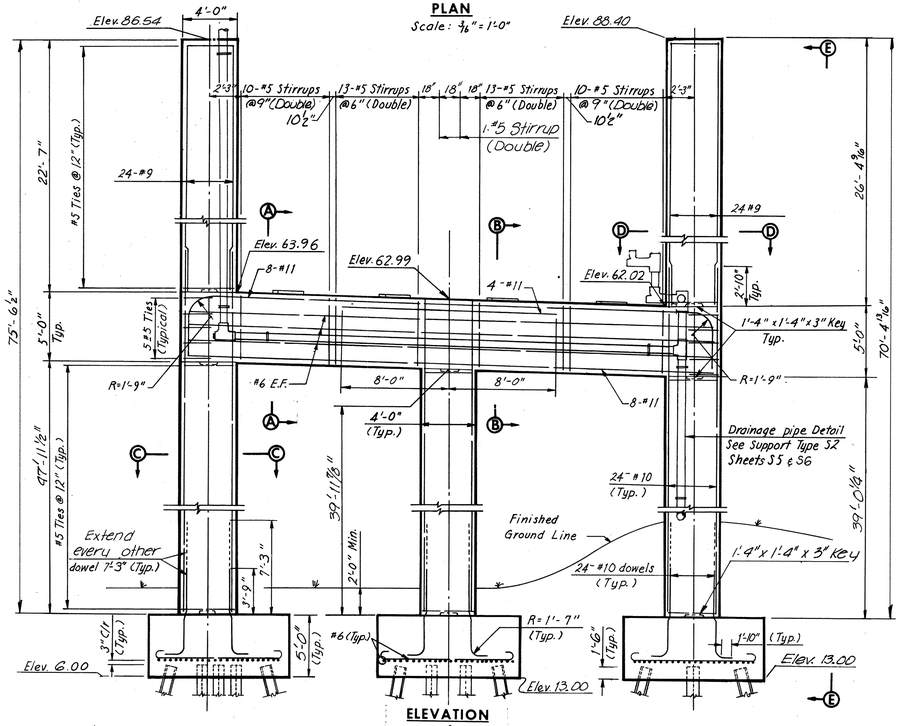
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 15 OF 38

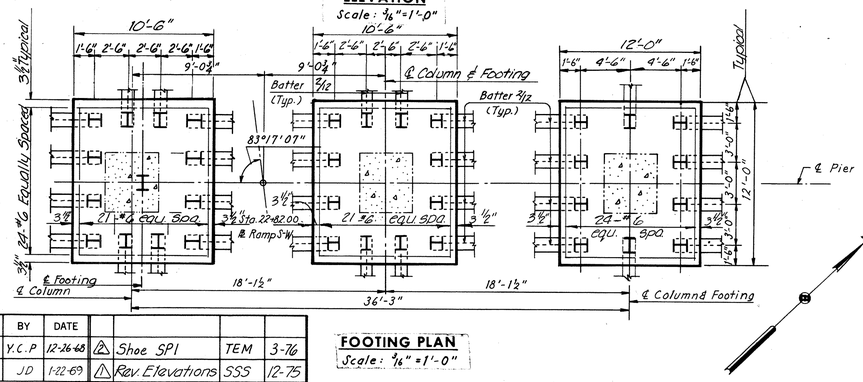
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11.	DOWNTOWN EXPRESSWAY	41	97



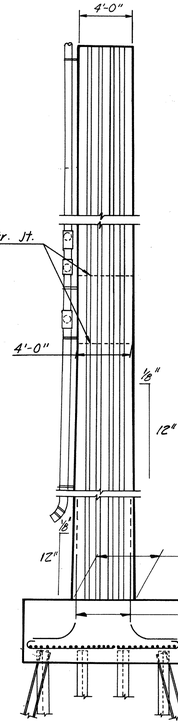
PLAN
Scale: 3/16" = 1'-0"



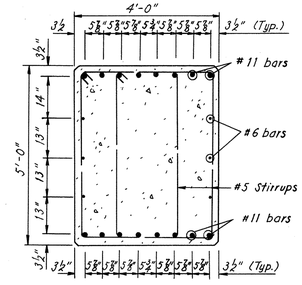
ELEVATION
Scale: 3/16" = 1'-0"



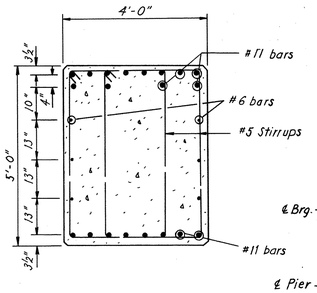
FOOTING PLAN
Scale: 3/16" = 1'-0"



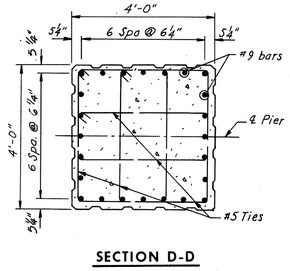
VIEW E-E
Scale: 3/16" = 1'-0"



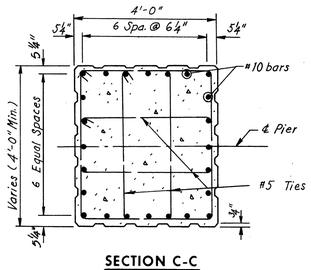
SECTION A-A
Scale: ½" = 1'-0"



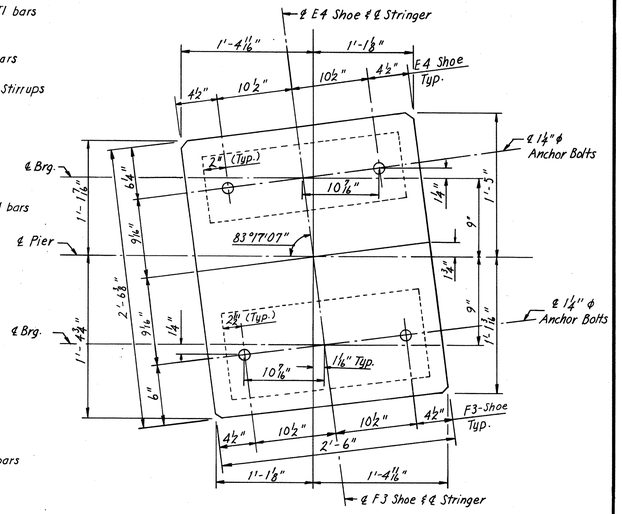
SECTION B-B
Scale: ½" = 1'-0"



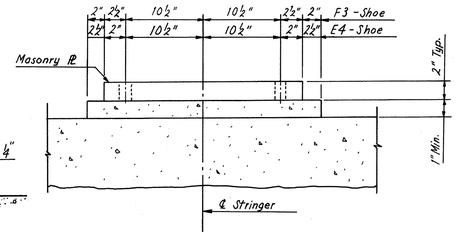
SECTION D-D
Scale: ½" = 1'-0"



SECTION C-C
No Scale

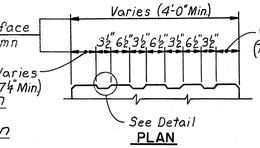


PAD AND ANCHOR BOLT SETTING PLAN
No Scale



PAD ELEVATION VIEW
No Scale

DETAIL



RUSTICATION DETAIL

Note:
Rustications on pier shaft shall extend a minimum of 2'-0" below the finished ground line except that when the top of footing is within 5'-0" of the finished ground line the rustications shall extend to the top of footing.

Notes:
For Shoe Details, see Sheet S1 and S2.
Batter Piles 2"/ft where shown.
For Steel Pile Details, See Sheet 9.
For Framing Plan see Sheet 24.
Estimated Pile Tip Elevation = -11.0
All piles shall be 12BP53 steel piles (Design capacity=57 tons)

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

Note
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	12-26-68	2	Shoe SP1	TEM	3-76
CHECKED	JD	1-22-69	1	Rev. Elevations	SSS	12-75
IN CHARGE						

AS BUILT

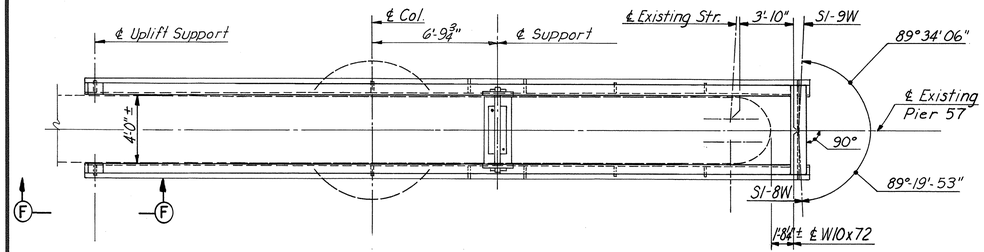
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 19

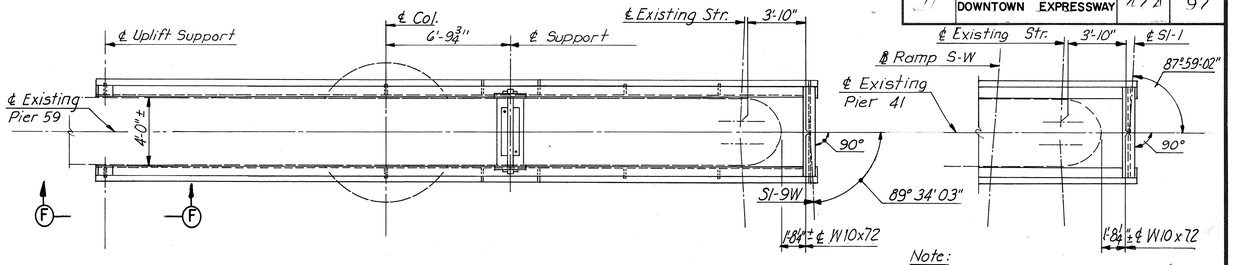
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 16 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
II	DOWNTOWN EXPRESSWAY	17A	97



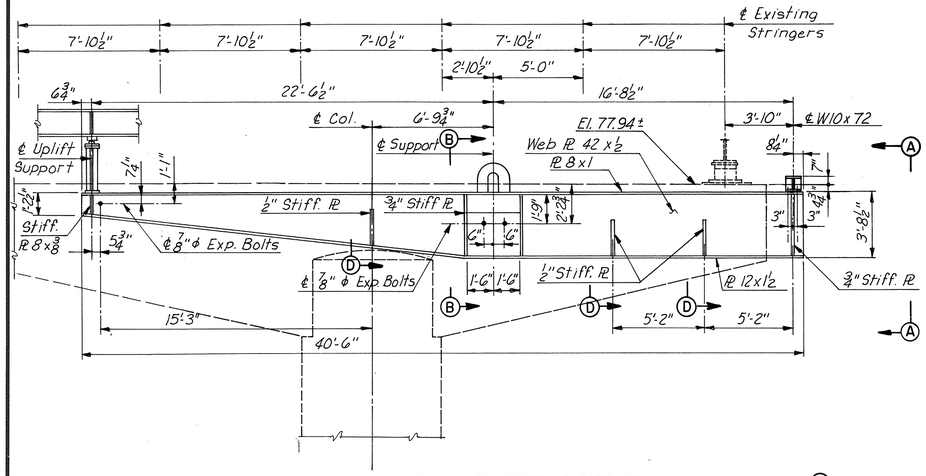
PLAN OF EXISTING PIER 57
Scale: ¼"=1'-0"



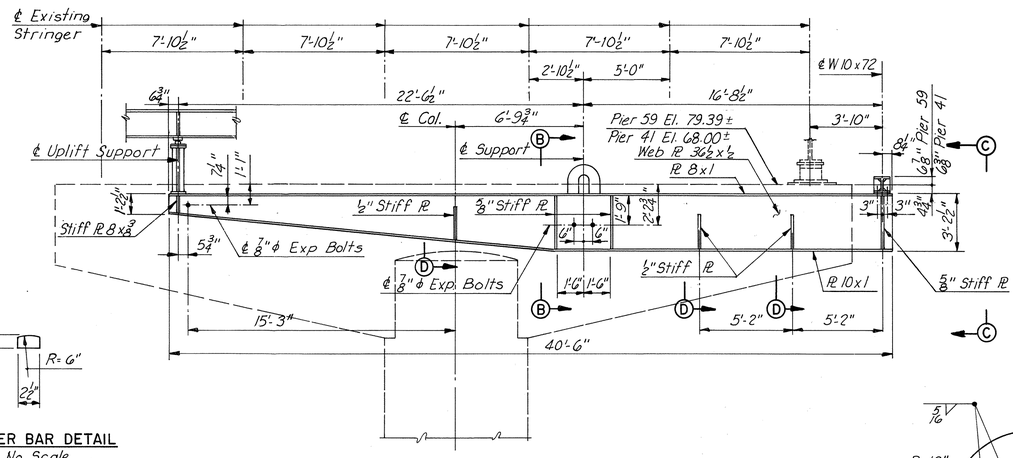
Note:
For dimensions not shown, see Plan of Pier 59.

PLAN OF EXISTING PIER 59
Scale: ¼"=1'-0"

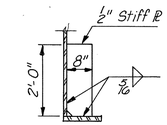
PARTIAL PLAN OF EXISTING PIER 41
Scale: ¼"=1'-0"



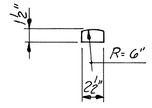
ELEVATION OF EXISTING PIER 57
Scale: ¼"=1'-0"



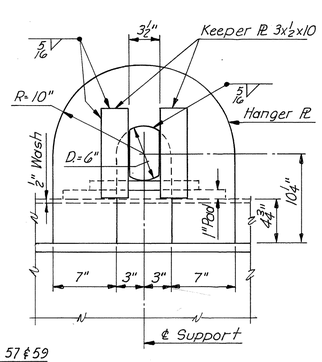
ELEVATION OF EXISTING PIERS 59 & 41
Scale: ¼"=1'-0"



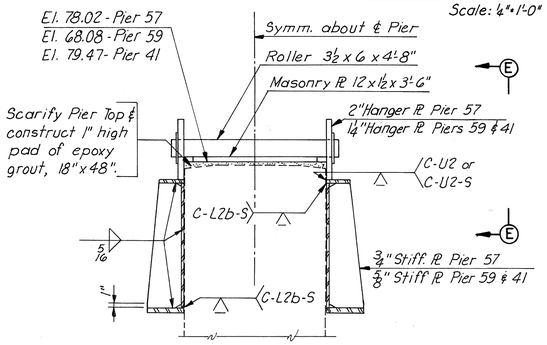
SECTION D
Scale ½"=1'-0"



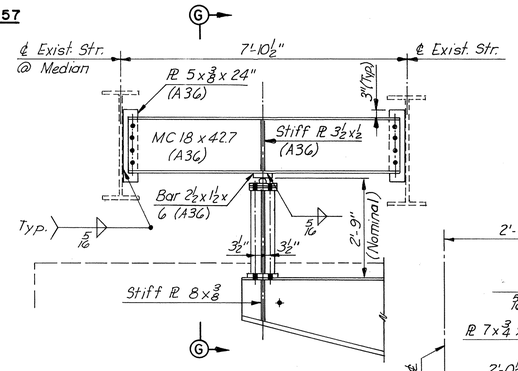
ROCKER BAR DETAIL
No Scale



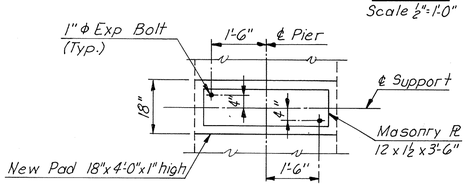
VIEW E-E
Scale ½"=1'-0"



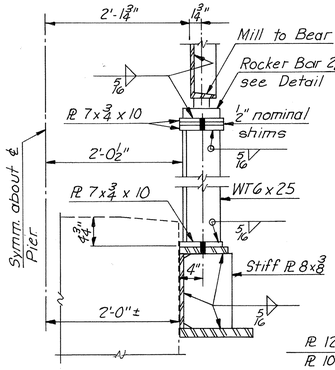
SECTION B-B
Scale ½"=1'-0"



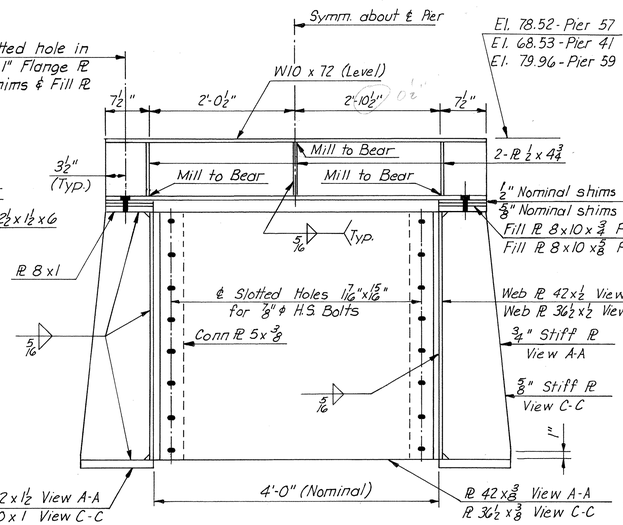
VIEW F-F
Scale ½"=1'-0"



PAD PLAN
Scale ½"=1'-0"



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



VIEW A-A & C-C
Scale 1"=1'-0"

AS BUILT

NOTE:
Structural steel shall be A588 except as noted.

DESIGNED			3	Entire Sheet	TEM	10-76
DRAWN	EJM/GBP	8-11-75	2	Elev. and Dim.	TEM	9-8-75
CHECKED	PRY	10-14-76	1	New Sheet added	L.B.P.	8-25-75
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE

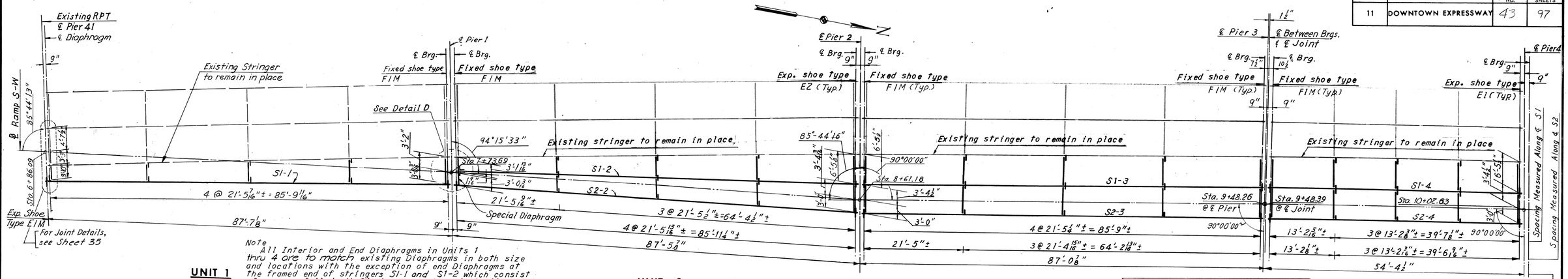
EXISTING PIERS 41, 57 & 59 MODIFICATIONS

SCALE As Noted
DATE
SHEET 17A OF 38

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

17A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	43	97

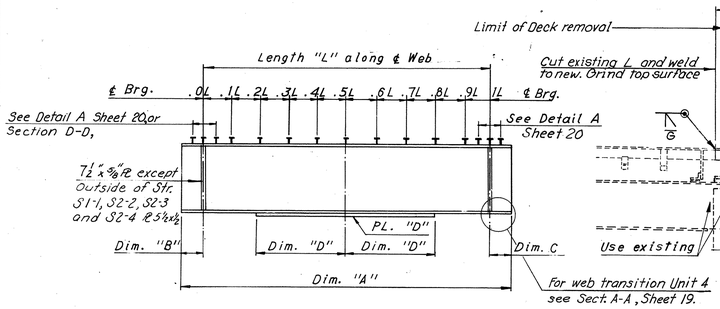


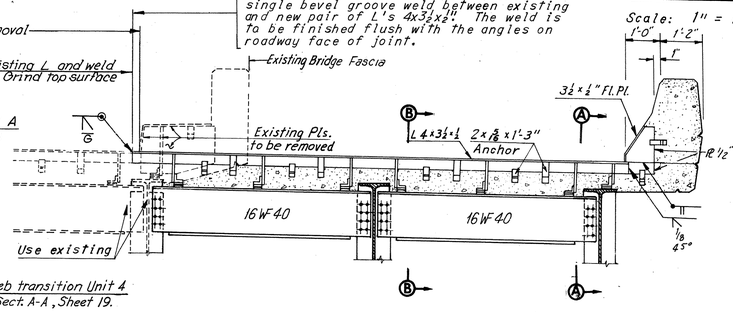
UNIT 1

Note
All Interior and End Diaphragms in Units 1 thru 4 are to match existing Diaphragms in both size and locations with the exception of end Diaphragms at the framed end of stringers S1-1 and S1-2 which consist of full depth Diaphragms as shown in Sections C-C, D-D and Detail D, and Section G-G.

UNIT 2

Curb portion of existing expansion joints is to be removed beyond the curbline an amount sufficient for performance of single bevel groove weld between existing and new pair of L's 4x3½x½" The weld is to be finished flush with the angles on roadway face of joint.

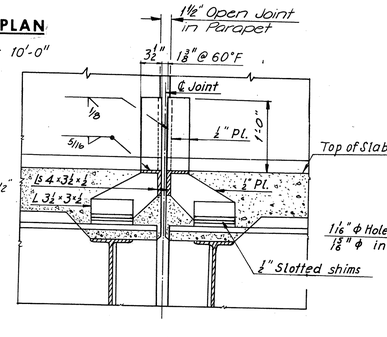




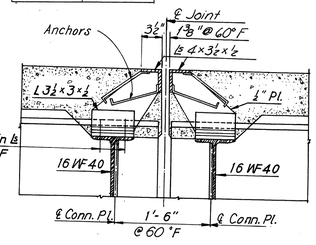
FRAMING PLAN

Scale: 1" = 10'-0"

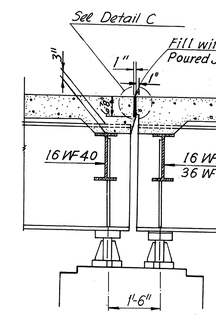
UNIT 3



SHOE SCHEDULE			
EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQRD.	TYPE	NO. REQRD.
E1	2	F1M	8
E2	2		
E1M	1		



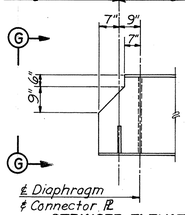
UNIT 4



Spacing Measured Along ℄ Ramp S-W

STRINGER ELEVATION UNITS 2,3&4

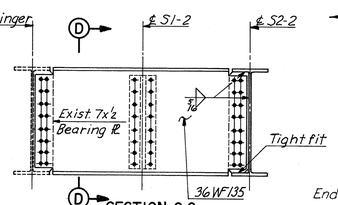
No Scale



Note:
for details not shown see Stringer Elevation Unit 2,3 & 4. For Section G-G, see Sheet 32.

STRINGER ELEVATION UNIT 1

No Scale

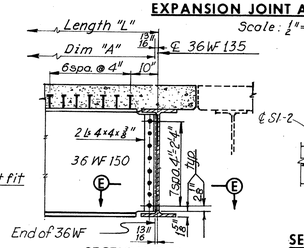


SECTION C-C

Scale: ½" = 1'-0"

EXPANSION JOINT AT PIERS 2 AND 4

Scale: ½" = 1'-0"



SECTION D-D

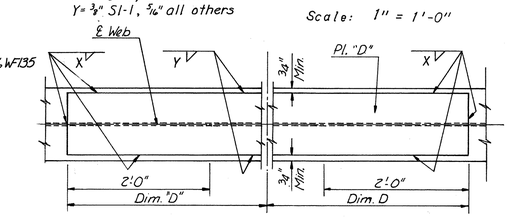
No Scale

SECTION E-E

No Scale

SECTION A-A

Scale: 1" = 1'-0"

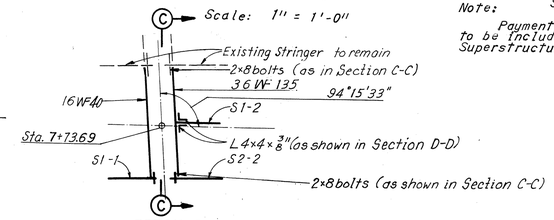


COVER PLATE DETAIL

No Scale

SECTION B-B

Scale: 1" = 1'-0"



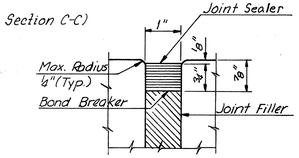
DETAIL D

No Scale

FIXED JOINT AT PIERS 1 AND 3

Scale: ½" = 1'-0"

Note:
Payment for Hot Poured Joint Sealer to be included in Unit Price bid for Superstructure Concrete.



DETAIL C

No Scale

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	DIM "A"	LENGTH "L"	DIM "B"	DIM "C"	DIM "D"	PL. "D"	MAX SHEAR STUD SPACING ** 0.0L-0.1L *	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L *
1	S1-1	36WF182	87'-8 11/16"	86'-6 11/16"	——	7"	29'-9"	10½"x1⅝"	18"	19"	24"	24"	24"	24"	24"	24"	19"	18"
2	S1-2	36WF150	‡86'-3 11/16"	‡85'-9½"	——	7"	32'-6"	10½"x¾"	18"	20½"	24"	24"	24"	22"	20"	17"	13⅛"	12"
	S2-2	36WF194	87'-2⅝"	85'-11¼"	7½"	8"	42'-0"	10½"x1⅛"	15½"	18"	22"	22"	22"	22"	19½"	16"	13½"	11½"
3	S1-3	36WF194	86'-11"	85'-9"	7"	7"	32'-0"	10½"x1⅛"	12"	13½"	17½"	20½"	22"	22"	17½"	17½"	13½"	12"
	S2-3	36WF194	86'-11⅞"	85'-7⅞"	8"	7½"	42'-0"	10½x⅝"	10½"	12"	14½"	17½"	20"	20"	17½"	14½"	12"	10½"
4	S1-4	36WF150	53'-11⅞"	52'-9⅞"	7"	7"	——	——	12½"	14"	16"	18½"	22½"	22½"	18½"	16"	14"	12½"
	S2-4	36WF150	54'-0⅛"	52'-8 11/16"	7½"	8"	——	——	11"	12½"	14½"	17"	21½"	21½"	17"	14½"	12½"	11"

DEAD LOAD DEFLECTION SCHEDULE		
¼L	½L	¾L
1 3/8	1 15/16	1 7/16
1 5/8	2 1/4	1 3/8
1 3/16	1 11/16	1 1/4
1 3/8	1 11/16	1 3/8
1 3/8	2	1 3/8
1 3/8	2	1 3/8
2 1/16	2 15/16	2 1/16
5/16	1/2	5/16
7/16	9/16	7/16
7/16	5/8	7/16

CAMBER SCHEDULE		
¼L	½L	¾L
2 1/8	3 1/16	2 3/16
1 11/16	2 7/16	1 3/4
2	2 7/8	2 1/16
2 1/16	2 15/16	2 1/16
7/16	9/16	7/16
7/16	5/8	7/16

** Use 2-7/8" ø Shear Stud all Stringers this sheet.

* Spacing begins at termination of 7 spaces @ 4" as shown in Detail A Sheet 20. This Detail is typical for all stringer ends except framed ends of stringers S1-1 and S1-2 which are shown in Section D-D.

Note
For Dead Load Deflection Diagram and Detail A, see Sheet 20.

Notes:
All structural steel shall be A36 unless denoted otherwise.
For Superstructure Steel Quantities see Sheet 4.
For Shoe Details see Sheets S1 and S2.
For additional Diaphragm Details see Sheet 25.
For Shear Stud Details see Sheet 20.
All transverse dimensions shown on Joint Details are normal to ℄ Joint.
All structural steel for expansion Joints shall be of A588 steel.

	BY	DATE
MADE	KCT JLK	11-8-68 6-26-75
CHECKED	PTA	01-20-89
IN CHARGE		

NO.	REVISION	BY	DATE
4	Camber S2-2	TEM.	8-76
4	Shear Stud spa.	TEM.	C-7-76
3	R D & Shoe Type	TEM	3-76
2	Str. Size in Section D-D	TEM	3-76
1	Framing Unit I, Str. Elev. Unit I	TEM	8-2575
1	Section C-C shoe E1M		

Note
Dimensions shown on the plans for existing structural metal work are in accordance with drawings prepared for the original construction.
The Contractor shall verify all necessary dimensions of existing structural metal work prior to preparing shop drawings for new metalwork.

‡.....Length "L" is measured from ℄ Diaphragm to ℄ Brg and dimension "A" is out to out of Stringer.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

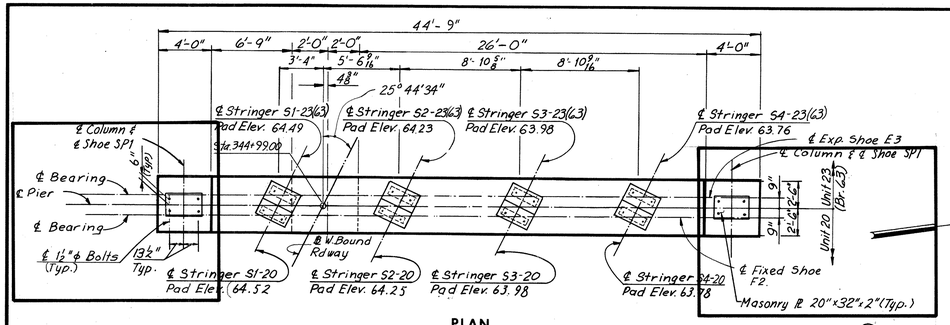
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 1, 2, 3 AND 4

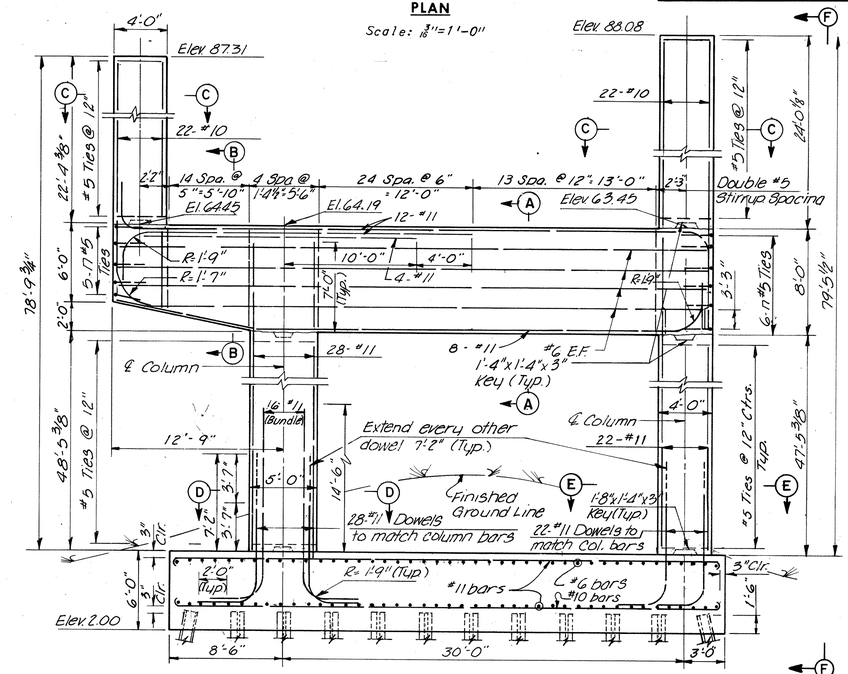
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 18 OF 38

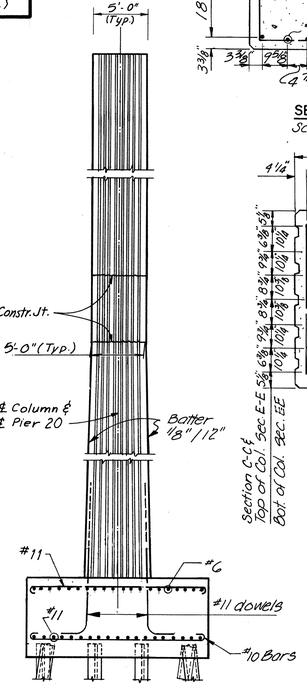
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	42	97



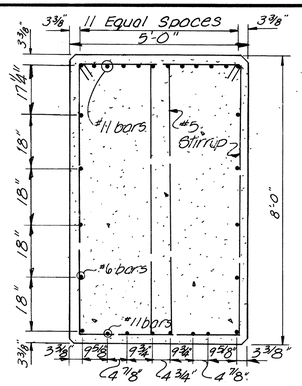
PLAN
Scale: 3/16"=1'-0"



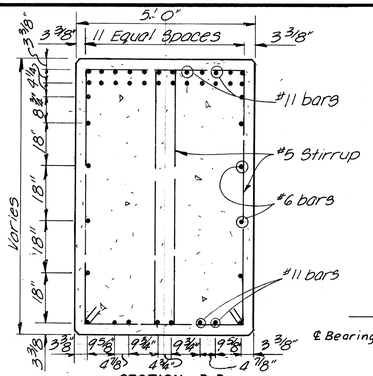
ELEVATION
Scale: 3/16"=1'-0"



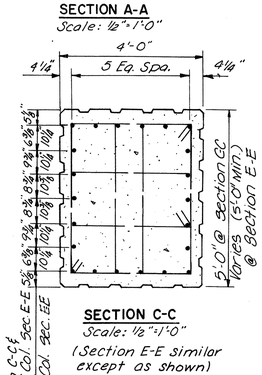
VIEW F-F
No Scale



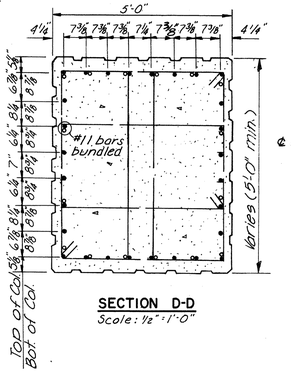
SECTION A-A
Scale: 1/2"=1'-0"



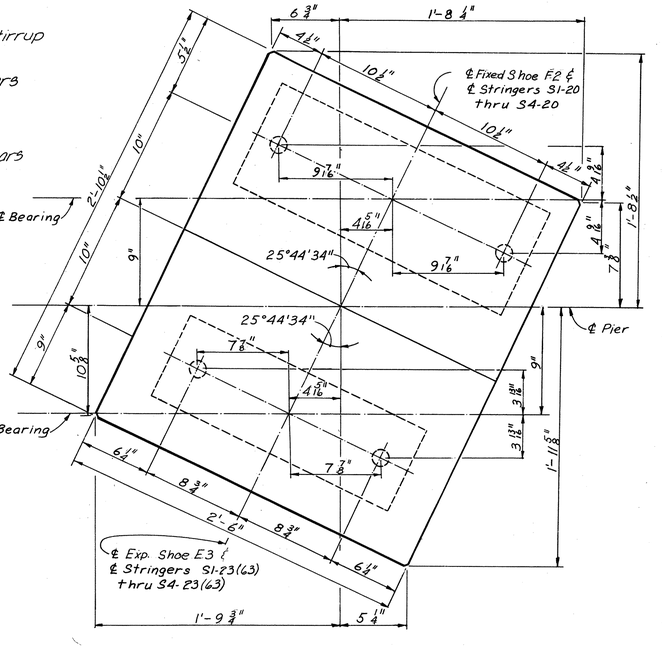
SECTION B-B
Scale: 1/2"=1'-0"



SECTION C-C
Scale: 1/2"=1'-0"
(Section E-E similar except as shown)



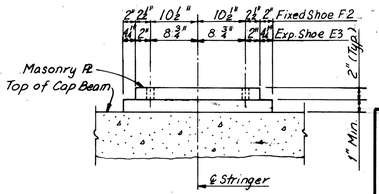
SECTION D-D
Scale: 1/2"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

Note:
Anchor Bolts and Setting Template for the shoes at Unit 23(63) shall be furnished by others for setting in the pier cap by the Contractor.

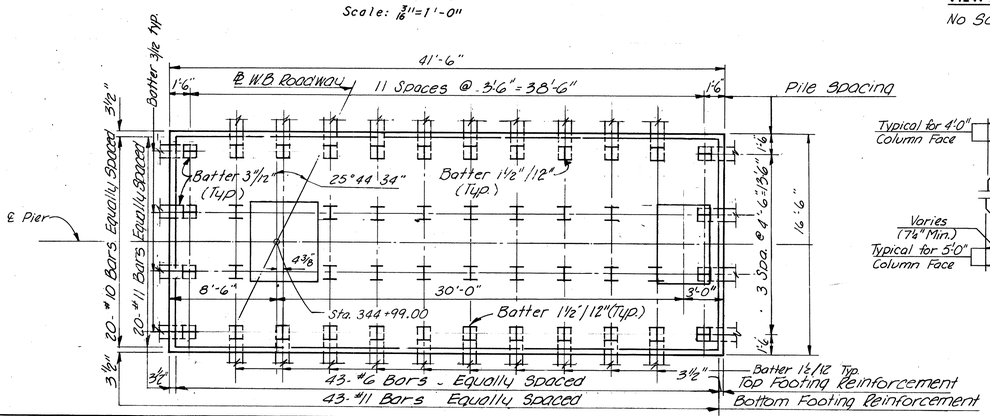
NOTE:
Pier 20 was constructed as part of Contract 10 with the Exception of the anchor bolts for the upper steel capbeam (SP1 Shoes). These shall be supplied and drilled in place as part of Contract 11.



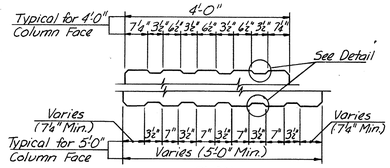
PAD ELEVATION VIEW
No Scale.

Note:
All piles shall be 12BP53 Steel Piles (Design Capacity = 57 tons).
Batter all transverse piles 3" per foot where shown.
Batter all longitudinal piles 1 1/2" per foot where shown.
For Standard Shoe details, see Sheet S1 & S2.
For Framing Plan, see Sheet 24.
Estimated Pile Tip Elevation -11.0.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2ft. redesign will be required.



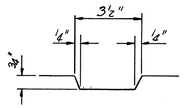
FOOTING PLAN
Scale: 3/16"=1'-0"



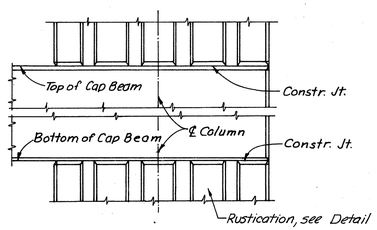
PLAN

RUSTICATION DETAIL
No Scale

Note:
Rustications on pier shafts shall extend a minimum of 2'-0" below the finished ground line except that when the top of footing is within 5'-0" of the finished ground line the rustications shall extend to the top of footing.



DETAIL



DETAIL K
No Scale

	BY	DATE
MADE	J.D.	12-13-68
CHECKED	C.E.B.	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Shoe SP1	T.E.M.	3-76
2	Right Col. Elev.	T.E.M.	3-76
1	Rev. Elevations	SSS	12-75

AS BUILT

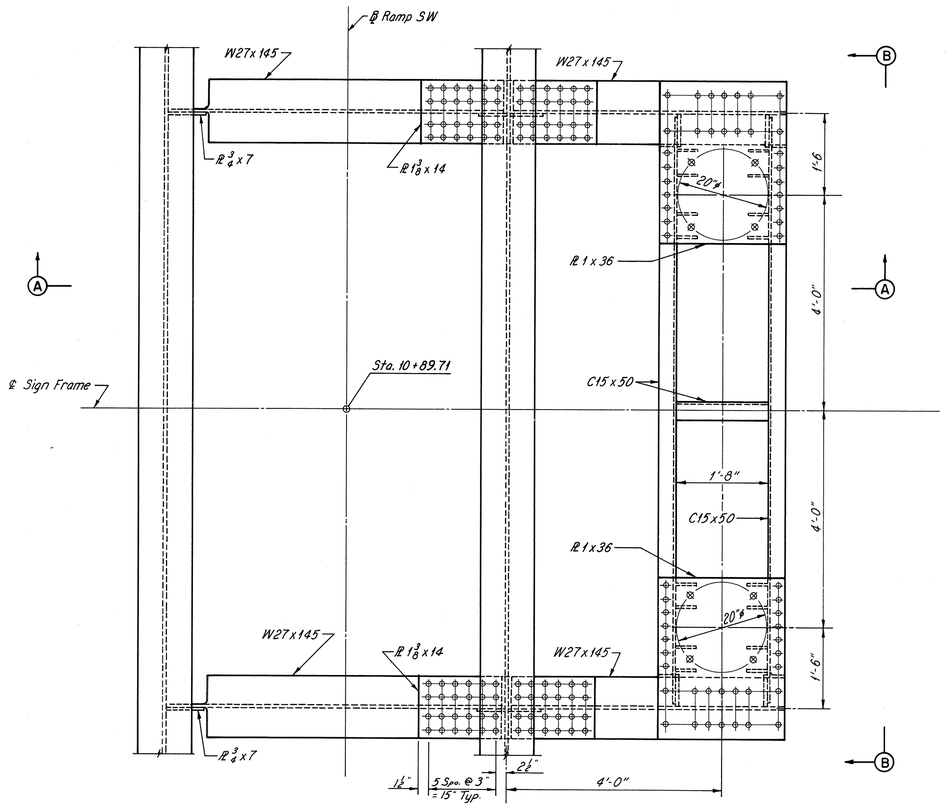
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 20

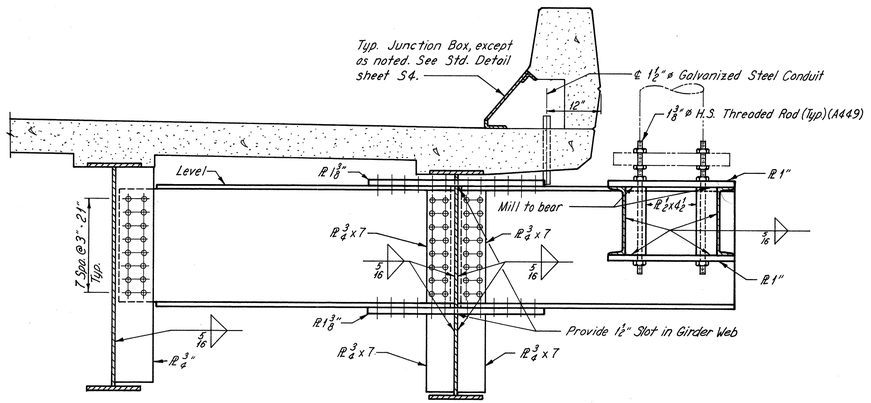
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 17 OF 38

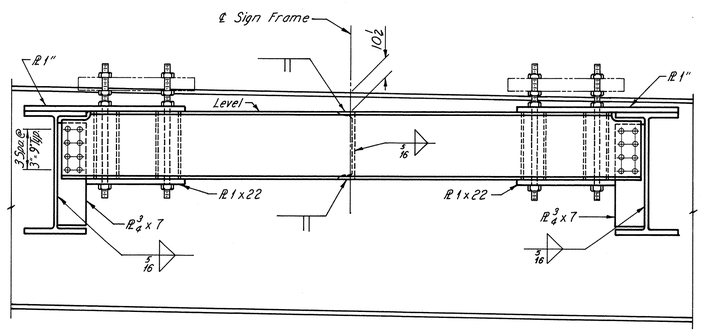
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	44A	97



PLAN



SECTION A-A



VIEW B-B

Notes:
1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be 7/8" ø H.S. unless noted otherwise.

	BY	DATE				
MADE	JLK	7-23-75				
CHECKED	DWB	7-23-75	1	Dim ℄ Sign Frame to ℄ Level Channel	TEM.	4-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

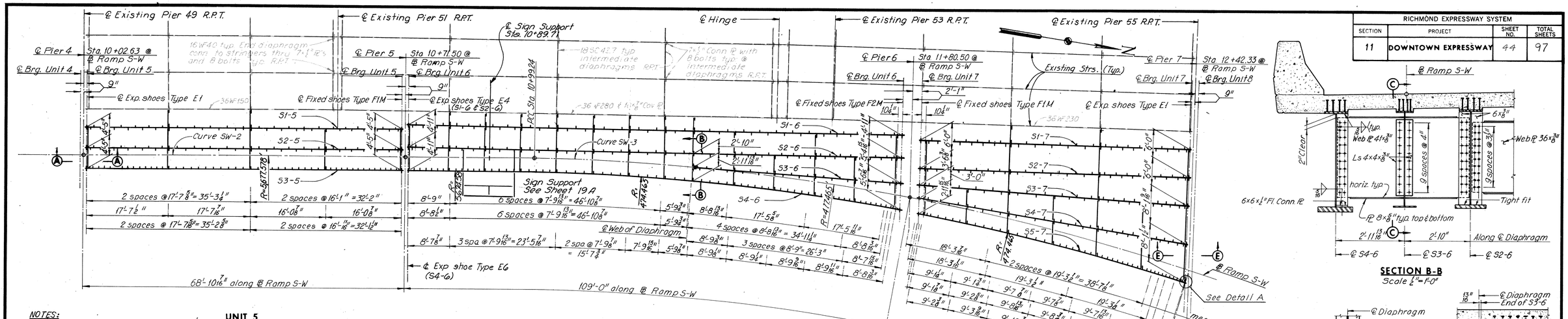
BRIDGE NO. 65
RAMP W-S CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
SIGN SUPPORT BRACKET DETAILS UNIT 6

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

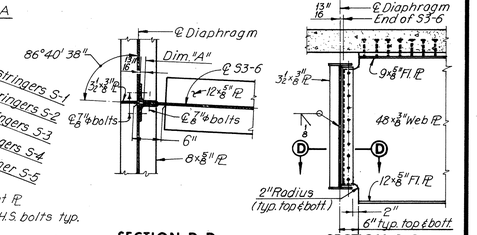
SCALE: As Shown
CONTRACT NO.: 11
SHEET NO. 19A OF 38

44A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	44	97

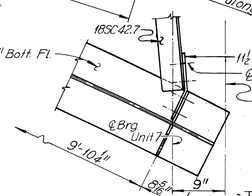


SECTION B-B
Scale ½"=1'-0"

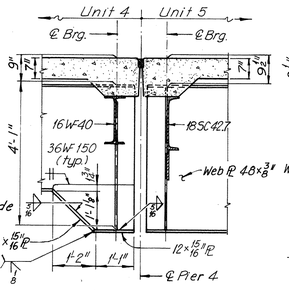


SECTION D-D
DETAILS OF FRAMED END STRINGER S3-6
Scale ½"=1'-0"

SECTION C-C



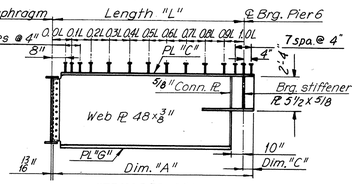
DETAIL A
Scale 1"=1'-0"



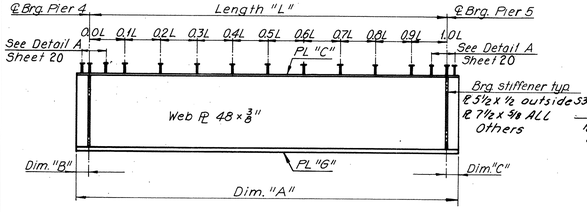
SECTION A-A

SECTION E-E

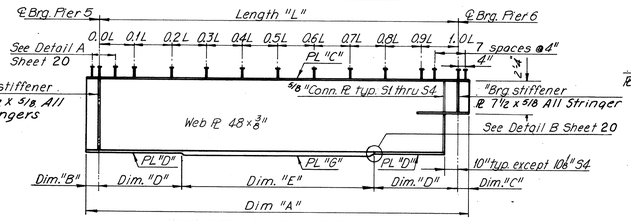
FRAMING PLAN
Scale 1"=10'-0"



STRINGER S3

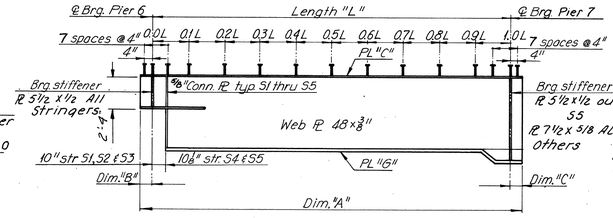


STRINGER ELEVATION UNIT 5



STRINGERS S1, S2 AND S4

STRINGER ELEVATIONS UNIT 6



STRINGER ELEVATION UNIT 7

Note: Web transition @ Pier 7 is shown for stringers S1-7 through S5-7.

DETAILS OF WEB TRANSITION AT PIERS 4 AND 7
Scale ½"=1'-0"

SHOE SCHEDULE

FIXED SHOES		EXPANSION SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
F1M	8	E1	8
F2M	4	E4	2
		E6	1

STRINGER SCHEDULE

UNIT	STRINGER	DIM. "A"	LENGTH "L"	DIM. "B"	DIM. "C"	DIM. "D"	DIM. "E"	PL. "C"	PL. "D"	PL. "G"	MAX. SHEAR STUD SPACING ** 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L*
5	S1-5	68'-7 1/4"	67'-5 1/4"	7"	7"	--	--	9 x ⅝"	--	12"x⅜"	18"	20"	23"	24"	24"	24"	24"	23"	20"	18"
	S2-5	68'-6 11/16"	67'-4 11/16"	7"	7"	--	--	9"x⅝"	--	12"x⅜"	18"	20"	23"	24"	24"	24"	24"	23"	20"	18"
	S3-5	68'-8 1/4"	67'-4 1/4"	8"	8"	--	--	9"x⅝"	--	12"x⅞"	15"	17"	20"	24"	24"	24"	24"	24"	20"	17"
6	S1-6	107'-1 1/2"	106'-0"	7"	6½"	16'-0"	74'-0"	16"x1"	16"x1"	16"x1 1/16"	18"	20"	24"	24"	24"	24"	24"	24"	20"	18"
	S2-6	107'-0 3/8"	105'-10 13/16"	7"	6½"	12'-11 3/16"	80'-0"	16"x1"	16"x1"	16"x1 1/16"	17"	20"	24"	24"	24"	24"	21"	18"	14"	13"
	S3-6	45'-0 1/4" ‡	44'-6 3/16" ‡	--	6½"	--	--	9"x⅝"	--	12"x⅝"	17" ‡‡	17"	17"	17"	17"	17"	17"	17"	17"	17"
	S4-6	107'-3 5/16"	106'-1 1/16"	8"	6 9/16"	16'-0"	74'-1 1/16"	16"x⅛"	18"x1½"	18"x2 1/16"	15"	17"	21"	24"	24"	24"	24"	19"	15"	13"
7	S1-7	58'-10 1/4"	57'-8 3/16"	6½"	7"	--	--	9"x⅝"	--	12"x⅝"	15"	17"	19"	22"	24"	24"	22"	19"	17"	15"
	S2-7	58'-9½"	57'-8"	6½"	7"	--	--	9"x⅝"	--	12"x⅝"	15"	17"	19"	22"	24"	24"	22"	19"	17"	15"
	S3-7	58'-9½"	57'-8"	6½"	7"	--	--	9"x⅝"	--	12"x¾"	18"	18"	24"	24"	24"	24"	22"	17"	16"	14"	12"
	S4-7	59'-2 1/4"	58'-0 5/8"	6 9/16"	7 1/16"	--	--	9"x⅝"	--	12"x⅜"	18"	18"	24"	24"	24"	24"	22"	17"	16"	14"	12"
	S5-7	60'-2"	58'-11 1/8"	6 9/16"	8 5/16"	--	--	9"x⅝"	--	12"x1"	16"	16"	22"	22"	22"	22"	22"	18"	15"	13"	11"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
3/8"	9/16"	3/8"
½"	11/16"	½"
5/8"	⅞"	5/8"
1 1/8"	1 11/16"	1¼"
1 7/16"	2 1/16"	1½"
1/16"	⅛"	1/16"
2"	2 15/16"	2"
1/4"	3/8"	1/4"
1/4"	3/8"	1/4"
1/4"	3/8"	1/4"
5/16"	7/16"	5/16"
3/8"	½"	3/8"

CAMBER SCHEDULE

¼L	½L	¾L
11/16"	1"	3/4"
13/16"	1⅛"	⅞"
15/16"	1 5/16"	1"
1 15/16"	2 3/8"	1 7/16"
1 15/16"	2 3/8"	2"
1/8"	1/8"	1/8"
1/16"	1/8"	1/16"
2"	2 7/16"	2"
1/4"	3/8"	1/4"
1/4"	3/8"	1/4"
1/4"	3/8"	1/4"
5/16"	7/16"	5/16"
3/8"	½"	3/8"

Notes:
For Superstructure Steel Quantities see Sheet 4.
For additional Diaphragm Details see Sheet 26.
For Deck Plan see Sheet 26.
For Dead Load Deflection and Camber Diagram see Sheet 20
For Joint Details see Sheets 34 and 35.
For Detail "A" see Sheet 20
For Standard Shoe Details see Sheets S1 and S2.
For Flange to Web welds see Sheet 24.

UNIT 5

Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction.
The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

New Diaphragms are to match existing Diaphragms as shown in "Framing Plan".
Connection bolts in Diaphragms between existing exterior stringer and new stringer S1, shall not be fully tightened until new concrete deck slab has been poured.

Intermediate stiffener ℓs 4½"x⅜" shall be equally spaced between Diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

All horizontal dimensions in "Stringer Elevations" are measured along ℄ Web.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

** Use 2-⅞"ø Shear Studs on stringers S3-6 and S1-7 through S5-7
** Use 2-⅞"ø Shear Studs on stringers S1-5, S2-5 and S3-5

*.....Spacing begins at termination of 7 spaces @ 4"
‡.....See Stringer Elevation of stringer S3-6
‡‡.....For Shear Stud spacing at framed end of stringer S3-6 see Stringer Elevation above.
NOTE: ALL STRUCTURAL STEEL SHALL BE A-36

	BY	DATE
MADE	J.K. JLK	1-18-69 6-27-75
CHECKED	AMH	1-30-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Camber S1-6	TEM.	3-76
2	Dimension Changes	TEM	9-8-75
3	Diaphs. removed & Note revised	J.B.F.	8-25-75
4	Shoes @ Pier 5	TEM	7-76
5	Shear Studs	TEM	6-76
6	Shear Stud Spacing	TEM	6-7-76

AS BUILT

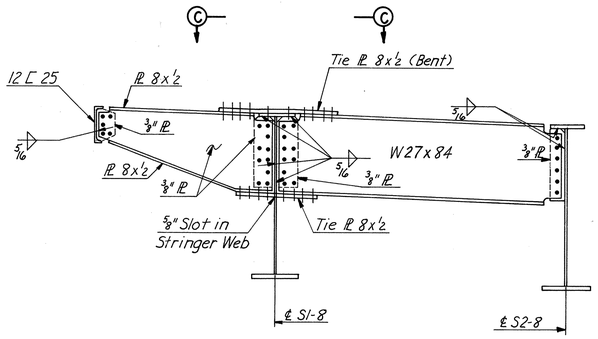
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN-UNITS 5,6 AND 7

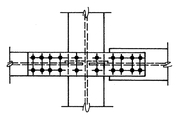
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As shown
CONTRACT NO.: 11
SHEET NO. 19 OF 38

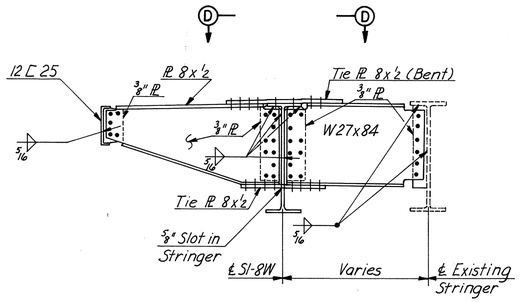
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	Downtown Exp	45A	97



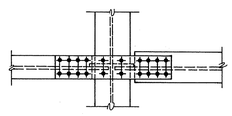
SECTION A-A



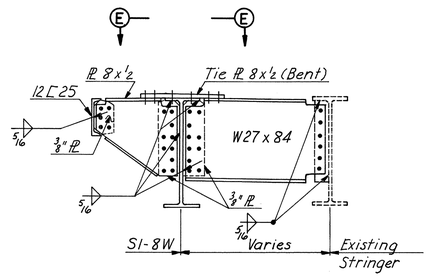
SECTION C-C



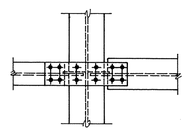
SECTION M-M



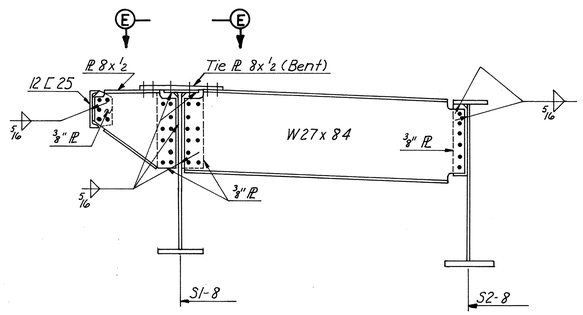
SECTION D-D



SECTION N-N



SECTION E-E



SECTION B-B

NOTE:
For location of Sections A-A & B-B, see Sheet 20.
For location of Sections M-M & N-N, see Sheet 32.

DESIGNED						
DRAWN	E.J.M	9-75				
CHECKED			⚠	New Sheet	T.E.M.	9-9-75
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 65
RAMP S W CONNECTION FROM
RICHMOND PETERSBURG TURNPIKE
FRAMING DETAILS UNIT 8 & 8W

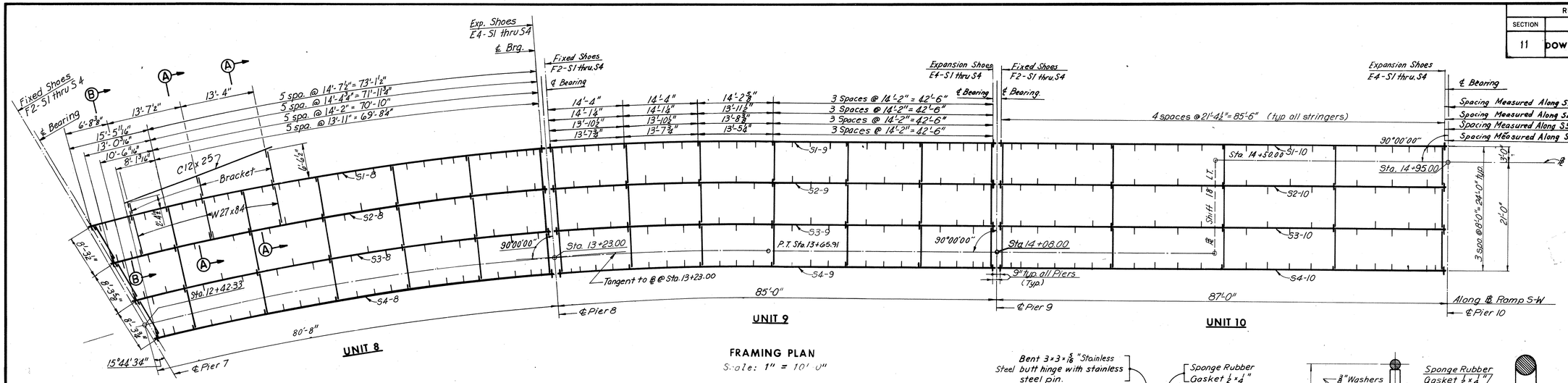
SCALE As Noted
DATE

SHEET 20a OF 38

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia

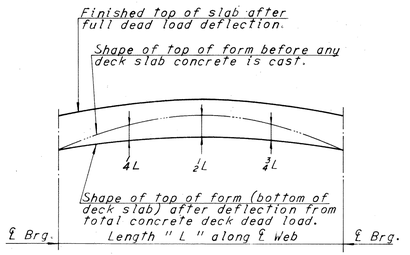
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	45	97



FRAMING PLAN

Scale: 1" = 10'-0"

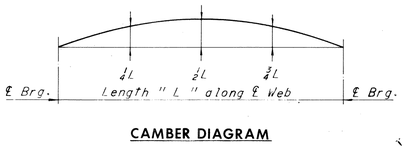


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

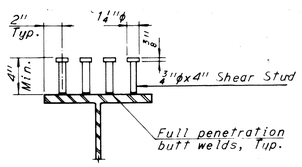
The stringers shall be fabricated with a total camber amounting to the tabulated value. A positive number indicates an upward camber and negative number indicates a downward camber. This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.

Notes:

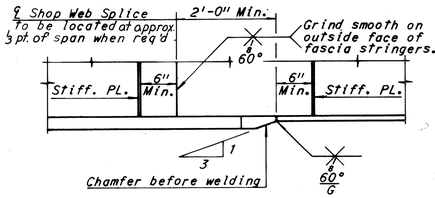
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance from top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross section on sheet 27.



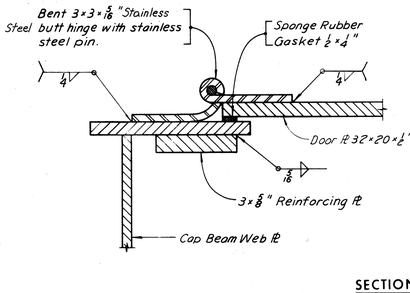
SHEAR STUD DETAIL

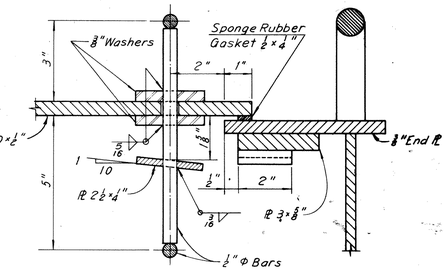
No Scale



DETAIL "B"

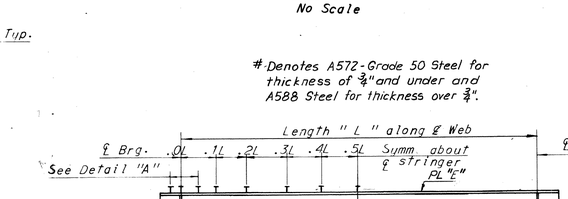
No Scale





SECTION C-C

No Scale



DETAIL "A"

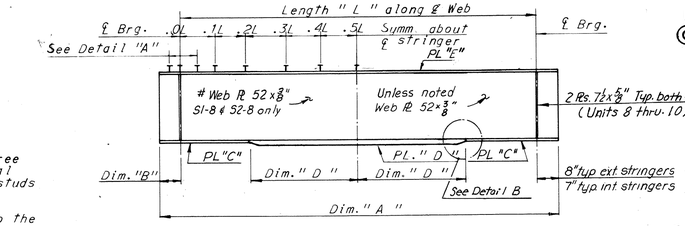
No Scale

SHEAR STUD NOTE

Contractor may, if he elects, use three ⅞" diameter studs at the same longitudinal spacing in lieu of the four ¾" diameter studs shown.

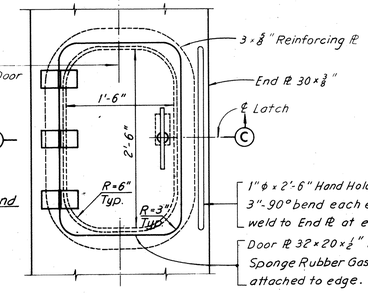
Stud rows shall be placed parallel to the main deck reinforcement.

# Denotes A572-Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾".



STRINGER ELEVATION

No Scale



ACCESS DOOR - TYPE B

Scale: 1" = 1'-0"

For the location of Access Door Type-B, see sheet 7.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	12	F2	12

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "D"	PL."C"	PL."D"	PL."E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
8	S1-8	89'-11 3/16"	88'-7 1/16"	8"	26'-6"	#16x1½"	#16x2"	#12x1"	9"	10"	12"	16½"	20"
	S2-8	86'-1 15/16"	84'-11 13/16"	7"	30'-0"	#16x1"	#16x1½"	#12x⅜"	11½"	12½"	15"	18"	21½"
	S3-8	82'-6 11/16"	81'-4 11/16"	7"	24'-0"	16x 1"	16x1¾"	12x1"	12"	13"	16"	19"	23"
	S4-8	79'-1 7/16"	77'-9 5/16"	8"	26'-0"	16x ⅝"	16x1⅞"	12x⅜"	12"	13½"	16"	19"	24"
9	S1-9	86'-1 8⅝"	85'-4⅝"	8"	27'-6"	16x1¼"	16x2⅛"	12x⅜"	10"	11"	14"	16½"	21"
	S2-9	85'-1 10"	84'-8"	7"	28'-0"	16x 1"	16x 2"	12x⅜"	11"	12½"	15½"	18"	22"
	S3-9	85'-1 1⅛"	83'-11⅜"	7"	30'-0"	16x ¾"	16x1⅝"	12x⅜"	11½"	13"	16"	19"	23"
	S4-9	84'-1 6⅜"	83'-2⅜"	8"	28'-0"	16x ⅜"	16x1½"	12x⅜"	11½"	13½"	17"	20½"	24"
10	S1-10	86'-1 10"	85'-6"	8"	29'-0"	16x ⅜"	16x1½"	12x⅜"	10½"	11½"	15"	18"	23"
	S2-10	86'-1 8"	85'-6"	7"	29'-0"	16x ⅜"	16x1½"	12x⅜"	11½"	12½"	15½"	18½"	22"
	S3-10	86'-1 8"	85'-6"	7"	29'-0"	16x ⅜"	16x1½"	12x⅜"	11½"	12½"	15½"	18½"	22"
	S4-10	86'-1 10"	85'-6"	8"	29'-0"	16x ⅜"	16x1½"	12x⅜"	10½"	11½"	15"	18"	23"

* Spacing begins at termination of 7 spaces @ 4".

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1/16"	1 3/4"	1 1/4"
1 3/16"	1 1/16"	1 3/16"
7/8"	1 1/4"	7/8"
3/4"	1 1/16"	3/4"
1/8"	1 3/4"	1 1/4"
1"	1 3/8"	1"
15/16"	1 5/16"	15/16"
1 1/8"	1 9/16"	1 1/8"
1 1/16"	1 1/2"	1 1/16"
1 1/8"	1 9/16"	1 1/8"

CAMBER SCHEDULE

¼L	½L	¾L
-3/4"	-1"	-1 1/16"
-3 3/16"	-1 1/16"	-3 3/16"
-1 1/8"	-1 1/2"	-1 7/8"
-1 1/4"	-1 5/8"	-1 1/4"
1 1/2"	2 1/8"	1 1/2"
1 1/4"	1 11/16"	1 1/4"
1 3/16"	1 5/8"	1 3/16"
1 9/16"	3 9/16"	3"
1 9/16"	3 1/2"	2 15/16"
1 15/16"	3 7/16"	2 15/16"
2 5/16"	3 1/2"	2 15/16"

Notes:

All steel shall be A36 steel unless denoted otherwise.

Intermediate stiffener plates shall be equally spaced between diaphragms as shown. The first two plates at the ends of stringers shall be one half the normal spacing within the panel.

All intermediate stiffeners shall be Pl. 4½x⅜". For framing and connecting detail, see sheet 27. For shoe detail, see sheet S1 & S2.

All Horizontal Dimensions are measured along ℄ Web.

For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.

For Diaphragm Details, see Sheet 27.

For Structural Steel Quantities, see Sheet 4.

For Joint Details, see Sheets 34 and 35.

It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

For Sections A-A and B-B see Sheet 20a.

AS BUILT

NO.	REVISION	BY	DATE
3	St. length S2-8	TEM	3-76
2	Dimensions Added	TEM	9-9-75
1	Bracket Unit 8	TEM	8-25-75
	Re-design S1-8 & S2-8	TEM	
	Pl. Stes.	TEM	5-76

	BY	DATE
MADE	R.C. J.L.K.	1-16-69 6-26-75
CHECKED	AMH	1-24-69
IN CHARGE		

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 8,9 AND 10

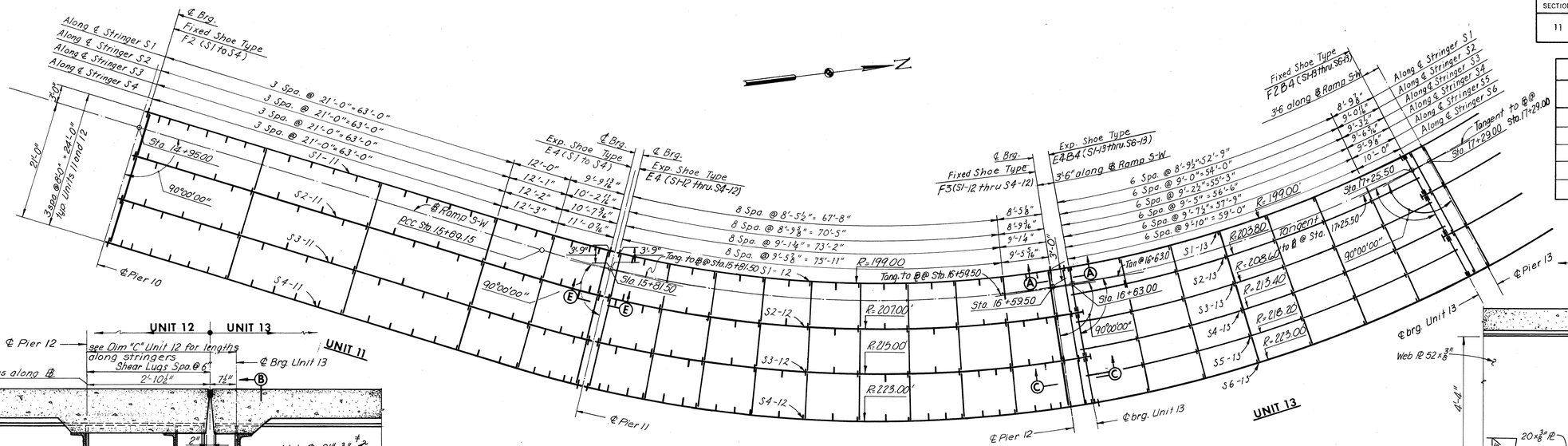
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

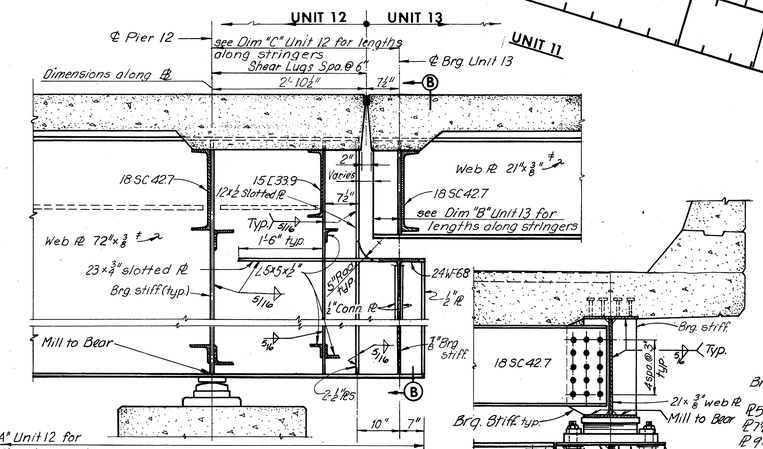
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 20 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	46	97

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	8	F2	4
E4B4	6	F3	4
		F2B4	6



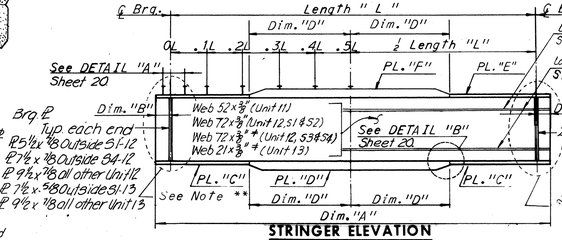


Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

UNIT 12

** Note: For stringers in Unit 11, see Section E-E
For stringers in Units 12 and 13, see Section A-A

FRAMING PLAN
Scale: 1" = 10'-0"

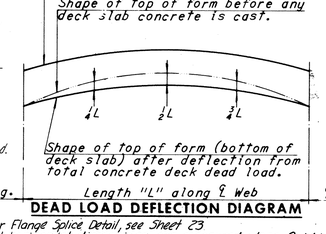


STRINGER ELEVATION

Note: Shear lug spacing shown above are typical for both halves of the stringer.

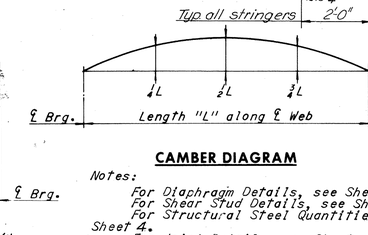
Finished top of slab after full dead load deflection.

Shape of top of form before any deck slab concrete is cast.

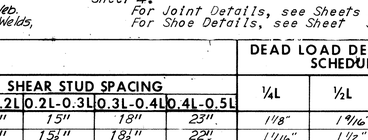


DEAD LOAD DEFLECTION DIAGRAM

For Flange Splice Detail, see Sheet 23
All horizontal dimensions are measured along ℄ Web.
For Horizontal Stiffener Detail and Web to Flange Welds, see Sheet 24.



CAMBER DIAGRAM



Notes:
For Diaphragm Details, see Sheet 28.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "C"	Dim. "D"	Dim. "B"	PL. "C"	PL. "D"	PL. "E"	PL. "F"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
11	S1-11	86'-1 8/16"	84'-9 15/16"	8"	29'-0"	8"	16x4 3/4"	16x1 1/2"	12x4 3/4"	—	10½"	12"	15"	18"	23"
	S2-11	86'-5 11/16"	85'-3 11/16"	7"	29'-2"	7"	16x4 3/4"	16x1 1/2"	12x4 3/4"	—	11½"	12½"	15½"	18½"	22"
	S3-11	86'-11 8/16"	85'-9 8/16"	7"	29'-6"	7"	16x4 3/4"	16x1 1/2"	12x4 3/4"	—	11½"	12½"	15½"	18½"	22"
	S4-11	87'-7 7/16"	86'-3 7/16"	8"	29'-8"	8"	16x4 3/4"	16x1 1/2"	12x4 3/4"	—	10½"	12"	15"	18"	23"
12	S1-12	80'-9 1/4"	76'-1 1/4"	3'-5 3/8"	—	8"	12x8 1/4"	—	12x4 3/4"	—	16½"	19½"	22½"	24"	24"
	S2-12	83'-11 6/16"	79'-2 6/16"	3'-7"	—	7"	16x4 1/4"	—	12x4 3/4"	—	14"	16½"	19½"	24"	24"
	S3-12	87'-1 5/16"	82'-3 1/16"	3'-8 1/16"	25'-0"	7"	12x11 7/16"	16x1 3 11/16"	12x4 3/4"	—	13½"	14½"	17"	21½"	24"
	S4-12	90'-5 11/16"	85'-4 5/16"	3'-10 3/16"	24'-6"	8"	16x11 7/16"	16x1 3 11/16"	12x11 1/4"	—	12½"	13"	16"	21"	24"
13	S1-13	62'-6 7/16"	61'-6 7/16"	6"	—	6"	16x14 1/16"	—	12x3 1/4"	—	8½"	9½"	12"	15½"	20½"
	S2-13	64'-0 1/16"	63'-0 1/16"	6"	—	6"	16x8 3/16"	—	12x3 1/4"	—	8½"	10"	13"	16½"	21"
	S3-13	65'-6 1/16"	64'-6 1/16"	6"	18'-6"	6	16x14 1/16"	20x1 3 11/16"	12x11 1/4"	—	8"	9"	12"	16"	20"
	S4-13	67'-1 0 5/16"	66'-0 5/16"	6"	18'-6"	6	16x8 3/16"	20x1 3 11/16"	16x8 1/4"	—	8"	9"	11½"	14½"	18½"
	S5-13	68'-6 1/16"	67'-6 1/16"	6"	19'-6"	6	16x16 3/16"	20x1 8 3/16"	16x16 1/16"	—	7½"	8½"	11½"	14½"	19½"
	S6-13	70'-0"	69'-0"	6"	19'-6"	6	20x16 1/16"	24x1 1 1/16"	16x11 1/4"	20x11 1/8"	6½"	7½"	10"	13½"	19"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1 1/8"	1 9/16"	1 1/8"	3 5/8"	5"	3 5/8"
1 1/16"	1 1/2"	1 1/16"	3 5/8"	5"	3 7/8"
1 1/8"	1 9/16"	1 1/8"	3 3/4"	5 1/16"	3 3/4"
1 3/16"	1 5/8"	1 3/16"	3 7/8"	5 1/4"	3 7/8"
1/4"	3/8"	1/4"	2 3/16"	2 7/8"	2 3/16"
3/8"	1/2"	3/8"	2 9/16"	3 1/2"	2 5/8"
5/8"	13/16"	5/8"	3 1/8"	4 1/4"	3 1/16"
7/8"	1 1/4"	7/8"	3 1/16"	5 1/8"	3 13/16"
7/8"	1 1/4"	7/8"	2 7/16"	3 3/8"	2 7/16"
7/8"	1 1/4"	7/8"	2 1/2"	3 7/16"	2 1/2"
1 3/16"	1 5/8"	1 3/16"	2 13/16"	3 13/16"	2 13/16"
1 3/8"	1 15/16"	1 3/8"	3"	4 1/8"	3"
1 1/2"	2 1/16"	1 1/2"	3 1/8"	4 1/4"	3 1/8"
2 3/16"	3"	2 3/16"	3 13/16"	5 1/4"	3 13/16"

* Spacing begins at termination of 7 spaces @ 4".

Note: Dim. "D" is measured out from the halfway line (.5L) between ℄ Brgs. of stringer.

Note: See Section A-A for limits of Dims. A, B and C as shown in the Stringer Schedule above.
Dimension F equals 39'-0", S6-13 only.

: Denotes A572 Grade 50 Steel for thickness of 2" and under and A588 Steel for thickness over 4".

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note: Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 29.

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

AS BUILT

	BY	DATE
MADE	J.V.	1-21-69
CHECKED	A.M.H.	1-27-69
IN CHARGE		

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

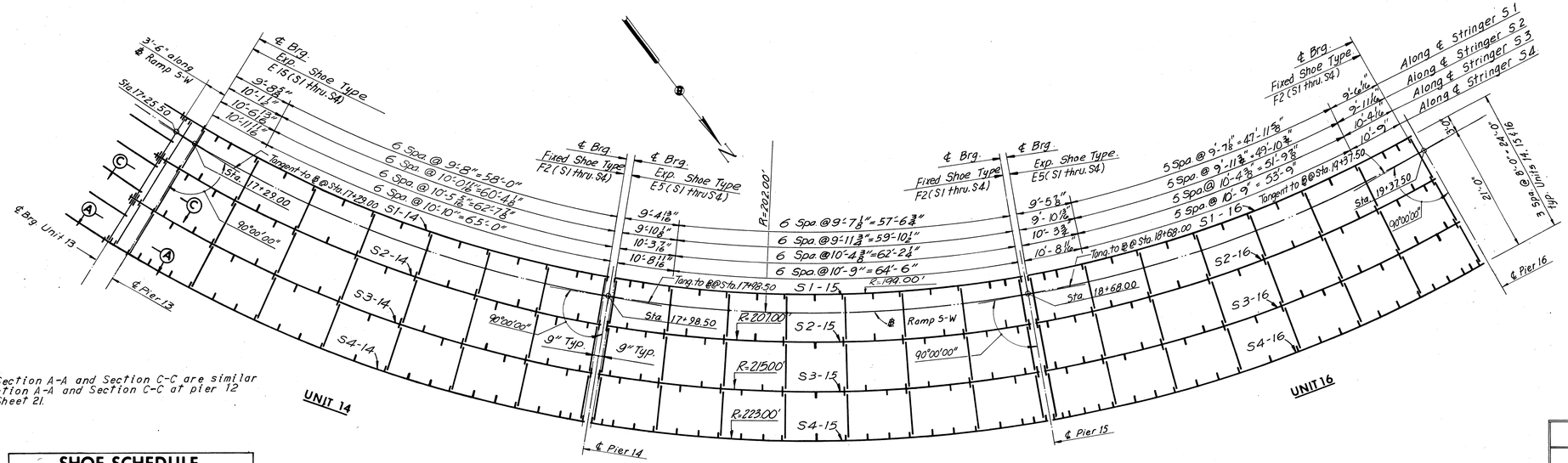
FRAMING PLAN UNITS 11, 12 AND 13

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

SCALE As Noted
CONTRACT NO. 11
SHEET NO. 21 38

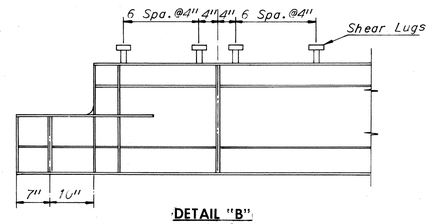
46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	47	97



Note: Section A-A and Section C-C are similar to Section A-A and Section C-C at pier 12 see, Sheet 21.

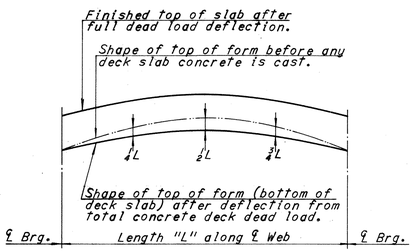
FRAMING PLAN
Scale 1" = 10'-0"



DETAIL "B"
No Scale

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	8	F2	12
E15	4		

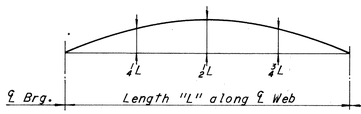


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer witout altering the slab thickness.

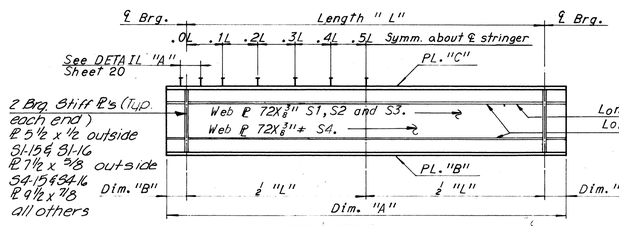
Notes:
All steel shall be A36 unless otherwise shown.
Exterior Stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be 4½ x ⅜".



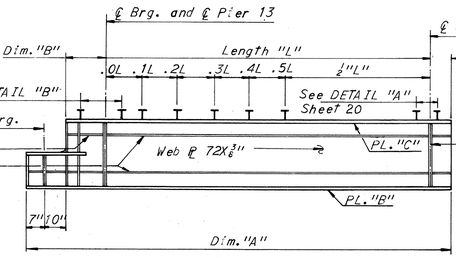
CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 29.



STRINGER ELEVATION
UNITS 15 AND 16
No Scale



STRINGER ELEVATION
UNIT 14
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim "A"	LENGTH "L"	Dim. "B"	Dim. "C"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
14	S1 - 14	72'-5"	67'-8⅝"	2'-7⅝"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 14	75'-2⅝"	70'-5⅝"	2'-9⅛"	7"	16 x ⅜"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 14	78'-1⅜"	73'-2⅝"	2'-10⅛"	7"	16 x 1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 14	81'-1⅛"	75'-11⅛"	3'-0⅜"	8"	‡16 x 1"	12 x ¾"	11½"	13½"	15½"	19"	23½"
15	S1 - 15	68'-3⅜"	66'-11⅜"	8"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 15	70'-10⅜"	69'-8⅜"	7"	7"	16 x ⅜"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 15	73'-7⅛"	72'-5⅛"	7"	7"	16 x1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 15	76'-6⅛"	75'-2⅛"	8"	8"	‡16 x 1"	‡12 x ¾"	11½"	13½"	15½"	19"	23½"
16	S1 - 16	68'-3⅜"	66'-11⅜"	8"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 16	70'-10⅜"	69'-8⅜"	7"	7"	16 x ⅜"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 16	73'-7⅛"	72'-5⅛"	7"	7"	16 x1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 16	76'-6⅛"	75'-2⅛"	8"	8"	‡16 x 1"	‡12 x ¾"	11½"	13½"	15½"	19"	23½"

*. . . Spacing begins @ termination of 17 spaces @ 4"

‡. . . Denotes A572 Grade 50 steel for thicknesses of ¾" and under and A588 for thicknesses over ¾"

DEAD LOAD DEFLECTION SCHEDULE		
¼L	½L	¾L
1/8"	3/16"	1/8"
1/4"	5/16"	1/4"
3/8"	1/2"	3/8"
9/16"	13/16"	9/16"
1/8"	3/16"	1/8"
1/4"	5/16"	1/4"
3/8"	1/2"	3/8"
9/16"	13/16"	9/16"

CAMBER SCHEDULE		
¼L	½L	¾L
1 11/16"	2 5/16"	1 11/16"
1 7/8"	2 1/2"	1 7/8"
2"	2 11/16"	2"
2 3/16"	3"	2 3/16"
3/16"	1/4"	3/16"
5/16"	7/16"	5/16"
7/16"	5/8"	7/16"
11/16"	15/16"	11/16"
9/16"	1 1/4"	1 3/16"
7/16"	1 1/16"	1 1/16"
5/16"	7/8"	15/16"

Notes:
All Horizontal Dimensions are measured along ℄ Web.
For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.
For Diaphragm Details, see Sheet 29.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

AS BUILT

	BY	DATE				
MADE	J.V.	1-21-69				
CHECKED	A.M.H	1-27-69	1	Diaph. Spacing Unit 16	T.E.M	5-76
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

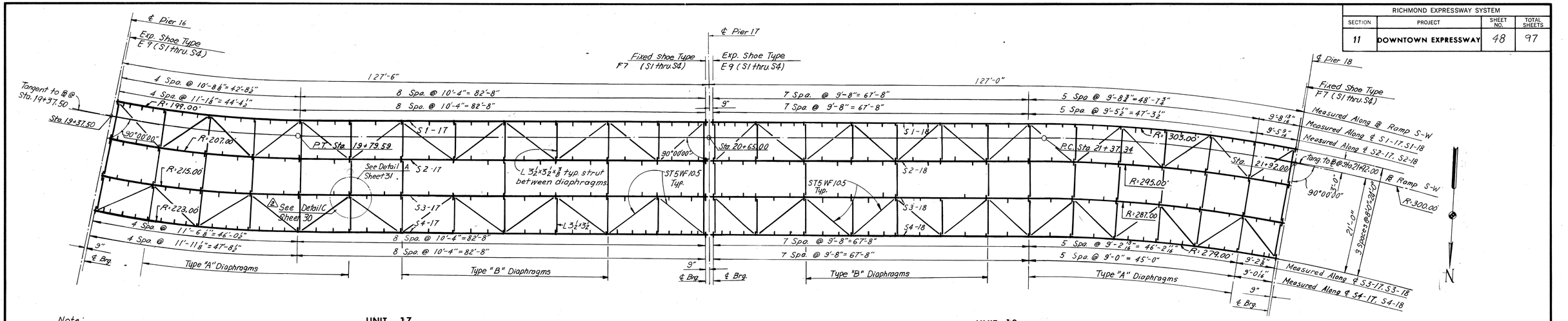
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 14, 15 AND 16

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 22 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	48	97

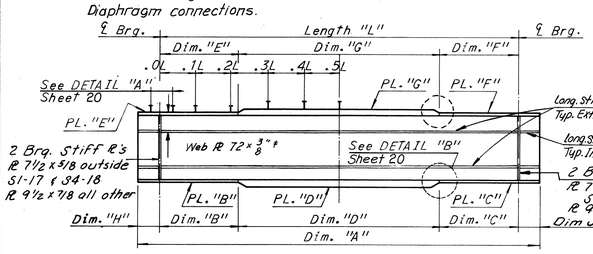


UNIT 17

UNIT 18

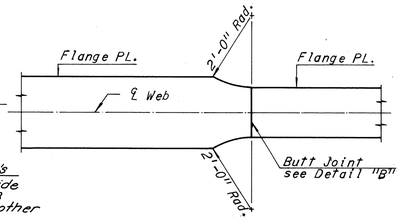
FRAMING PLAN
Scale: 1"=10'-0"

Note:
Detail A Sheet 31 to be used at top flange of all Type "A" Diaphragms.
Detail A Sheet 31 to be used at bottom flange of all Type "A" Diaphragms without Lateral Bracing.
Detail C Sheet 30 to be used at bottom flange of all Type "A" and "B" Diaphragms with Lateral Bracing
Section C-C Sheet 30 portion marked "Without Lateral Bracing" to be used at all other Type "B" Diaphragm connections.

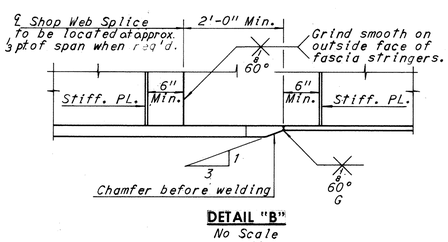


STRINGER ELEVATION
No Scale

Note:
All horizontal dimensions are measured along ℄ Web.

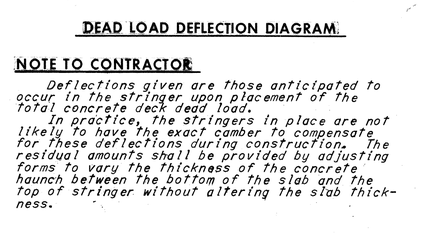


FLANGE PLATE SPLICE DETAIL
No Scale



DETAIL "B"
No Scale

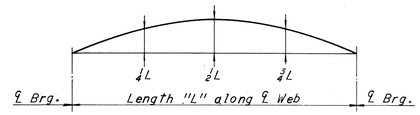
Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be 4½×⅜" except where the width of top flange plate is 20" or over, Pl. 5x⅜" shall be used.



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Note:
For Details of Intermediate diaphragms Types "A" and "B" see, Sheet 30.



CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with a total camber amounting to the tabulated value.
A positive number indicates an upward camber and a negative number indicates a downward camber. This will provide approximate compensation for deflection under full load and for conformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 30.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E9	8		
		F7	8

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "J"	PL. "B" #	PL. "C" #	PL. "D" #	PL. "E" #	PL. "F" #	PL. "G" #	MAX. SHEAR STUD SPACING 0.0L-0.1L *	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
17	S1 - 17	126'-8¼"	125'-4½"	23'-8¼"	23'-8¼"	78'-0"	23'-8¼"	23'-8¼"	78'-0"	8"	8"	16 x 1⅜"	16 x 1"	20 x 1⅜"	12 x 1"	12 x ¾"	16 x 1"	12"	14½"	18½"	23½"	24"
	S2 - 17	128'-2¼"	127'-0½"	25'-0"	25'-0"	77'-0½"	——	26'-6½"	100'-6"	7"	7"	16 x 1⅜"	16 x 1⅛"	16 x 1¼"	——	12 x ¾"	12 x 1¼"	12½"	15"	19"	24"	24"
	S3 - 17	129'-10½"	128'-8½"	25'-0"	25'-0"	78'-8½"	25'-10¼"	25'-10¼"	77'-0"	7"	7"	20 x 1⅜"	16 x 1¼"	20 x 1¼"	16 x 1⅛"	12 x 1⅛"	16 x 1¼"	11"	13"	17½"	23"	24"
	S4 - 17	131'-8½"	130'-4½"	25'-6"	25'-6"	79'-4½"	25'-6"	25'-6"	79'-4½"	8"	8"	20 x 1⅝"	20 x 1¾"	20 x 2¼"	16 x 1⅝"	16 x 1"	16 x 1⅛"	10½"	13"	15½"	20½"	24"
18	S1 - 18	127'-4⅛"	126'-0⅛"	25'-3¼"	27'-3 5/16"	73'-6"	25'-3¼"	27'-3 5/16"	73'-6"	8"	8"	20 x 1⅛"	20 x 1½"	24 x 1⅛"	16 x ⅞"	16 x 1¼"	20 x 1¼"	10"	12"	17"	23½"	24"
	S2 - 18	125'-9⅛"	124'-7⅛"	24'-6"	24'-6"	75'-7⅛"	24'-6"	24'-6"	75'-7⅛"	7"	7"	16 x 1⅛"	16 x 1⅜"	20 x 1⅜"	12 x 1"	12 x 1⅛"	16 x 1¼"	11½"	14"	18"	23½"	24"
	S3 - 18	124'-3⅜"	123'-1⅜"	24'-0"	24'-0"	75'-1⅜"	24'-0"	24'-0"	75'-1⅜"	7"	7"	16 x 1¼"	16 x 1⅜"	16 x 2"	12 x 1⅛"	12 x 1"	12 x 1¼"	12½"	15"	19"	24"	24"
	S4 - 18	123'-0⅛"	121'-8⅛"	30'-0"	24'-0"	67'-8⅛"	——	——	121'-8⅛"	8"	8"	16 x 1"	16 x 1"	20 x 1⅛"	——	——	12 x ¾"	10"	12"	15"	20"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1¼"	1 15/16"	1½"
1 9/16"	2¼"	1 7/16"
1 7/8"	2 9/16"	1 13/16"
2"	2 3/4"	1 15/16"
2 1/8"	3"	2 3/16"
1 11/16"	2 5/16"	1 11/16"
1 7/16"	1 15/16"	1 3/8"
1 3/8"	1 3/4"	1⅛"

CAMBER SCHEDULE

¼L	½L	¾L
-4 13/16"	-6⅛"	-4 9/16"
-4⅛"	-5 3/8"	-4 1/8"
-3 5/16"	-4 11/16"	-3 3/4"
-3 3/4"	-4 1/8"	-3 1/2"
3/4"	2½"	2 3/16"
⅛"	1 7/16"	1⅛"
-⅜"	5/8"	3/16"
- ½"	¼"	-3/8"

Note:
Shear stud spacing as shown is typical for both halves of the stringers.
*Spacing begins at termination of 7 spaces @ 4".
# Denotes A572 Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾".

Notes:
All Horizontal Dimensions are measured along ℄ Web.
For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.
For Diaphragm Details, see Sheet 30.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35
For Shoe Details, see Sheet S1 & S2.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

AS BUILT

	BY	DATE				
MADE	R.C.	11.21.68	2	Note added	TEM	3-76
CHECKED	S.C.C.	12.1.68	1	Delete F7 & D Shoes & Sheet No. rev.	J.B.P.	8-25-75
IN CHARGE			NO.	REVISION	BY	DATE

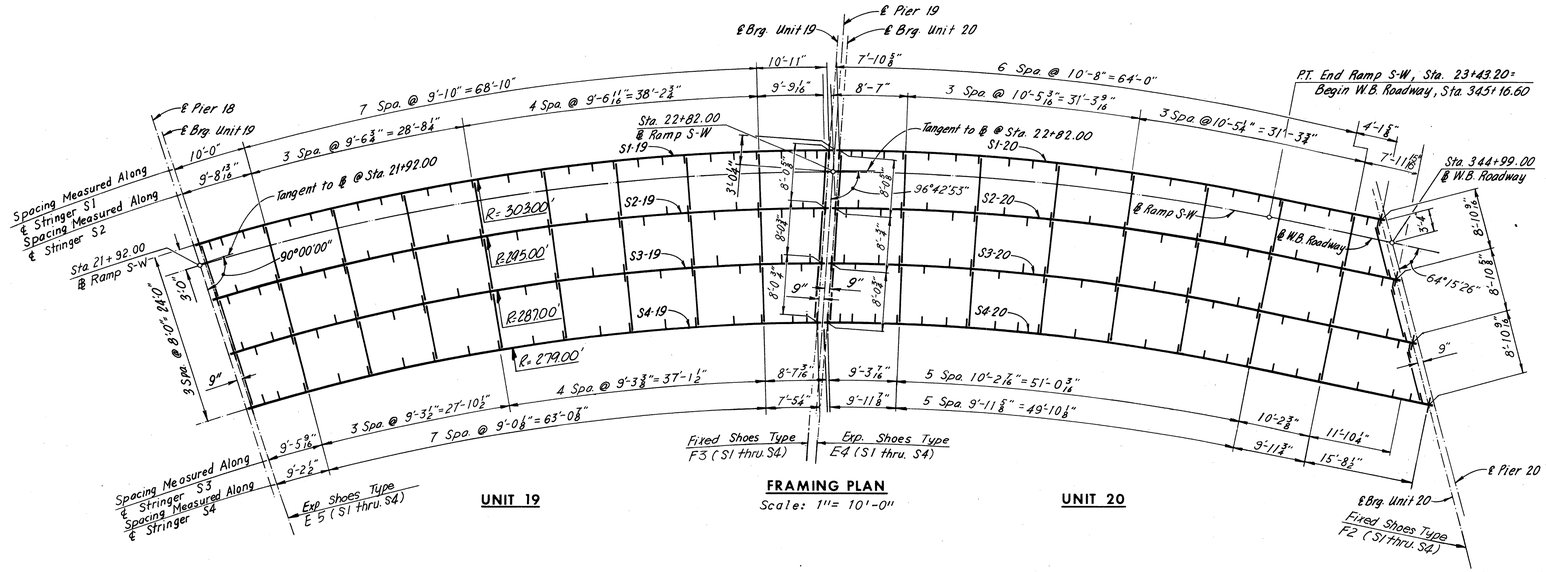
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 23 OF 38

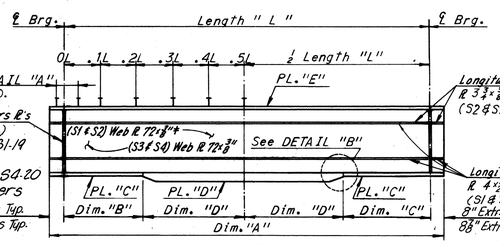
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	49	97



FRAMING PLAN
Scale: 1" = 10'-0"

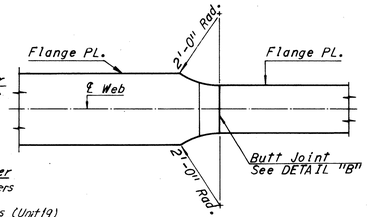
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	4	F2	4
E5	4	F3	4

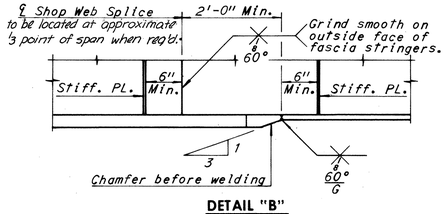


STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.



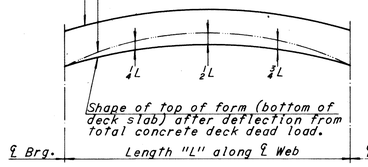
FLANGE PLATE SPLICE DETAIL
No Scale



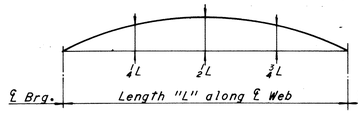
DETAIL "B"
No Scale

Finished top of slab after full dead load deflection.

Shape of top of form before any deck slab concrete is cast.



DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

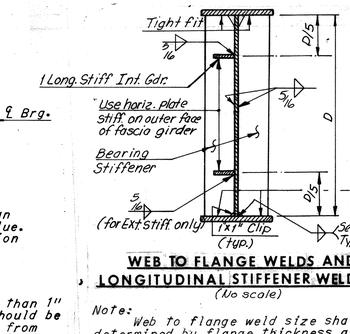
Dimensions are in inches.

Note: Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered distance, top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 33

Note: All steel shall be A36 unless otherwise shown. Exterior Stringer Longitudinal Stiffeners shall be located on the exterior face of the stringer. Intermediate stiffener Pls. 4½"x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Legend:
‡ Denotes A572-Grade 50 steel for thicknesses of 4" and under, and A588 steel for thicknesses over 4".
* Spacing begins at termination of 17 spaces @ 4".



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
(No scale)

Note: Web to flange weld size shall be determined by flange thickness as follows:

To 1¼" ..... ⅜" weld
over 1¼" to 2¼" ..... ½" weld
over 2¼" ..... ⅝" weld

Notes: All Horizontal Dimensions are measured along ℄ Web.

For Diaphragm Details, see Sheet 31.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
19	S1-19	91'-1"	89'-9"	13'-10¼"	13'-10¼"	31'-0"	12 x 1"‡	16 x 1⅛"‡	12 x 1"‡	11"	12½"	16"	19"	24"
	S2-19	87'-6 7/16"	86'-4 7/16"	12'-2 7/16"	12'-2 7/16"	31'-0"	12 x ¾"‡	16 x 1⅛"‡	12 x ¾"‡	11½"	13"	17½"	20½"	24"
	S3-19	84'-2 3/4"	83'-0 3/4"	12'-0 3/8"	12'-0 3/8"	29'-6"	12 x ¾"	16 x 1⅛"	12 x ¾"	14"	16"	21½"	24"	24"
	S4-19	81'-0 5/16"	79'-8 5/16"	39'-10 5/16"	39'-10 5/16"	———	16 x ⅝"	———	12 x ¾"	20½"	23½"	24"	24"	24"
20	S1-20	77'-5 1/16"	76'-0¼"	38'-0⅛"	38'-0⅛"	———	16 x ⅞"‡	———	12 x ¾"	13"	14½"	17½"	21"	24"
	S2-20	80'-5"	79'-2¼"	39'-7⅛"	39'-7⅛"	———	16 x ⅞"‡	———	12 x ¾"	14"	16"	18½"	22"	24"
	S3-20	83'-7"	82'-4¼"	41'-2⅛"	41'-2⅛"	———	16 x 1⅛"	———	12 x ¾"	16½"	19"	21½"	24"	24"
	S4-20	86'-11 1/16"	85'-6¼"	42'-9⅛"	42'-9⅛"	———	16 x ⅝"	———	12 x ¾"	17⅛"	20"	23½"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE		
¼L	½L	¾L
1"	1 3/8"	1"
¾"	1"	¾"
7/16"	5/8	7/16"
1/4"	5/16"	1/4"
5/8"	7/8"	5/8"
3/8"	1/2"	3/8"
9/16"	13/16"	9/16"
5/16"	7/16"	5/16"

CAMBER SCHEDULE		
¼L	½L	¾L
1 1/8"	1 9/16"	1 1/8"
7/8"	1 1/4"	7/8"
9/16"	3/4"	9/16"
5/16"	11/2"	5/16"
7/8"	1 1/8"	3/4"
5/8"	15/16"	5/8"
11/2"	3/4"	1/2"
7/16"	5/8"	7/16"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	12-3-68				
CHECKED	A.M.H.	1-27-69	1	Diaph. layout at Pier 19	T.E.M.	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

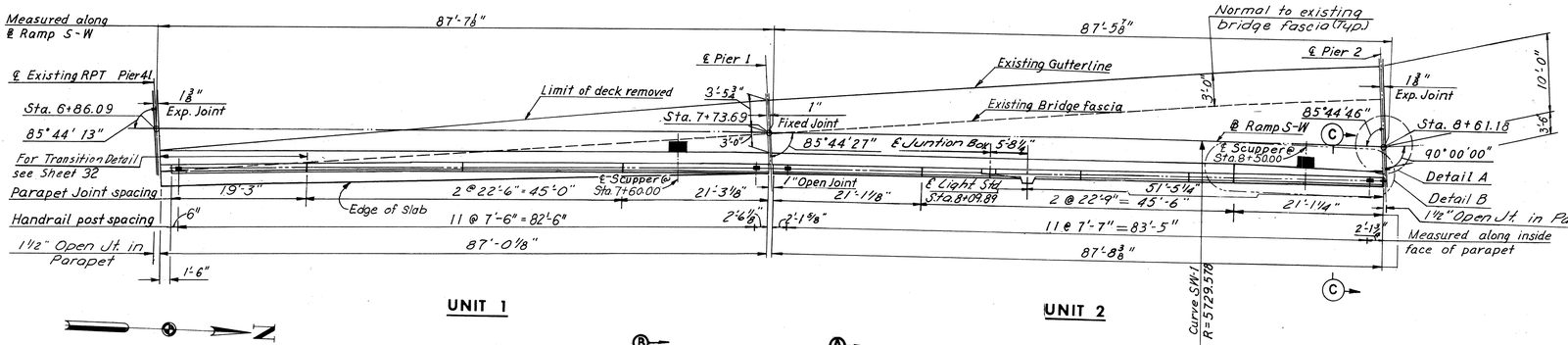
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

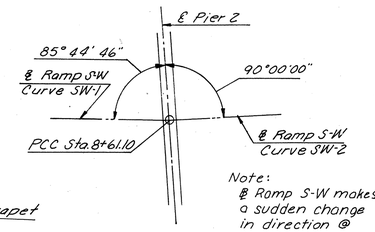
FRAMING PLAN - UNITS 19 AND 20

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 24 OF 38

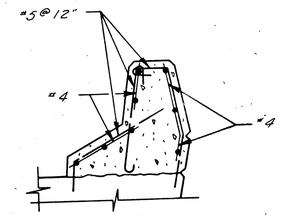
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	50	97





DETAIL A
No Scale

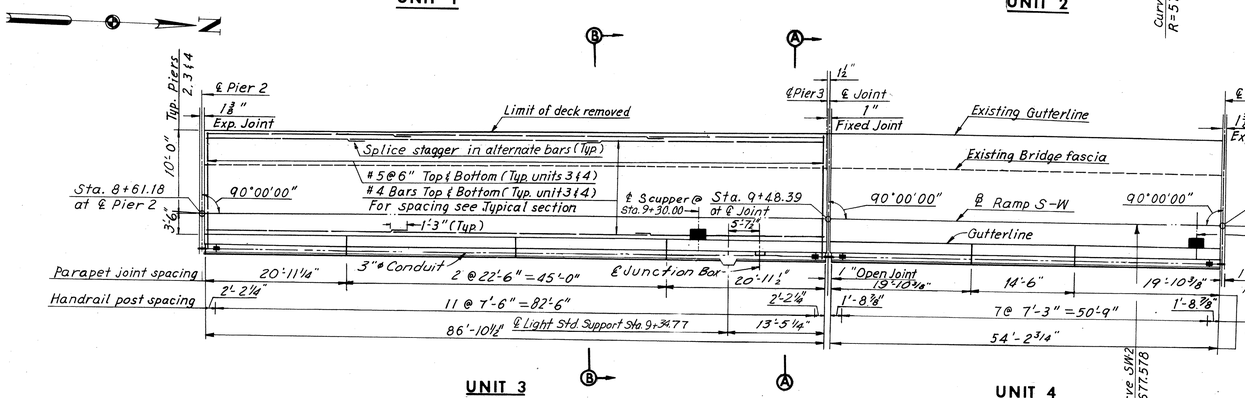
Note:
℄ Ramp S-W makes a sudden change in direction @ Sta. 8+61.10.



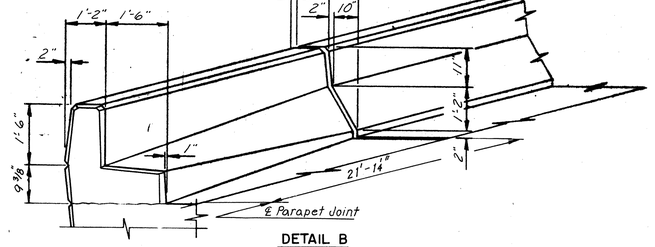
SECTION C-C
No Scale

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
6+86.09	——	72.84	——
+90.00	——	72.90	72.85
7+00.00	——	73.05	73.00
+10.00	——	73.19	73.15
+20.00	——	73.35	73.30
+30.00	73.50	73.49	73.45
+40.00	73.66	73.64	73.60
+50.00	73.82	73.79	73.75
+60.00	73.98	73.94	73.89
+70.00	74.14	74.09	74.04
+73.69	74.20	74.15	74.10
+80.00	74.30	74.24	74.19
+90.00	74.46	74.39	74.34
8+00.00	74.62	74.54	74.49
+10.00	74.79	74.69	74.64
+20.00	74.95	74.84	74.79
+30.00	75.11	74.99	74.94
+40.00	75.27	75.15	75.09
+50.00	75.43	75.29	75.23
+60.00	75.59	75.44	75.39
+61.18	75.61	75.45	75.40
+70.00	75.75	75.60	75.54
+80.00	75.91	75.76	75.70
+90.00	76.08	75.92	75.86
9+00.00	76.24	76.08	76.02
+10.00	76.40	76.24	76.19
+20.00	76.56	76.40	76.35
+30.00	76.72	76.56	76.51
+40.00	76.88	76.73	76.67
+48.39	77.02	76.86	76.81
+50.00	77.04	76.89	76.83
+60.00	77.20	77.05	76.99
+70.00	77.37	77.21	77.15
+80.00	77.53	77.37	77.32
+90.00	77.69	77.53	77.48
10+00.00	77.85	77.69	77.64
+02.63	77.89	77.74	77.68

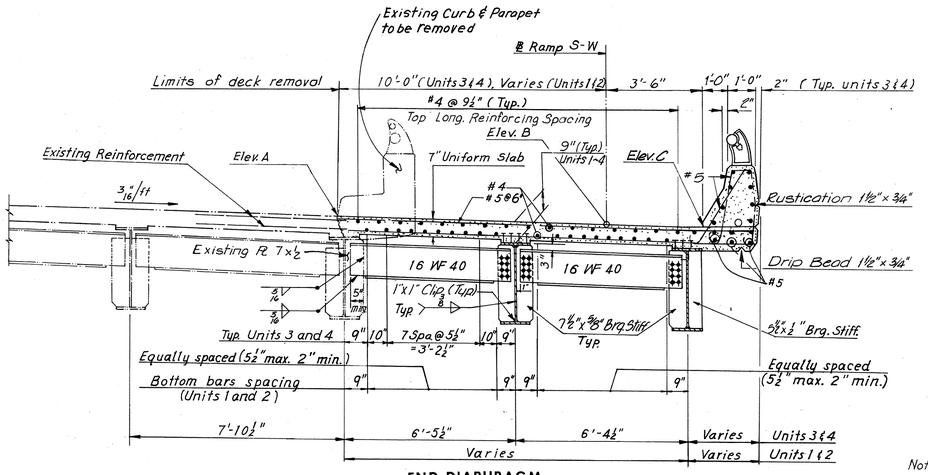
Note A:
Elev A from Sta 6+86.09 to 10+02.63 is given along the existing Gutter Line R.P.T. and is radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp S-W. Cross Slope is radial to the Base Line R.P.T.
Elev A is to be field verified. Minor adjustments may be required.



DECK PLAN
Scale: 1"=10'-0"



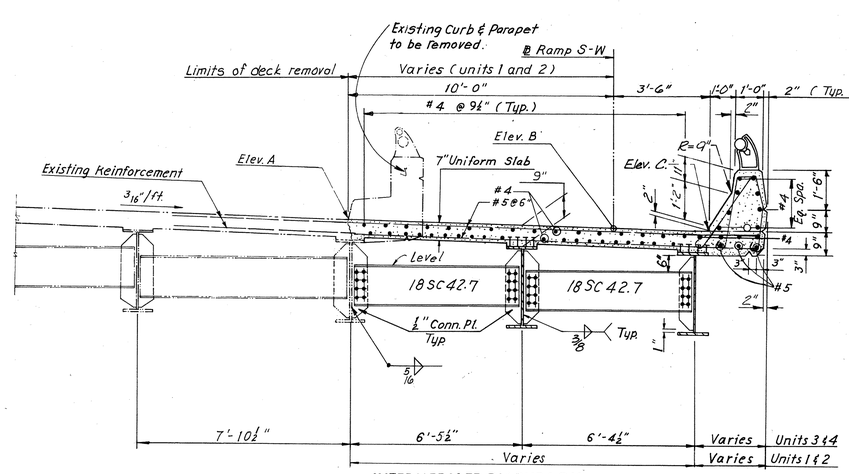
DETAIL B
No Scale



END DIAPHRAGM

SECTION A-A
Scale: ⅜" = 1'-0"

Note:
Existing No. 5 transverse steel top and bottom to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinforcing shall be straightened.



INTERMEDIATE DIAPHRAGM

SECTION B-B
Scale: ⅜" = 1'-0"

Note:
For Framing plan, see Sheet 18.
For Joint Details, see Sheet 18.
For Quantities, see Sheet 4
For Handrail Detail, see Sheet S3
Elev. A is to be confirmed by contractor.
Cross Slope in Units 1 and 2 should be normal to ℄ R.P.T.
For Drainage Details see Support Type 6 for Units 1, 2 and 3, and Support Type 5 for Unit 4, see Sheets S5 & S6

AS BUILT

	BY	DATE
MADE	KCT	11-2-68
	JLK	6-27-75
CHECKED	YCP	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Deck Elev.	T.E.M.	9-8-75
1	limits of deck removal Sect A & B	T.E.M.	8-25-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

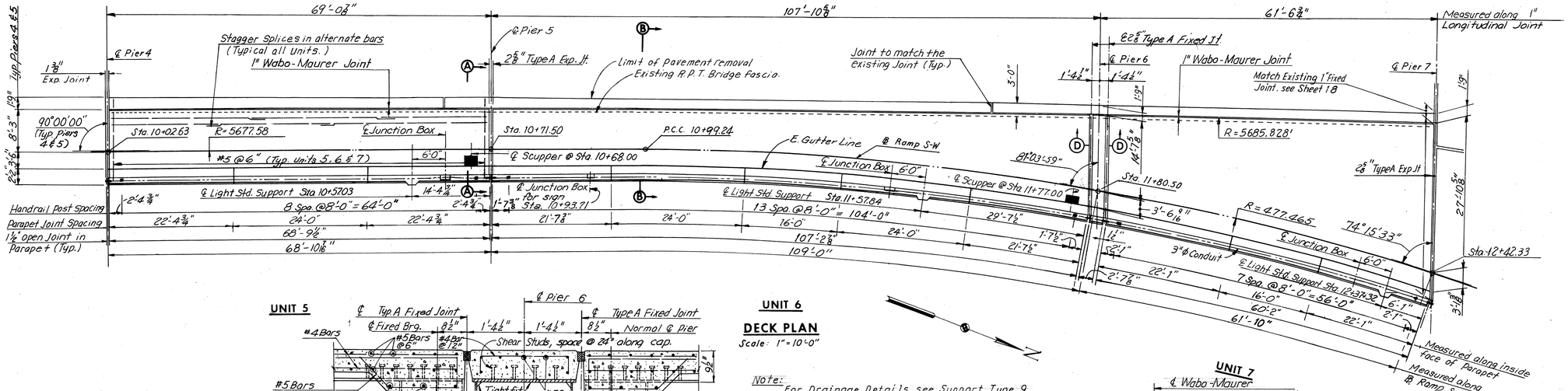
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 1,2,3 AND 4

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

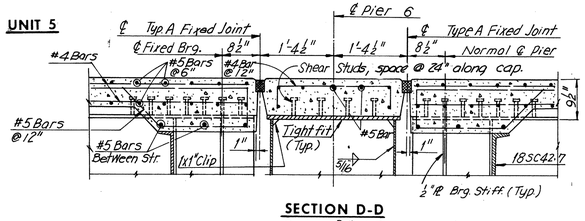
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 25 OF 38

50

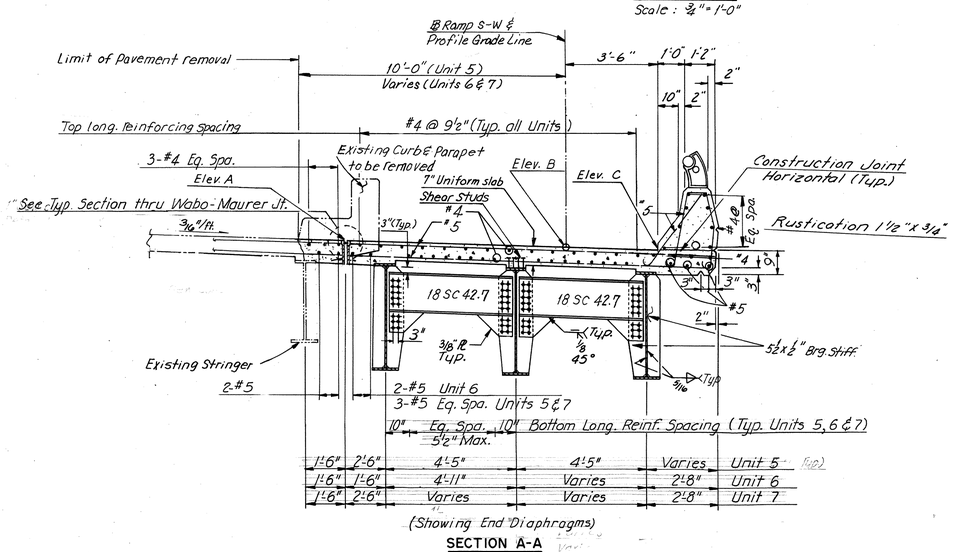
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	51	97



UNIT 5



SECTION D-D
Scale: ½" = 1'-0"



SECTION A-A
Scale: ⅜" = 1'-0"
(Unit 5 shown, Units 6 & 7 similar)

UNIT 6

DECK PLAN

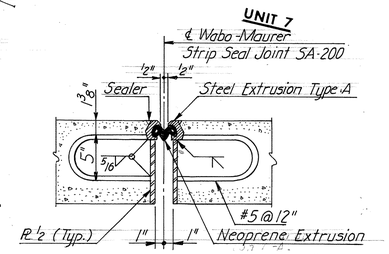
Scale: 1" = 10'-0"

Note: For Drainage Details, see Support Type 9 for Unit 5, and Support Type 5 for Unit 6, see Sheets 55 & 56.
Elevations given in the Elevation Table may require adjustment in the field.

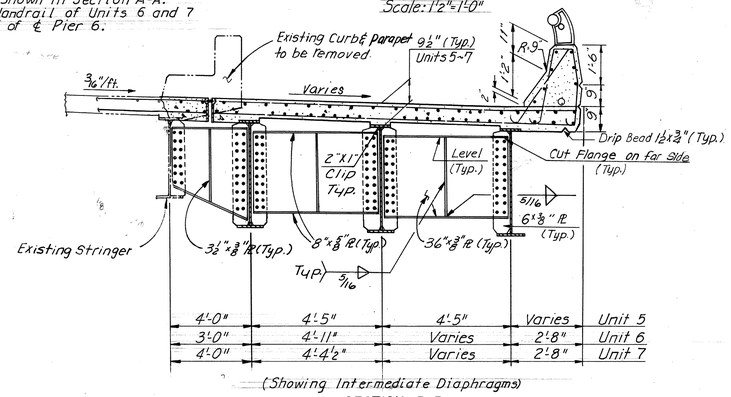
Note: For Framing Plan, See Sheet 19.
For Joint Details, See Sheet 34 & 35.
For Quantities, See Sheet 4.
For Handrail Details, See Sheet 33.
Elev. A is to be confirmed by contractor.

Note: Reinforcement in Curb and Parapet is same as shown in Section A-A.
Extend Handrail of Units 6 and 7 to within 1" of ℄ Pier 6.

UNIT 7



TYPICAL SECTION THRU WABO-MAURER JOINT
Scale: 1½" = 1'-0"

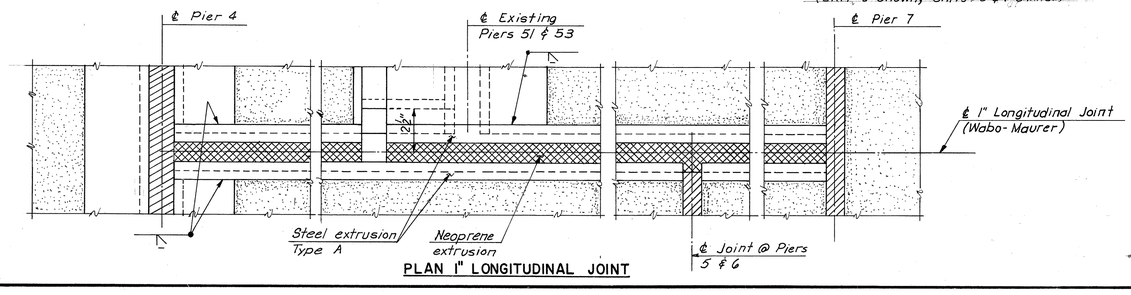


SECTION B-B
Scale: ⅜" = 1'-0"
(Unit 6 Shown, Units 5 & 7 similar)

Note A:
Elev. A from Sta. 10+02.63 to 12+42.33 is given along ℄ longitudinal joint and is radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp S-W. Cross Slope is radial to the Base Line R.P.T.
Elev. A is to be field verified. Minor adjustments may be required.

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
10+02.63	77.83	77.74	77.68
+10	77.95	77.86	77.80
+20	78.12	78.02	77.96
+30	78.27	78.18	78.12
+40	78.44	78.34	78.29
+50	78.60	78.50	78.45
+60	78.76	78.66	78.61
+70	78.92	78.82	78.77
+71.50	78.94	78.85	78.80
+80	79.08	78.97	78.91
+90	79.24	79.11	79.04
11+00	79.40	79.24	79.16
+10	79.57	79.36	79.27
+20	79.73	79.47	79.36
+30	79.89	79.57	79.45
+40	80.05	79.66	79.53
+50	80.21	79.74	79.60
+60	80.37	79.82	79.68
+70	80.53	79.90	79.76
+79.11	80.67	79.97	79.83
+80	80.69	79.98	79.84
+80.50	80.70	79.98	79.84
+81.89	80.72	80.00	79.86
+90	80.86	80.06	79.92
12+00	81.01	80.14	80.00
+10	81.17	80.22	80.08
+20	81.33	80.29	80.15
+30	81.48	80.36	80.22
+40	81.64	80.43	80.29
+42.33	81.68	80.45	80.31

Notes for Wabo-Maurer Joint:
Do not use steel extrusions as screed support.
Steel extrusion shall conform to ASTM A36.
Structural steel shall conform to ASTM A588.
Steel assembly shall be shop welded to convenient lengths and butt welded in the field to desired length. Joint shall conform to grade of deck slab.
Steel assembly shall be sandblasted in the shop prior to painting.
Steel assembly shall receive one shop coat of epoxy zinc paint.
Neoprene extrusion shall be roughened with a wire brush before bonding to steel extrusion with Bon Lastic Adhesive. Groove in steel extrusion to be blown out with oil-free and water-free compressed air prior to installation of Neoprene extrusion.
The Wabo-Maurer joint assembly shall be installed in accordance with manufacturers recommended construction methods.



PLAN 1" LONGITUDINAL JOINT

	BY	DATE
MADE	G.C.C. J.L.K.	11-3-68 6-27-75
CHECKED	Y.C.P.	1-20-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Deck Elev.	T.E.M.	5-76
2	Deck Elev & Dim.	T.E.M.	9-8-75
1	Limit of pavement removal & 1" longit. joint revised, Det. A removed, ℄ Wabo-Maurer Jt. added	S.B.P.	8-25-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN UNITS 5, 6 AND 7

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

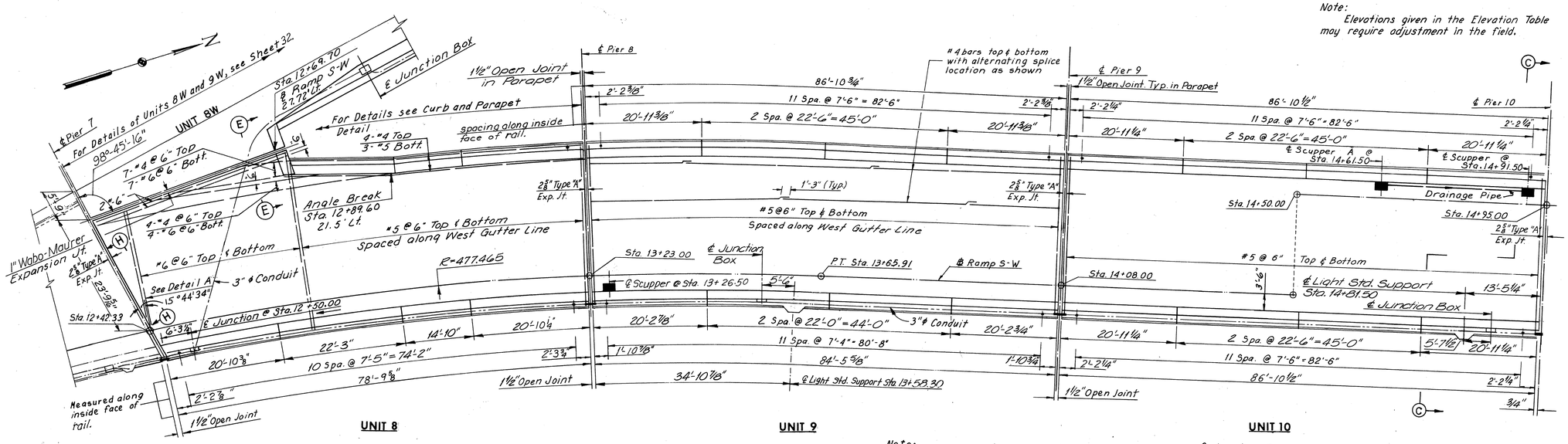
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 26 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	52	97

Note:
Elevations given in the Elevation Table may require adjustment in the field.

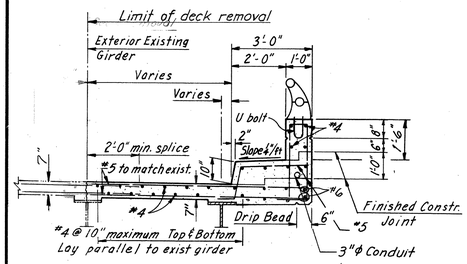
* Elev. given along ℄ of joint along lines radial to ℬ Ramp S-W

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
12+42.33	81.38	80.45	80.31
12+40	*81.53	—	—
12+50	*81.62	80.50	80.36
12+60	*81.72	80.57	80.43
12+70	*81.82	80.68	80.54
12+80	81.72	80.81	80.66
12+90	81.83	80.98	80.83
13+00	82.03	81.17	81.03
13+10	82.26	81.40	81.26
13+20	82.53	81.67	81.52
13+23	82.62	81.75	81.61
13+30	82.80	81.96	81.82
13+40	83.07	82.28	82.15
13+50	83.37	82.64	82.52
13+60	83.67	83.01	82.90
13+70	83.96	83.38	83.29
13+80	84.26	83.76	83.68
13+90	84.56	84.13	84.06
14+00	84.86	84.50	84.44
14+08	85.10	84.80	84.75
14+10	85.16	84.87	84.82
14+20	85.47	85.24	85.20
14+30	85.76	85.62	85.60
14+40	86.06	85.99	85.98
14+50	86.36	86.36	86.36
14+60	86.71	86.72	86.79
14+70	87.03	87.05	87.19
14+80	87.32	87.35	87.57
14+90	87.57	87.62	87.91
14+95	87.69	87.74	88.08

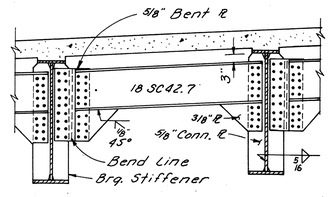


Note:
Piers 8, 9 and 10 are not skewed.

DECK PLAN
Scale: 1"=10'-0"

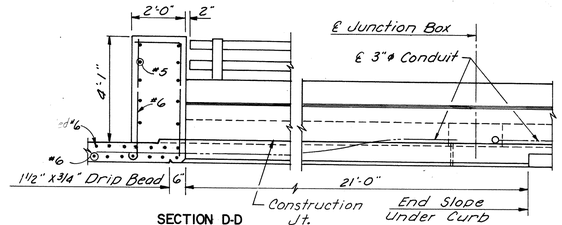


SECTION B-B
Scale: ⅜"=1'-0"

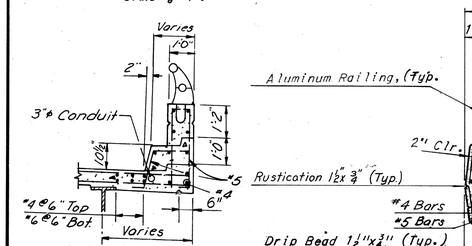


End Diaphragm Typical for South End Unit 8

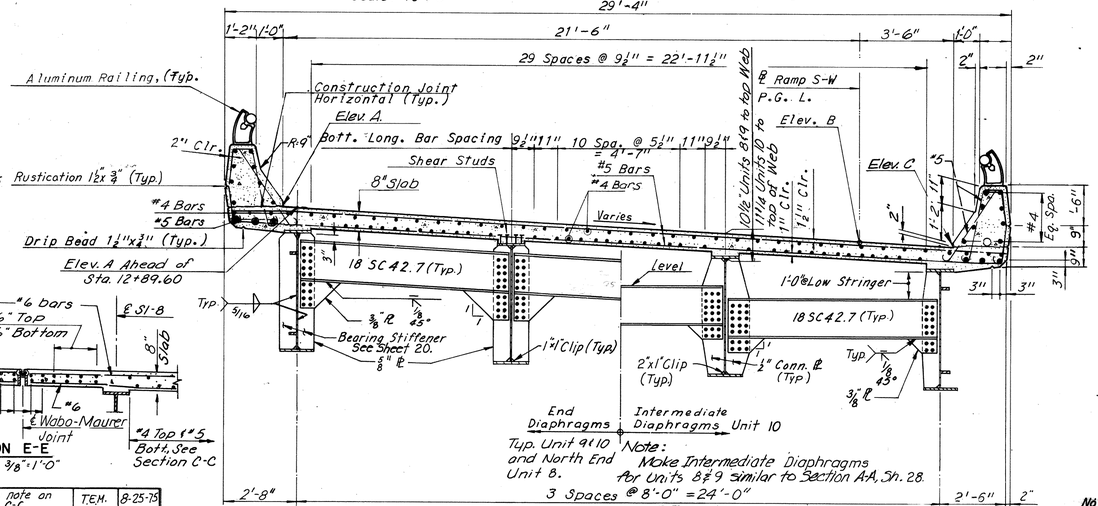
SECTION H-H
Scale: ⅜"=1'-0"



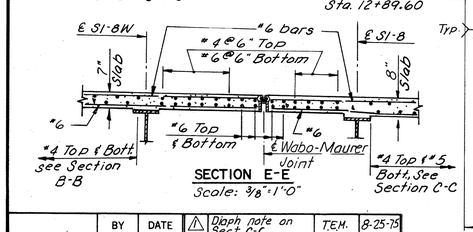
SECTION D-D
Scale: ⅜"=1'-0"



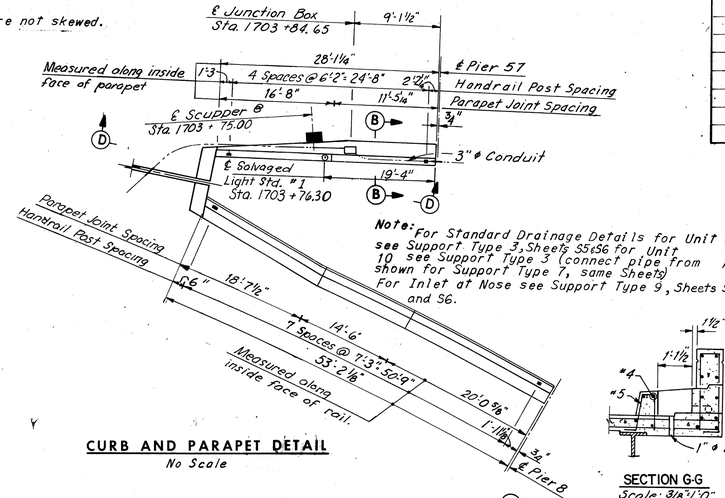
SECTION F-F
Scale ⅜"=1'-0"



SECTION C-C
Scale: ⅜" = 1'-0"

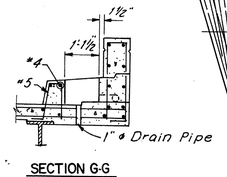


SECTION E-E
Scale: ⅜"=1'-0"

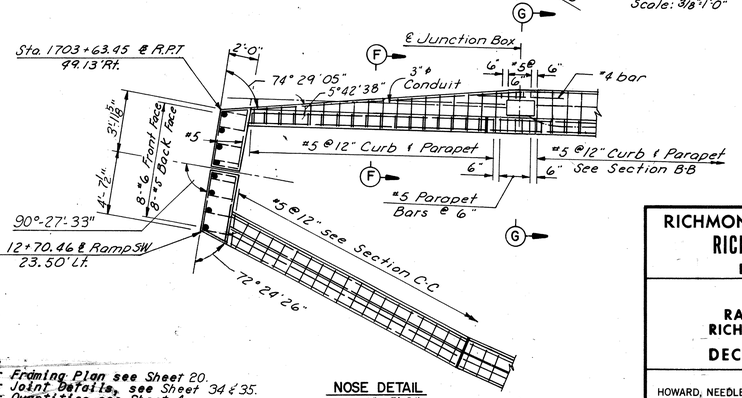


CURB AND PARAPET DETAIL
No Scale

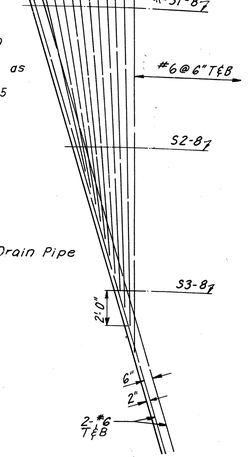
Note:
For Standard Drainage Details for Unit 9 see Support Type 3, Sheets 55 & 56 for Unit 10 see Support Type 3 (connect pipe from A as shown for Support Type 1, same Sheets) For Inlet at Nose see Support Type 9, Sheets 55 and 56.



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



NOSE DETAIL
Scale: 1"=5'-0"



DETAIL A
Scale ¼"=1'-0"

AS BUILT

Notes:
For Framing Plan see Sheet 20.
For Joint Details, see Sheet 34 & 35.
For Quantities see Sheet 4.
For Handrail Details, see Sheet 58.

	BY	DATE
MADE	C.E.B.	1-30-69
CHECKED	R.C.	4-22-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Daph note on Sect C-C	T.E.M.	8-25-75
2	Limit of slab removal, longit. joint, slab thickness & #6 bundled bars rev.	J.B.P.	8-25-75
3	Section B-B	TEM	11-76
4	Joint Location	PRY	10-76
5	Deck Elev.	T.E.M.	9-8-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

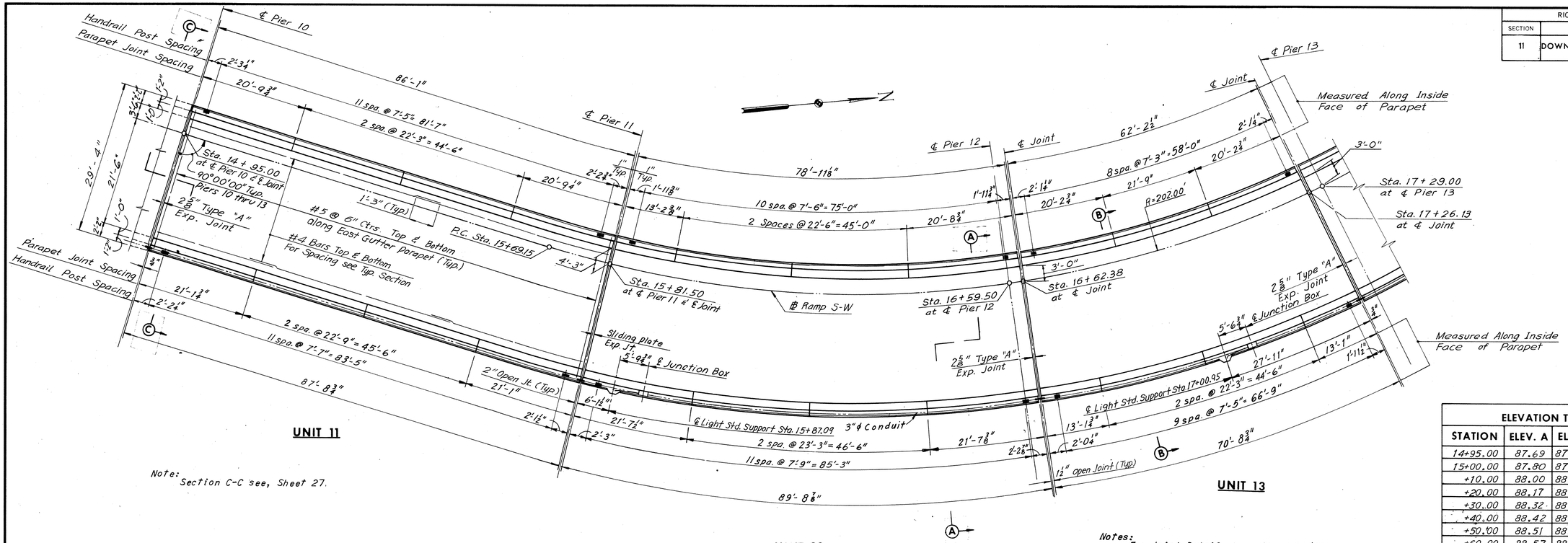
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN UNITS 8, 9 AND 10

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

SCALE: As Noted
CONTRACT NO 11
SHEET NO 27 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	53	97



UNIT 11

Note: Section C-C see, Sheet 27.

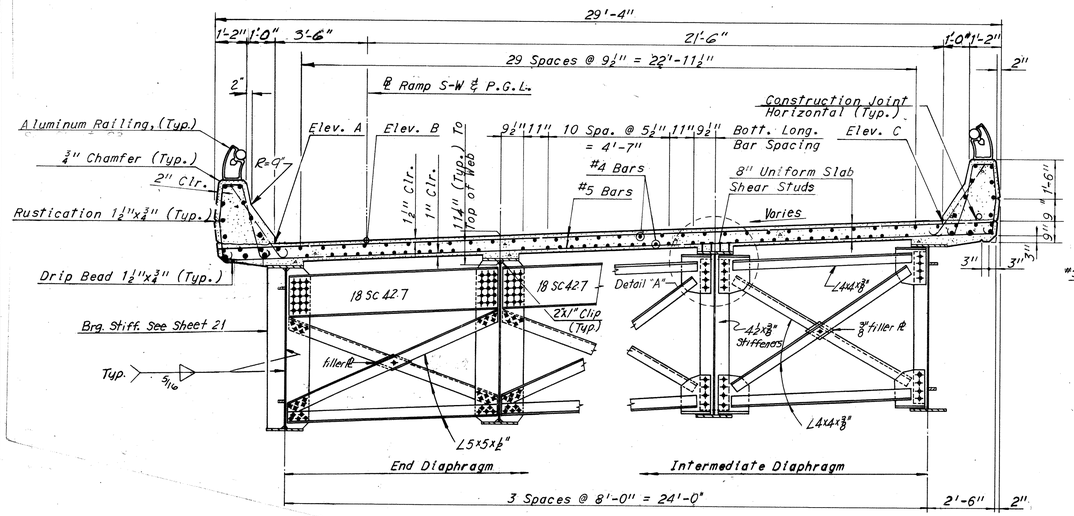
UNIT 12

UNIT 13

DECK PLAN
Scale : 1"=10'-0"

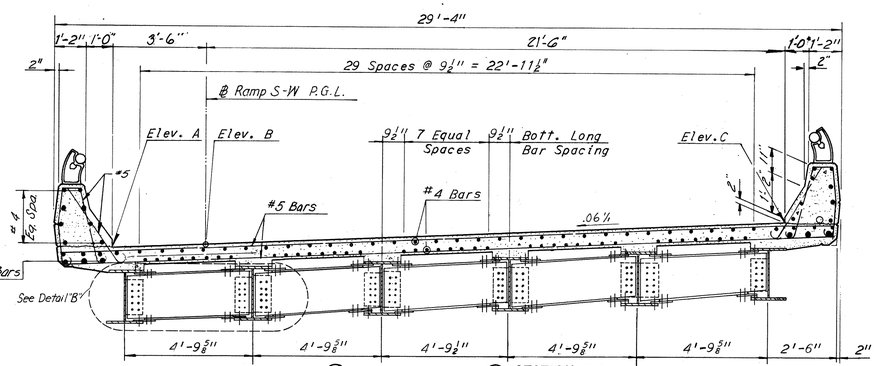
Notes:
For Joint Details, see Sheet 34 & 35.
For Framing Plan, see Sheet 21.
For Steel and Concrete Quantities, see Sheet 4.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 6, Sheets 55 & 56.
For Superstructure details, see Sheet 32.

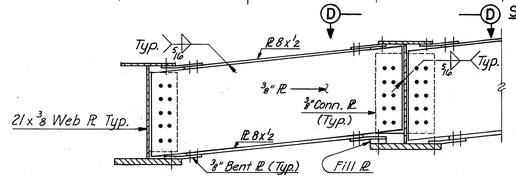
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
14+95.00	87.69	87.74	88.07
15+00.00	87.80	87.86	88.23
+10.00	88.00	88.07	88.51
+20.00	88.17	88.26	88.77
+30.00	88.32	88.41	89.00
+40.00	88.42	88.54	89.20
+50.00	88.51	88.63	89.37
+60.00	88.57	88.70	89.51
+70.00	88.60	88.74	89.63
+80.00	88.60	88.75	89.71
+81.50	88.60	88.75	89.72
+90.00	88.57	88.73	89.76
16+00.00	88.50	88.69	89.80
+10.00	88.42	88.61	89.79
+20.00	88.31	88.51	89.73
+30.00	88.17	88.37	89.63
+40.00	88.00	88.21	89.49
+50.00	87.81	88.02	89.31
+59.50		87.81	
+60.00	87.59	87.80	89.09
+62.38	87.53	87.74	89.03
+70.00	87.34	87.55	88.84
+80.00	87.06	87.27	88.56
+90.00	86.75	86.96	88.25
17+00.00	86.41	86.62	87.91
+10.00	86.05	86.26	87.55
+20.00	85.65	85.86	87.15
+26.12	85.40	85.61	86.90
+29.00		85.49	



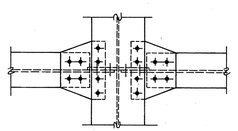
SECTION A-A
Scale: ⅜" = 1'-0"

Note: For Detail A, See Sheet 31.





DETAIL B
Scale: ¾"=1'-0"



VIEW D-D
Scale: ¾"=1'-0"

	BY	DATE
MADE	SCC	10-31-68
CHECKED	G.S.H	1-14-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Detail 'B' & View D-D revised	A.B.P.	8-25-76

AS BUILT

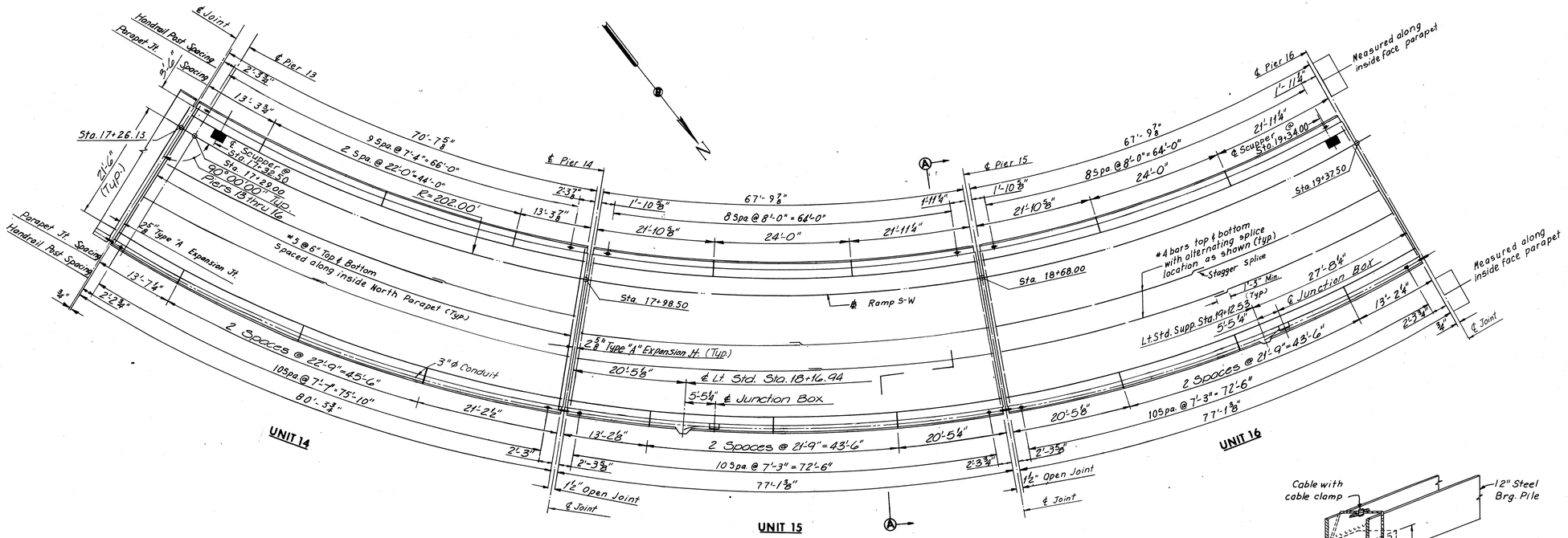
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 11 12 AND 13

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

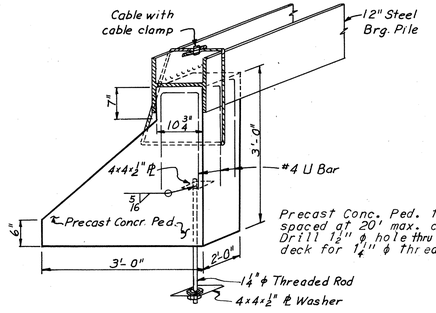
SCALE:
CONTRACT NO. 11
SHEET NO. 28 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	54	97

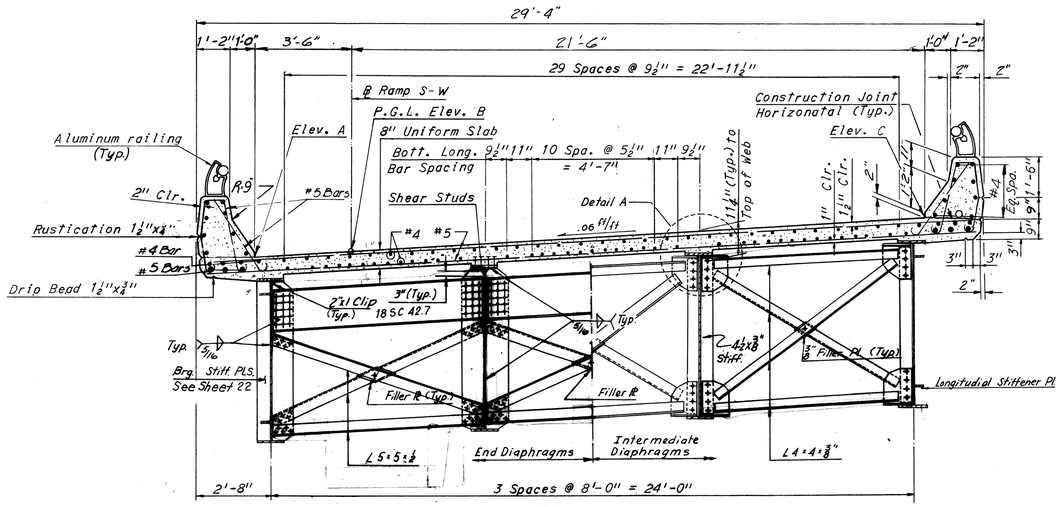


DECK PLAN
Scale: 1" = 10'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
17+29.00	85.28	85.49	86.78
+30.00	85.23	85.44	86.73
+40.00	84.78	84.99	86.28
+50.00	84.30	84.51	85.80
+60.00	83.74	84.00	85.29
+70.00	83.25	83.46	84.75
+80.00	82.68	82.89	84.18
+90.00	82.09	82.30	83.59
+98.50	81.56	81.77	83.06
18+00.00	81.46	81.67	82.96
+10.00	80.82	81.03	82.82
+20.00	80.18	80.39	81.68
+30.00	79.54	79.75	81.04
+40.00	78.90	79.11	80.40
+50.00	78.26	78.47	79.74
+60.00	77.62	77.83	79.12
+68.00	77.11	77.32	78.61
+70.00	76.98	77.19	78.48
+80.00	76.36	76.57	77.86
+90.00	75.75	75.96	77.25
19+00.00	75.12	75.33	76.62
19+10.00	74.52	74.72	75.93
19+20.00	73.93	74.12	75.24
19+30.00	73.37	73.54	74.57
19+37.50	72.98	73.13	74.09



PROPOSED TEMPORARY FIXED TRAFFIC BARRICADE



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

Notes:
For Framing Plan see Sheet 22
For Joint Details, see Sheet 34 & 35
For Quantities see Sheet 4
For Handrail Details, see Sheet 33.

Note:
For Detail A, see Sheet 31.

Note: For Standard Drainage Details for Units 14 and 16, see Support Type 3 Sheets 55 & 56.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	12-10-68				
CHECKED	Y.C.P	1-15-69				
IN CHARGE						

AS BUILT

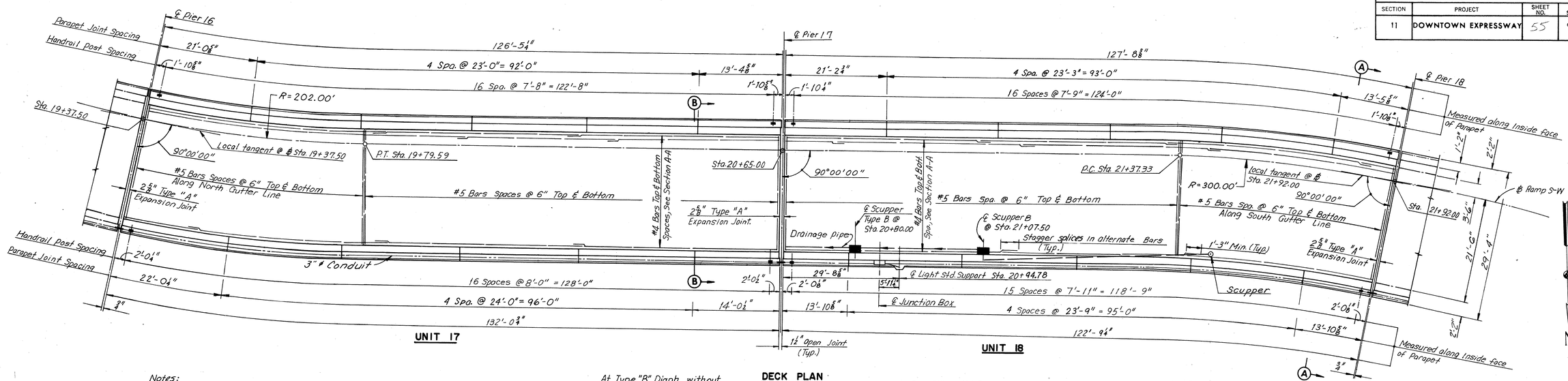
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 14,15 AND 16

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

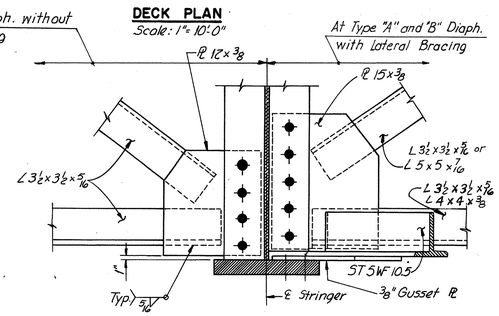
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 29 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	55	97

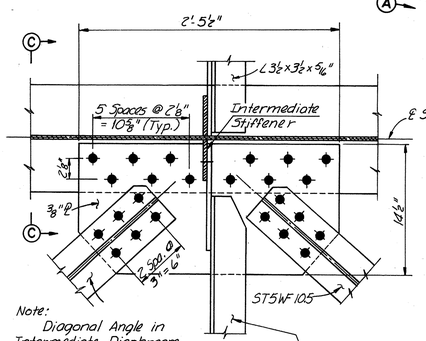


Notes:
For Framing Plan see Sheet 23.
For Joint Details, see Sheet 35.
For Quantities, see Sheet 4.
For Handrail Details see Sheet 53.
For Standard Drainage Details for Unit 18, see Support Type 3, Sheets 55 & 56 (connect pipe from A to pipe from B as shown for Support Type 7).

DECK PLAN
Scale: 1"= 10'-0"



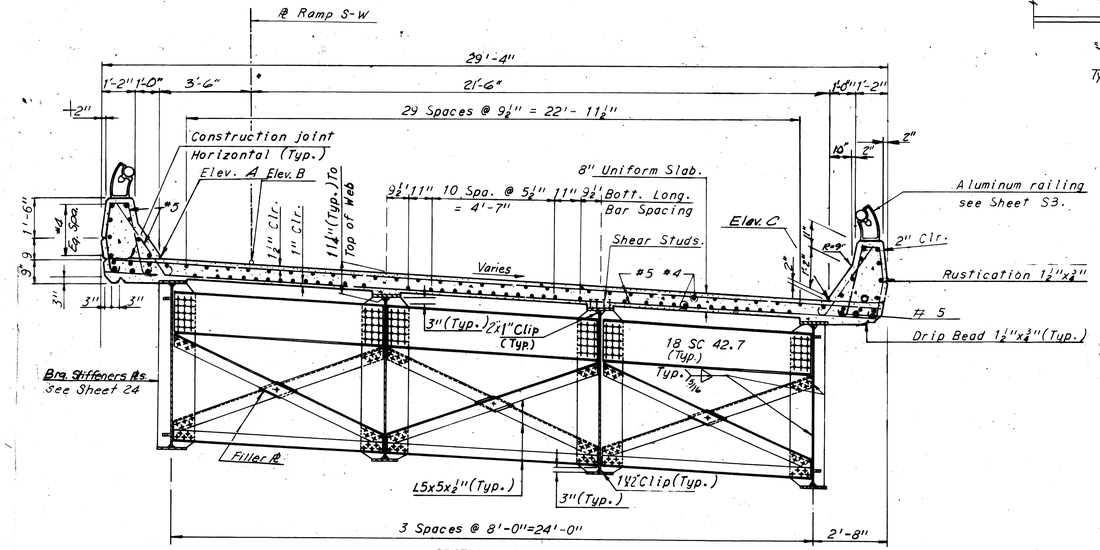
SECTION C-C
Scale: 1½"= 1'-0"



Note:
Diagonal Angle in Intermediate Diaphragm is not shown.

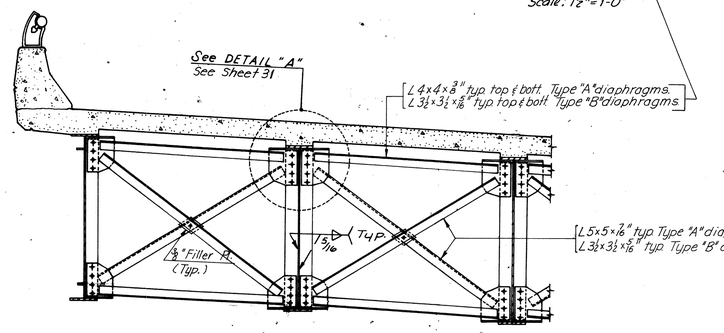
DETAIL C
Scale: 1½"= 1'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
19+37.50	72.98	73.13	74.09
+40.00	72.85	73.00	73.94
+50.00	72.38	72.52	73.38
+60.00	71.95	72.08	72.86
+70.00	71.56	71.68	72.37
+80.00	71.21	71.31	71.97
+90.00	70.89	70.98	71.49
20+00.00	70.61	70.68	71.11
+10.00	70.36	70.42	70.77
+20.00	70.15	70.20	70.46
+30.00	69.98	70.01	70.18
+40.00	69.85	69.86	69.94
+50.00	69.74	69.74	69.74
+60.00	69.68	69.66	69.56
+65.00	69.66	69.64	69.48
+70.00	69.65	69.62	69.42
+80.00	69.67	69.61	69.30
+90.00	69.71	69.64	69.23
21+00.00	69.79	69.71	69.20
+10.00	69.89	69.79	69.18
+20.00	70.00	69.88	69.15
+30.00	70.10	69.96	69.13
+40.00	70.19	70.05	69.12
+50.00	70.29	70.13	69.10
+60.00	70.40	70.21	69.07
+70.00	70.50	70.30	69.06
+80.00	70.59	70.38	69.09
+90.00	70.68	70.47	69.18
+92.00	70.70	70.49	69.20



SECTION A-A
Scale: ⅜"=1'-0"
END DIAPHRAGM

Note:
For location of End diaphragms See Sheet 23.



SECTION B-B
INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

Note:
For location of Intermediate diaphragms Types "A" and "B" see Sheet 23.

	BY	DATE
MADE	R.C.	11.18.68
CHECKED	Y.C.P	1-14-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Diaph.	TEM	3-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

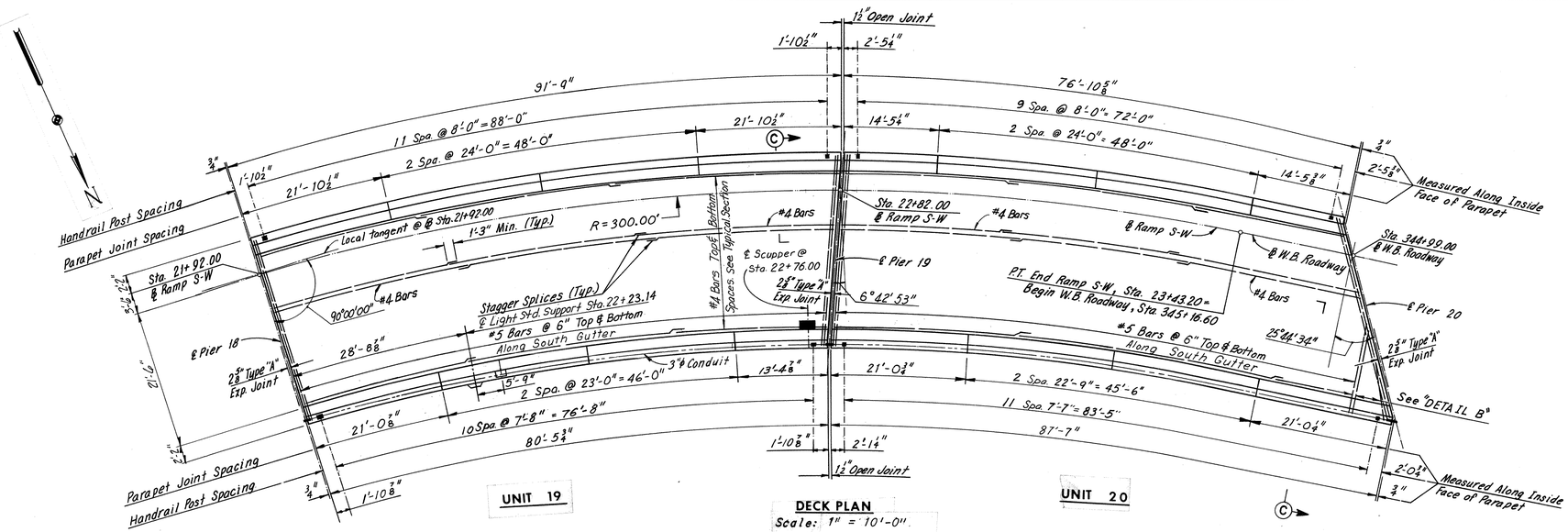
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 30 OF 38

55

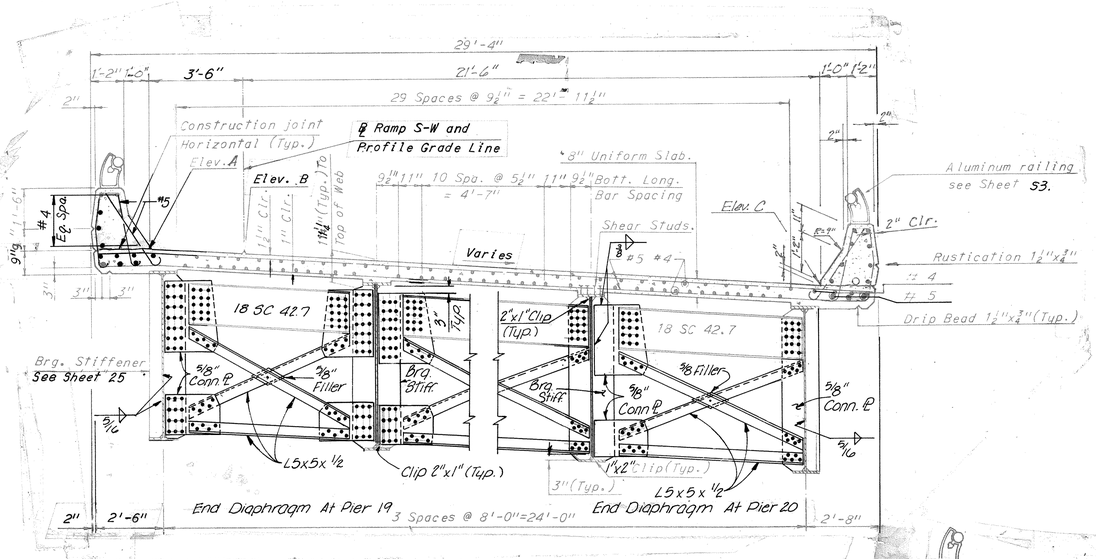
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	56	97



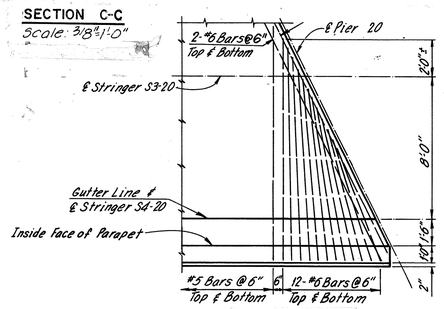
DECK PLAN
Scale: 1" = 10'-0"

ELEVATION TABLE

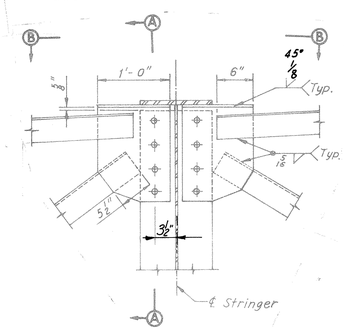
STATION	ELEV. A	ELEV. B	ELEV. C
21+92.00	70.70	70.49	69.26
22+00.00	70.76	70.55	69.32
+10.00	70.84	70.63	69.40
+20.00	70.93	70.72	69.49
+30.00	71.01	70.80	69.57
+40.00	71.09	70.88	69.65
+50.00	71.18	70.97	69.74
+60.00	71.26	71.05	69.82
+70.00	71.35	71.14	69.91
22+79.34	—	—	69.99
+80.00	71.43	71.22	69.99
+82.00	—	71.24	—
22+82.35	71.45	—	—
+90.00	71.51	71.30	70.07
23+00.00	71.60	71.39	70.14
+10.00	71.67	71.47	70.32
+20.00	71.74	71.56	70.48
+30.00	71.81	71.64	70.59
+40.00	71.88	71.72	70.75
23+43.20	71.90	71.75	70.80
345+16.60	71.90	71.75	70.80
345+10.00	71.95	71.81	70.91
345+00.45	72.02	—	—
345+00.00	72.03	71.89	71.07
344+99.00	—	71.90	—
344+88.87	—	—	71.25



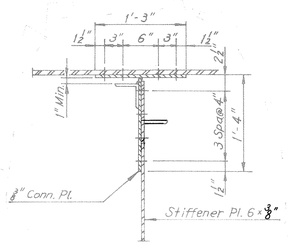
Note:
For details of end diaphragm at Pier 18 see Section A-A, Sheet 32.



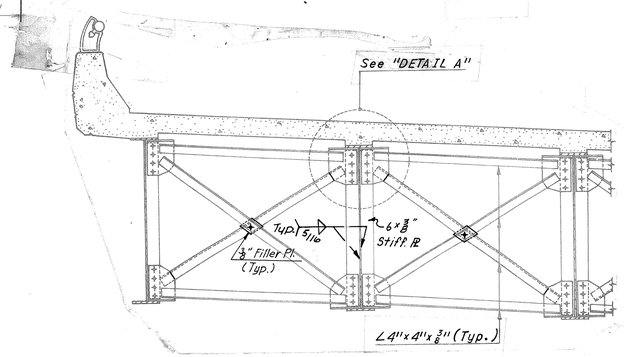
DETAIL B
Scale: ½" = 1'-0"



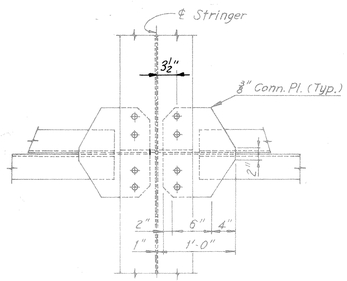
DETAIL A
No Scale



SECTION A-A
No Scale



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"



VIEW B-B
No Scale

Notes:
For Framing Plan see Sheet 24
For Joint Details, see Sheet 37 & 38
For Quantities see Sheet 4.
For Handrail Details, see Sheet 53.

Note:
For Standard Drainage Details for Unit 20 see Support Type 2 Sheet 35.

	BY	DATE				
MADE	D.E.S.					
CHECKED	Y.C.P	1-14-69	⚠	Dim. Det. A View B-B Diaph. Conn. Pier 20	T.E.M	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

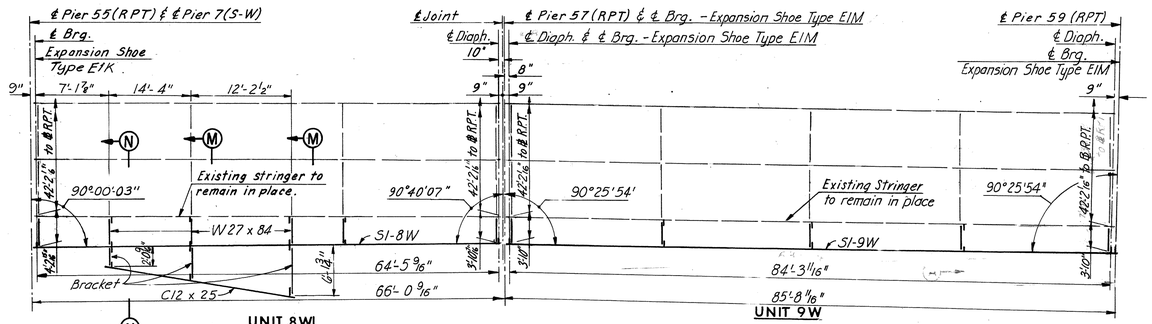
DECK PLAN - UNITS 19 AND 20

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

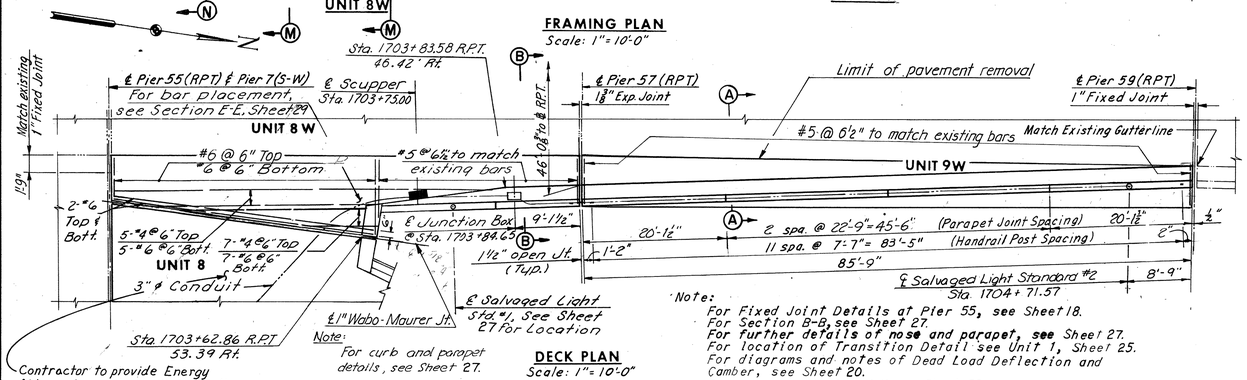
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 31 OF 38

56

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	57	97



FRAMING PLAN
Scale: 1"=10'-0"



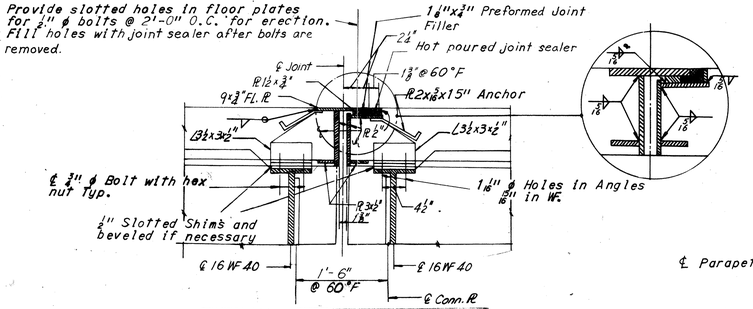
Contractor to provide Energy Attenuator - 8 Unit Hi-Dro Cell Sandwich Unit as supplied by Hydro-Cell, Ltd., 11 Lincoln Ave., New Rochelle, N.Y. 10801

Note: For curb and parapet details, see Sheet 27.

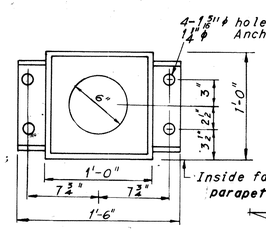
DECK PLAN
Scale: 1"=10'-0"

Note:
For Fixed Joint Details at Pier 55, see Sheet 18.
For Section B-B, see Sheet 27.
For Further details of nose and parapet, see Sheet 27.
For location of Transition Detail see Unit 1, Sheet 25.
For diagrams and notes of Dead Load Deflection and Camber, see Sheet 20.
For Sections M-M & N-N see Sheet 20a.

Provide slotted holes in floor plates for ¾" ℄ bolts @ 2'-0" O.C. for erection. Fill holes with joint sealer after bolts are removed.

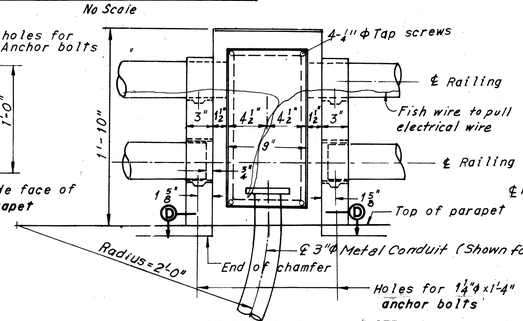


EXPANSION JOINT DETAIL - PIER 57
No Scale



SECTION D-D
Scale: 1½"=1'-0"

SHOE SCHEDULE	
EXPANSION SHOES	
TYPE	NO. REQD.
EIM	3
EIK	1

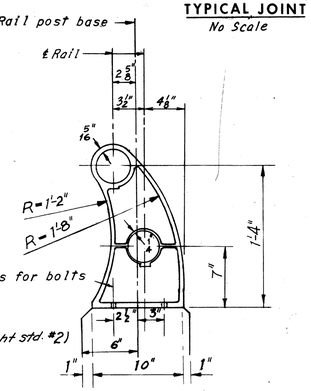


DETAILS OF SALVAGED LIGHT STD. BASE
Scale: 1½"=1'-0"

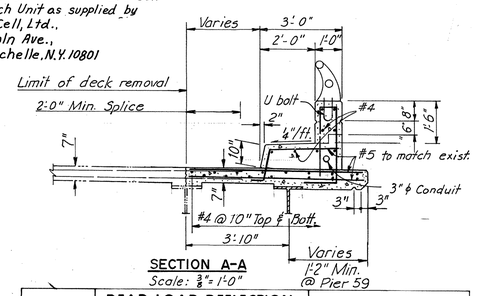
Hand tighten north set screws at joint

Provide joint at every other post except end post.

TYPICAL JOINT
No Scale

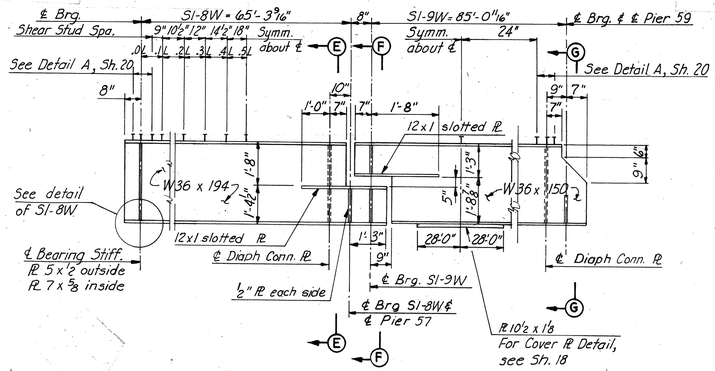


SALVAGED RAIL POST
Scale: 1½"=1'-0"

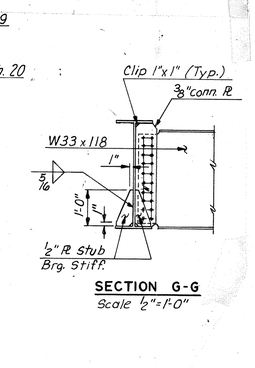


SECTION A-A
Scale: ¾"=1'-0"

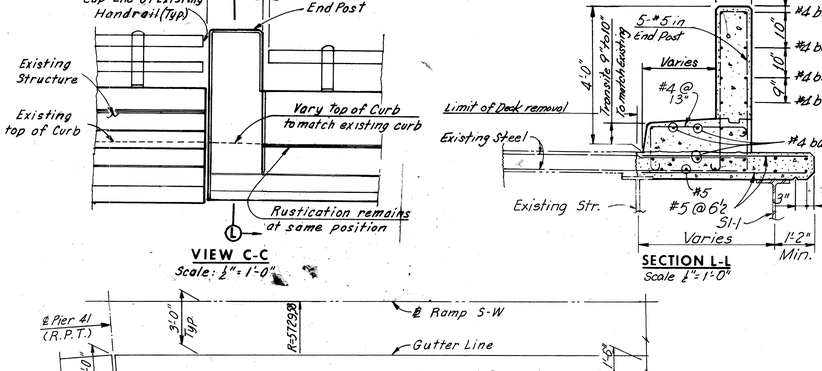
	DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
STRINGER	¼L	½L	¾L	¼L	½L	¾L
SI-8W	1 13/16"	1 7/16"	1 3/16"	1⅛"	1 7/16"	1"
SI-9W	1½"	1⅞"	1½"	2"	2¼"	2"



STRINGER ELEVATION SI-8W & SI-9W
No Scale

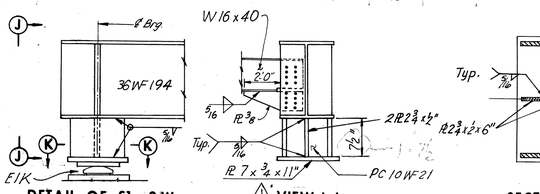


SECTION G-G
Scale ½"=1'-0"



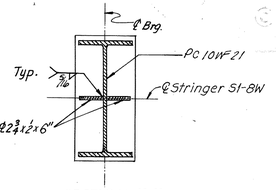
VIEW C-C
Scale: 1"=1'-0"

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

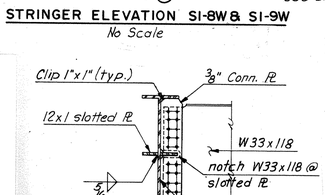


DETAIL OF SI-8W
No Scale

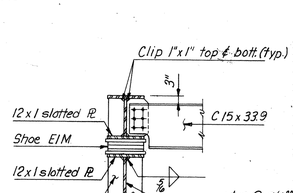
VIEW J-J
No Scale



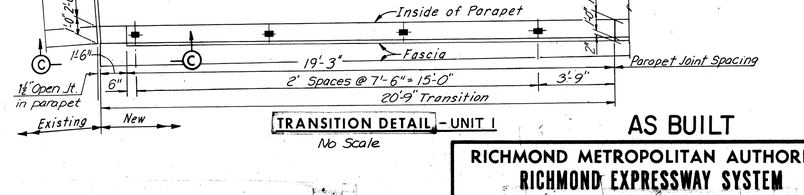
SECTION K-K
No Scale



SECTION E-E
Scale ½"=1'-0"



SECTION F-F
Scale ½"=1'-0"



TRANSITION DETAIL - UNIT 1
No Scale

AS BUILT

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparation of shop drawings for new metalwork.
New Diaphragms are to match Existing Diaphragms unless otherwise shown.

	BY	DATE
MADE	AMH	2-19-69
CHECKED	RCT	5-8-69
IN CHARGE		

NO.	REVISION	BY	DATE
⚠	Bracket Dimensions	P.R.Y.	10-76
⚠	Dimensions Added	T.E.M.	9-9-75
⚠	Angle @ Pier 7	T.E.M.	9-5-75
⚠	Major revisions	A.B.P.	8-25-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

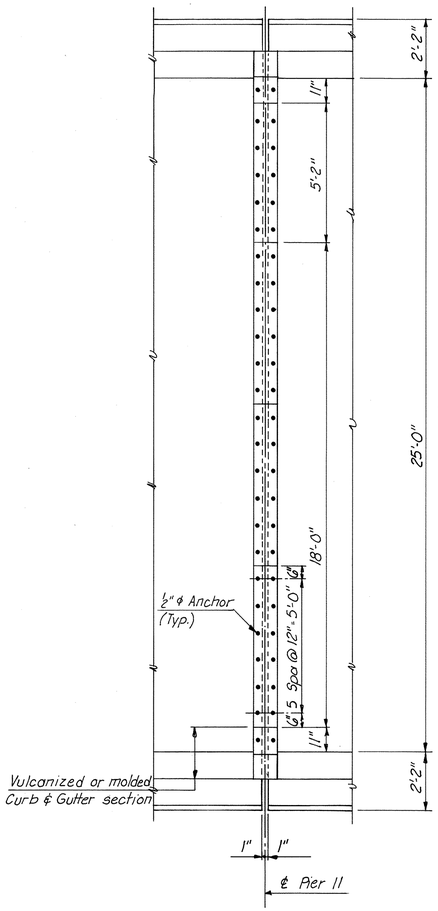
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
SUPERSTRUCTURE DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 32 OF 38

57

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
		59A	



PLAN

NOTE

Plan is shown for Transflex 200A. Onflex 25 is similar except as noted under Notes Onflex 25.

NOTES

*Dimension shown is at 60° F. For Dim. "W", "X" and "Y" adjustment due to temparture change, see Adjustment Schedule.

Reinforced Elastomeric Expansion Dam, Transflex type 200A or Onflex type 25, to be installed in accordance with the manufacturer's specifications. The manufacturer's representative shall be present during installation.

Shop drawings, showing complete details and dimensions of the dam and other pertinent information for installation of a practical leakproof joint, shall be prepared in accordance with these specifications. Review of shop drawings by the Engineer shall be required prior to installation of the expansion dam.

TRANSFLE 200A

Curb and gutter sections shall be a one piece molded section or shall be pre-assembled by the manufacturer and all joints therein vulcanized.

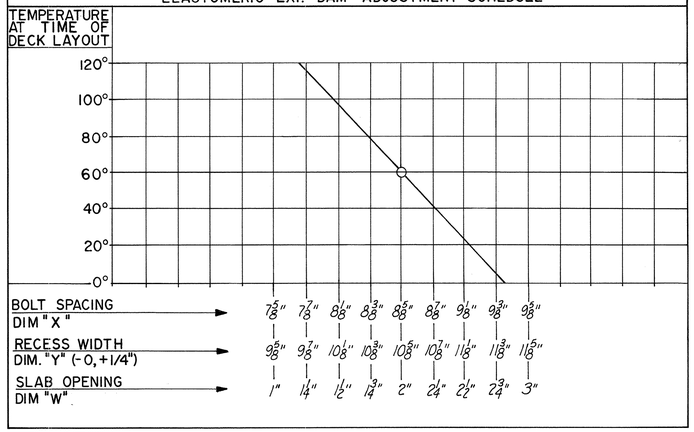
Units of the dam shall have tongue and groove joints at the ends of all units to provide for a positive leakproof connection between adjacent units.

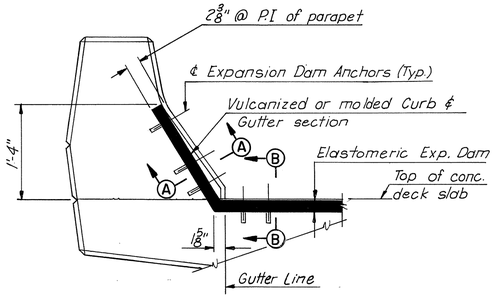
ONFLEX 25

Elastomeric membrane shall be one piece premolded unit extending full length of the aluminum extrusion.

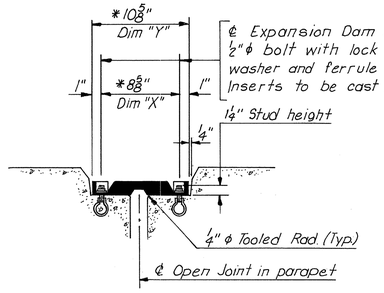
Aluminum extrusions to be continuous with mitered and welded joints at the gutter lines.

ELASTOMERIC EXP. DAM ADJUSTMENT SCHEDULE

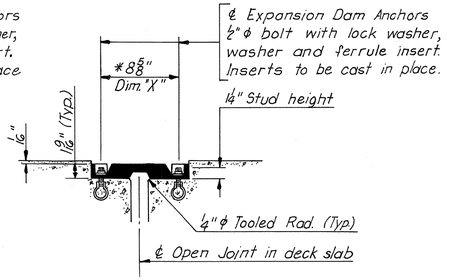




TYPICAL SECTION ALONG ℄ JOINT

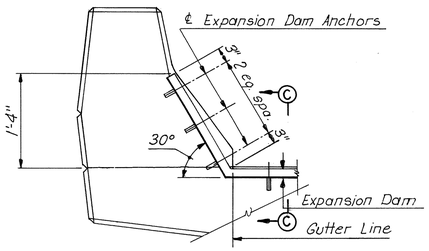


SECTION A-A

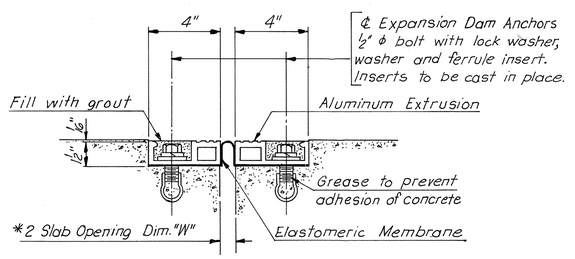


SECTION B-B

TRANSFLEX 200A JOINT DETAILS



TYPICAL SECTION ALONG ℄ JOINT



SECTION C-C

ONFLEX 25 JOINT DETAILS

DESIGNED						
DRAWN	TEM	9-30-76				
CHECKED			1	New Sheet '	TEM	9-30-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

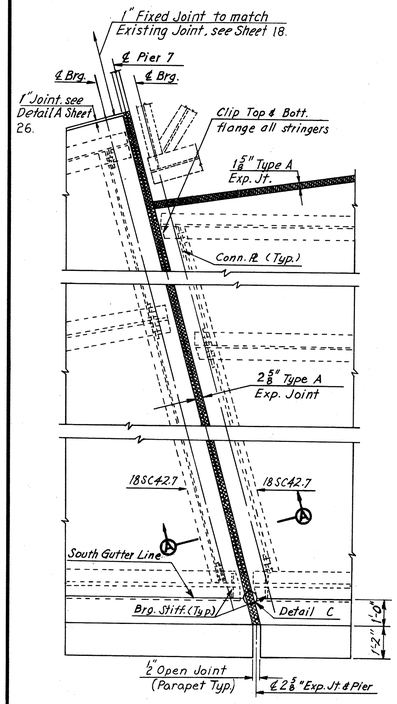
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS - PIER II

SCALE _____
DATE _____
SHEET 34A OF ____

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

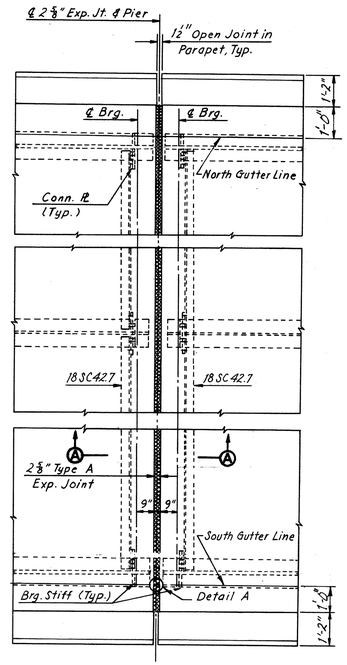
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	59	97



PLAN — JOINT AT PIER 7

Scale : ⅜" = 1'-0"

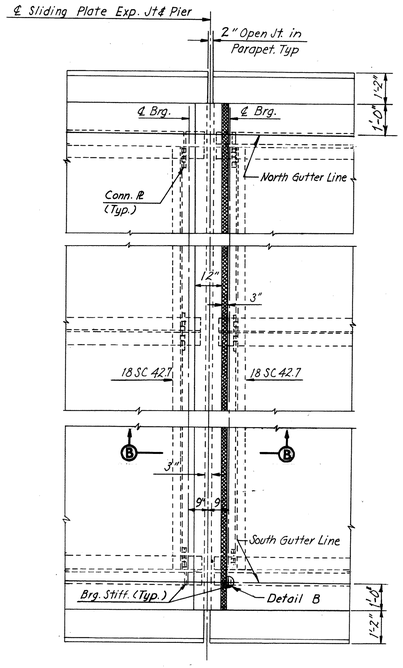
Note :
For Detail C, See Sheet 35.



PLAN — JOINT AT PIERS 8, 9, 10, 17 AND 18

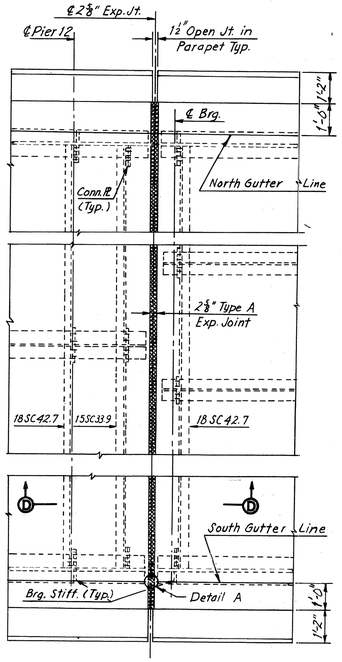
Scale : ⅜" = 1'-0"

(Piers 4 and 5 similar)



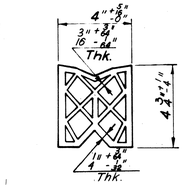
PLAN — JOINT AT PIER 11

Scale : ⅜" = 1'-0"

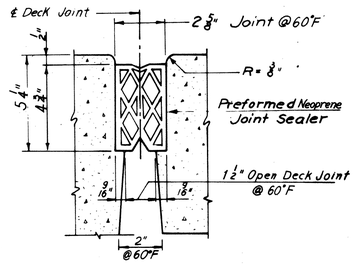


PLAN — JOINT AT PIER 12

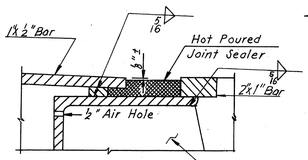
Scale : ⅜" = 1'-0"



PREFORMED NEOPRENE JOINT SEALER FOR 2 5/8" TYPE "A" JOINT

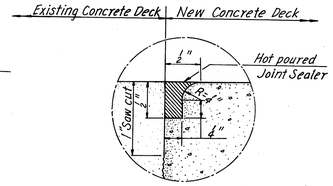


2 5/8" TYPE "A" JOINT



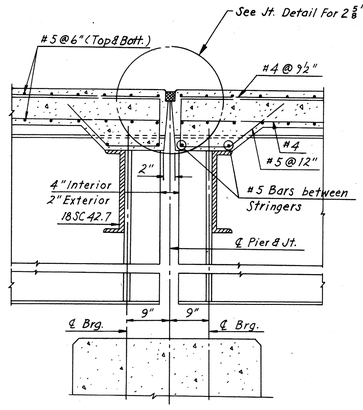
DETAIL B

Scale : 3"=1'-0"



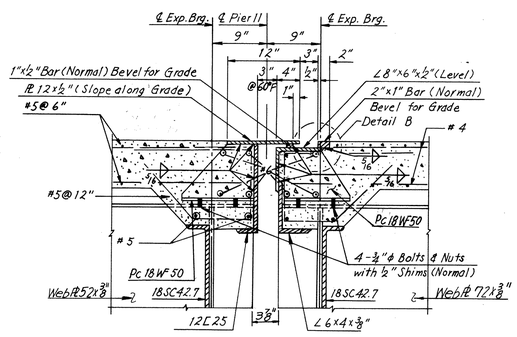
DETAIL D

Full Scale



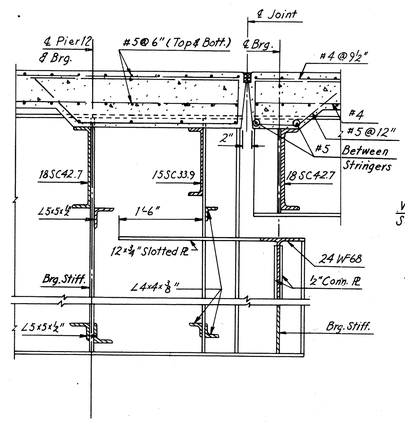
SECTION A-A

Scale : ¼" = 1'-0"



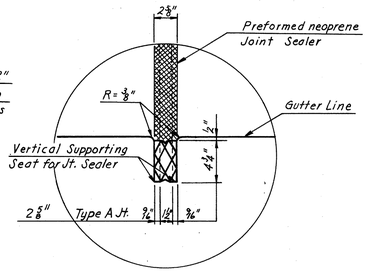
SECTION B-B

Scale : 1"=1'-0"



SECTION D-D

Scale : ¾"=1'-0"



DETAIL A

No Scale

For Piers 17 and 18 see Section C-C, Sheet 35.

Note:
All horizontal dimensions shown above are normal to ℄ Joint.

Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	12-18-68				
CHECKED	G.S.H.	1-29-69				
IN CHARGE						

AS BUILT

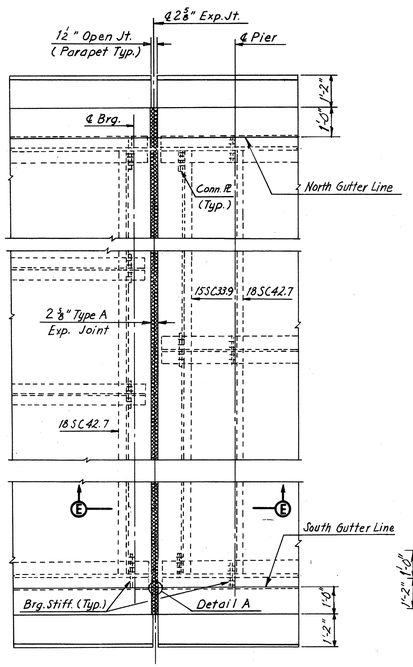
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

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

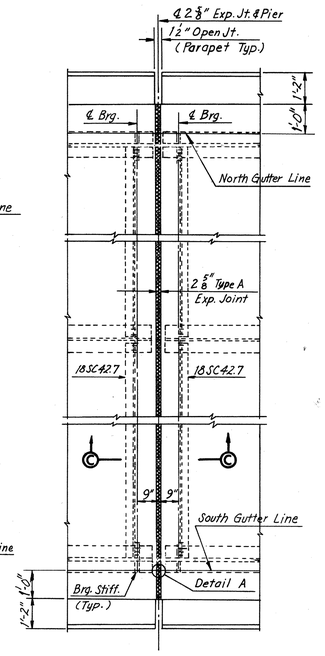
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 34 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	60	97



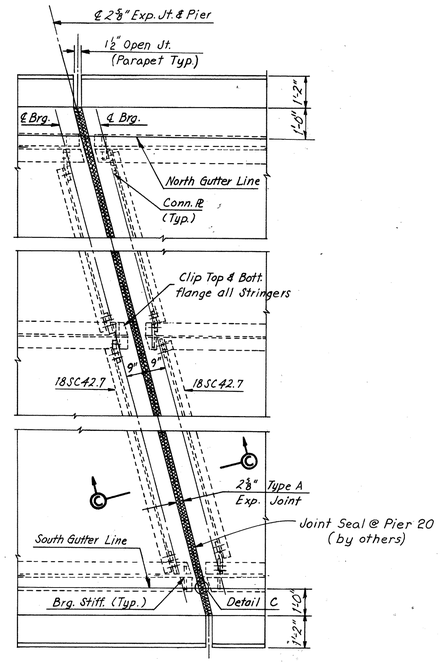
PLAN — JOINT AT PIER 13

Scale: ⅜" = 1'-0"



PLAN — JOINT AT PIERS 14, 15 AND 16

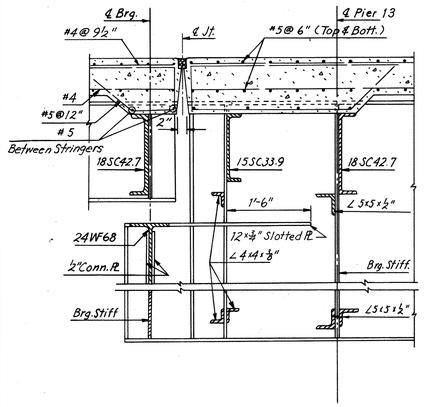
Scale: ⅜" = 1'-0"



PLAN — JOINT AT PIERS 19 AND 20

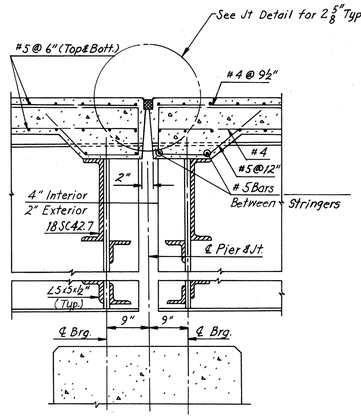
Scale: ⅜" = 1'-0"

Note: For Detail A, See Sheet 34



SECTION E-E

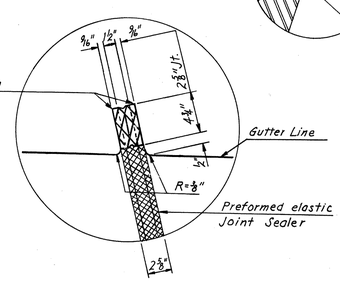
Scale ⅜" = 1'-0"



SECTION C-C

Scale ½" = 1'-0"

Vertical Supporting Seat for Jt. Sealer

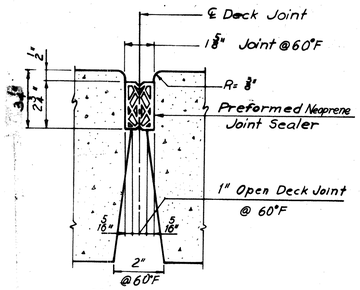


DETAIL C

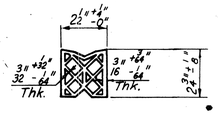
No Scale

Note: All horizontal dimension of sections shown above are normal to ℄ joint and pier.

Notes: For Details of bearing stiffeners and connection plates, see Framing Plan Sheets.
For End Diaphragms, See Cross Sections-Deck Plan Sheets.

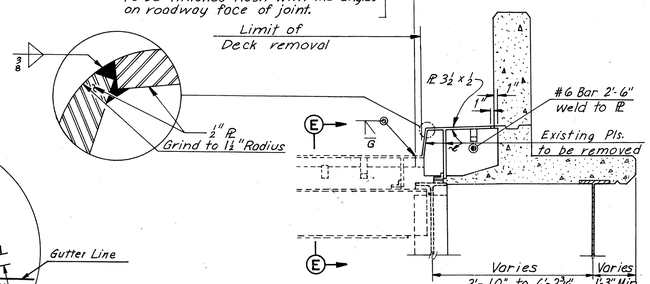


1⅝" TYPE "A" JOINT



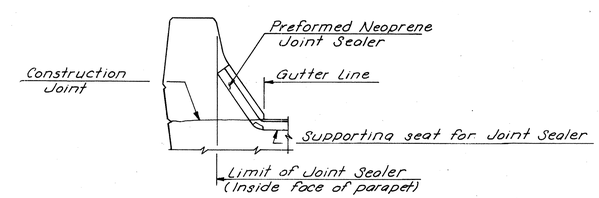
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" JOINT

Curb portion of existing expansion joints is to be removed beyond the curbline an amount sufficient for performance of single bevel groove weld between existing and new pair of L's 4 x 3½ x ½". The weld is to be finished flush with the angles on roadway face of joint.



EXPANSION JOINT AT EXISTING PIER 41

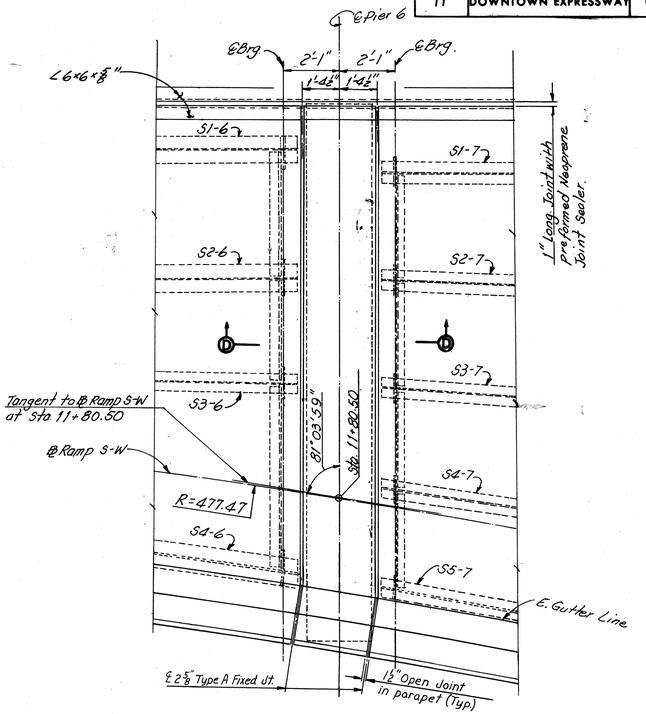
Scale: ½" = 1'-0"



TREATMENT OF TYPE "A" JOINT AT GUTTER

No Scale

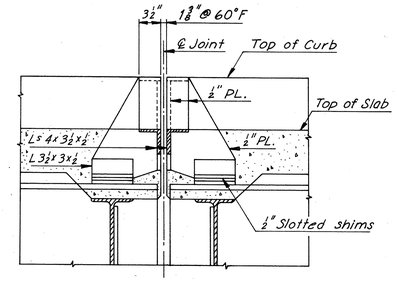
Note: All horizontal dimensions shown above are normal to ℄ Joint.



PLAN - JOINT AT PIER 6

Scale ⅜" = 1'-0"

Note: For Section D-D, see Sheet 7 & 26.



SECTION E-E

Scale: 1" = 1'-0"

	BY	DATE				
MADE	Y. C. P	12-18-68				
CHECKED	G.S.H.	1-28-69	△	Revised Exp. Jt. at Pier 41	TEM	9-9-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 35 OF 38

60

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	61	97

BORING DS65-1

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
21'	3	8	S-1	5'-2.5'	21'	.5 Cobblestone
	5 12	16				
	9	26				Brown M-F Sand, Some Wood, Little Silt Trace M-f Gravel (FILL)
	29					
16	27 12	18	S-2	4'-6'		
	31 21	22				
	8				-14.0	
	10					
	11					Black Organic Clayey Silt, Little M-f Sand, Trace Granite, Cinders (FILL)
11	12 1	2	S-3	9'-11'		
	14 3	11			-4.0	
	16					
	21					
	24					
6	8 11	9	S-4	14'-16'		
	8 7	8				
	9					
	12					
(0)	16					
1	24 20	18	S-5	19'-21'		
	11 17	12				
	14					
	14					Brown C-f Sand, Some Silt, Trace C-f Gravel
	21					
-4	35					
	25 18	21	S-6	25-27		
	20 17	14				
	19 10	10	S-7	27-29		
	20 14	14				
-9	21					
	8					
	12					
	20				-19.5	
	100/.5		C-1	33.5-38.5'		(C-1: 50% Rec)
-14	15Min					
	10Min					
	14Min					
	16Min					Gray Hard Granite
	16Min		C-2	38.5'-43.5'		
-19	22Min					(C-2: 75% Rec.)
	18Min					
	16Min					
	16Min					
	24Min					

Bottom of Hole Elev. -22.5

BORING DS65-2

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
19.0	5	6 16	S-1	0'-2'	19.0	Brown M-f Sand, Some M-f Gravel Little Silt, Trace Brick, Cinders, (FILL)
	10	16 18				
	12				-16.0	
	16					
14.0	18	3 4	S-2	4'-6'		
	12	6 7				
	4					
	1					
	15					
9.0	14	6 10	S-3	9'-11'		
	7	7 7				
	6					
	8					Gray Clayey Silt, Little M-f Sand, Trace M-f Gravel, Brick Cinders (FILL)
(0)	8					
4.0	6	2 3	S-4	14'-16'		
	6	4 2				
	8					
	2					
	4					
-1'	4	2 4	S-5	19'-21'		
	4	3 3				
	4					
	5				-6.0	
	7					
-6'	14	4 7	S-6	24-26		
	14	7 8				
	8					Gray M-f Sand, Some Silt
	12					
	14				-10.5	
-11	14	10 88	S-7	29-30.3		
	24	100				Gray Decompsoed Granite
	250/.6				-13.3	
	12Min		C-1	32.5'-37.5'		(C-1: 90% Rec.)
	8Min					
-16'	9Min					Gray Hard Granite
	12Min					
	14Min					

Bottom of Hole Elev. -18.5'

BORING DS65-3

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.4	50	33 17	S-1	0' 2'	20.4	.5' Gravel (FILL)
	30	15 12				
	20					
	18					
15.4	14	21 25	S-2	4'-6'		
	8	12 10				
	10					
	5					
	10					
10.4	6	18 12	S-3	9'-11'		
	7	9 9				Brown Clayey Silt, Little Brick, Little M-f Sand, Trace M-f Gravel, Cinders, Wood (FILL)
	7					
	7					
	13					
(1) 5.4	7	15 9	S-4	14'-16'		
	5	7 5				
	6					
	7					
	8					
0.4	11	8 6	S-5	19'-21'		
	11	6 5				
	11					
	11				-2.6'	
	10					
-4.6	11	2 10	S-6	24'-26'		
	14	15 21				C-f Sand and M-f Gravel
	28					
	17					
	21					
-9.6	11	5 9	S-7	29'-31'		Dark Gray Silt and Clay, Little M-f Sand Trace M-f Gravel, Trace Organic Silt
	14	14 10				
	20					
	25					
	36				-13.6	
-14.6	OPEN	51 86	S-8	34-35.5		
		100				
		100	S-9	37-37		
	18Min		C-1	37-41		Granite Boulder (C-1: 25% Rec.)
	16Min					
-19.6	20Min					
	20Min					
-24.6		100	S-10	44-44		Gray Decomposed Granite
-29.6		100	S-11	49-49		
					-33.6	
-34.6	8Min		C-1	54-59		(C-1: 95% Rec.)
	12Min					
	7Min					Gray Hard Granite
	5Min					
	7Min					

Bottom of Hole Elev. -38.6'

BORING DS65-4

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.0	8	12 15	S-1	0-2	20.0	
	6	12 10				
	5					
	6					
15.0	4	6 7	S-2	4-6		
	6	9 6				
	6					
	4					
	4					
10.0	2	20 100	S-3	2-10		
	3					
	4					
	5					Gray-Black-Tan-Red Clayey-Silt, Little M-f Sand, Little Cinders, Brick, Wood, M-f Gravel (FILL)
	4					
(0) 5.0	5	3 3	S-4	14-16		
	7	6 7				
	9					
	10					
	12					
0.0	6	20 55	S-5	19-21		
	18	5 20				
	20					
	24				-3.0	
	34					
-5.0	18	20 22	S-6	24-26		
	20	20 24				
	24					
	30					
	32					Gray C-f Sand, Little M-f Gravel Trace Wood
-10.0	20	38 40	S-7	29-31		
	26	42 46				
	26					
	30					
	32					Gray C-f Sand, Little M-f Gravel Trace Wood
-10.0	20	38 40	S-7	29-31		
	26	42 46				
	26					
	30					
	28					
-15.0	30	40 56	S-8	34-36		
	41	25 27			-12.5	
	OPEN					
-20.0		12 25	S-9	39-41		Gray-Green Decomposed Granite
-25.0		100	S-10	44.44.1		
	7Min		C-1	45.2-50	-29.2	(C-1: 77% Rec.)
	10Min					
	8Min					Gray Hard Granite With Quartz
	10Min					
-30.0	20Min					

Bottom of Hole Elev. -30.2

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ø).
(c) Samples designated by a "C" number indicate 1⅜" ø (AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 11
SHEET NO. 36 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	62	97

BORING DS65-5

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
15.5	Water				15.5	
						Water
					11.5	
10.5	Casing Pushed	1 1	S-1	4'-6'		
5.5		1 1 1 1	S-2	9'-11'		
						Gray-Black Clayey Silt, Trace F Sand, Trace Organic Matter
.5		1 2 2 2	S-3	14-16		
-4.5		1 2 2 1 2 3	S-4	19-21		
-8.5		2 2 3 4	S-5	24-26	-8.5	
						Gray C-f Sand Some Silt Trace Leaves, Wood
-13.5		7 9 11 13	S-6	29-31	-13.5	
-14.5	113	11 15				
	125	27 35				
	OPEN					Gray Decomposed Granite
-19.5		13 17 33 25	S-7	34-36	-21.5	
	15Min		C-1	37-42		(C-1: 90% Rec.)
-24.5	35Min 35Min 40Min 50Min					Gray Hard Granite

Bottom of Hole Elev. -26.5'

BORING DS65-6

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
15.5	Water				15.5	
						Water
10.5						
	Casing Dropped	1 1 1 2	S-1	6-8		
5.5						
		1 1 2 3	S-2	10-12		
0.5						Black-Brown Silt Little M-f Sand Little Organic
	25				-0.5'	
	28					
	23					
-4.5	19	17 8	S-3	19-21		
	22	9 11				
	23					
	38					Gray C-f Sand, Some Silt, Trace F Gravel
	31					
-9.5	34	7 9	S-4	24-26		
	39	13 15			-11.5'	
	29					
	33					
	44					
-14.5	63	13 21	S-5	29-31		
	85	25 33				
	OPEN					Gray Decompsed Granite
-19.5		11 27	S-6	34-36		
		37 47				
		39 100	S-7	37-38.3	-22.6'	
	15Min 100		C-1	38.1-43.1'		(C-1: 20% Rec.)
-24.5	10Min					
	15Min					
	20Min					
	20Min					Gray Hard Granite (C-2: 94% Rec.)
	25Min		C-2	43.1'-48.1'		
-29.5	35Min					
	45Min					
	15Min					
	10Min					

Bottom of Hole Elev. -32.6'

BORING DS65-7

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
23.1	3	6 18	S-1	0'-2'	23.1	
	14	22 27				
	16					
	21					
18.1	13	8 8	S-2	4'-6'		
	12	5 6				
	12					
	14					
	17					Brown Clayey Silt, Some M-f Sand Trace M-f Gravel, Cinders, Brick(FILL)
13.1	14	9 8	S-3	9'-11'		
	13	6 6				
	14					
	16					
	17					
8.1	17	3 8	S-4	14'-16'		
(0)	19	9 9				
	27					
	24					
	32					
3.1	34	12 12	S-5	19'-21'	3.9'	
	39	16 17				
	46					
	51					
	72					Gray M-f Sand, Some Silt, Trace Leaves, Trace Organic
-1.9	81	11 12	S-6	24'-26'		
	57	14 19				
	35					
	35					
	30				-5.9	
-6.9	33					
	27	10 14	S-7	30'-32'		
	25	12 14				Brown C-f Sand and C-f Gravel, Little Silt
	28					
	27					
-11.9	117				-10.9	
	110	100	S-8	35-35.1		
	5Min		C-1	36.2'		Granite Boulder (C-1: 12% Rec.)
	6Min			38.2'		
	31Q					
-16.9	411					Gray Decomposed Granite In Wash
	OPEN	100	S-9	40-40.2		
					-20.3	
	1Min		C-2	43.6		(C-2: 79% Rec.)
-21.9	1Min			48.6'		
	2Min					
	3Min					
	1Min					
	1Min		C-3	48.6-53.6'		Gray Hard Granite (C-3: 100% Rec.)
-26.9	1Min					
	2Min					
	3Min					
	3Min					

Bottom of Hole Elev. 30.3'

BORING DS65-8

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
22.7	8	10 12	S-1	0'-2'	22.7	
	20	16 24				
	26					
	31					
17.7	45	8 9	S-2	4'-6'		
	18	12 11				
	22					
	26					
	16					Brown Clayey Silt, Little M-f Sand, Trace F Gravel Brick, Cinders, And Organic (FILL)
12.7	7	4 5	S-3	9'-11'		
	10	7 7				
	9					
	12					
	12					
7.7	5	5 6	S-4	14'-16'		
	6	6 7				
	15					
	10				4.7'	
	15					
(0) 2.7	14	8 7	S-5	19'-21'		
	12	7 7				
	9					
	8					
	7					
-2.3	7	5 9	S-6	24'-26'		
	8	5 7				Brown C-f Sand Some M-f Gravel Little Silt, Trace Brick (FILL)
	12					
	18	13 16	S-7	27'-29'		
	23	12 27				
-7.3	19					
	19	8 9	S-8	30'-32'		
	29	12 14				
	29				-10.3'	
	32					
-12.3	64		S-9	34'-36'		
	66					Brown C-f Sand, Some M-f Gravel Little Silt
	84					
	129		S-10	37'-39'		
	166				-16.3'	
-17.3	201					
	850	100	S-11	40'-40'		
	OPEN	100	S-12	41-41.4		
						Brown-Gray Decomposed Granite
-22.3						
					-26.3	
-27.3	2Min		C-1	42'-54'		(C-1: 83% Rec.) Gray Hard Granite
	2Min					
	3Min					
	3Min					

Bottom Of Hole Elev. -31.3

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ denotes the ground water level as measured. (Hours after (00) drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ø).
(c) Samples designated by a "C" number indicate 1⅝" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1"=6' Vert.
CONTRACT NO.: 11
SHEET NO. 37 OF 38

62

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	63	97

BORING DS67-1

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
32.2	8	3	4	S-1	0'-2'	32.2	.5 Topsoil
	12	3	3				
	18						
	26						
27.2	32	3	7	S-2	4'-6'		
	16	9	12				
	19						
	22						Brown Clayey Silt, Little C-f Sand,
	26						Trace M-f Gravel, Trace Brick, Cinders
22.2	55	19	16	S-3	9'-11'		(FILL)
	49	29	32				
	48						
	57						
	50						
17.2	66	9	12	S-4	14'-16'		
(0)	36	18	22				
	83					15.7'	
	94						
	112						
12.2	64	18	22	S-5	19'-21'		
	26	27	31				
	21						Gray C-f Sand, Some Clayey Silt, Trace
	8						M-f Gravel, Organic, Cinders, Leaves
	9						(FILL)
7.2	7	3	2	S-6	24'-26'		
	7	3	3				
	11	6	8	S-7	26'-28'		
	10	6	5			4.2'	
	11						
2.2	16	P	P	S-8	29'-31'		
	25	P	P				Dark Gray Organic Silt Little F Sand
	16						Trace Clay, Leaves, Wood
	17						(FILL)
	30					-1.1'	
-2.8	35	15	17	S-9	34-35.5		
	40	21					Gray C-f Sand and M-f Gravel,
	28						Little Silt
	129					-5.8	
	5Min			C-1	38-43		(C-1: 70% Rec.)
-7.8	8Min						
	12Min						Gray Hard Granite
	14Min						
	12Min						
							Bottom Of Hole Elev. -10.8'

BORING DS68-1

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
26.1	7	9	9	S-1	0'-2'	26.1	
	9	7	7				
	11						
	13						
21.1'	8	7	7	S-2	4'-6'		Brown C-f Sand Little C-f Gravel
	6	5	7				Trace Roots, Brick and Cinders
	9						(FILL)
	16						
	18						
16.1'	5	11	10	S-3	9-11		
	9	7	7				
	11					14.1'	
	7						Gray Clayey Silt, Trace F
	10						Sand Trace Wood, Brick and Cinders
11.1	3	1	1	S-4	14-15.5	11.1	(FILL)
	4	1	100				
	109						
	31						
	6						
6.1	18	1	3	S-5	19-21		Brown C-f Sand, Little Clayey
	11	3	4				Silt, Little C-f Gravel, Trace
	18						Brick and Cinders (FILL)
	17						
	8						
1.1	12	2	2	S-6	24-26		
	13	2	15				
	15					-0.9	
	70						
	90						Brown C-f Sand, and C-f
-3.9	OPEN	12	11	S-7	29-31		Gravel Trace Silt, Brick and Cinders
		14	10				(FILL)
	25Min			C-1	33.5'-	-7.4	
-8.9	25Min				38.5'		(C-1: 90% Rec.)
	25Min						
	25Min						Gray Hard Granite
	12Min						
							Bottom of Hole Elev. -12.4'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞" ø).
(c) Samples designated by a "C" number indicate 1⅞" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

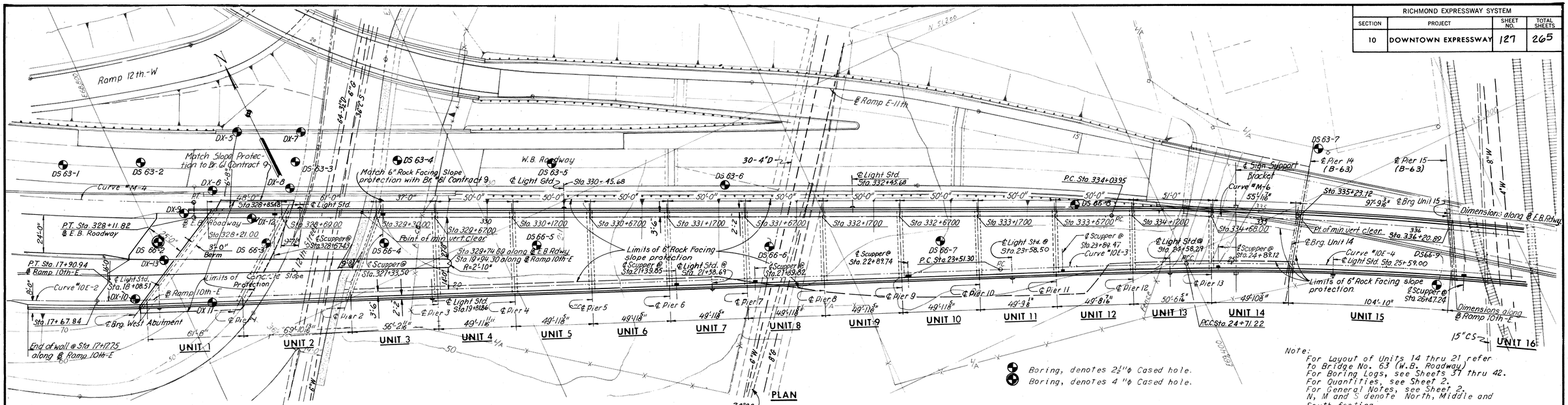
BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

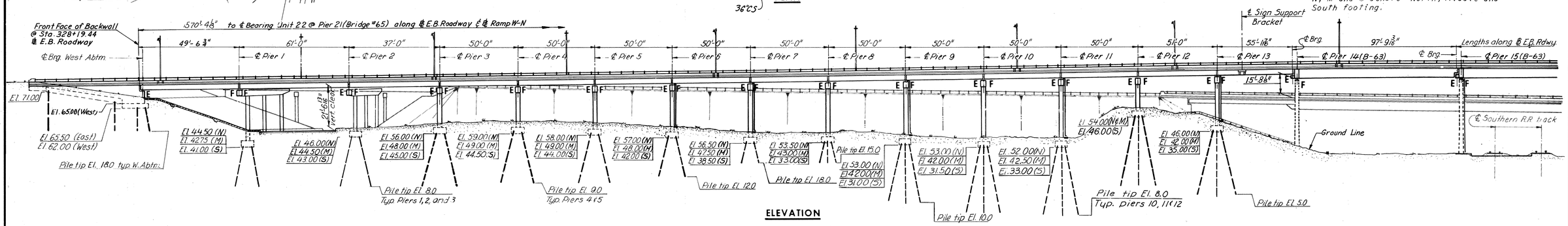
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 6' Vert.
CONTRACT NO.: 11
SHEET NO. 38 OF 38

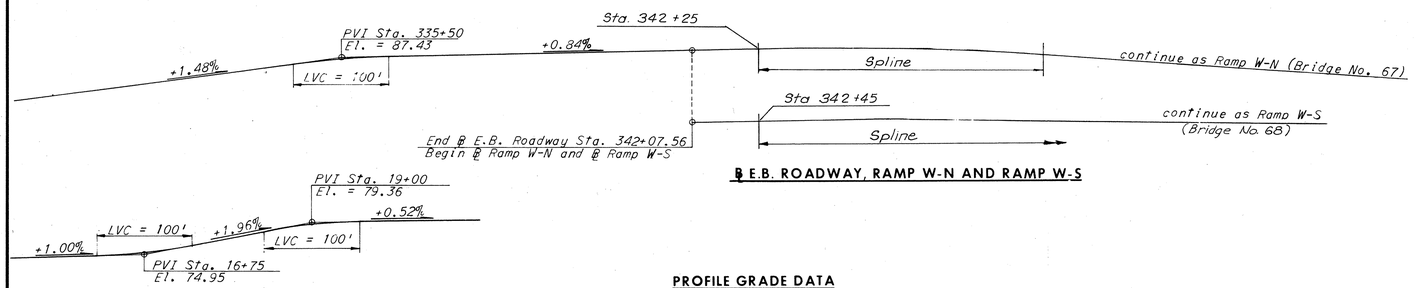
63

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	127	265





ELEVATION



℄ E.B. ROADWAY, RAMP W-N AND RAMP W-S

℄ RAMP 10TH-E.

PROFILE GRADE DATA

℄ Downtown Expressway Curve M-4		℄ E.B. Roadway Curve M-6		℄ Ramp W-N Curve WN-1	
P.I.	= 326+57.21	P.I.	= 336+40.09	P.I.	= 345+25.47
Δ	= 12°25'03"	Δ	= 11°45'56"	Δ	= 64°53'49"
D	= 4°00'	D	= 2°30'	D	= 11°27'33"
T	= 155.83'	T	= 236.14'	T	= 317.90'
L	= 310.44'	L	= 470.62'	L	= 566.33'
R	= 1,432.40'	R	= 2,291.83'	R	= 500.00'

Curve: 10E-2		℄ Ramp 10th-E Curve: 10E-3		Curve: 10E-4	
P.I.	= 17+36.87	P.I.	= 24+11.27	P.I.	= 26+80.64
Δ	= 6°29'42"	Δ	= 1°11'57"	Δ	= 12°30'55"
D	= 6°00'	D	= 1°00'	D	= 3°00'
T	= 54.18'	T	= 59.97'	T	= 209.42'
L	= 108.25	L	= 119.93'	L	= 417.18'
R	= 954.93'	R	= 5,729.58'	R	= 1,909.86'

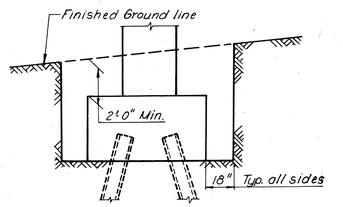
HORIZONTAL CURVE DATA

	BY	DATE
MADE	JV	9-12-68
CHECKED	G.C.C.	5-2669
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	8-76
2	Sign Support Bracket & Sh. 16A & 20A added	R.B.H.	9-74
1	Footing elev. & piles, Piers 8, 9, 10, 11, 12 & 13	R.B.H.	8-74

INDEX

	SHEET
GENERAL PLAN AND ELEVATION	1
GENERAL PLAN AND ELEVATION	2
WEST ABUTMENT	3
WEST ABUTMENT DETAILS	4
WEST ABUTMENT RETAINING WALL	5
PIER 1	6
PIER 2	7
PIERS 3 AND 4	8
PIERS 5 AND 6	9
PIERS 7 AND 8	10 ℄ 10A
PIERS 9 AND 10	11
PIERS 11 AND 12	12
PIER 13	13
FRAMING PLAN UNITS 1, 2, 3 AND 4	14
FRAMING PLAN UNITS 5, 6, 7, 8 AND 9	15
FRAMING PLAN UNITS 10, 11, 12, 13 AND 14	16 ℄ 16A
FRAMING PLAN UNITS 15 AND 16	17
FRAMING PLAN UNITS 17 AND 18	18
FRAMING PLAN UNITS 19 AND 20	19
FRAMING PLAN UNITS 21 AND 22	20 ℄ 20A
FRAMING PLAN UNIT 23	21
FRAMING DETAILS PIERS 14, 15 AND 16	22
FRAMING DETAILS PIERS 17, 18, 19 AND 20	23
FRAMING DETAILS PIER 21	24
FRAMING DETAILS PIER 22 (BR 63)	25
FRAMING DETAILS UNITS 21 AND 22	26
FRAMING DETAILS UNITS 18, 21 AND 22	27
DECK PLAN UNITS 1, 2, 3 AND 4	28
DECK PLAN UNITS 5, 6, 7, 8 AND 9	29
DECK PLAN UNITS 10, 11, 12, 13 AND 14	30
DECK PLAN UNITS 15 AND 16	31
DECK PLAN UNITS 17 AND 18	32
DECK PLAN UNITS 19 AND 20	33
DECK PLAN UNITS 21 AND 22	34
DECK PLAN UNIT 23	35
SUPERSTRUCTURE DETAILS	36
JOINT DETAILS	37 AND 38
APPROACH SLAB AND ROCK FACING SLOPE PROTECTION	39
CONCRETE SLAB SLOPE PROTECTION DETAILS	40
BORING LOGS	41 THRU 46
STANDARD DETAILS	S1 THRU S7



LIMITS OF STRUCTURE EXCAVATION
no scale

AS BUILT

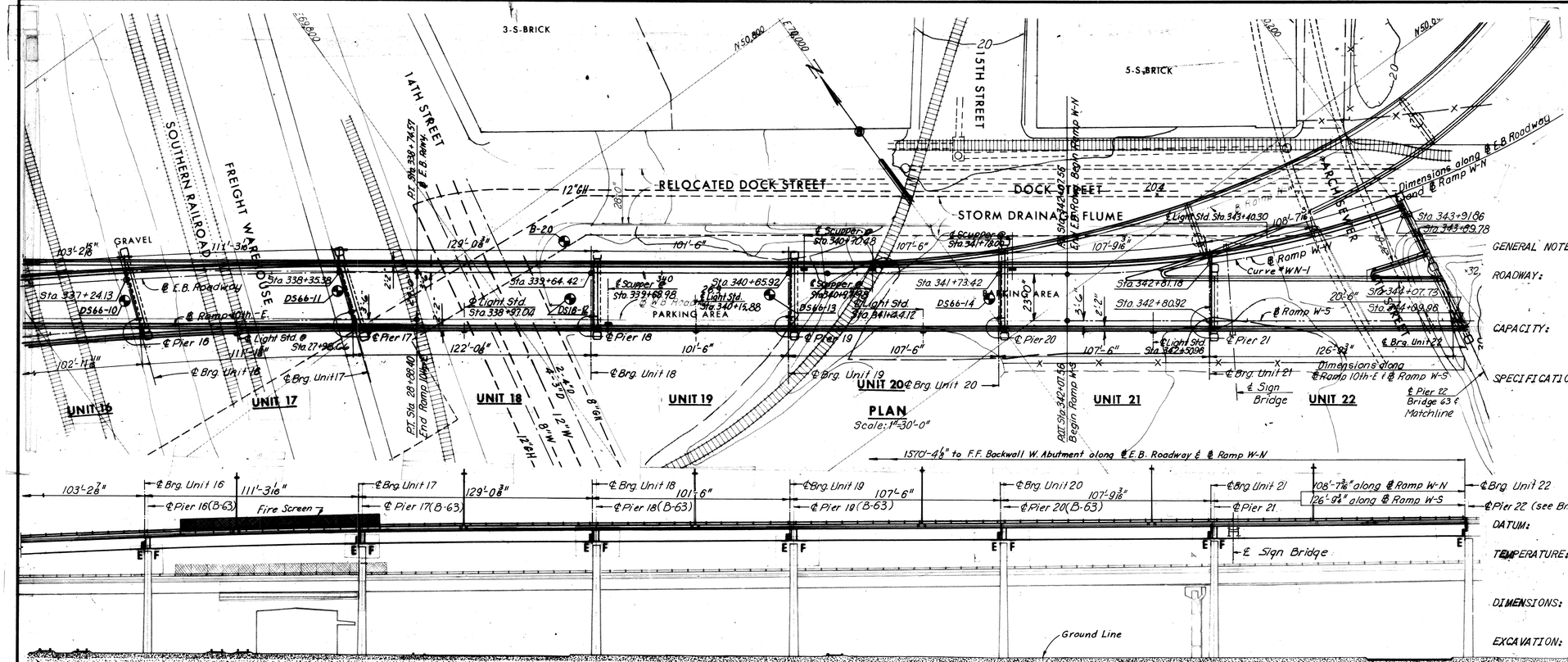
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
GENERAL PLAN AND ELEVATION

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

SCALE: 1"=30'
CONTRACT NO.: 10
SHEET NO. 1 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	128	265



Notes:
For Vertical and Horizontal Curve Data see Sheet 1.
For Layout of Units 14 thru 22 refer to Bridge No. 63 (Westbound Roadway).

ESTIMATED QUANTITIES

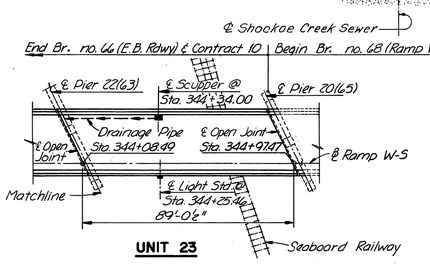
	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Underdrain 6"Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin. Ft.
Superstructure	--	2,237.6	530,860	1,564,700	567,800	3,241	--	--	---
Substructure	1,835	1,256.6	155,030	---	----	84	34	150	9,410
Total	1,835	3,494.2 ‡	685,890	1,564,700	567,800	3,325	34	150	9,410

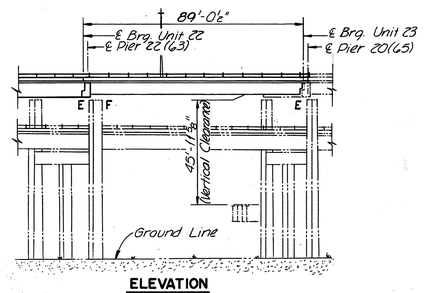
	Asphalt Damp-proofing Sq. Yds.	Approach Slab Concrete (‡) Cu. Yds.	Fire Screen Lin. Ft.	Approach Slab Reinforcing Steel (Lbs.)	Metal Conduit Lin. Ft.	Concrete Slope Protection Sq. Yds.	Bridge Drainage Metal Work Lbs.	Rock Facing Slope Prot. Sq. Yds.	Energy Attenuator 8-Unit Each
Superstructure	--	--	210	---	2,214	--	11,870	--	1
Substructure	105	91.5	---	23,870	92	559	--	3,320	---
Total	105	91.5 ‡	210	23,870	2,306	559	11,870	3,320	1

‡ All Concrete for Superstructure shall be Class A4 and for Substructure Class A3.

	BY	DATE
MADE	J.V.	1-9-69
CHECKED	G.C.C.	5-26-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Span Facilities & R.R. name added	PRMS	4-19-74
2	Sign Bridge added & Struct. Sht Qty.	R.B.H.	9-74
3	As Built	TEM	8-76





GENERAL NOTES:

ROADWAY: One variable width roadway transitioning from E.B. Roadway Downtown Expressway and Ramp 10th-E into Ramps W-N and W-S (Bridges No. 67 and 68)

CAPACITY: Dead load includes 15 Lbs. per sq. ft. for future wearing surface. Live load. HS 20-44 loading and alternate military loading.

SPECIFICATIONS:
GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973 modified by Special Design provisions.
WELDING: 1972 Structural Welding Code of the American Welding Society.

CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete

DATUM: City of Richmond

TEMPERATURE: The normal temperature referred to in the plans is 60°F. The temperature range for movement is 0°F to 120°F.

DIMENSIONS: All dimensions are measured horizontally and vertically unless otherwise noted.

EXCAVATION: Excavation below subgrade and cut slope template shall be classified as Structure Excavation. All excavation above these limits shall be classified as Regular Excavation and is not included in the Structural Quantities.

FOUNDATIONS: Footings shall rest on firm material. Foundation material shall be dry and special attention is called to Section 401.05 of General Specifications and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing steel shall be deformed bars conforming to ASTM A615 Grade 40. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted.

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572 - Grade 50 and A588 as noted. See Special Provisions.
All field connections shall be made with high strength bolts. High strength bolts shall be ⅞" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

AS BUILT

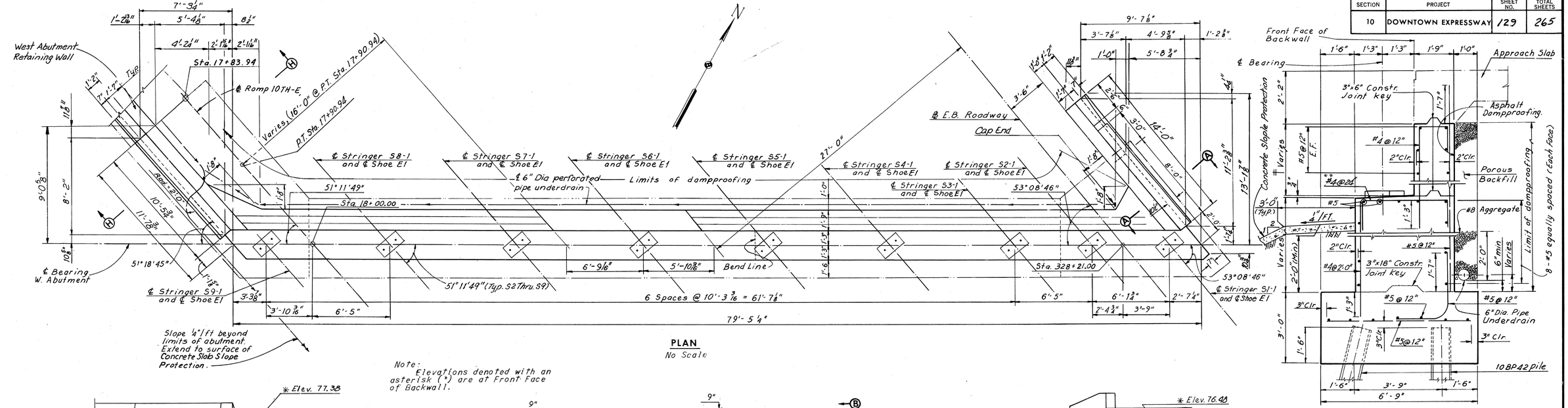
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
GENERAL PLAN AND ELEVATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 2 OF 46

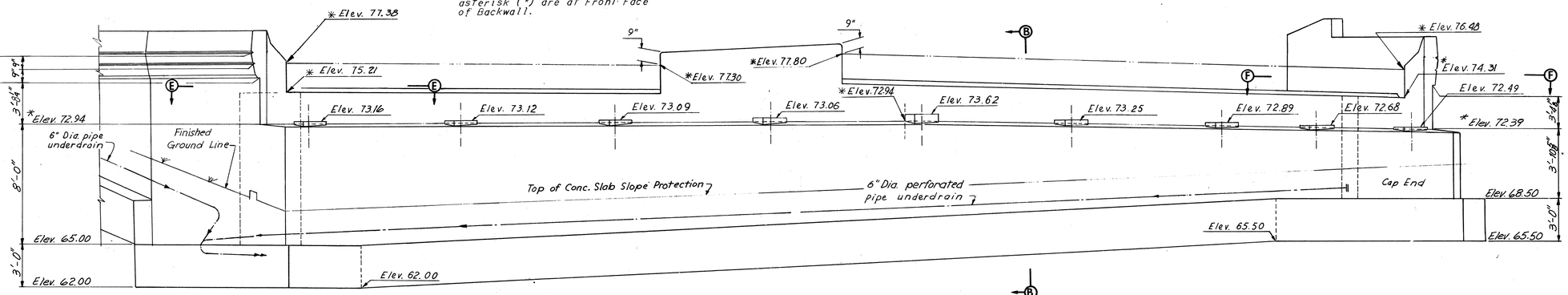
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	129	265



PLAN
No Scale

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

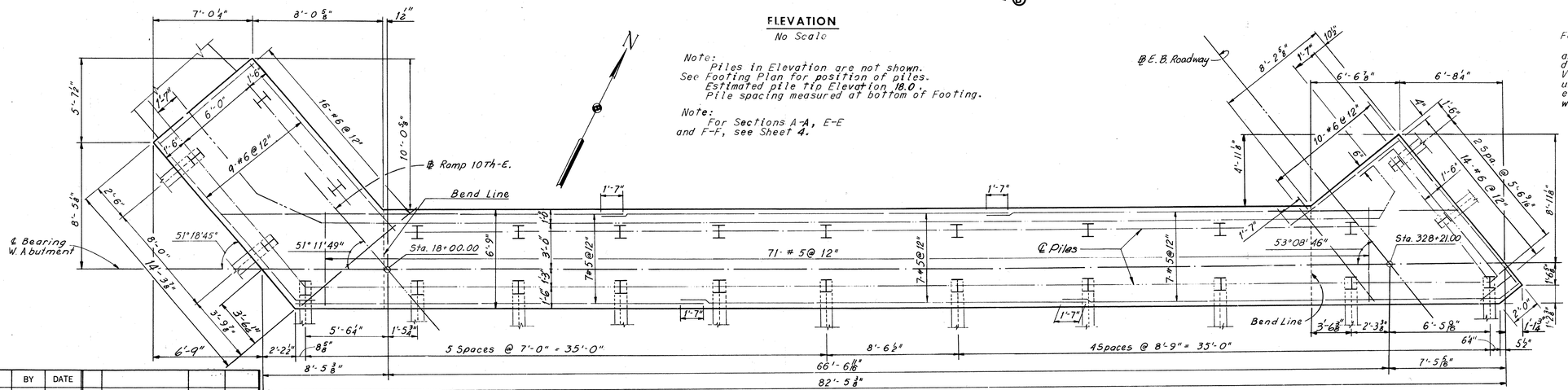
Note:
Elevations denoted with an asterisk (*) are at Front Face of Backwall.



ELEVATION
No Scale

Note:
Piles in Elevation are not shown.
See Footing Plan for position of piles.
Estimated pile tip Elevation 18.0'
Pile spacing measured at bottom of Footing.

Note:
For Sections A-A, E-E and F-F, see Sheet 4.



FOOTING PLAN
No Scale

Foundation Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer.
Vertical wall reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Note:
For Architectural treatment of Abutments and Wingwalls, see Sheet 57.

** Provide two additional #4 bars @ 24" at each unreinforced bearing pad.

Note:
All piles shall be 10BP42 Steel Piles (Design Capacity = 45 tons)
Batter piles 3" per foot where shown.
For Steel pile details, see Sheet 4.
For North Wingwall elevation and details, see Sheet 4.
For South Wingwall and Retaining wall elevation and details, see Sheet 5.
For Rail Post Spacing, see Sheet 5.
For Anchor Bolt setting plan and reinforcing pad details, see Sheet 4.
For Framing Plan, see Sheet 14.

‡ Top of backwall to conform to Roadway.

	BY	DATE
MADE	C.E.B	7-26-68
CHECKED	G.C.C.	8-15-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	8-76

AS BUILT

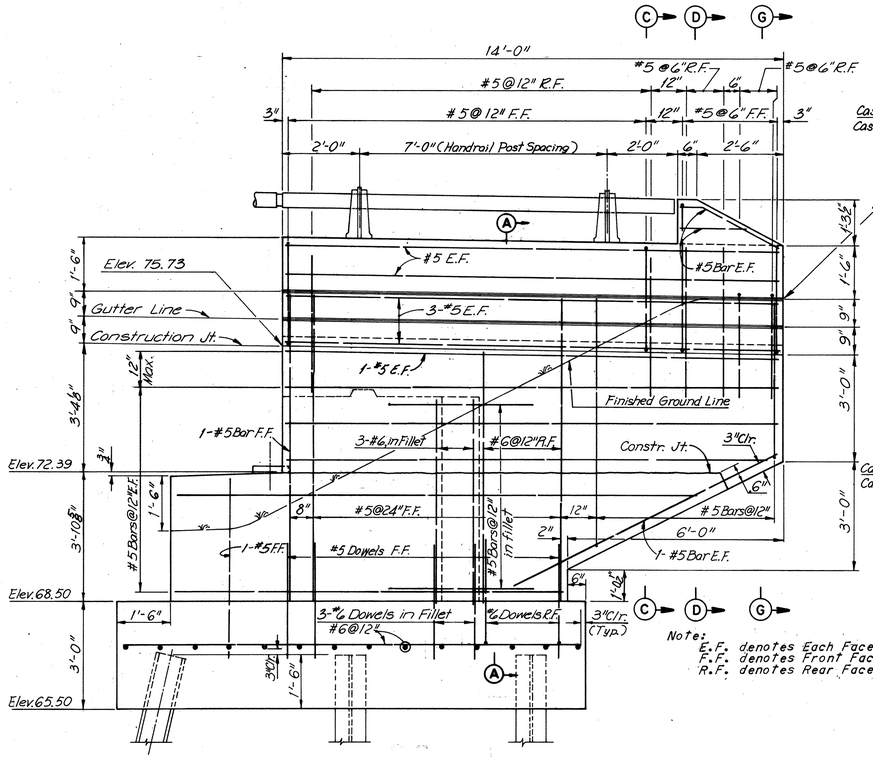
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
WEST ABUTMENT

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK AL. INDRIA KANSAS CITY

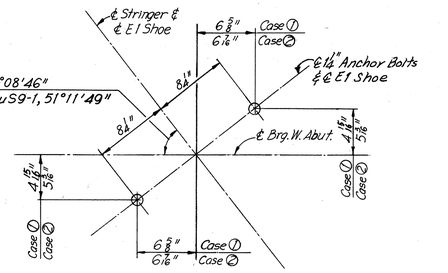
SCALE: As Noted
CONTRACT NO.: 10
NO. 3 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	130	265



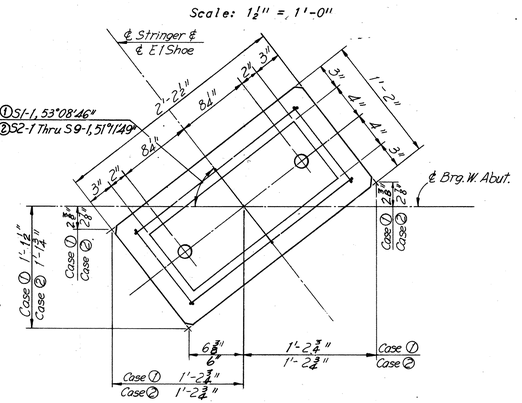
NORTH WINGWALL ELEVATION

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



ANCHOR BOLT SETTING PLAN

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

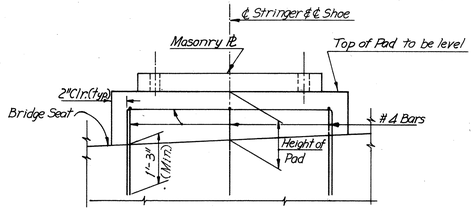


PAD PLAN

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

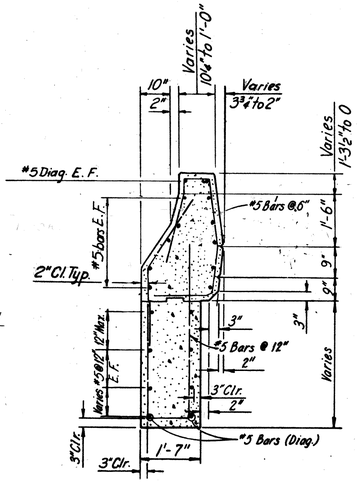
Note:
No reinforcing steel required for pad height less than 4".

Note:
All piles shall be 10BP42 steel piles (Design Capacity = 45 Tons).
Batter piles 3" per foot where shown.
Estimated pile tip Elev. 18.0.
For Abutment, see Sheet 3.
For Standard Handrail details, see Sheet S3.
For Standard Shoe details, see Sheets S1 & S2.
For Framing Plan, see Sheet 14.
For architectural treatment of Abutments and Wingwalls, see Sheet 5



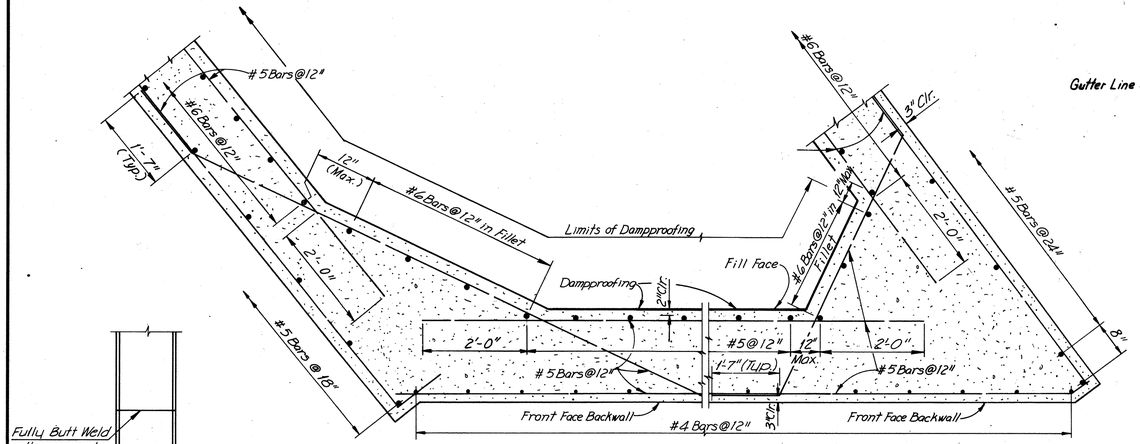
PAD ELEVATION

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



SECTION G-G

Scale: 1" = 1'-0"

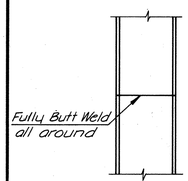


SECTION E-E

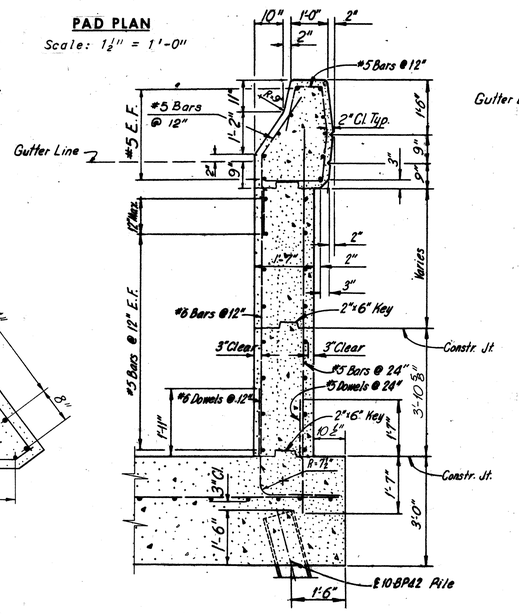
SECTION F-F

FILLET DETAILS

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



DETAIL OF STEEL PILE SPLICE



SECTION A-A

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

SECTION C-C

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

SECTION D-D

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

	BY	DATE				
MADE	AHH	7-23-68				
CHECKED	G.C.C.	8-21-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

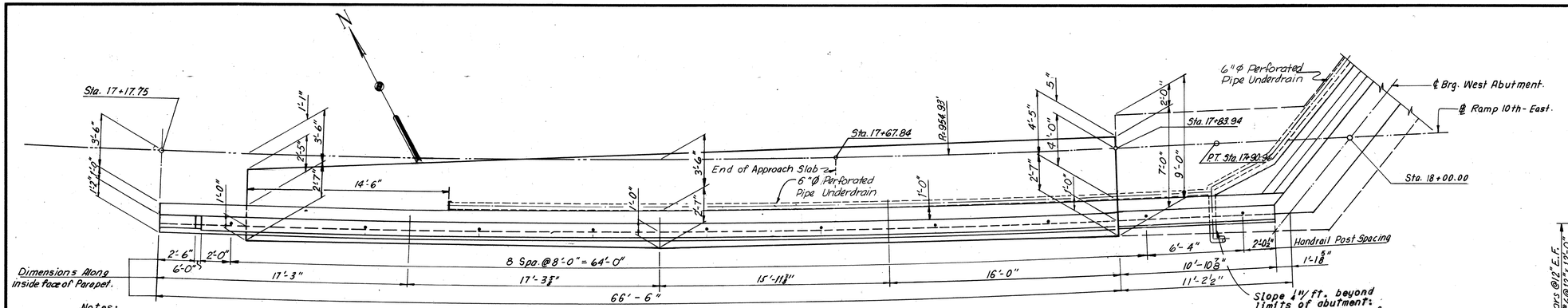
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

WEST ABUTMENT DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 4 OF 46

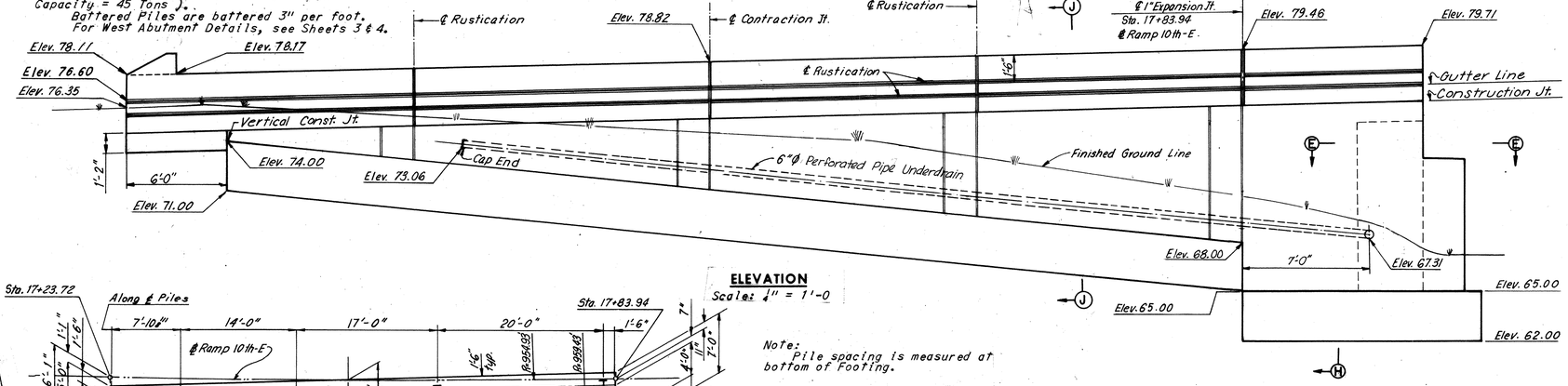
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	131	265



Notes:
Ends of footing are on Radial Lines.
Longitudinal dimensions in Footing Plan are along inside face of parapet.
For Handrail Details, see Standard Architectural Details, Sheet S3.
All piles are 10BP42 Piles (Design Capacity = 45 Tons).
Battered Piles are battered 3" per foot.
For West Abutment Details, see Sheets 3 & 4.

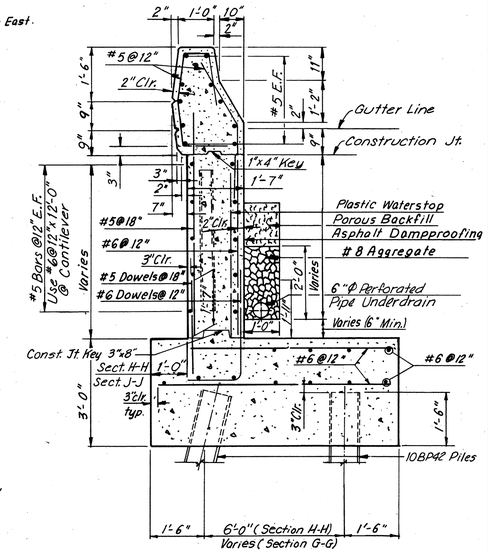
PLAN
Scale: 1/4" = 1'-0"

Note:
Piles not shown in Plan or Elevation Views. For location, see Footing Plan Sheet 3.



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

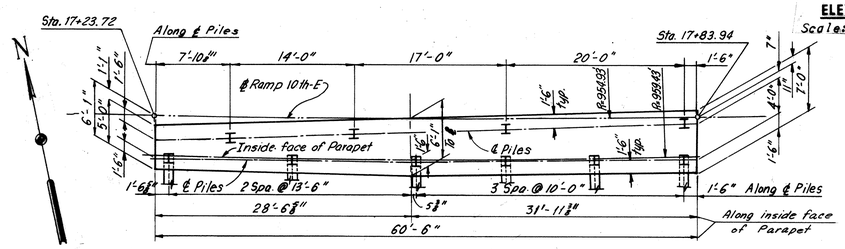
Note:
Pile spacing is measured at bottom of Footing.



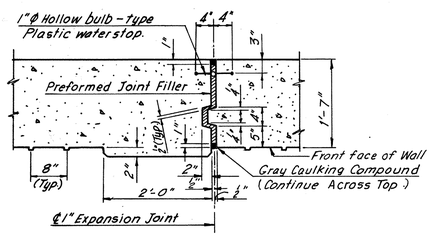
SECTION H-H
Scale: 1/2" = 1'-0"

Note:
For Section E-E, see sheet 4.

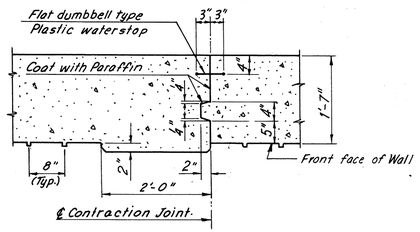
Note:
Section J-J is similar.



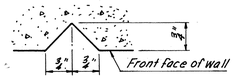
FOOTING PLAN
Scale: 1/8" = 1'-0"



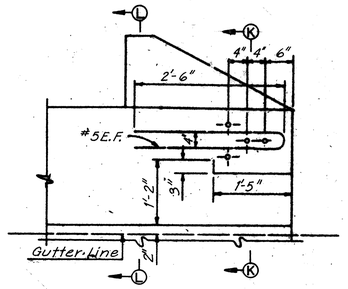
EXPANSION JOINT DETAIL
Scale: 1/2" = 1'-0"



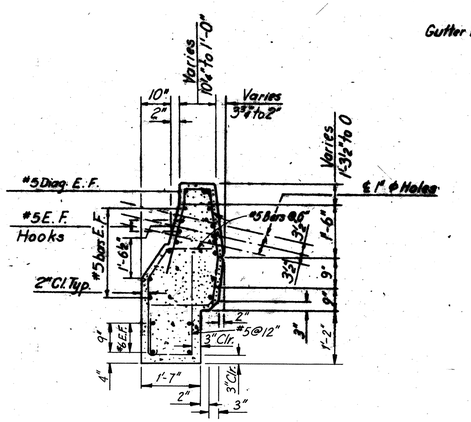
CONTRACTION JOINT DETAIL
Scale: 3/4" = 1'-0"



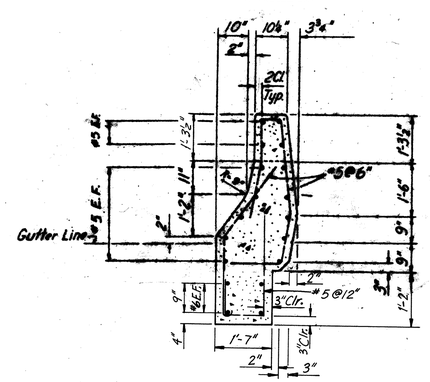
RUSTICATION DETAIL
No Scale



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



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



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

	BY	DATE
MADE	M.A.R.	7-23-68
CHECKED	RLM	8-14-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Underdrain change Add Guard Rl. Attach.	PRMS	4-19-71
	As Built	TEM	8-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

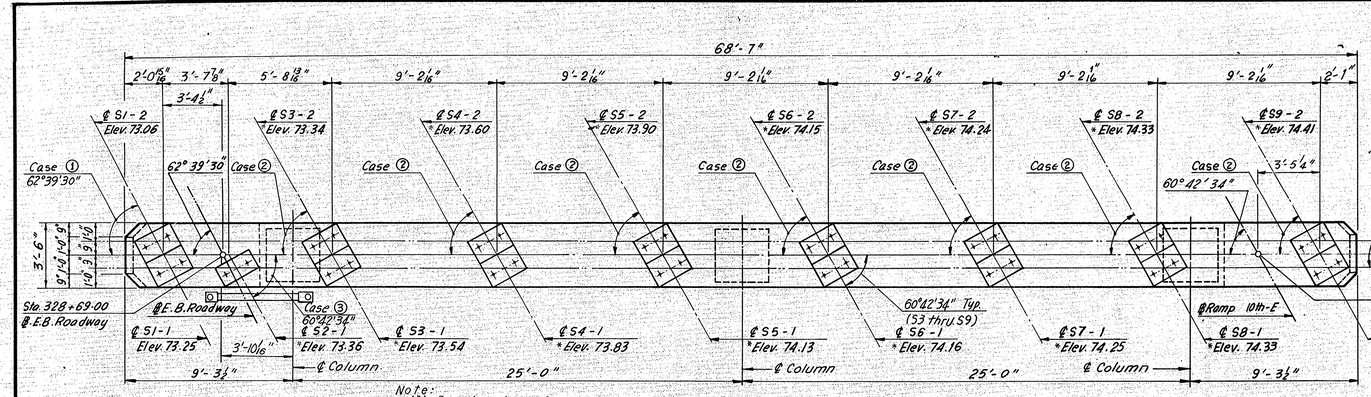
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
WEST ABUTMENT RETAINING WALL

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 46

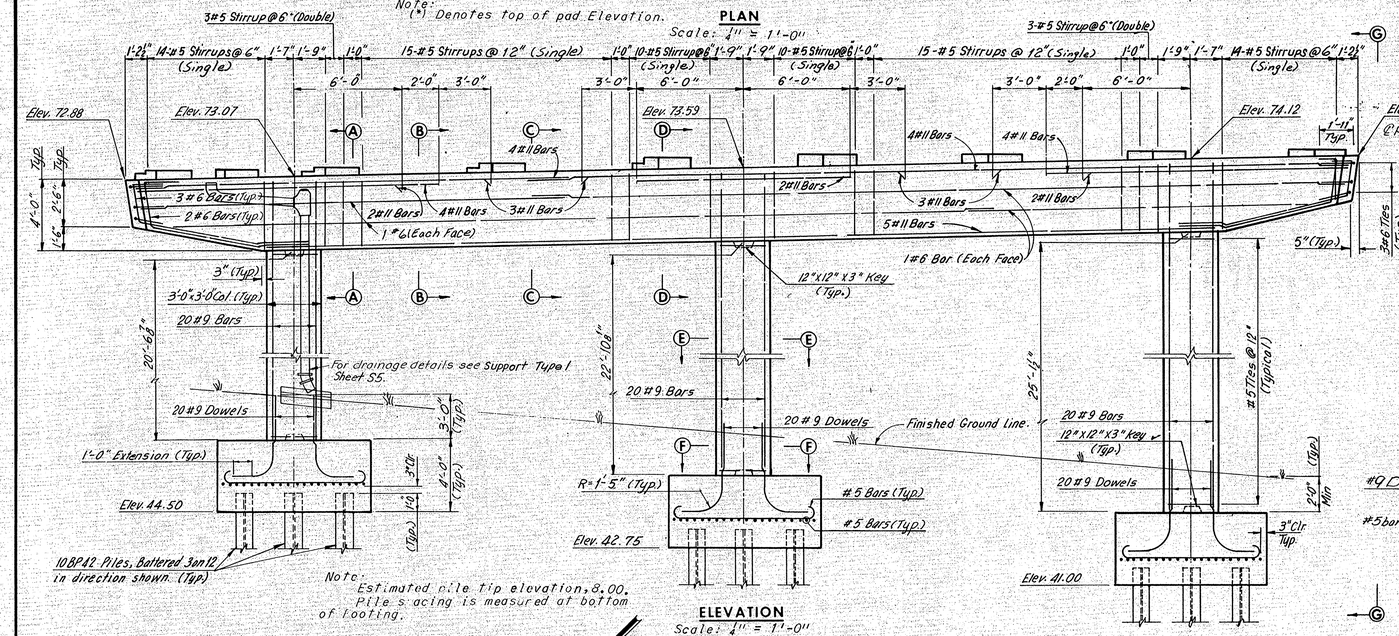
1828-22-10-066

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	132	265



PLAN

Scale: 1" = 1'-0"

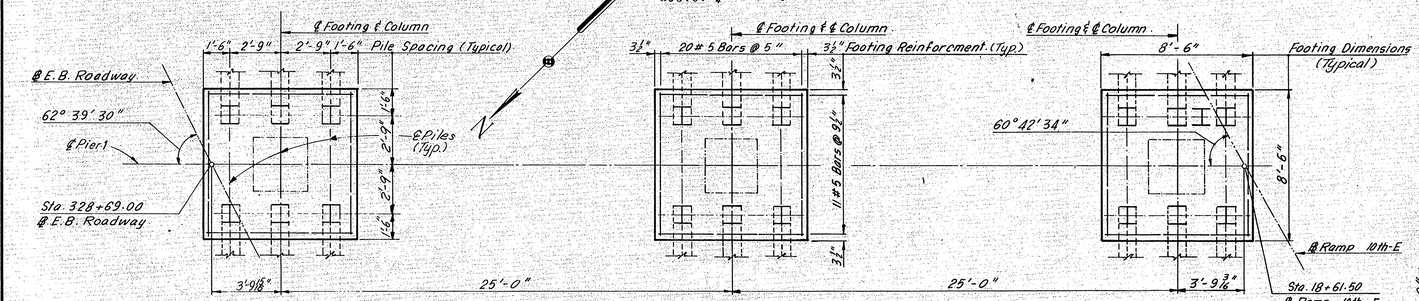


Note:
Estimated pile tip elevation, 8.00.
Pile spacing is measured at bottom of footing.

ELEVATION

Scale: 1" = 1'-0"

Note:
For architectural treatment of columns, see Sheet 51.

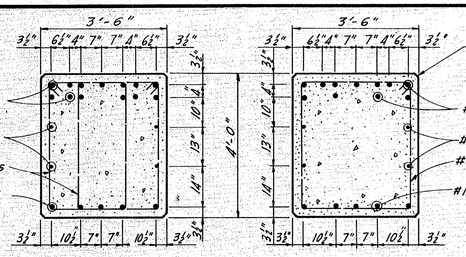


FOOTING PLAN

Scale: 1" = 1'-0"

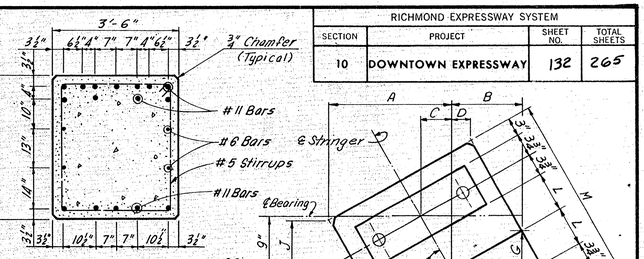
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets S1 and S2
For Framing Plan, see Sheet 14.
For Steel Pile Details, See Sheet 11



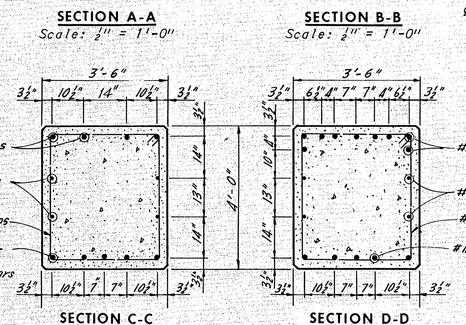
SECTION A-A

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



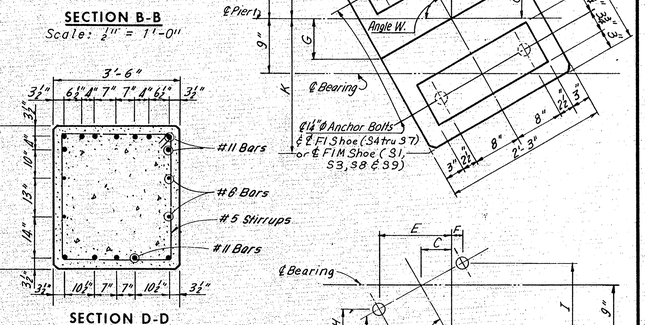
SECTION B-B

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



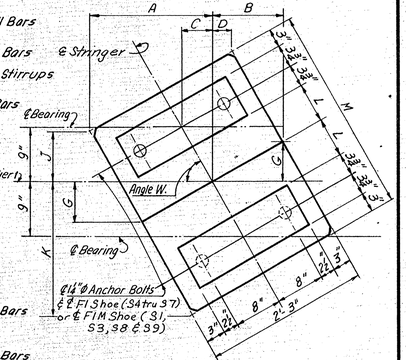
SECTION C-C

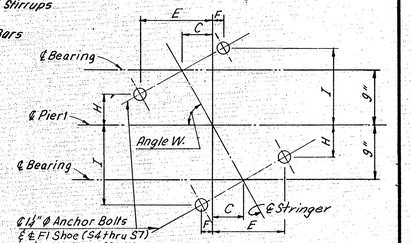
Scale: 1/2" = 1'-0"



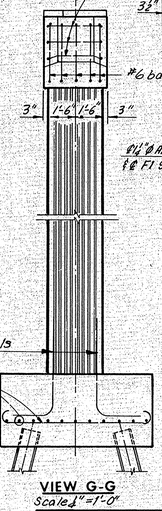
SECTION D-D

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





Case ① & ②



VIEW G-G

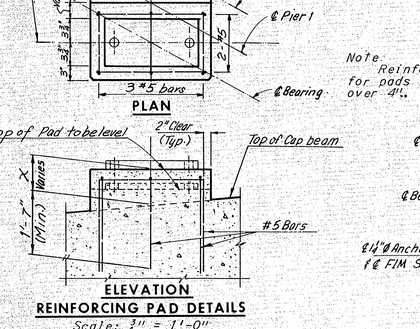
Scale 1"=1'-0"

SECTION E-E

Scale: 1" = 1'-0"

SECTION F-F

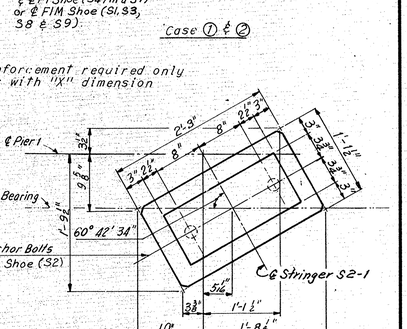
Scale: 1" = 1'-0"



ELEVATION REINFORCING PAD DETAILS

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

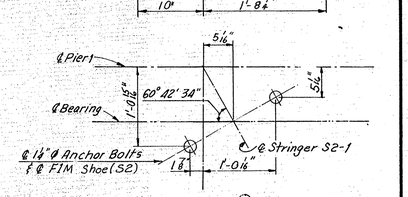
Note: Reinforcement required only for pads with "X" dimension over 4".



ANCHOR BOLT SETTING PLAN DIMENSIONS

Case	Angle W	A	B	C	D	E	F	G	H	I	J	K	L	M
1	62° 39' 30"	19 3/8	12	4 5/8	4 1/4	11 3/8	2 1/16	6 1/4	5 5/8	12 11/16	8 3/8	21 1/4	6 3/8	33 3/4
2	60° 42' 34"	20 1/8	11 3/4	5 1/4	3 3/8	12 1/16	1 7/8	6 3/8	5 5/8	12 5/8	8 3/8	21 1/2	6 3/8	34 1/4

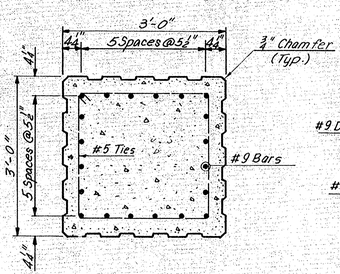
Dimensions are in inches.

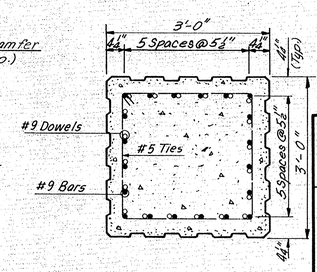


Case ③

PAD AND ANCHOR BOLT SETTING PLAN

Scale: 1" = 1'-0"





	BY	DATE				
MADE	MAA	7-31-68	2	As Built	TEM	8-76
CHECKED	RLM	8-15-68	1	Dimensions	RWZ	10-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

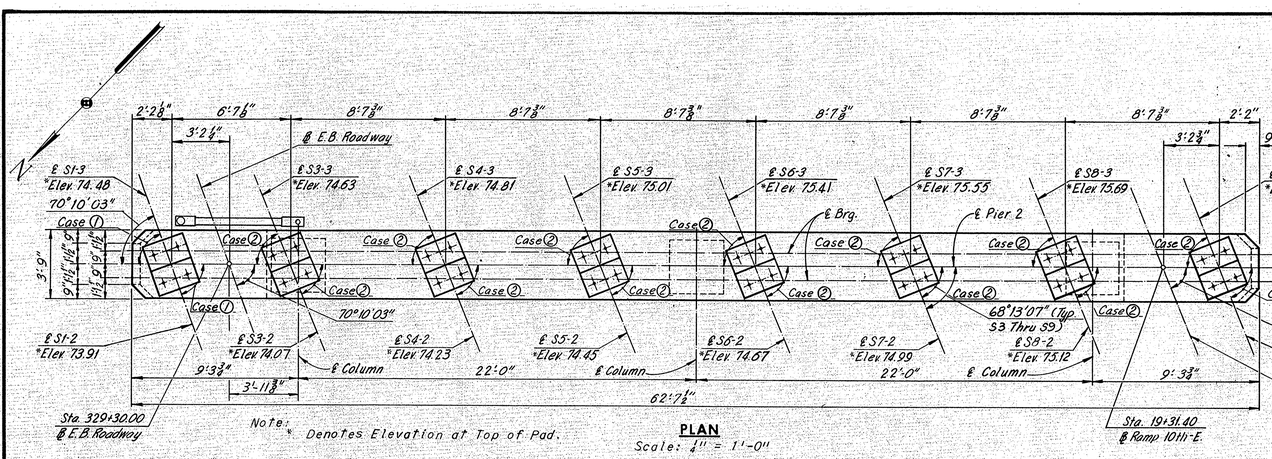
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 1

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

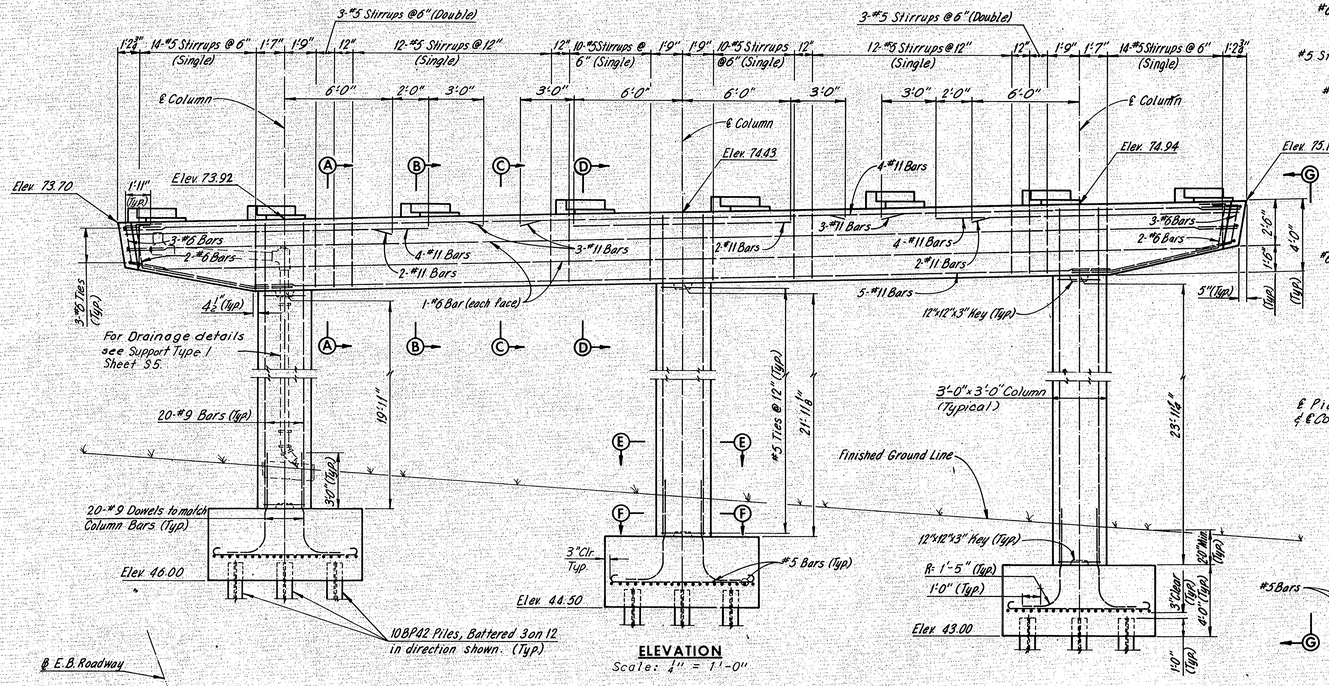
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 6 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	133	265

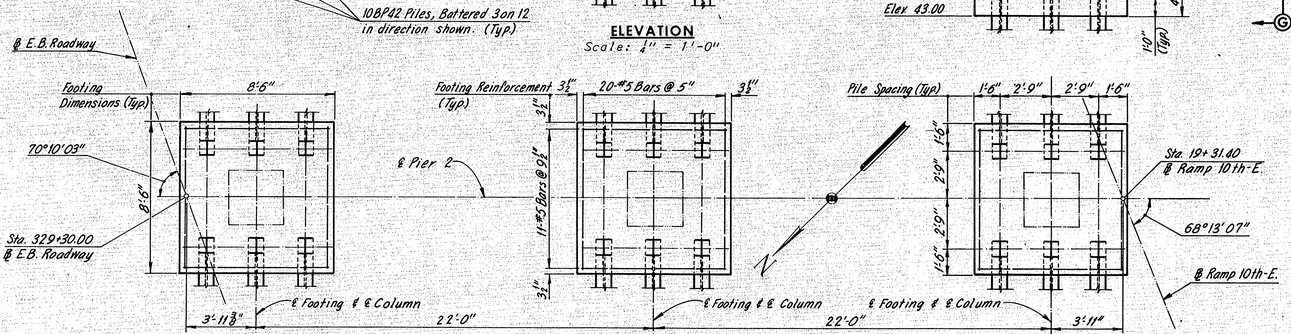


Note: * Denotes Elevation at Top of Pad.

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



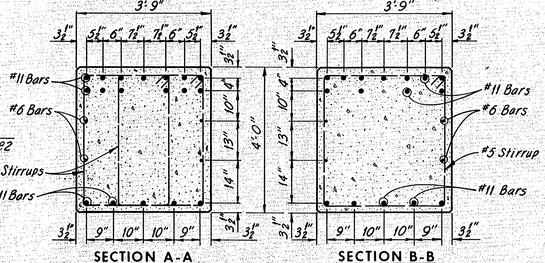
ELEVATION
Scale: 1/4" = 1'-0"



FOOTING PLAN
Scale: 1/4" = 1'-0"

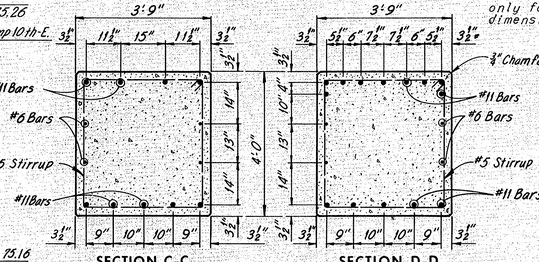
Note: Pile spacing is measured at bottom of Footing.

Note: Footing elevations are approximate and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



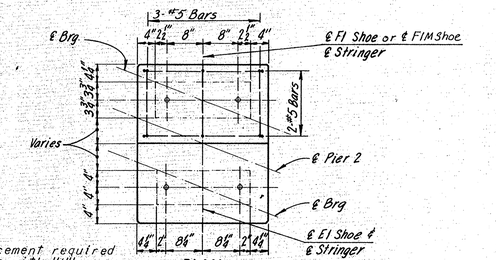
SECTION A-A
Scale: 1/2" = 1'-0"

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



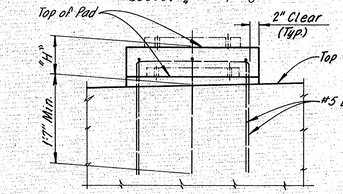
SECTION C-C
Scale: 1/2" = 1'-0"

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



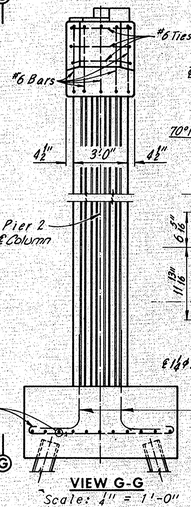
Note: Reinforcement required only for pads with "H" dimension over 4".

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

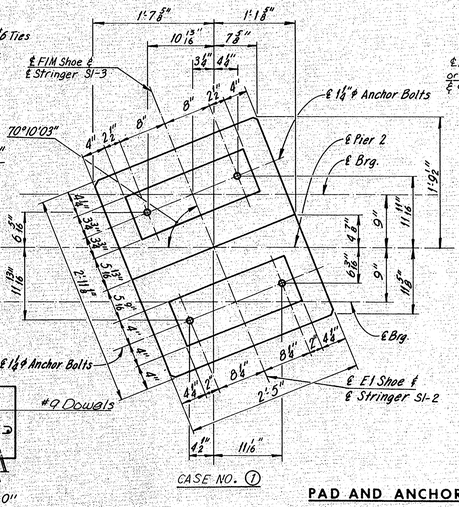


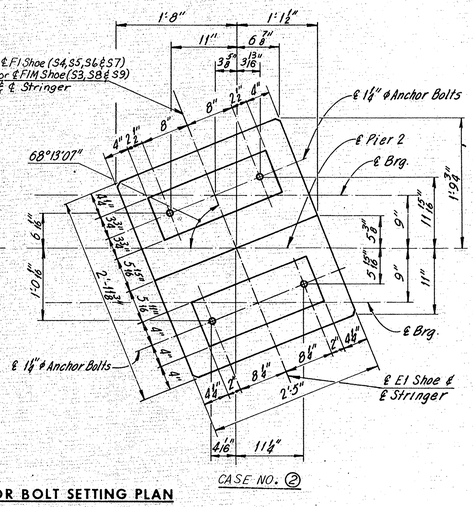
ELEVATION
Scale: 1/4" = 1'-0"

PAD REINFORCEMENT DETAILS

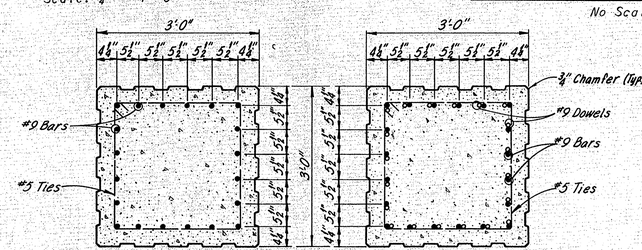


VIEW G-G
Scale: 1/4" = 1'-0"





PAD AND ANCHOR BOLT SETTING PLAN
No Scale



SECTION E-E
Scale: 1/4" = 1'-0"

SECTION F-F
Scale: 1/4" = 1'-0"

Note: For architectural treatment of columns, see Sheet 57.

Note:
All piles shall be 10BP42 steel piles (Design capacity = 45 tons).
Batter all pile 3" per foot in direction shown.
For Steel Pile Details, see Sheet 11.
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plan, see Sheet 14.
Estimated Pile Tip Elev., 8.00.

	BY	DATE				
MADE	D.E.S.	8-1-68				
CHECKED	R.L.M.	8-15-68	1	As Built	T.E.M.	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

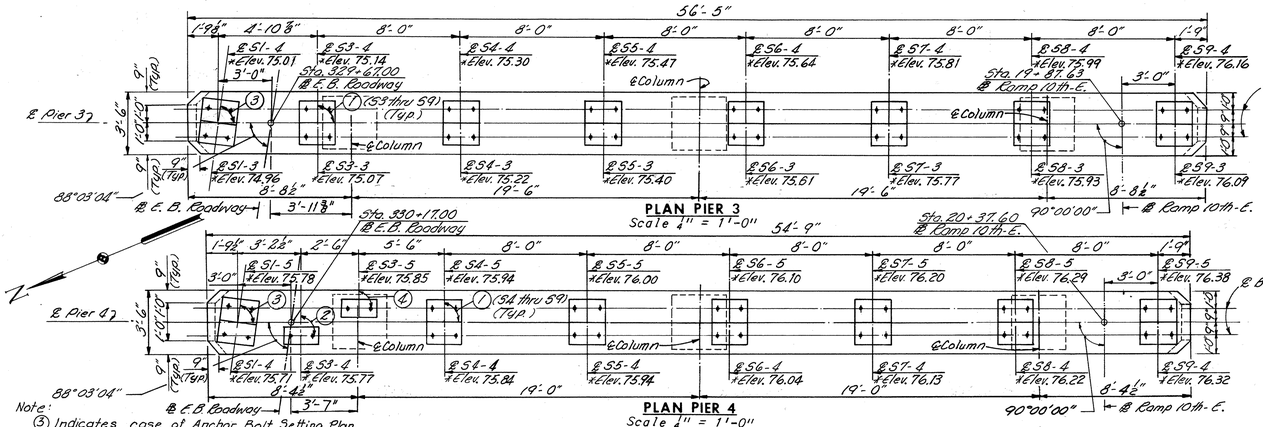
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

PIER 2

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 46

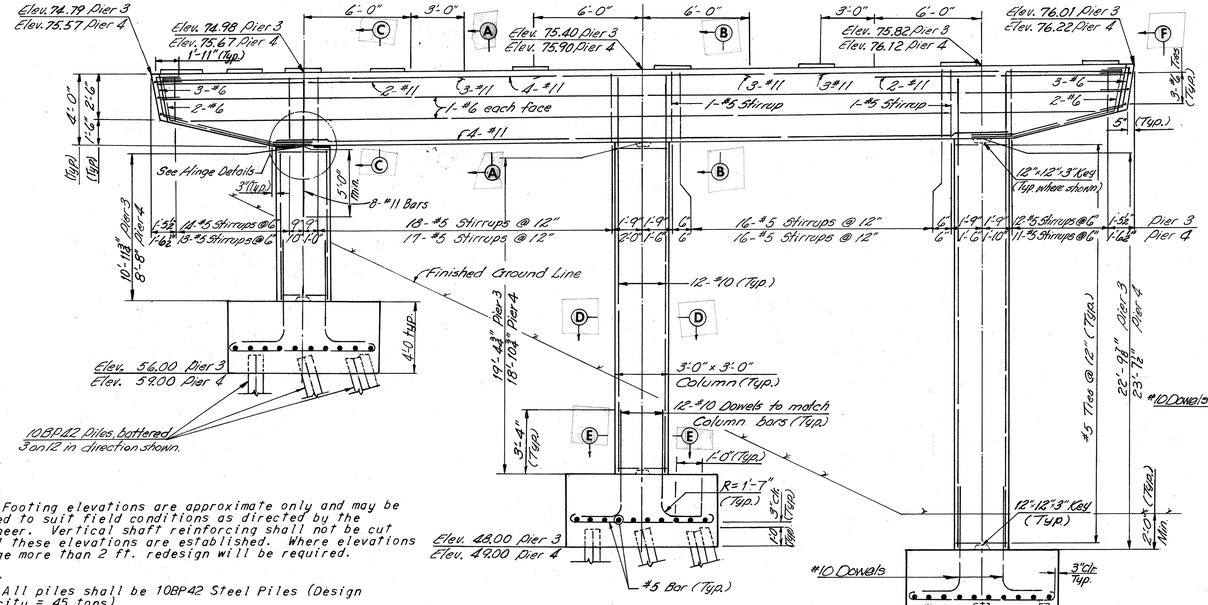
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	134	265



PLAN PIER 3
Scale 1" = 1'-0"

PLAN PIER 4
Scale 1" = 1'-0"

Note:
③ Indicates case of Anchor Bolt Setting Plan.
* Elevations given are at top of pad.

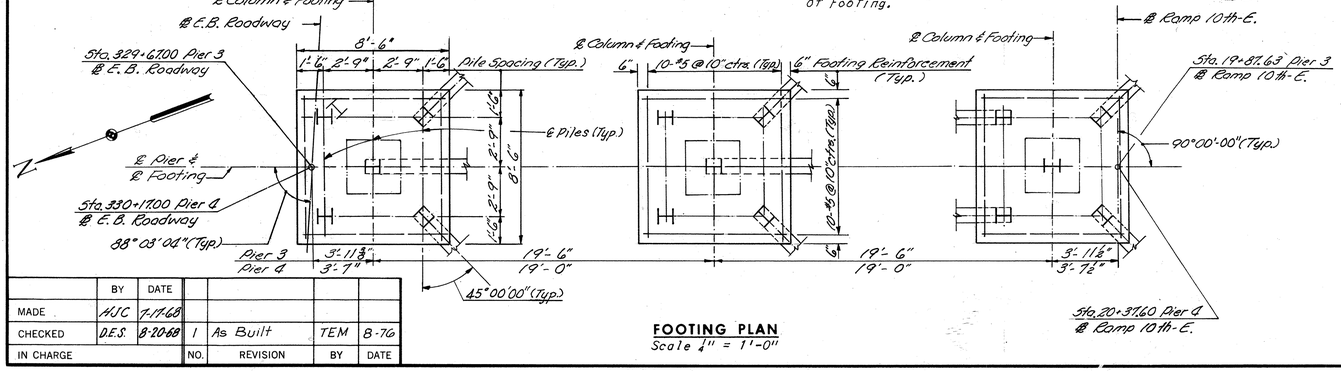


ELEVATION
Scale 1" = 1'-0"

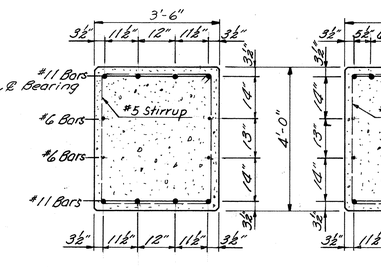
Note:
Pile spacing is measured at bottom of Footing.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

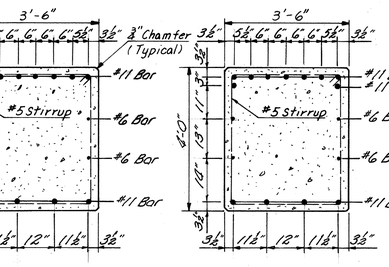
Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 & S2.
For Framing Plan see Sheet 146.
For Steel Pile Details see Sheet 11.
Estimated Pile Tip elevation 8.00 (Pier 3), 9.00 (Pier 4)



FOOTING PLAN
Scale 1" = 1'-0"

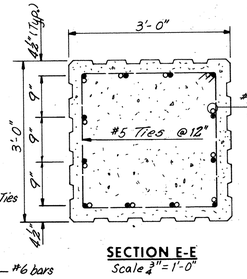


SECTION A-A
Scale 1" = 1'-0"

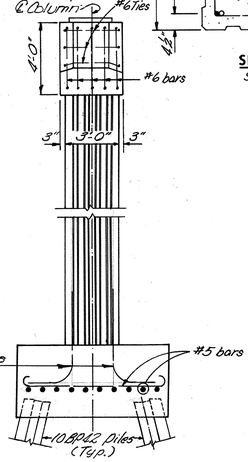


SECTION B-B
Scale 1" = 1'-0"

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

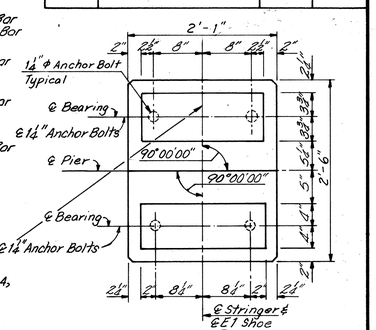


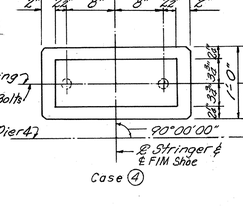
SECTION E-E
Scale 3/4" = 1'-0"

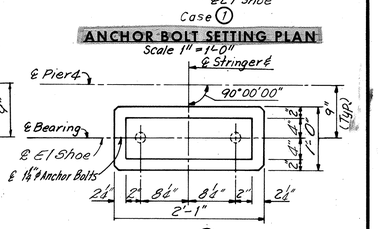


VIEW F-F
Scale 1" = 1'-0"

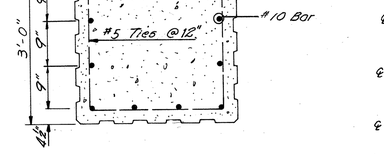
Note:
For architectural treatment of columns, see Sheet 37.



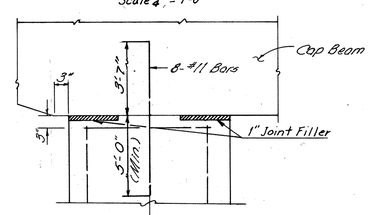




PAD AND ANCHOR BOLT SETTING PLAN
Scale 1" = 1'-0"



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



HINGE DETAILS
Scale 3/4" = 1'-0"

	BY	DATE				
MADE	AJC	7-17-68				
CHECKED	DES.	8-20-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

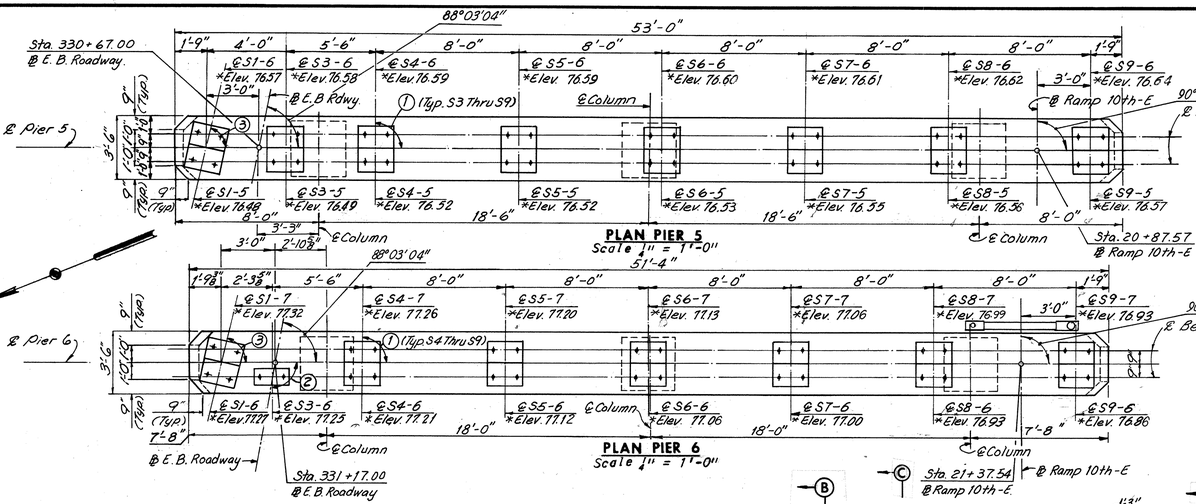
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

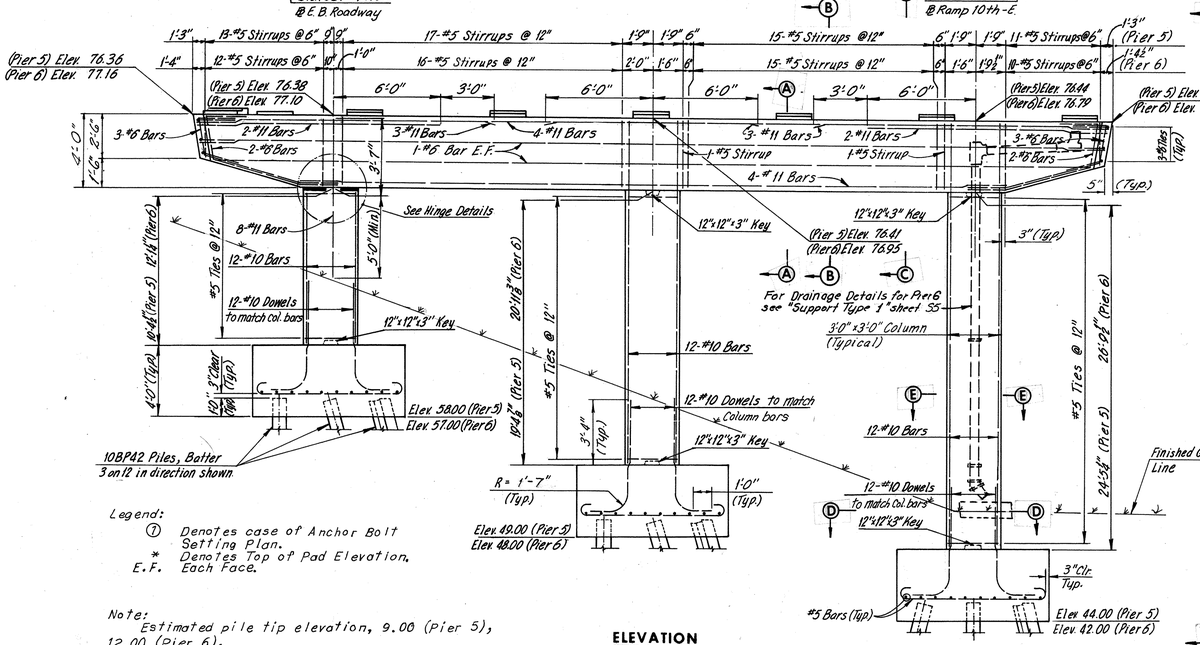
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 3 AND 4

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

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 8 OF 46

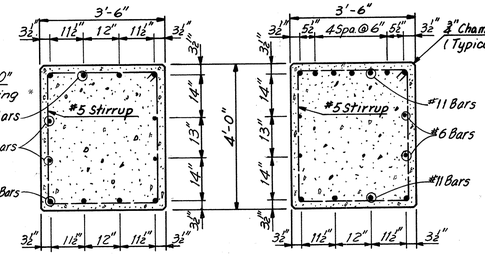
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	135	265

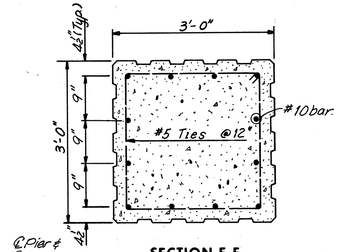


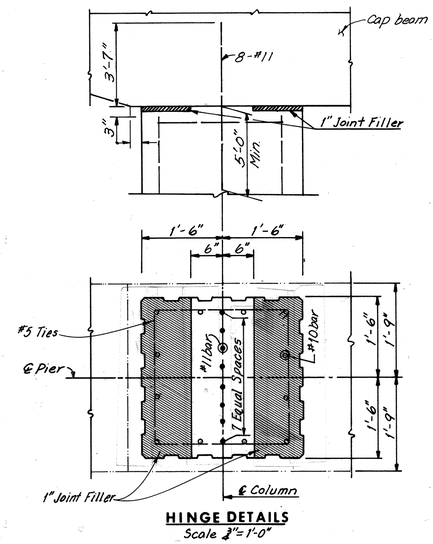


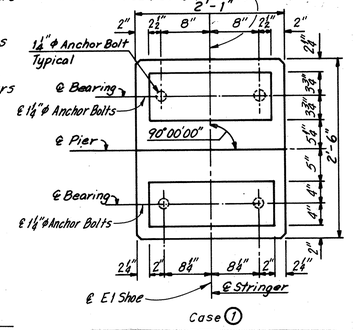
Legend:
① Denotes case of Anchor Bolt Setting Plan.
* Denotes Top of Pad Elevation.
E.F. Each Face.

Note:
Estimated pile tip elevation, 9.00 (Pier 5), 12.00 (Pier 6).

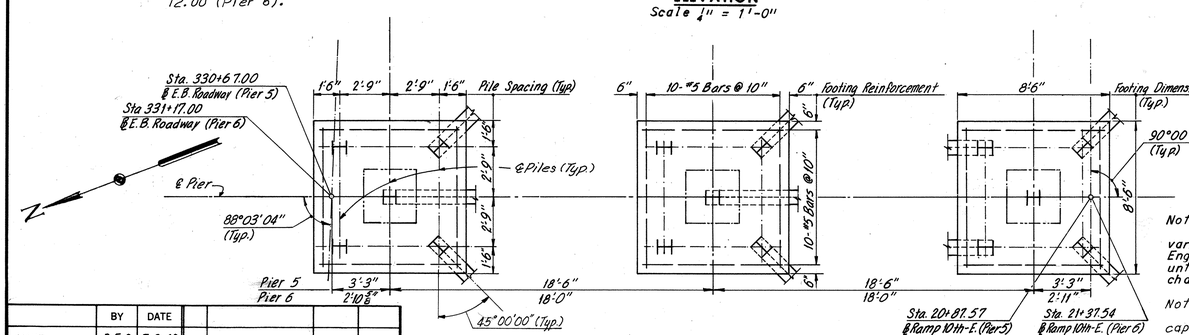








PAD AND ANCHOR BOLT SETTING PLAN
No Scale



Note:
Pile spacing is measured at bottom of Footing.

Note:
For architectural treatment of columns, see Sheet 37.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all Piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plan, see Sheet 15
For Steel Pile Details, see Sheet 11.

	BY	DATE				
MADE	D.E.S	7-2-68				
CHECKED	G.C.C	8-20-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

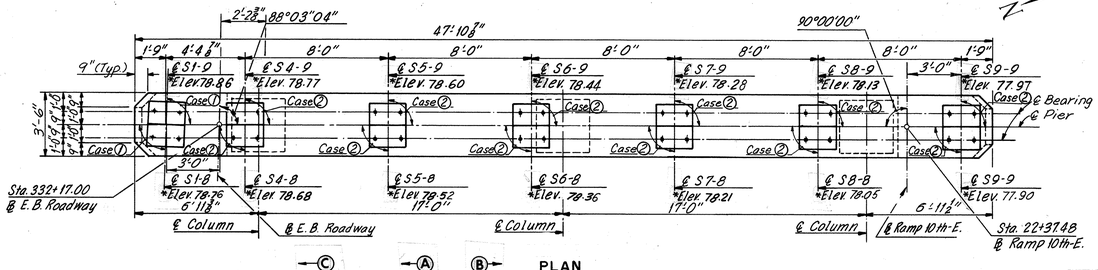
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 5 AND 6

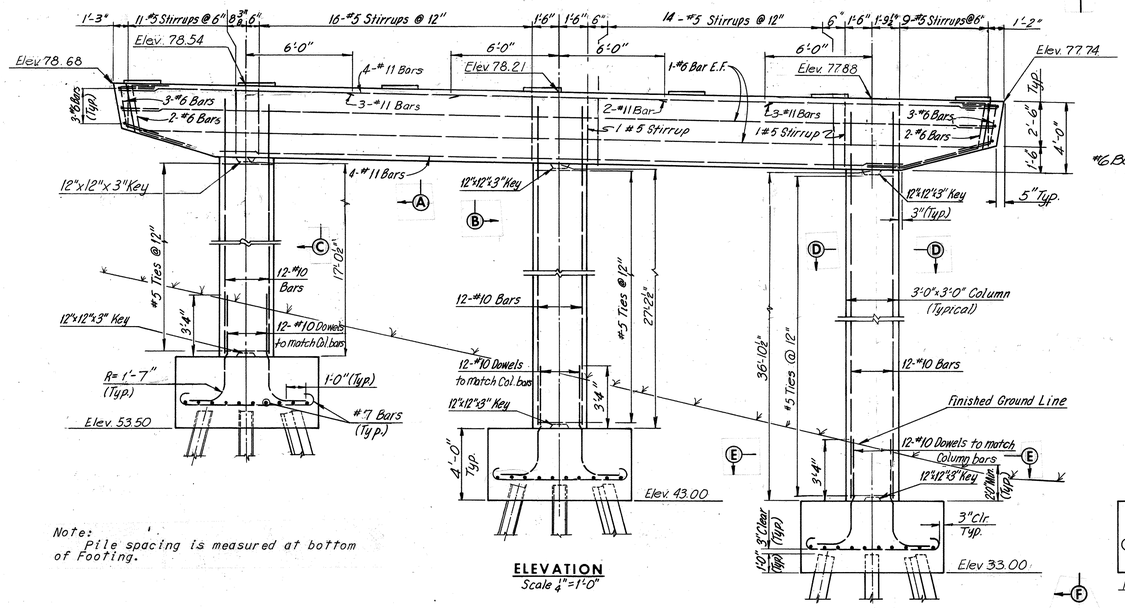
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 9 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	136A	265

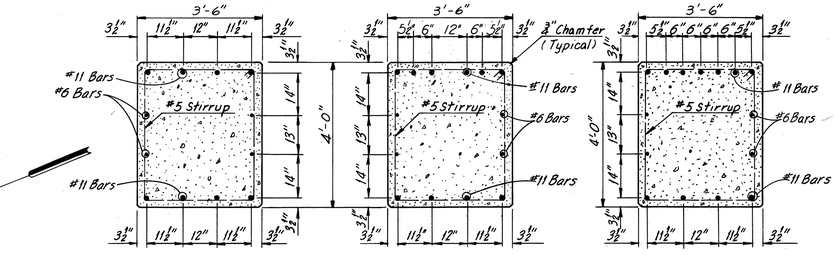


PLAN
Scale : 4"=1'-0"



ELEVATION
Scale 4"=1'-0"

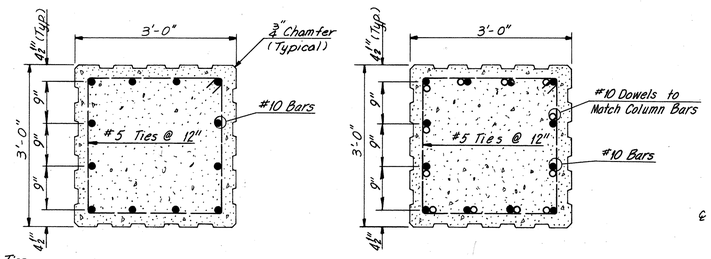
Note:
Pile spacing is measured at bottom of Footing.



SECTION A-A
Scale ½"=1'-0"

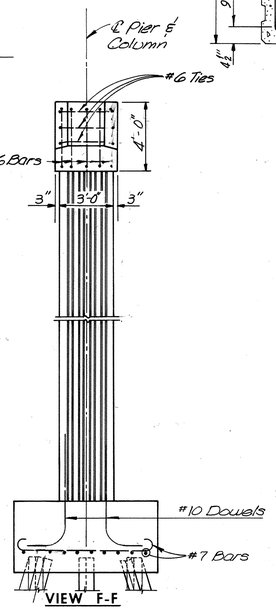
SECTION B-B
Scale ½"=1'-0"

SECTION C-C
Scale ½"=1'-0"



SECTION D-D
Scale ¾"=1'-0"

SECTION E-E
Scale ¾"=1'-0"



VIEW F-F
No Scale

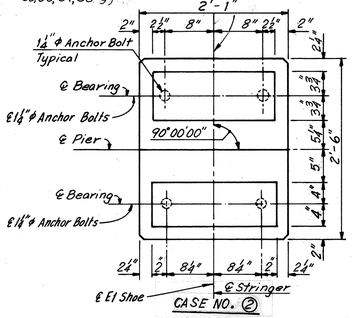
FOOTING PLAN
Scale 4"=1'-0"

Note:
For architectural treatment of columns, see Sheet 57.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

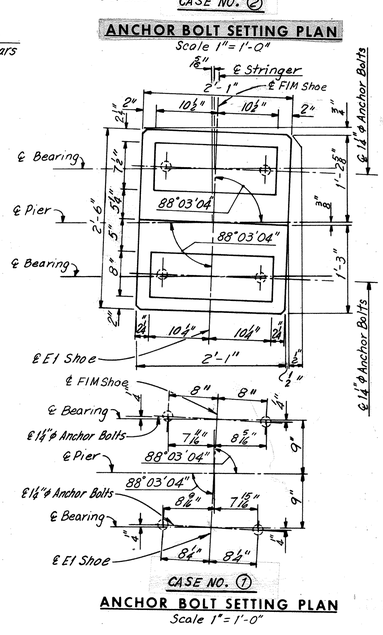
Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets 51 and 52
For Framing Plan see Sheet 15.
For Steel Pile Details, see Sheet 11.
E. F. = Each Face.
Denotes Top of pad elevation.
Estimated Pile Tip elevation, 15.00

℄ FIM Shoes (S9-9) or ℄ FI Shoe (S4, S5, S6, S7, S8-9)



CASE NO. ②

ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



CASE NO. ①

ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"

	BY	DATE
MADE	DES	7-10-68
CHECKED	M.A.A.	7-31-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76
1	Pier 7 eliminated this sheet, Fig. elev. dim+ Point Fig. added, Hinge eliminated	R.B.H.	8-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

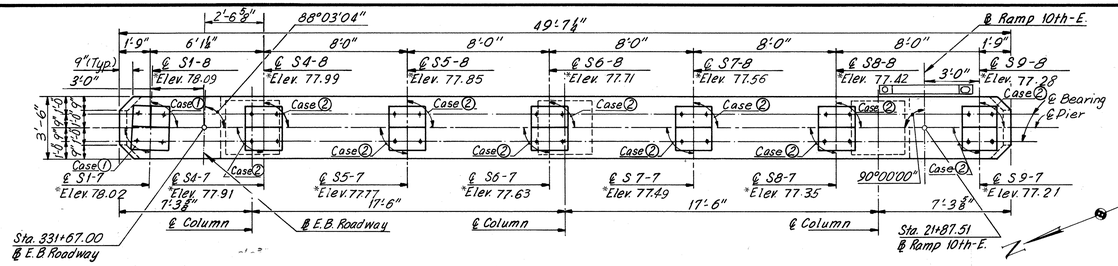
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

PIER 8

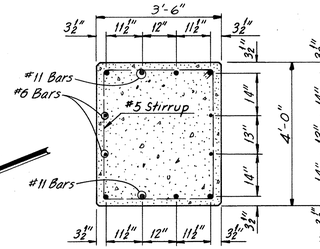
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10A OF 46

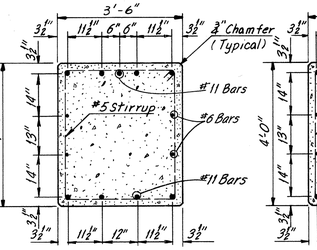
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	136	265



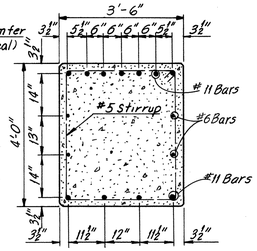
PLAN
Scale: 1/4"=1'-0"



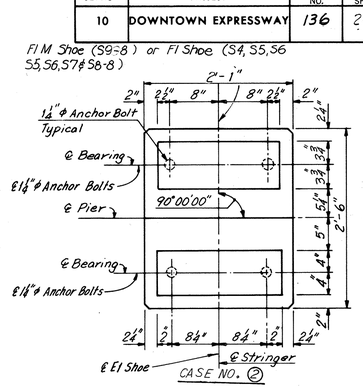
SECTION A-A
Scale 1/2"=1'-0"



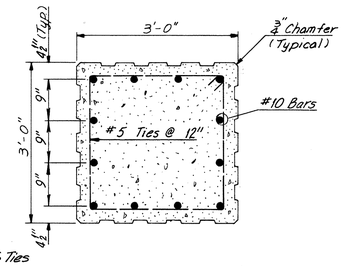
SECTION B-B
Scale 1/2"=1'-0"



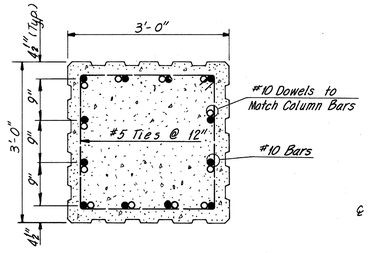
SECTION C-C
Scale 1/2"=1'-0"



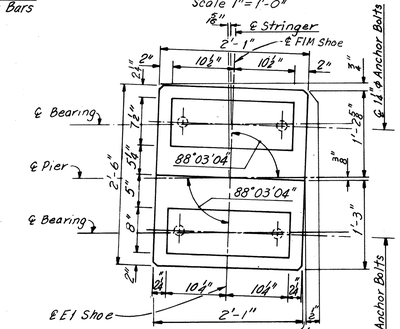
ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



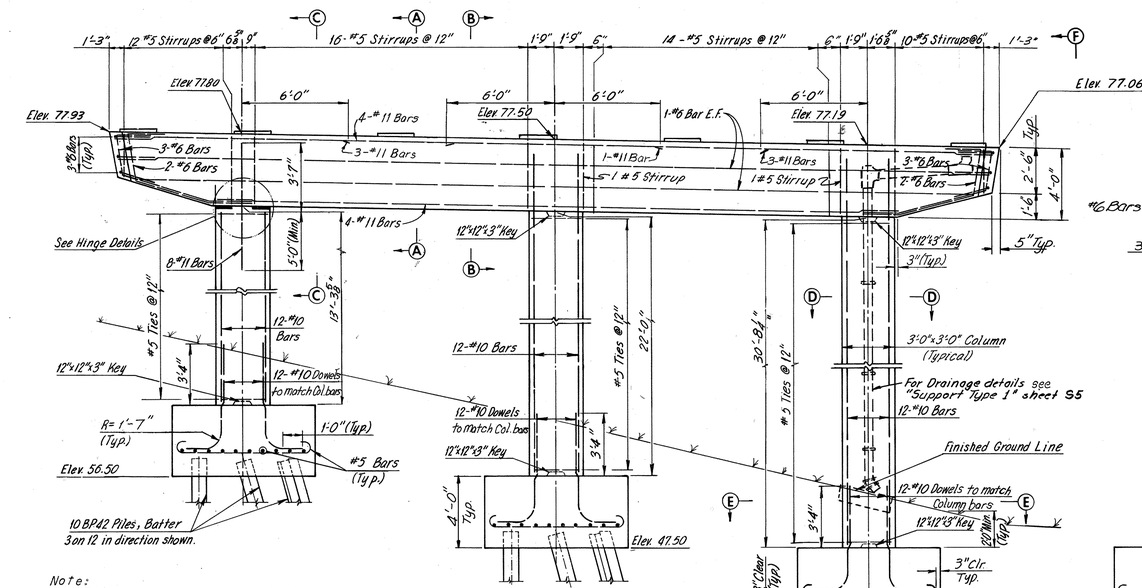
SECTION D-D
Scale 3/4"=1'-0"



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



ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



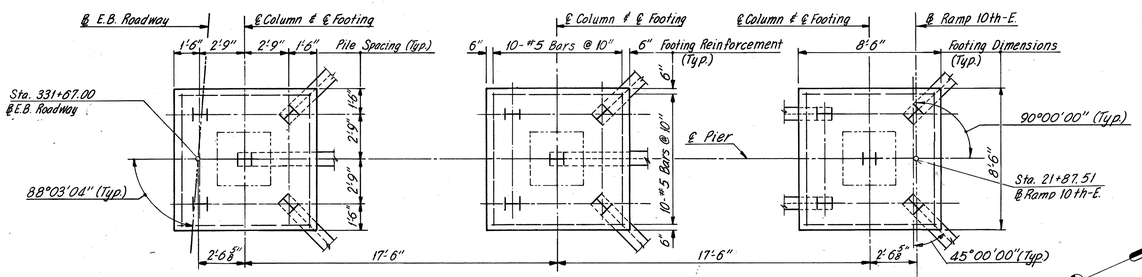
ELEVATION
Scale 1/4"=1'-0"

VIEW F-F
No Scale

HINGE DETAILS
Scale 3/4"=1'-0"

Note:
Pile spacing is measured at bottom of Footing.

Note:
For architectural treatment of columns, see Sheet 57.



FOOTING PLAN
Scale 1/4"=1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 and S2
For Framing Plan see Sheet 16.
For Steel Pile Details, see Sheet 11.
E.F. = Each Face.
*Denotes Top of pad elevation.
Estimated Pile Tip elevation, 18.00

	BY	DATE
MADE	DES.	7-10-68
CHECKED	M.A.A.	7-31-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	8-76
⚠	Pier 8 Elimited this Sheet	R.B.H.	8-74

AS BUILT

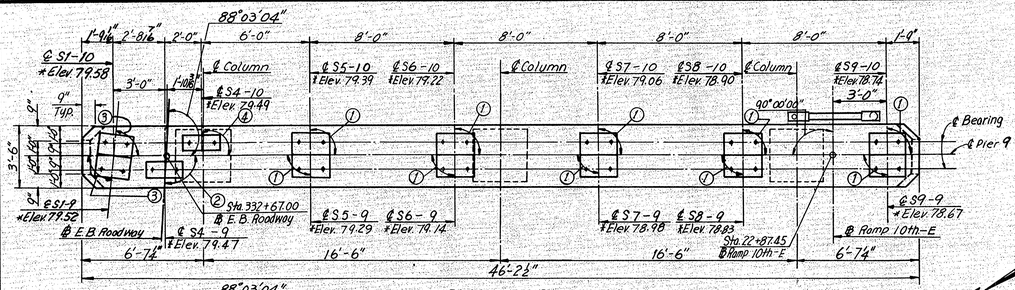
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 7

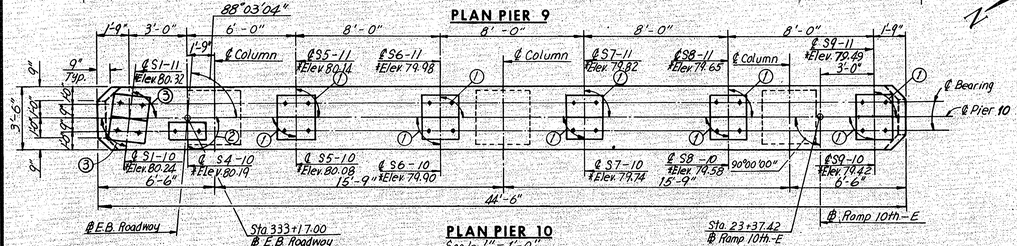
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	137	265



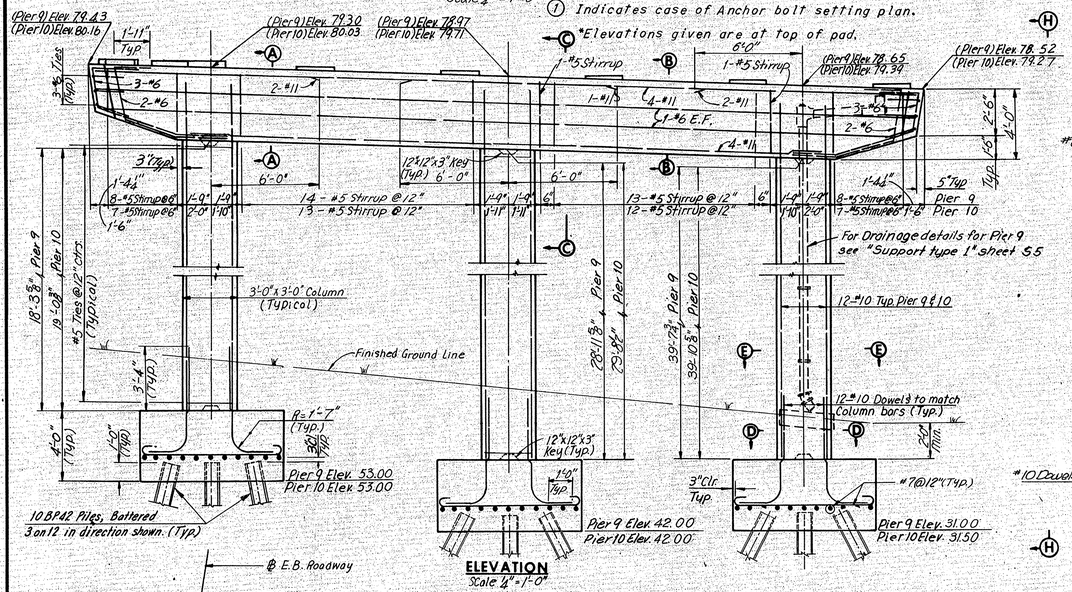
PLAN PIER 9



PLAN PIER 10

Scale 1" = 1'-0"

① Indicates case of Anchor bolt setting plan.



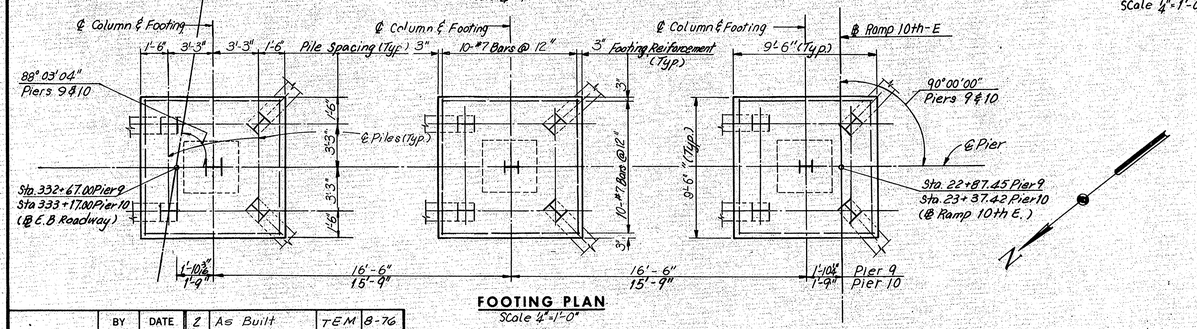
*Elevations given at top of pad.

ELEVATION

Scale ¼" = 1'-0"

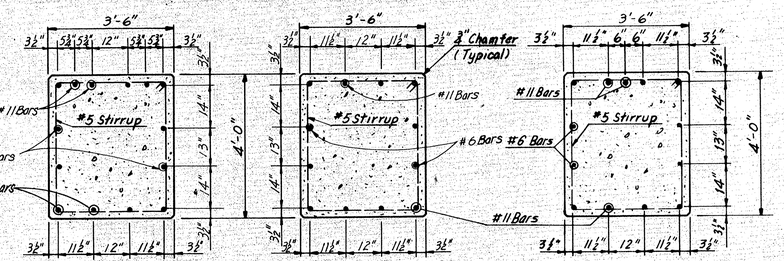
VIEW H-H

Scale ¼" = 1'-0"



FOOTING PLAN

Scale ¼" = 1'-0"



SECTION A-A

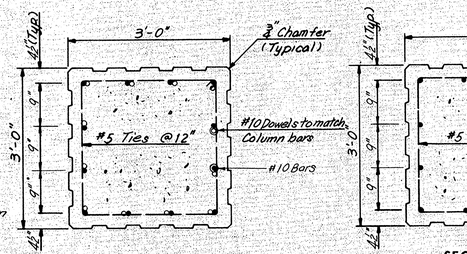
Scale ½" = 1'-0"

SECTION B-B

Scale ½" = 1'-0"

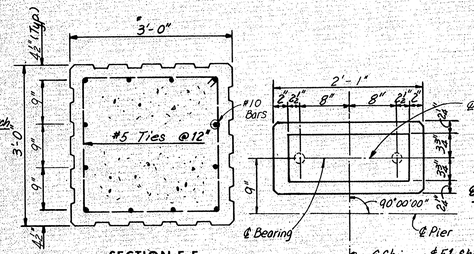
SECTION C-C

Scale ½" = 1'-0"



SECTION D-D

Scale ½" = 1'-0"

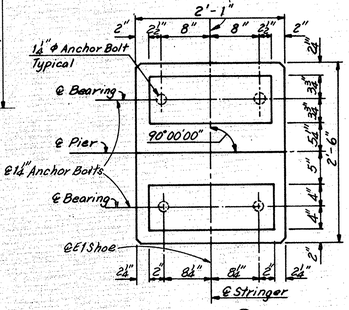


SECTION E-E

Scale ½" = 1'-0"

Case ④

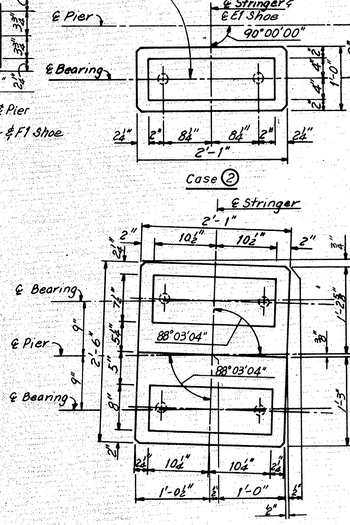
℄ F1 Shoe (S5, S6, S7 & S8-10; & S5, S6, S7, & S8-11)
℄ F1M Shoe (S9-10 & S9-11)



Case ①

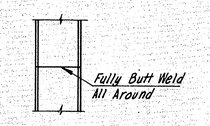
ANCHOR BOLT SETTING PLAN

Scale: 1" - 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN

Scale 1" = 1'-0"



DETAIL OF STEEL PILE SPLICE

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets 51 and 52.
For Framing Plan, see Sheets 15 & 16.
Estimated Pile Tip elevation 10.00 (Pier 9), 8.00 (Pier 10).

For architectural treatment of column, see Sheet 57.

AS BUILT

	BY	DATE
MADE	GSH	7-24-68
CHECKED	G.C.C.	8-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76
1	Footing Elev., Dims, Reinf. & pile pattern Col. heights	R.B.H.	8-74

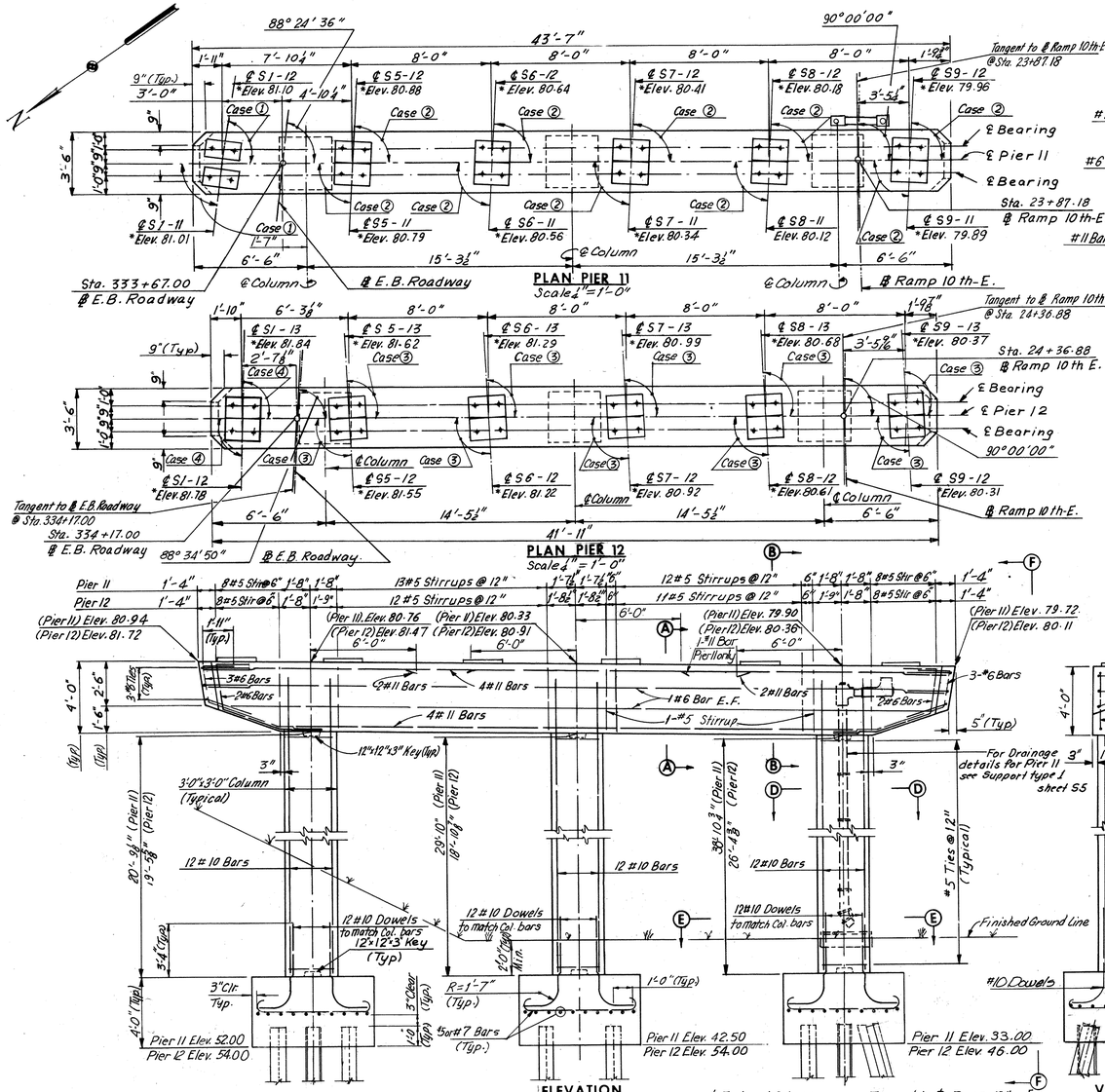
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 9 AND 10

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

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 11 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	138	265



	BY	DATE				
MADE	M.A.A.	7-17-68	2	As Built	TEM	8-76
CHECKED	GCC	8-20-68	⚠	Hg. sizes, Reinf & Piling	P.R.Y.	8-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

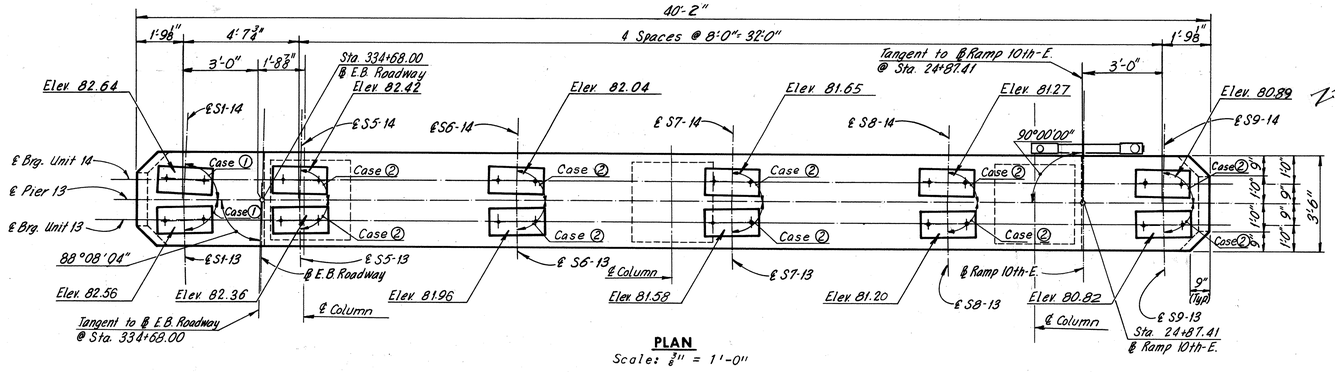
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 11 AND 12

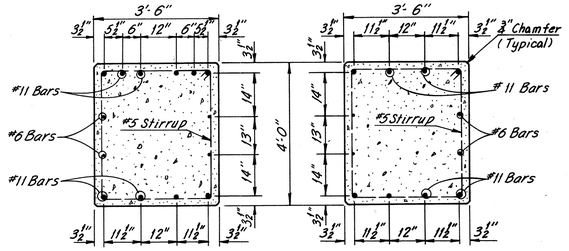
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 12 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	139	265

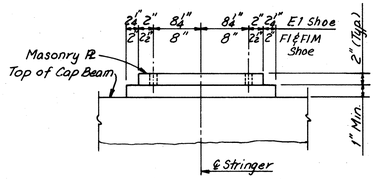


PLAN
Scale: ⅜" = 1'-0"

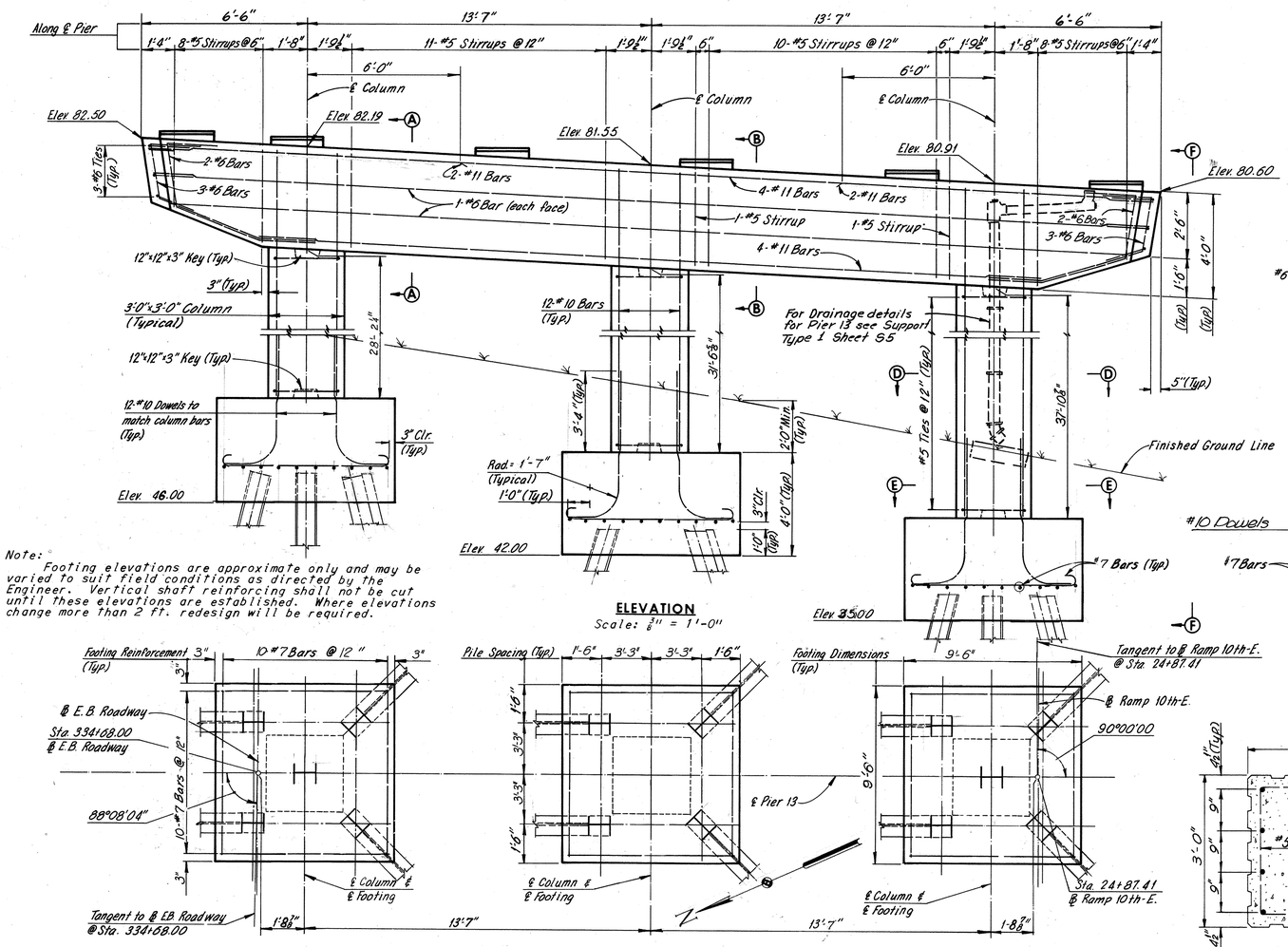


SECTION A-A
Scale: ½" = 1'-0"

SECTION B-B
Scale: ½" = 1'-0"

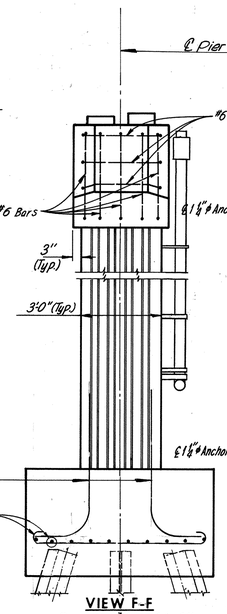


PAD ELEVATION VIEW
No Scale

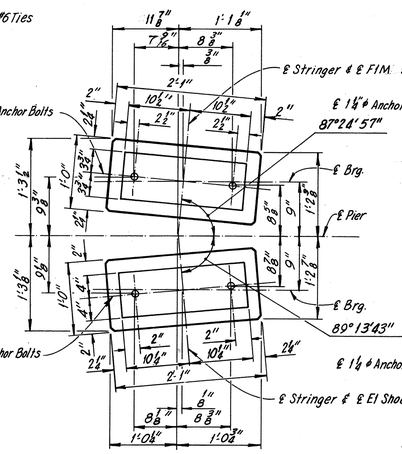


ELEVATION
Scale: ⅜" = 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

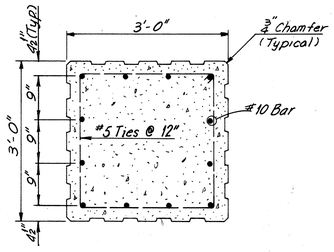


VIEW F-F
Scale: ⅜" = 1'-0"

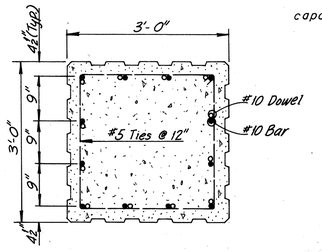


PAD AND ANCHOR BOLT SETTING PLAN
No Scale

FOOTING PLAN
Scale: ⅜" = 1'-0"



SECTION D-D
Scale: ¾" = 1'-0"



SECTION E-E
Scale: ¾" = 1'-0"

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Bother all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 and S2
For Framing Plan see Sheet 16.
For Steel Pile Details, see Sheet 11.
Estimated Pile Tip Elev., 5.00.
For architectural treatment of columns, see Sheet 37.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	7-3-68	2	As Built	TEM	8-76
CHECKED	G.C.C.	8-15-68	1	Footing elev. Reinf. Pile pattern, Dim. Col. heights	R.B.H.	8-74
IN CHARGE						

AS BUILT

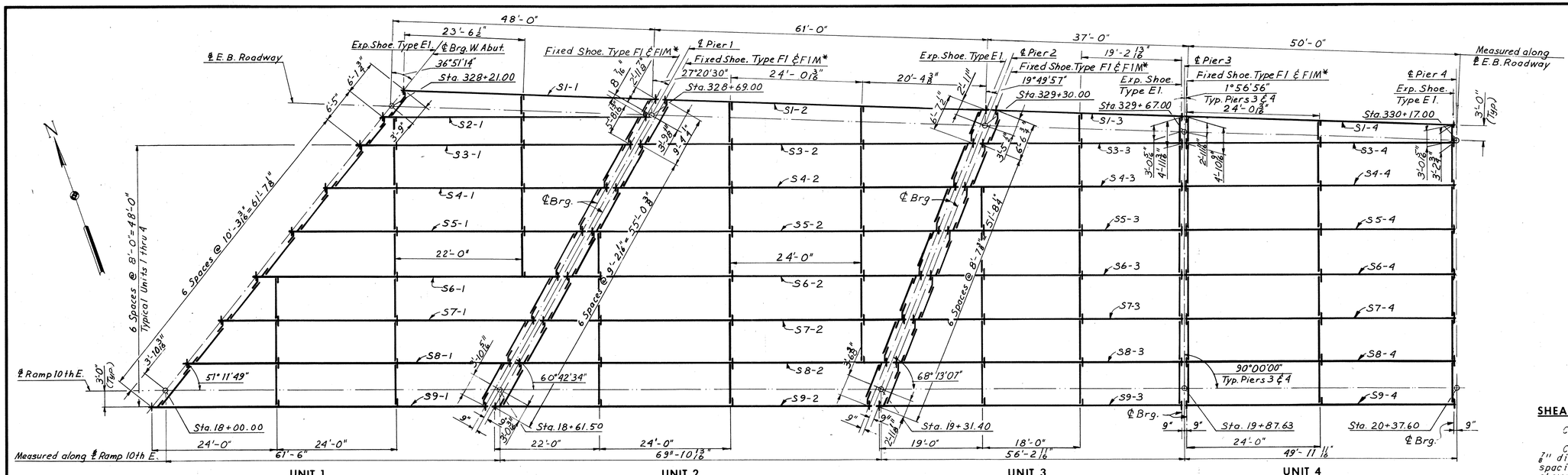
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 13

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	140	265



* All fixed shoes for stringers S1, S2, S3, S8 and S9 @ Piers 1, 2 and 3 shall be of type F1M, all other fixed shoes to be of type F1.

FRAMING PLAN

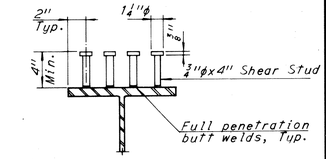
Scale: 1" = 10'-0"

STRINGER SCHEDULE															DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L		¼L	½L	¾L	¼L	½L	¾L
1	S1-1	33 WF 118	48'-6 3/8"	46'-5½"	1'-4¼"	9"	0	0	13"	14½"	17"	20½"	24"		¼"	⅜"	¼"	5/16"	½"	5/16"
	S2-1	33 WF 118	50'-6 1/16"	48'-5 11/16"	1'-4 11/16"	8"	0	0	12½"	13½"	16"	19"	23½"		5/16"	7/16"	5/16"	⅜"	½"	⅜"
	S3-1	33 WF 118	51'-9 1/16"	49'-8 11/16"	1'-4 11/16"	8"	0	0	9"	10"	11½"	13½"	16½"		⅜"	9/16"	⅜"	½"	11/16"	½"
	S4-1	33 WF 118	53'-8 3/16"	51'-7 13/16"	1'-4 11/16"	8"	19'-0"	10x½"	7½"	8"	10"	11½"	14"		½"	11/16"	½"	9/16"	13/16"	9/16"
	S5-1	33 WF 118	55'-7 5/16"	53'-7 1/16"	1'-4 11/16"	8"	21'-0"	10x⅝"	7½"	8"	10"	11½"	14"		9/16"	13/16"	9/16"	11/16"	15/16"	11/16"
	S6-1	36 WF135	57'-7 7/16"	55'-6 7/16"	1'-4 11/16"	8"	21'-0"	10½x⅝"	8"	8½"	10½"	12½"	15"		5/8"	15/16"	5/8"	13/16"	1⅛"	1"
	S7-1	36 WF 135	59'-6 7/16"	57'-5 3/16"	1'-4 11/16"	8"	21'-6"	10½x⅝"	8"	8½"	10½"	12½"	15"		5/8"	15/16"	5/8"	13/16"	1⅛"	15/16"
	S8-1	36 WF 135	61'-5 3/16"	59'-5 1/16"	1'-4 11/16"	8"	22'-6"	10½x⅝"	8"	8½"	10½"	12½"	15"		11/16"	15/16"	11/16"	13/16"	1⅛"	15/16"
	S9-1	36 WF 135	63'-6 5/8"	61'-4 13/16"	1'-4 15/16"	9⅛"	24'-0"	10½x⅝"	7"	8½"	9½"	11½"	14½"		11/16"	15/16"	11/16"	⅞"	1 1/16"	⅞"
2	S1-2	36 WF 135	60'-4 3/16"	58'-10 11/16"	9"	8½"	22'-0"	10½x½"	8"	9½"	11½"	13½"	17"		⅞"	15/16"	⅞"	1"	1⅛"	⅞"
	S3-2	36 WF 135	62'-3 3/16"	60'-11 5/16"	8"	7⅞"	22'-6"	10½x⅝"	8½"	9½"	11½"	13½"	16½"		¾"	1"	11/16"	⅞"	1⅛"	⅞"
	S4-2	36 WF 150	63'-6 1/16"	62'-3 1/16"	8"	7⅞"	23'-3"	10½x⅝"	8"	8½"	11"	12½"	15½"		⅞"	⅞"	⅞"	15/16"	1⅛"	15/16"
	S5-2	36 WF 150	64'-10 1/8"	63'-6 5/8"	8"	7⅞"	24'-0"	10½x⅝"	8"	8½"	11"	12½"	15½"		11/16"	1"	11/16"	⅞"	1 1/16"	⅞"
	S6-2	36 WF 150	66'-1 11/16"	64'-10 1/8"	8"	7⅞"	25'-0"	10½x1"	8"	8½"	10½"	12½"	15½"		1"	1⅛"	1"	1⅛"	1⅜"	1⅛"
	S7-2	36 WF 150	67'-5 5/16"	66'-1⅛"	8"	7⅞"	25'-9"	10½x1"	8"	8½"	11"	12½"	15½"		1"	1⅛"	1"	1⅛"	2⅜"	1⅛"
	S8-2	36 WF 150	68'-8 11/16"	67'-5⅛"	8"	7⅞"	26'-6"	10½x1¼"	8"	8½"	11"	12½"	15½"		⅞"	1¼"	⅞"	1⅜"	2⅝"	1⅜"
	S9-2	36 WF 150	70'-2 3/16"	68'-8⅜"	9⅜"	8⅝"	27'-0"	10½x1¼"	7¼"	8½"	11"	13½"	16½"		⅞"	1¼"	⅞"	1⅜"	2⅝"	1⅜"
3	S1-3	30 WF 99	35'-7 11/16"	34'-3 5/16"	8½"	8"	0	0	11"	12"	14"	16½"	20½"		⅝"	¾"	⅝"	¾"	⅝"	¾"
	S3-3	30 WF 99	37'-10 9/16"	36'-8¼"	7⅞"	7"	0	0	9"	10"	11½"	13½"	16"		¾"	⅝"	¾"	⅝"	¾"	⅝"
	S4-3	30 WF 108	41'-1⅛"	39'-10 9/16"	7⅞"	7"	0	0	7½"	8"	9"	10½"	13"		¼"	⅜"	¼"	5/16"	7/16"	5/16"
	S5-3	30 WF 108	44'-3½"	43'-0 15/16"	7⅞"	7"	15'-0"	9x½"	7"	7½"	9½"	11"	13"		5/16"	7/16"	5/16"	⅜"	½"	⅜"
	S6-3	30 WF 108	47'-5 7/8"	46'-3 5/8"	7⅞"	7"	17'-0"	9x½"	7"	7½"	9"	11"	13"		½"	⅝"	½"	⅝"	13/16"	11/16"
	S7-3	30 WF108	50'-8¼"	49'-5 1/16"	7⅞"	7"	19'-3"	9x⅝"	7"	7½"	9"	11"	13"		9/16"	13/16"	9/16"	¾"	1"	11/16"
	S8-3	30 WF 108	53'-10 3/8"	52'-8"	7⅞"	7"	21'-6"	9x1"	7"	7½"	9½"	11"	13"		⅝"	⅞"	⅝"	13/16"	1⅛"	15/16"
	S9-3	30 WF 108	57'-3"	55'-10 3/8"	8⅝"	8"	23'-3"	9x1⅛"	7"	7½"	9½"	11½"	14"		¾"	⅞"	¾"	1"	1⅛"	1"
4	S1-4	30 WF 108	49'-10"	48'-6"	8"	8"	0	0	10½"	11½"	13½"	16½"	20½"		11/16"	⅝"	11/16"	½"	¾"	½"
	S3-4	30 WF 99	49'-7⅝"	48'-5⅝"	7"	7"	18'-0"	9x⅜"	8½"	9½"	11½"	13½"	16"		11/16"	⅝"	11/16"	9/16"	⅝"	9/16"
	S4-4	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13"		½"	⅝"	½"	9/16"	⅝"	9/16"
	S5-4	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13"		½"	⅝"	½"	9/16"	⅝"	9/16"
	S6-4	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13"		½"	⅝"	½"	9/16"	¾"	9/16"
	S7-4	30 WF108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13"		½"	⅝"	½"	9/16"	⅝"	9/16"
	S8-4	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13"		½"	11/16"	½"	9/16"	13/16"	9/16"
	S9-4	30 WF 108	49'-9⅛"	48'-5⅝"	8"	8"	19'-0"	9x⅝"	7"	8"	9½"	11½"	14"		½"	11/16"	½"	9/16"	¾"	9/16"

* Spacing begins at termination of 6 spaces @ 4".

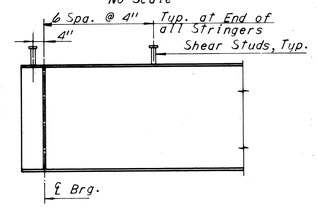
Note: All steel shall be A36 unless otherwise denoted.

Notes:
For Diaphragm and Connection Details, see Sheet 26.
For Joint Details, see Sheet 37.
For Shoe Details, see Sheets 31 and 32
For angles between ℄ Piers and Stringers, see Sheets 3, 6, 7 & 8.
For Superstructure steel quantities, see Sheet 2.



SHEAR STUD DETAIL

No Scale



DETAIL "A"

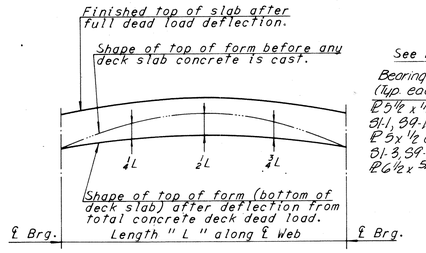
No Scale

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.

Contractor may, if he elects, use three ⅞" diameter studs at the same longitudinal spacing in lieu of the four ¾" diameter studs shown.

Stud rows shall be placed parallel to the main deck reinforcement.

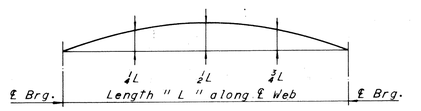


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



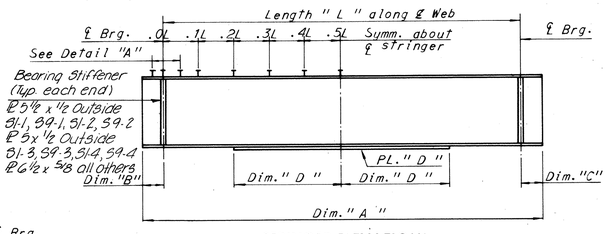
CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.

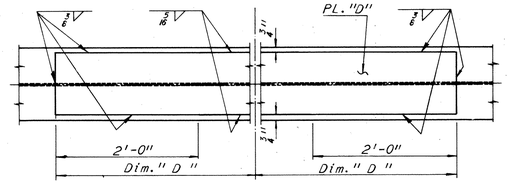
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.



STRINGER ELEVATION

No Scale



COVER PLATE DETAIL

No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 28.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO.REQD.	TYPE	NO.REQD.
E1	33	F1	16
		F1M	17

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	8-6-68	2	As Built	TEM	8-76
CHECKED	J.V.	10-22-68	1	Pier 1 & 2 Dim. Change	LBP	10-16-78
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

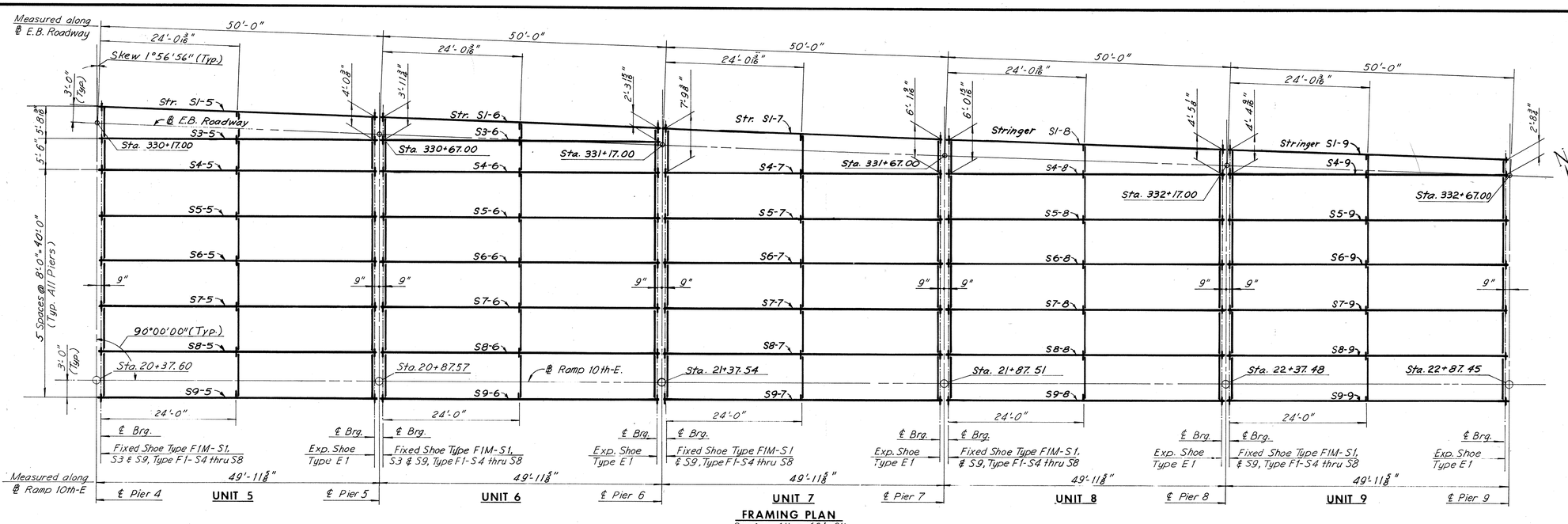
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN - UNITS 1,2,3 AND 4

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

SCALE: 1"=10' Unless as shown
CONTRACT NO.: 10
SHEET NO. 14 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	141	265



FRAMING PLAN
Scale: 1" = 10'-0"

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	37	F1	25
		F1M	12

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
5	S1-5	30 WF 108	49'-10"	48'-6"	8"	8"	0	0	11"	11¼"	13½"	16½"	20½"
	S3-5	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	0	0	10"	11¼"	13"	15½"	19"
	S4-5	30 WF 99	49'-7⅝"	48'-5⅝"	7"	7"	18'-0"	9x⅜"	8"	9"	11"	12½"	15"
	S5-5	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18' 6"	9x¼"	7"	7½"	9½"	11"	13"
	S6-5	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S7-5	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S8-5	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S9-5	30 WF 108	49'-9⅜"	48'-5⅝"	8"	8"	19'-0"	9x⅝"	7½"	8"	9½"	11½"	14"
6	S1-6	30 WF 99	49'-10"	48'-6"	8"	8"	0	0	13⅜"	15"	18"	22"	2'-1"
	S3-6	30 WF 99	49'-7⅝"	48'-5⅝"	7"	7"	0	0	11½"	12½"	14½"	17½"	21½"
	S4-6	30 WF 99	49'-7⅝"	48'-5⅝"	7"	7"	18'-0"	9x⅜"	8"	9"	11"	12½"	15"
	S5-6	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S6-6	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S7-6	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S8-6	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S9-6	30 WF 108	49'-9⅜"	48'-5⅝"	8"	8"	19'-0"	9x⅝"	7½"	8"	9½"	11½"	14"
7	S1-7	30 WF 108	49'-10"	48'-6"	8"	8"	17'-6"	9x⅜"	8"	8½"	10½"	12½"	15½"
	S4-7	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S5-7	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S6-7	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S7-7	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S8-7	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S9-7	30 WF 108	49'-9⅜"	48'-5⅝"	8"	8"	19'-0"	9x⅝"	7½"	8"	9½"	11½"	14"
8	S1-8	30 WF 108	49'-10"	48'-6"	8"	8"	17'-6"	9x⅜"	9½"	10½"	13"	15½"	19½"
	S4-8	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	8"	8½"	11"	13"	15½"
	S5-8	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13½"
	S6-8	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13½"
	S7-8	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13½"
	S8-8	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x⅜"	7"	7½"	9½"	11"	13½"
	S9-8	30 WF 108	49'-9⅜"	48'-5⅝"	8"	8"	19'-6"	9x⅝"	7"	7½"	10"	12"	14½"
9	S1-9	30 WF 99	49'-10"	48'-6"	8"	8"	0	0	14"	15"	18"	22"	24"
	S4-9	30 WF 99	49'-7⅝"	48'-5⅝"	7"	7"	17'-0"	9x⅜"	9"	10"	12"	14"	17"
	S5-9	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¼"	7"	7½"	9½"	11"	13"
	S6-9	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18"-6"	9x¾"	7"	7½"	9½"	11"	13"
	S7-9	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S8-9	30 WF 108	49'-7⅝"	48'-5⅝"	7"	7"	18'-6"	9x¾"	7"	7½"	9½"	11"	13"
	S9-9	30 WF 108	49'-9⅜"	48'-5⅝"	8"	8"	19'-0"	9x⅝"	7½"	8"	9½"	11½"	14"

* Spacing begins at termination of 6 spaces @ 4".

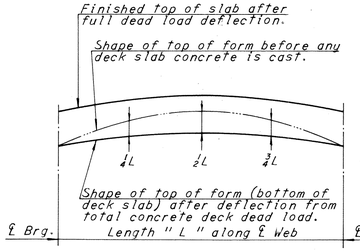
Note:
All steel shall be A36 unless denoted otherwise.

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
2"	1⅞"	2"
1⅞"	2⅛"	1⅞"
1⅝"	1⅞"	1⅝"
1⅜"	1⅝"	1⅜"
1⅛"	1⅜"	1⅛"
1"	1⅛"	1"
⅞"	1"	⅞"
¾"	⅞"	¾"
⅝"	¾"	⅝"
½"	⅝"	½"
⅜"	½"	⅜"
¼"	⅜"	¼"
⅛"	¼"	⅛"
0	⅛"	0

CAMBER SCHEDULE

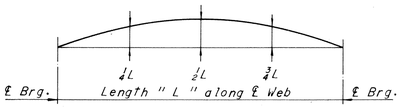
¼L	½L	¾L
2⅜"	3⅛"	2⅜"
1⅝"	2⅛"	1⅝"
1⅜"	1⅝"	1⅜"
1⅛"	1⅜"	1⅛"
⅞"	1⅛"	⅞"
¾"	⅞"	¾"
⅝"	¾"	⅝"
½"	⅝"	½"
⅜"	½"	⅜"
¼"	⅜"	¼"
⅛"	¼"	⅛"
0	⅛"	0



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

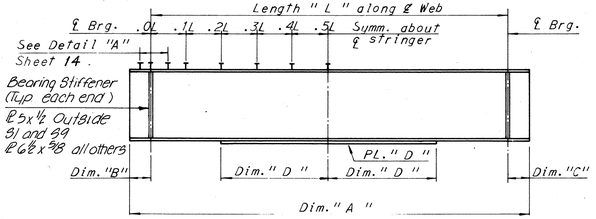
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



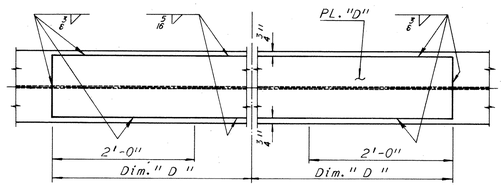
CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.



STRINGER ELEVATION
No Scale



COVER PLATE DETAIL
No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 29 .

Notes:
For Diaphragm and Connection Details, see Sheet 29.
For Joint Details, see Sheet 37.
For Shoe Details, see Sheets 51 and 52.
For Shear Stud Details, see Sheet 14.
For angles between ℄ Piers and Stringers, see Sheets 8, 9, 10 & 11.
For Superstructure steel quantities, see Sheet 2.

	BY	DATE				
MADE	SHS	8-2-68				
CHECKED	JD	11-21-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

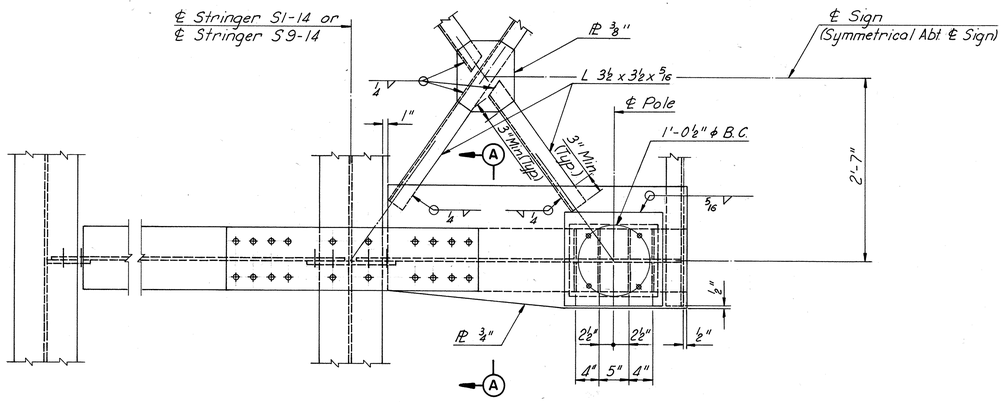
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN-UNITS 5,6,7,8,AND 9

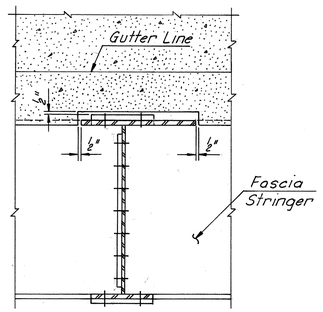
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=10' Unless as shown
CONTRACT NO.: 10
SHEET NO. 15 OF 46

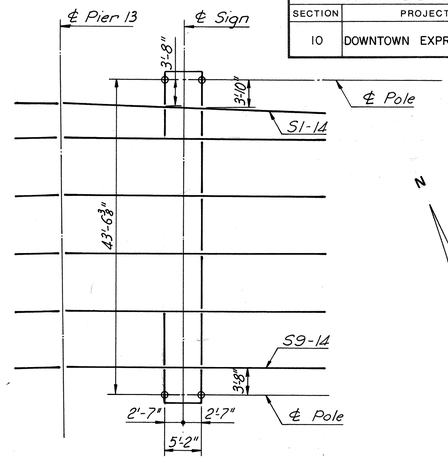
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	142A	265



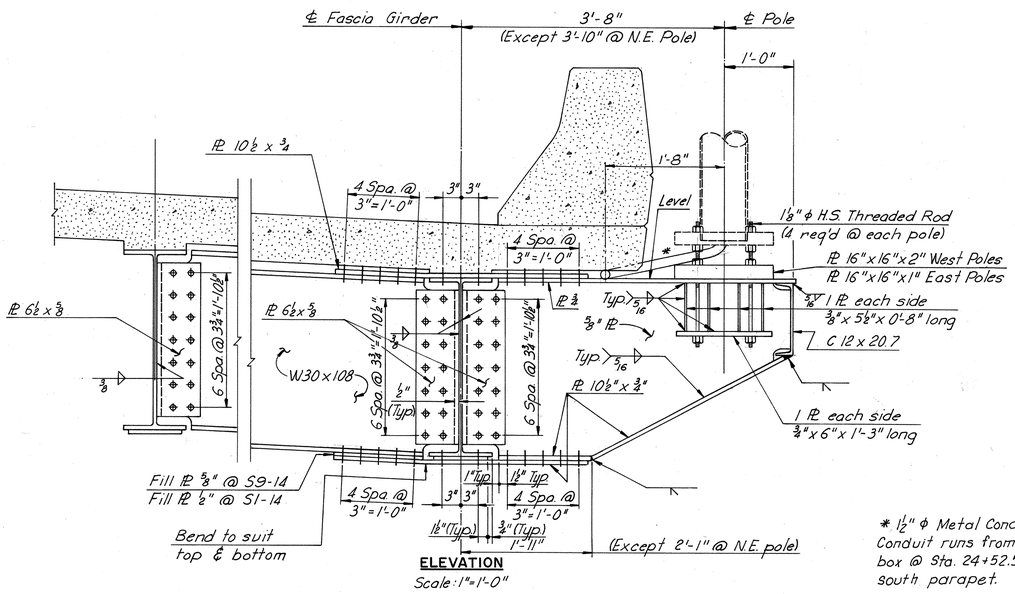
HALF PLAN
Scale: 1"=1'-0"



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

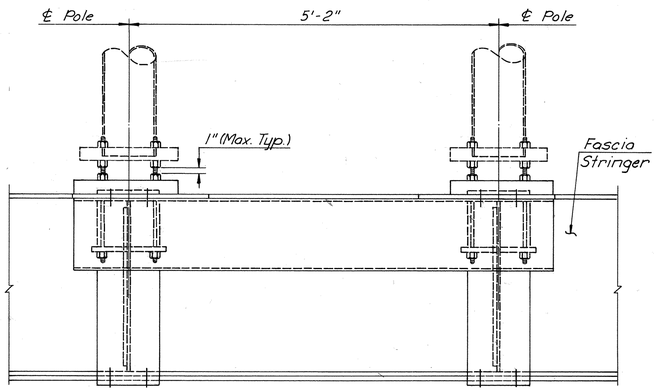


LAYOUT PLAN
Scale: 1"=10'-0"



ELEVATION
Scale: 1"=1'-0"

* 1½" ϕ Metal Conduit
Conduit runs from junction box @ Sta. 24+52.54 under south parapet.



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

NOTES:

1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞" ϕ H.S. unless noted otherwise.

DESIGNED						
DRAWN	N.L.B.	8-74	2	As Built	TEM	8-76
CHECKED	R.B.H.	9-74	1	New Sheet Added.	R.B.H.	9-74
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

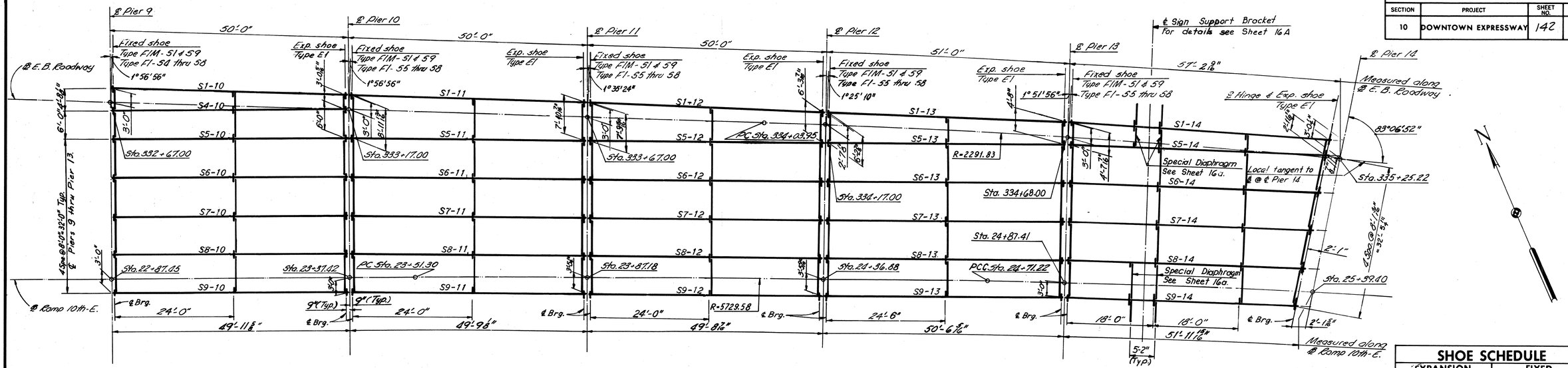
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
SIGN SUPPORT BRACKET DETAILS - UNIT 14

SCALE AS SHOWN
DATE
SHEET 16A OF 46

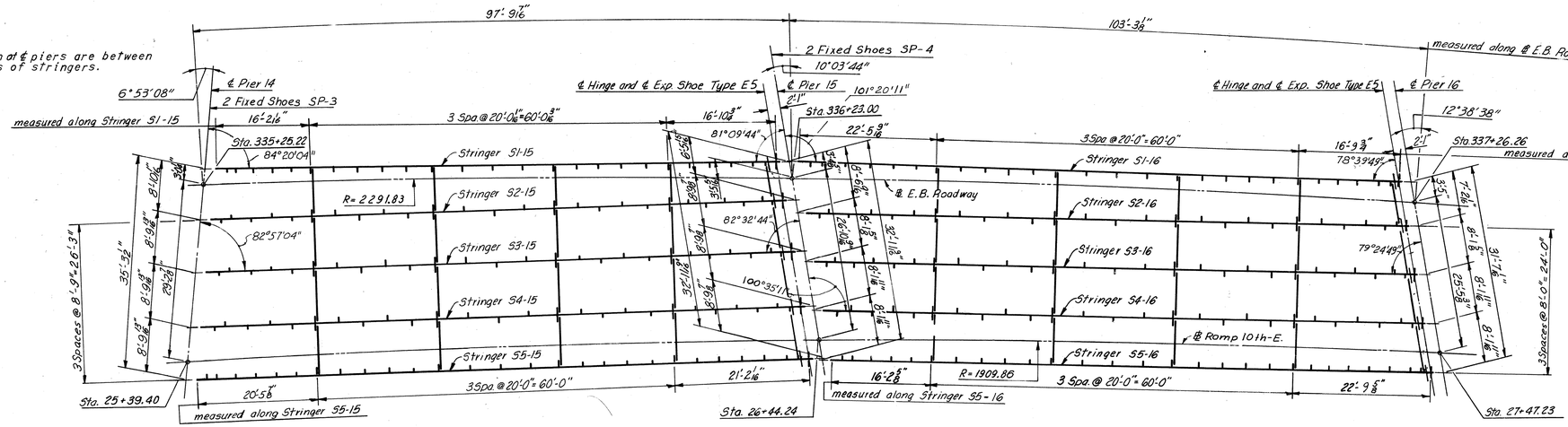
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	142	265


℄ Pier 9
℄ Pier 10
℄ Pier 11
℄ Pier 12
℄ Pier 13
℄ Pier 14
℄ Sign Support Bracket
For details see Sheet 16A
℄ E.B. Roadway
℄ Ramp 10th-E.
Fixed shoe
Type FIM-51 & 59
Type FI-54 thru 58
Exp. shoe
Type EI
Type FI-55 thru 58
1°56'56"
1°35'24"
1°25'10"
1°51'56"
3 Hinge & Exp. shoe
Type EI
Measured along ℄ E.B. Roadway.
Measured along ℄ Ramp 10th-E.
Special Diaphragm
See Sheet 16G.
Local tangent to ℄ @ ℄ Pier 14
89°06'52"
S1-10
S4-10
S5-10
S6-10
S7-10
S8-10
S9-10
S1-11
S5-11
S6-11
S7-11
S8-11
S9-11
S1-12
S5-12
S6-12
S7-12
S8-12
S9-12
S1-13
S5-13
S6-13
S7-13
S8-13
S9-13
S1-14
S5-14
S6-14
S7-14
S8-14
S9-14
Sta. 332+67.00
Sta. 333+17.00
Sta. 333+67.00
Sta. 334+03.95
PC Sta. 334+03.95
Sta. 334+68.00
Sta. 22+87.05
Sta. 23+37.42
PC Sta. 23+51.30
Sta. 23+87.18
Sta. 24+36.88
Sta. 24+87.41
PCC Sta. 24+71.22
Sta. 25+39.10
Sta. 335+25.22
R=2291.83
R=5729.58
45 Spaces @ 1'-3 2/16" = 56'-0" Typ. ℄ Piers 9 thru Pier 13
43 Spaces @ 1'-3 2/16" = 53'-11" Typ.
4 Spaces @ 1'-7 5/8" = 6'-4 1/2"
4 Spaces @ 1'-7 5/8" = 6'-4 1/2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	143	265

Note:
Dimensions shown at ℄ piers are between extended Centerlines of stringers.



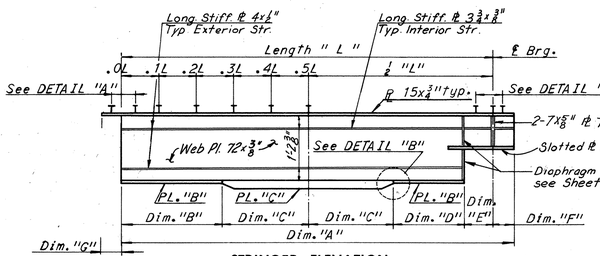
Note:
Stringers S2-15 thru S5-15 and Stringers S2-16 thru S5-16 are parallel.
Diaphragm spacing is shown along stringer length "L".

UNIT 15

UNIT 16

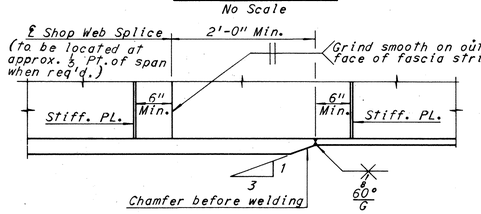
FRAMING PLAN

Scale: 3/32"=1'-0"



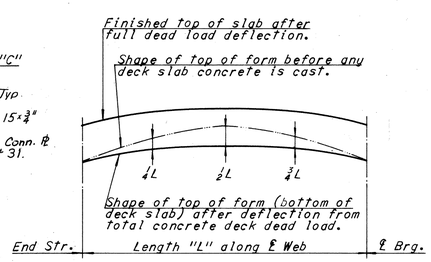
STRINGER ELEVATION

No Scale

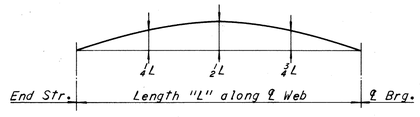


DETAIL "B"

No Scale



DEAD LOAD DEFLECTION DIAGRAM



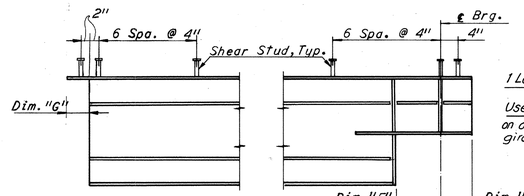
CAMBER DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 31.

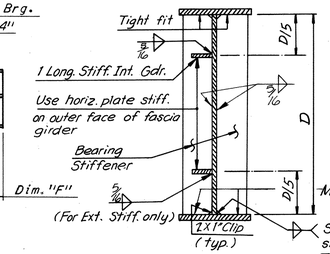


DETAIL "A"

No Scale

DETAIL "C"

No Scale



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS

No Scale

Note: Web to flange weld size shall be determined by flange thickness as follows:

to 1½".....3/16" weld
over 1½" to 2¼".....⅜" weld

SHOE SCHEDULE

FIXED SHOES		EXPANSION SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
SP-3	2	E5	10
SP-4	2		

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
15	S1-15	93'-8¼"	93'-1"	23'-3½"	23'-3"	22'-5⅝"	10¼"	7¼"	6⅜"	15x⅜"	15x1⅛"	13½"	15½"	19"	24"	24"
	S2-15	95'-6⅞"	94'-11 15/16"	24'-5⅞"	23'-0"	23'-7⅞"	10¼"	7¼"	6⅜"	15x⅜"	15x1¼"	14"	16"	18½"	21½"	23½"
	S3-15	97'-9⅜"	97'-2½"	22'-1¼"	26'-6"	21'-3⅜"	10¼"	7¼"	6⅜"	15x⅞"	15x1⅜"	14"	16"	18"	21"	22⅛"
	S4-15	100'-0⅛"	99'-5¼"	24'-2⅜"	25'-6"	23'-4⅛"	10¼"	7¼"	6⅜"	15x1"	15x1¼"	14"	16"	18½"	21"	23"
	S5-15	102'-3"	101'-7 15/16"	24'-4"	26'-6"	23'-5⅞"	10¼"	7¼"	6⅜"	15x1"	15x1¼"	13½"	15½"	18½"	23"	24"
16	S1-16	99'-10 7/16"	99'-3 5/16"	23'-7⅜"	26'-0"	22'-9½"	10⅜"	7¼"	6⅝"	15x⅞"	15x1⅜"	14"	16"	19"	24"	24"
	S2-16	99'-7⅝"	99'-0¼"	24'-6⅛"	25'-0"	23'-7 15/16"	10⅜"	7⅛"	6⅝"	15x⅞"	15x1¼"	15"	17"	19½"	22½"	24"
	S3-16	99'-7⅝"	99'-0¼"	24'-0⅛"	25'-6"	23'-1⅜"	10⅜"	7¼"	6⅝"	15x⅞"	15x1¼"	15"	17"	19½"	22½"	24"
	S4-16	99'-7⅝"	99'-0¼"	24'-0⅛"	25'-6"	23'-1 15/16"	10⅜"	7¼"	6⅝"	15x⅞"	15x1¼"	15"	17"	19½"	22½"	24"
	S5-16	99'-7⅝"	99'-0¼"	24'-0⅛"	25'-6"	23'-1 15/16"	10⅜"	7¼"	6⅝"	15x⅞"	15x1⅜"	14"	16½"	19½"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1 5/16"	1 7/16"	1 5/16"
7/8"	1 3/16"	1"
1 5/16"	1 3/16"	1 5/16"
1"	1 3/16"	1"
1 1/16"	1 3/16"	1 1/16"
1 5/16"	1 3/16"	1 5/16"
1 5/16"	1 3/16"	1 5/16"
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1 5/16"	1 3/16"	1 5/16"

CAMBER SCHEDULE

¼L	½L	¾L
1 5/16"	1 13/16"	1 5/16"
1½"	2"	1 7/16"
1 5/8"	2 3/16"	1½"
1 11/16"	2 5/16"	1 5/8"
1¾"	2 5/16"	1 5/8"
1 3/16"	1 9/16"	1 3/16"
1"	1 7/16"	1"
1"	1 7/16"	1"
1"	1 7/16"	1"
1"	1 7/16"	1"

Note All structural steel in Units 15 and 16 is A36.

* Spacing begins at termination of 6 spaces @ 4"

Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.

Intermediate stiffener Pls. 4½ x ⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Notes:
For Superstructure steel quantities, see Sheet 2.
For Joint Details, see Sheet 38.
For Shoe Details, see Sheets 51 and 52
For Diaphragm Details, see Sheet 31.
For Framing Details, see Sheet 22.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers see Sheet 22.

	BY	DATE				
MADE	RLM	7-31-68				
CHECKED	PTA	11-4-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN - UNITS 15 AND 16

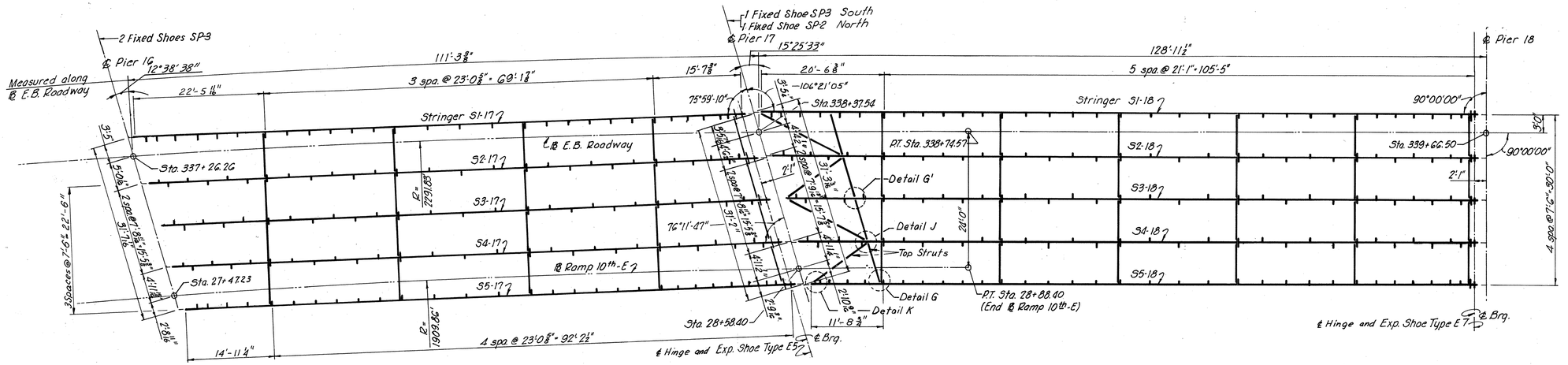
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK · ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 17 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	144	265

Note:
Stringers S2-17 thru S5-17 and Stringers S1-18 thru S5-18 are parallel.
Diaphragm spacing is shown along stringer length "L".

Dimensions shown at ℄ Piers are between extended center lines of stringers.

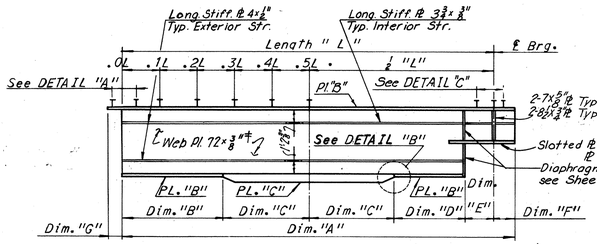


UNIT 17

UNIT 18

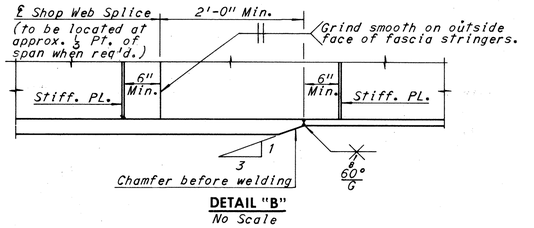
FRAMING PLAN

Scale: 1"=10'-0"



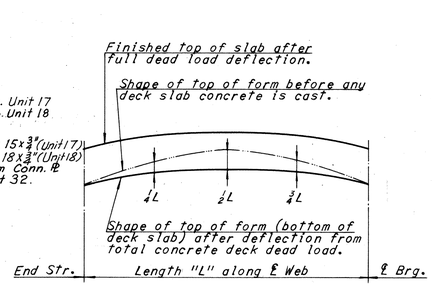
STRINGER ELEVATION

No Scale



DETAIL "B"

No Scale

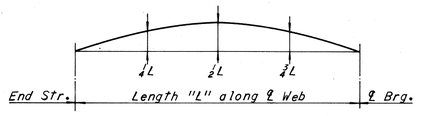


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.

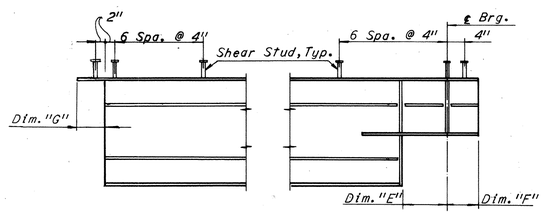
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 32.

Note:
For web to flange weld sizes and longitudinal stiffener plate details see Sheet 17.



DETAIL "A"

No Scale

DETAIL "C"

No Scale

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	5	SP-2	1
E7	5	SP-3	3

Note:
Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.
Intermediate stiffener Pls. 4 1/2 x 3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All steel shall be A36 unless otherwise noted.

Notes:
For Framing Details, see Sheet 22 and 23.
For Joint Details, see Sheet 38.
For Shoe Details, see Sheets S1 & S2.
For Diaphragm Details, see Sheet 32.
For Superstructure steel quantities, see Sheet 2.
For Details G, G', J and K, see Sheet 27.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers, see Sheets 22 & 23.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING* 0.0L-0.1L	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
17	S1-17	107'-10 3/16"	107'-2 15/16"	26'-7 1/2"	27'-0"	25'-9 1/16"	10 3/16"	7 1/4"	6 1/16"	‡ 15x3/8"	‡ 15x1/4"	13 1/16"	15 1/4"	18 1/16"	23"	24"
	S2-17	107'-9"	107'-1 5/16"	28'-6 7/16"	25'-0"	27'-8 9/16"	10 3/16"	7 1/4"	6 1/16"	‡ 15x3/8"	‡ 15x1/4"	14 1/16"	17"	19 1/16"	22"	24"
	S3-17	107'-9"	107'-1 3/4"	28'-6 7/16"	25'-0"	27'-8 9/16"	10 3/16"	7 1/4"	6 1/16"	‡ 15x3/8"	‡ 15x1/4"	14 1/16"	17"	19 1/16"	22"	24"
	S4-17	107'-9"	107'-1 3/4"	28'-6 7/16"	25'-0"	27'-8 9/16"	10 3/16"	7 1/4"	6 1/16"	‡ 15x3/8"	‡ 15x1/4"	14 1/16"	17"	19 1/16"	22"	24"
	S5-17	107'-9"	107'-1 3/4"	28'-0 7/16"	25'-6"	27'-2 9/16"	10 3/16"	7 1/4"	6 1/16"	‡ 15x3/8"	‡ 15x1/4"	14"	16"	19"	24"	24"
18	S1-18	126'-6 3/16"	125'-11 3/16"	30'-11 1/16"	32'-0"	30'-1 1/16"	10"	7"	6 3/16"	‡ 18x3/8"	‡ 18x1/4"	14"	16 1/16"	19 1/16"	24"	24"
	S2-18	124'-4"	123'-9"	34'-10 1/16"	27'-0"	34'-0 1/16"	10"	7"	6 3/16"	‡ 18x3/8"	‡ 18x1/4"	16"	18 1/16"	21 1/16"	24"	24"
	S3-18	122'-1 3/16"	121'-6 9/16"	36'-3 5/16"	24'-6"	35'-5 1/16"	10"	7"	6 3/16"	‡ 18x3/8"	‡ 18x1/4"	16"	18 1/16"	21 1/16"	23 1/16"	24"
	S4-18	119'-11 3/16"	119'-4 3/16"	———	118'-6 3/16"	———	10"	7"	6 3/16"	‡ 18x3/8"	‡ 18x1	16"	18 1/16"	21 1/16"	23 1/16"	24"
	S5-18	117'-8 3/4"	117'-1 3/4"	37'-0 7/16"	21'-6"	36'-2 7/16"	10"	7"	6 3/16"	‡ 18x3/8"	‡ 18x1 1/4"	14 1/16"	17"	20"	24"	24"

UNIT	STRINGER	DEAD LOAD DEFLECTION SCHEDULE 1/4L	1/2L	3/4L	CAMBER SCHEDULE 1/4L	1/2L	3/4L
17	S1-17	1 3/8"	2 1/4"	1 5/8"	2"	2 3/8"	2 1/16"
	S2-17	1 3/8"	2 1/4"	1 5/8"	1 11/16"	2 5/16"	1 5/16"
	S3-17	1 3/8"	2 1/4"	1 5/8"	1 1/2"	2"	1 3/8"
	S4-17	1 3/8"	2 1/4"	1 5/8"	1 5/8"	1 5/8"	1 1/16"
	S5-17	1 3/8"	2 3/8"	1 9/16"	1"	1 1/16"	3/4"
18	S1-18	2 1/4"	3 1/8"	2 1/4"	2 15/16"	4 1/16"	2 15/16"
	S2-18	2 3/8"	2 15/16"	2 1/8"	2 1/16"	3 5/16"	2 3/16"
	S3-18	2"	2 3/16"	2"	2 3/16"	3 1/16"	2 5/16"
	S4-18	1 7/16"	2 5/16"	1 7/16"	2 3/16"	3 1/16"	2 1/16"
	S5-18	1 1/4"	2 1/16"	1 3/16"	2 1/16"	3 1/16"	2 5/16"

*Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of 4" and under and A588 steel for thickness over 4".

	BY	DATE	NO.	REVISION	BY	DATE
MADE	FRD	8-20-68	2	As Built	TEM	8-76
CHECKED	PTA	4-25-69	1	Pier 17 Shoes	DWB	11-14-74
IN CHARGE						

AS BUILT

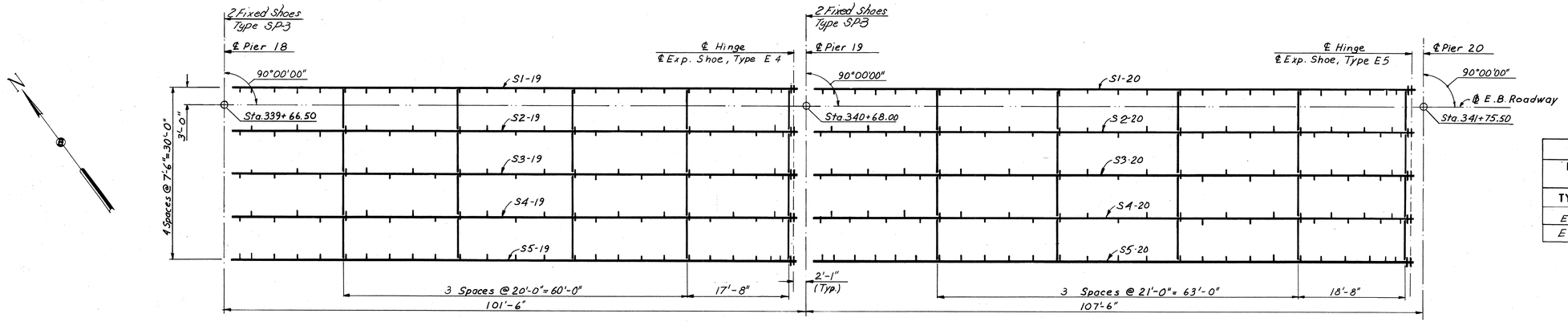
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	145	265

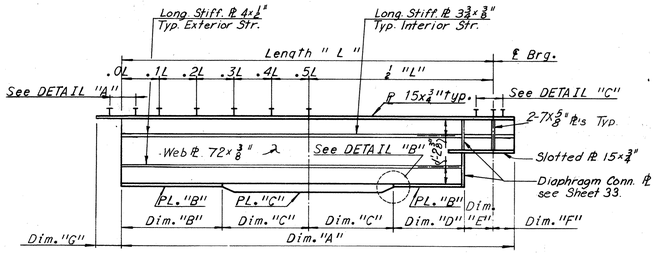


FRAMING PLAN
Scale: 1" = 10'-0"

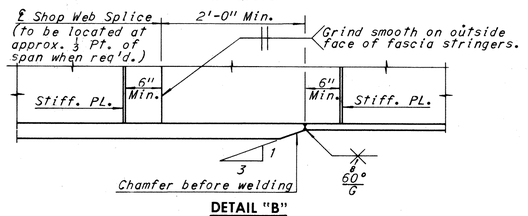
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	5	SP-3	4
E5	5		

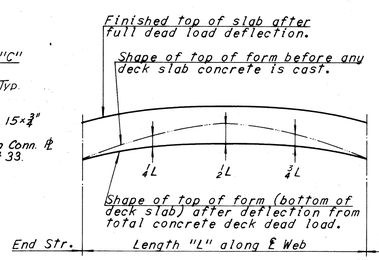
Note: For web to flange weld sizes and Longitudinal Stiffener Plate details see Sheet 17.



STRINGER ELEVATION
No Scale



DETAIL "B"
No Scale

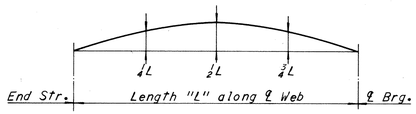


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

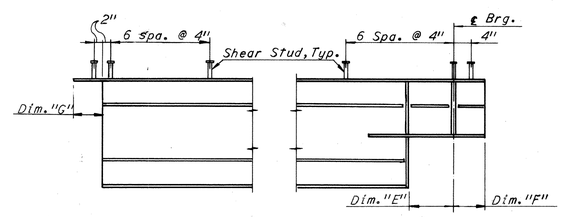
The stringers shall be fabricated with an upward camber amounting to the tabulated value.

This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 33



DETAIL "A"
No Scale

DETAIL "C"
No Scale

Note: Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.

Intermediate stiffener Pls. 4½ x ⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
19	S1-19	98'- 2¼"	97'- 7¼"	23'-9⅝"	25'-0"	22'-11⅝"	10"	7"	6⅛"	15x⅞"	15x1¼"	14½"	17"	20"	24"	24"
	S2-19	98'- 2¼"	97'- 7¼"	24'-9⅝"	24'-0"	23'-11⅜"	10"	7"	6⅛"	15x⅞"	15x1¼"	16"	18"	21"	24"	24"
	S3-19	98'- 2¼"	97'- 7¼"	24'-9⅝"	24'-0"	23'-11⅝"	10"	7"	6⅛"	15x⅞"	15x1¼"	16"	18"	21"	24"	24"
	S4-19	98'- 2¼"	97'- 7¼"	24'-9⅝"	24'-0"	23'-11⅜"	10"	7"	6⅛"	15x⅞"	15x1¼"	16"	18"	21"	24"	24"
	S5-19	98'- 2¼"	97'- 7¼"	23'-9⅜"	25'-0"	22'-11⅜"	10"	7"	6⅛"	15x⅞"	15x1¼"	14½"	17"	20"	24"	24"
20	S1-20	104'- 2¼"	103'- 7¼"	24'-3⅝"	27'-6"	23'-5⅝"	10"	7"	6½"	15x1"	15x1½"	14½"	17"	20"	24"	24"
	S2-20	104'- 2¼"	103'- 7¼"	22'-3⅝"	29'-6"	21'-5⅝"	10"	7"	6½"	15x⅞"	15x1⅜"	15½"	18"	21"	24"	24"
	S3-20	104'- 2¼"	103'- 7¼"	22'-3⅝"	29'-6"	21'-5⅝"	10"	7"	6½"	15x⅞"	15x1⅜"	15½"	18"	21"	24"	24"
	S4-20	104'- 2¼"	103'- 7¼"	22'-3⅝"	29'-6"	21'-5⅝"	10"	7"	6½"	15x⅞"	15x1⅜"	15½"	18"	21"	24"	24"
	S5-20	104'- 2¼"	103'- 7¼"	24'-3⅝"	27'-6"	23'-5⅝"	10"	7"	6½"	15x1"	15x1½"	14½"	17"	20"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1"	1⅜"	1"
1"	1⅜"	1"
1"	1⅜"	1"
1"	1⅜"	1"
1"	1⅜"	1"
1⅛"	1⅝"	1⅛"
1⅜"	1⅝"	1⅜"
1⅜"	1⅝"	1⅜"
1⅜"	1⅝"	1⅜"
1⅜"	1⅝"	1⅜"

CAMBER SCHEDULE

¼L	½L	¾L
1¼"	1⅜"	1¼"
1¼"	1⅜"	1¼"
1¼"	1⅜"	1¼"
1¼"	1⅜"	1¼"
1¼"	1⅜"	1¼"
1⅛"	2"	1⅜"
1⅜"	2¼"	1⅝"
1⅜"	2⅜"	1⅞"
1⅜"	2⅜"	1⅞"
1⅜"	2⅜"	1⅞"

* Spacing begins at termination of 6 spaces @ 4"

Note: All structural steel in Units 19 and 20 is A36.

Notes:
For Superstructure steel quantities, see Sheet 2.
For Diaphragm Details, see Sheet 33.
For Shoe Details, see Sheets 51&52
For Joint Details, see Sheet 38.
For Framing Details, see Sheet 23.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers, see Sheet 23.

	BY	DATE				
MADE	J.D.	8-6-68				
CHECKED	PTA	11-4-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

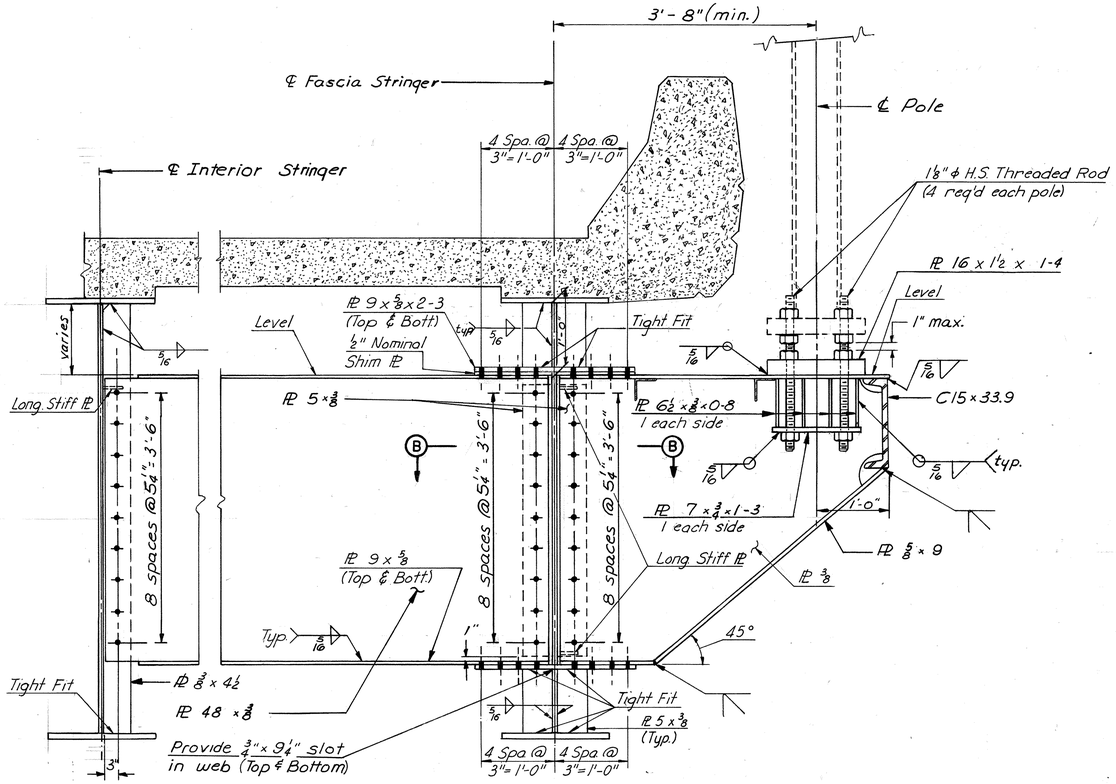
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN – UNITS 19 AND 20

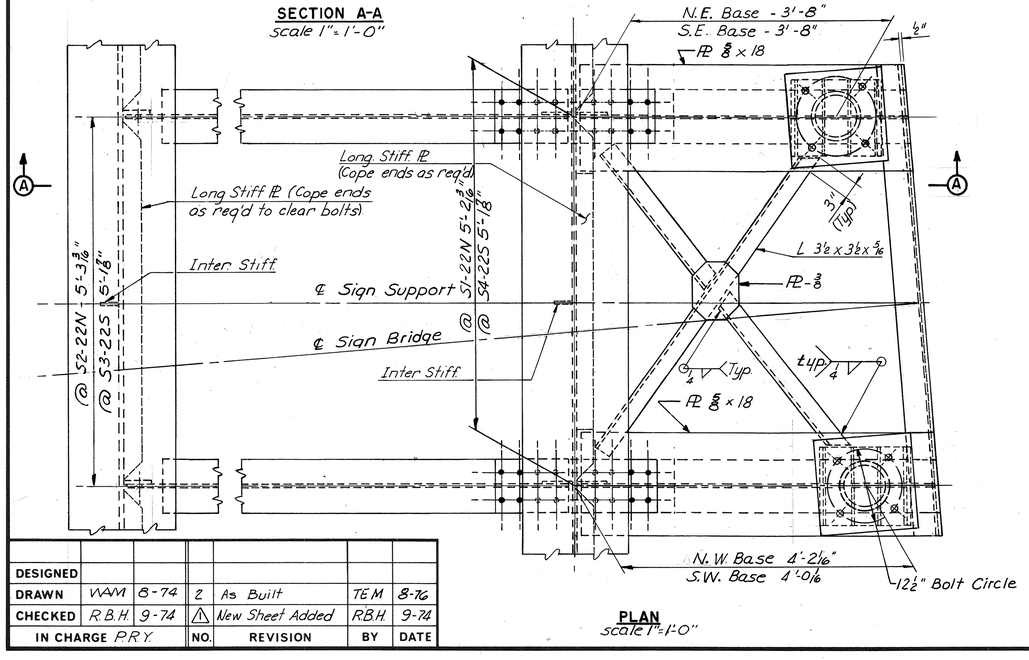
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 46

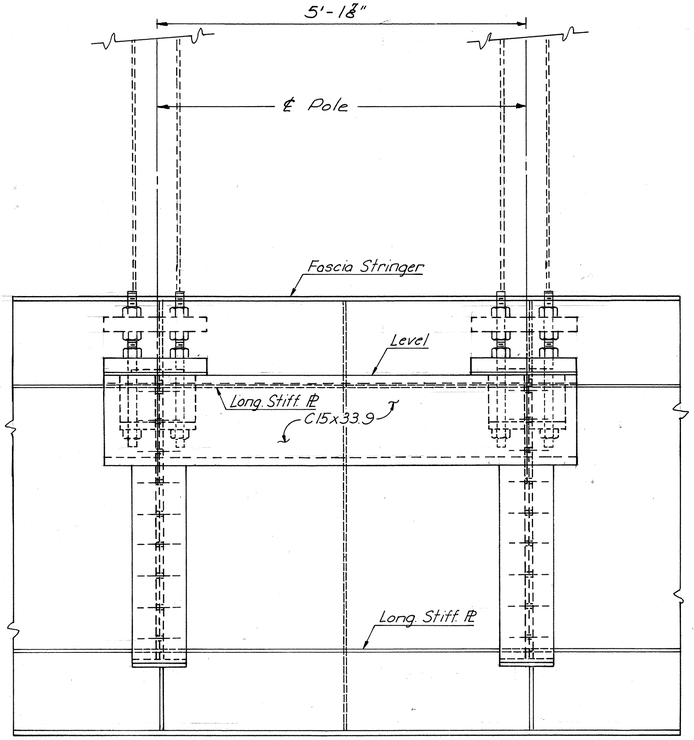
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	146A	265



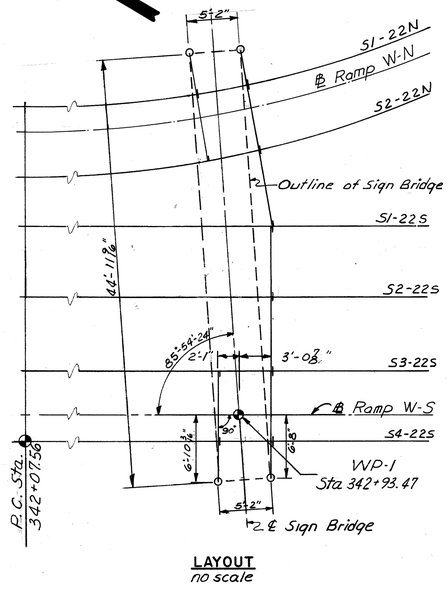
SECTION A-A
scale 1"=1'-0"



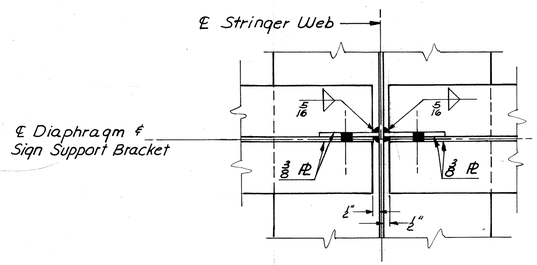
PLAN
scale 1"=1'-0"



ELEVATION
scale 1"=1'-0"



LAYOUT
no scale



SECTION B-B
Scale: None

NOTES:

1. All bolts to be ⅞" ϕ H.S. (except as noted)
2. See Framing Plan, Sheet 20, for location of sign support diaphragms.
3. All material shall be ASTM-A36 steel except anchor bolt assemblies.
4. Care shall be taken to insure vertical alignment of the end frame. Any misalignment shall be taken up in the leveling nut.
5. For signing and sign pole details see roadway plans.

DESIGNED						
DRAWN	WAM	8-74	2	As Built	TEM	8-76
CHECKED	R.B.H.	9-74	△	New Sheet Added	R.B.H.	9-74
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12th. STREET R.R. TRACKS and 16th. STREET

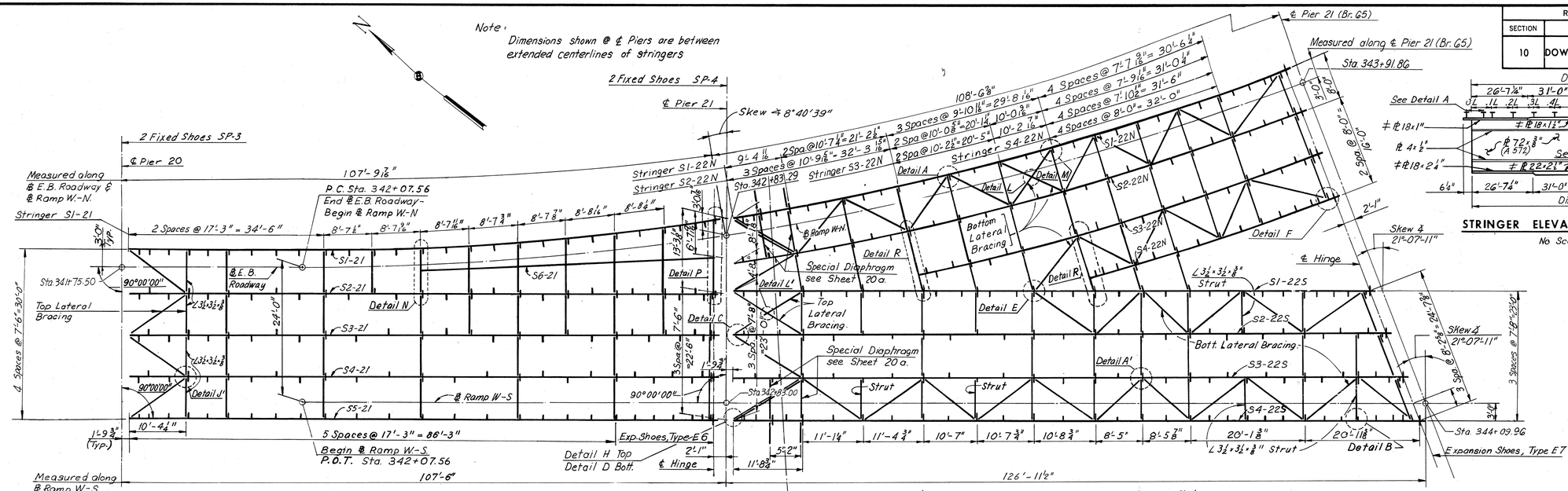
SIGN SUPPORT DETAILS — UNIT 22

SCALE As Noted
DATE
SHEET 20A OF 46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	146	265

Note:
Dimensions shown @ ℄ Piers are between extended centerlines of stringers

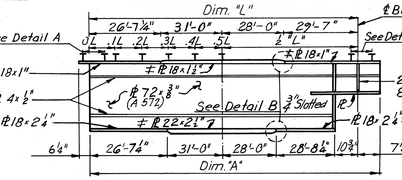


UNIT 21

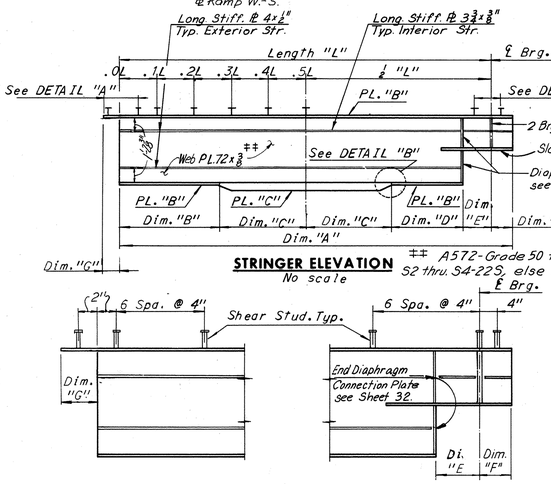
FRAMING PLAN
Scale: 1" = 10'-0"

UNIT 22

Note:
All Diagonals in Top and Bottom Lateral Bracing are ST5WF10.5.



STRINGER ELEVATION FOR S1-22S
No Scale

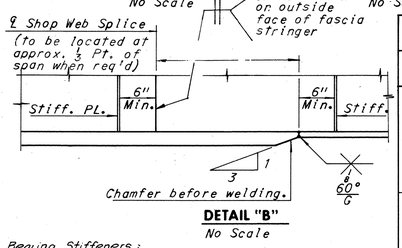


STRINGER ELEVATION
No scale

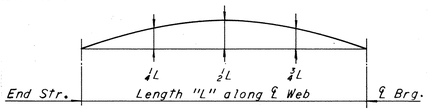
‡‡ A572-Grade 50 for S2-21, S2 thru. S4-22S, else A36.

DETAIL "A"
No Scale

DETAIL "C"
No Scale



DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade. Dimensions are in inches.

NOTE TO CONTRACTOR
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

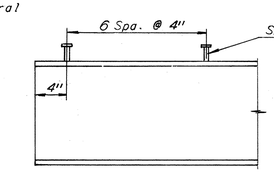
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 34.

Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 17.

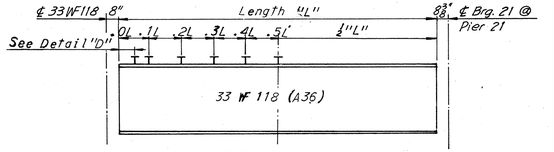
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E6	5	SP-3	2
E7	8	SP-4	2

Note:
All steel shall be A36 unless otherwise noted.
Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.
Intermediate stiffener pls. 4½"x ⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.



DETAIL D
No Scale



STRINGER ELEVATION FOR S6-21
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
21	S1-21	104'-5⅝"	103'-10¼"	19'-5¼"	32'-6"	18'-7⅛"	10¼"	7⅛"	6½"	18x⅝	18x1⅛	14"	16"	20"	24"	24"
	S2-21	104'-2¼"	103'-7¼"	15'-9⅝"	36'-0"	14'-11⅝"	10"	7"	6½"	12x⅝ ±	12x1⅜ ±	11"	12½"	16"	18½"	23"
	S3-21	104'-2¼"	103'-7¼"	22'-3⅝"	29'-6"	21'-5⅜"	10"	7"	6½"	15x⅝ °	15x1⅛	15½"	18"	21"	24"	24"
	S4-21	104'-2¼"	103'-7¼"	22'-3⅝"	29'-6"	21'-5⅜"	10"	7"	6½"	15x⅞ °	15x1⅛	15½"	18"	21"	24"	24"
	S5-21	104'-2¼"	103'-7¼"	24'-3⅝"	27'-6"	23'-5⅜"	10"	7"	6½"	15x1 °	15x1½	14½"	17"	20"	24"	24"
	S6-21	—	50'-4⅜"	—	—	Stringer Size 33 WF 118				—	—	12"	13½"	15"	17½"	20½"
22	S1-22N	104'-1⅜"	103'-6⅞"	21'-9⅜"	30'-0"	20'-11⅜"	10"	7"	6⅝"	18x⅝	18x½	15"	17½"	22"	24"	24"
	S2-22N	107'-0⅞"	106'-5⅜"	17'-2 15/16"	36'-0"	16'-4 15/16"	10"	7"	6⅜"	18x⅞	18x1⅜	13"	14½"	17½"	20½"	24"
	S3-22N	75'-4⅝"	74'-9⅛"	16'-4¼"	21'-0"	15'-6⅞"	10"	7"	---	12x⅝	12x1¼	12½"	13½"	15½"	19"	22½"
	S4-22N	45'-5⅜"	44'-10⅞"	22'+5⅛"	—	21'-7¼"	10"	7"	---	10x⅝	---	17½"	19"	22"	24"	24"
	S1-22S	115'-9¾"	115'-2¼"	For Dimensions, see Stringer Elevation for Stringer S1-22S.								10"	10½"	11½"	14½"	24"
	S2-22S	118'-9 5/16"	118'-1 13/16"	38'-6⅞"	20'-6"	37'-8 3/16"	10¾"	7½"	6¼	18x⅞ ±	18x1 ±	15½"	17½"	20½"	22½"	24"
	S3-22S	121'-8 13/16"	121'-1 5/16"	35'-0 5/8"	25'-6"	34'-1 15/16"	10¾"	7½"	6¼"	18x⅞ ±	18x1⅛ ±	15½"	17½"	20½"	23"	24"
	S4-22S	124'-8⅜"	124'-0⅞"	31'-0 7/16"	31'-0"	30-11 7/16"	10⅝"	7½"	6¼"	18x⅞ ±	18x1¼ ±	14"	16"	19"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE		
¼L	½L	¾L
13/16"	1'-8"	2'-8"
1'-7/16"	2'-1 1/16"	2'-1½"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"
1'-1/16"	2'-1 1/16"	2'-1 1/16"

CAMBER SCHEDULE		
¼L	½L	¾L
2'-8"	3'-7/16"	2'-8"
1'-3/16"	2'-1/16"	1'-3/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"
1'-1/16"	2'-1/16"	1'-1/16"

‡ Denotes A572 Grade 50 steel for thickness of ¾" and under, and A588 steel for thickness over ¾".

*Spacing begins at termination of 6 spaces @ 4".

° Top Pl. 15x¼

Notes.
For Superstructure steel quantities, see Sheet 2.
For Joint details, see Sheet 38
For framing details, see Sheets 23 thru 27.
For Shoe details, see Sheets S1 & S2
For Shear stud detail, see Sheet 14
For Diaphragm details, see Sheets 33 & 34.
For Details A, A', B, C, D, E, H, J', L, L' and M, see Sheet 27.
For Details N, P and R, see Sheet 26.
For Angles between ℄ Piers and Stringers, see Sheets 23 & 24.

Bearing Stiffeners:
2-ℓ 8½ X ⅜" for S1-21, S1 & S2-22N, S1, S2, S3 & S4-22S. 2-ℓ 7X ⅝" for S3, S4 & S5-21, 2ℓ B½ x ¾" for S3 & S4-22S & 2ℓ 5½x ⅞" for S2-21.

	BY	DATE
MADE	GSH	08-06-68
CHECKED	JD	10-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes, Deflections & Cambers Completed	PRMS	4-19-74
2	Dim. & Mat. Change	K.D.P.	6-74
3	Add Sign Support Bracket	TEM	7-74
4	As Built	TEM	8-76

AS BUILT

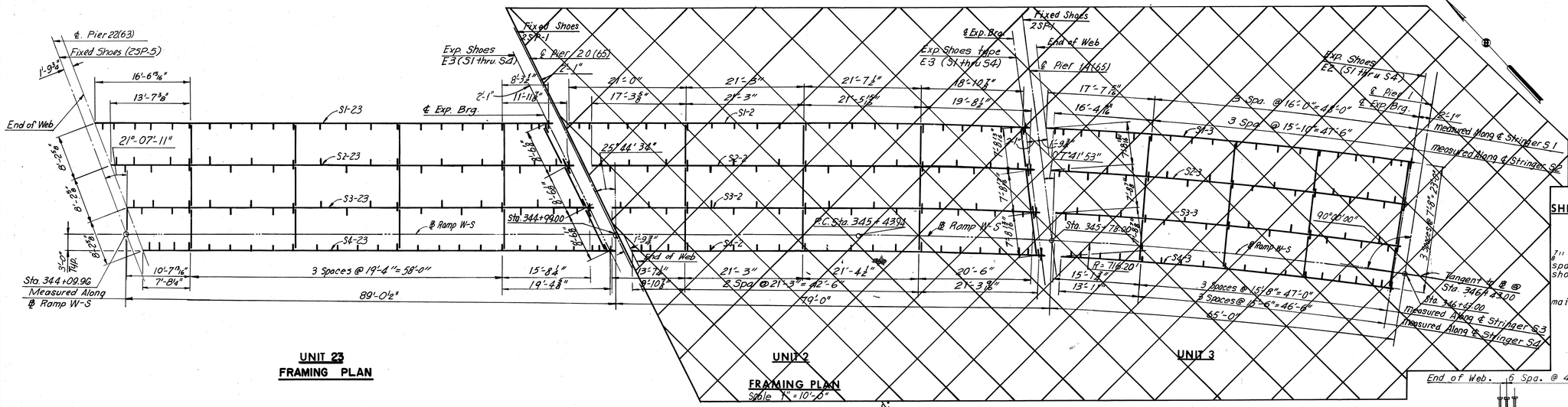
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 21 AND 22

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 20 OF 46

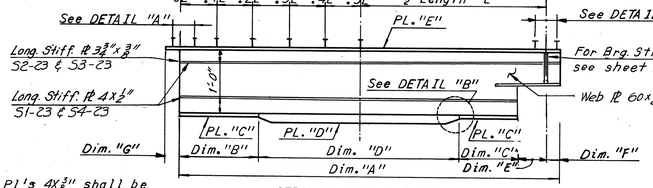
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	147	265



UNIT 23 FRAMING PLAN

FRAMING PLAN

Scale 1" = 10'-0"



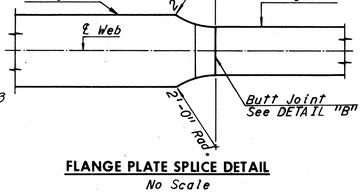
STRINGER ELEVATION

No Scale

Note: All horizontal dimensions are measured along ℄ Web.

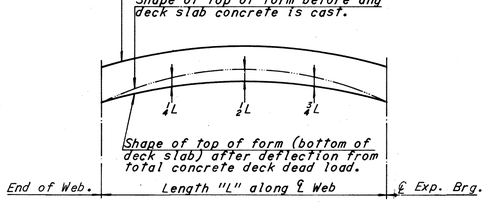
Note :

Intermediate stiffener Pl's 4X3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

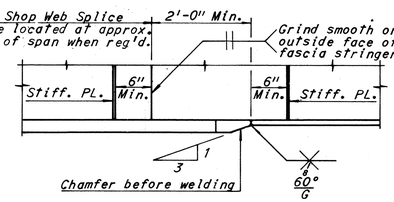


FLANGE PLATE SPLICE DETAIL

No Scale

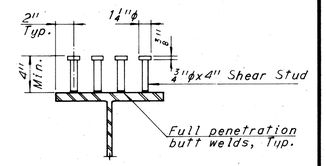


DEAD LOAD DEFLECTION DIAGRAM



DETAIL "B"

No Scale



SHEAR STUD DETAIL

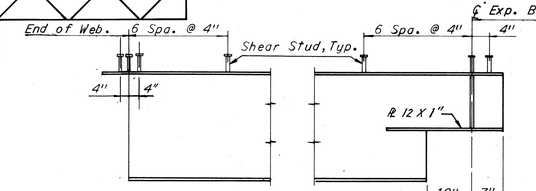
No Scale

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.

Contractor may, if he elects, use three 7/8" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown.

Stud rows shall be placed parallel to the main deck reinforcement.



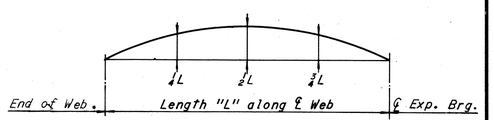
DETAIL "A"

No Scale

DETAIL "C"

(Normal to ℄ Pier)

No Scale



CAMBER DIAGRAM

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E3	4	Sp-5	2

Notes:

For Framing Details @ piers 22(63), and 20(65), see Sheet 25.
For Diaphragm connections see Sheet 35.
For Shoe Details, see Sheet S1 and S2
For superstructure steel quantities, see sheet 2.
For joint details, see Sheet 38.
Exterior stringer longitudional stiffeners shall be located on the exterior face of the stringer.

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

Note: For web to flange weld sizes and horizontal plate stiffener details see Sheet 17.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
23	S1 - 23	83'-6 7/16"	82'-10 7/16"	9'-5 1/4"	8'-6 1/16"	64'-0"	11 1/16"	7 3/16"	6 15/16"	12 x 3/4"‡	12 x 1 3/4"	12 x 3/4"‡	11 1/2"	13 1/2"	17"	20 1/2"	24"
	S2 - 23	84'-3"	83'-7 1/4"	11'-3 5/8"	10'-4 1/2"	61'-0"	11 1/16"	7 3/16"	6 15/16"	12 x 3/4"‡	12 x 1 1/4"	12 x 3/4"‡	11 1/2"	14 1/2"	17 1/2"	20 1/2"	24"
	S3 - 23	84'-1 11/16"	84'-4 1/16"	11'-8 1/16"	10'-8 7/8"	61'-0"	11 1/16"	7 3/16"	6 15/16"	12 x 3/4"‡	12 x 1 1/4"	12 x 3/4"‡	11 1/2"	14 1/2"	17 1/2"	20 1/2"	24"
	S4 - 23	85'-8 5/8"	85'-0 7/8"	10'-6 7/16"	9'-7 5/16"	64'-0"	11 1/16"	7 3/16"	6 15/16"	12 x 3/4"‡	12 x 1 3/4"	12 x 3/4"‡	11 1/2"	13 1/2"	17"	20 1/2"	24"
2	S1 - 2	83'-4 5/16"	82'-9 3/16"	12'-10 11/16"	12'-0 3/16"	57'-0"	10 1/16"	7 1/16"	6 15/16"	12 x 3/4"‡	12 x 1 1/2"	12 x 3/4"	12 1/2"	14 1/2"	17 1/2"	21 1/2"	24"
	S2 - 2	80'-4 1/16"	79'-9 1/16"	14'-4 1/16"	13'-6 1/16"	51'-0"	10 1/16"	7 1/16"	6 15/16"	12 x 3/4"‡	12 x 1 1/2"	12 x 3/4"	13"	14 1/2"	18"	21 1/2"	24"
	S3 - 2	77'-3 15/16"	76'-8 3/4"	—	—	75'-10 5/16"	10 1/16"	7 1/16"	6 15/16"	—	12 x 1 1/8"	12 x 3/4"	13 1/2"	15 1/2"	17 1/2"	20 1/2"	24"
	S4 - 2	74'-3 1/16"	73'-8 7/16"	—	—	72'-10 5/16"	10 1/16"	7 1/16"	6 15/16"	—	12 x 1 1/8"	12 x 3/4"	13"	15"	17 1/2"	21"	24"
3	S1 - 3	66'-2 5/16"	65'-7 3/16"	10'-3 5/16"	9'-2 5/16"	45'-0"	10"	7"	6 15/16"	12 x 1"	16 x 1 1/4"	12 x 3/4"	10"	11 1/2"	14"	17"	22"
	S2 - 3	64'-5 9/16"	63'-10 3/16"	9'-11 1/16"	9'-1 5/16"	44'-0"	10"	7"	6 15/16"	12 x 1"	16 x 1 1/4"	12 x 3/4"	10 1/2"	12"	14"	16"	19 1/2"
	S3 - 3	62'-8 3/4"	62'-1 3/4"	11'-6 7/8"	10'-2 7/8"	40'-0"	10"	7"	6 15/16"	12 x 1"	16 x 1 1/8"	12 x 3/4"	12"	13 1/2"	16"	18 1/2"	22"
	S4 - 3	61'-0"	60'-5"	—	—	59'-7"	10"	7"	6 15/16"	—	12 x 1 1/4"	12 x 3/4"	12"	14"	16"	19 1/2"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
1"	1 3/8"	1"	1 3/8"	1 7/8"	1 3/8"
1 1/16"	1 7/16"	1 1/16"	1 3/8"	1 7/8"	1 3/8"
1 1/16"	1 7/16"	1 1/16"	1 3/8"	1 7/8"	1 3/8"
1 1/8"	1 9/16"	1 1/8"	1 1/2"	2 1/16"	1 1/2"
3/4"	1 1/16"	3/4"	1 5/16"	2 1/16"	1 5/16"
11/16"	1"	11/16"	1 1/4"	1 5/16"	1 1/16"
5/8"	7/8"	5/8"	1 1/8"	1 3/16"	1 1/8"
1/2"	11/16"	1/2"	1 1/16"	1 1/8"	1 1/16"
1/2"	11/16"	1/2"	1 1/16"	1 1/8"	1 1/16"
3/8"	5/8"	3/8"	1 1/8"	1 1/16"	1 1/8"
7/16"	5/8"	7/16"	1 1/16"	2 1/16"	1 7/16"
3/8"	9/16"	3/8"	1 1/16"	1 1/2"	1 1/16"
5/16"	7/16"	5/16"	3/4"	1"	3/4"

Note : All steel shall be A36 unless shown otherwise.

* Spacing begins at termination of 6 spaces @ 4"

‡ Denotes A572-Grade 50 Steel for thickness of 3/4" and under and A588 Steel for thickness over 3/4".

	BY	DATE
MADE	GSH	12-10-68
CHECKED	JD	4-28-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Shoe Callout Added	PRMS	4-19-71
2	As Built	TEM	8-76

AS BUILT

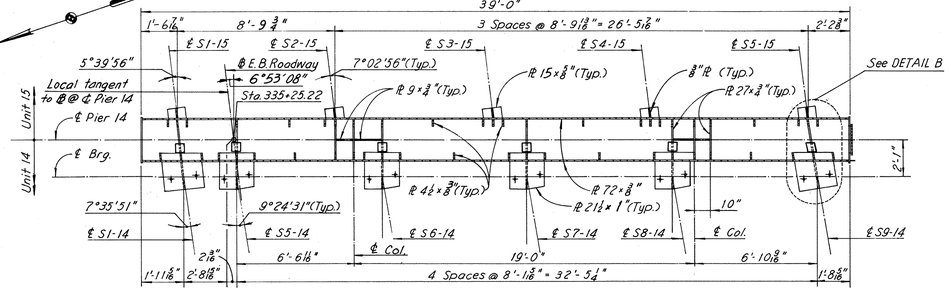
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST.- R.R. TRACKS AND 16TH ST.
FRAMING PLAN UNIT 23

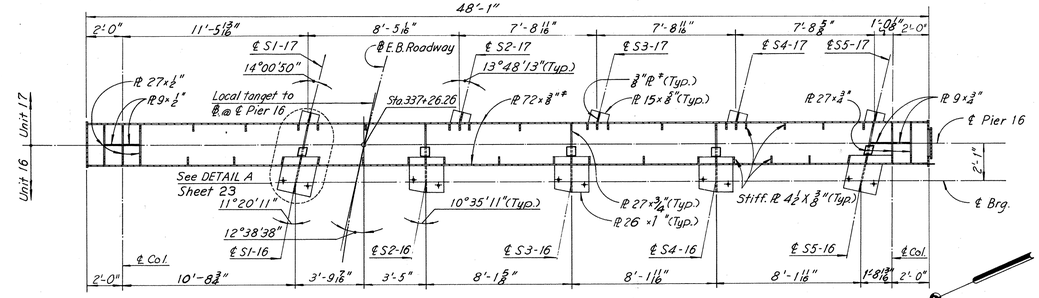
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 21 OF 46

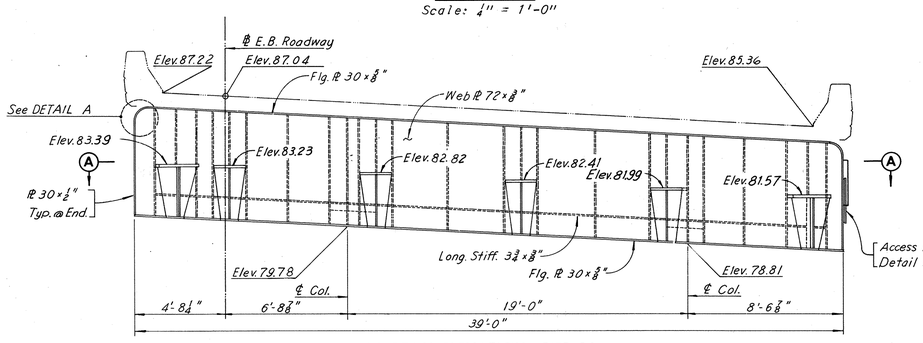
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	148	265



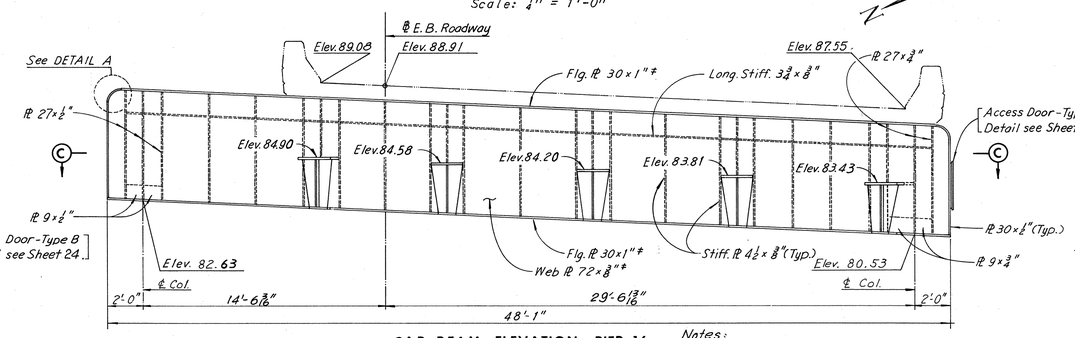
SECTION A-A
Scale: ¼" = 1'-0"



SECTION C-C
Scale: ¼" = 1'-0"



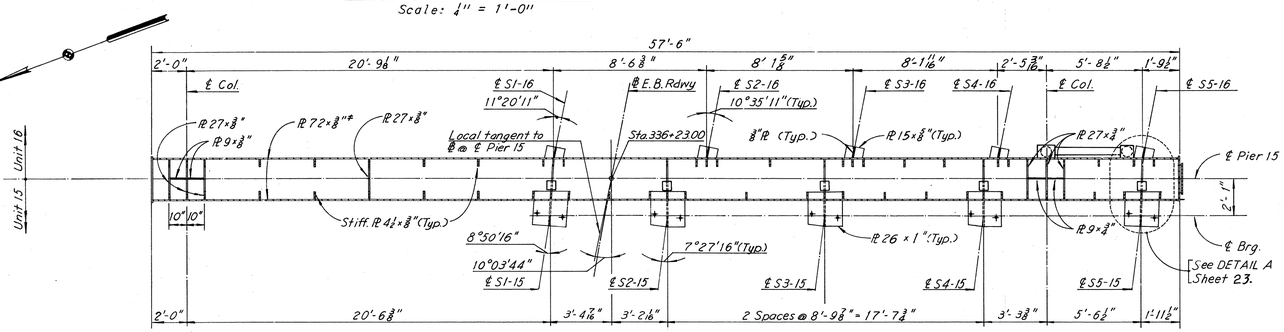
CAP BEAM ELEVATION - PIER 14
Scale: ¼" = 1'-0"



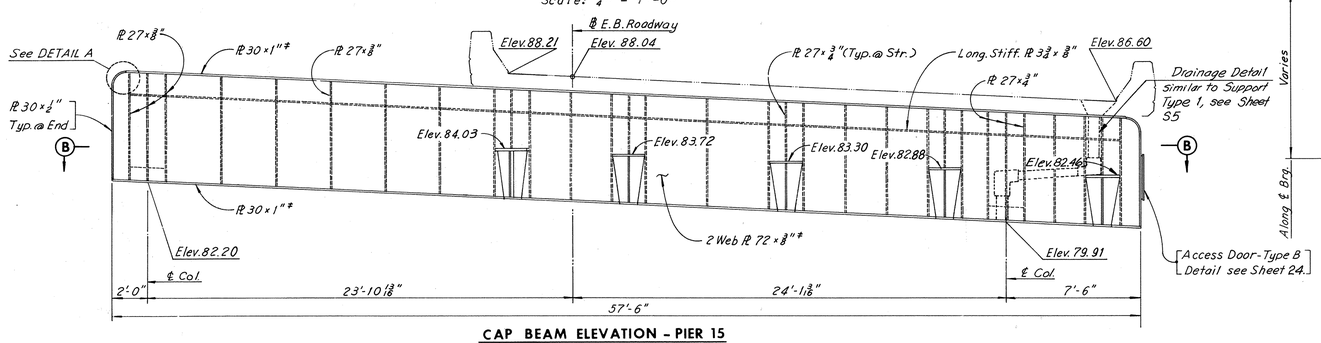
CAP BEAM ELEVATION - PIER 16
Scale: ¼" = 1'-0"

Notes:
For Framing Plans see:
Sheet 16 for Unit 14,
Sheet 17 for Units 15 & 16,
Sheet 18 for Unit 17.

For Deck Plans see:
Sheet 30 for Unit 14,
Sheet 31 for Units 15 & 16,
Sheet 32 for Unit 17.



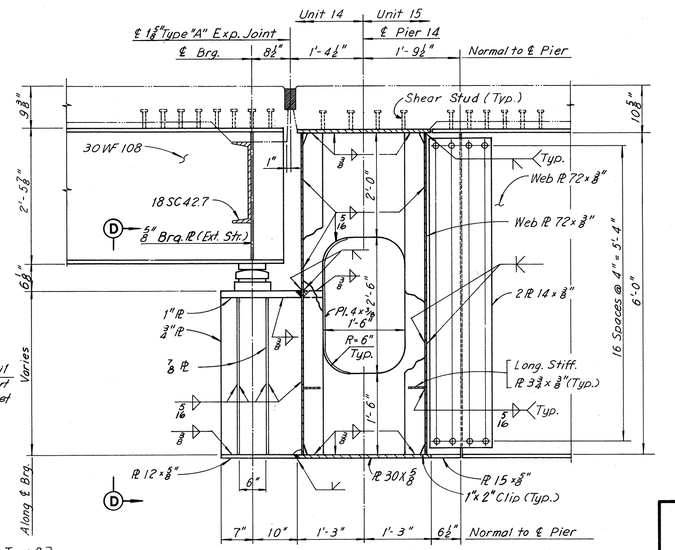
SECTION B-B
Scale: ¼" = 1'-0"



CAP BEAM ELEVATION - PIER 15
Scale: ¼" = 1'-0"

Note:
All steel shall be A36 unless denoted otherwise.
≠ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

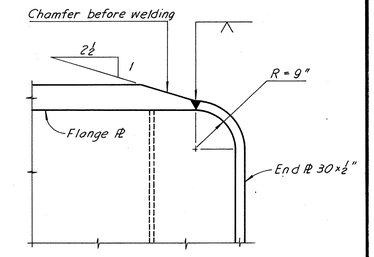
Provide Drain Holes at lower end of cap beam.
All elevations shown are final elevations.



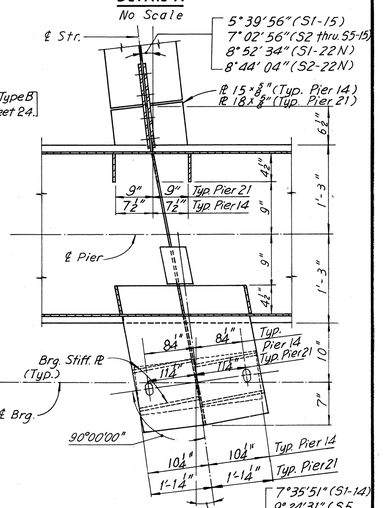
TYPICAL SECTION - PIER 14
Scale: ¾" = 1'-0"

Note: TYPICAL SECTION for Piers 15 and 16, see TYPICAL SECTION, Sheet 23.

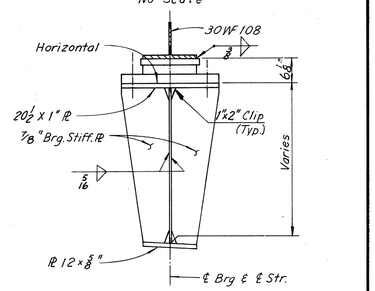
Note: Shear studs are placed in rows, with four shear studs in each row. Rows are spaced at 24" centers within limits of concrete deck.



DETAIL A
No Scale



DETAIL B
No Scale



SECTION D-D
No Scale

	BY	DATE
MADE	M.H.H	12-7-68
CHECKED	J. D.	1-29-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76

AS BUILT

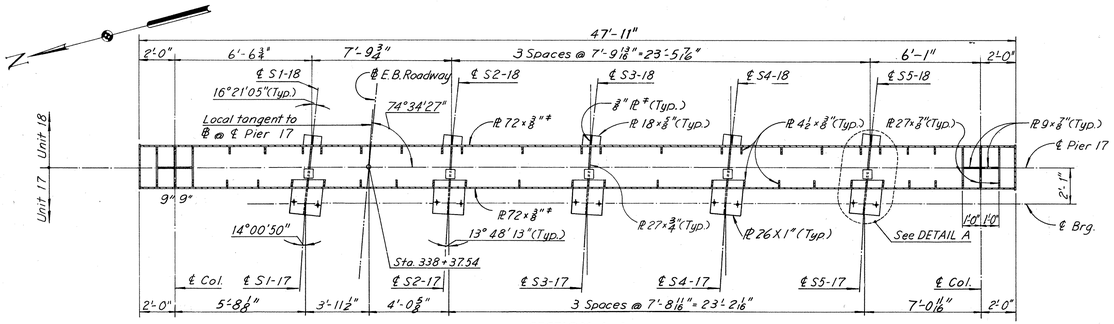
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
PIERS 14, 15 AND 16

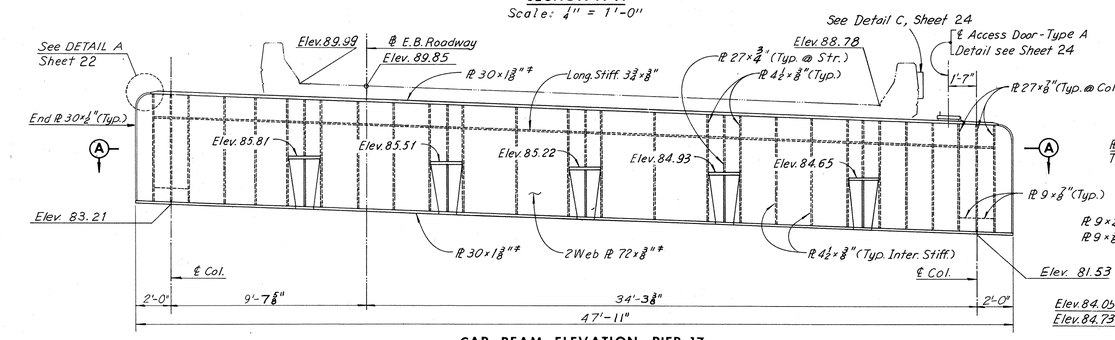
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 22 OF 46

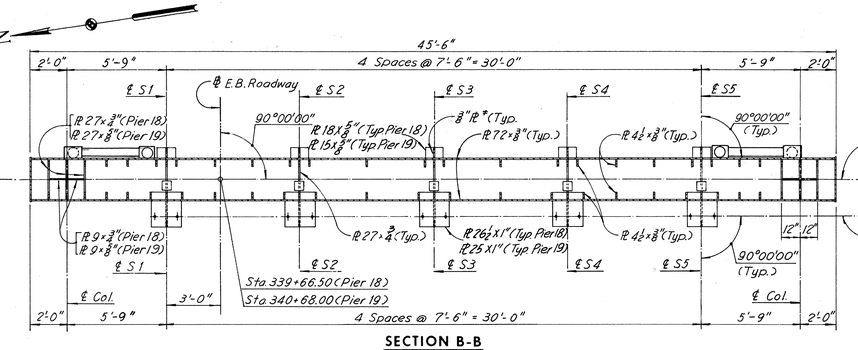
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	149	265



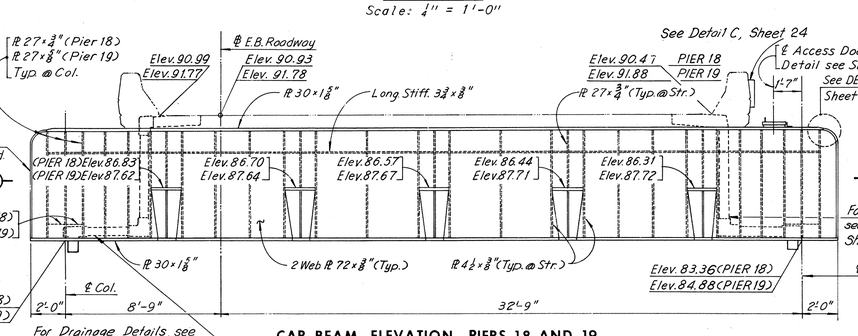
SECTION A-A
Scale: ¼" = 1'-0"



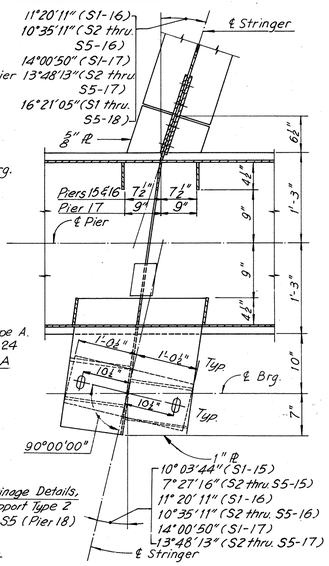
CAP BEAM ELEVATION - PIER 17
Scale: ¼" = 1'-0"



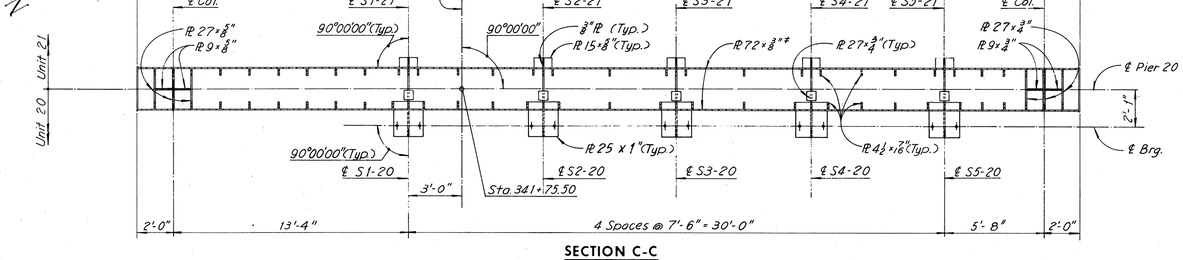
SECTION B-B
Scale: ¼" = 1'-0"



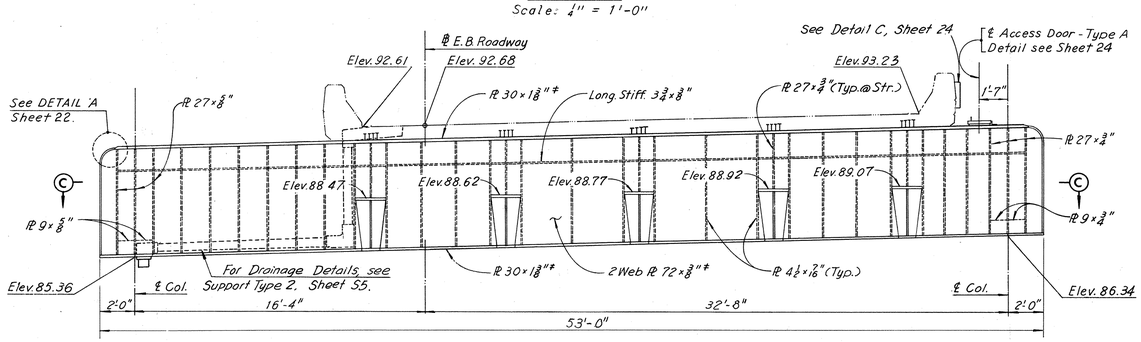
CAP BEAM ELEVATION - PIERS 18 AND 19
Scale: ¼" = 1'-0"



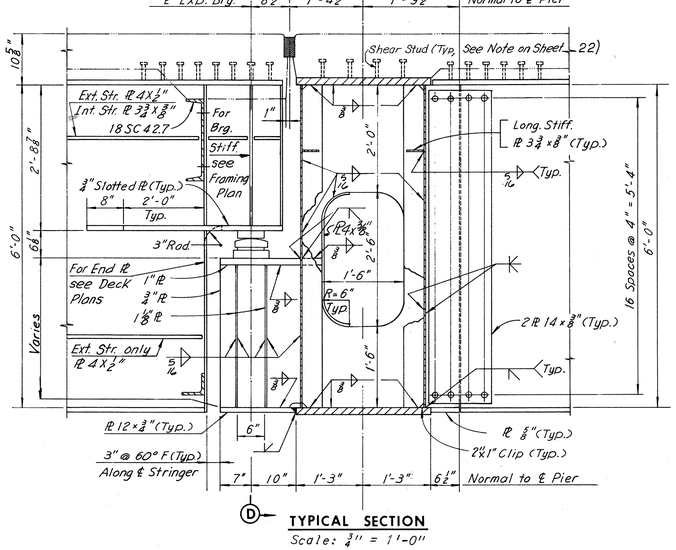
DETAIL A
No Scale



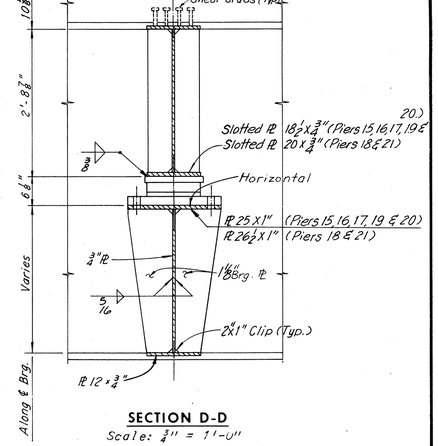
SECTION C-C
Scale: ¼" = 1'-0"



CAP BEAM ELEVATION - PIER 20
Scale: ¼" = 1'-0"



TYPICAL SECTION
Scale: ¾" = 1'-0"



SECTION D-D
Scale: ¾" = 1'-0"

Notes:
For Framing Plans see:
Sheet 18 for Units 17 & 18.
Sheet 19 for Units 19 & 20.
Sheet 20 for Units 21 & 22.
For Deck Plans see:
Sheet 32 for Units 17 & 18.
Sheet 33 for Units 19 & 20.
Sheet 34 for Units 21 & 22.

Note:
All steel shall be A36 unless denoted otherwise.
≠ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

Provide Drain Holes at lower end of cap beam.
All elevations shown are final elevations.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	M.H.H.	12-17-68				
CHECKED	J.D.	1-29-69	1	As Built	TEM	8-76
IN CHARGE						

AS BUILT

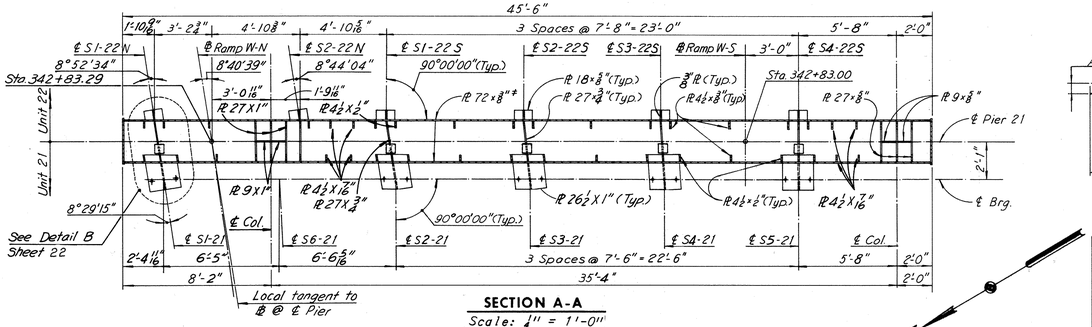
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
PIERS 17, 18, 19 AND 20

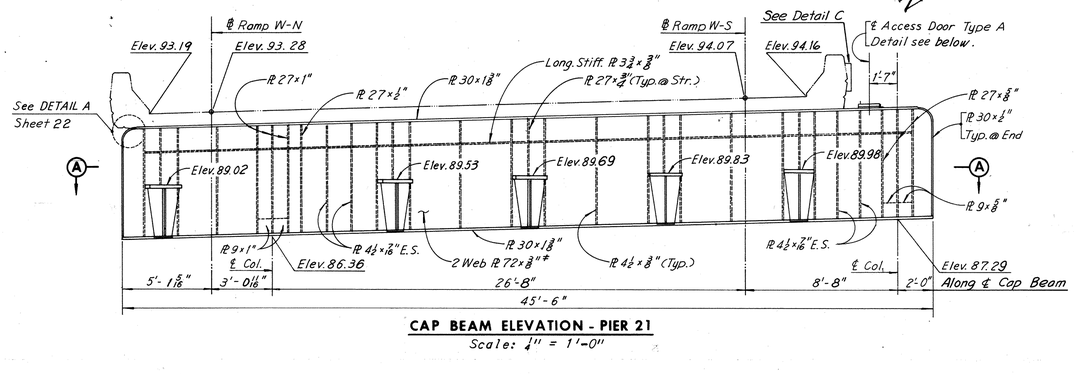
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 23 OF 46

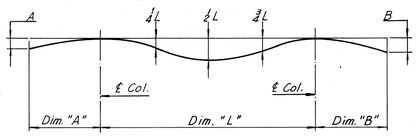
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	150	265



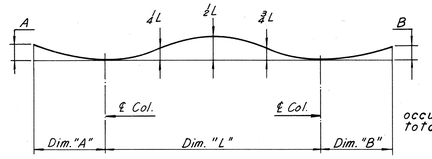
SECTION A-A
Scale: 1" = 1'-0"



CAP BEAM ELEVATION - PIER 21
Scale: 1" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM
No Scale



CAMBER DIAGRAM
No Scale

CAP BEAM SCHEDULE				DEAD LOAD DEFLECTION SCHEDULE					CAMBER SCHEDULE				
PIER	Dim "A"	Dim. "L"	Dim. "B"	A	¼L	½L	¾L		A	¼L	½L	¾L	B
14	11'-5⅛"	19'-0"	8'-6⅞"	0	0	0	0	0	0	0	0	0	0
15	2'-0"	48'-0"	7'-6"	0	1/8	3/16	1/4	-0	0	1/4	3/8	5/16	-3/16
16	2'-0"	44'-1"	2'-0"	0	1/4	3/8	1/4	0	0	1/16	1/16	1/16	0
17	2'-0"	43'-11"	2'-0"	0	1/4	1/16	1/4	0	0	1/16	1/8	1/16	0
18	2'-0"	41'-6"	2'-0"	0	1/8	1/16	1/8	0	0	1/16	1/4	1/16	0
19	2'-0"	41'-6"	2'-0"	0	1/8	1/16	1/8	0	0	1/16	1/4	1/16	0
20	2'-0"	49'-0"	2'-0"	0	1/16	1/16	1/16	0	0	1/8	1/2	1/8	0
21	8'-2"	35'-4"	2'-0"	-1/16	1/16	1/8	1/16	0	-1/16	1/8	3/16	1/8	0

Note: A negative deflection indicates an upward deflection, and a negative camber indicates a downward camber.

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

NOTE TO FABRICATOR

The cap beams shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

Note:
Cap beams having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

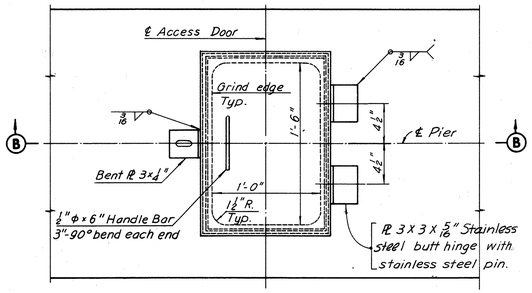
If cap beams are not cambered, distance top of cap beams to top of slab will vary along the cap beams in accordance with the offset dimensions shown in the Camber Diagram and Contractor shall adjust the bearing pads.

Notes :

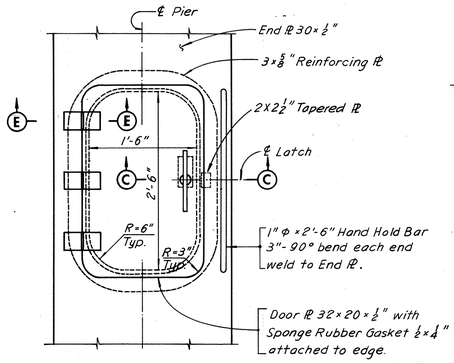
For Framing Plan Units 21 and 22, see Sheet 20.

For Typical Section through Cap Beam see Sheet 23.

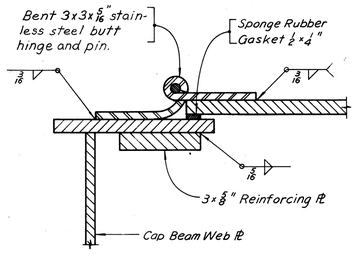
For Deck Plan Units 21 & 22, see Sheet 34.



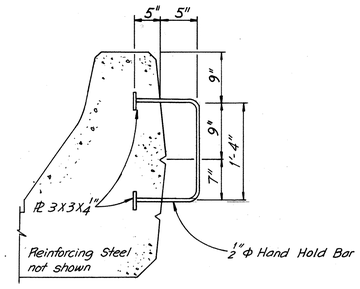
ACCESS DOOR- TYPE A
Scale: 1½" = 1'-0"



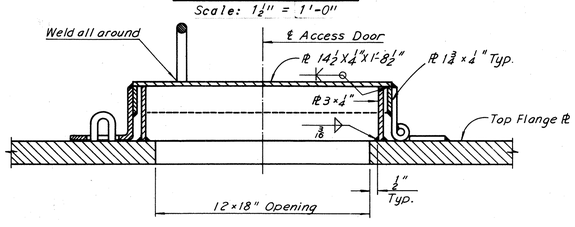
ACCESS DOOR - TYPE B
Scale: 1" = 1'-0"



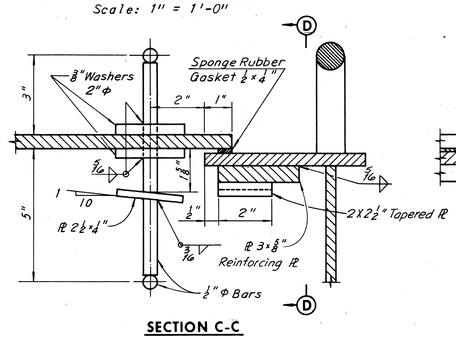
SECTION E-E
No Scale



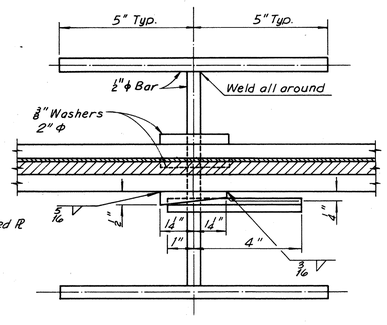
DETAIL C
Scale: 1"=1'-0"



SECTION B-B
No Scale



SECTION C-C
No Scale



SECTION D-D
No Scale

Notes :

All Steel is A36 unless otherwise shown.

‡Use A572 Grade 50 for thickness of ¾" and less, and A588 for thickness over ¾".

	BY	DATE
MADE	M.H.H.	12-2768
CHECKED	JD	5-7-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note & Welds Chngd	PRMS	4-19-74
2	As Built	TEM	8-76

AS BUILT

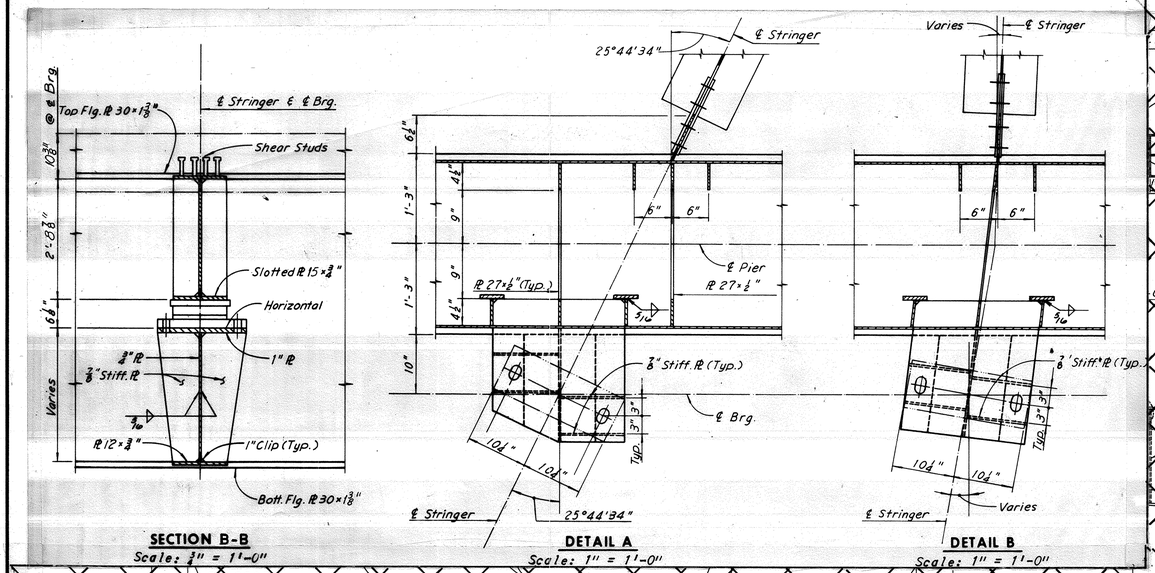
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS PIER 21

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	151	265



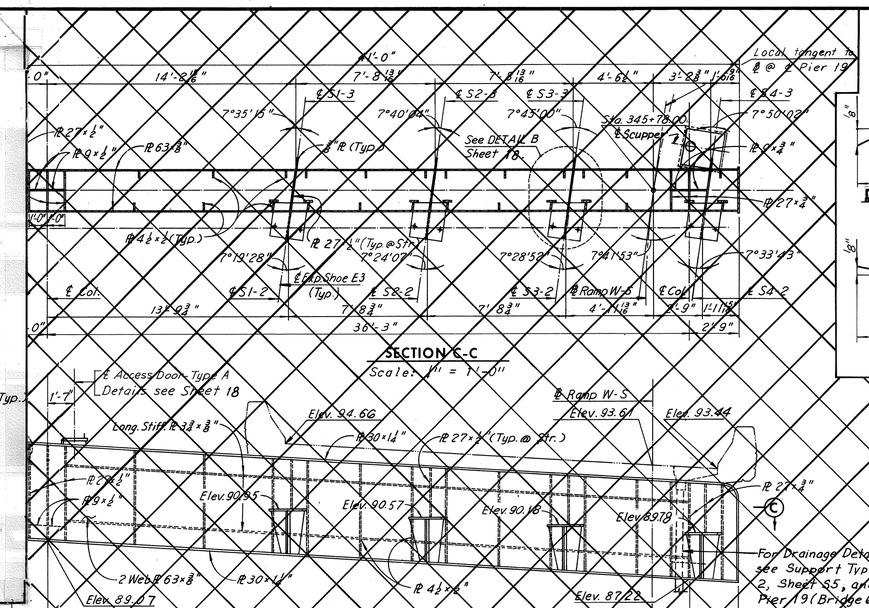
SECTION B-B
Scale: 3/4" = 1'-0"

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

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

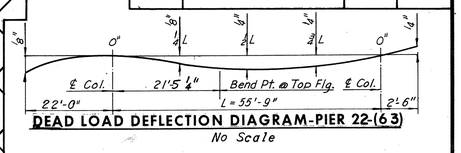
CAP BEAM ELEVATION - PIER 20-(65)
Scale: 1/4" = 1'-0"

Note: TYPICAL SECTION for PIER 20-(65) and PIER 19-(65) see TYPICAL SECTION Sheet 18.

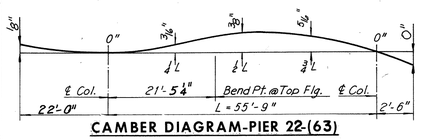


SECTION C-C
Scale: 1/4" = 1'-0"

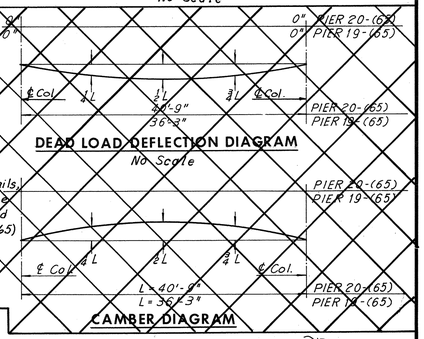
CAP BEAM ELEVATION - PIER 19-(65)
Scale: 1/4" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM-PIER 22-(63)
No Scale

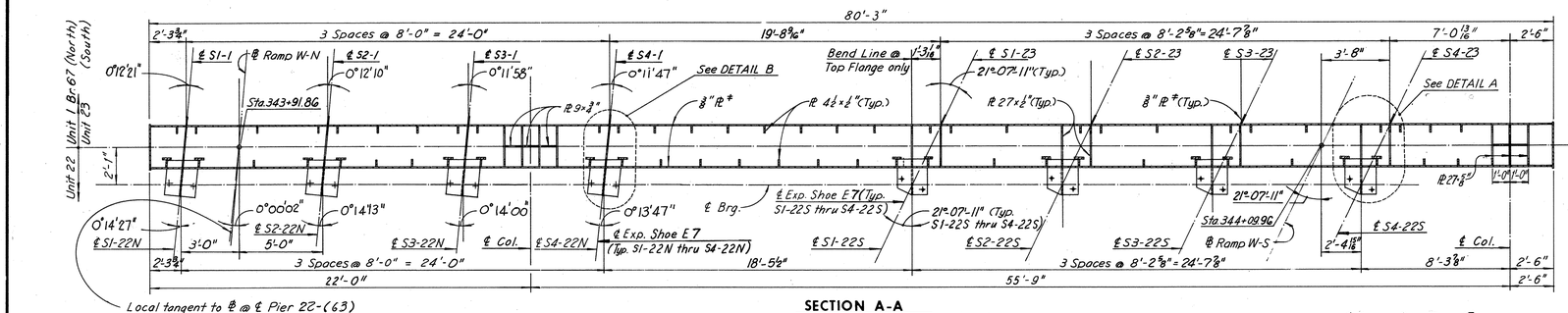


CAMBER DIAGRAM-PIER 22-(63)
No Scale

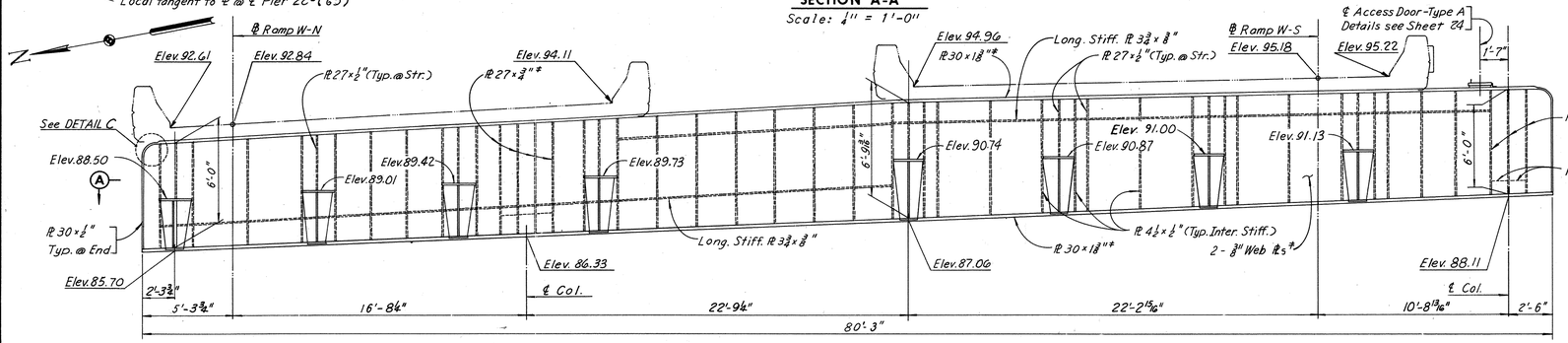


DEAD LOAD DEFLECTION DIAGRAM
No Scale

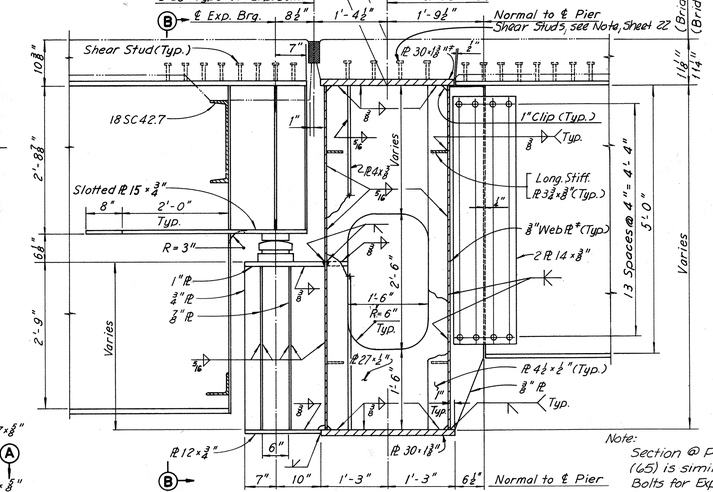
CAMBER DIAGRAM



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

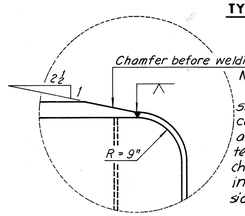


CAP BEAM ELEVATION - PIER 22-(63)
Scale: 1/4" = 1'-0"



TYPICAL SECTION - PIER 22-(63)
Scale: 3/4" = 1'-0"

Note:
Section @ Pier 20 (65) is similar. Anchor Bolts for Expansion Shoes to be provided under this contract.



DETAIL C
No Scale

Note:
The Contractor shall supply the fabrication of the capbeam at Pier 20(65) with a template for the anchor bolts in the bearing seat for the expansion shoes at Unit 23.

	BY	DATE
MADE	MHH	2-1-69
CHECKED	JD	6-6-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Notes, Deflections & Cambers Added	PRM℄	4-19-71
	As Built	TEM	8-76

Note:
All steel shall be A36 unless denoted otherwise.
* Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Notes:
Provide Drain Holes at lower end.
All elevations shown are final elevations.

For Framing Plan, see Sheet 21.
For Joint Details, see Sheet 38.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

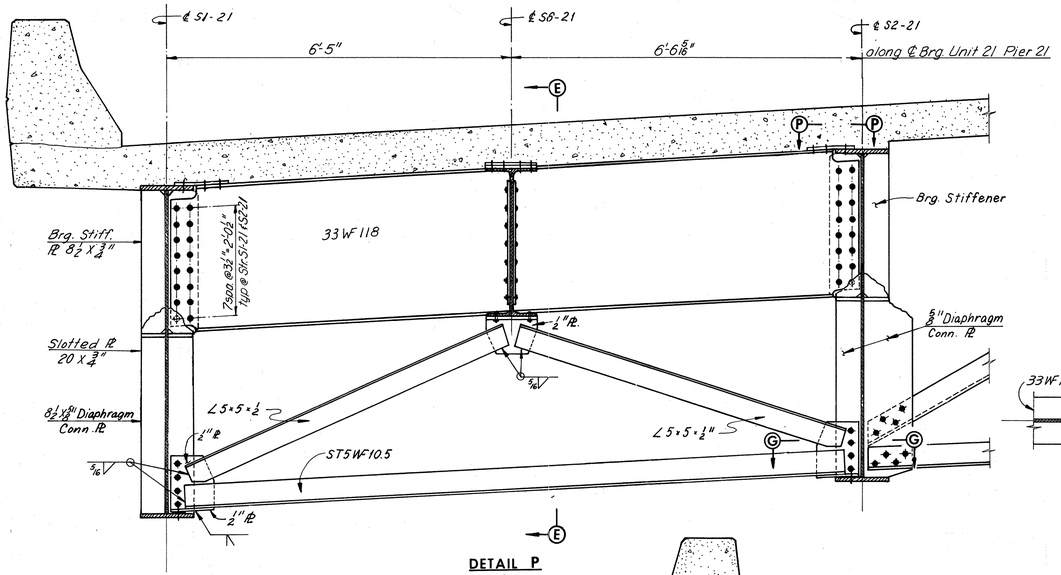
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING DETAILS
PIER 22 (BR. 63)

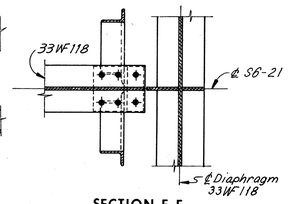
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 25 OF 46

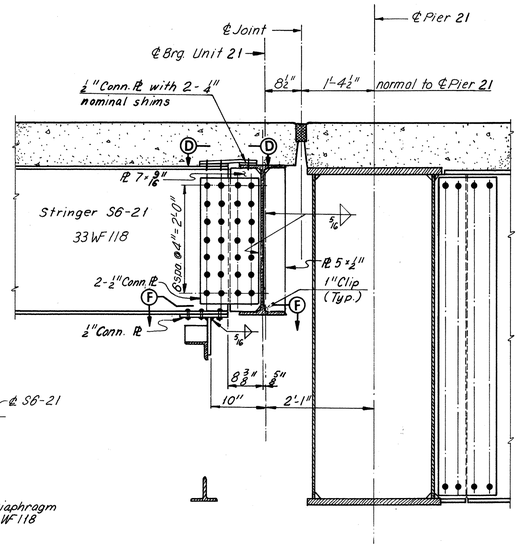
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	152	265



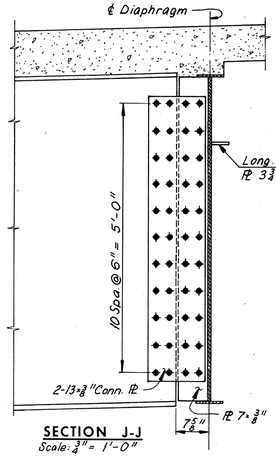
DETAIL P
Scale: 3/4" = 1'-0"
Looking East.



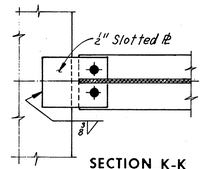
SECTION F-F
Scale: 3/4" = 1'-0"



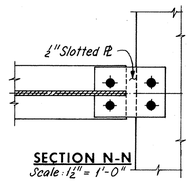
SECTION E-E
Scale: 3/4" = 1'-0"



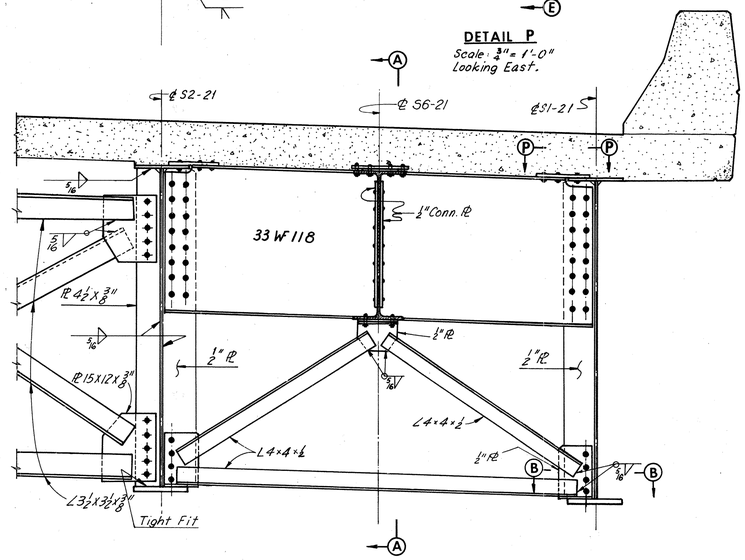
SECTION J-J
Scale: 3/4" = 1'-0"



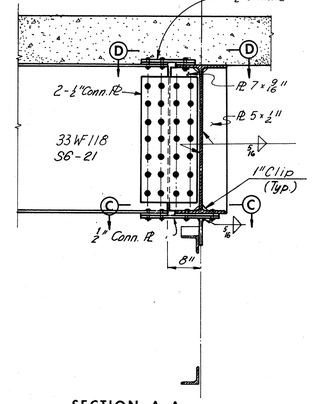
SECTION K-K
Scale: 1 1/2" = 1'-0"



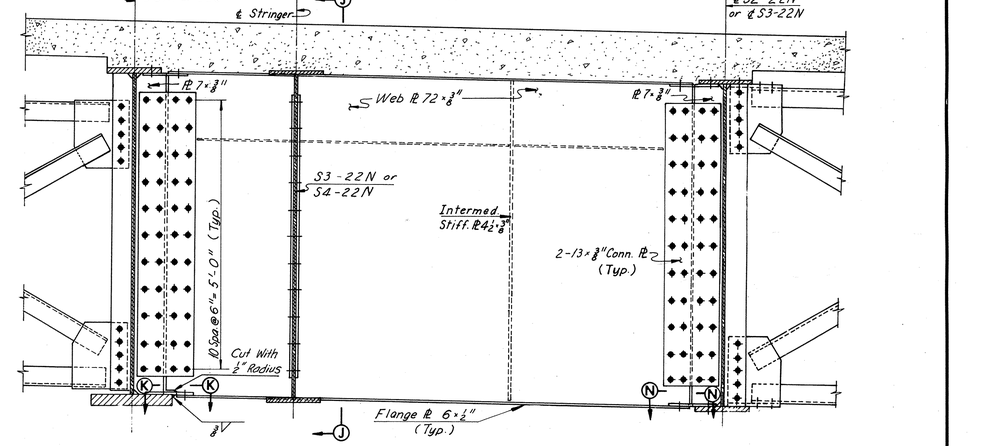
SECTION N-N
Scale: 1 1/2" = 1'-0"



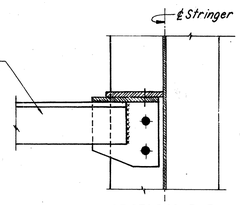
DETAIL N
Scale: 3/4" = 1'-0"
Looking West



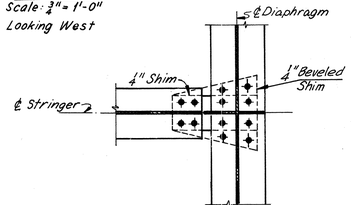
SECTION A-A
Scale: 3/4" = 1'-0"



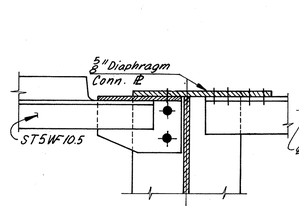
DETAIL R
Scale: 3/4" = 1'-0"
Looking West



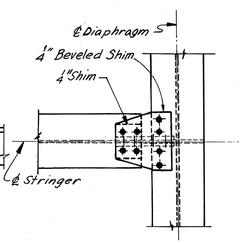
SECTION B-B
Scale: 1 1/2" = 1'-0"



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



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



SECTION D-D
Scale: 3/4" = 1'-0"
Section P-P similar

Note: For location of Details N, P and R, see Sheet 20.
All steel for diaphragms and connections shall be A36 unless otherwise noted.

	BY	DATE				
MADE	PTA	12-12-68				
CHECKED	AMH	2-7-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

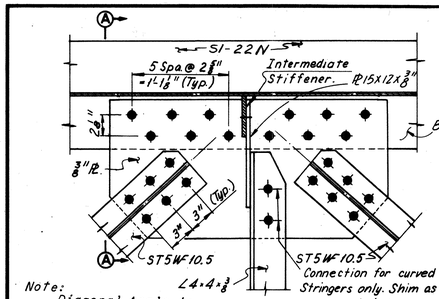
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
UNITS 21 AND 22

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

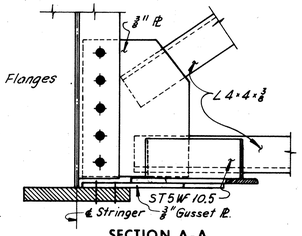
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 26 OF 45

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	153	265

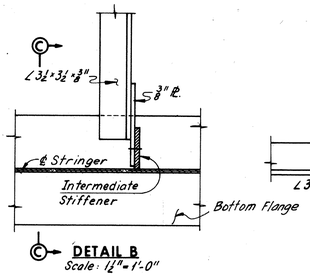


Note: Diagonal Angle in Intermediate Diaphragm is not shown.

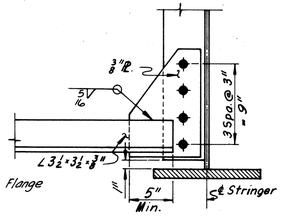
DETAIL A
Scale: 1/2" = 1'-0"
Detail A' Similar.



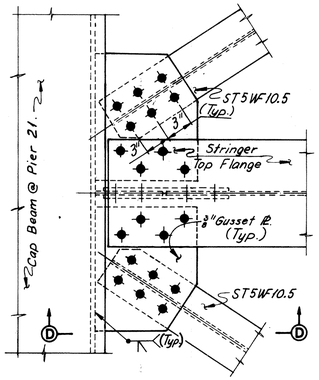
SECTION A-A
Scale: 1/2" = 1'-0"



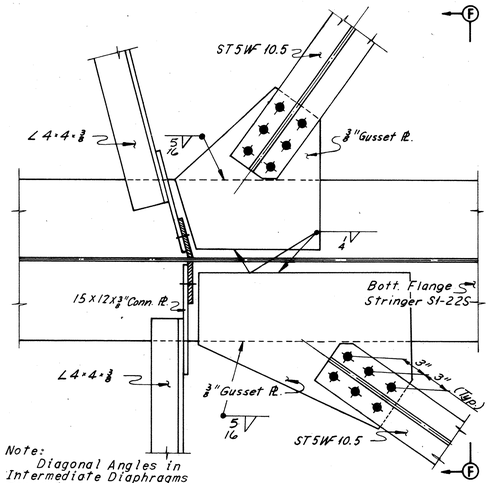
DETAIL B
Scale: 1/2" = 1'-0"



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

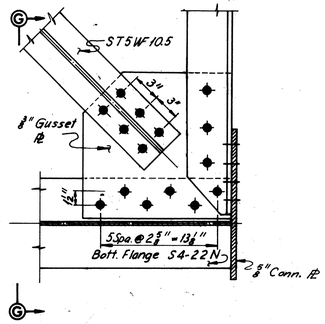


DETAIL C
Scale: 1/2" = 1'-0"

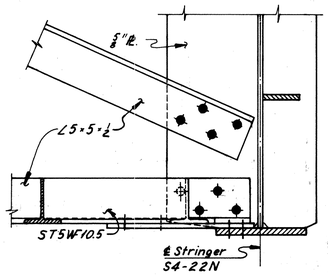


Note: Diagonal Angles in Intermediate Diaphragms are not shown.

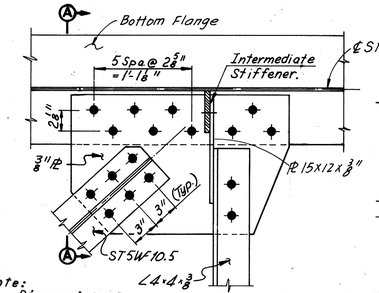
DETAIL E
Scale: 1/2" = 1'-0"



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

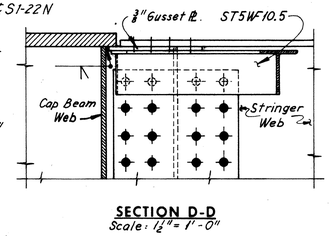


SECTION G-G
Scale: 1/2" = 1'-0"

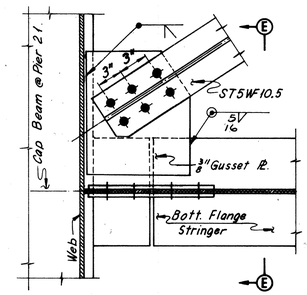


Note: Diagonal Angle in Intermediate Diaphragm is not shown.

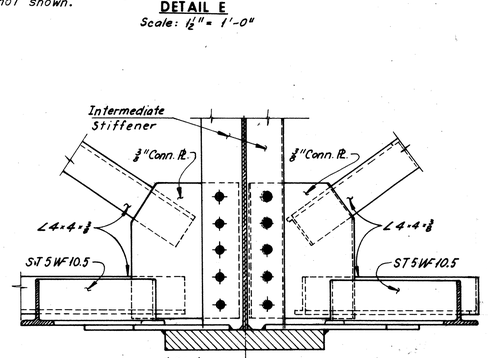
DETAIL M
Scale: 1/2" = 1'-0"



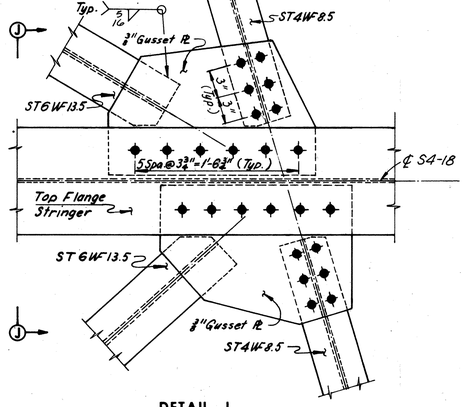
SECTION D-D
Scale: 1/2" = 1'-0"



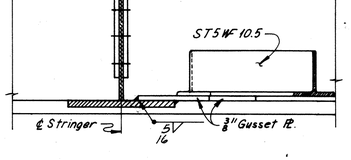
DETAIL D
Scale: 1/2" = 1'-0"



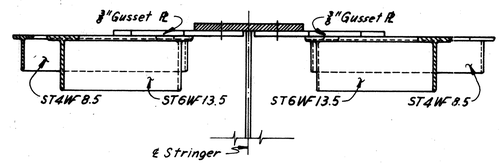
SECTION F-F
Scale: 1/2" = 1'-0"



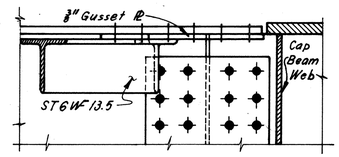
DETAIL J
Scale: 1/2" = 1'-0"
Detail J' Similar.



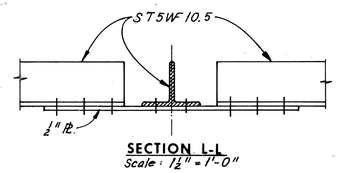
SECTION E-E
Scale: 1/2" = 1'-0"



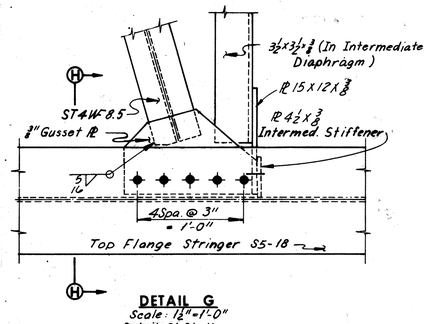
SECTION J-J
Scale: 1/2" = 1'-0"



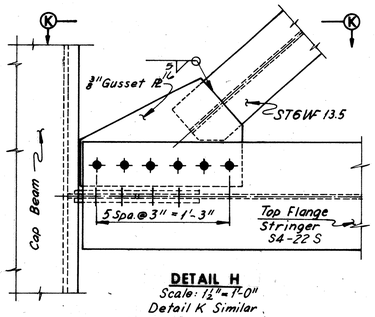
SECTION K-K
Scale: 1/2" = 1'-0"



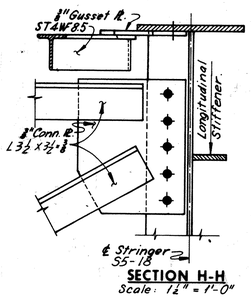
SECTION L-L
Scale: 1/2" = 1'-0"



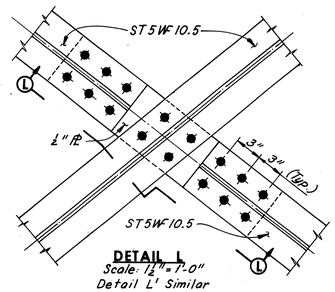
DETAIL G
Scale: 12"=1'-0"
Detail G' Similar.



DETAIL H
Scale: 1/2" = 1'-0"
Detail K Similar.



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



DETAIL L
Scale: 1/2" = 1'-0"
Detail L' Similar.

Note:
For location of Details A, A', B, C, D, E, F, H, J', L, L' and M, see Sheet 20.
For location of Details G, G', J and K, see Sheet 18.

	BY	DATE				
MADE	PTA	12-14-68				
CHECKED	AMH	2-10-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

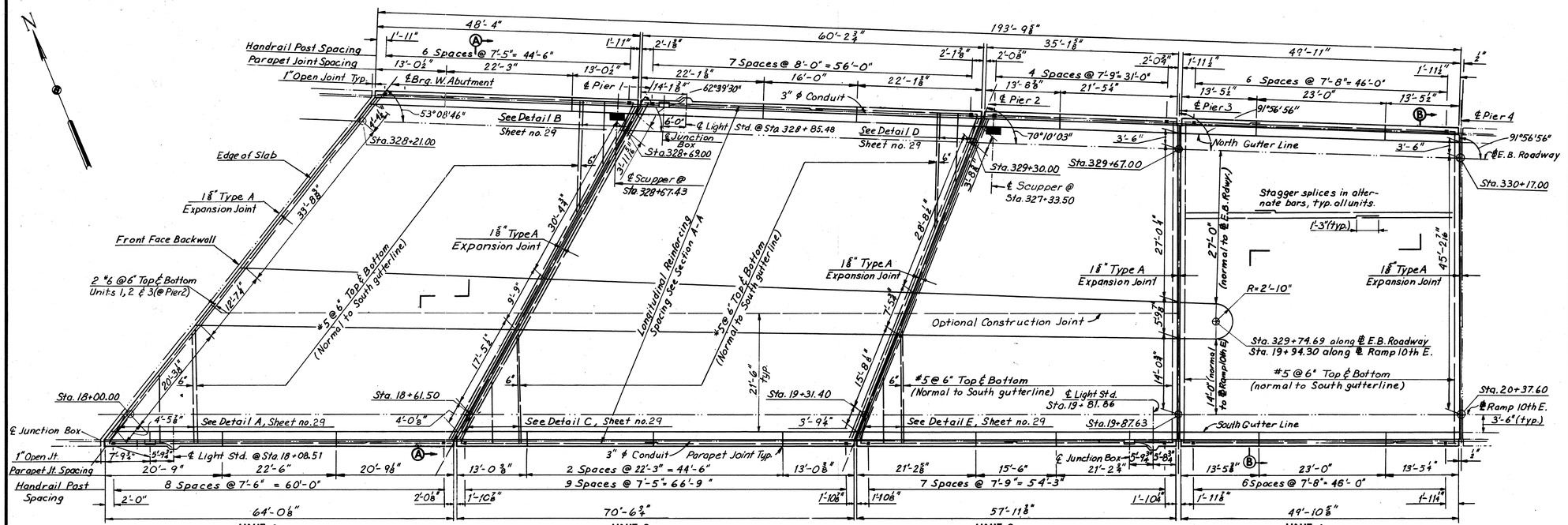
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST., R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
UNITS 18, 21 AND 22

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

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 27 OF 46

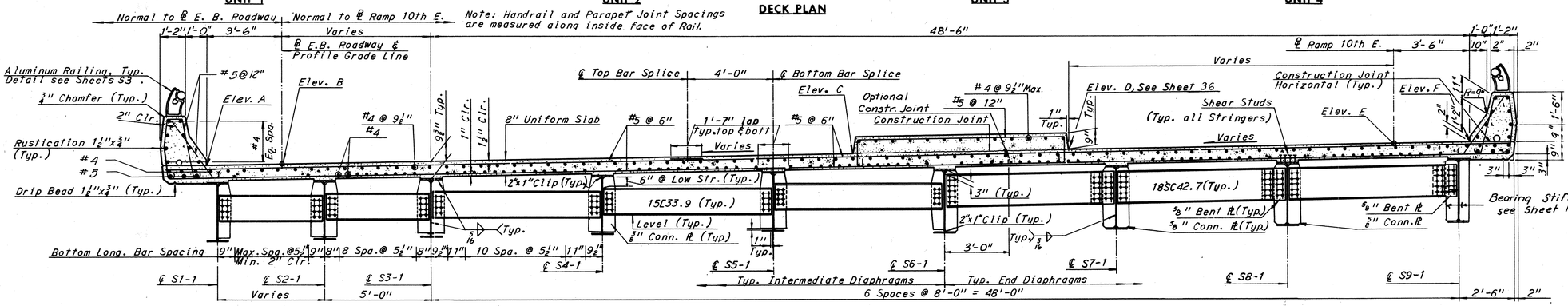
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	154	265



DECK PLAN

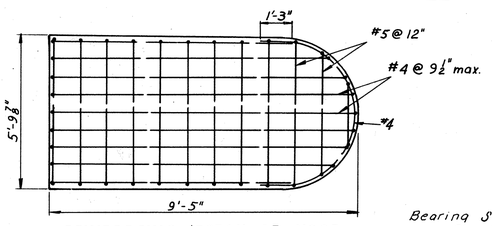
Normal to ℄ E. B. Roadway, Normal to ℄ Ramp 10th E.

Note: Handrail and Parapet Joint Spacings are measured along inside face of Rail.



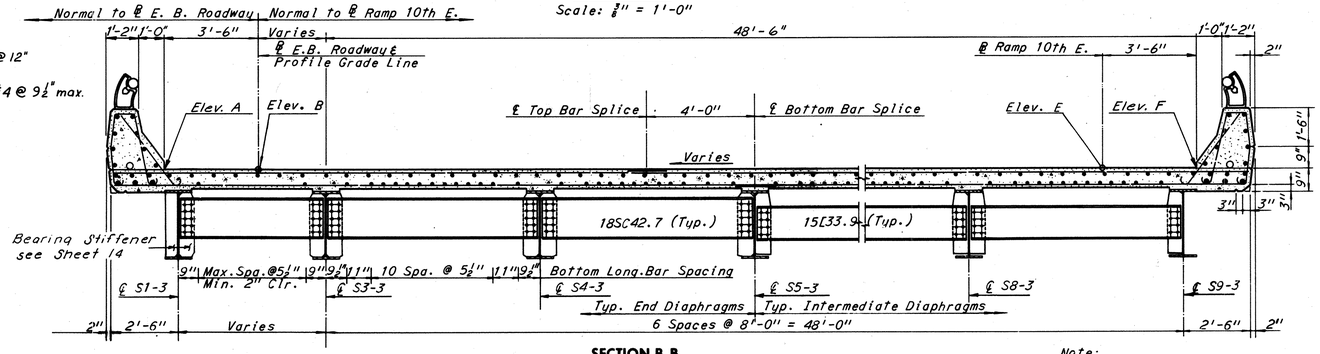
SECTION A-A

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



REINFORCING DETAIL AT NOSE

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



SECTION B-B

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

Note: Transverse dimensions given in Sections A-A and B-B are normal to ℄ Ramp 10th-E.

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C	ELEV. E	ELEV.
328+00.00	76.13	76.33	77.81	—	—
+00.00	—	—	77.81	—	—
+10.00	76.29	76.48	77.91	—	—
+20.00	76.44	76.63	78.00	—	—
+21.00	—	76.64	—	—	—
+23.62	76.50	—	—	—	—
+30.00	76.61	76.77	78.10	—	—
+40.00	76.76	76.92	78.19	—	—
+50.00	76.91	77.07	78.28	—	—
+55.04	—	—	78.33	—	—
+60.00	77.07	77.22	78.38	—	—
+69.00	—	77.35	—	—	—
+70.00	77.22	77.37	78.47	—	—
+70.81	77.25	—	—	—	—
+80.00	77.38	77.51	78.57	—	—
+90.00	77.53	77.66	78.66	—	—
329+00.00	77.68	77.81	78.75	—	—
+10.00	77.84	77.96	78.85	—	—
+20.00	77.99	78.11	78.94	—	—
+20.26	—	—	78.95	—	—
+30.00	78.16	78.25	79.04	—	—
+31.26	78.17	—	—	—	—
+40.00	78.31	78.40	79.13	—	—
+50.00	78.46	78.55	79.22	—	—
+60.00	78.62	78.70	79.32	—	—
+66.88	78.73	—	—	—	—
+67.00	—	78.80	—	—	—
+67.92	—	—	79.39	—	—
+70.00	78.77	78.85	79.41	—	—
+80.00	78.93	78.99	—	79.88	79.94
+90.00	79.08	79.14	—	79.93	79.99
330+00.00	79.23	79.29	—	79.98	80.03
+10.00	79.39	79.44	—	80.03	80.08
+16.88	79.51	—	—	—	—
+17.00	—	79.54	—	—	—
+18.54	—	—	—	80.08	—
+18.64	—	—	—	—	80.12
+20.00	79.54	79.59	—	80.08	80.13

Note: For Elevations along ℄ Ramp 10th East, see Sheet 33.

Notes:
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 14.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Details A, B, C, D and E, see Sheet 29
For Standard Drainage Details, see Support Type 1, Sheet S5 & S6.

	BY	DATE
MADE	J.D.	8-6-68
CHECKED	J.V.	10-23-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Bar Space Added	PRMS	4-19-74
	As Built	T.E.M.	8-76

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 1,2,3 AND 4

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

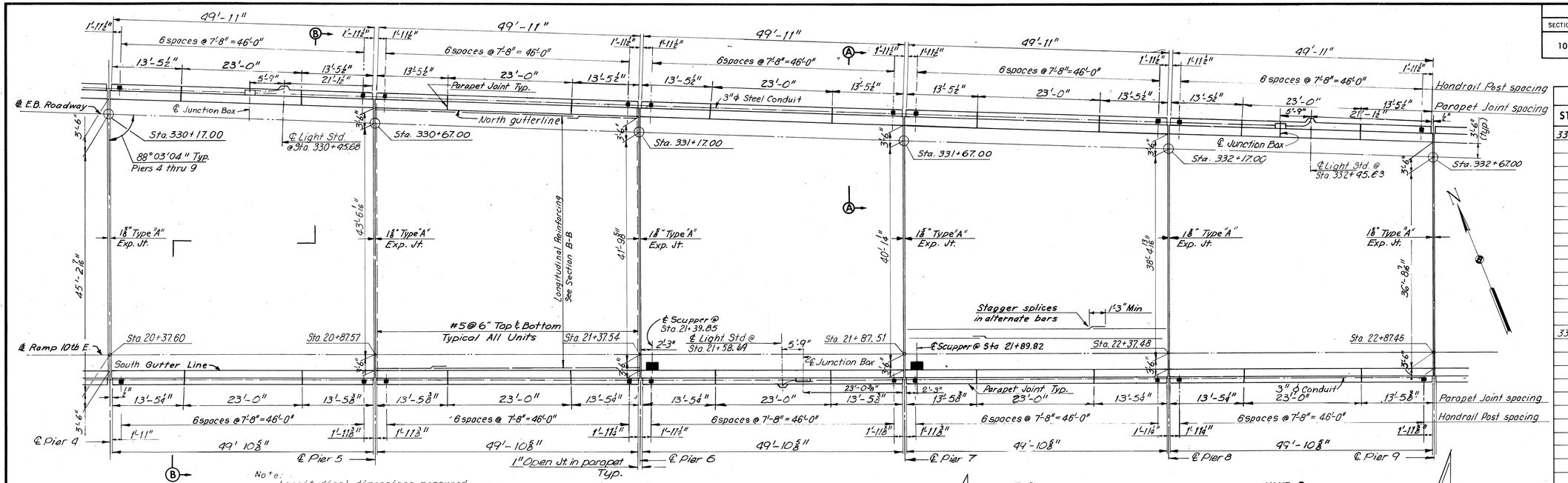
SCALE: 1"=10' Unless as shown
CONTRACT NO: 10
SHEET NO. 28 OF 46

AS BUILT

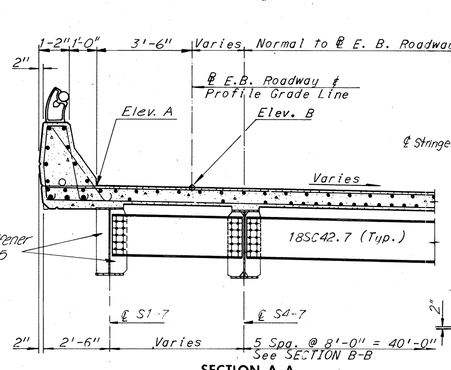
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	155	265

ELEVATION TABLE

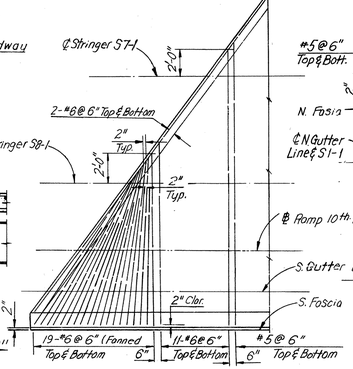
STATION	ELEV. A	ELEV. B	ELEV. C
330+10.00	79.39	79.44	80.08
+16.88	79.50	--	--
+17.00	--	79.54	--
+18.66	--	--	80.12
+20.00	79.54	79.59	80.13
+30.00	79.71	79.73	80.16
+40.00	79.86	79.88	80.21
+50.00	80.02	80.03	80.27
+60.00	80.17	80.18	80.32
+66.88	80.28	--	--
+67.00	--	80.28	--
+68.60	--	--	80.36
+70.00	80.32	80.33	80.37
+80.00	80.48	80.47	80.43
+90.00	80.63	80.62	80.49
331+00.00	80.79	80.77	80.54
+10.00	80.94	80.92	80.60
+16.88	81.05	--	--
+17.00	--	81.02	--
+18.54	--	--	80.65
+20.00	81.09	81.07	80.66
+30.00	81.26	81.21	80.72
+40.00	81.41	81.36	80.78
+50.00	81.57	81.51	80.84
+60.00	81.72	81.66	80.92
+66.88	81.82	--	--
+67.00	--	81.76	--
+68.48	--	--	81.00
+70.00	81.87	81.81	81.01
+80.00	82.02	81.95	81.12
+90.00	82.17	82.10	81.25
332+00.00	82.32	82.25	81.40
+10.00	82.47	82.40	81.56
+16.88	82.57	--	--
+17.00	--	82.50	--
+18.42	--	--	81.69
+20.00	82.62	82.55	81.71
+30.00	82.76	82.69	81.86
+40.00	82.91	82.84	82.02
+50.00	83.06	82.99	82.17
+60.00	83.21	83.14	82.33
+66.88	83.31	---	--
+67.00	--	83.24	--
+68.37	--	--	82.46
+70.00	83.36	83.29	82.48



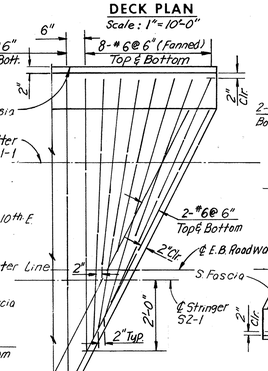
Note: Longitudinal dimensions measured along inside face of rail.



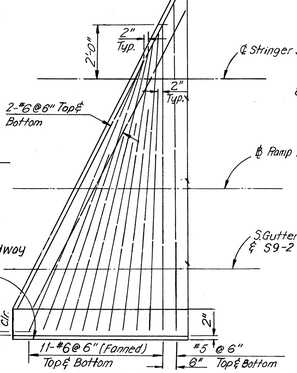
SECTION A-A
Scale: 3/8" = 1'-0"



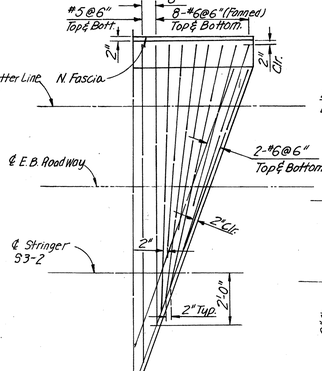
DETAIL A
Scale: 3/8" = 1'-0"



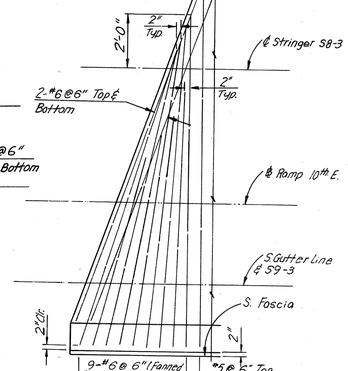
DETAIL B
Scale: 1/2" = 1'-0"



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

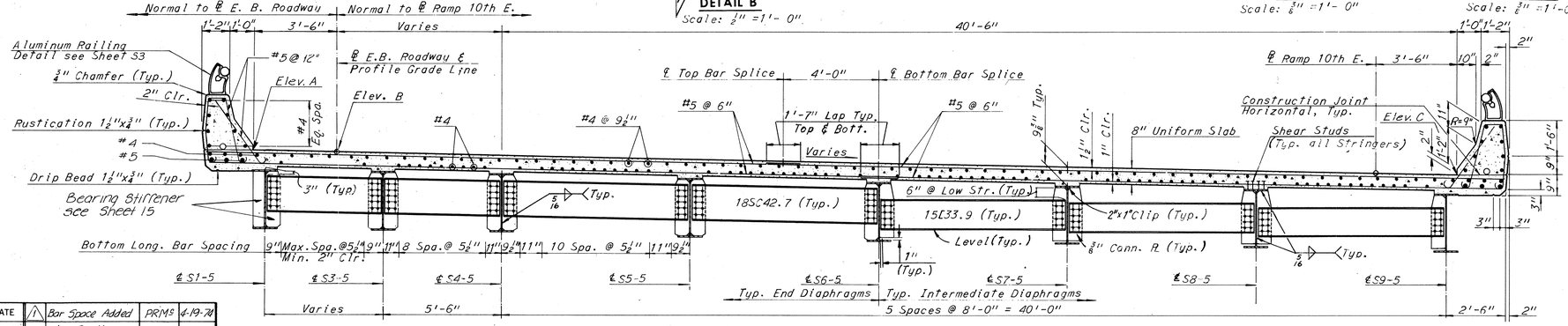


DETAIL D
Scale: 3/8" = 1'-0"



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

Note: Details A through E belong to DECK-PLAN-UNITS 1,2,3 and 4, see Sheet 28
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 15.
For Handrail Details, see Sheet S3.
For Superstructure Quantities, see Sheet 2.
For Standard Drainage Details, see Surport Type 1, Sheet S5 & S6.



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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SHS	8-2-68	2	As Built	TEM	8-76
CHECKED	AHH	11-1-68				
IN CHARGE				Bar Space Added	PRM	4-19-71

AS BUILT

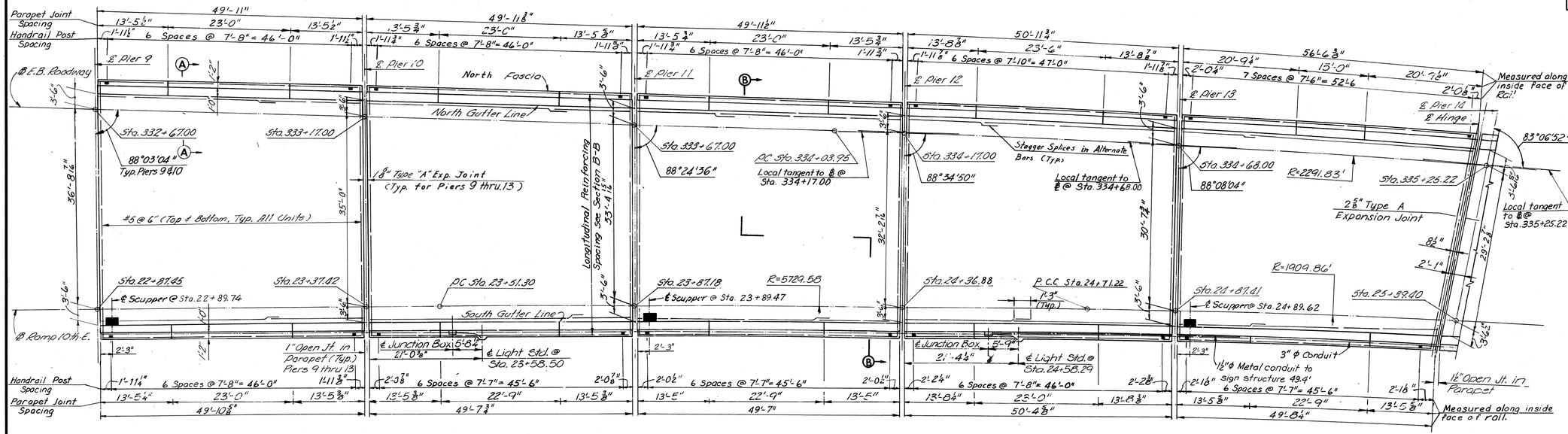
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 5, 6, 7, 8, AND 9

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

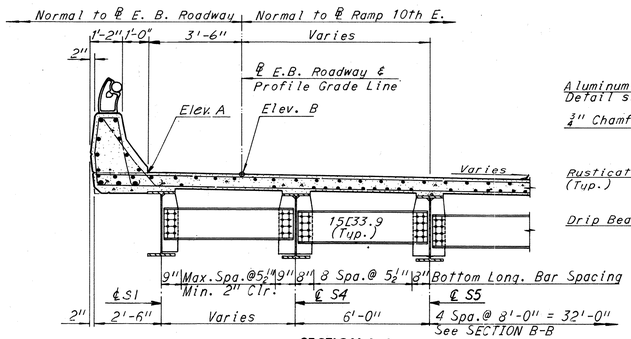
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 29 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	156	265



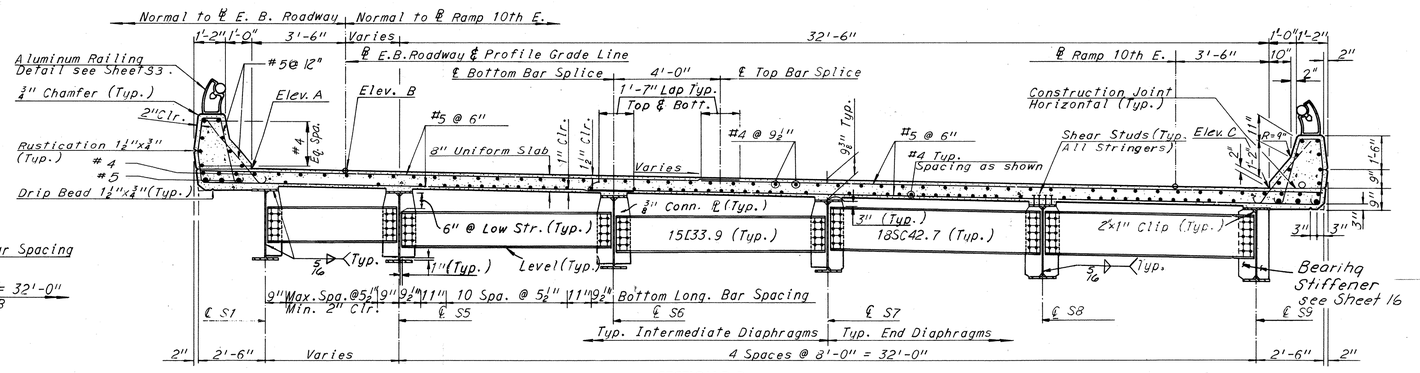
DECK PLAN

Scale 1" = 10'-0"



SECTION A-A

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



SECTION B-B

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

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
332+60.00	83.21	83.14	82.33
332+66.88	83.31	——	——
332+67.00	——	83.24	——
332+68.37	——	——	82.46
332+70.00	83.36	83.29	82.48
332+80.00	83.50	83.43	82.64
332+90.00	83.65	83.58	82.79
333+00.00	83.80	83.73	82.95
333+10.00	83.95	83.88	83.10
333+16.88	84.05	——	——
333+17.00	——	83.98	——
333+18.31	——	——	83.21
333+20.00	84.10	84.03	83.23
333+30.00	84.25	84.17	83.35
333+40.00	84.40	84.32	83.45
333+50.00	84.56	84.47	83.54
333+60.00	84.71	84.62	83.62
333+66.90	84.82	——	——
333+67.00	——	84.72	——
333+68.02	——	——	83.69
333+70.00	84.86	84.77	83.70
333+80.00	85.03	84.91	83.78
333+90.00	85.18	85.06	83.86
334+00.00	85.34	85.21	83.94
334+10.00	85.49	85.36	84.03
334+16.91	85.60	——	——
334+17.00	——	85.46	——
334+17.88	——	——	84.10
334+20.00	85.64	85.51	84.12
334+30.00	85.80	85.65	84.20
334+40.00	85.95	85.80	84.30
334+50.00	86.11	85.95	84.39
334+60.00	86.26	86.10	84.49
334+67.89	86.38	——	——
334+68.00	——	86.22	——
334+69.11	——	——	84.63
334+70.00	86.41	86.25	84.61
334+80.00	86.56	86.39	84.74
334+90.00	86.71	86.54	84.88
335+00.00	86.86	86.69	85.04
335+10.00	87.01	86.84	85.20
335+20.00	87.15	86.97	85.35
335+25.64	87.23	——	——
335+25.22	——	87.04	——
335+21.29	——	——	85.36
335+30.00	87.29	87.11	85.49

Notes:
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 16.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Standard Drainage Details, see Support Type , Sheet S5 & S6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	WJC	8-5-68	2	Bar Space Added	PRMS	4-19-74
CHECKED	JD	10-21-68		As Built	TEM	8-76
IN CHARGE						

AS BUILT

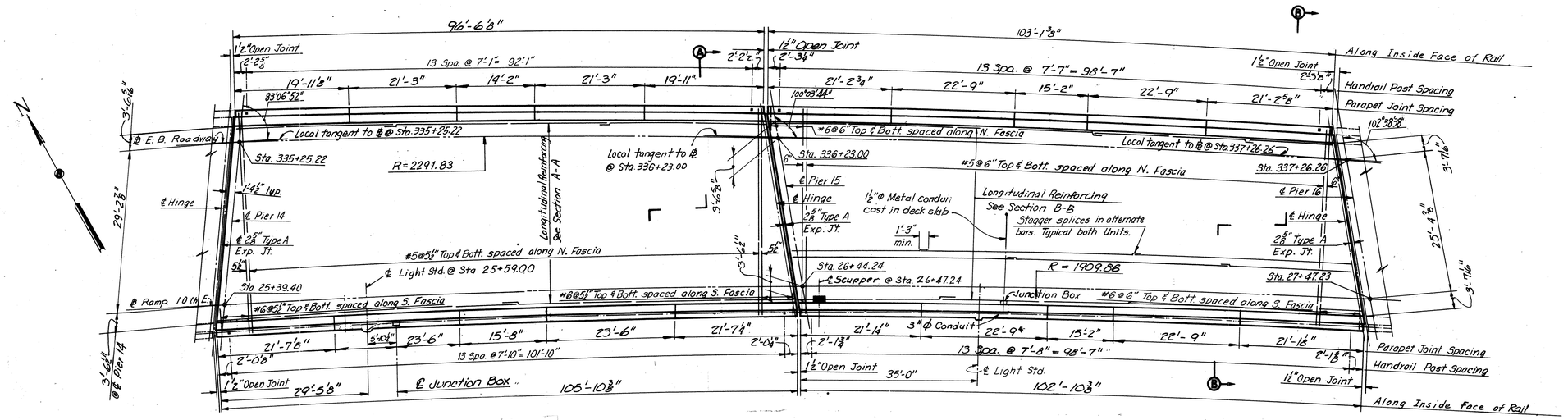
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 10.11.12.13 AND 14

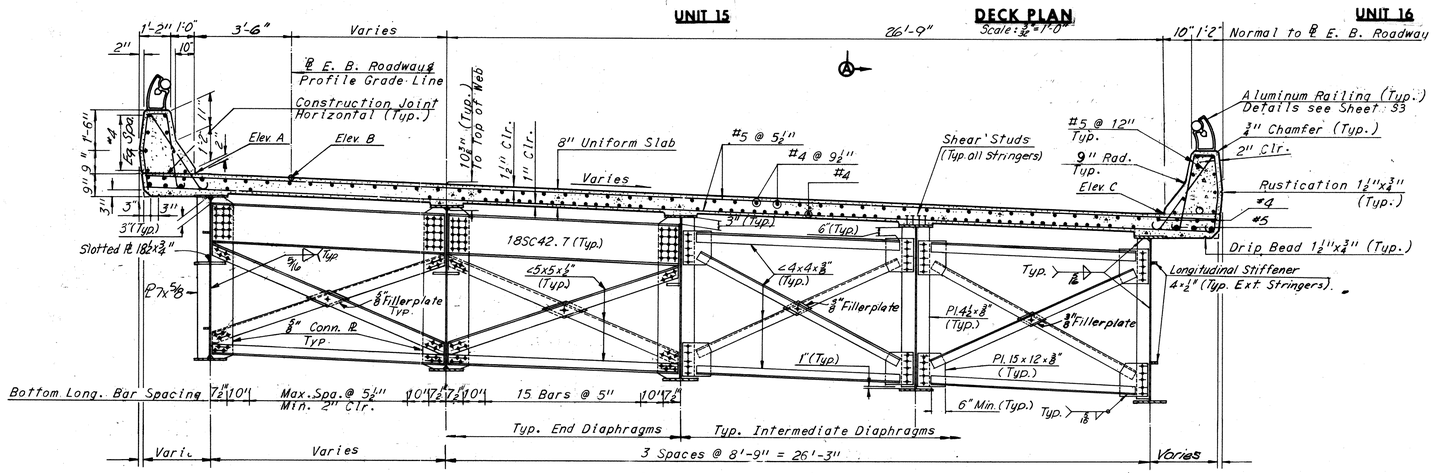
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 30 OF 46

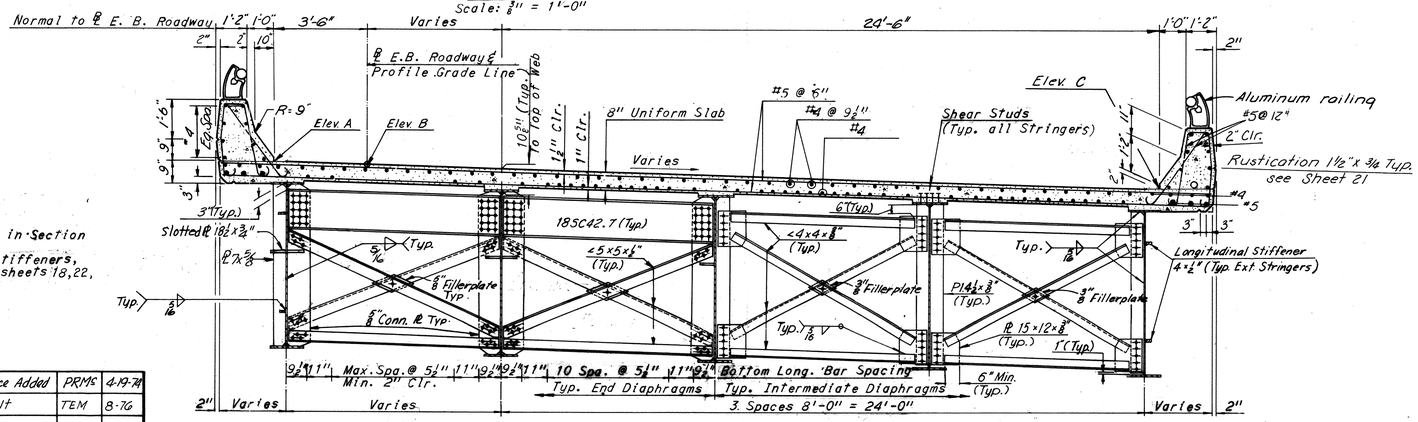
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	157	265



DECK PLAN
Scale: 3/32" = 1'-0"



SECTION A-A
Scale: ⅜" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"

Notes:
For details not shown in Section B-B, see Section A-A.
For details of brg. stiffeners, long. stiffeners, see sheets 18, 22, and 23.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	RLM	8-6-68	2	As Built	TEM	8-76
CHECKED	SCC	10-21-68		Bar Space Added	PRMC	4-19-74
IN CHARGE						

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
335+10.00	87.01	86.84	85.20
+20.00	87.15	86.97	85.35
+21.29	—	—	85.36
+25.22	87.22	—	—
+30.00	87.18	87.11	85.50
+40.00	87.40	87.23	85.64
+50.00	87.53	87.35	85.76
+60.00	87.63	87.46	85.89
+70.00	87.74	87.57	86.01
+80.00	87.85	87.67	86.11
+90.00	87.93	87.76	86.23
336+00.00	88.02	87.85	86.33
+10.00	88.10	87.93	86.42
+20.00	88.19	88.02	86.52
+22.38	88.21	—	—
+23.00	—	88.04	—
+28.25	—	—	86.60
+30.00	88.27	88.10	86.61
+40.00	88.36	88.19	86.70
+50.00	88.44	88.27	86.80
+60.00	88.52	88.35	86.89
+70.00	88.61	88.44	86.98
+80.00	88.69	88.52	87.08
+90.00	88.78	88.61	87.17
337+00.00	88.86	88.69	87.26
+10.00	88.94	88.77	87.35
+20.00	89.03	88.86	87.44
+25.98	89.08	—	—
+26.26	—	88.91	—
+30.00	89.11	88.94	87.53
+32.60	—	—	87.55
337+40.00	89.20	89.03	87.62

Notes:
For Joint Details, see Sheet 38.
For Framing Plan, see Sheet 17.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Standard Drainage Details, see Support Type 2 Sheet 55&56.

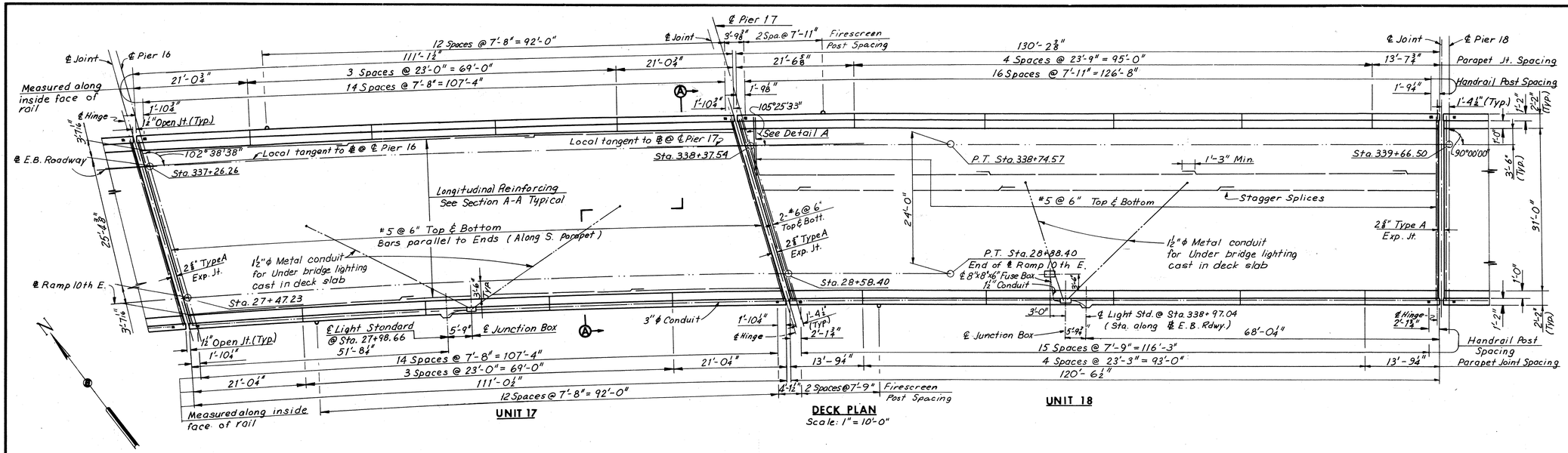
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 15 AND 16

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

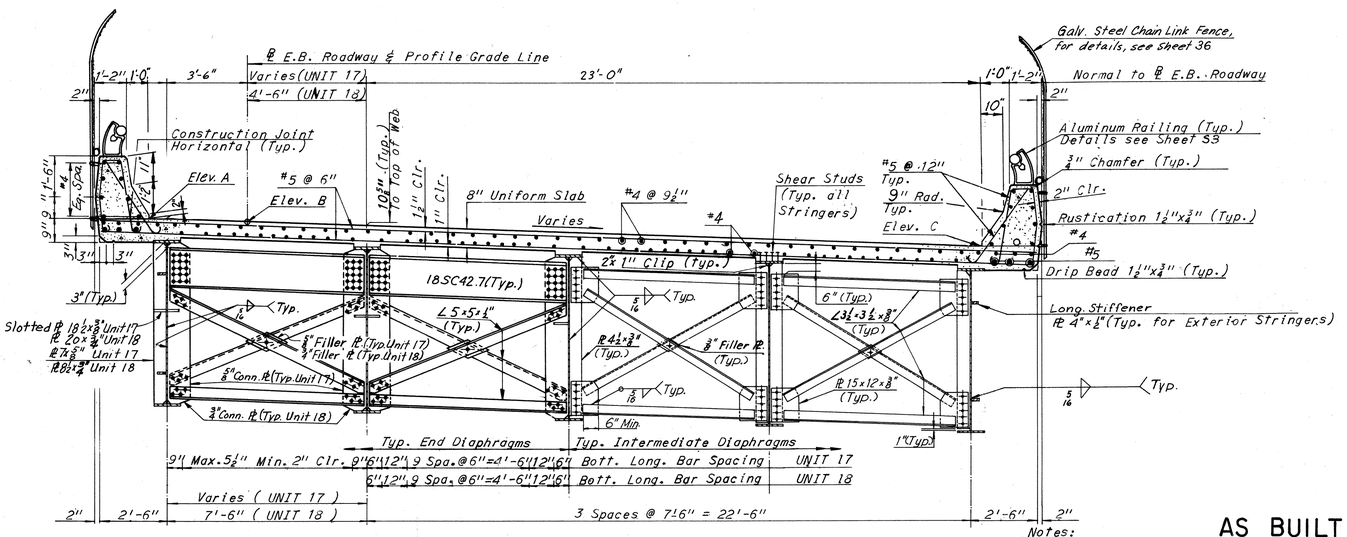
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 31 OF 46



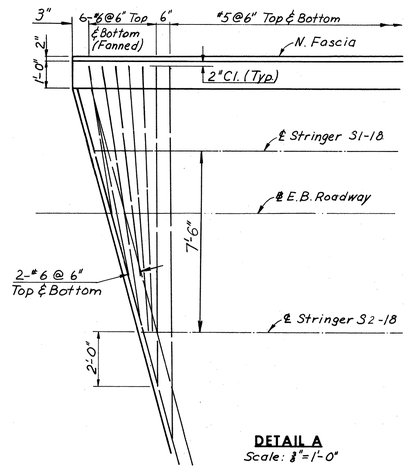
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	158	265

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
337+20.00	89.03	88.86	87.44
+25.48	89.08	--	--
+26.26	--	88.91	--
+30.00	89.11	88.94	87.53
+32.60	--	--	87.55
+40.00	89.20	89.03	87.62
+50.00	89.28	89.11	87.71
+60.00	89.36	89.19	87.80
+70.00	89.45	89.28	87.89
+80.00	89.53	89.36	87.98
+90.00	89.62	89.45	88.07
338+00.00	89.70	89.53	88.18
+10.00	89.78	89.61	88.30
+20.00	89.86	89.70	88.43
+30.00	89.93	89.78	88.57
+36.58	89.99	--	--
+37.54	--	89.85	--
+40.00	90.01	89.87	88.71
+45.13	--	--	88.78
+50.00	90.09	89.95	88.85
+60.00	90.17	90.03	88.99
+70.00	90.25	90.12	89.13
+80.00	90.32	90.20	89.26
+90.00	90.40	90.29	89.40
339+00.00	90.48	90.37	89.54
+10.00	90.55	90.45	89.69
+20.00	90.63	90.54	89.83
+30.00	90.70	90.62	89.96
+40.00	90.78	90.71	90.10
+50.00	90.86	90.79	90.24
+60.00	90.94	90.87	90.38
+66.50	90.99	90.93	90.47
+70.00	91.02	90.96	90.52



SECTION A-A
Scale: ⅜" = 1'-0"



DETAIL A
Scale: ⅜"=1'-0"

AS BUILT

Notes:
For Joint Details, see Sheet 38.
For Framing Plan, see Sheet 18..
For Handrail Details, see Sheet 33
For Superstructure quantities, see Sheet 2.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	8-9-68				
CHECKED	R.C.	10-18-68	1	As Built	TEM	8-76
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

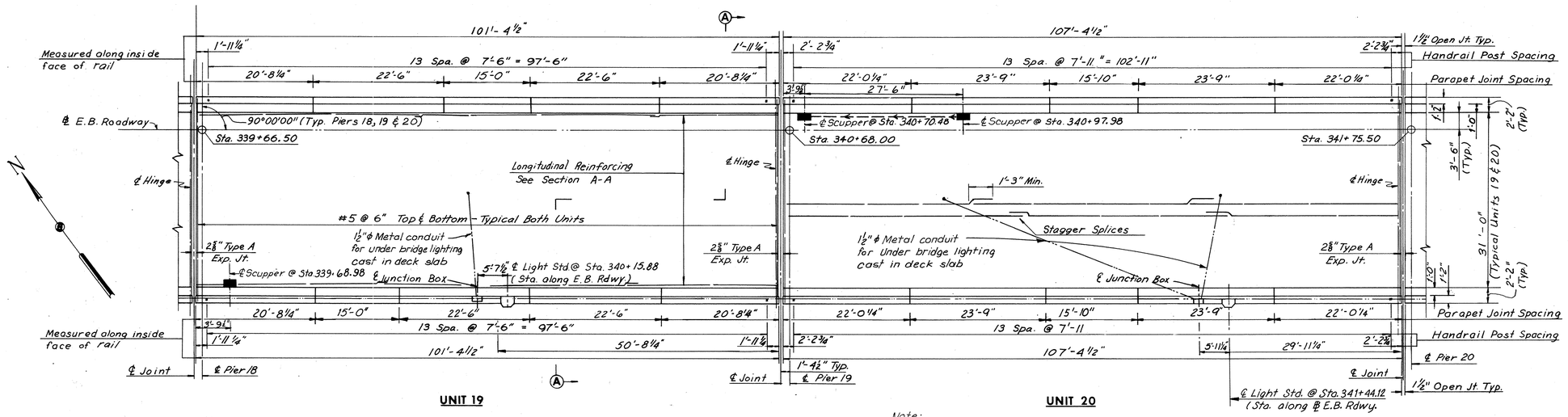
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

DECK PLAN – UNITS 17 AND 18

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

SCALE:
CONTRACT NO.: 10
SHEET NO. 32 OF 46

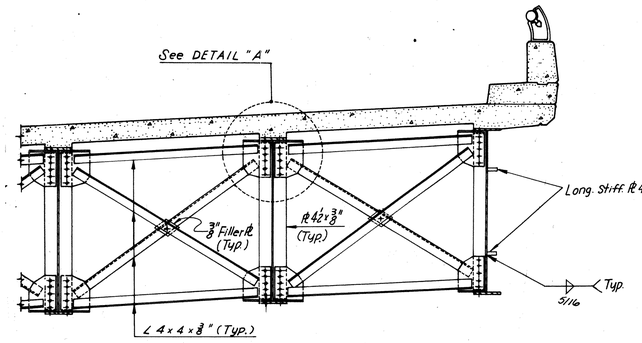
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	159	265



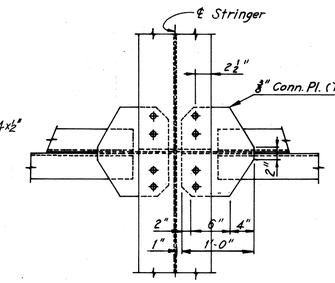
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
339+60.00	90.94	90.87	90.38
+66.50	90.99	90.93	90.47
+70.00	91.02	90.96	90.52
+80.00	91.09	91.04	90.65
+90.00	91.17	91.13	90.79
340+00.00	91.24	91.21	90.94
+10.00	91.32	91.29	91.08
+20.00	91.40	91.38	91.22
+30.00	91.47	91.46	91.35
+40.00	91.55	91.55	91.49
+50.00	91.63	91.63	91.63
+60.00	91.71	91.71	91.77
+68.00	91.77	91.78	91.88
+70.00	91.79	91.80	91.91
+80.00	91.86	91.88	92.04
+90.00	91.94	91.97	92.18
341+00.00	92.02	92.05	92.32
+10.00	92.09	92.13	92.47
+20.00	92.17	92.22	92.61
+30.00	92.24	92.30	92.74
+40.00	92.32	92.39	92.87
+50.00	92.40	92.47	92.99
+60.00	92.49	92.55	93.09
+70.00	92.57	92.64	93.19
+75.50	92.61	92.68	93.23
+80.00	92.65	92.72	93.27

Note: For Standard Drainage details for Unit 19 See Support Type 2 Sheet S5 and for Unit 20 Support Type 7 Sheet S6.

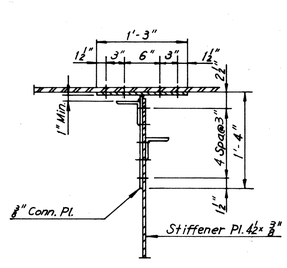
DECK PLAN
Scale: 1"=10'-0"



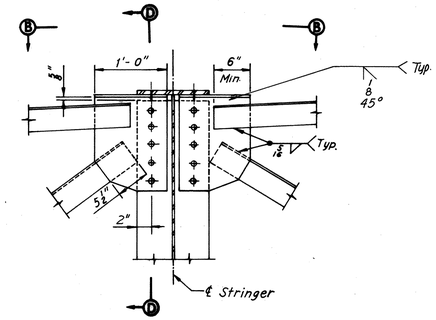
INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"



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



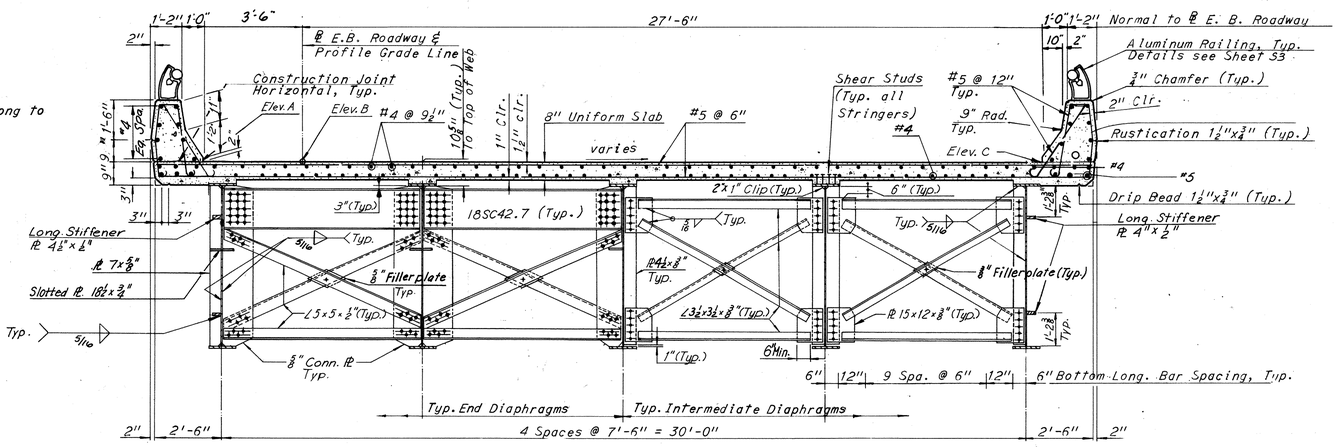
SECTION D-D
Scale: 1"=1'-0"



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

Note: Intermediate Diaphragm Details belong to Units 21 and 22, see Sheet 34

Note: For details of brg. stiffeners, see sheets 19 & 23



SECTION A-A
Scale: ⅜" = 1'-0"

Notes:
For Joint Details, see Sheet 38
For Framing Plan, see Sheet 19.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.

	BY	DATE				
MADE	SHS	8-2-68				
CHECKED	R. C.	10-18-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

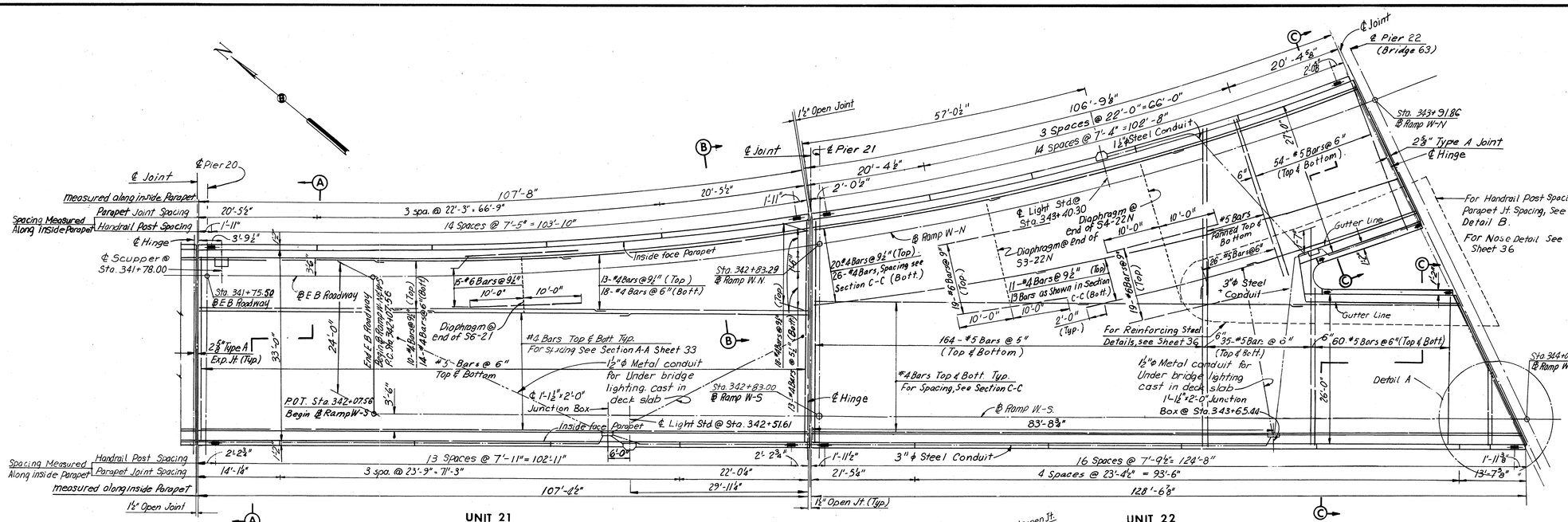
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

DECK PLAN-UNITS 19 AND 20

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 33 OF 46

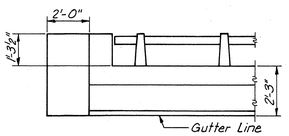
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	160	265



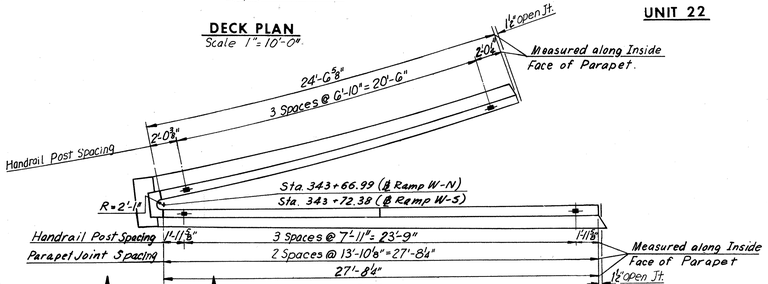
UNIT 21

UNIT 22

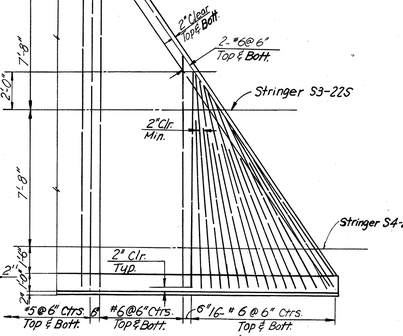
Note: For Section A-A, see Sheet 33.



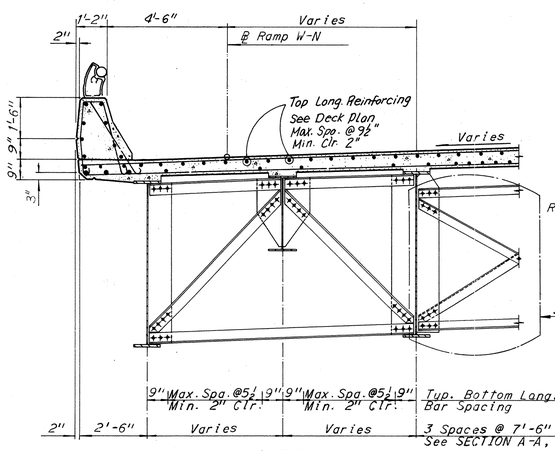
VIEW D-D
No Scale



DECK PLAN
Scale 1" = 10'-0"

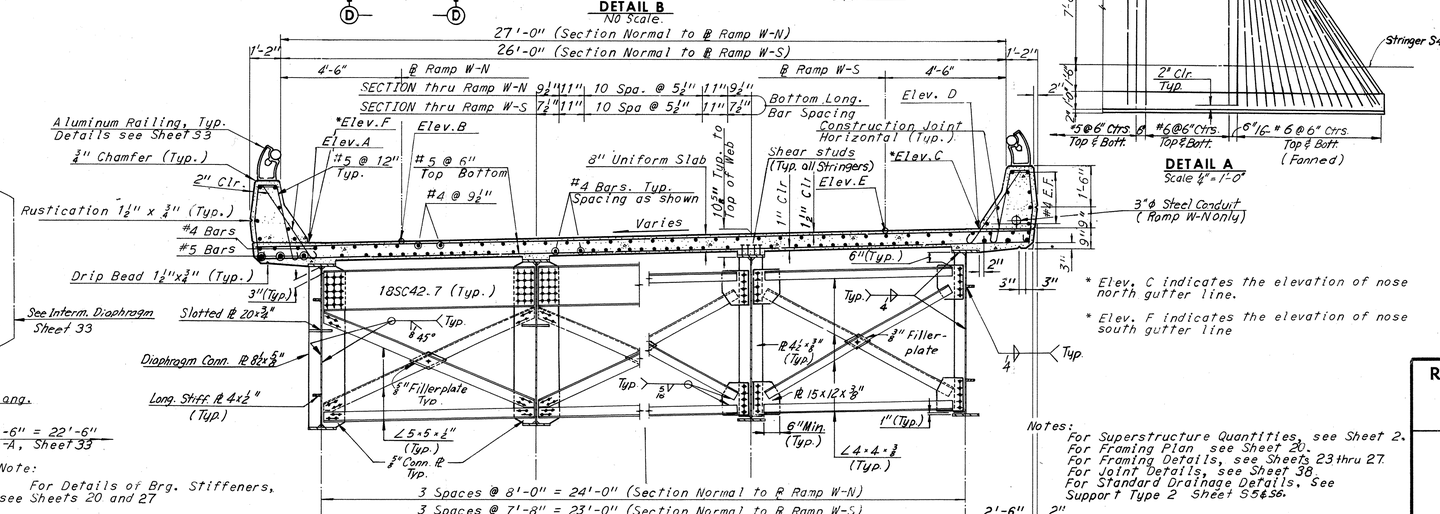


DETAIL A
Scale ½" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"

Note: For Details of Brg. Stiffeners, see Sheets 20 and 27



SECTION C-C
Scale: ⅜" = 1'-0"

Note: Intermediate Diaphragms shown can only be used where stringers are straight. For Intermediate Diaphragm Details at curved stringers, see Sheet 33.

* Elev. C indicates the elevation of nose north gutter line.

* Elev. F indicates the elevation of nose south gutter line

Notes:
For Superstructure Quantities, see Sheet 2.
For Framing Plan see Sheet 20.
For Framing Details, see Sheets 23 thru 27.
For Joint Details, see Sheet 38.
For Standard Drainage Details, see Support Type 2 Sheet 556.

ELEVATION TABLE			
STATION ℄ Ramp W-N	ELEV. A	ELEV. B *	ELEV. C
341+75.50	92.61	92.68	—
+80.00	92.65	92.72	—
+90.00	92.74	92.81	—
342+00.00	92.82	92.89	—
+10.00	92.90	92.97	—
+20.00	92.98	93.06	—
+30.00	93.06	93.15	—
+40.00	93.14	93.24	—
+50.00	93.21	93.32	—
+60.00	93.26	93.38	—
+70.00	93.32	93.45	—
+80.00	93.35	93.49	—
+90.00	93.37	93.52	—
343+00.00	93.39	93.55	—
+10.00	93.40	93.57	—
+20.00	93.38	93.56	—
+30.00	93.35	93.54	—
+40.00	93.30	93.50	—
+50.00	93.22	93.43	—
+60.00	93.14	93.35	94.64
+70.00	93.02	93.23	94.52
+80.00	92.86	93.07	94.36
+90.00	92.66	92.87	94.16

ELEVATION TABLE				
STATION ℄ Ramp W-S	ELEV. D	ELEV. E *	ELEV. F	
342+07.56	93.50	93.43	—	
+10.00	93.52	93.45	—	
+20.00	93.61	93.54	—	
+30.00	93.69	93.62	—	
+40.00	93.78	93.71	—	
+50.00	93.87	93.80	—	
+60.00	93.97	93.90	—	
+70.00	94.08	94.01	—	
+80.00	94.20	94.13	—	
+90.00	94.31	94.24	—	
343+00.00	94.42	94.35	—	
+10.00	94.53	94.46	—	
+20.00	94.64	94.57	—	
+30.00	94.74	94.67	—	
+40.00	94.84	94.77	—	
+50.00	94.93	94.86	—	
+60.00	95.01	94.94	94.53	
+70.00	95.07	95.00	94.59	
+80.00	95.14	95.07	94.69	
+90.00	95.18	95.12	94.79	
344+00.00	95.21	95.16	94.89	
+10.00	95.22	95.18	94.96	

	BY	DATE				
MADE	G.S.H.	08-09-68				
CHECKED	S.C.C.	10-25-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

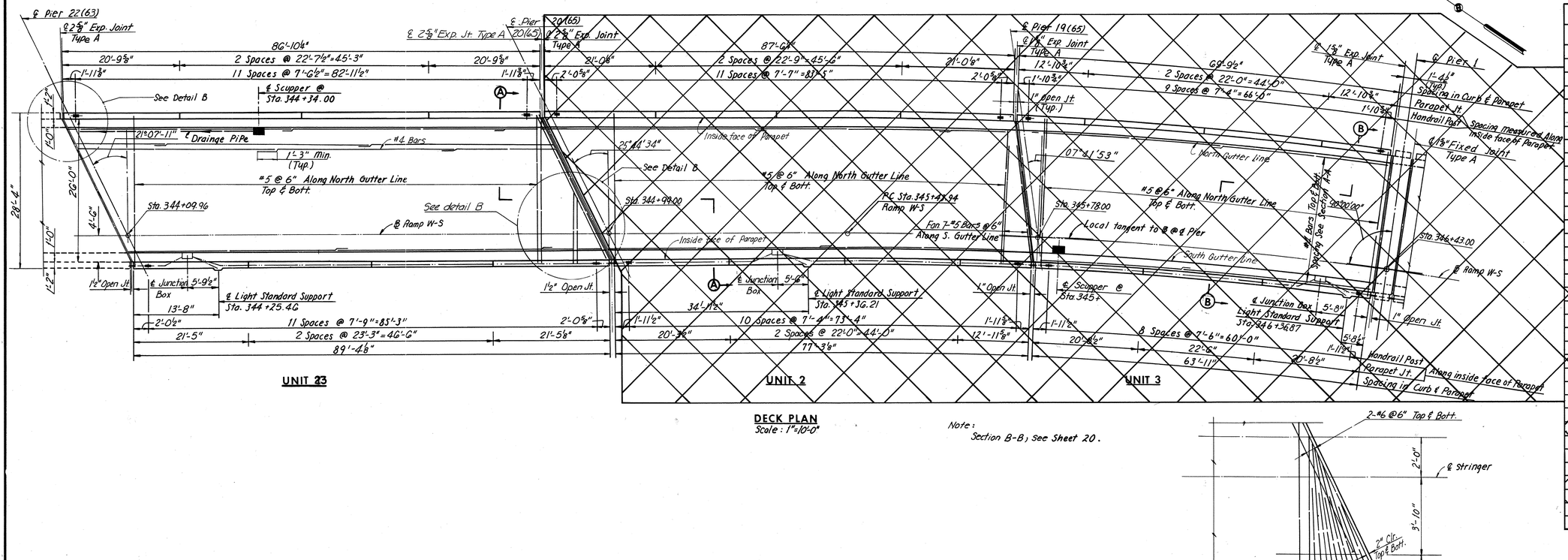
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN — UNITS 21 AND 22

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 34 OF 46

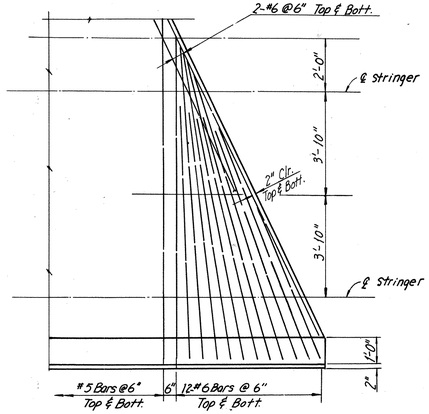
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	161	265



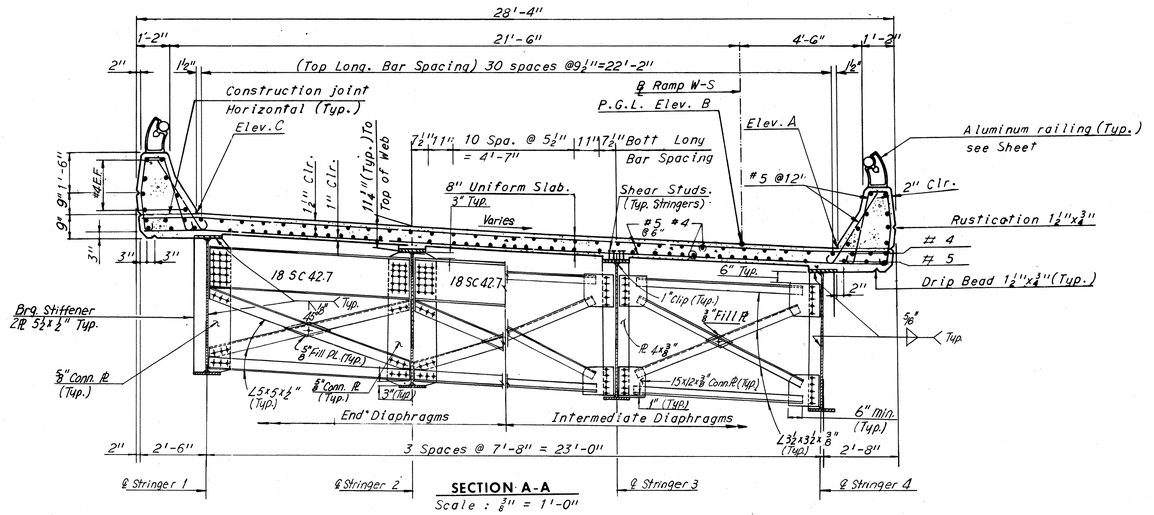
DECK PLAN
Scale: 1"=10'-0"

Note:
Section B-B, see Sheet 20.

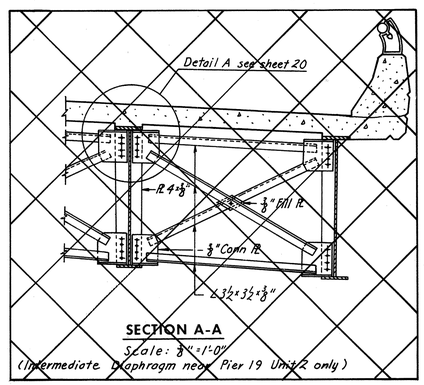
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
344+00.00	95.21	95.16	94.89
+10.00	95.22	95.18	94.96
+20.00	95.21	95.18	95.02
+30.00	95.19	95.17	95.06
+40.00	95.14	95.13	95.08
+50.00	95.08	95.08	95.08
+60.00	95.01	95.02	95.10
+70.00	94.91	94.94	95.10
+80.00	94.81	94.85	95.10
+90.00	94.69	94.75	95.08
345+00.00	94.47	94.06	93.99
+10.00	94.51	94.02	93.94
+20.00	94.55	93.98	93.89
+30.00	94.60	93.94	93.83
+40.00	94.63	93.89	93.76
+50.00	94.65	93.83	93.69
+60.00	94.66	93.76	93.61
+70.00	94.66	93.68	93.52
+73.84	94.66	---	---
+77.08	---	---	93.44
+78.00	---	93.61	---
+80.00	94.66	93.59	93.41
345+90.00	94.62	93.49	93.29
346+00.00	94.56	93.38	93.17
+10.00	94.47	93.25	93.05
+20.00	94.35	93.12	92.91
+30.00	94.20	92.97	92.76
+40.00	94.06	92.82	92.61
+41.63	---	---	92.59
+41.66	94.02	---	---



DETAIL B
Scale: ⅜"=1'-0"



SECTION A-A
Scale: ⅜"=1'-0"



SECTION A-A
Scale: ⅜"=1'-0"
(Intermediate Diaphragm near Pier 19 Unit 2 only)

Notes
For Framing Plan, see Sheet 21.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 2 Sheet S5&S6.
For Joint Details, see Sheet 38.
For Standard Handrail Details, see Sheet S3.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-29-68	2	As Built	TEM	8-7-74
CHECKED	A.H.H.	12-13-68	1	Bar Call-outs Added	PRM'S	4-19-74
IN CHARGE						

AS BUILT

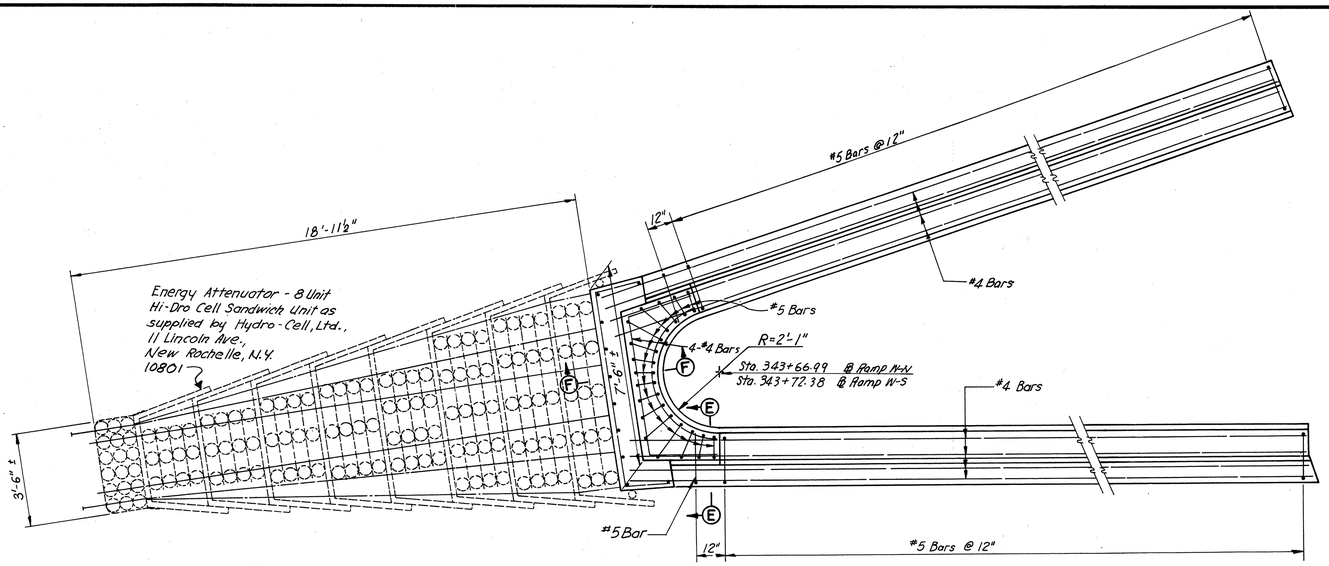
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST.-R.R. TRACKS AND 16TH ST.
DECK PLAN — UNIT 23

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

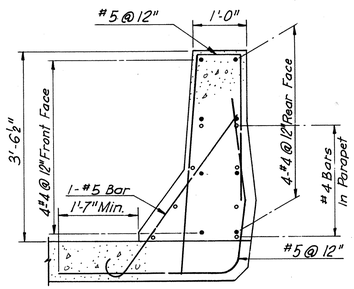
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 35 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	162	265

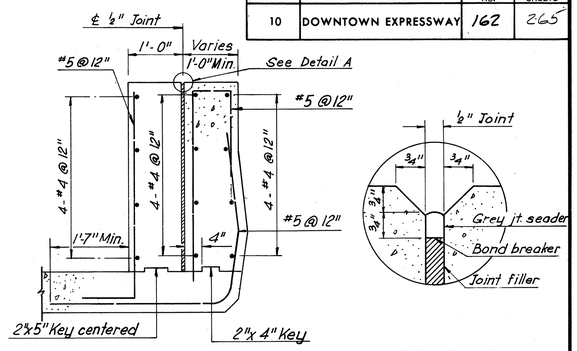


Note:
Reinforcing Steel in curb and parapet is shown.
For typical section thru. curb and parapet, see Section C-C Sheet 34.

CURB AND PARAPET REINFORCING STEEL DETAIL
Scale : ⅜" = 1'-0"

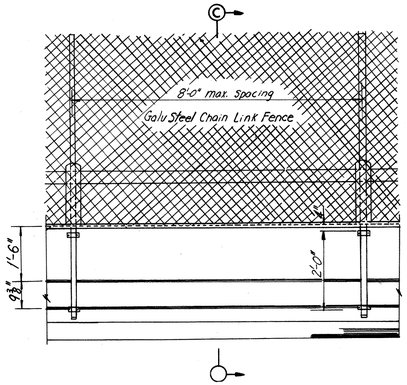


SECTION E-E
(Deck Steel Not Shown)
Scale : ¾" = 1'-0"

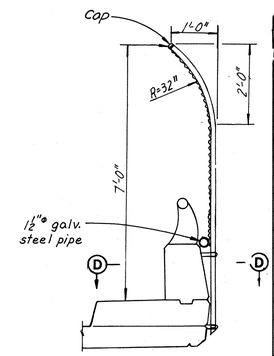


SECTION F-F
(Deck Steel Not Shown)
Scale : ¾" = 1'-0"

DETAIL A
Scale : Half Size



ELEVATION VIEW



SECTION C-C

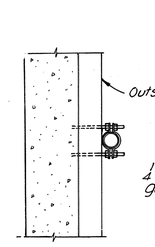
ELEVATION TABLE			
STATION ℄ Ramp 10th ℄	ELEV. D	ELEV. E	ELEV. F
17 + 90.00	76.88	77.20	77.26
+ 97.59	—	—	77.41
18 + 00.00	77.08	77.40	77.46
+ 10.00	77.28	77.60	77.66
+ 12.70	77.33	—	—
+ 20.00	77.48	77.79	77.85
+ 30.00	77.68	77.99	78.05
+ 40.00	77.87	78.18	78.24
+ 50.00	78.07	78.38	78.44
+ 59.82	—	—	78.63
+ 60.00	78.26	78.57	78.63
+ 61.50	—	78.60	—
+ 70.00	78.44	78.74	78.80
+ 70.04	78.44	—	—
+ 80.00	78.60	78.90	78.96
+ 90.00	78.75	79.05	79.11
19 + 00.00	78.88	79.18	79.24
+ 10.00	79.00	79.30	79.36
+ 20.00	79.11	79.40	79.46
+ 30.00	79.20	79.49	79.55
+ 30.20	—	—	79.55
+ 31.40	—	79.50	—
+ 37.22	79.25	—	—
+ 40.00	79.27	79.56	79.62
+ 50.00	79.33	79.62	79.68
+ 60.00	79.39	79.67	79.73
+ 70.00	79.44	79.72	79.78
+ 80.00	79.49	79.78	79.84
+ 87.63	79.53	79.82	79.88
+ 90.00	79.55	79.83	79.89
+ 94.30	79.58	79.85	79.91
20 + 00.00	—	79.88	79.94

Note:
See Sheet 28 for Location of Elevations above.

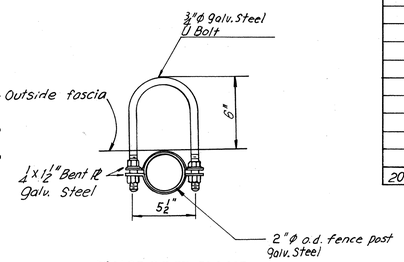
Note:
Reinforcing Steel in Slab is shown.

* Spacing measured along north curb of nose.

SLAB REINFORCING STEEL DETAIL
Scale : ⅜" = 1'-0"



SECTION D-D



FENCE POST CLAMP

FIRE SCREEN DETAILS
No Scale

Note:
For location of fence, see Sheet 32.
For location of nose, see Sheet 34.

	BY	DATE				
MADE	GSH/BTA	12-14-68				
CHECKED	JD	2-19-69	1	As Built	TEM.	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

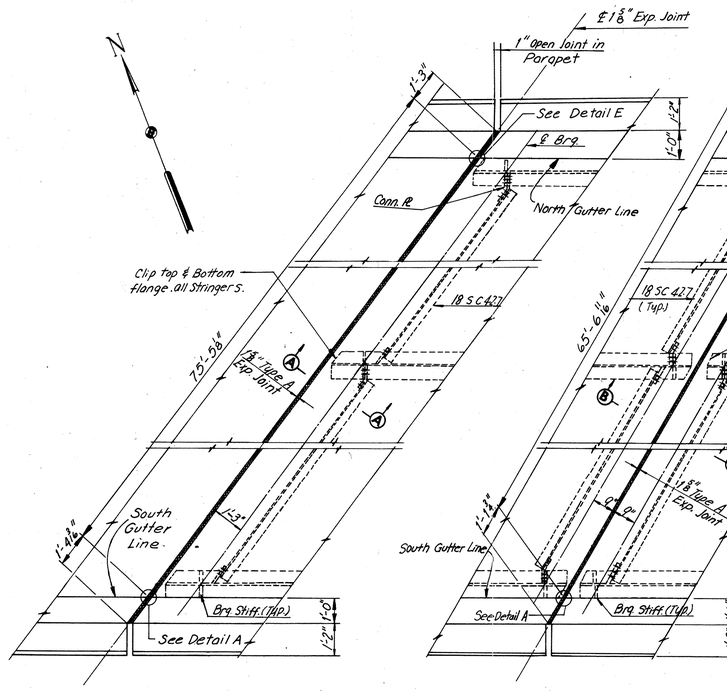
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
SUPERSTRUCTURE DETAILS

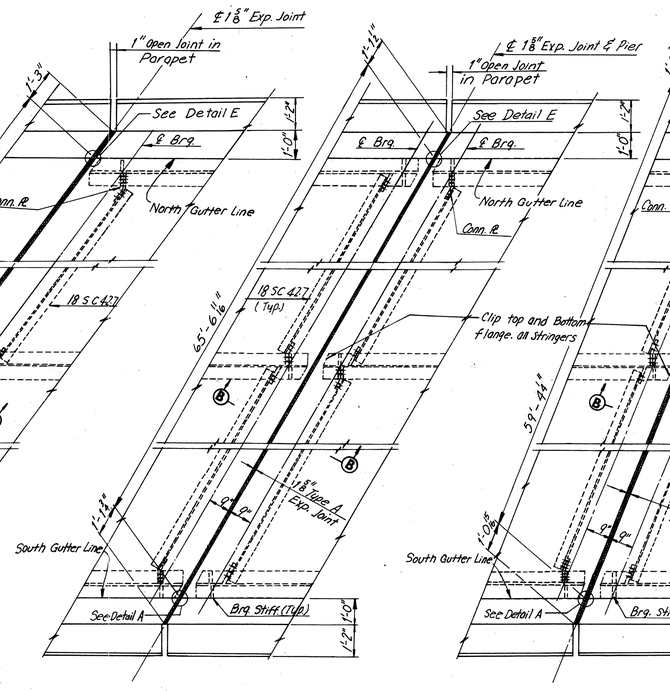
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 36 OF 46

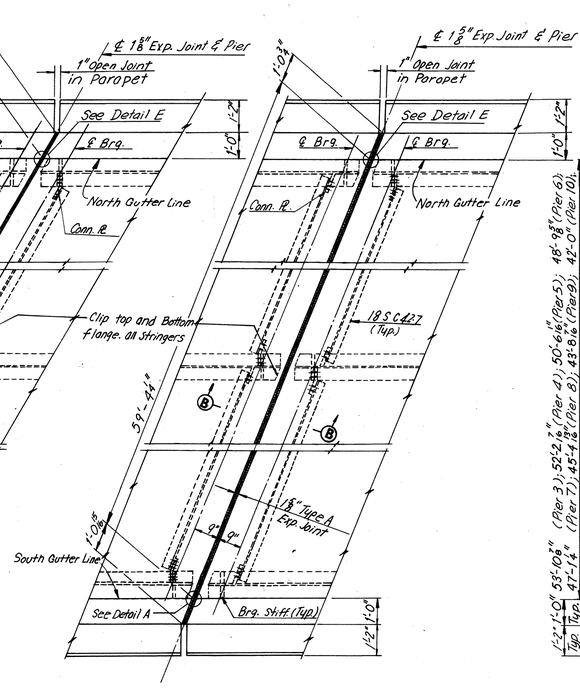
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	163	265



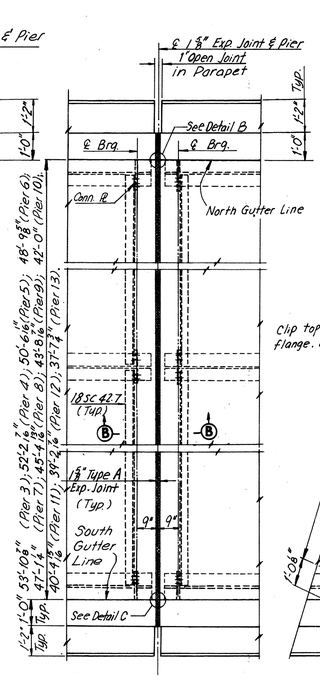
PLAN — JOINT AT WEST ABUTMENT
Scale : ⅜" = 1'-0"



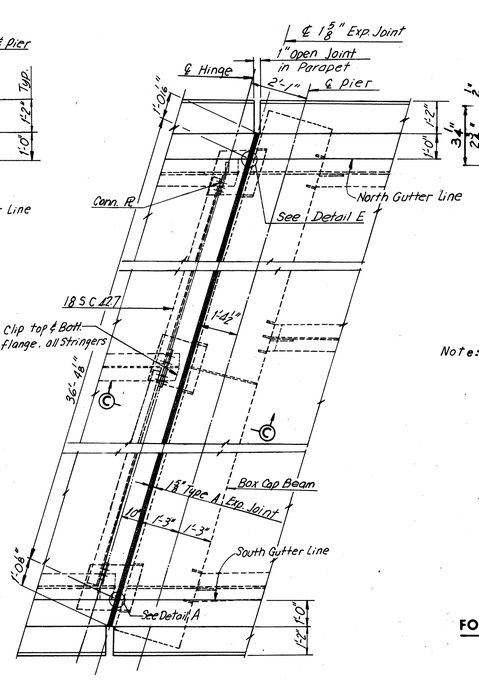
PLAN — JOINT AT PIER 1
Scale : ⅜" = 1'-0"



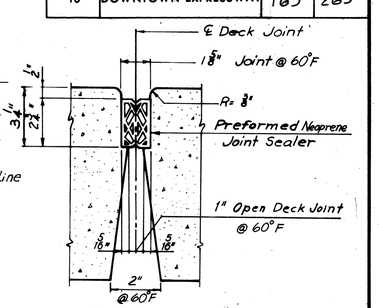
PLAN — JOINT AT PIER 2
Scale : ⅜" = 1'-0"



PLAN — JOINT AT PIERS 3 THRU. 13
Scale : ⅜" = 1'-0"

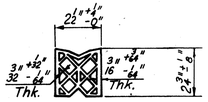


PLAN — JOINT AT PIER 14
Scale : ⅜" = 1'-0"



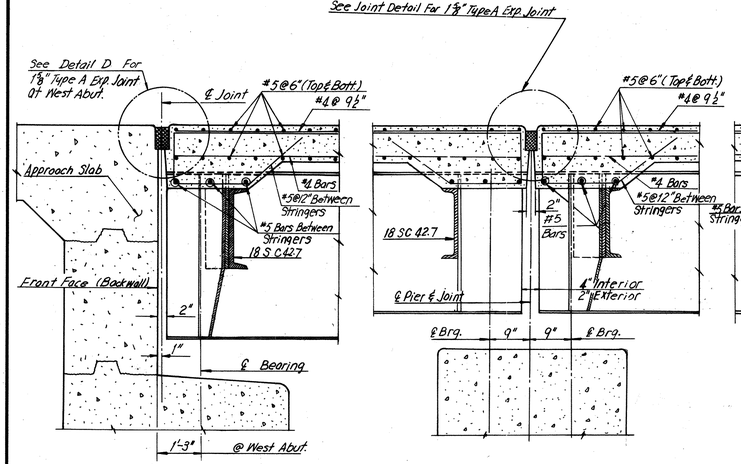
1⅝" TYPE "A" EXPANSION JOINT

Note: For Joint Detail @ Abutment see Detail D.



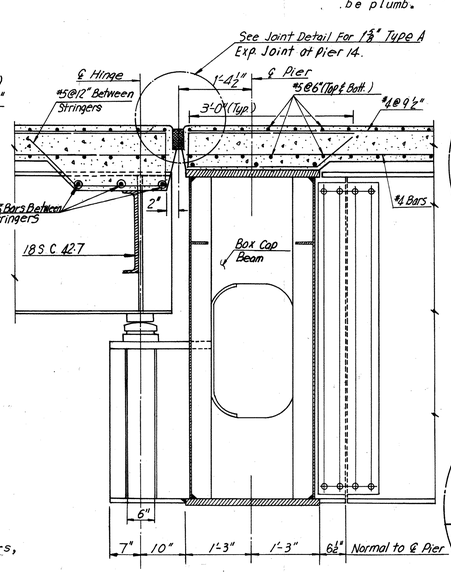
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" EXPANSION JOINT

Note: End of stringers and connection R's shall be plumb.

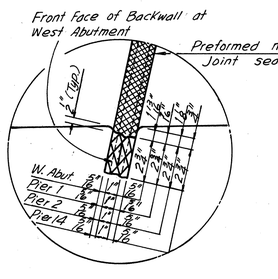


SECTION A-A
Scale : ¾" = 1'-0"

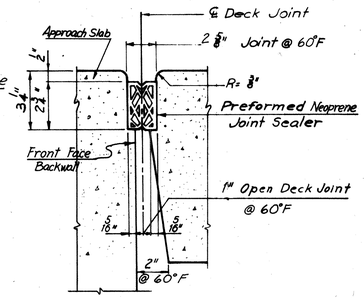
SECTION B-B
Scale : ¾" = 1'-0"



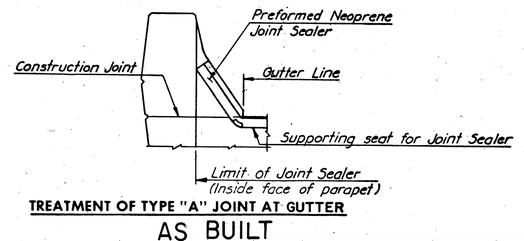
SECTION C-C
Scale : ¾" = 1'-0"



DETAIL A
No Scale

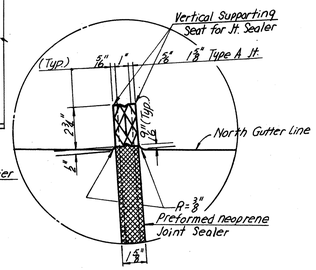


DETAIL D
No Scale

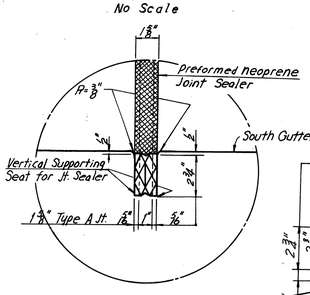


TREATMENT OF TYPE "A" JOINT AT GUTTER

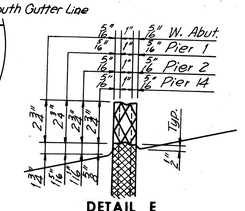
AS BUILT



DETAIL B
No Scale
Typical for Piers 3 thru. 13.



DETAIL C
No Scale
Typical for Piers 3 thru. 13



DETAIL E
No Scale

Note: All horizontal dimensions of Sections shown above are normal to ℄ joint and pier.

Note: For details of bearing stiffeners, see Deck Plan Sheets 28,29, & 30.

Note: It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-10-68				
CHECKED	C.E.B	2-5-69	1	As Built	TEM	8-76
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

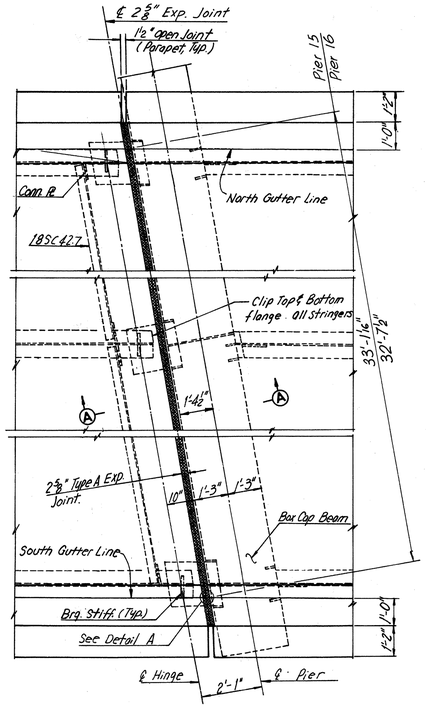
BRIDGE NO. 66
EASTBOUND ROADWAY O
12TH ST. - R.R. TRACKS AND 161

JOINT DETAILS

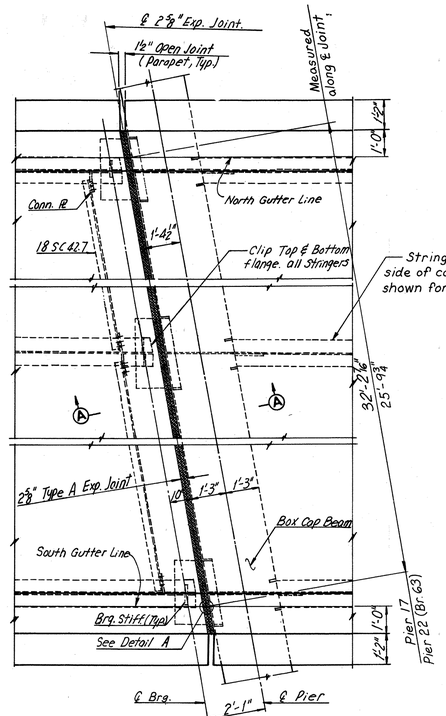
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 37 OF 46

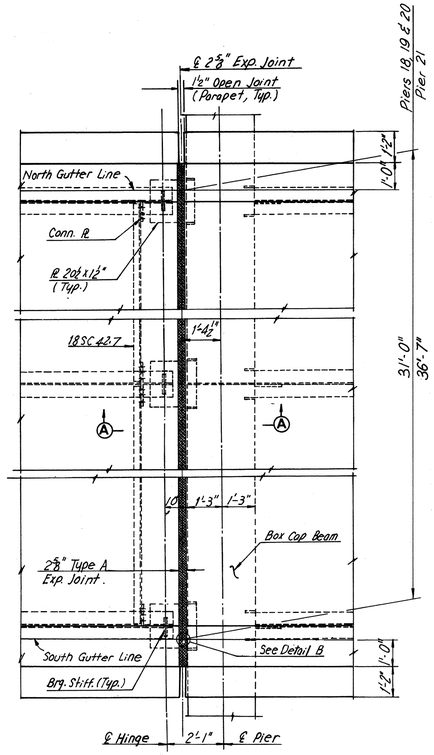
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	164	265



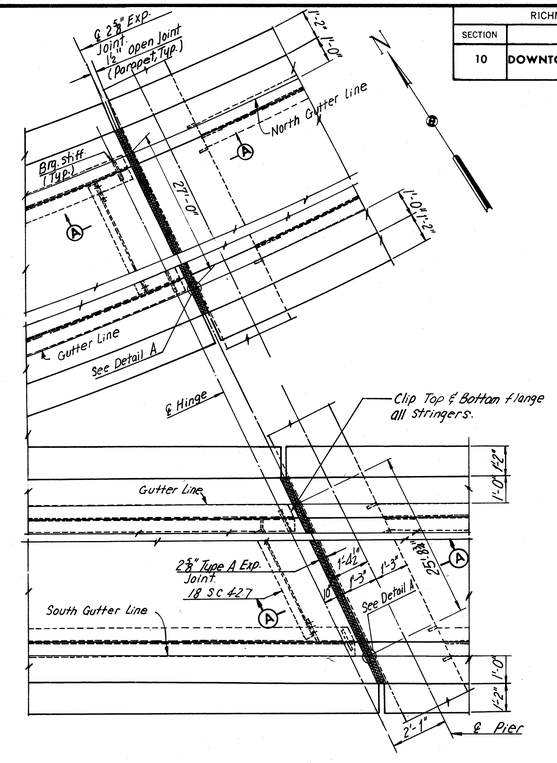
PLAN — JOINT AT PIERS 15 AND 16
Scale ⅜" = 1'-0"



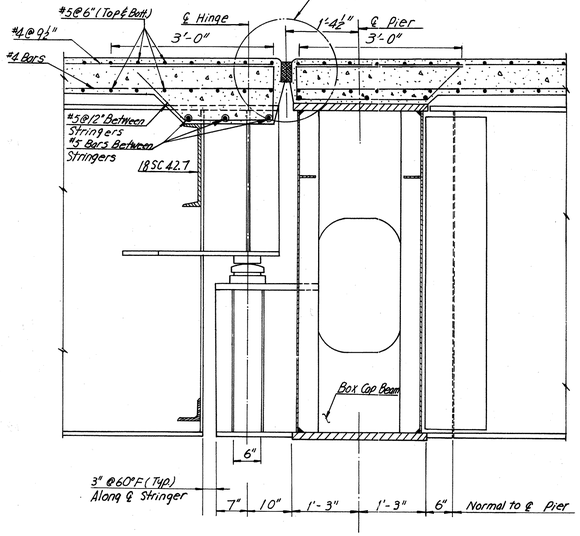
PLAN — JOINT AT PIER 17 AND PIER 22 (BR. 63)
Scale ⅜" = 1'-0"



PLAN — JOINT AT PIERS 18 19 ,20 AND 21 (BRIDGE 63)
Scale ⅜" = 1'-0"



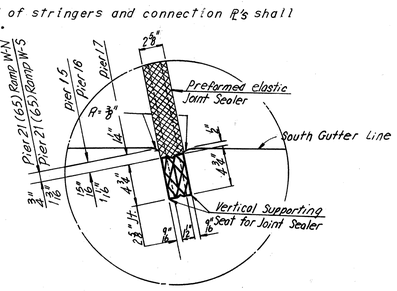
PLAN — JOINT AT PIER 22 (BRIDGE 63)
Scale ⅜" = 1'-0"



SECTION A-A
Scale ⅜" = 1'-0"

Note:
All horizontal dimensions of Section shown above are normal to ℄ joint and pier.

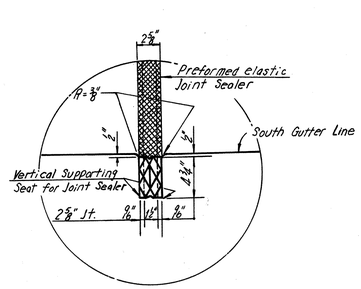
Note:
End of stringers and connection ℞'s shall be plumb.



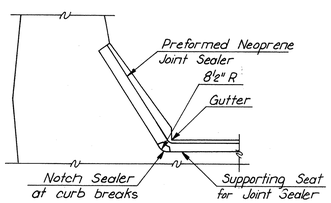
DETAIL A
No Scale
Typical for Piers 15 thru. 17 & Pier 21 (Br. 65)

Note:
For details of bearing stiffeners, see Framing Plan Sheets 17 thru 21.

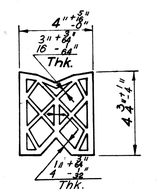
Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of ends of the slab and for the temperature at the time of construction.



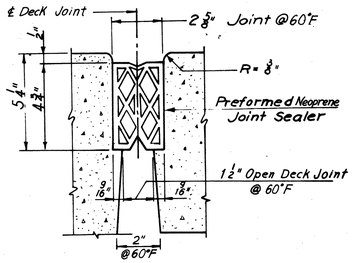
DETAIL B
No Scale
Typical for Piers 18 thru. 20 & Pier 21 (Br. 63.)



TREATMENT OF TYPE "A" JOINT AT CURB
No Scale



PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" EXPANSION JOINT
No Scale



2⅝" TYPE "A" EXPANSION JOINT
No Scale

Note:
All horizontal dimensions shown above are normal to ℄ Joint.

	BY	DATE				
MADE	G.S.H.	10-15-68				
CHECKED	C.E.B.	2-5-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

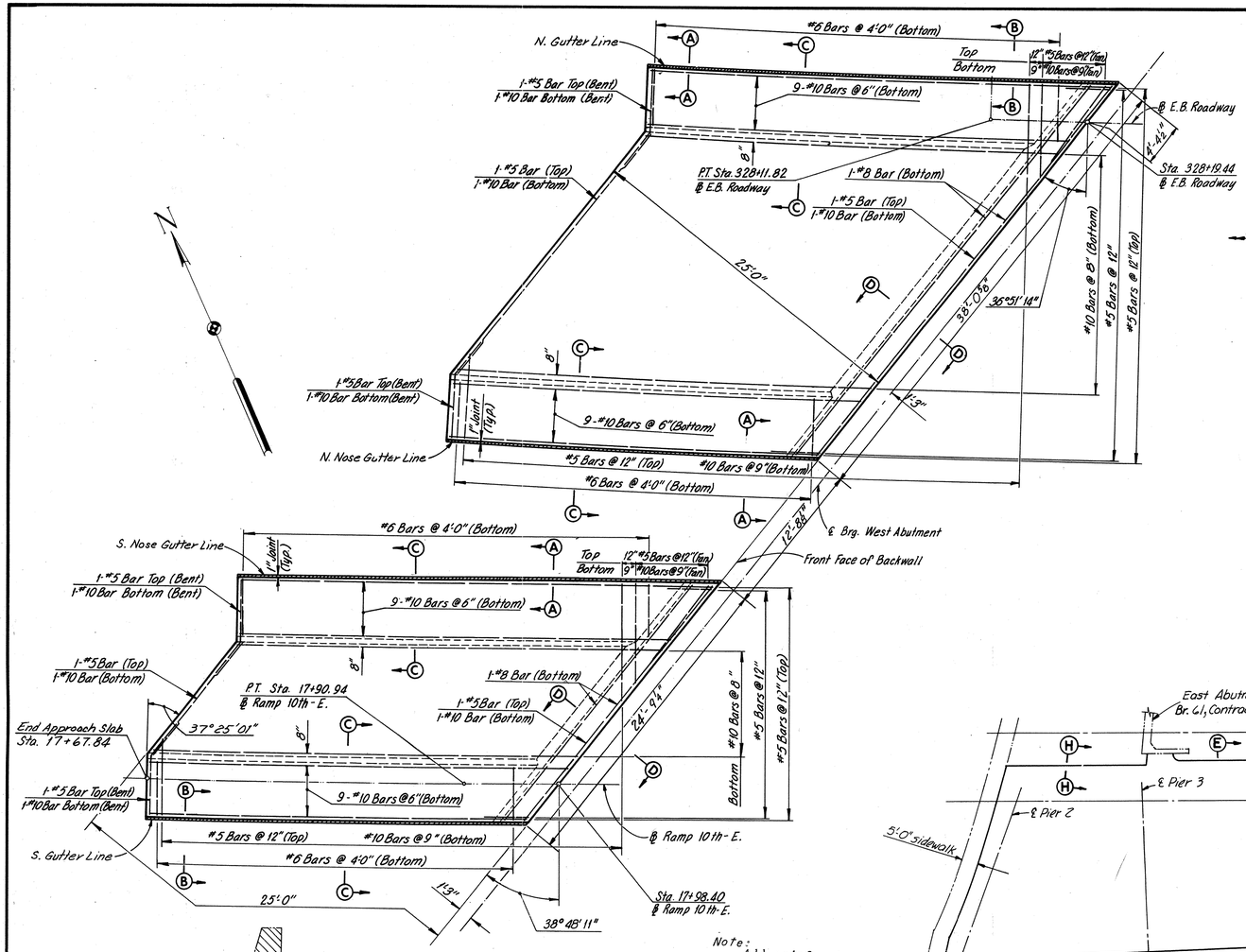
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
JOINT DETAILS

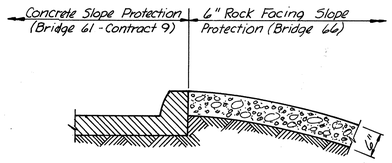
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 38 OF 46

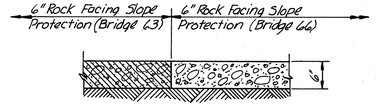
PROJECT NO.	RICHMOND EXPRESSWAY SYSTEM			
7095-127-101	SECTION	PROJECT	SHEET NO	TOTAL SHEETS
	10	DOWNTOWN EXPRESSWAY	165	265



WEST APPROACH SLAB - PLAN
Scale: 3/16" = 1'-0"

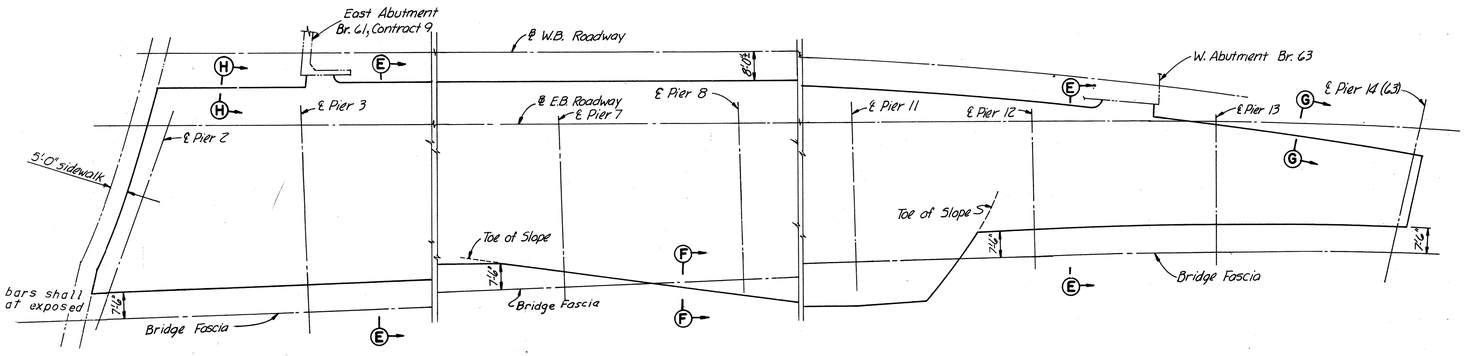


SECTION H-H
Scale: 3/4" = 1'-0"



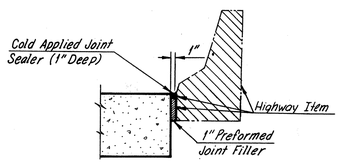
SECTION G-G
Scale: 3/4" = 1'-0"

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

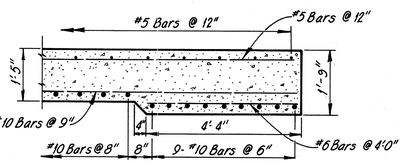


Note:
All reinforcing bars shall be minimum 2" clear at exposed face of concrete.

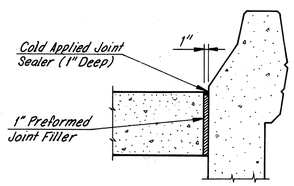
ROCK FACING SLOPE PROTECTION PLAN
Scale: 1" = 20'-0"



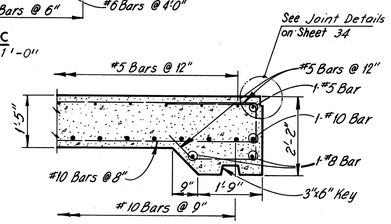
SECTION A-A
Scale: 1/2" = 1'-0"



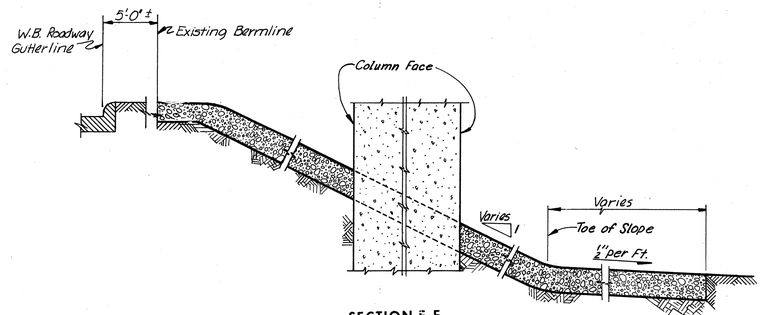
SECTION C-C
Scale: 1/2" = 1'-0"



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



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



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

	BY	DATE				
MADE	D.E.S.	7-2-68				
CHECKED	HJC	7-9-68	1	As Built	TEM	8-7-68
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

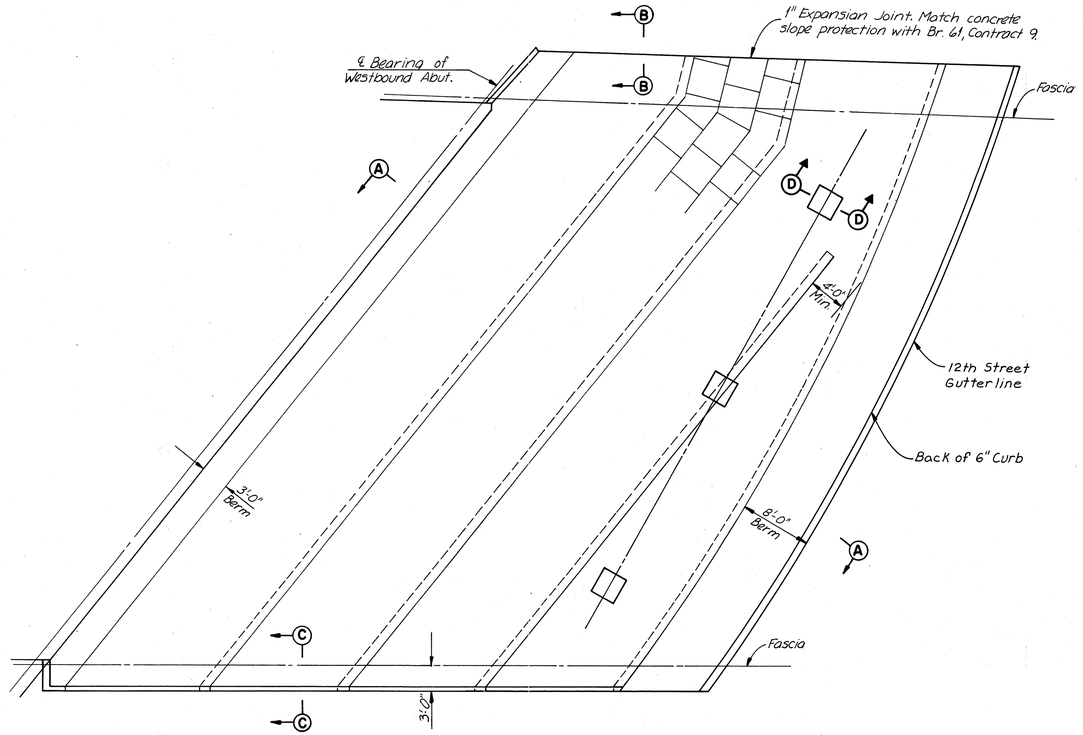
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
APPROACH SLAB AND ROCK FACING
SLOPE PROTECTION DETAILS

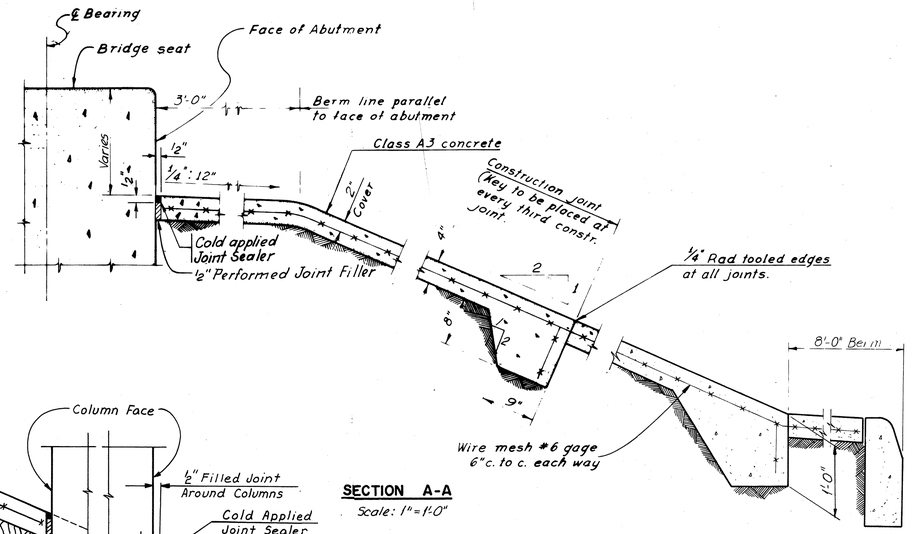
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 39 OF 46

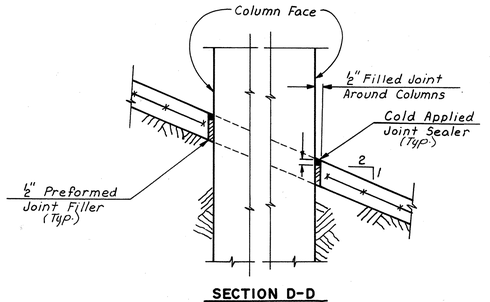
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	166	265



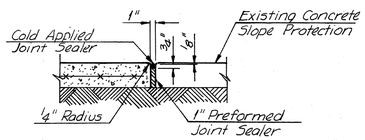
WEST ABUTMENT
Scale: 1/8"=1'-0"



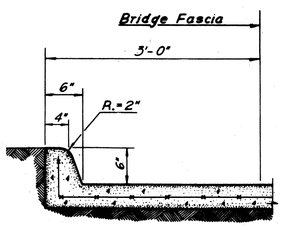
SECTION A-A
Scale: 1"=1'-0"



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



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



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

SLOPE PROTECTION NOTE

The item "Cast-in-place Concrete Slab Slope Protection" shall include the excavation of, or the placing and compaction of any embankment material necessary to bring the surface of the paved slopes to the finished elevations shown on the plans.

"Cast-in Place Concrete Slab Slope Protection" shall be paid for at the contract unit price per square yard, which price shall include the concrete slab including wire mesh and joint filler. The slab shall be constructed in 4'-0" x 4'-0" panels, placed in horizontal courses, alternate panels being poured in a staggered pattern with adjacent panels poured later. The slab shall be Class A3 Concrete of such consistency that it can be placed without the use of top forms. The surface shall be finished with a wood float.

Reinforcing shall consist of wire mesh No. 6 gage, 6" C.C. each way, placed at the center of the slab, and continuous through construction joints.

DESIGNED	D.E.S.	7-68				
DRAWN	J.P.F.	4-74				
CHECKED	L.P.H.	4-74	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
CONCRETE SLOPE PROTECTION DETAILS

SCALE As shown
CONTRACT 10
SHEET 40 OF 46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	167	265

BORING DS63-7

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
60.0'	7	7	S-1	0-2'	60.0	
	12	8	9			
	8					
	5					
55.0	7	2	2	S-2	4-6	
	11	2	2			Brown-Black C-f Sand, Some Cinders and Brick, Trace M-F Gravel Clayey Silt (FILL)
	13					
	14					
	16					
50.0	13	8	11	S-3	9-11	
	23	11	31			
	10					
	25				47.0	
	29					
45.0'	40	19	19	S-4	14-16	
	45	16	15			
	88					
	100					
	217					
40.0	76	19	12	S-5	19-21	Brown C-f Sand, Little C-f Gravel, Little Silt
	18	14	14			
	24					
	27					
	124					
35.0	40	69	24	S-6	24-26	
	65	31	27			
	70					
	150					
	301				31.0	
(0) 30.0	72				30.5	6" Boulder
	36					
	25					
	29					
	32					Gray Clayey Silt, Trace F Sand (MARL)
25.0	27	4	4	S-7	34-36	
	32	5	6			
	20					
	41					
	89				21.0	
20.0	76	21	16	S-8	39-41	
	47					
	35					Brown Decomposed Granite
	70					
	OPEN					
15.0	1Min			C-1	44.7-49.7'	(C-1: 11% Rec.)
	1Min					
	2Min					Dark Gray Weathered Granite (Diorite)
	2Min					
10.0	3Min			C-2	49.7-54.7'	(C-2: 60% Rec.)
	2Min					
	4Min					
	4Min					
	5Min					Dark Gray Hard Granite (Diorite)
05.0	4Min			C-3	54.7-59.7	(C-3: 71% Rec.)
	5Min					
	3Min					
	3Min					
	4Min					
0.0						Bottom of Hole Elev. 0.3'

BORING DS66-2

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
46.2	20		7	S-1	.5-2.5	46.2 .5 Asphalt
	13	6	7			
	12	7				
	12					
41.2	21	10	7	S-2	4'-6'	
	25	8	6			Brown C-f Sand, Some Cinders and Brick, Little Clayey Silt (FILL)
	17					
	10					
	8					
(0) 36.2	17	2	1	S-3	9'-11'	
	26	1	1			
	20	2	1	S-4	11'-13'	
	18	1	1			
	16	7	5	S-5	13'-14'	
31.2	70					
	50					
	44					
	35				28.2	
	OPEN	6	3	S-6	18'-20'	
26.2		3	4			
		P	P	7-11	20'-22'	Gray Clayey Silt Trace F Sand (MARL) Rec. 16"=62%
		P	P			
		P	P	8-11	22'-24'	
		P	P			
21.2		3	10	S-7	24'-26'	21.2
		15	25			Gray C-f Sand, Little Clayey Silt
						Bottom of Hole Elev. 20.2

BORING DS66-3

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
50.0	6	27	16	S-1	0-2	50.0
	12	14	12			
	12					
	15					Brown Clayey Silt, Some Cinders and Bricks, Little C-f Gravel, Trace Roots (FILL)
45.0	8	9	5	S-2	4-6	
	12	5	5			
	15					
	10					
	14				41.0	
41.0	4	7	6	S-3	9-11	
	8	4	5			Brown Clayey Silt, Little C-f Sand, Trace F Gravel
	7					
	6					
	6				37.0	
35.0	20	4	7	S-4	14-16	
	11	4	5			
	14					
	27					Gray Brown Clayey Silt, Trace M-f Sand
	14					
30.0	16	6	4	S-5	19-21	
	11	8	8			
(0)	14					
	16					
	16				26.0	
25.0	21	10	8	S-6	24-26	
	26	6	5			Gray Silt and Clay, Little C-f Sand (MARL)
	25					
	14					
	22				21.0	
20.0	21	12	12	S-7	29.0-30.5	
	20	11				Gray C-f Sand Some M-f Gravel, Little Silt and Clay
	40					
	OPEN					
					17.0	
15.0		100/		S-8	34-36	
						Decomposed Granite
					11.0	
11.0	5Min			C-1	39-44	(C-1: 50% Rec.)
	12Min					
	6Min					Gray Hard Granite
	5Min					(C-2: 100% Rec.)
	5Min					
5.0	6Min			C-2	44-49	
	6Min					
	8Min					
	5Min					
	6Min					
						Bottom of Hole Elevation 01.0'

BORING DS66-4

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
50.7	9	11	17	S-1	0'-2'	50.7
	11	11	13			
	13					
	15					
45.7	13	9	11	S-2	4'-6'	
	27	17	19			
	25					
	17					
	15					
40.7	13	13	15	S-3	9'-11'	
	35	17	21			Brown Clayey Silt, Little C-f Gravel, Trace C-f Sand, Cinders Asphalt and Bricks (FILL)
(0)	57					
	79					
	159					
35.7	13	100/3		S-4	14-14.3	
	13					
	35					
	85					
	89					
30.7	21	15	17	S-5	19-21	30.7
	35	21	26			
	51					
	59					
	47					
25.7	14	13	5	S-6	24-26	
	25	17	9			Brown Gray C-f Sand, Some C-f Gravel, Little Clayey Silt
	31					
	37					
	41					
20.7	24	2	3	S-7	29-31	
	25	21	17			
	33					
	107					
	74				17.2	
15.7	29	11	13	S-8	34-36	
	25	15	21			Gray Clay and Silt, Little M-f Sand (MARL)
	33				13.7	
	153					
	155					Gray Decomposed Granite
10.7	OPEN	26	47	S-9	39-40.4	
		100			9.7	
	4Min			C-1	41-45	(c-1: No Rec.)
	4Min					
	5Min					
5.7	5Min					
	5Min			C-2	45-46	(C-2: 75% Rec.)
	5Min			C-3	46-48	(C-3: 83% Rec.)
	4Min					Gray Hard Granite (Diorite)
	4Min			C-4	48-50	(C-4: 54% Rec.)
.7	5Min					
	4Min			C-5	50-55	(C-5: 97% Rec.)
	5Min					
	5Min					
	5Min					
-4.3	5Min					Bottom of Hole Elev. -4.3'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞" ϕ).
(c) Samples designated by a "C" number indicate 1⅛" ϕ(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 41 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	168	265

BORING DS66-5

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
50.4'						50.4'	
	28	22	21	S-1	0'-2'		.5 Asphalt
	83	26	60				
	51						Gray C-f Sand, Some Concrete
	21						Cinders and Brick Little C-f Gravel
45.4'	24	19	38	S-2	4'-6'		(FILL)
	25	25	24				
	24						
	30						
	19					41.4'	
40.4'	8	3	5	S-3	9'-11'		
	10	6	6				
	17						
	18						Gray C-f Sand, Some M-f Gravel
(0)	22						Little Silt
35.4	4	14	12	S-4	14'-16'		
	16	23	19				
	18	20	19	S-5	16-17.5'		
	19	10				32.4'	
	3						
30.4'	5	2	5	S-6	19'-21'		
	9	7	5				
	8						
	11						
	8						
25.4	24	12	16	S-7	24'-26'		Gray Silt, Some C-f Sand
	32	18	15				Little M-f Gravel
	26						
	27						
	19						
20.4'	21	5	6	S-8	29'-31'		
	28	7	9				
	37						
	149					17.4'	
	36						
15.4'	46	23	20	S-9	34'-36'		
	116	21	46				Gray Decomposed Granite
	OPEN						
	▼						
	2Min			C-1	38.7'-	10.7'	
10.4'	2Min				43.7'		(C-1: 70% Rec.)
	1Min						
	2Min						Dark Gray Hard Granite
	2Min						(Diorite)
							Bottom Of Hole Elev. 6.7'

BORING DS66-6

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
45'						45.0'	
	DRILLED						
	DRILLED						
	DRILLED						
	6						
40'	6	3	2	S-1	4'-6'		
	7	1	1				
	9						
	12						Tan-Gray C-f Sand, Some
	22						Silt, Little M-f Gravel
35'	56	7	10	S-2	9'-11'		
	71	17	19				
	124						
	94						
	12						
30'	105	69	100/3	S-3	14-14.8		
	124						
	46					28.0'	
	10						
	15						
(0) 25'	13	6	7	S-4	19'-21'		Gray Silt and Clay, Some
	14	8	8				M-f Sand
	14						
	20						
	16					21.0'	
20'	18	9	12	S-5	24-25.4		
	14	100					Gray C-f Sand, Some M-f
	OPEN						Gravel, Trace Decomposed
	▼						Granite
	12Min			C-1	28'-33'		(C-1: 32% Rec.)
15'	5Min					17.0'	
	5Min						
	38Min						
	7Min						Gray Hard Granite
	13Min			C-2	33'-38'		(C-2: 88% Rec.)
10'	13Min						
	13Min						
	9Min						
	8Min						
							Bottom Of Hole Elev. 7'

BORING DS66-7

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
59.5'						59.5'	
	10	10	10	S-1	0'-2'		.5' Gravel Fill
	12	12	12				
	16						
	20						
54.5'	35	7	7	S-2	4'-6'		
	35	7	9				
	33						
	33						Brown M-f Sand, Little Silt
	24						
49.5	18	3	4	S-3	9'-11'		
	29	4	5				
	27						
	30						
	45					43.5'	
44.5'	19	14	14	S-4	14'-16'		
	40	15	13				
	45						
	48						
	46						
39.5'	24	10	16	S-5	19'-21'		
	29	8	27				Brown C-f Sand, Some C-f Gravel,
	197						Trace Silt
	441						
	230						
34.5'	39	23	23	S-6	24'-26'		
	32	22	21				
	147						
	107						
	310					30.5'	
29.5	75	14	15	S-7	29'-31'		
	37	16	10				
	24						
	37						
)	50						Gray Clayey Silt, Trace F Sand
24.5'	38	3	3	S-8	34'-36'		(MARL)
	43	3	4				
	40						
	43						
	32					20.5	
19.5'	32	4	9	S-9	39.40.5		
	29	10					
	146						
	137/.5						Gray M-f Sand, Little Clayey
	OPEN						Silt, Trace C-f Gravel
14.5'	▼			S-10	44-44.5		
	2Min			C-1	46.4'-	13.1'	(C-1: 28% Rec.)
	2Min				51.4'		
	2Min						
9.5'	6Min						Gray Hard Granite
	3Min						
	6Min			C-2	51.4'-		(C-2: 79% Rec.)
	3Min				56.4'		
	4Min						
4.5'	4Min						
	6Min						Bottom Of Hole Elev. 3.1

BORING DS66-8

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
61.4'						61.4'	
	17	20	12	S-1	0'-2'		Gray C-f Gravel, Little Cinders,
	11	20	34				Trace Brick (FILL)
	12						
	10						
56.4'	9	7	5	S-2	4'-6'		
	14	4	7				
	26						Brown M-f Sand, Little Silt
	25						
	33						
51.4'	38	12	18	S-3	9'-11'		
	34	16	14				
	60						
	53						
	49					47.4'	
46.4'	15	9	14	S-4	14'-16'		
	7	20	38				
	21						
	86						
	63						
41.4'	17	14	14	S-5	19'-21'		
	28	16	15				
	33						
(1)	150						Brown C-f Sand Some C-f
	276						Gravel Trace Silt
36.4'	101	42	100	S-6	24'-26'		
	170						
	125						
	177						
	100						
31.4'	88	28	28	S-7	29-31'		
	50	28	29				
	82						
	67						
	50					27.4'	
26.4'	28	4	4	S-8	34-36'		
	54	4	5				
	59						
	52						Gray Clayey Silt, Trace
	41						F Sand (MARL)
21.4	61	7	11	S-9	39-41'		
	74	6	8				
	58						
	75					18.4	
	26						
16.4'	287	100		S-10	44.0'-		
	OPEN				44.4'		
							Gray Decomposed Granite
11.4'							
		50	80	S-11	51.0'-		
		100			52.2'		
6.4'							
	▼	100		S-12	56-56.4	4.5	
	3Min			C-1	56.9'-		(C-1: 57% Rec.)
	4Min				66.9'		
1.4'	4Min						
	12Min						Gray Hard Granite
	6Min						
	8Min			C-2	61.9'-		(C-2: 78% Rec.)
	7Min				66.9'		
-3.6'	12Min						
	6Min						
	8Min						
	14Min			C-3	66.9'-		(C-3:94% Rec.)
	12Min				71.9'		Gray Hard Granite
-8.6'	10Min						
	17Min						
	11Min						Bottom Of Hole Elevation -10.5'

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞"ø).
(c) Samples designated by a "C" number indicate Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 42 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	169	265

BORING DS63-1

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
51.7	6					51.7	
	7	10	10	S-1	1-3		
	12	11	12				
	62						
46.7	12	10	12	S-2	4-6		
	15	13	12				
	30						
	51						
	61						
41.7	42						
	12	16	24	S-3	10-12		
	32	24	20				
	41	21	24	S-4	12-13		
	46						
36.7	29	15	24	S-5	14-16		
	39	29	24				
	36						
	49						
	45						
31.7	30	17	28	S-6	19-21		
	46	25	24				
	88						
	118						
	102						
26.7	OPEN	36	34	S-7	24.0-25.5		
		33					
21.7		22	22	S-8	29.0-30.5		
		24					
16.7		44	100	S9	34.0-34.6	15.7	
	5Min			C-1	36.1-41.1		
	5Min						
	6Min						
11.7	9Min						
	8Min						
	7Min			C-2	41.1-46.1		
	7Min						
	7Min						
6.7	9Min						
	7Min						

Brown Black C-f Gravel, Some C-f Sand, Trace Cinders, Trace Brick, Trace Asphalt (FILL)

Brown Clayey Silt, Some C-f Sand, Little Decomposed Granite

Gray Clay and Silt, Some C-f Sand, Little Decomposed Granite

Brown Gray Decomposed Granite

(C-1: 25% Rec.)

Gray Hard Granite

(C-2: 67% Rec.)

Bottom of Hole, Elevation 5.6'

BORING DS63-2

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
51.2	9	15	9	S-1	0'-2'	51.2	
	11	8	15				
	21						
	40						
46.2	40	16	11	S-2	4'-6'		
	27	12	13				
	28						
	24						
	46						
41.2	27	20	15	S-3	9'-11'		
	9	12	15				
	12						
	18						
	25						
36.2	33	11	25	S-4	14'-16'	36.2	
	31	20	24				
	14						
	20						
	26					32.2	
31.2	32	15	13	S-5	19'-21'		
	30	6	10				
	28						
	16						
	17					28.2	
26.2	25	2	4	S-6	24'-26'		
	24	4	8				
	31						
	49						
	58					23.2	
21.2	OPEN	10	14	S-7	29-30.5		
		19					
						18.2	
16.2		100		S-8	34'34.2	15.8	
				C-1	35.6-35.8		
	6Min			C-2	35.8-40.8'		
	8Min						
	4Min						
11.2	8Min						
	4Min			C-3	40.8'-45.8'		
	8Min						
	11Min						
	16Min						
6.2	17Min						
	27Min			C-4	45.8'-50.8'		
	5Min						
	12 Min						
	17Min						
1.2	10Min						
	12Min			C-5	50.8'-55.8'		
	12Min						
	8Min						
	12Min						
-3.8	14Min						
	11Min						

Brown C-f Sand, Little Clayey Silt Trace f Gravel, Trace Brick (FILL)

Brown Clayey Silt, Little M-f Sand

Gray-Brown Clay and Silt, Little M-f Sand

Gray Clay and Silt, Little M-f Sand (MARL)

Green - Brown Clay and Silt, Little C-f Sand

Brown Decomposed Granite (C-1: No Rec.) (C-2: 45% Rec.)

(C-3: 40% Rec.)

Gray Hard Granite (C-4: 67% Rec.)

(C-5: 65% Rec.)

Bottom of Hole Elev. - 4.6'

BORING DS63-3

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
54.0*	5	12	10	S-1	0-2	54.0	
	8	2	8				.3' Asphalt
	8						
	9						Black Cinders, Some C-f Gravel, Some C-f Sand (FILL)
49.0	7	5	3	S-2	4-6		
	5	3	2				
	12						
	30						
	42					45.0	
44.0'	19	6	6	S-3	9-11		
	8	6	6				
	22						
	14						
	10						
39.0	17	5	5	S-4	14-16		Brown C-f Sand, Some C-f Gravel, Little Clay and Silt, Trace Cinders and Bricks
	9	6	12				
	16						
	10						
	12						
34.0*	10	2	2	S-5	19-21		
	10	2	2				
	11						
	11						
	10					30.0	
29.0	6	2	2	5.6	24-26		
	8	2	2				Brown, Clayey Silt, Some C-f Sand
	10						
	14						
	10					25.0	
24.0	9	2	2	S-7	29-31		Gray Clay and Silt, Some C-f Sand
	10	2	2			23.0	
	56						
	80						
	73						Gray Decomposed Granite
19.0	30	25	100	S-8	34.0-34.7		
	OPEN						
	2Min			C-1	38.5-43.5	15.3	
14.0	2Min						(C-1: 48% Rec.)
	4Min						
	14Min						
	4Min						
	3Min			C-2	43.5-48.5		(C-2: 56% Rec.)
09.0	3Min						
	6Min						Dark Gray Hard Granite (Diorite)
	9Min						
	8Min						
	6Min			C-3	48.5-53.5		(C-3: 46% Rec.)
04.0	6Min						
	8Min						
	9Min						
	10Min						
-1.0							

Bottom of Hole Elev. 0.5'

BORING DS63-4

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
51.3	2					51.3	
	8	7	12	S-1	1'-3'		
	21	28	31				
	18						
46.3	6	5	5	S-2	4'-6'		
	5	6	6				
	6						
	7						
	5						
41.3	5	4	4	S-3	9-11		
	6	4	7				Brown, Black, Red Cinders, Brick, Trace C-f Sand, Trace C-f Gravel, Trace Clayey Silt (FILL)
	7						
	7						
	8						
36.3	20	7	12	S-4	14-16		
	31	12	17				
	178						
	796						
	66						
31.3	12	5	7	S-5	19'-21'		
	12	9	11				
	11						
	9						
	12					27.3	
26.3	6	4	5	S-6	24'-26'		
	8	6	7				Brown Silt and Clay, Some C-f Sand Trace C-f Gravel
	9						
	12						
	24						
21.3	11	37	18	S-7	29'-31'	21.3	
	70	10	8				Brown C-f Sand, Trace M-f Gravel Trace Silt
	30						
	24						
	45					17.3	
16.3	22	3	6	S-8	34'-36'		Gray Silt and Clay Some M-f Sand Trace M-f Gravel (MARL)
	30	12	8			15.8	
	101						
	206						
	OPEN						Gray Decomposed Granite
11.3		9	40	S-9	39-40.4		
		100					
				C-1	43.5'-7.8	7.8	(C-1: 25% Rec.)
6.3	3Min				45.5'		
	4Min			C-2	45.5'-48.5'		(C-2: 80% Rec.)
	7Min						
	5Min						Dark Gray Hard Granite (Diorite)
	12Min			C-3	48.5'-53.5'		(C-3: 70% Rec.)
1.3	6Min						
	9Min						
	8Min						
	9Min						
-3.7	1Min						

Bottom of Hole Elev. -2.2'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ϕ)
(c) Samples designated by a "C" number indicate 1⅞" ϕ(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

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

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 43 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	170	265

BORING DS63-5

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
50.3	7	7	9	S-1	0-2	50.3'	.3' Asphalt
	9	13	11				
	11						Brown Red C-f Sand, Some Cinders, Bricks and Gravel (FILL)
	13					46.3'	
45.3	15	27	11	S-2	4-6		
	25	13	17				
	17						
	15						
	15						
40.3	11	5	9	S-3	9-11		
	19	11	13				
	157						
	47						Brown Red Clayey Silt Some C-f Sand Little C-f Gravel Cinders and Bricks (FILL)
	285						
35.3	11	25	21	S-4	14-16		
	26	17	15				
	22						
	17						
	13						
30.3	35	15	13	S-5	19-21		
	37	11	13				
	49						
	51						
	59					26.3'	
25.3	35	17	15	S-6	24-26		
	37	13	11				
	27						
	25						Brown f-f Sand, Some C-f Gravel, Trace Cinders and Bricks (FILL)
	21						
20.3	OPEN	17	21	S-7	29-31		
		25	27				
						16.3'	
15.3	▼	100		S-8	34-34.1	15.3	Decomposed Granite
	5Min			C-1	35-40		(C-1: 98% Rec.)
	5Min						
	4Min						Dark Gray Hard Granite
	4Min						
10.3	6Min						
							Bottom of Hole. Elevation 10.3'

BORING DS63-6

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
46.2	10	21	12	S-1	0'-2'	46.2	.5 Asphalt
	12	14	20				
	14						
	11						
41.2	10	10	6	S-2	4'-6'		
	11	6	5				
	35						Black Cinders, Some C-f Sand Little C-f Gravel, Little Silt (FILL)
	15						
	28						
36.2	14	5	3	S-3	9'-11'		
	14	3	5				
	36						
	28						
	27					32.2'	
31.2	14	8	9	S-4	14'-16'		
(1)	66	44	49				
	47						Gray C-f Sand, Some C-f Gravel, Little Silt
	63						
	23					27.2'	
26.2	55	5	5	S-5	19'-21'		
	16	6	8				
	OPEN						
	▼						Gray Clayey Silt, Some M-f Sand (MARL)
21.2		4	8	S-6	24-25.7		
		6	100				
	1Min			C-1	26.8-31.8'	19.4'	(C-1: 97% Rec.)
	1Min						
	1Min						
16.2	1Min						Dark Gray Hard Granite (Diorite) (C-2: 100% Rec.)
	1Min						
	1Min			C-2	31.8-36.8'		
	1Min						
	2Min						
11.2	2Min						
	1Min						Bottom of Hole Elev. 9.4'

BORING DX-9

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
52.0	4	6	4	S-1	0-2	52.0	
	7	4	6				
	4						
	6						
47.0	7	4	6	S-2	4-6		
	8	6	4				
	10						
	10						Black Brown CLAYEY SILT, and c-f Sand, little f Gravel, cinders, Brick (FILL)
	12						
42.0	7	4	7	S-3	9-11		
	10	7	10				
	10						
(0)	11						
	10						
37.0	DRILL	2	4	S-4	14-16		
	▼	1	2				
	12min			C-1	17.5-18.5	34.5	
						33.5	Gray GRANITE (C-1: 100% Rec)
32.0	10min			C-2	19-23		VOID Elev. 33.0 - 33.5
	10min						(C-2: 75% Rec)
	10min						Gray GRANITE
	10min					28.0	
	DRILL	4	5	S-5	23-25		
27.0		5	6				Brown Gray CLAYEY SILT, and c-f Sand, some f Gravel
						24.5	
22.0		2	2	S-6	29-31		Gray SILTY CLAY, trace f Sand (MARL)
		2	3				
						19.5	
17.0		6	16	S-7	34-36		
		19	27				Green Decomposed GRANITE
12.0	▼	100		S-8	39-39.1	11.0	
	12min			C-3	41-46		(C-1: 81% Rec)
	13min						Green Medium Hard GRANITE
	14min						
7.0	13min						
	14min						Bottom of Hole, Elev. 6.0'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅛" ϕ).
(c) Samples designated by a "C" number indicate 1⅜" ϕ (AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

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

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 44 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	171	265

BORING DX-5

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
60.2		10	10 6	S-1	0-2	60.2
		7	7 6			
		7				
		13				
55.2		12	5 5	S-2	4-6	
		20				Gray Black c-f SAND, some c-f Gravel, trace silt, Brick (FILL)
		19	5 5			
		18				
		19				
50.2		18	8 17	S-3	9-11	
		19	9 10			
		18				
		41				
		60				
(0) 45.2	OPEN	22	12	S-4	14-16	45.2
		13	8			
40.2		10	10	S-5	19-20.1	
		50				
						Brown Tan Gray CLAYEY SILT and c-f Sand, some c-f Gravel Cinders Brick (FILL)
35.2		50		S-6	24-24.1	
30.2		8	8	S-7	29-31	
		5	9			
						26.2
25.2		11	14	S-8	34-36	
		16	19			
20.2		11	14	S-9	39-41	
		18	37			Gray Green Decomposed GRANITE
15.2		20	24	S-10	44-46	
		30	49			
						(C-1: 88% Rec)
10.2	12min			C-1	49-54	11.2
	12min					Gray Pink Hard GRANITE
	12 min					
	12 min					
	12 min					

Bottom of Hole, Elev. 6.2

BORING DX-6

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
52.1		20	20 14	S-1	0-2	52.1
		18	20 18			
		11				
		14				
47.1		10	6 9	S-2	4-6	
		14	7 10			
		18				Black Brown SILT, some c-f Sand, some cinders, coal & Brick (FILL)
		18				
		20				
42.1		18	12 14	S-3	9-11	
		14	19 41			
		16				
		19				
		40				38.6
(1) 37.1		50	9 14	S-4	14-16	
		40	13 13			
		28				
		24				Brown SILTY CLAY, and c-f Sand, little f Gravel
		18				
32.1		20	26 18	S-5	19-21	
		21	14 11			
		80				
		31				29.1
		35				
27.1		22	2 2	S-6	24-26	
		20	2 3			
		15				Gray SILTY CLAY, trace f Sand (MARL)
		40				
		50				
22.1		28	2 6	S-7	29-31	
		30	19 17			
		39				
		60				12.5
		58				
17.1	OPEN	30	25	S-8	34-36	
		27	26			-
						Gray Green Brown Decomposed GRANITE
12.1		30	36	S-9	39-40.4	
		100				11.1
	10min			C-1	41-46	(C-1: 96% Rec)
	9min					Gray Pink Hard GRANITE
	8min					
7.1	8min					
	7min					

Bottom of Hole, Elev. 6.1'

BORING DX-7

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
57.9		17	17 6	S-1	0-2	57.9
		12	6 6			
		12				
		21				
52.9		10	6 6	S-2	4-6	
		14	12 7			
		10				
		7				
		10				Brown Black CLAYEY SILT and C-f Sand, little c-f Gravel, little Brick and Cinders (FILL)
47.9		6	2 3	S-3	9-11	
		5	3 3			
		7				
		12				
		18				
42.9		8	8 4	S-4	14-16	
		9	5 5			
		27				
		18				39.5
	3min			C-1	18.4-22.6	(C-1: 20% Rec)
37.9	3min					
	3 min					Gray GRANITE
	3 min					35.3
						34.9 VOID
	3 min			C-2	23-26	(C-2: 33% Rec)
32.9	3 min					Gray GRANITE
	3 min					
	OPEN					31.9
		4	4	S-5	27-29	
		4	4			
27.9		6	6	S-6	29-31	
		6	6			
						Gray Brown CLAYEY SILT, and c-f Sand, some c-f Gravel, trace Brick & Cinders (FILL)
22.9		1	1	S-7	34-36	
		1	4			
						20.9 (lost drill water, Elev. 20.9)
				C-3	37-39	(C-3: 68% Rec)
						18.9 Gray GRANITE
17.9		45	33	S-8		
						Brown Green Decomposed GRANITE
	8 min			C-4		14.9
12.9	5 min					(C-4: 40% Rec)
	5 min					
	5 min					
	6 min					Gray Hard GRANITE
	7 min			C-5		(C-5: 67% Rec)
7.9	12 min					

Bottom of Hole Elev. 7.9'

BORING DX-8

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
52.5		11	13 14	S-1	0-2	52.5
		13	13 13			
		14				
		15				
47.5		23	8 19	S-2	4-6	
		56	16 11			
		23				Black Brown c-f SAND, and Silt, some c-f Gravel, cinders, brick (FILL)
		19				
		22				
42.5		25	6 5	S-3	9-11	
		20	7 10			
		15				
		13				
		16				38.5
37.5		25	4 5	S-4	14-16	
		23	6 7			
		21				
		18				
		22				
32.5		18	3 3	S-5	19-21	
		15	3 3			Gray Tan SILT & CLAY and m-f Sand
		16				
		14				
		13				
(24) 27.5		11	3 4	S-6	24-26	
24)		12	4 3			
		10				
		9				24.5
		8				
22.5		19	1 1	S-7	29-31	
		19	2 3			Gray SILTY CLAY, trace f Sand
		19				
		57				
		57				
17.5		31	5 10	S-8	34-35.4	
		61	50 100			17.1
		OPEN				Green Decomposed GRANITE
12.5		25	45	S-9	39-40.3	12.2
	10min	100		C-1	40.3-45.3	(C-1: 86% Rec)
	10min					Gray Green Medium Hard GRANITE
	10min					
	9min					
7.5	11min					

Bottom of Hole, Elev. 7.2

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1 3/8" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3 3/8" ϕ)
(c) Samples designated by a "C" number indicate 1 3/16" ϕ (AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN · EXPRESSWAY

BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 45 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	172	265

BORING DX-10

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
44.0						44.0	
	14	28	29	S1	0-2		
	15	11	11				
	19						
	13						
39.0	11	3	3	S2	4-6		
(0)	32	3	4				
	37						Brown Gray CLAY & SILT some f Sand some cinders (FILL)
	15						
	23						
34.0	3	8	6	S3	9-11		TIMBER, Elev. 35.0
	36	48	9				
	12						
	46						
	29					30.5	
29.0	15	6	4	S4	14-16		
	18	4	3				
	20						
	24						Gray CLAY & SILT, some f Sand
	23						
24.0	33	2	2	S5	19-21		
	29	3	4				
	33						
	29						
	31					20.0	
19.0	69	9	43	S6	24-25.1		Gray Green Decomposed GRANITE
	110	100					
	125	6M		S1	26.8 31.2		Gray Brown GRANITE (C1:26% Rec)
	45	6M					
	40	6M					
14.0	40	6M					
	34	6M					
	OPEN	6	9	S7	31.5-33.3	12.5	
		35	41				
							Gray Decomposed GRANITE
9.0							
						7.1	
	7M			C2	36.9		
	8M				41.9		(C2:40% Rec)
	8M						Gray Hard GRANITE
4.0	7M						
	8M						
							Bottom of Hole, Elev. 2.1

BORING DX-11

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
44.8						44.8	
	14	20	18	S-1	0-2		
	18	30	36				Black ASPHALT, STONE, BRICK (FILL)
	20					41.8	
	10						
39.8	6	4	2	S-2	4-6		Black Brown CLAYEY SILT, some c-f Sand, little m-f Gravel cinders (FILL)
	6	2	3				
	7					37.0	
	11						
	7						
34.8	6	1	1	S-3	9-11		
(0)	8	1	3				Gray SILT & CLAY, trace c-f Sand
	8						
	8					30.8	
	14						
29.8	8	12	8	S-4	14-16		Gray c-f SAND, and c-f Gravel, some Clayey Silt (organic)
	8	8	14				
	12						
	12					27.3	
	14						
24.8	14	2	2	S-5	19-21		
	12	2	2				
	18						
	11						Gray Organic SILT and Clay some m-f Sand
	16						
19.8	OPEN	2	5	S-6	24-26		
	↓	4	3			18.8	
	12 min			C-1	26-31		(C-1: 26% Rec)
	9 min						
	10 min						Gray Hard GRANITE
14.8	7 min						
	12 min						
	15 min			C-2	31-33		(C-2: 62% Rec)
	15 min						
							Bottom of Hole, Elev. 11.8

BORING DX-12

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
51.8						51.8	
	14	51	24	S1	0-2		
	10	14	8				
	12						
	18						
46.8	14	6	8	S-2	4-6		
	18	8	9				
	20						Black Brown c-f SAND, some Brick, Cinders, little m-f Gravel, little Silt (FILL)
	21						
	20						
41.8	12	8	9	S-3	9-11		
	16	9	7				
	19						
	20						
	22						
36.8	14	8	6	S-4	14-16		
	18	12	8				
	20						
	18						
	51					32.8	
31.8	65						BOULDER
	19					30.8	
(24)	20	5	5	S5	21-23		
	14	12	9				
	16						
26.8	18	4	9	S6	24-26		
	16	6	6				Gray SILTY CLAY, some m-f Sand
	14						
	14						
21.8	OPEN	2	2	S7	29-31		
		3	3				
							(C-1: 0% Rec)
				C-1	33.5-37	18.3	Gray Decomposed GRANITE
16.8							
						14.8	
	10 M			C-2	37-42		(C-2: 50% Rec)
	10 M						
11.8	10 M						Gray Pink Hard GRANITE
	10 M						
	10 M						
							Bottom of Hole, Elev. 9.8

BORING DX-13

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
45.9						45.9	
	9	11	7	S-1	0-2		
	9	7	8				
	7						
	7						Brown Tan Gray CLAYEY SILT, and c-f Sand, some m-f Gravel, little Brick, Cinders (FILL)
40.9	6	3	4	S-2	4-6		
(0)	7	2	1				
	12						
	6						
	7					37.4	
35.9	6	3	1	S-3	9-11		
	7	1	1				
	7						Brown Gray c-f SAND, and Clayey Silt, trace f Gravel
	8						
	19						
30.9		100		S-4	14-14.6		
	8 min.			C-1	14.6	31.3	(C-1: 50% Rec)
	8 min				16.6		Pink Hard GRANITE
	OPEN					29.3	
25.9		1	2	S-5	19-21		
		2	2				
							Gray SILTY CLAY, trace f Sand
20.9							
20.9		2	2	S-6	24-26		
		2	2				
						16.9	
15.9		100		S-7	29-29.6		Gray Decomposed GRANITE
	7 min			C-2	30.9 -	15.0	
	8 min				35.9		Gray Green Medium Hard GRANITE
	9 min						
	7 min						
10.9	7 min						
							Bottom of Hole, Elev. 10.0

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅞" ø).
(c) Samples designated by a "C" number indicate 1⅝" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse		trace	1-10%
m-medium		little	10-20%
f-fine		some	20-35%
		and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

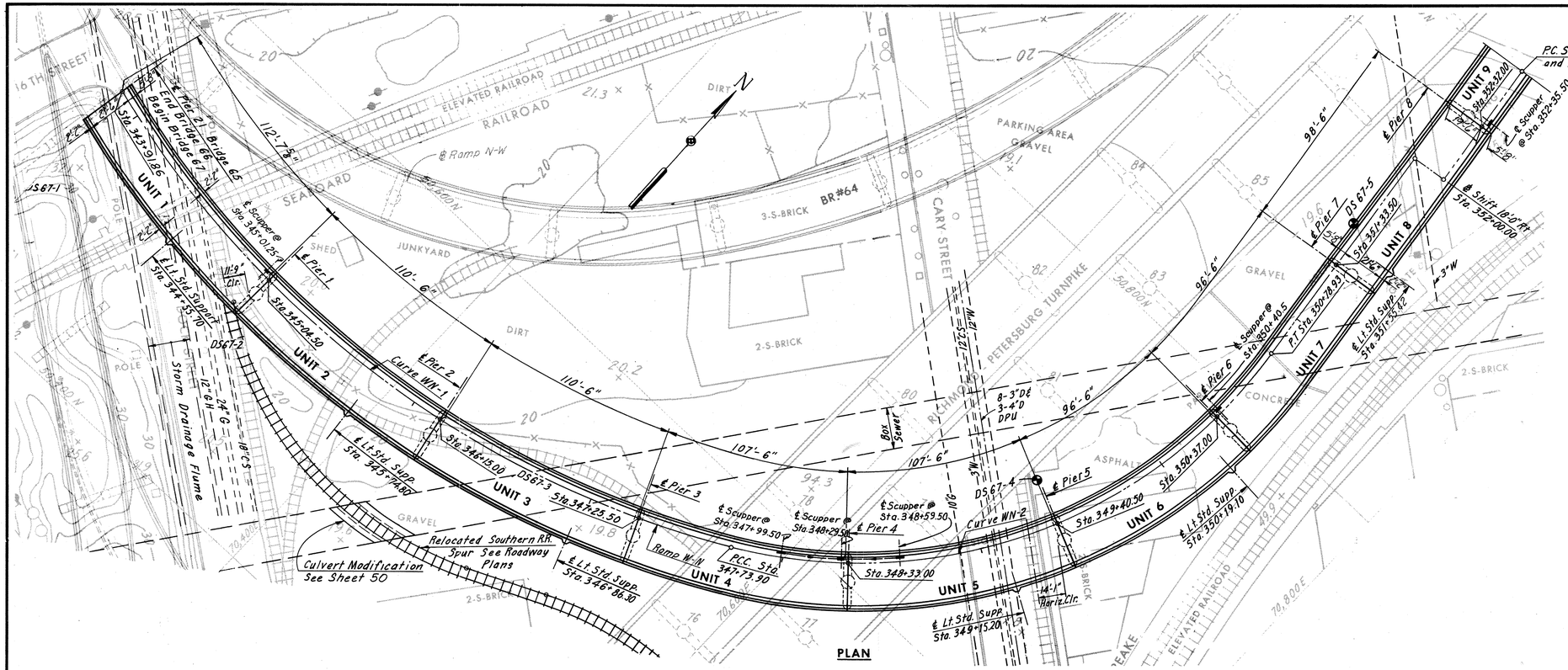
BORING LOGS

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

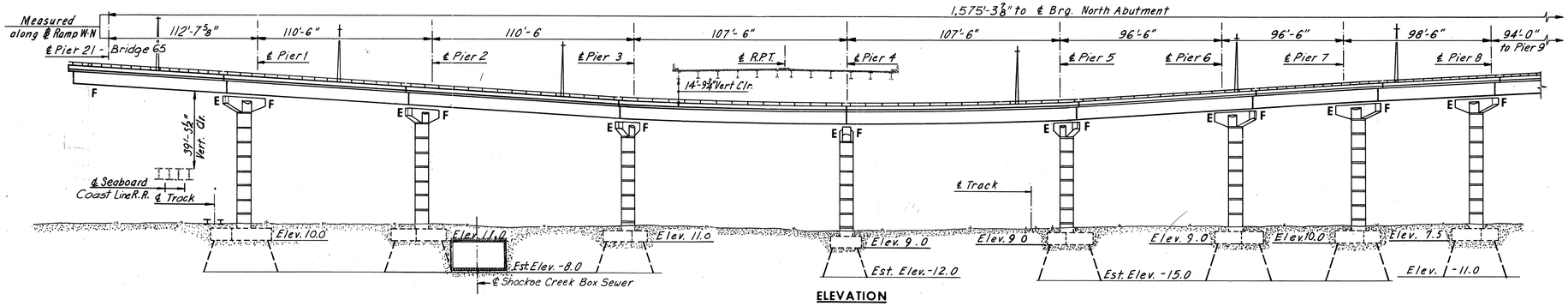
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 46 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	173	265



PLAN



ELEVATION

CURVE DATA

℄ R.P.T.

Curve: R.P.T.-1
P.I. = Sta. 1704+68.83
Δ = 15°03'56"
D = 1°00'
T = 757.65'
L = 1,506.56'
R = 5,729.58

Curve: R.P.T.-2
P.I. = Sta. 1723+07.01
Δ = 33°27'07"
D = 4°00'
T = 430.45'
L = 836.30'
R = 1,432.39'

℄ Ramp W-N

Curve: WN-1
P.I. = Sta. 345+25.47
Δ = 64°53'49"
D = 11°27'33"
T = 317.90'
L = 566.33'
R = 500.00

Curve: WN-2
P.I. = Sta. 349+47.64
Δ = 68°32'15"
D = 22°28'08"
T = 173.75'
L = 305.03'
R = 255.00'

Curve: WN-3
P.I. = Sta. 353+19.15
Δ = 6°23'54"
D = 6°00'
T = 53.38'
L = 106.64'
R = 954.93'

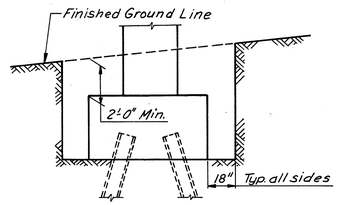
Curve: WN-4
P.I. = Sta. 355+39.85
Δ = 5°01'11"
D = 1°30'
T = 167.43'
L = 334.65'
R = 3,819.72'

Curve: WN-5
P.I. = Sta. 358+17.39
Δ = 13°10'51"
D = 6°00'
T = 110.33'
L = 219.68'
R = 954.93'

Curve: WN-6
P.I. = Sta. 361+67.68
Δ = 19° 35' 06"
D = 4° 09' 03"
T = 238.25'
L = 471.85'
R = 1,380.39'

℄ Ramp N-W

Curve: NW-1
P.I. = Sta. 13+42.50
Δ = 32° 01' 34"
D = 3° 51' 36"
T = 426.01'
L = 829.72'
R = 1,484.39



LIMITS OF STRUCTURE EXCAVATION
No Scale

INDEX

GENERAL PLAN AND ELEVATION 1
GENERAL PLAN AND ELEVATION 2
LAYOUT 3
LAYOUT 4
PIERS 1 AND 2 5
PIER 3 6
PIERS 4 AND 5 7
PIER 6 8
PIER 7 9
PIERS 8 AND 9 10
PIER 10E 11
PIERS 11 AND 12E 12
PIER 13E 13
PIERS 10W AND 12W 14
PIERS 13W AND 14 15
NORTH ABUTMENT 16
NORTH ABUTMENT DETAILS 17
NORTH ABUTMENT RETAINING WALL MODIFICATION 18
FRAMING PLAN - UNITS 1 AND 2 19
FRAMING PLAN - UNITS 3 AND 4 20
FRAMING PLAN - UNITS 5 AND 6 21
FRAMING PLAN - UNITS 7 AND 8 22
FRAMING PLAN - UNIT 9 AND FRAMING DETAILS 23
FRAMING PLAN - UNIT 10 24
GIRDER ELEVATIONS - UNIT 10 25
FRAMING PLAN - UNITS 11, 12, 13, 14 AND 15 26
FRAMING PLAN - UNITS 11, 12, 13, 14 AND 15 27
FLOORBEAM 16 AND STEEL COLUMNS 28
DECK PLAN - UNITS 1 AND 2 29
DECK PLAN - UNITS 3 AND 4 30
DECK PLAN - UNITS 5 AND 6 31
DECK PLAN - UNITS 7 AND 8 32
DECK PLAN - UNIT 9 - AND SUPERSTRUCTURE DETAILS 33
DECK PLAN - UNIT 10 34
DECK PLAN - UNITS 11, 12, 13, 14 AND 15 35
STRESS SHEET TRUSS SPAN 36
TOP LATERAL SYSTEM 37
BOTTOM LATERAL SYSTEM 38
TRUSS DETAILS P.P. 0 TO P.P. 6 39
TRUSS DETAILS P.P. 7 TO P.P. 10 40
TRUSS DETAILS P.P. 11 TO P.P. 12 41
FLOORBEAM 0 AND JOINT DETAILS 42
INTERMEDIATE FLOOR BEAMS 43
MISCELLANEOUS DETAILS 44
FLOORBEAM 12 AND JOINT DETAILS 45
DECK PLAN - TRUSS SPAN 46
SHOE DETAILS AND DECK ELEVATIONS 47
JOINT DETAILS . . . . . 48 THRU 49
SLOPE PROTECTION DETAILS 50
BORING LOGS . . . . . 51 THRU 54
STANDARD DETAILS . . . . . S1 THRU S7

Note:
For General Notes, see Sheet 4.
For Quantity Table, see Sheet 3

	BY	DATE
MADE	AMH	3-5-69
CHECKED	KCT	5-12-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Light Sta. Location Unit 8	JLK	6-6-75
1	Sheets 42 & 45 added	LBP	3-5-75

AS BUILT

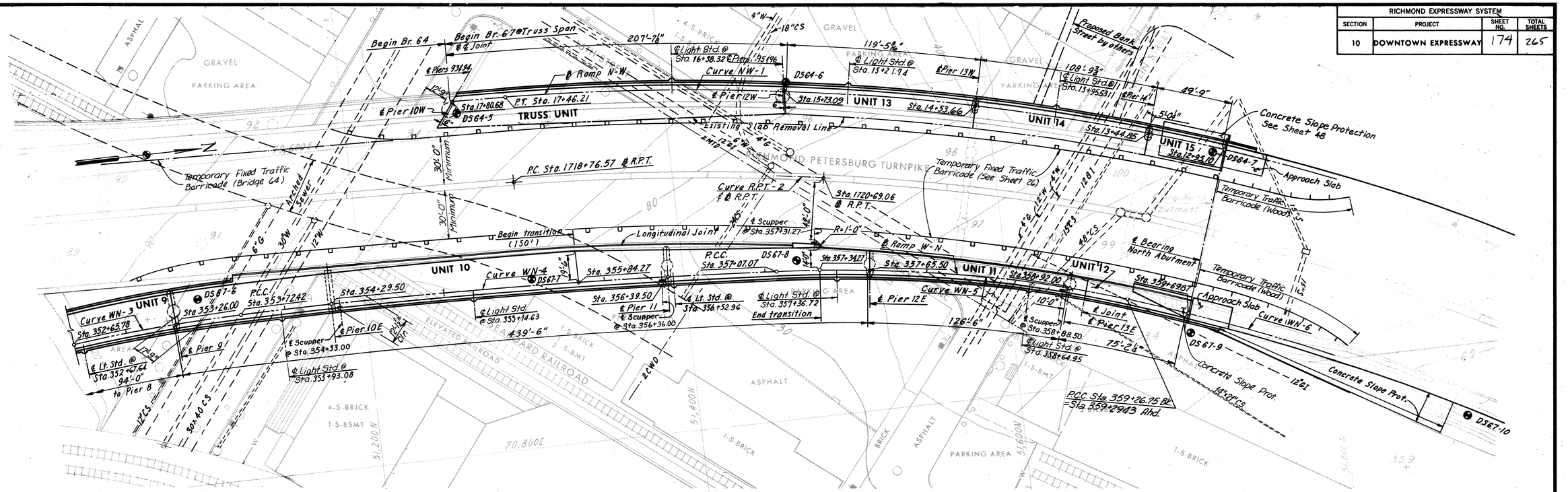
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

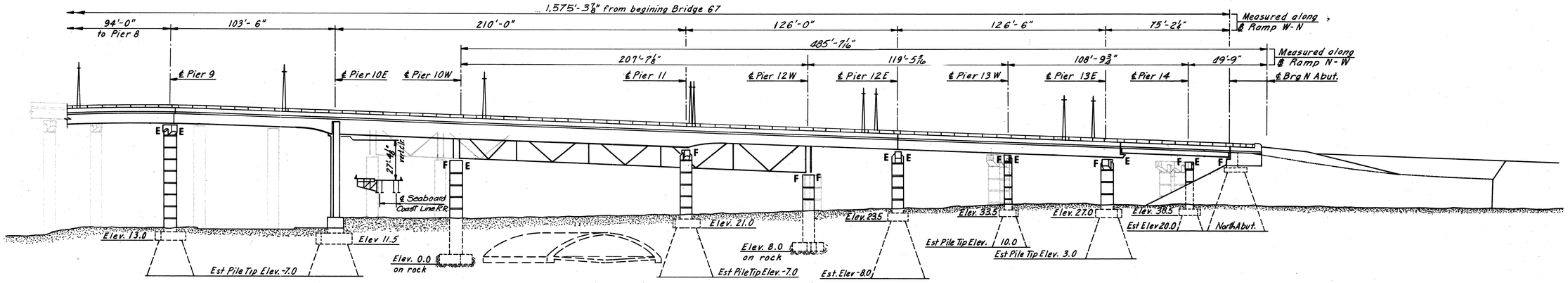
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 30'-0"
CONTRACT NO.: 10
SHEET NO. 1 OF 54

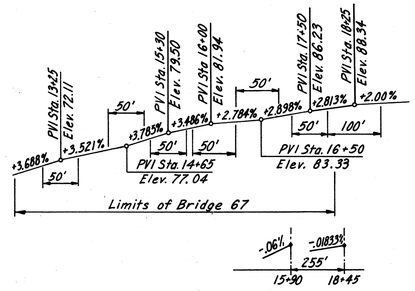
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	174	265



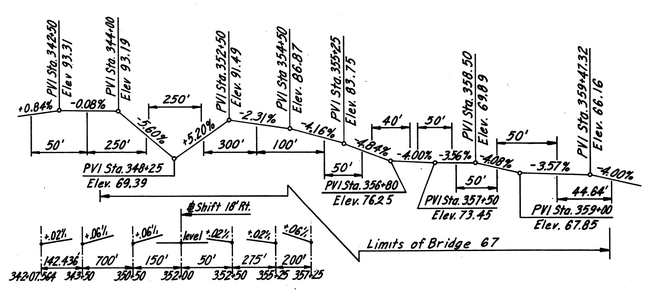
PLAN
Scale: 1"=30'-0"



ELEVATION
Scale: 1"= 30'-0"



PROFILE GRADE CROSS SLOPE - RAMP N-W



PROFILE GRADE AND CROSS SLOPE - RAM W-N

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	12-30-68	2	As Built	TEM	6-77
CHECKED	KCT	5-12-69	⚠	Revised Piers 6 Abut. Sta. & Span Length	DMB	1-24-75
IN CHARGE						

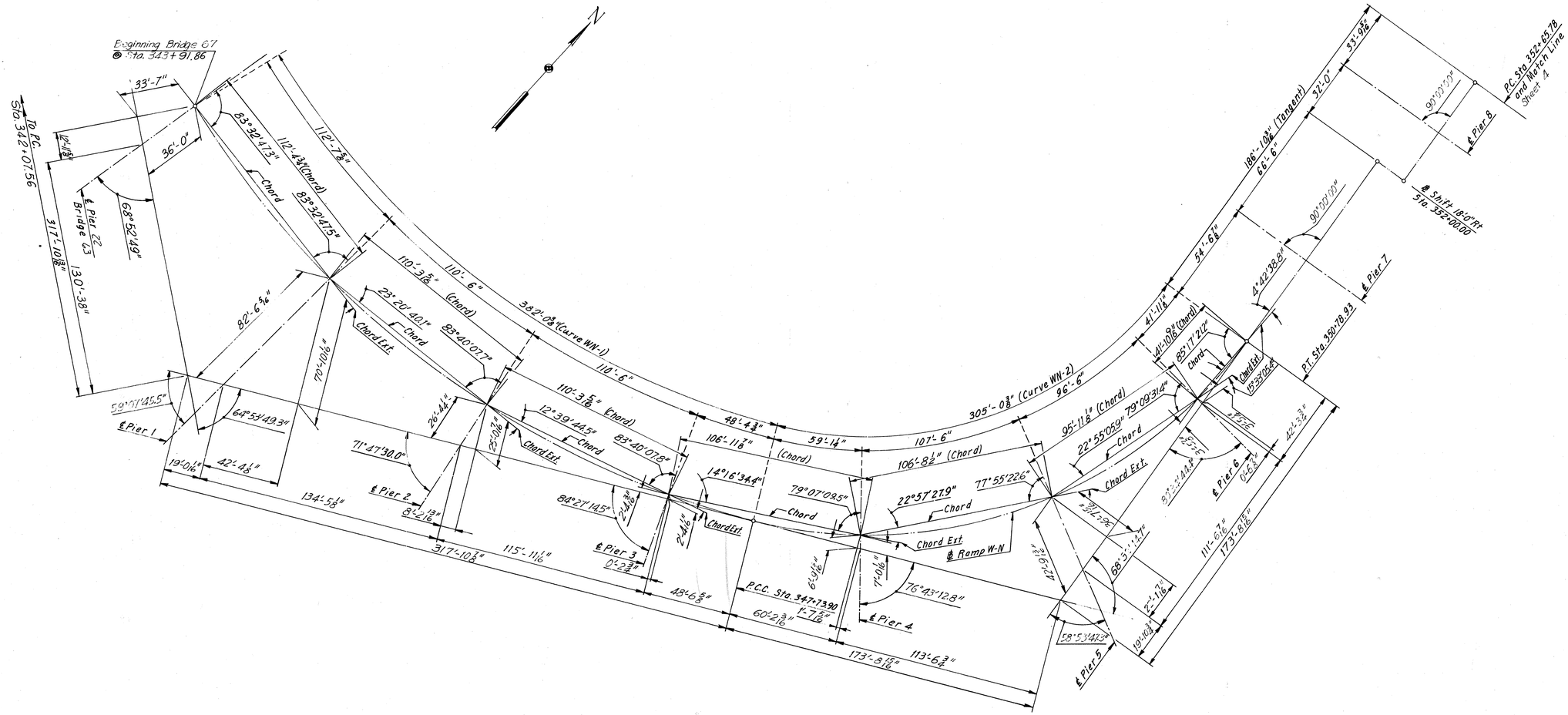
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 2 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	175	265



LAYOUT SKETCH
Scale: 1"=30'-0"

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Stregth Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Underdrain 6" Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin.Ft.	Steel Piles 12BP53 Lin.Ft.
Superstructure	---	1,729.0	394,000	1,852,700	550,750	2,930	---	---	---	---
Substructure	2,821	2,456.0	376,600	125,200	1,850	---	14	27	630	5,745
Total	2,821	4,185.0 ‡	770,600	1,977,900	552,600	2,930	14	27	630	5,745

	Steel Piles 14BP73 Lin. Ft	Asphalt Damp proofing Sq. Yds.	Approach Slab Concrete(‡) Cu. Yds.	Approach Slab Reinforcing Steel Lbs.	Metal Conduit 3" Dia. Lin. Ft.	Sheet Piling Lump Sum	Bridge Drainage Metal Work Lbs.	Concr. Slab Slope Prot. Sq. Yds.	Modifications to existing Shockoe Creek Box Sewer Lump Sum	Modifications to R.P. Turnpike Bridge Lump Sum	Elastomeric Expansion Dam Type 250 Lin. Ft.	Elastomeric Expansion Dam Type 400A Lin. Ft.
Superstructure	---	---	---		2,030	--	14,020	---	---	1	18	25
Substructure	760	27	38.0	7900	--	1	---	291	1	-	--	--
Total	760	27	38.0 ‡	7900	2,030	1	14,020	291	1	1	18	25

‡ All Concrete for Superstructure shall be Class A4 and for Substructure Class A3.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	3-28-69				
CHECKED	KCT	5-5-69	1	As Built	TEM	6-77
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

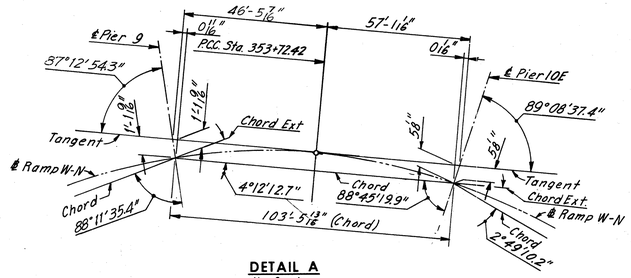
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

LAYOUT

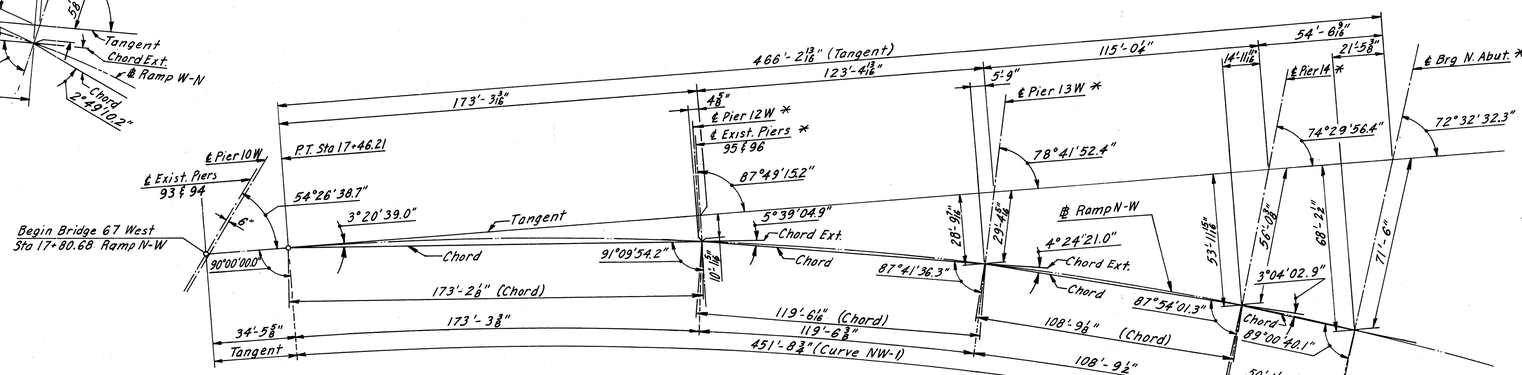
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

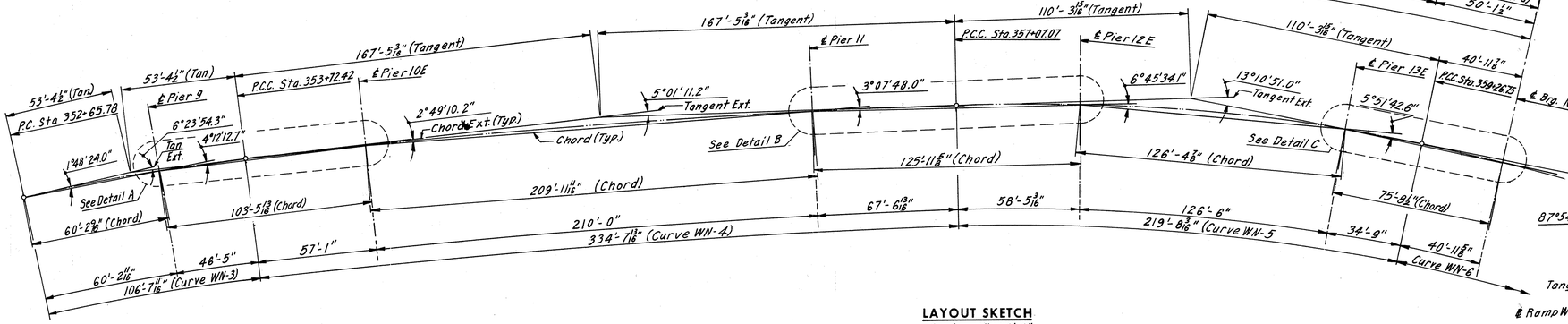
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 3 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	176	265

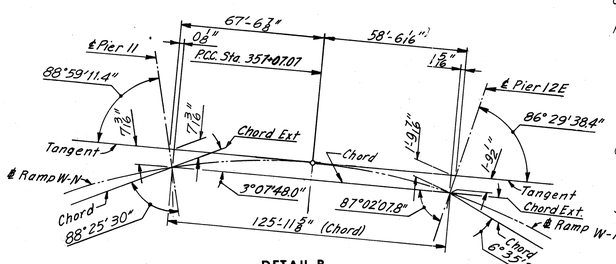


DETAIL A
No Scale





LAYOUT SKETCH
Scale : 1"= 30'-0"



DETAIL B
No Scale

DETAIL C
No Scale

*Note:
The centerline shown is for layout only. See abutment and pier drawings for exact locations of columns.

GENERAL NOTES:

ROADWAY: One variable width roadway connecting Br.66 (E.B. Roadway) with Richmond-Petersburg Turnpike.

Face to face of railing is 27'-0" thru the Ramp section, transitioning to 13'-0" wideni ng along Northbound Lanes of the R.P.T.
Also included is 13'-0" widening of Southbound Lanes of the R.P.T. from North Abutment to Pier 94.

CAPACITY: Dead load includes 15 lbs. per sq. ft. for future wearing surface. Live load. HS 20-44 loading and alternate military loading.

SPECIFICATIONS:

GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
WELDING: 1972 Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society.

CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete.

DATUM: City of Richmond

TEMPERATURE: The normal temperature referred to in the plans is 60° F. The temperature range for movement is 0° F. to 120° F.

DIMENSIONS: All dimensions are measured horizontally and vertically unless otherwise noted.

EXCAVATION: Excavation below subgrade and cut slope template shall be classified as Structure Excavation. All excavation above these limits shall be classified as Regular Excavation and is not included in the Structural Quantities.

FOUNDATIONS: Footings shall rest on firm material. Foundation material shall be dry and special attention is called to Section 401.05 of Standard Specifications and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face to concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted. All reinforcing steel shall conform to ASTM 615 Grade 40

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572 - Grade 50 and A588 as noted. See Special Provisions.
All field connections shall be made with high strength bolts. High strength bolts shall be ⅞" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

AS BUILT

	BY	DATE	⚠	Note Added	BY	DATE
MADE	AMH	3-27-69	2	As Built	TEM	6-77
CHECKED	KCT	5-6-69				
IN CHARGE			NO.	REVISION	BY	DATE

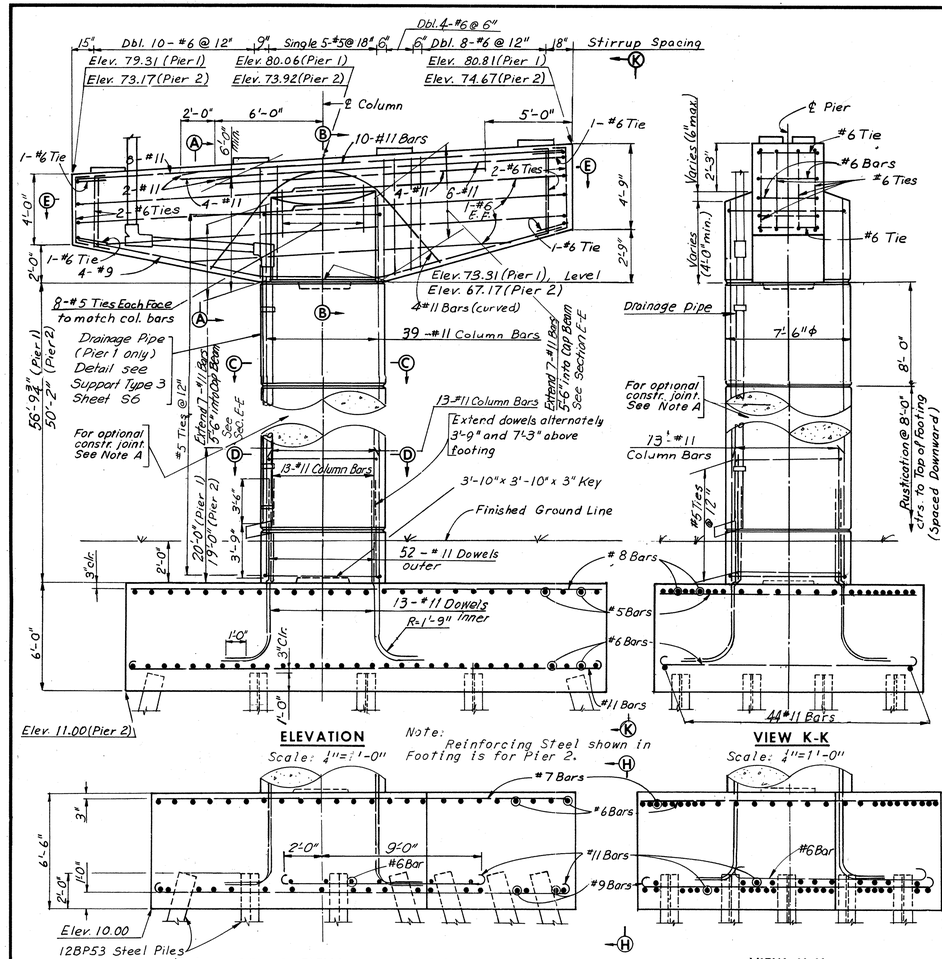
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
LAYOUT

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 4 OF 54

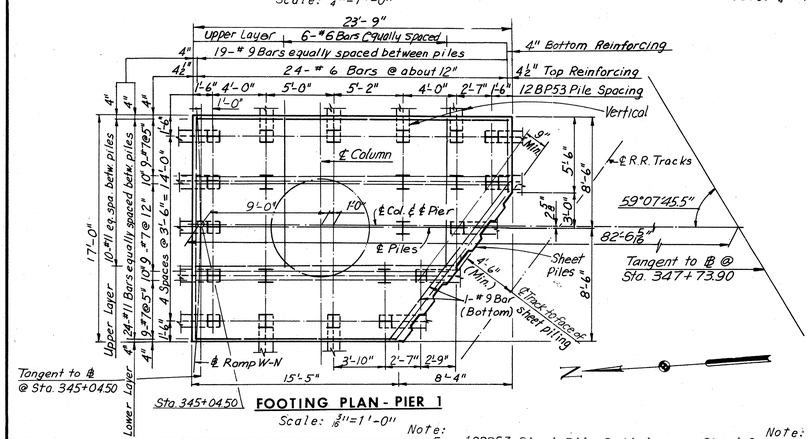
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	177	265



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

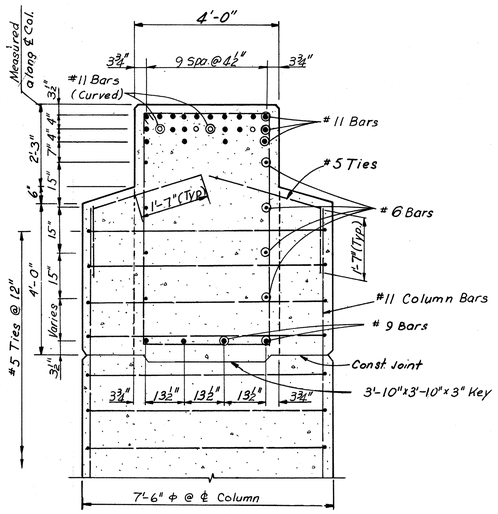
Note: Reinforcing Steel shown in Footing is for Pier 2.

FOOTING ELEVATION - PIER 1
Scale: 1/4"=1'-0"

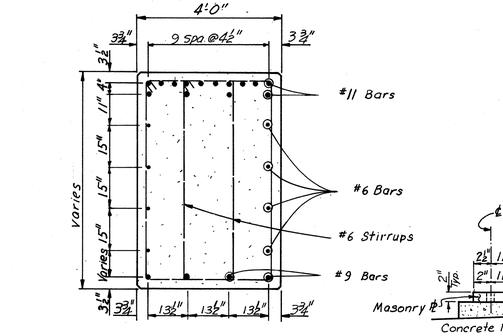


FOOTING PLAN - PIER 1
Scale: 1/8"=1'-0"

Note: For 12BP53 Steel Pile Details, see Sheet 6. All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons). Batter all piles 3" per foot where shown. For Standard Shoe details, See Sheets 51 & 52. For Framing Plan, See Sheet 19 & 20. Estimated Pile tip Elevation -78.00.

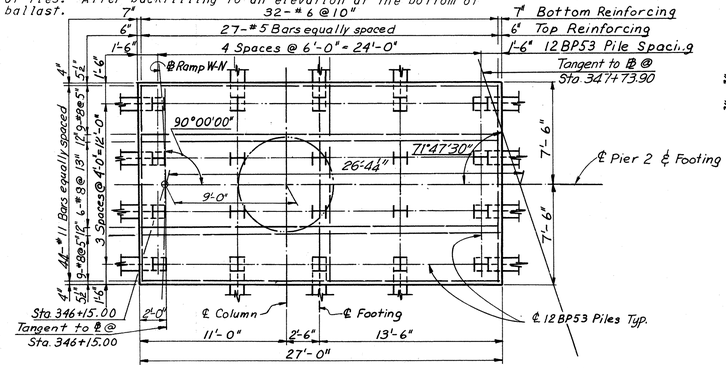


SECTION B-B
Scale: 1/2"=1'-0"



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

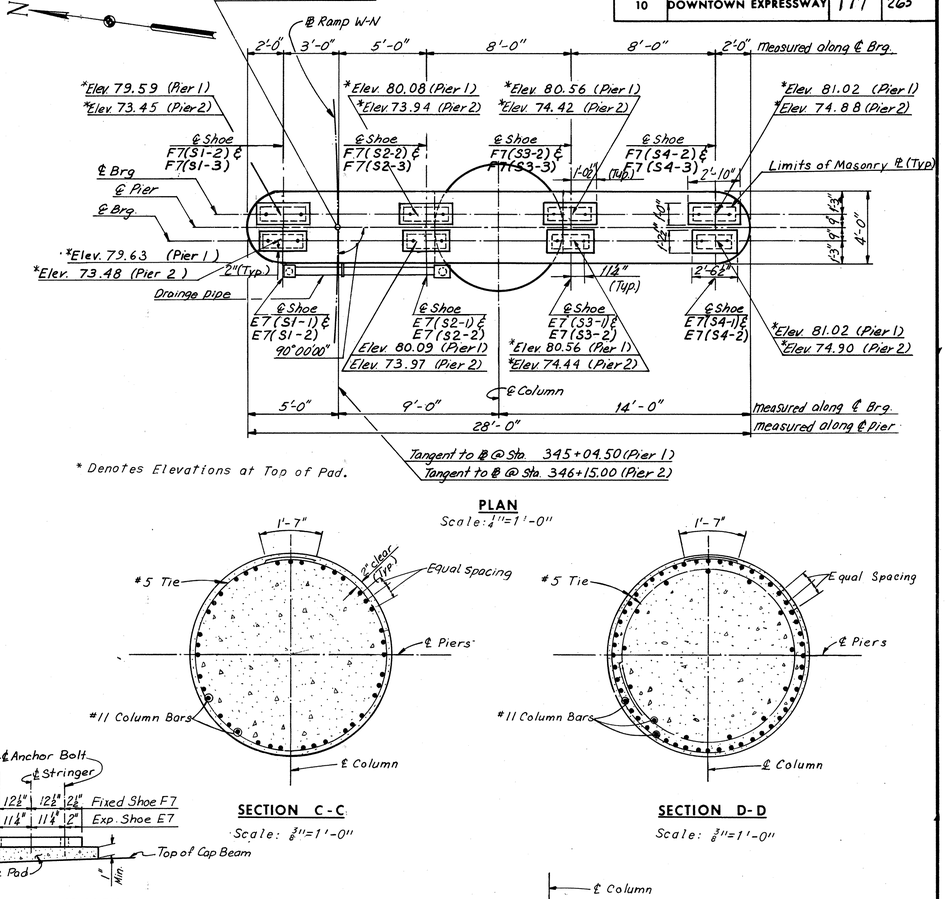
Note: (Pier 1 only) The face of the Sheet piling to ℄ Track not encroach within 4'-6" and nor over the top of rail during the Construction of the piers.
The Sheet piling shall be cut off at the Elev. of Bottom of ties. After backfilling to an elevation at the bottom of ballast.



FOOTING PLAN - PIER 2
Scale: 1/8"=1'-0"

Note: Footing is eccentric.

FOOTINGS FOR PIERS 1 AND 2 ARE ECCENTRIC AS SHOWN ON FOOTING PLANS ABOVE



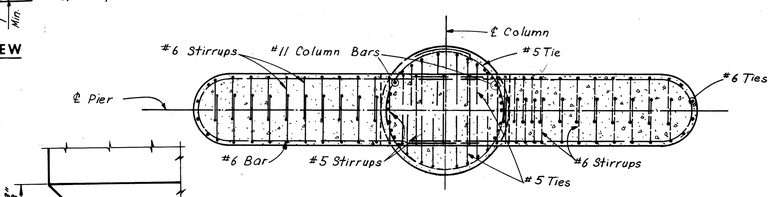
* Denotes Elevations at Top of Pad.

PAD ELEVATION VIEW
No Scale

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

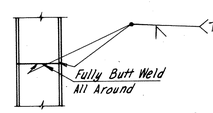
SECTION C-C
Scale: 3/8"=1'-0"

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



SECTION E-E
Scale: 1/4"=1'-0"

RUSTICATION DETAIL
Full Scale



PILE SPLICE DETAIL
No Scale

Note A:
A construction joint will be permitted at a rustication near midheight of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minmum of 3'-6". Splices shall be staggered atleast 3'-3" between adjacent bars.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	9-16-68				
CHECKED	G.S.H.	4-21-69	1	As Built	TEM	6-77
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

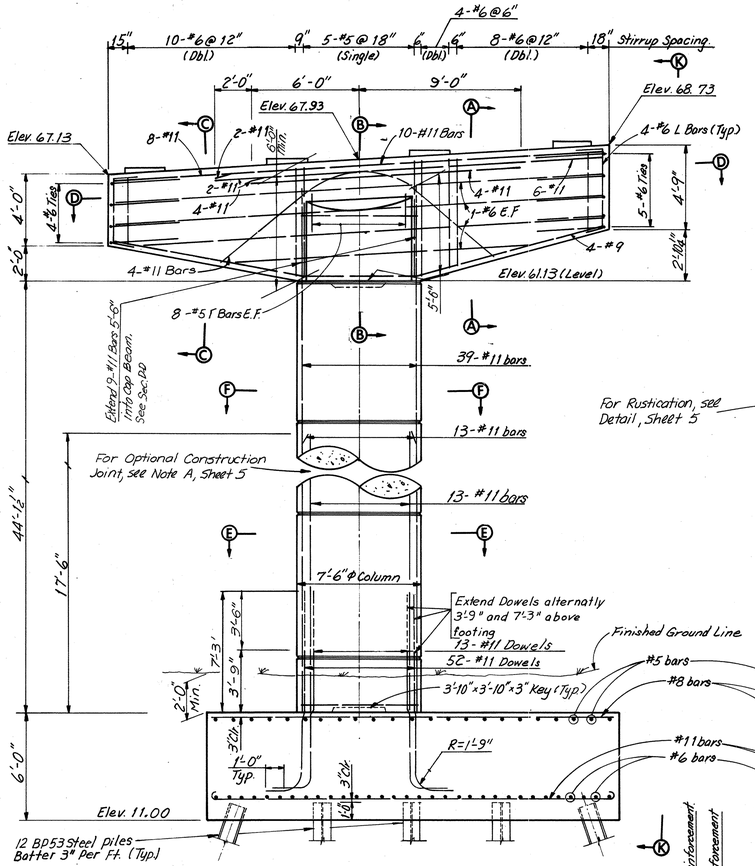
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

PIERS 1 AND 2

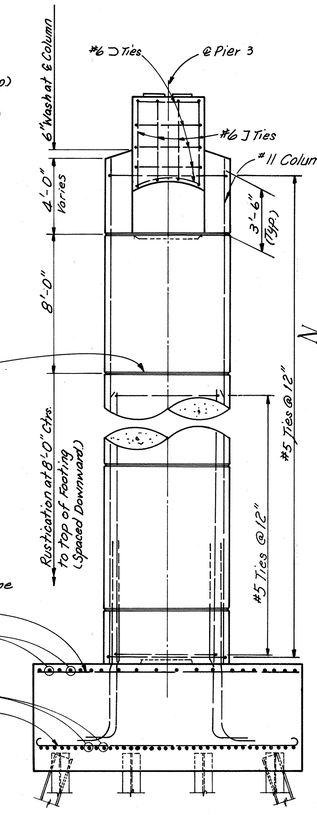
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 54

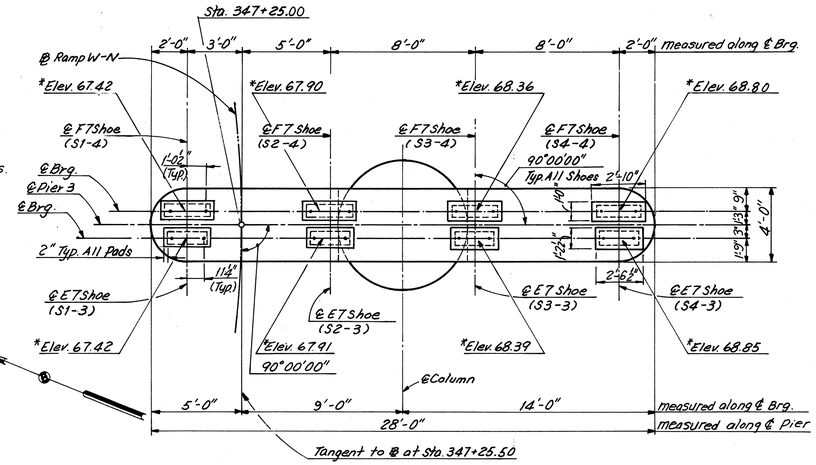
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	178	265



ELEVATION
Scale $\frac{1}{4}$"=1'-0"

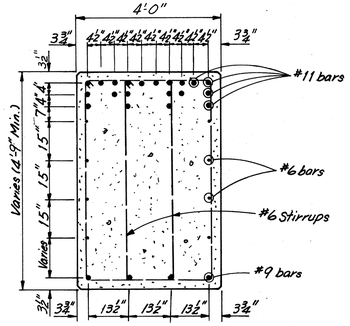


VIEW K-K
Scale $\frac{1}{4}$"=1'-0"

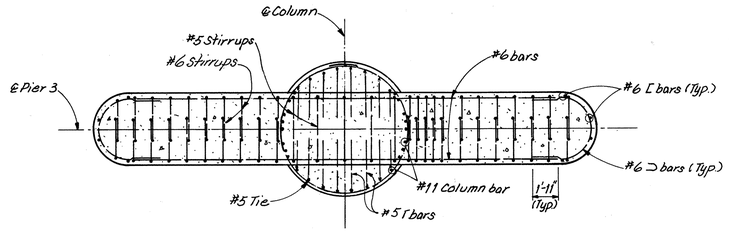


PLAN
Scale $\frac{1}{4}$"=1'-0"

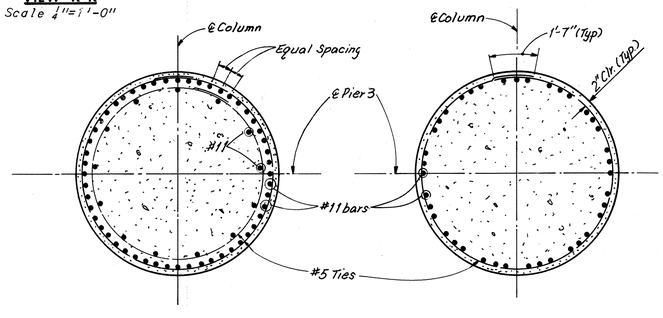
* Denotes top elevation of Concrete Pad.



SECTION A-A
Scale $\frac{1}{2}$"=1'-0"

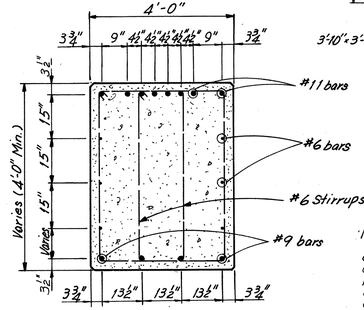


SECTION D-D
Scale $\frac{1}{4}$"=1'-0"

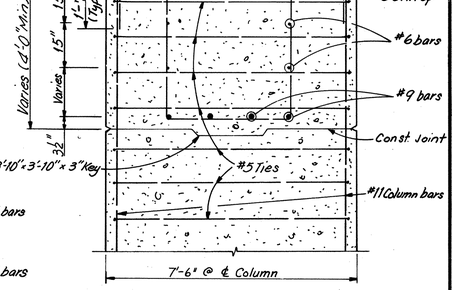


SECTION E-E
Scale $\frac{3}{8}$"=1'-0"

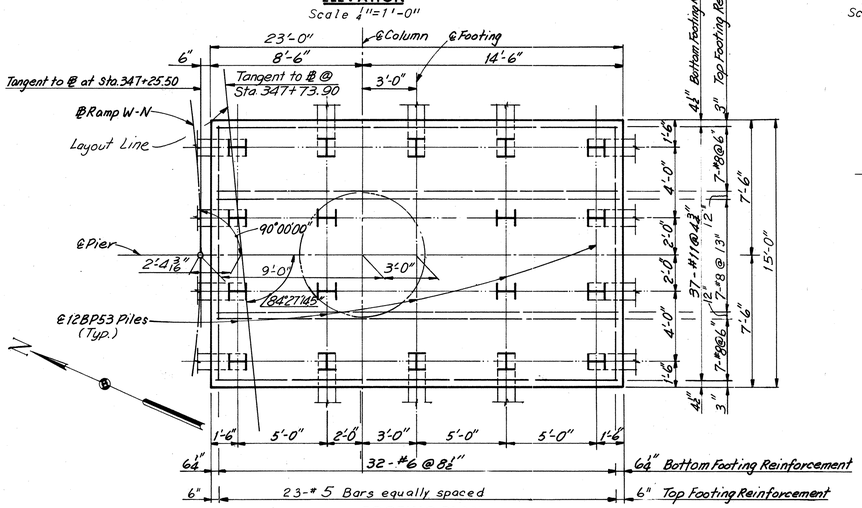
SECTION F-F
Scale $\frac{3}{8}$"=1'-0"



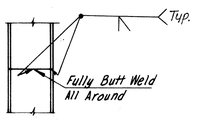
SECTION C-C
Scale $\frac{1}{2}$"=1'-0"



SECTION B-B
Scale $\frac{1}{2}$"=1'-0"



FOOTING PLAN
Scale $\frac{1}{4}$"=1'-0"



PILE SPLICE DETAIL

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Framing Plan, see Sheet 20.
Estimated Pile tip Elevation -8.00.
For Standard Shoe details, see Sheets S1 & S2.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by The Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

	BY	DATE
MADE	G.C.C.	9-17-68
CHECKED	P.T.A.	4-21-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Added	LRH	4-19-74
2	As Built	TEM	6-77

FOOTING FOR PIER 3 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

AS BUILT

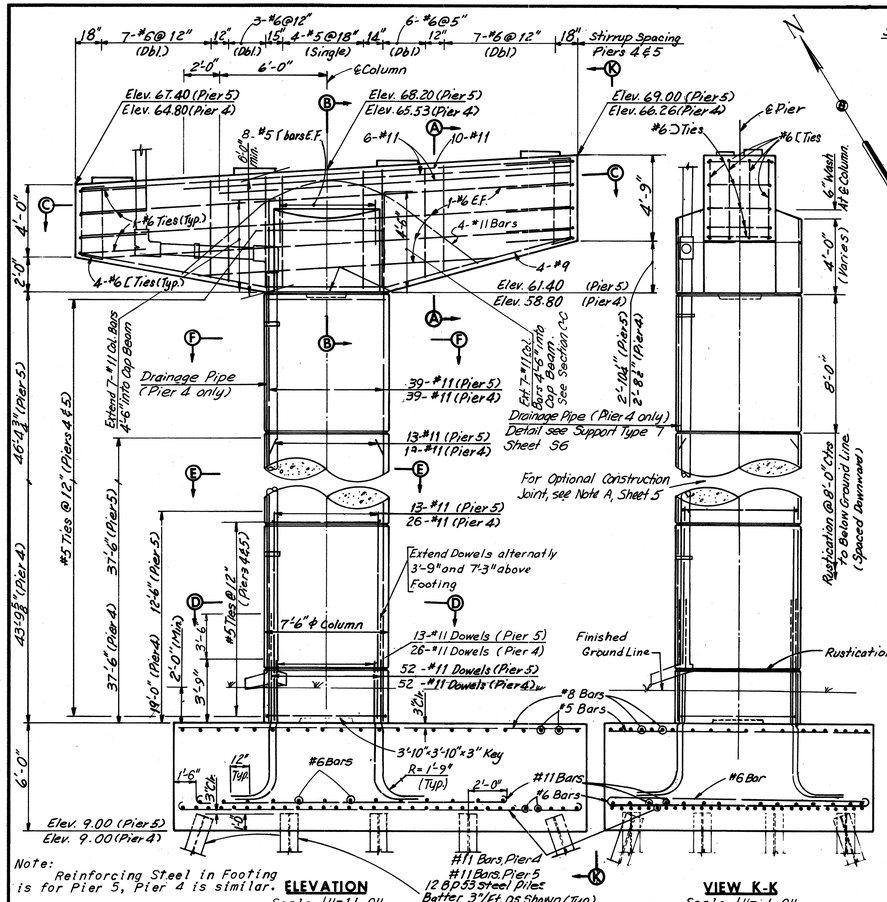
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 3

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

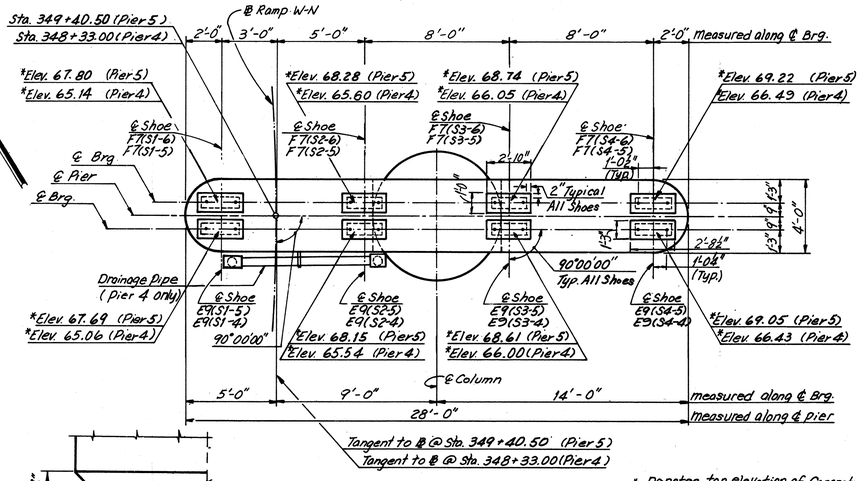
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 6 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	179	265



Note: Reinforcing Steel in Footing is for Pier 5, Pier 4 is similar.

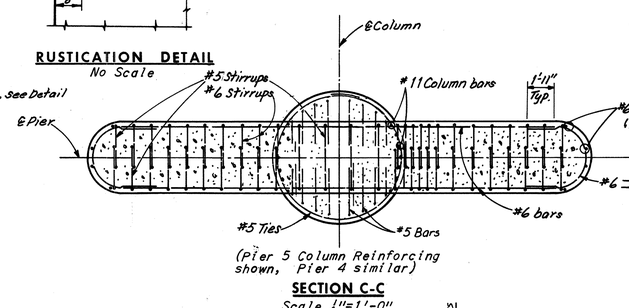
ELEVATION
Scale ¼"=1'-0"



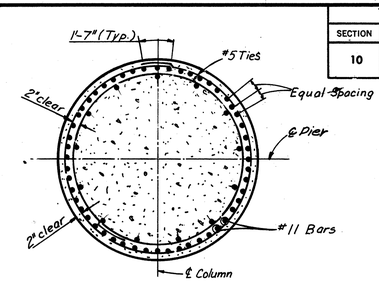
PLAN
Scale ¼"=1'-0"

* Denotes top elevation of Concrete pad.

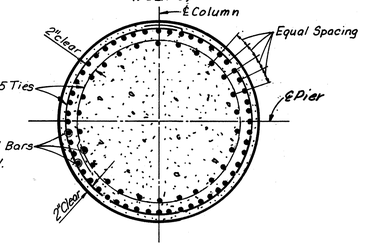
RUSTICATION DETAIL
No Scale



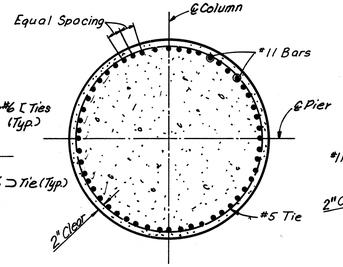
SECTION C-C
Scale ¼"=1'-0"

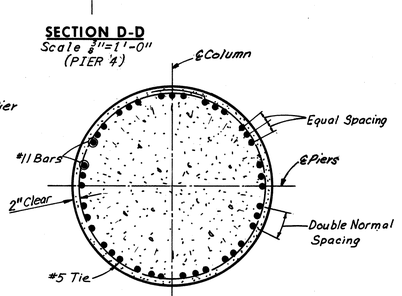


SECTION D-D
Scale ⅜"=1'-0"
(PIER 5)

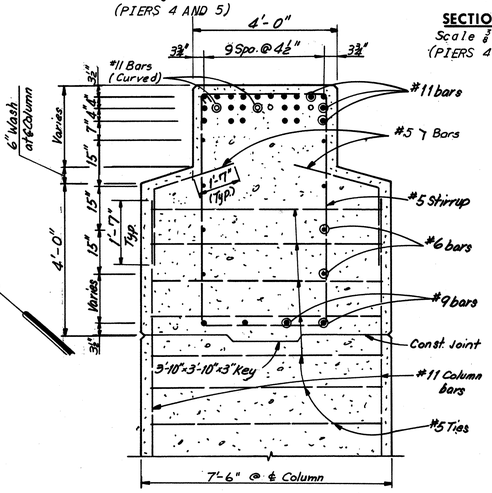


SECTION D-D
Scale ⅜"=1'-0"
(PIER 4)



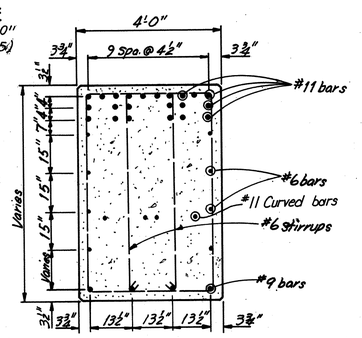


SECTION E-E
Scale ⅜"=1'-0"
(PIERS 4 AND 5)



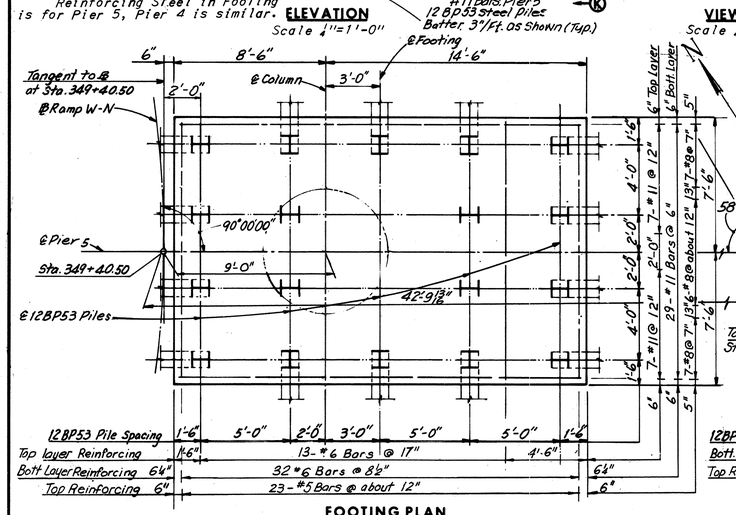
SECTION B-B
Scale ½"=1'-0"

SECTION F-F
Scale ⅜"=1'-0"
(PIERS 4 AND 5)

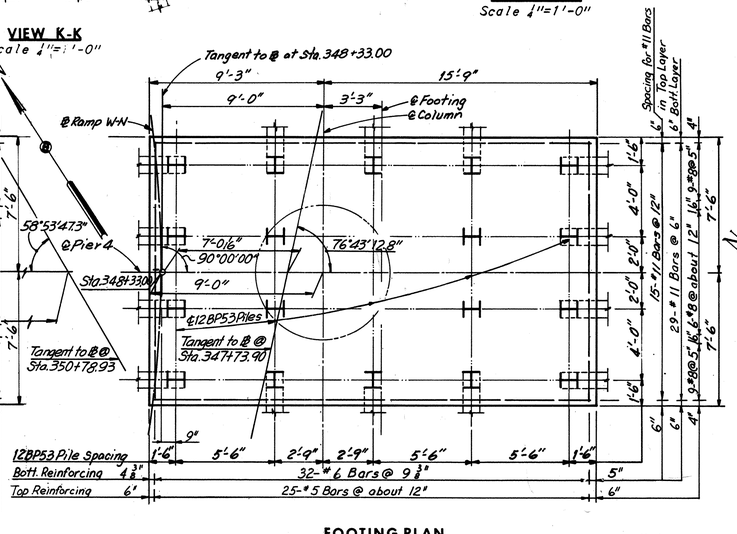


SECTION A-A
Scale ½"=1'-0"

VIEW K-K
Scale ½"=1'-0"



FOOTING PLAN
Scale ¼"=1'-0"
(PIER 5)



FOOTING PLAN
Scale ¼"=1'-0"
(PIER 4)

Note: Reinforcing Steel in Footing is for Pier 5, Pier 4 is similar.

Note: Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2Ft., redesign will be required.

Note: All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons). Batter all piles 3" per foot where shown. For Standard Shoe details, see Sheets S1& S2. For Framing Plan, see Sheet 20€21. Estimated Pile Tip Elevation -12.00 (Pier 4) and -15.00 (Pier 5).

FOOTINGS FOR PIERS 4 AND 5 ARE ECCENTRIC AS SHOWN ON FOOTING PLANS ABOVE

AS BUILT

	BY	DATE				
MADE	G.C.C.	9-14-68	2	As Built	LRH	6-19-74
CHECKED	J. D.	9-17-68			TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

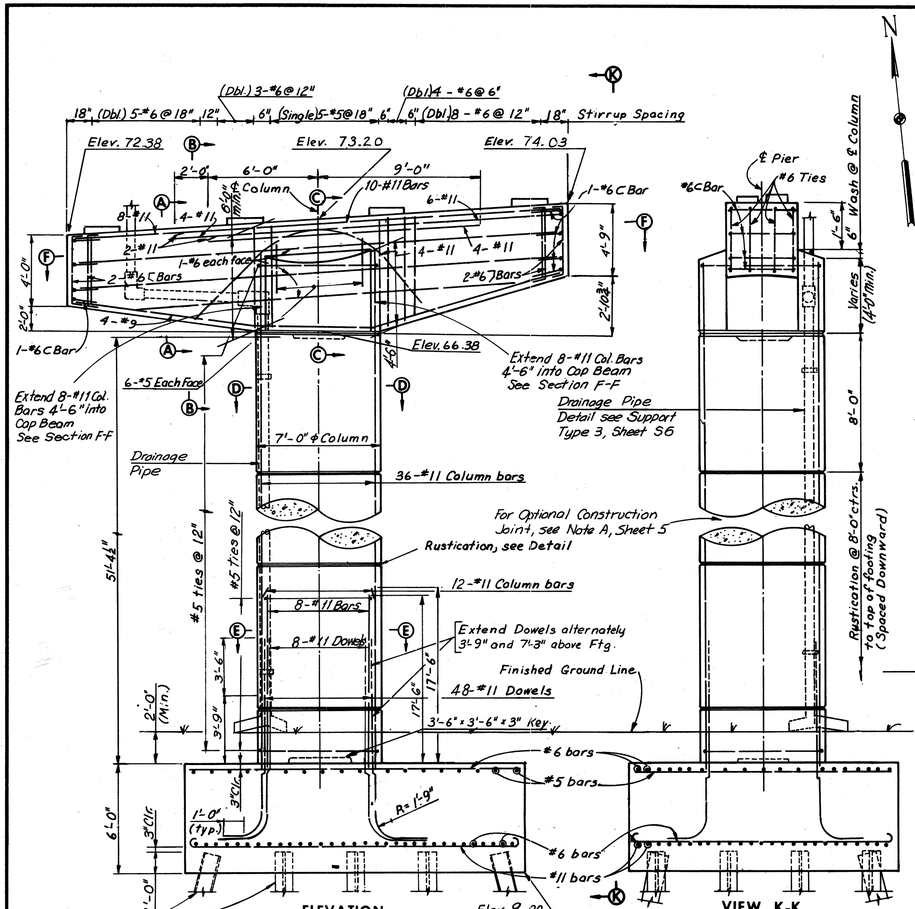
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 4 AND 5

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

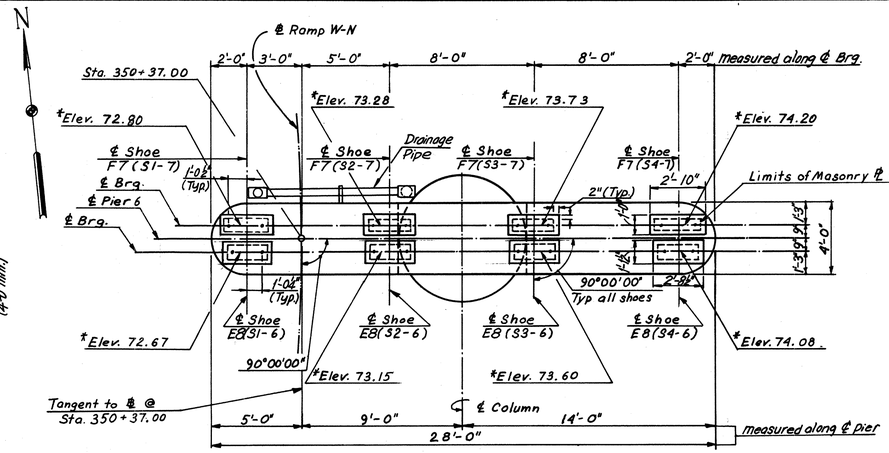
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	180	265



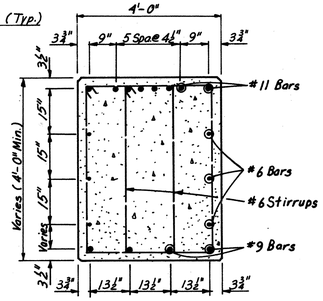
ELEVATION
Scale: 1/4"=1'-0"

VIEW K-K
Scale: 1/4"=1'-0"

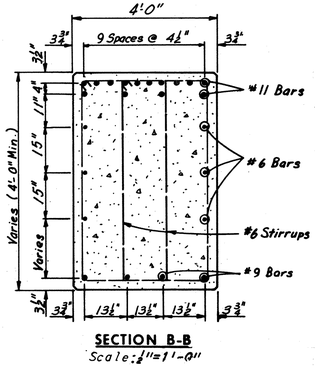


PIER CAP PLAN
Scale: 1/4"=1'-0"

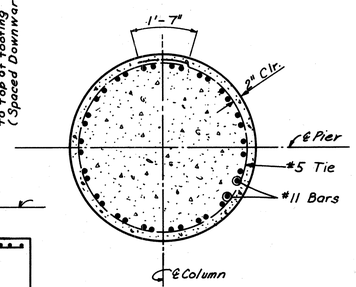
* Denotes top elevation of Concrete Pad.



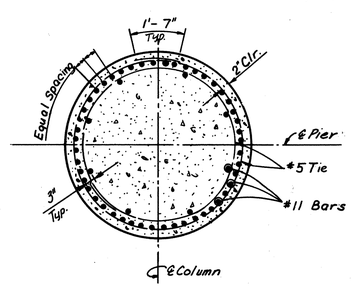
SECTION A-A
Scale: 1/2"=1'-0"



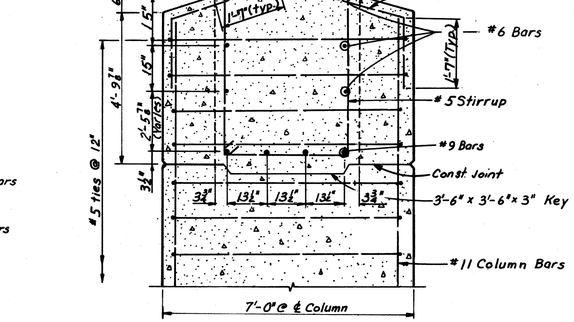
SECTION B-B
Scale: 1/2"=1'-0"



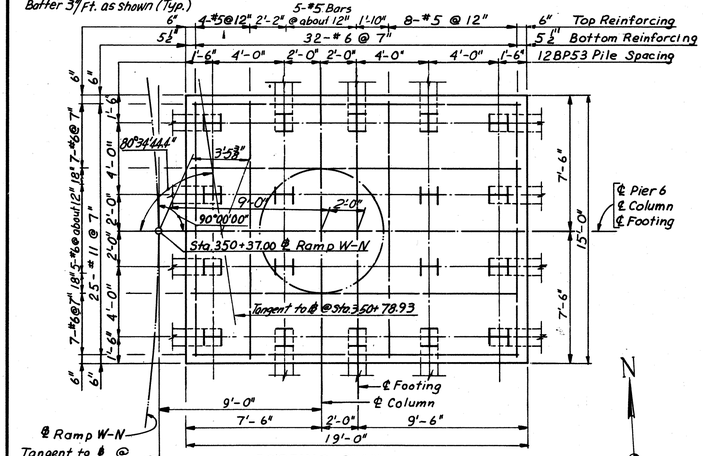
SECTION D-D
Scale: 3/8"=1'-0"



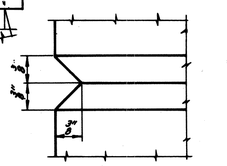
SECTION E-E
Scale: 3/8"=1'-0"



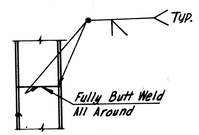
SECTION C-C
Scale 1/2"=1'-0"



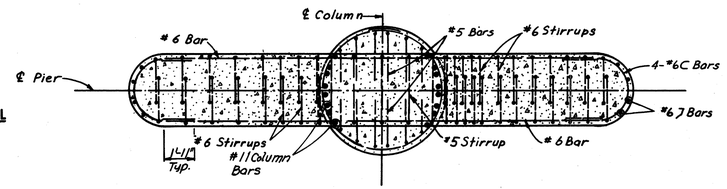
FOOTING PLAN
Scale: 1/4"=1'-0"



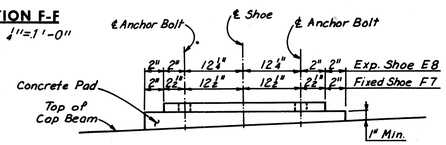
RUSTICATION DETAIL



PILE SPLICE DETAIL



SECTION F-F
Scale: 1/4"=1'-0"



ANCHOR BOLT SETTING PLAN
No Scale

	BY	DATE
MADE	J.D.	9-12-68
CHECKED	Y.C.P	5-15-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note Added	LRH	6-19-74
2	As Built	TEM	6-77

FOOTING FOR PIER 6 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets S1&S2.
For Framing Plan, see Sheet 21.
Estimated Pile Tip Elevation, -15.00.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

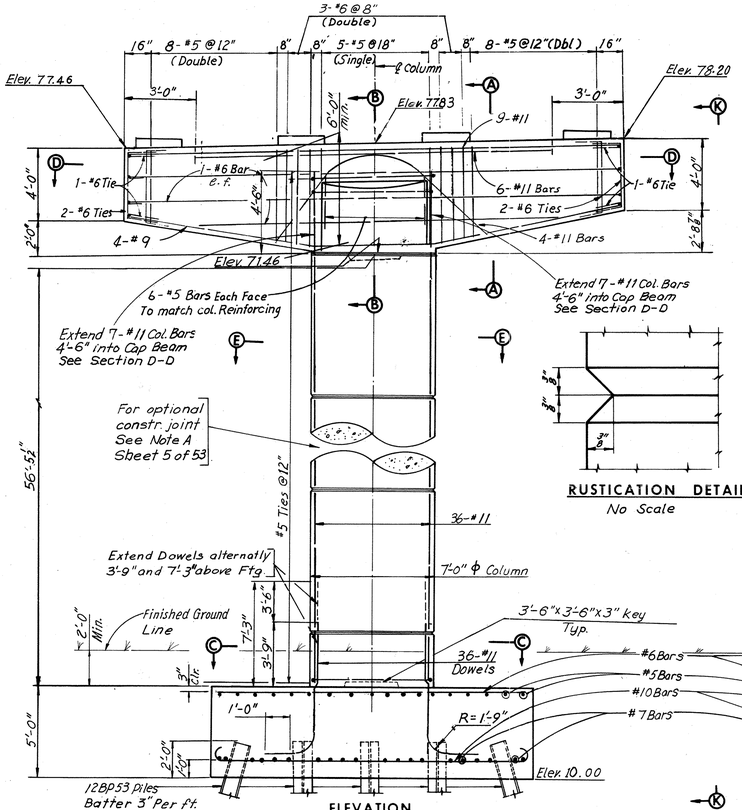
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

PIER 6

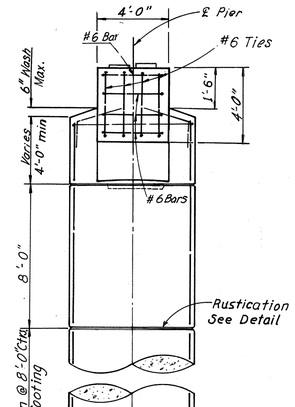
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 8 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	181	265

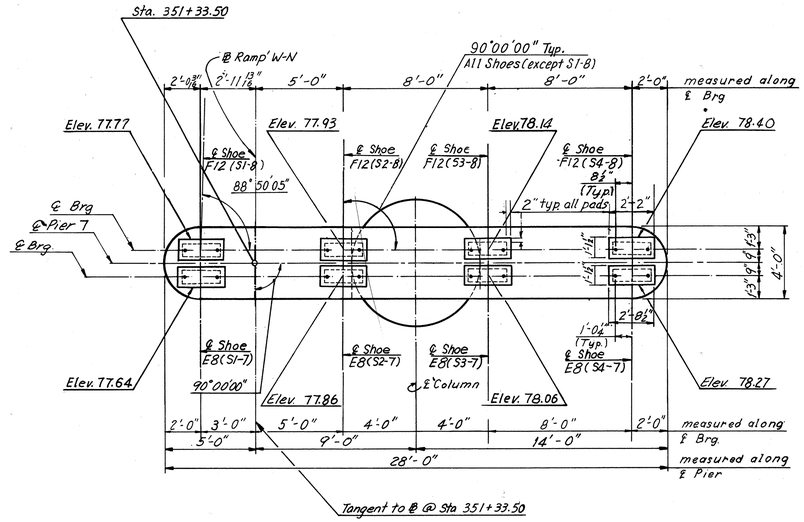


ELEVATION
Scale 1/4"=1'-0"

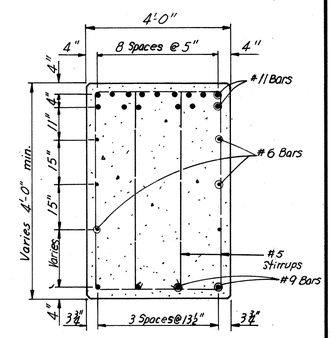


VIEW K-K
Scale 1/4"=1'-0"

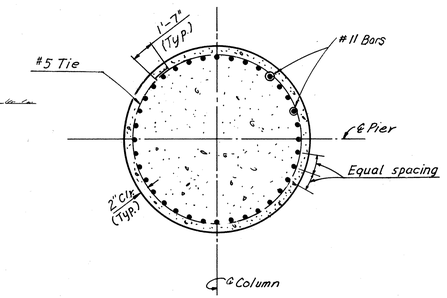
RUSTICATION DETAIL
No Scale



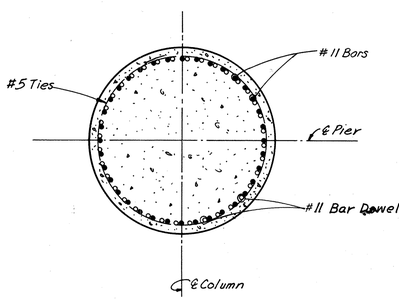
PLAN
Scale 1/4"=1'-0"



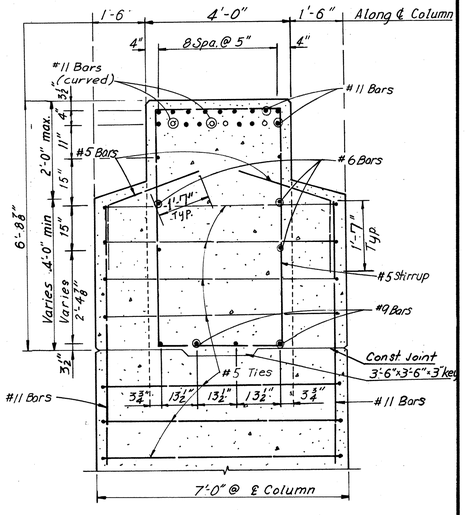
SECTION A-A
Scale 1/2"=1'-0"



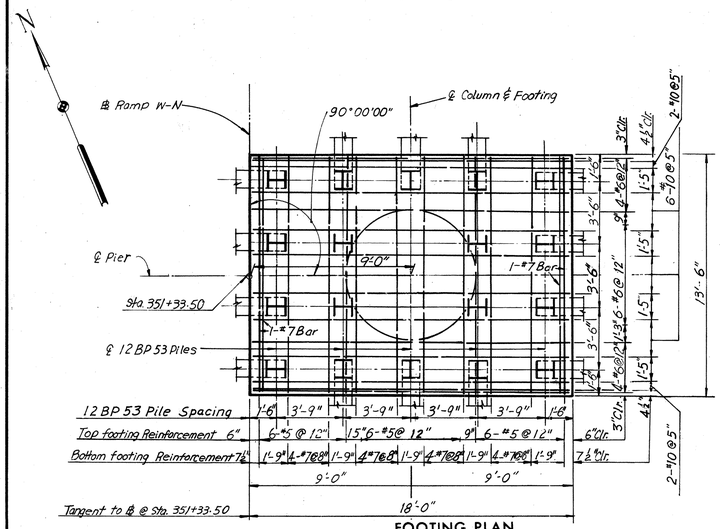
SECTION E-E
Scale 3/8"=1'-0"



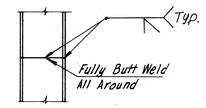
SECTION C-C
Scale 3/8"=1'-0"



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



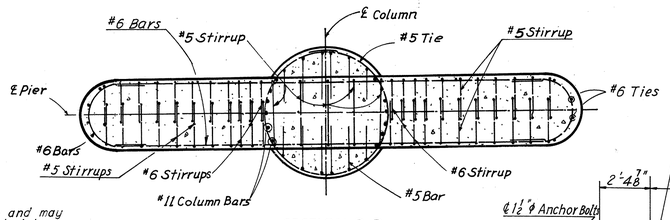
FOOTING PLAN
Scale: 1/4"=1'-0"



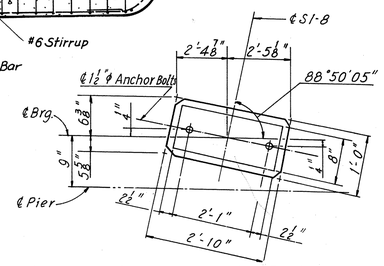
PILE SPLICE DETAIL
No Scale

Note:
Footing elevations are approximate only and may be varied to suit filed conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheet S1.
For Framing Plan, see Sheet 21 & 22.
Estimated pile tip Elevation -15.00.



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



PAD AND ANCHOR BOLT SETTING PLAN

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	9-12-68	2	As Built	TEM	6-77
CHECKED	YCP	5-13-69	1	Revise Pad elevs. Span B	DMB	2-6-75
IN CHARGE						

AS BUILT

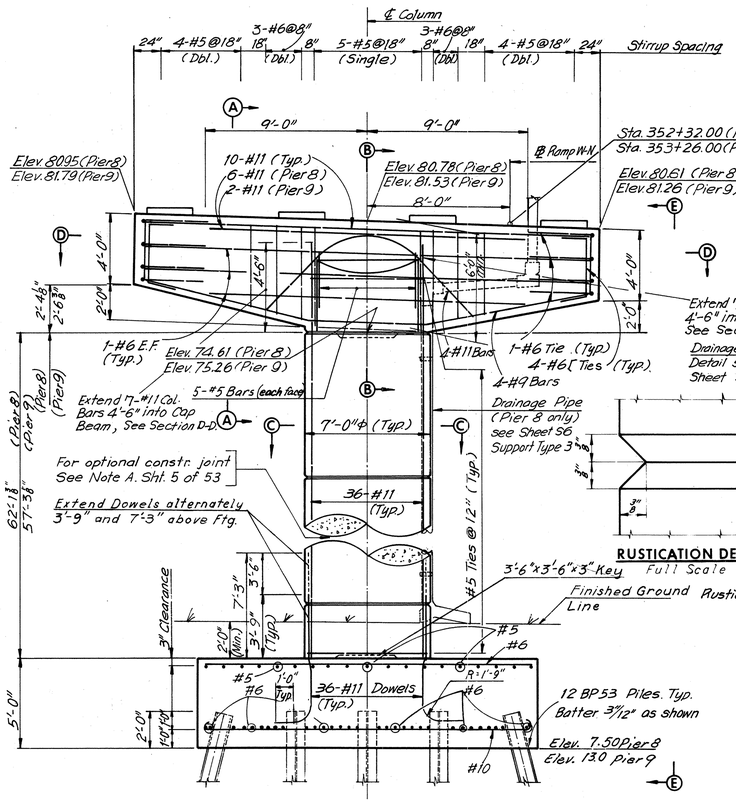
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 7

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 9 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	182	265



	BY	DATE				
MADE	SCC.	2.14.69	2	As Built	TEM	6-77
CHECKED	PTA	4-19-69	⚠	Revise Pad Elevs. 32-8 & 33-8	DW.B	2-6-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

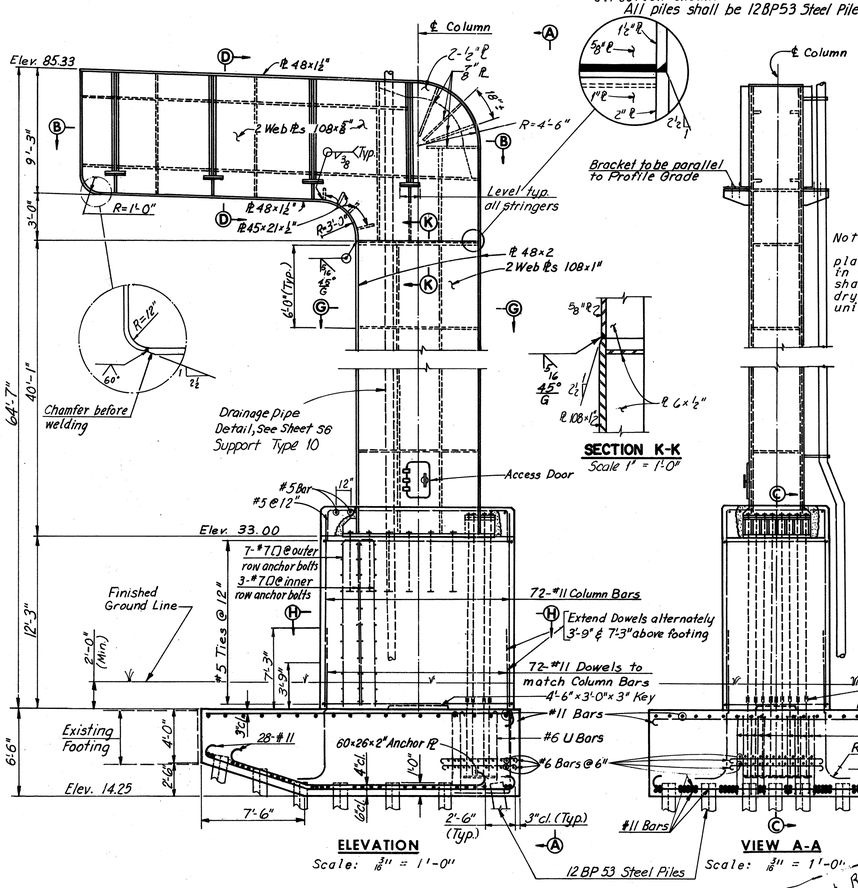
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 8 AND 9

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 54

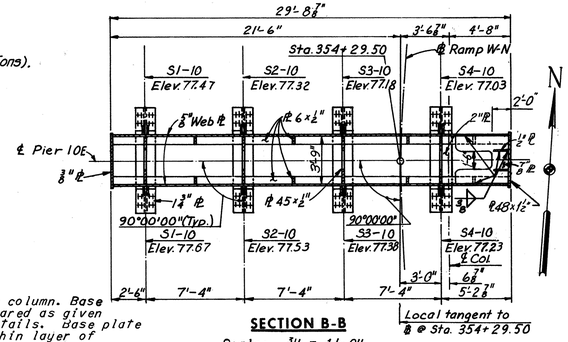
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	183	265

Note:
All Steel shall be A36 except otherwise shown.
Pile Tip Elev. -7.00
batter exterior piles 2" per foot in direction shown.
All piles shall be 12BP53 Steel Piles (Design Cap. = 57 Tons).

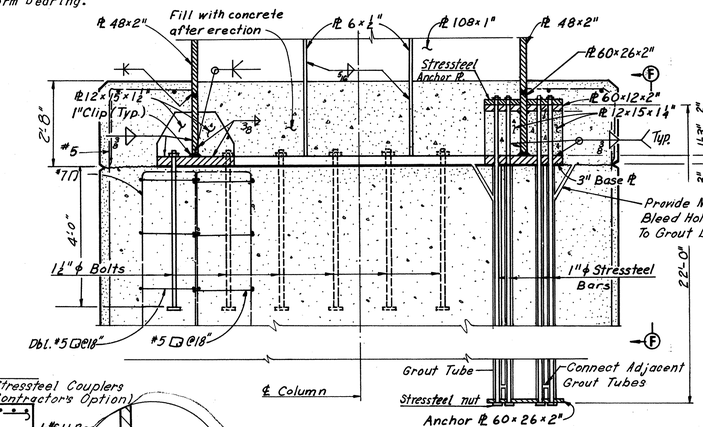


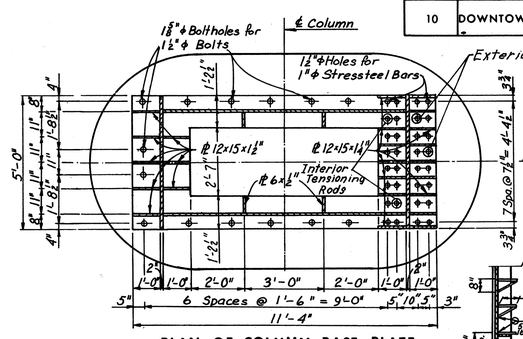
ELEVATION
Scale: 3/16" = 1'-0"

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

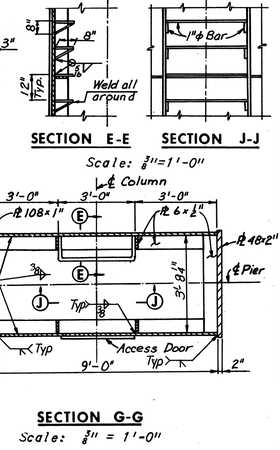


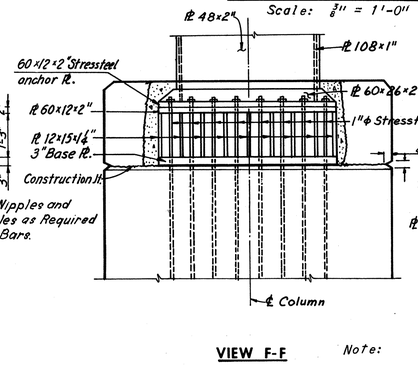
SECTION B-B
Scale: 3/16" = 1'-0"





PLAN OF COLUMN BASE PLATE
Scale: ⅜" = 1'-0"





SECTION G-G
Scale: ⅜" = 1'-0"

VIEW F-F
Scale: ½" = 1'-0"

Note:
Stressteel rods shall be 1"ϕ Special Grade, 160 ksi. min. ult Strength, 32 rods req'd. Rods to be grouted after tensioning. Initial Jacking Force Required. = 88K ± 6" for seating wedge.

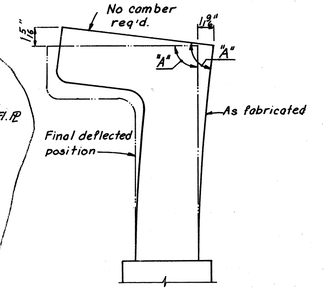
Rods shall be tensioned as outlined in the construction sequence. Rods need not be tensioned in pairs, However, tensioning shall proceed outward from the centerline of Pier 10.

Rods of the first group shall be checked in the same sequence as initial tensioning, checking shall continue until two successive 1"ϕ rods checked have a tension of at least 80 K.

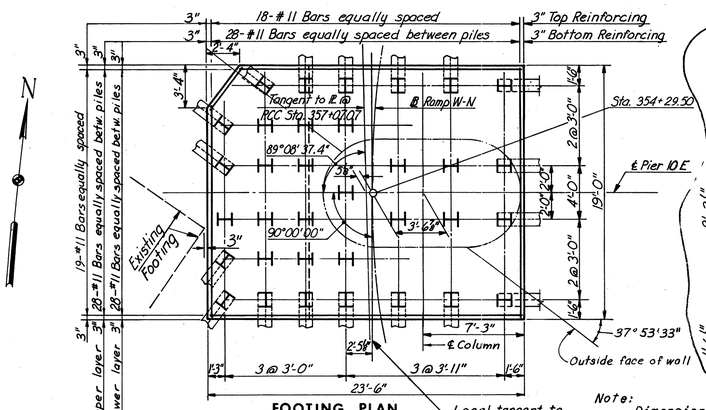
The contractor is cautioned against nicking the stress rods and he shall follow the manufacturers recommended handling procedures The contractor shall provide adequate safety measures. The contractor shall submit his proposed construction procedures to the engineer for approval.

GENERAL CONSTRUCTION SEQUENCE:

1. Construct footing and pedestal including 32-1"ϕ stressteel bars.
2. Erect column and capbeam. Tighten down nuts on 1½"ϕ anchor bolts. Stress 12 interior tensioning rods.
3. Erect structural steel superstructure in such a manner that load eccentricity on the column is kept at a minimum.
4. Stress 12 exterior tensioning rods.
5. Place concrete deck.
6. Stress remaining 8 tensioning rods.
7. Check tension on initial group of rods.
8. Cutoff rod extension. Fill column base with concrete, grout and encase base and anchorage with concrete.



CAMBERING OF COLUMN
No Scale



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

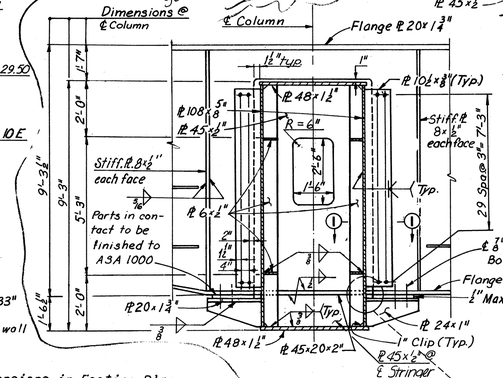
Local tangent to ℄ @ Sta. 354+29.50

Note: Dimensions in Footing Plan are measured at bottom of Footing.

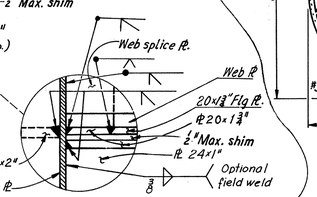
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

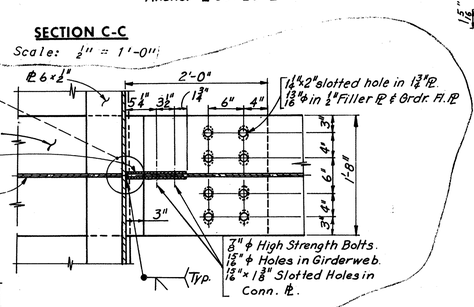
FOOTING FOR PIER 10E IS ECCENTRIC AS SHOWN ON FOOTING PLAN

Not Revised See Shop Drawing



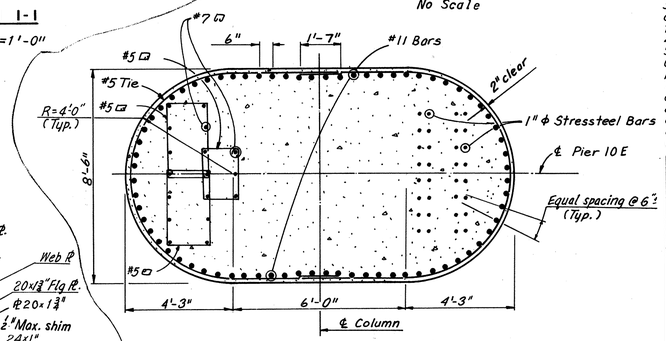
SECTION D-D
Scale: ⅜" = 1'-0"





SECTION C-C
Scale: ½" = 1'-0"

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



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

AS BUILT

	BY	DATE
MADE	J.D.	3-11-69
CHECKED	PTA	4-24-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Fig. Plan & Elev. changed	S.B.P.	7-23-75
1	Elev Sect. B-B changed	REG	1-24-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

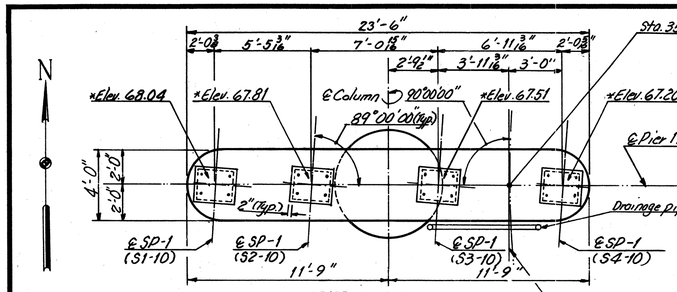
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

PIER 10E

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

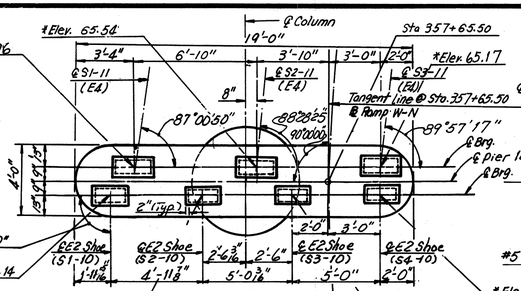
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 11 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	184	265

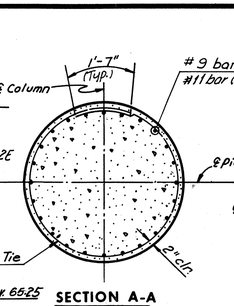


PIER CAP PLAN
Scale : 1" = 1'-0"

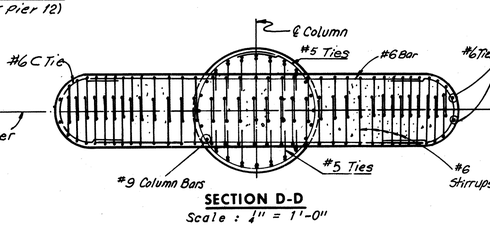
* Denoted top elevations of pad.



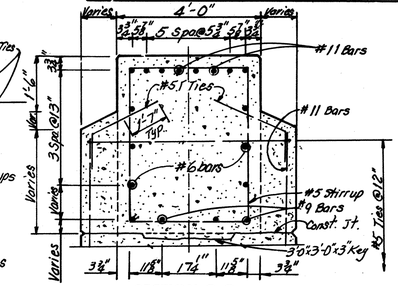
PIER CAP PLAN
Scale : 1" = 1'-0"



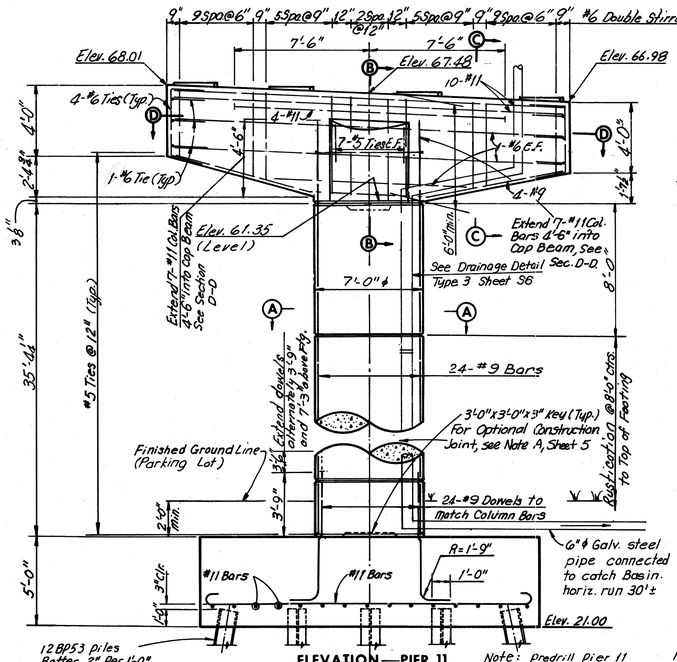
SECTION A-A
Scale : ⅜" = 1'-0"



SECTION D-D
Scale : ¼" = 1'-0"

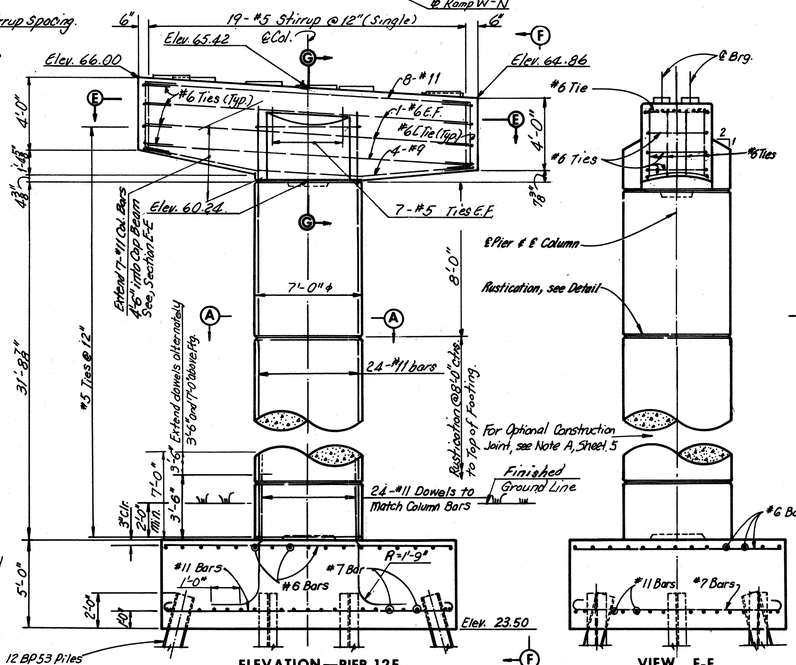


SECTION G-G
Scale : ½" = 1'-0"



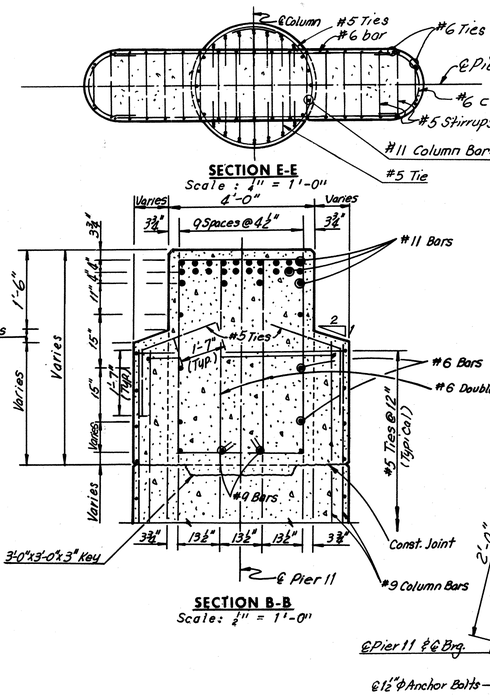
ELEVATION—PIER 11
Scale : 1" = 1'-0"

Note: Predrill Pier 11 all Piles to Elev. 5'-0" below F.L. Inch Sewer



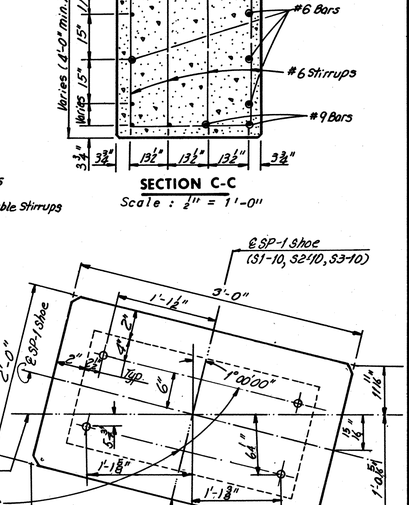
ELEVATION—PIER 12E
Scale : ¼" = 1'-0"

VIEW F-F
Scale : ¼" = 1'-0"

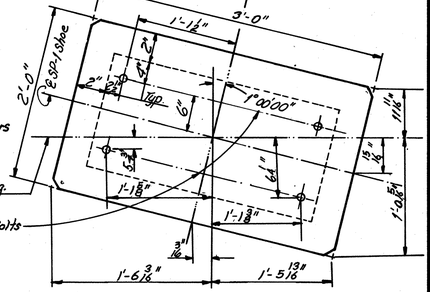


SECTION E-E
Scale : 1" = 1'-0"

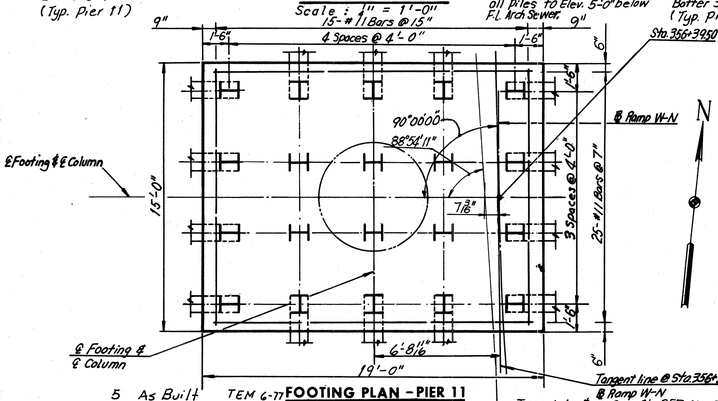
SECTION B-B
Scale: ¼" = 1'-0"

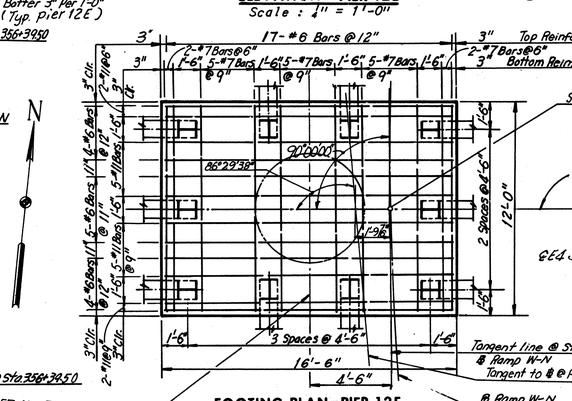


SECTION C-C
Scale : ½" = 1'-0"

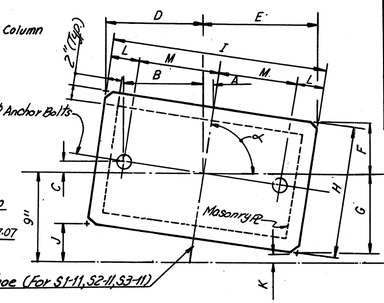


PAD AND ANCHOR BOLT SETTING PLAN
No Scale





FOOTING PLAN—PIER 12E
Scale : ¼" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

Notes:
For Standard Shoe Details, see Sheets S1 and S2
For Framing Plan, see Sheets 26 and 27
For Quantities of Steel and Concrete, see Sheet 2
All piles shall be 12BP53 Steel piles
(Design Capacity = 57 Tons)
Estimated pile tip elevation: Pier 11 = -5.0 ft.
Pier 12E = -8.0 ft.

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L	M
S1-11	87°00'50"	⅜"	10½"	⅜"	1'-2⅜"	1'-2⅛"	5½"	7"	1'-0½"	2'-5"	3½"	2"	4"	10½"
S2-11	88°28'25"	⅜"	10½"	¼"	1'-2⅛"	1'-2⅛"	5⅞"	6⅞"	1'-0½"	2'-5"	3⅜"	2⅜"	4"	10½"
S3-11	89°57'17"	0"	10½"	0"	1'-2½"	1'-2⅜"	6¼"	6¼"	1'-0½"	2'-5"	2¾"	2¾"	4"	10½"

	BY	DATE
MADE	G.S.H.	3-19-69
CHECKED	PTA	5-7-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Added	LRH	4-19-74
2	Column size	T.E.M.	9-10-74
3	BPI 'R' size chg. Pier Cap Dim. Chg.	REV	11-13-74
4	Pad Elevs. Pier 12E	DWB	2-10-75
5	As Built	TEM	6-77

Scale : 1" = 1'-0"

Note: Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

AS BUILT

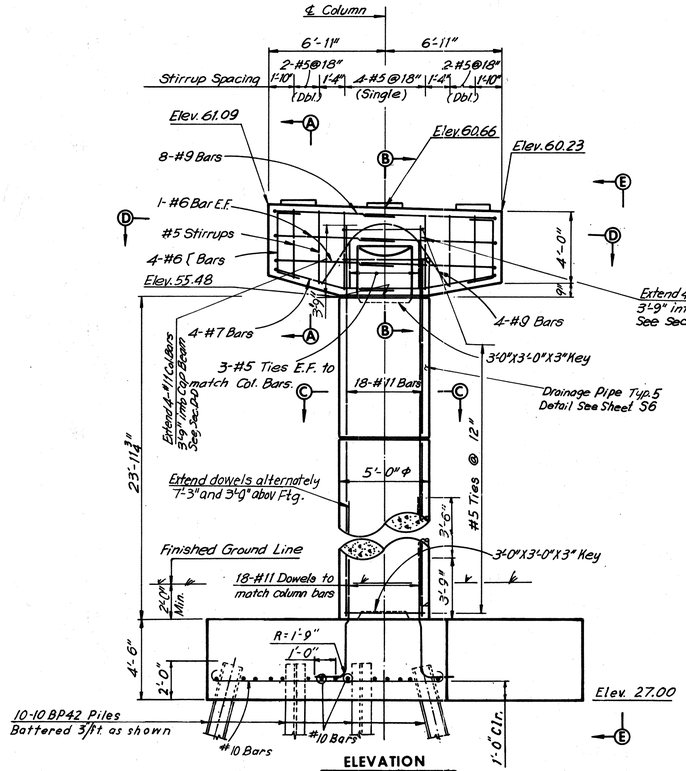
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIERS 11 AND 12E

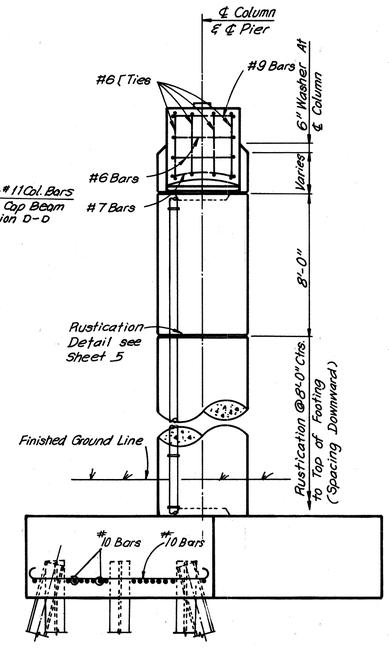
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 12 OF 54

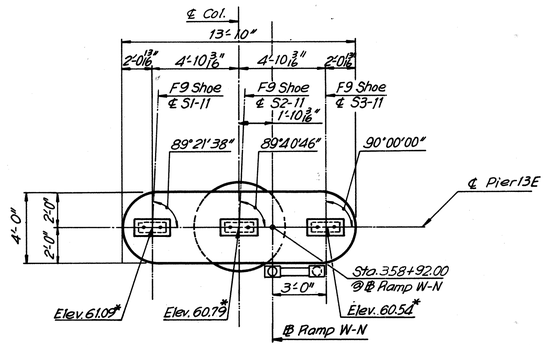
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	185	265



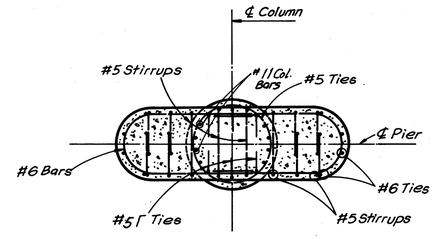
ELEVATION
Scale : 1"=1'-0"



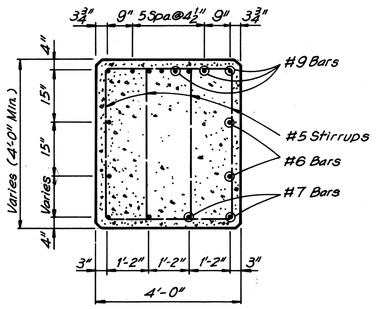
VIEW E-E
Scale : 1"=1'-0"



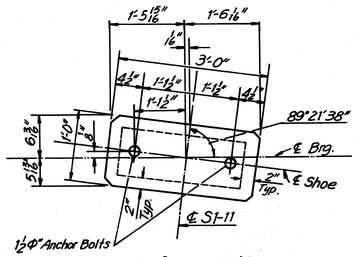
PLAN
Scale : 1"=1'-0"
*Denotes Elevations of Top Pad.

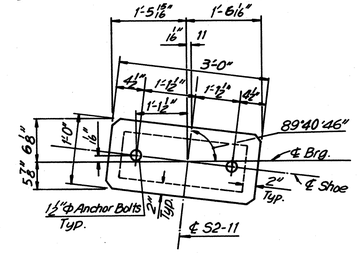


SECTION D-D
Scale : 1"=1'-0"

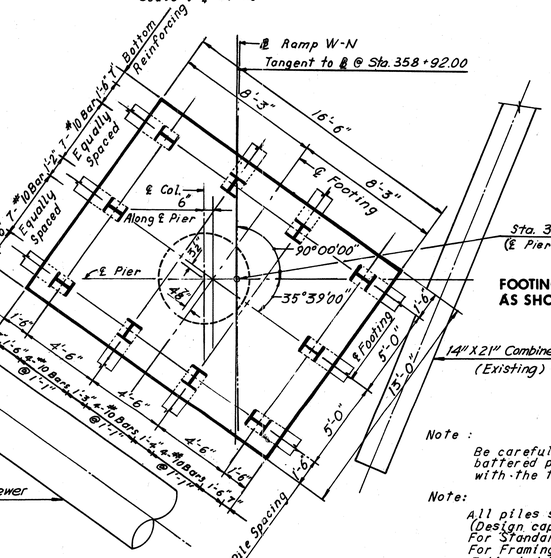


SECTION A-A
Scale : 1"=1'-0"





PAD AND ANCHOR BOLT SETTING PLAN
No Scale



FOOTING PLAN
Scale : 1"=1'-0"

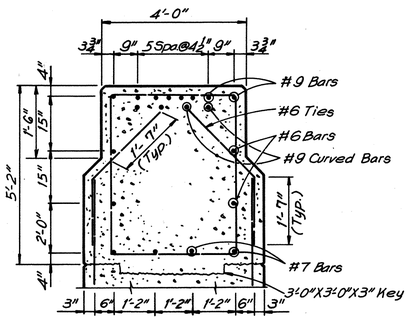
FOOTING FOR PIER 13E IS ECCENTRIC AS SHOWN ON FOOTING PLAN

14" X 21" Combined Sewer (Existing)

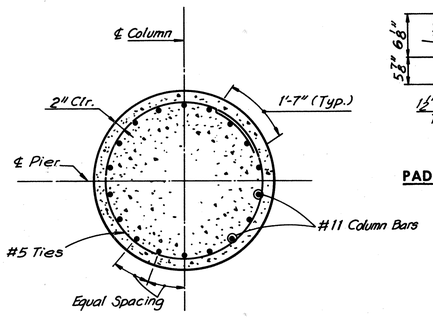
Note :
Be careful to avoid interference of battered piles and footing excavations with the two existing combined sewers.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons.)
For Standard Shoe Details, see Sheet
For Framing Plans, see Sheets 26 & 27.
Estimated Pile tip elevation. 30
For 10BP42 Steel Piles details, see Sheet 5.

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.



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



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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SCC	2.19.69	2	As Built	TEM	6-77
CHECKED	GSH	4.19.69	⚠	Pad Elevations	D.W.S	2-10-75
IN CHARGE						

AS BUILT

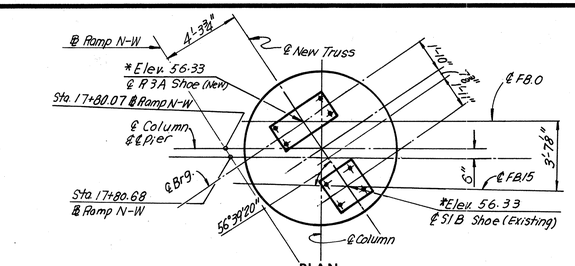
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 13E

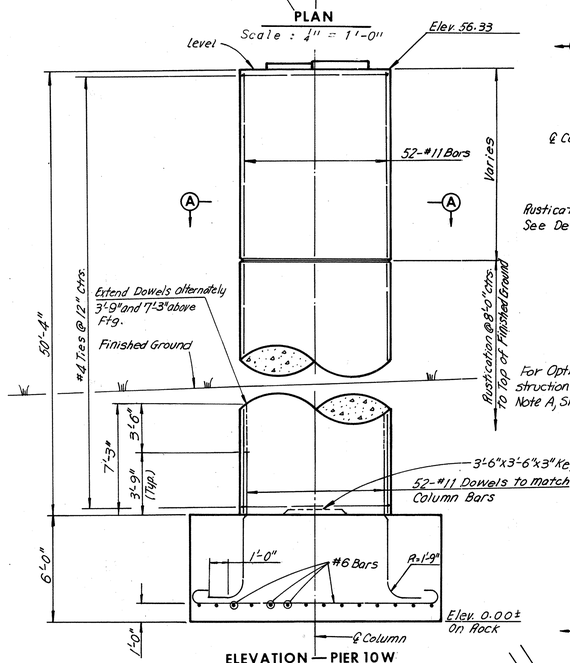
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 54

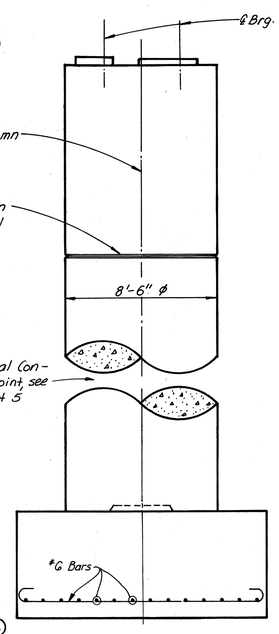
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	186	265



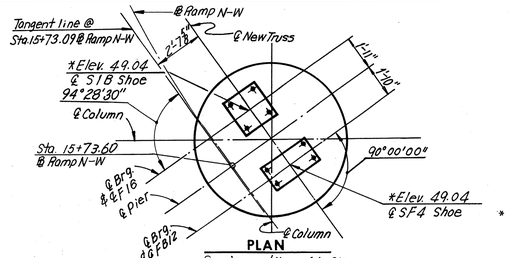
PLAN
Scale : ¼" = 1'-0"



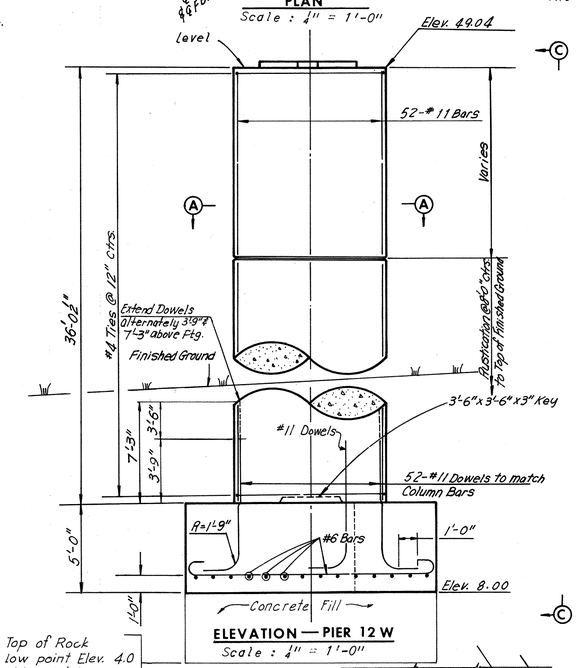
ELEVATION — PIER 10W
Scale : ¼" = 1'-0"



VIEW B-B
Scale : ¼" = 1'-0"

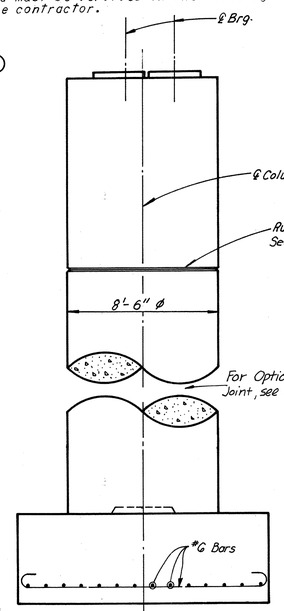


PLAN
Scale : ¼" = 1'-0"

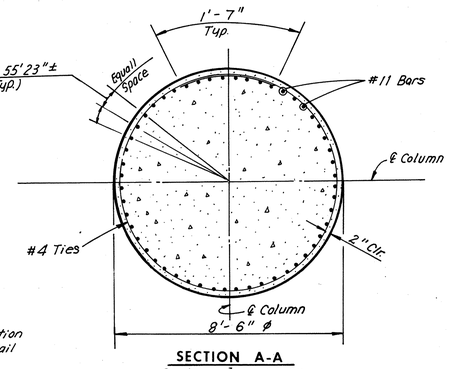


ELEVATION — PIER 12 W
Scale : ¼" = 1'-0"

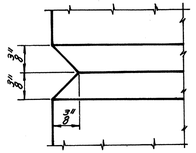
* Denotes the bottom elevations of shoe. and must be verified in the field by the contractor.



VIEW C-C
Scale : ¼" = 1'-0"

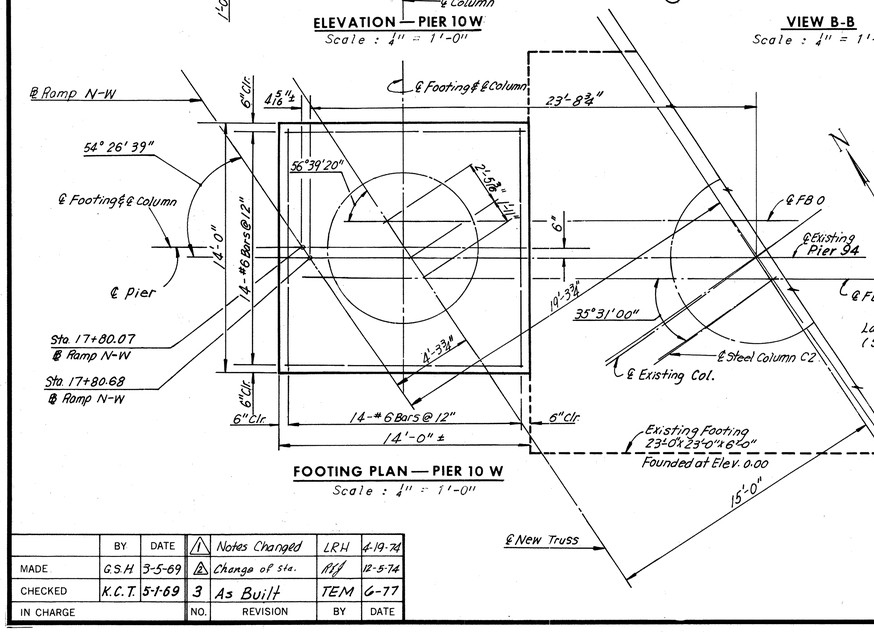


SECTION A-A
Scale : ⅜" = 1'-0"

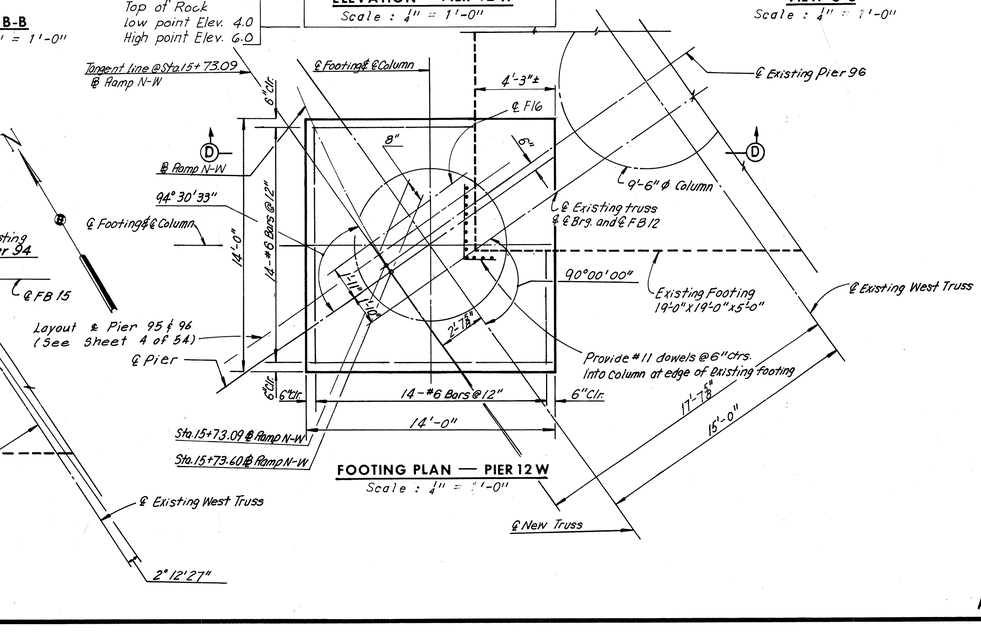


RUSTICTION DETAIL
Full Scale

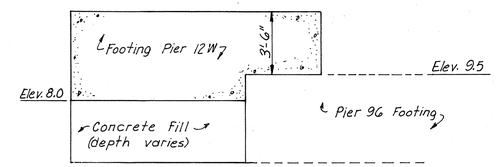
Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 Ft., redesign will be required.
For Shoe Details, see Sheet 47.
For Framing Plan, see Sheets 26.
For Quantities of Steel and Concrete, see Sheet 3.



FOOTING PLAN — PIER 10 W
Scale : ¼" = 1'-0"



FOOTING PLAN — PIER 12 W
Scale : ¼" = 1'-0"



SECTION D-D
No Scale

	BY	DATE
MADE	G.S.H	3-5-69
CHECKED	K.C.T.	5-1-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Changed	LRH	4-19-74
2	Change of sta.	LRH	12-5-74
3	As Built	TEM	6-77

AS BUILT

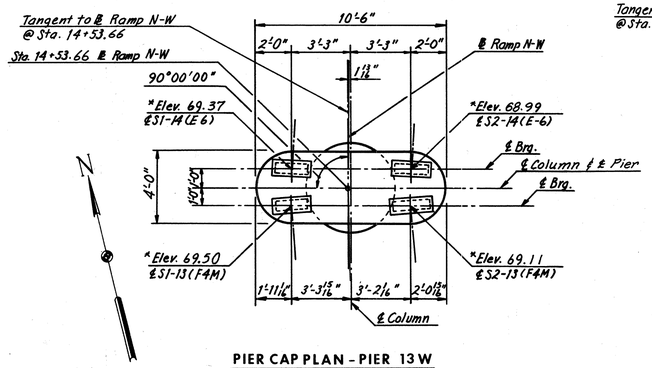
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 10 W AND 12 W

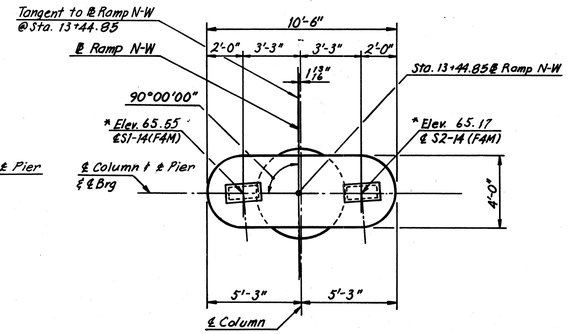
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 14 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	187	265

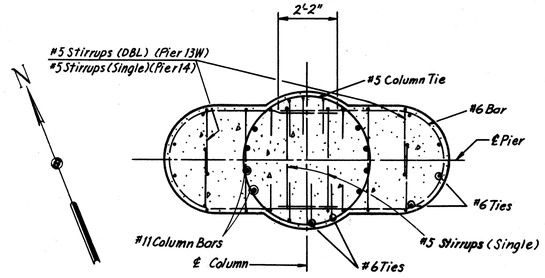


PIER CAP PLAN - PIER 13W
Scale: ¼"= 1'-0"

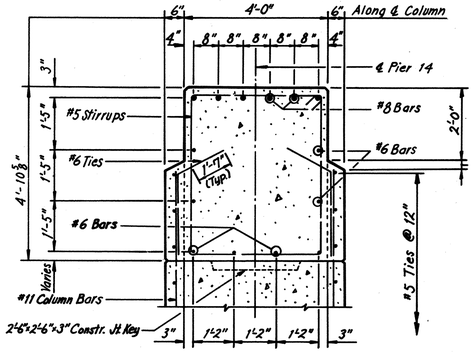


PIER CAP PLAN - PIER 14
Scale: ¼"= 1'-0"

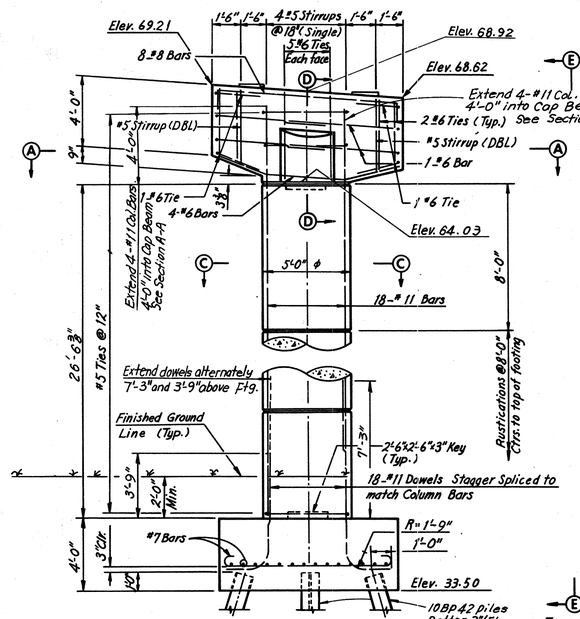
* Denotes the top Concrete Pad Elevations.



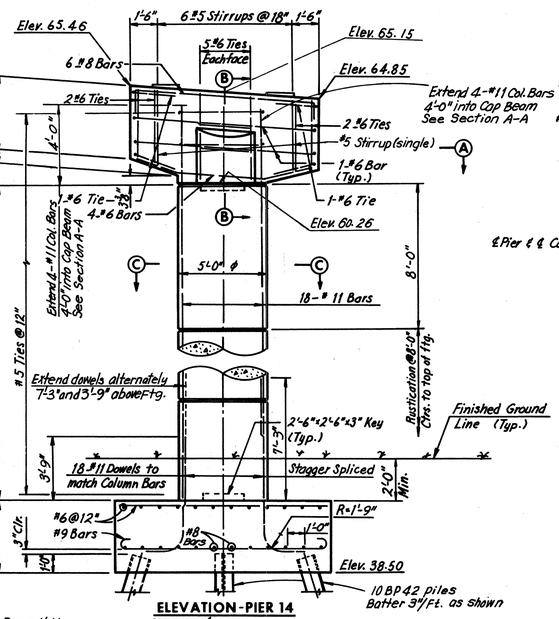
SECTION A-A
Scale: ⅜" = 1'-0"



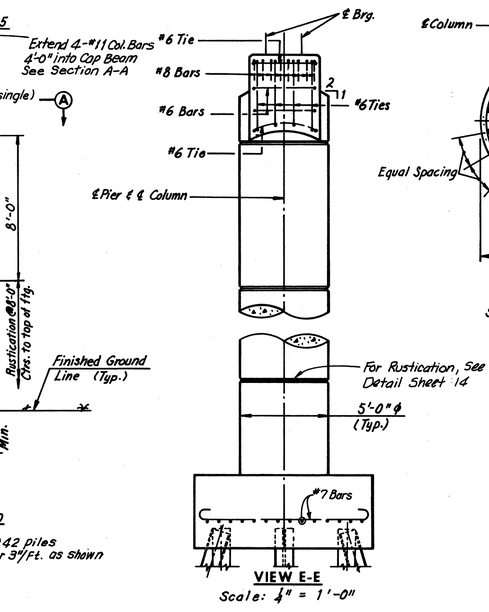
SECTION B-B
Scale: ½" = 1'-0"



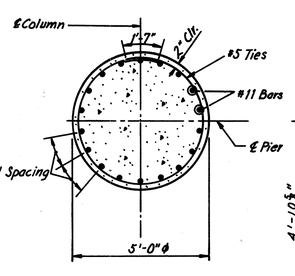
ELEVATION - PIER 13W
Scale: ¼"= 1'-0"



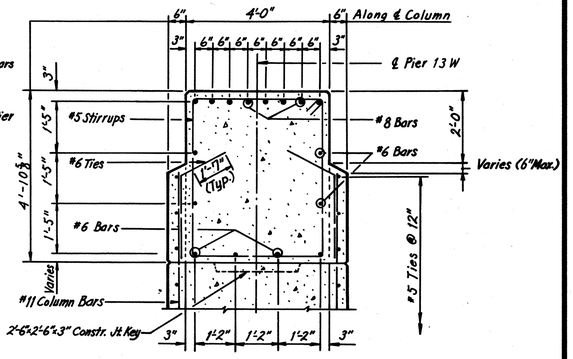
ELEVATION - PIER 14
Scale: ¼"= 1'-0"



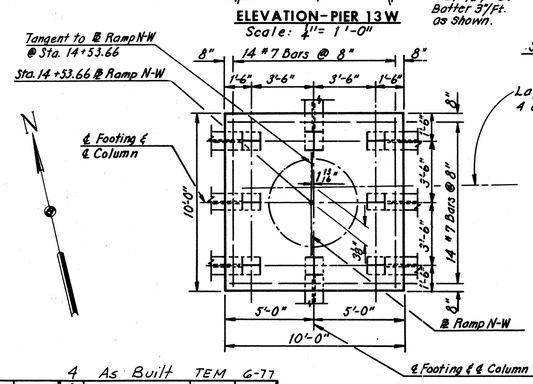
VIEW E-E
Scale: ¼" = 1'-0"



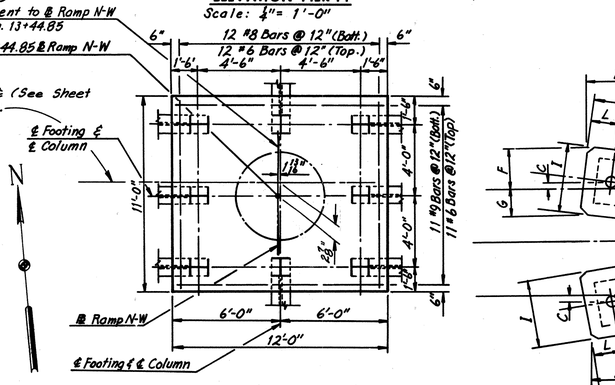
SECTION C-C
Scale: ⅜" = 1'-0"



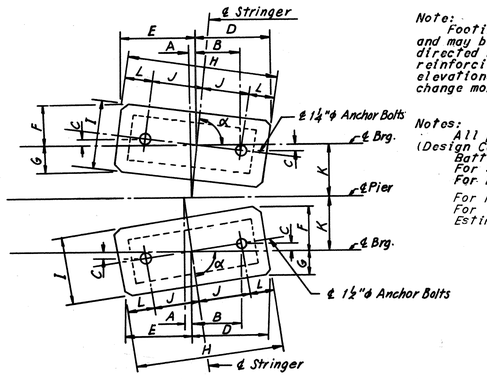
SECTION D-D
Scale: ½" = 1'-0"



FOOTING PLAN PIER 13W
Scale: 1"= 1'-0"



FOOTING PLAN - PIER 14
Scale: 1"= 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Pier	Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L
13W	S1-13	97°48'08"	7/16"	11½"	7/16"	1'-4⅛"	1'-3⅞"	6¼"	4⅞"	2'-8"	11"	11½"	12"	4½"
	S2-13	97°48'00"	7/16"	11½"	7/16"	1'-4⅛"	1'-3⅞"	6¼"	4⅞"	2'-8"	11"	11½"	12"	4½"
	S1-14	97°52'43"	7/16"	11¼"	7/16"	1'-3½"	1'-3"	6⅜"	5⅛"	2'-6½"	1'-0½"	11¼"	12"	4"
	S2-14	97°52'43"	7/16"	11¼"	7/16"	1'-3½"	1'-3"	6⅜"	5⅛"	2'-6½"	1'-0½"	11¼"	12"	4"
14	S1-14	97°55'17"	0"	11½"	7/16"	1'-4⅛"	1'-3⅝"	6⅛"	4⅛"	2'-8"	11"	11½"	0	4½"
	S2-14	97°55'17"	0"	11½"	7/16"	1'-4⅛"	1'-3⅝"	6⅛"	4⅛"	2'-8"	11"	11½"	0	4½"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 10BP42 steel piles.
(Design Capacity= 45 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet 51.
For Framing Plan, see Sheet 26.
For Rustication Details, see Sheet 14.
For 10BP42 Steel Pile Details, see Sheet 5.
Estimated Pile Tip Elevations
Pier 13W = 10.0
Pier 14 = 20.0

	BY	DATE
MADE	Y.C.P	3-5-69
CHECKED	K.C.T.	429-69
IN CHARGE		

NO.	REVISION	BY	DATE
4	As Built	TEM	6-77
1	Note Added	LRH	4-19-74
2	change of Sta.	REJ	12-5-74
3	Pad Elevations Piers 13W & 14	DWB	2-10-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

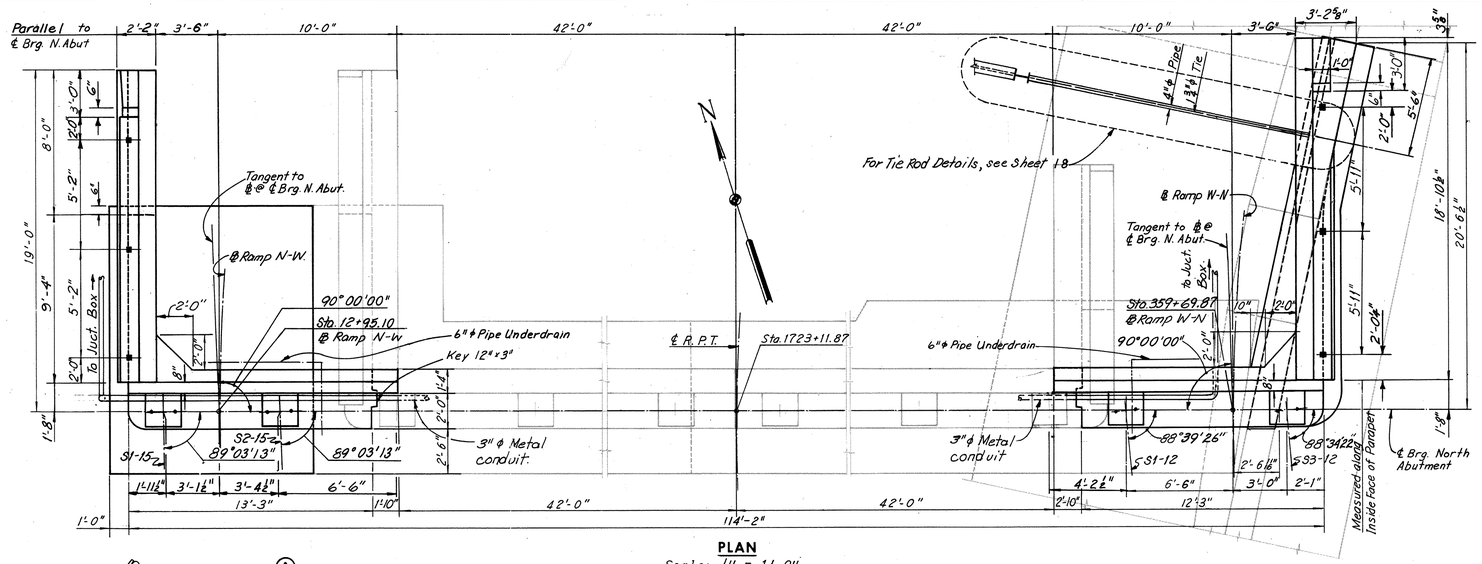
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 13W AND 14

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

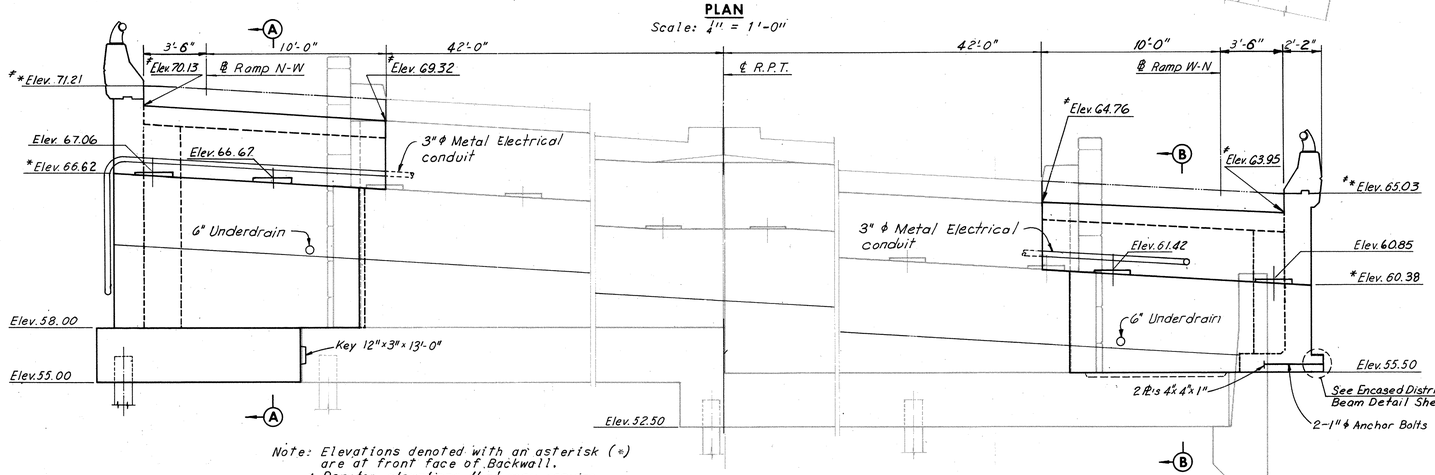
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 15 OF 54

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	188	265

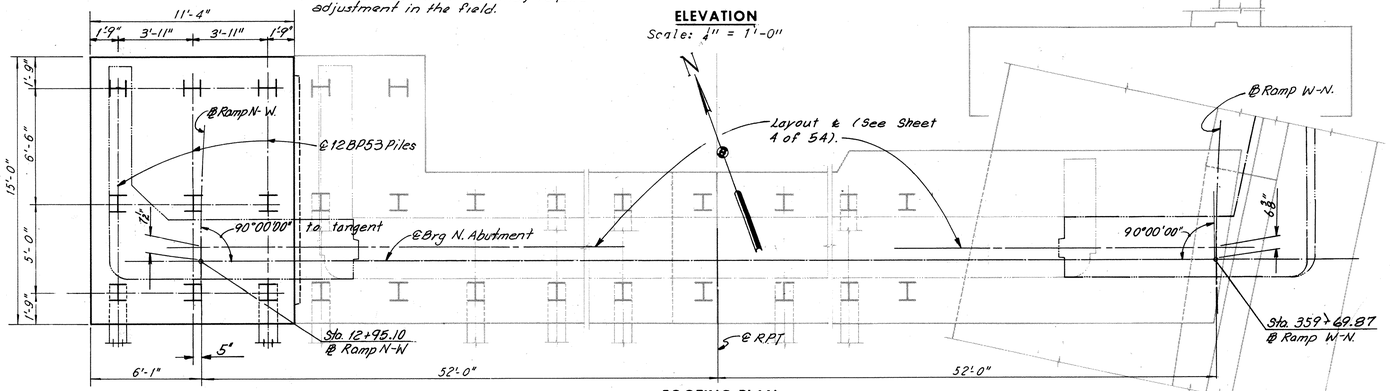


PLAN
Scale: ¼" = 1'-0"

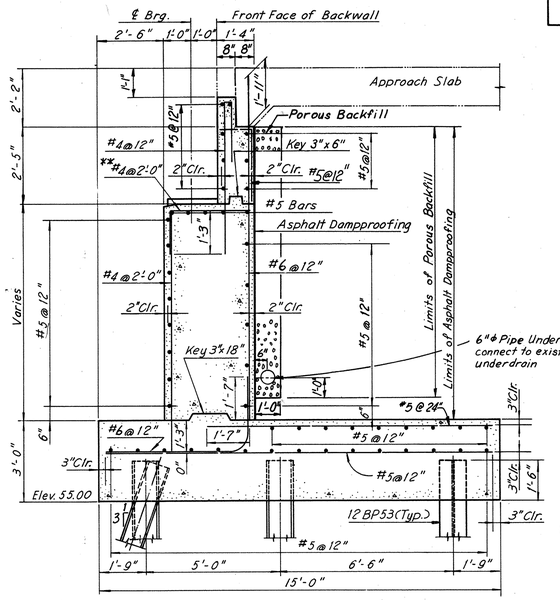


Note: Elevations denoted with an asterisk (*) are at front face of Backwall.
* Denotes elevations that may require adjustment in the field.

ELEVATION
Scale: 1" = 1'-0"

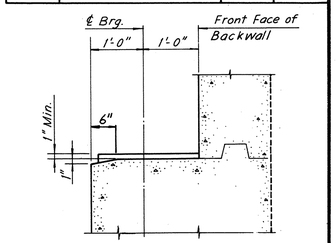


FOOTING PLAN
Scale: ¼" = 1'-0"

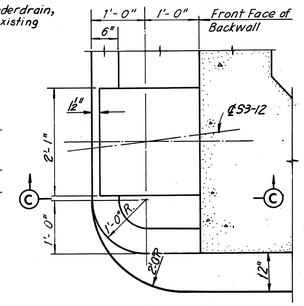


SECTION A-A
Scale: ⅜" = 1'-0"

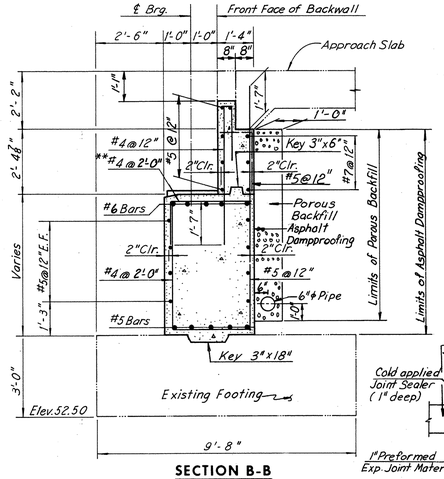
** Provide 2 additional #4 bars spaced at 2'-0" at each bearing pad.



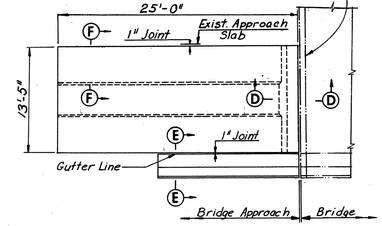
SECTION C-C
Scale: ¾" = 1'-0"



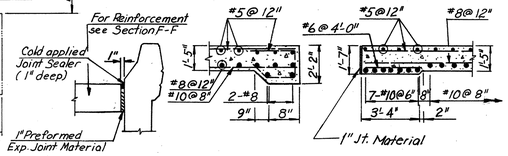
BEARING PAD DETAILS
Scale: ¾" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"



WEST APPROACH SLAB
Scale: ⅛" = 1'-0"
East Approach Slab similar



SECTION E-E
Scale: ¼"=1'-0"

SECTION D-D
Scale: ¼"=1'-0"

SECTION F-F
Scale: ¼"=1'-0"

Note:
All reinforcement extending from existing barrel, backwall and footing shall be cleaned and extended into new barrel and backwall.
The existing wingwall shall be removed to a depth of 2'-0" below the bottom of the approach slabs.

Note:
For North Abutment Details see Sheet 17.
For Retaining Wall see Sheet 18.
For Framing Plan see Sheet 26.
All Piles in Footing are 12BP53 Steel Piles (Design Capacity = 57 tons).
Estimated Pile Tip Elevation 20.00.
The Contractor shall verify all Elevations and Dimensions.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	MHH	1-7-69	1	change of Sta.	REJ	12-5-74
CHECKED	MH	5-13-69	2	Elevations & Note	DWB	2-10-75
IN CHARGE			3	As Built	TEM	6-77

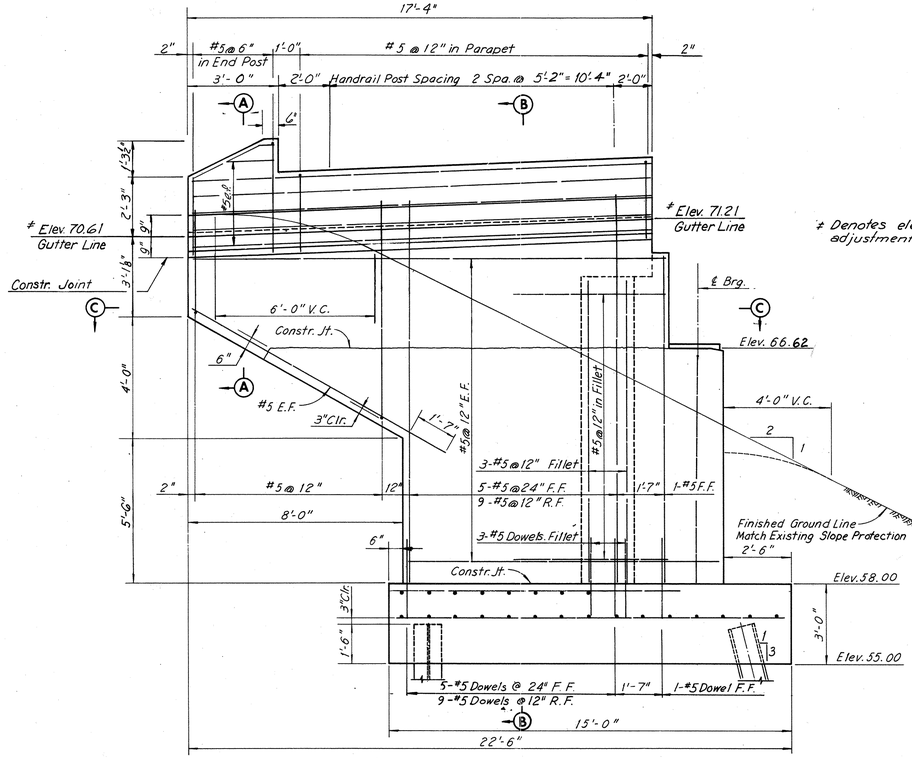
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT

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

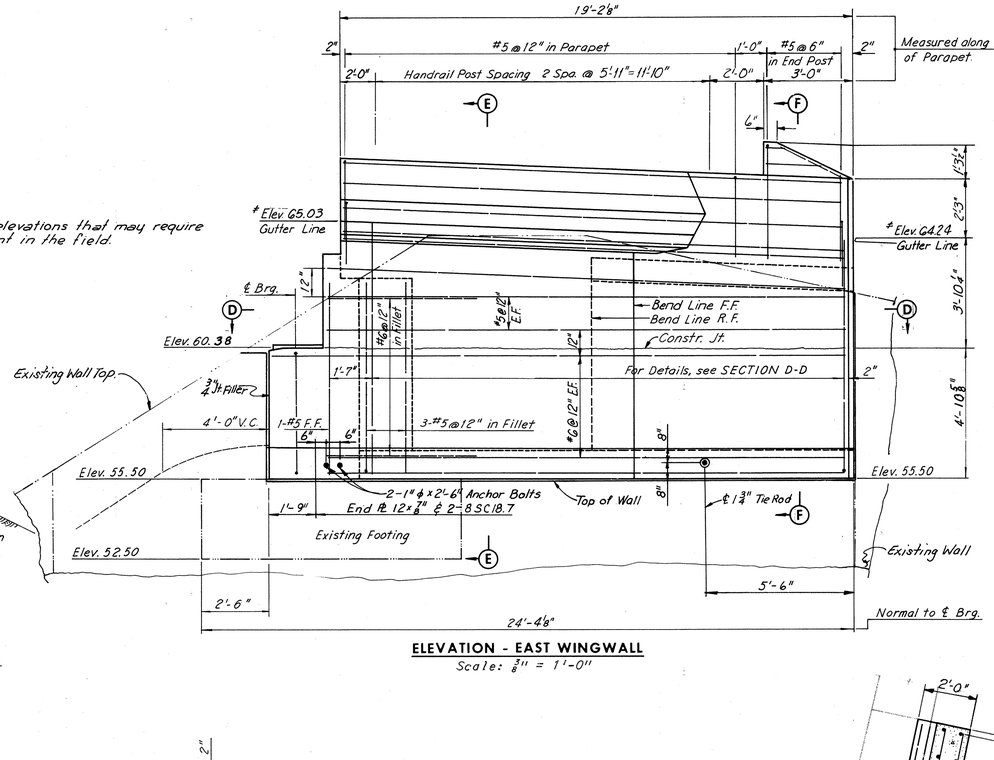
SCALE: As noted
CONTRACT NO.: 10
SHEET NO. 16 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	189	265

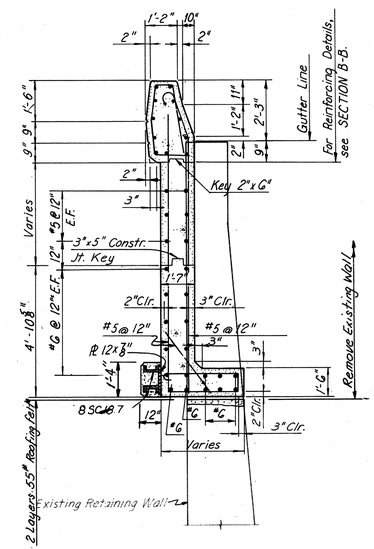


ELEVATION - WEST WINGWALL
Scale: $\frac{3}{8}$" = 1'-0"

℄ Denotes elevations that may require adjustment in the field.



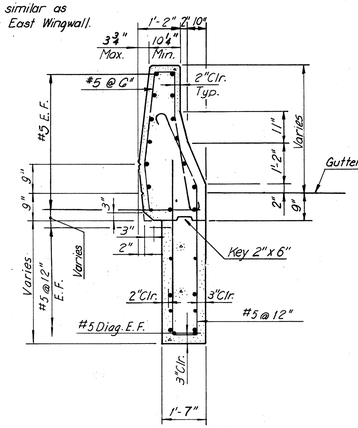
ELEVATION - EAST WINGWALL
Scale: $\frac{3}{8}$" = 1'-0"



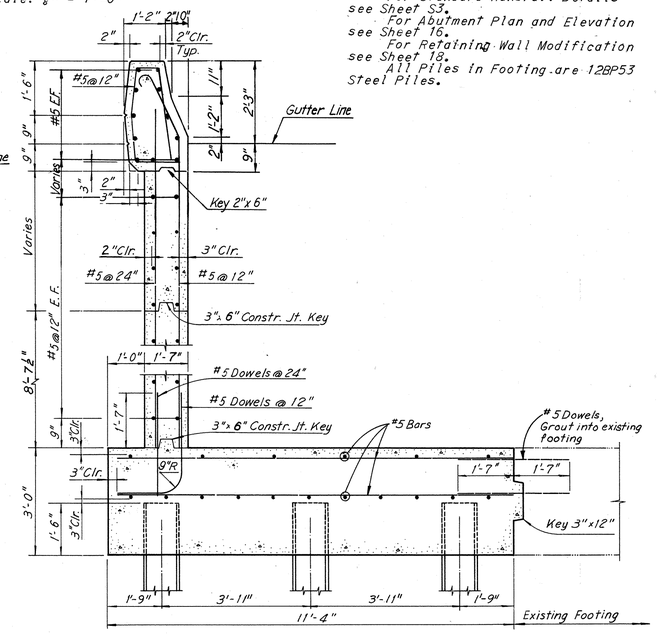
SECTION E-E
Scale: $\frac{3}{8}$" = 1'-0"

Note:
For Standard Handrail Details see Sheet S3.
For Abutment Plan and Elevation see Sheet 16.
For Retaining Wall Modification see Sheet 18.
All Piles in Footing are 12BP53 Steel Piles.

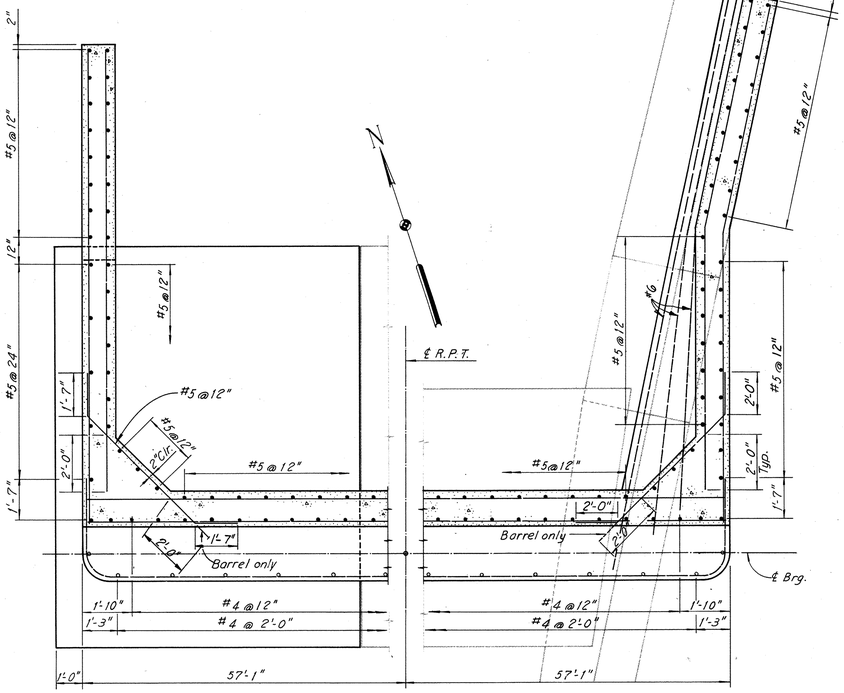
* Detail is similar as shown for East Wingwall.



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

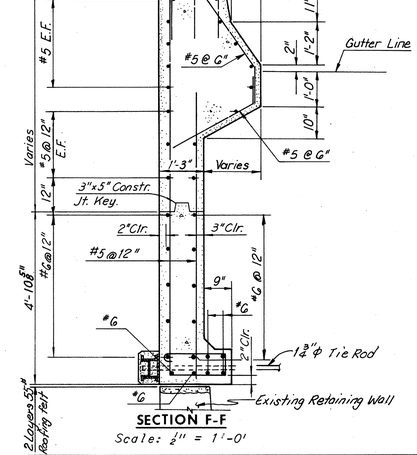


SECTION B-B
Scale: $\frac{1}{2}$" = 1'-0"



SECTION C-C
Scale: $\frac{3}{8}$" = 1'-0"

SECTION D-D
Scale: $\frac{3}{8}$" = 1'-0"



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

AS BUILT

	BY	DATE
MADE	MHH	1-14-69
CHECKED	AMH	5-13-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEN	6-77
1	Guttering Elevs. & Note	DWB	2-10-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

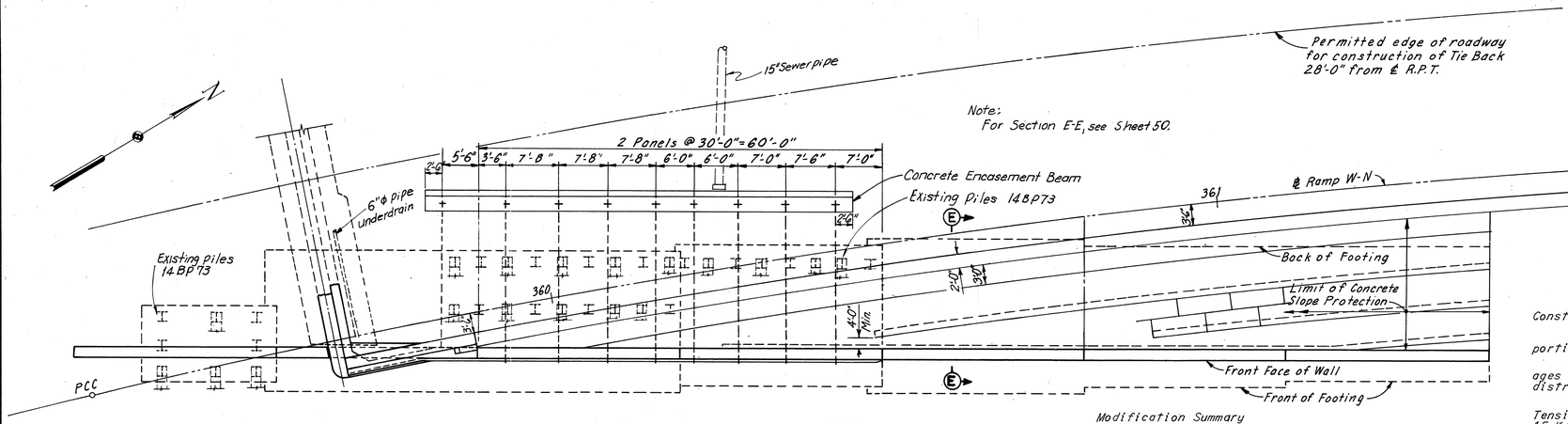
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT DETAILS

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

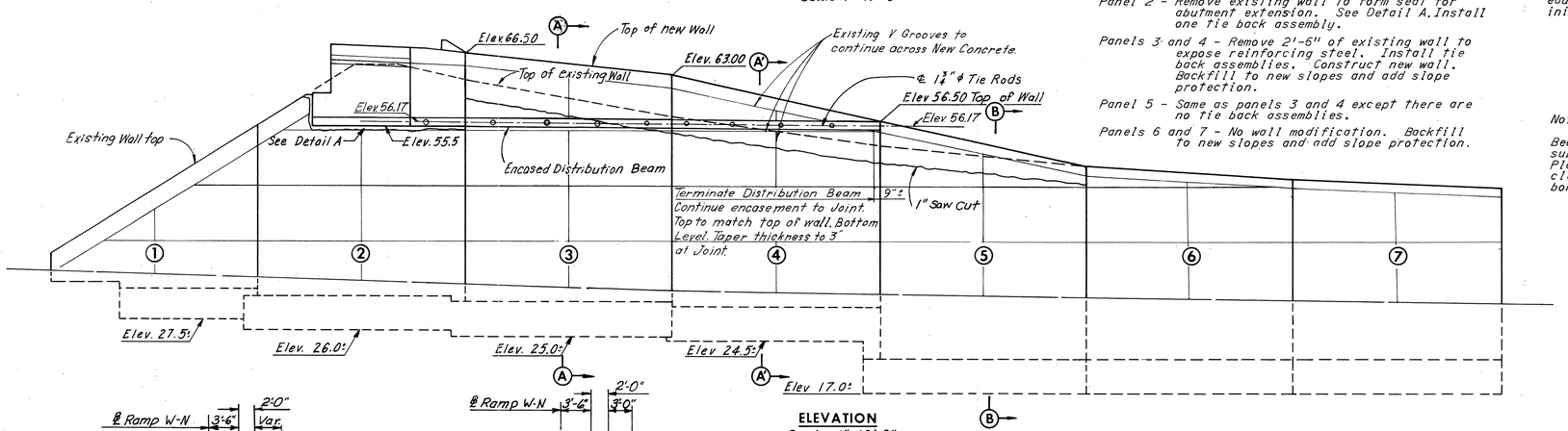
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 17 OF 54

LEGEND: E.F. denotes each face.
F.F. denotes front face.
R.F. denotes rear face.

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	190	265



PLAN
Scale: 1"=10'-0"



ELEVATION
Scale: 1"=10'-0"

Modification Summary

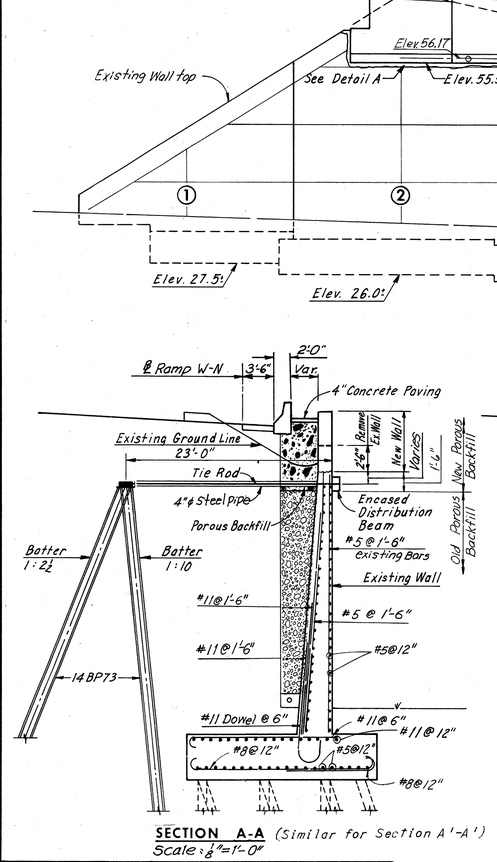
Panel 1 - No modification

Panel 2 - Remove existing wall to form seat for abutment extension. See Detail A. Install one tie back assembly.

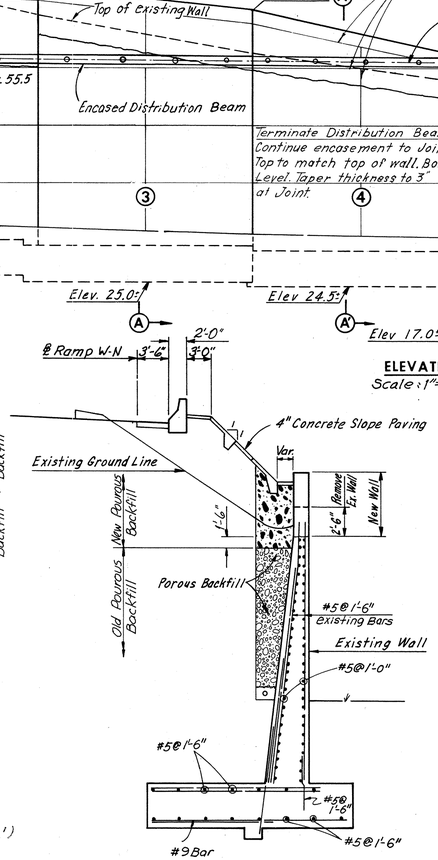
Panels 3 and 4 - Remove 2'-6" of existing wall to expose reinforcing steel. Install tie back assemblies. Construct new wall. Backfill to new slopes and add slope protection.

Panel 5 - Same as panels 3 and 4 except there are no tie back assemblies.

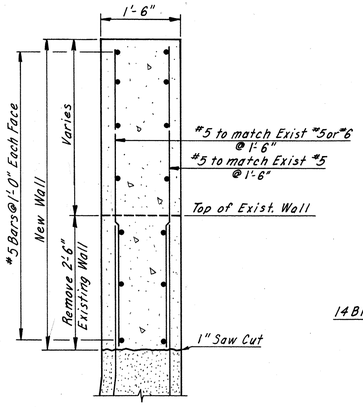
Panels 6 and 7 - No wall modification. Backfill to new slopes and add slope protection.



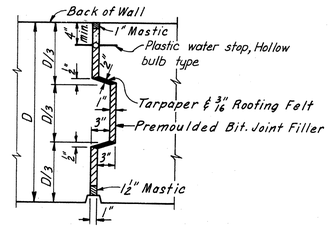
SECTION A-A (Similar for Section A'-A')
Scale: ⅛"=1'-0"



SECTION B-B
Scale: ⅛"=1'-0"



TYPICAL REINFORCING DETAIL TOP OF WALL
Scale: ¾"=1'-0"



EXPANSION JOINT DETAIL
Scale: 1"=1'-0"

Construction Sequence

Excavate sufficiently to remove required portions of wall. Extend wall to final height.

Make Excavation for placement of pile anchorages and tie rods. Drive piles and install steel distribution beam and tie rods.

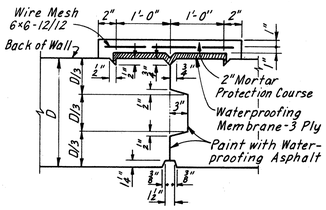
Bring tie rod nuts to "finger tight" condition. Tension tie rods to 18 K/rod, Panels 2 and 3; and 15 K/rod, Panel 4. Tension shall be determined by use of a Whitmore strain gage or other procedure approved by the Engineer. Gages shall be initilized after tie rod nuts are "finger tight"

Backfill wall to final slope.

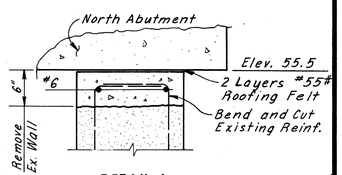
Place concrete slope protection

See Special Provision

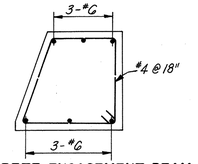
Note:
Rub wall with neat cement paste under 12"x½" Bearing Plate to provide reasonably smooth bearing surface. Roughen area between edge of Bearing Plate and limits of concrete encasement to provide clean bonding surface. See Special Provisions for bonding new concrete to existing.



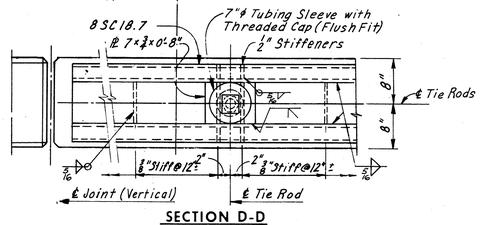
CONSTRUCTION JOINT DETAIL
Scale: 1"=1'-0"



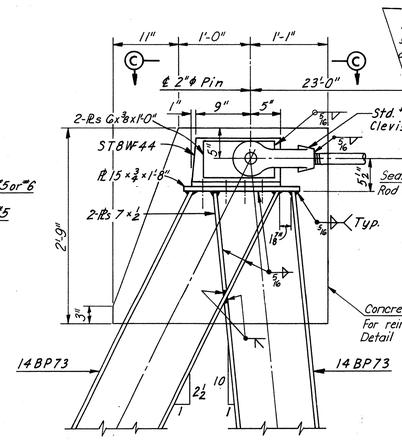
DETAIL A
Scale: 1"=1'-0"
Use similar detail for vertical face.



CONCRETE ENCASEMENT BEAM REINFORCING DETAIL
Scale: ½"=1'-0"



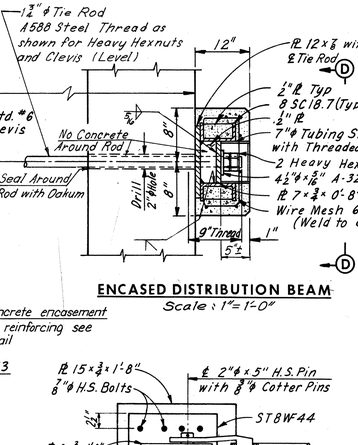
SECTION D-D
Scale: 1"=1'-0"



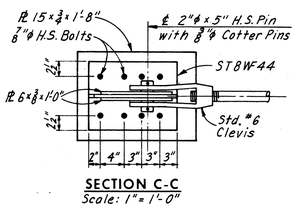
PILE CONNECTION DETAIL
Scale: 1"=1'-0"

Estimated Pile tip Elev. = 9.0

NOTE: *Load test of Piles is to be performed as specified in the Special Provisions.*



ENCASED DISTRIBUTION BEAM
Scale: 1"=1'-0"



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

AS BUILT

	BY	DATE
MADE	AMH	3-12-69
CHECKED	KCT	6-24-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	6-77

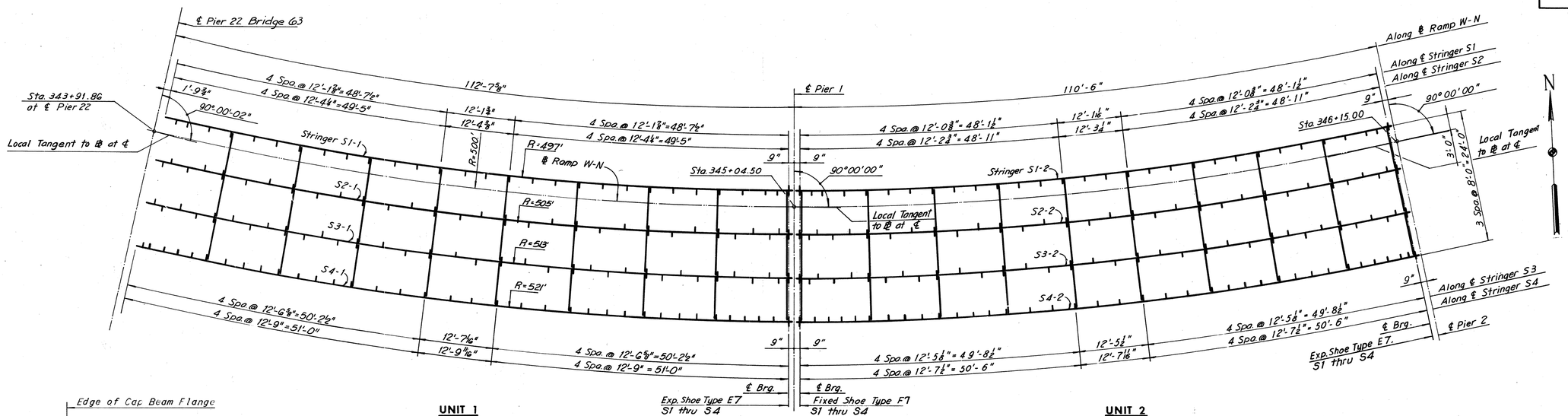
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT RETAINING WALL MODIFICATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 54

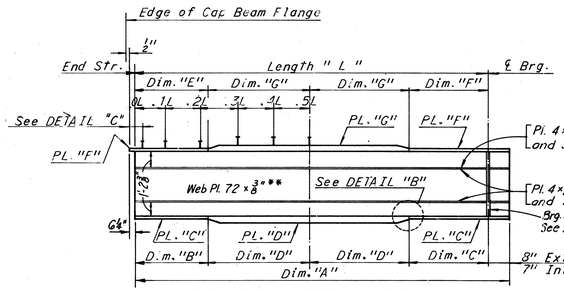
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	191	265



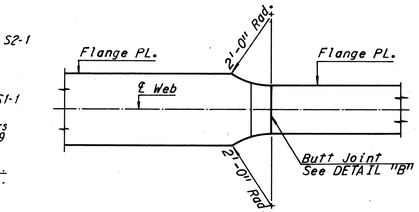
UNIT 1 **UNIT 2**

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-1 and S1-2

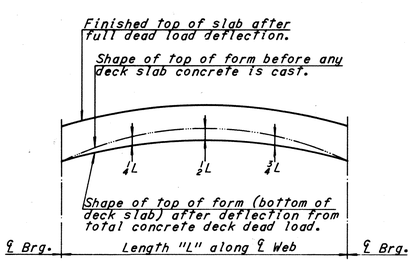
FRAMING PLAN
Scale: 1" = 10'-0"



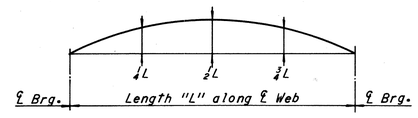
STRINGER ELEVATION - UNIT 1
No Scale



FLANGE PLATE SPLICE DETAIL
No Scale



DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

NOTE TO CONTRACTOR

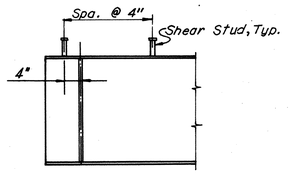
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Notes:
For Standard Shoe details, see Sheet S1&S2.
For Deck Plan, see Sheet 29.
For Details of diaphragms, see Sheet 29.
For Joint Details, see Sheet 29.
For Web to Flange Weld size, see note, Sheet 20.

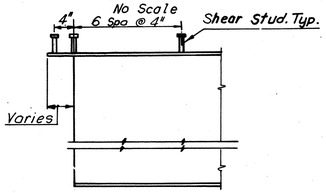
Note:
Shear lug spacing as shown is typical for both halves of the stringer.

SHOE SCHEDULE

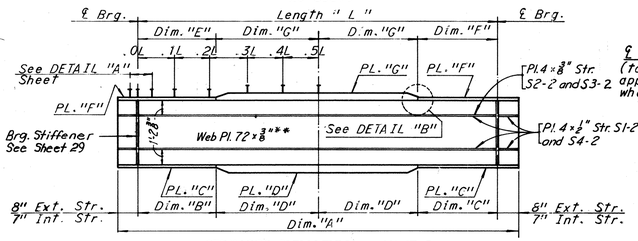
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E7	8	F7	4



DETAIL A
No Scale

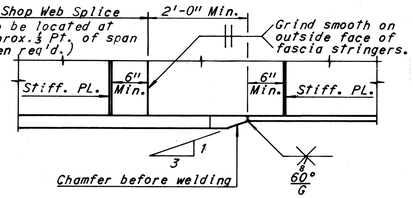


DETAIL C
No Scale



STRINGER ELEVATION UNIT 2
No Scale

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.



DETAIL "B"
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL "C"	PL "D"	PL "F"	PL "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
1	S1-1	110'-0⅜"	109'-4⅜"	19'-8⅜"	19'-8⅜"	35'-0"	54'-8⅜"	54'-8⅜"	-	16x⅝"	16x1⅛"	12x¾"	-	16½"	19"	24"	24"	24"	⅞"	1 3/16"	⅞"	⅛"	⅛"	⅛"	4 ⅛"	5 ½"	4 ⅛"
	S2-1	111'-9⅝"	111'-2⅝"	20'-4⅛"	20'-4⅛"	35'-3"	55'-7⅜"	55'-7⅜"	-	16x1⅛"‡	16x1⅜"‡	12x1 1/16"‡	-	12½"	15½"	20"	24"	24"	1⅛"	1⅜"	1⅛"	¼"	⅜"	¼"	4 ⅛"	6 ⅛"	4 ⅛"
	S3-1	113'-7⅛"	113'-0⅛"	20'-3"	20'-3 1/16"	36'-3"	19'-3"	19'-3 1/16"	37'-3"	20x1 1/4"‡	20x1 5/16"‡	12x1"‡	16x1 1/4"‡	10½"	12½"	16½"	21½"	24"	1 3/16"	1 1/16"	1 3/16"	⅜"	½"	⅜"	4 ⅝"	6 ¼"	4 ⅝"
	S4-1	115'-5 1/16"	114'-9 1/16"	20'-7⅞"	20'-7 13/16"	36'-9"	20'-7⅞"	20'-7 13/16"	36'-9"	20x1 5/16"‡	24x1⅜"‡	16x1"‡	20x1 1/4"‡	8½"	10"	14"	19½"	24"	1⅜"	1⅜"	1⅜"	⅜"	½"	⅜"	4 3/16"	6 ½"	4 3/16"
2	S1-2	109'-8⅛"	108'-4⅛"	21'-2"	21'-2"	33'-0"	54'-2"	54'-2"	-	12x1⅛"	16x1 1/4"	12x¾"	-	16"	18½"	24"	24"	24"	⅞"	1⅛"	⅞"	⅛"	⅜"	⅛"	1 ⅞"	1 ¼"	1 ⅜"
	S2-2	111'-3¼"	110'-1¼"	21'-9⅝"	21'-9⅝"	33'-3"	55'-0⅜"	55'-0⅜"	-	16x1"‡	16x1 3/16‡	12x1"‡	-	12½"	15½"	19½"	24"	24"	1¼"	1 1/16"	1¼"	¼"	⅜"	¼"	1 ⅞"	2 5/16"	1 5/8"
	S3-2	113'-0⅛"	111'-10⅛"	22'-2⅛"	22'-2⅛"	33'-9"	22'-2⅛"	22'-2⅛"	33'-9"	20x1"‡	20x1 3/16‡	12x⅞"‡	16x1"‡	10"	12½"	16½"	21½"	24"	1 3/8"	1 5/16"	1 3/8"	⅜"	½"	⅜"	2 ⅛"	2 11/16"	1 7/8"
	S4-2	114'-11 11/16"	113'-7 11/16"	22'-6 13/16"	22'-6 13/16"	34'-3"	22'-6 13/16"	22'-6 13/16"	34'-3"	20x1 1/4"‡	20x1 3/16‡	16x⅞"‡	16x1 1/4"‡	8½"	10"	14"	19½"	24"	1½"	2 1/16"	1½"	⅜"	⅝"	⅜"	2 ¼"	2 ⅞"	2"

* Spacing begins at termination of 6 spaces @ 4".
‡ Denotes A572-Grade 50 steel for thicknesses of ¾" and under and A588 steel for thicknesses over ¾".

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener plates shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

All intermediate stiffeners shall be 12.5x⅜".

AS BUILT

	BY	DATE
MADE	MHH	8-15-68
CHECKED	P.T.A.	10-18-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Dead Load Defl. Steel Added	REG	11-14-74
3	As Built	TEM	6-77

P.T.A.

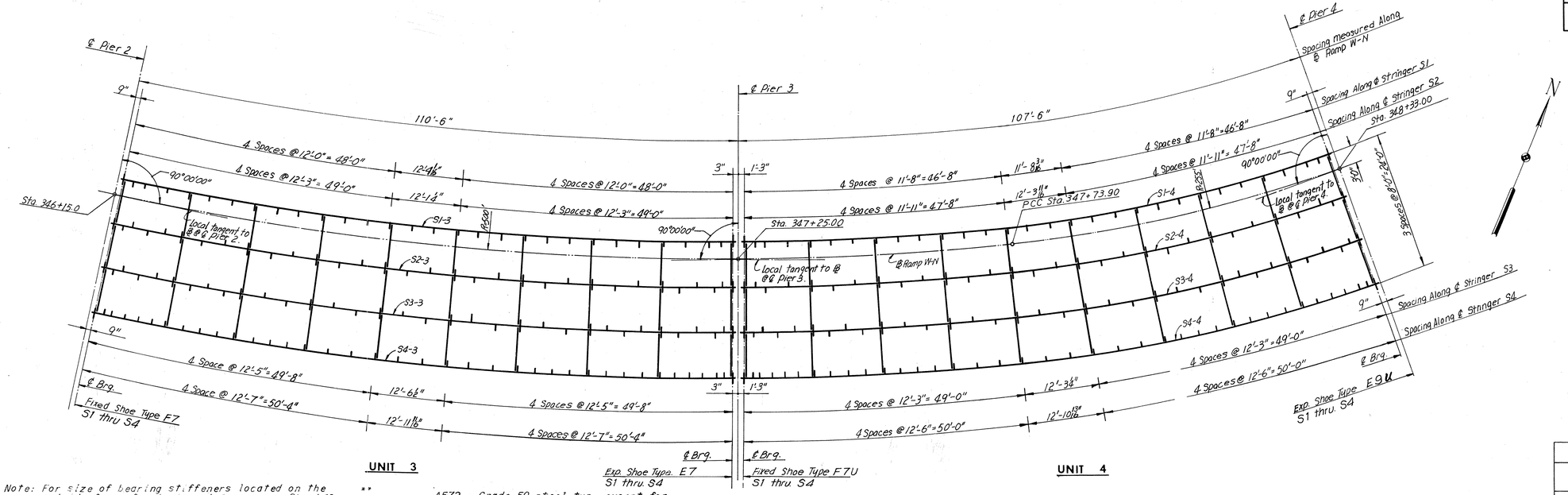
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 1 AND 2

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	192	265

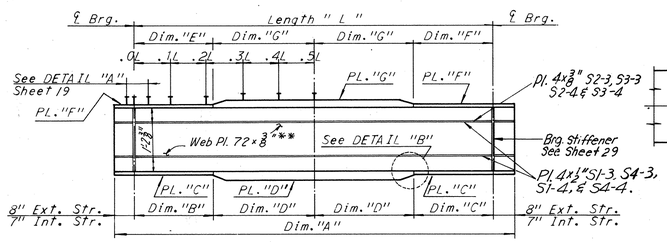


UNIT 3 **UNIT 4**

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-3 and S1-4

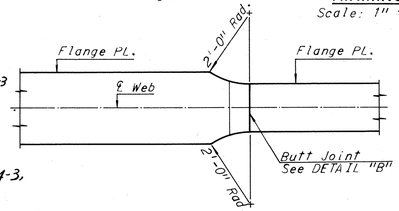
FRAMING PLAN
Scale: 1" = 10'-0"



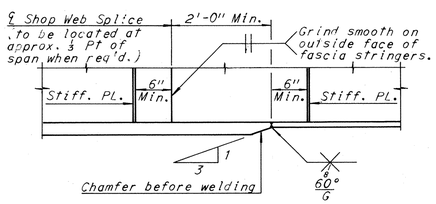
STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

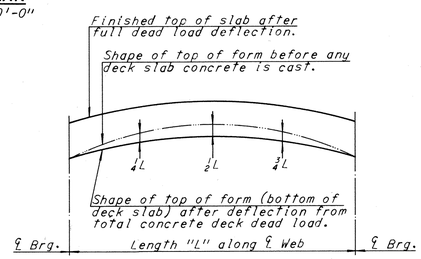
Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5 x 3/8".



FLANGE PLATE SPLICE DETAIL
No Scale



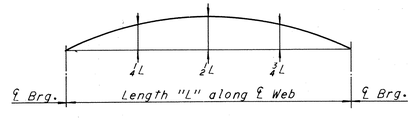
DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

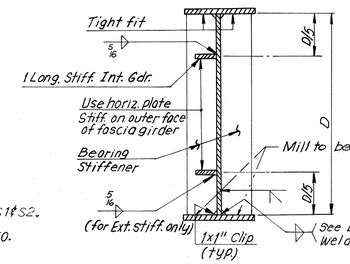


CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Notes:
For Standard Shoe details see Sheets S1 & S2.
For Deck Plan see, Sheet 30.
For Details of diaphragms, see Sheet 30.
For Joint details, see Sheet 49.



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS

Note: Web to flange weld size shall be determined by flange thickness as follows:
to 1 1/2" ..... 5/16" weld
over 1/2" to 2 1/4" ..... 3/8" weld

Note: Minus (-) sign in camber denotes downward camber.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E7	4	F7	4
E9U	4	F7U	4

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"#	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
3	S1-3	109'- 8 1/16"	108'- 4 1/16"	21'-2"	21'-2 1/16"	33'-0"	54'-2"	54'-2 1/16"	-	12x1 1/16"	16x1 1/4"	12x 3/4"	-	16 1/2"	18 1/2"	24"	24"	24"
	S2-3	111'- 3 1/16"	110'- 1 1/16"	21'-9 3/16"	21'-9 3/16"	33'-3"	55'-0 3/16"	55'-0 3/16"	-	16x11" ‡	16x1 3/8" ‡	12x11" ‡	-	12 1/2"	15 1/2"	19 1/2"	24"	24"
	S3-3	113'- 0 1/16"	111'-10 1/16"	22'-2 1/16"	22'-2 1/16"	33'-9"	22'-2 1/16"	22'-2 1/16"	33'-9"	20x11" ‡	20x1 3/8" ‡	12x 3/8" ‡	16x1"	10"	12 1/2"	16 1/2"	21 1/2"	24"
	S4-3	114'-11 15/16"	113'- 7 15/16"	22'-6 15/16"	22'-6 15/16"	34'-3"	22'-6 15/16"	22'-6 15/16"	34'-3"	20x1 1/4" ‡	20x1 3/4" ‡	16x 5/16" ‡	16x1 1/4"	8 1/2"	10"	14"	19 1/2"	24"
4	S1-4	106'- 4 3/16"	105'- 0 3/16"	20'-9 1/16"	20'-9 1/16"	31'-9"	52'-6 1/16"	52'-6 1/16"	-	12x1"	16x1"	12x 3/4"	-	16 1/2"	18 1/2"	24"	24"	24"
	S2-4	108'- 9 1/16"	107'- 7 1/16"	21'-0 15/16"	21'-0 1/16"	32'-9"	53'-9 15/16"	53'-9 1/16"	-	16x11" ‡	16x1 3/8" ‡	12x1" ‡	-	13"	15 1/2"	19 1/2"	24"	24"
	S3-4	111'- 5 1/4"	110'- 3 1/4"	21'-7 5/8"	21'-7 5/8"	33'-6"	21'-7 5/8"	21'-7 5/8"	33'-6"	20x1 1/4" ‡	20x1 3/4" ‡	16x 5/16" ‡	16x1 1/4"	10"	12"	16"	20 1/2"	24"
	S4-4	114'- 2 15/16"	112'-10 15/16"	21'-8 3/16"	21'-8 3/16"	34'-9"	21'-8 3/16"	21'-8 3/16"	34'-9"	20x1 1/4" ‡	24x1 3/4" ‡	16x1 1/4" ‡	20x1 1/2"	8"	9 1/2"	13"	18"	24"

DEAD LOAD DEFLECTION (CONCRETE ONLY)			DEAD LOAD DEFLECTIONS (STEEL ONLY)			CAMBER SCHEDULE		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
7/8"	1 1/4"	7/8"	1/8"	3/16"	1/8"	5/8"	5/8"	-3/16"
1 1/4"	1 11/16"	1 1/4"	1/4"	3/8"	1/4"	1 1/16"	1 1/4"	5/16"
1 3/8"	1 15/16"	1 3/8"	3/8"	1/2"	3/8"	1 5/16"	1 3/8"	2/16"
1 1/2"	2 1/16"	1 1/2"	3/8"	9/16"	3/8"	1 1/2"	1 13/16"	11/16"
9/16"	13/16"	9/16"	1/16"	1/16"	1/16"	-4 13/16"	-6 3/8"	-4 13/16"
1 1/16"	1 1/16"	1 1/16"	5/16"	5/16"	3/16"	-4 1/4"	-5 5/8"	-4 1/4"
1 3/8"	1 3/8"	1 3/8"	5/16"	1/16"	5/16"	-4 1/8"	-5 7/16"	-4 1/16"
1/4"	1 1/16"	1/4	3/8"	9/16"	3/8"	-4 1/16"	-5 1/4"	-3 7/8"

* Spacing begins at termination of 6 spaces @ 4".
‡ Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Note: Shear lug spacing as shown is typical for both halves of the stringer.

AS BUILT

	BY	DATE
MADE	G.S.H.	08-23-68
CHECKED	P.T.A.	10-18-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Shoes Revised, Camber & Note Added	LRH	4-19-74
2	Dead Load Defl. steel added	REB	11-14-74
3	As Built	TEM	6-77

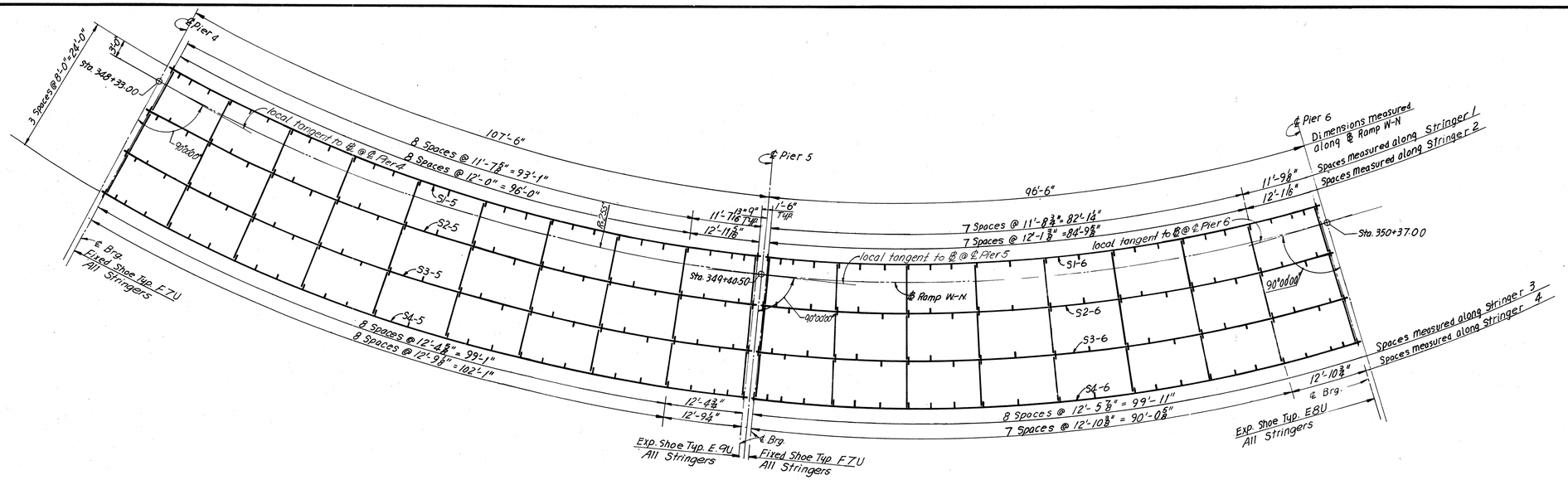
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN-UNITS 3 AND 4

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 20 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	193	265



SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO REQD.
E8U	4	F7U	8
E9U	4		

UNIT 5

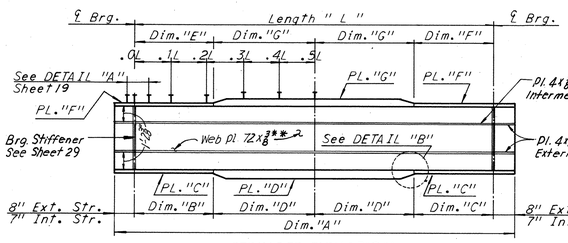
UNIT 6

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-5 and S1-6

FRAMING PLAN

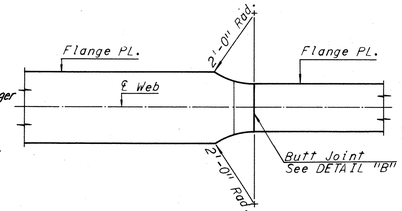
Scale 1" = 10'-0"



STRINGER ELEVATION

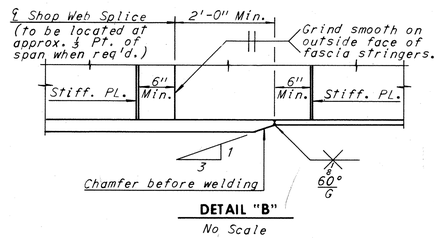
No Scale

Note: All horizontal dimensions are measured along ℄ Web.



FLANGE PLATE SPLICE DETAIL

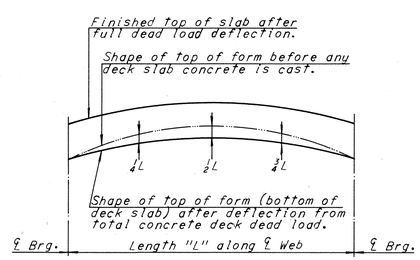
No Scale



DETAIL "B"

No Scale

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphrams as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5x⅜".



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Note:
Falsework supports will be required under Units 5 and 6 until all stringers and tie-down bearings are in place.

Note:
Minus (-) sign in camber denotes downward camber

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL "D"	PL."F"	PL "G"*	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼	½	¾	CAMBER SCHEDULE ¼	½	¾
5	S1-5	106'-0 15/16"	104'-8 15/16"	52'-4 7/16"	52'-4 3/16"	—	52'-4 7/16"	52'-4 3/16"	—	12x 3/4"	—	12x 3/4"	—	22 1/2"	24"	24"	24"	24"	7/16"	9/16"	7/16"	1/8"	3/16"	1/8"	-5/8"	-6 11/16"	-5/8"
	S2-5	109'-3 7/8"	108'-1 5/8"	21'-3 7/16"	21'-3 5/16"	32'-9"	54'-0 9/16"	54'-0 5/16"	—	16x 1" ‡	16x 1 3/8" ‡	12x 7/8" ‡	—	13 3/4"	16 1/2"	20 1/2"	24"	24"	1 1/16"	1 3/16"	1 1/16"	1/4"	5/16"	1/4"	-4 3/16"	-5 1/2"	-4 3/16"
	S3-5	112'-1 3/4"	111'-5 1/2"	22'-2 5/8"	22'-2 1/2"	33'-6"	22'-2 5/8"	22'-2 1/2"	33'-6"	20x 1 1/4" ‡	20x 1 3/4" ‡	16x 7/8" ‡	16x 1 1/4"	9 1/2"	12"	16"	20 1/2"	24"	1 1/4"	1 11/16"	1 1/4"	5/16"	1/2"	5/16"	-3 7/8"	-5 1/16"	-3 7/8"
	S4-5	116'-2 1/4"	114'-10 1/4"	22'-8 1/8"	22'-8 1/8"	34'-9"	22'-8 1/8"	22'-8 1/8"	34'-9"	20x 1 3/8" ‡	24x 1 1/8" ‡	16x 1 1/4" ‡	20x 1 2"	7 1/4"	9 1/2"	13"	18"	24"	1 7/16"	2"	1 7/16"	7/16"	5/8"	7/16"	-3 9/16"	-4 5/8"	-3 9/16"
6	S1-6	95'-2 3/8"	93'-10 3/8"	46'-11 1/4"	46'-11 1/8"	0	46'-11 1/4"	46'-11 1/8"	—	12x 1" ‡	—	12x 3/4"	—	20"	23 1/2"	24"	24"	24"	3/8"	9/16"	3/8"	1/16"	1/8"	1/16"	1/4"	7/16"	3/8"
	S2-6	98'-0 11/16"	96'-10 11/16"	19'-2 5/16"	19'-2 3/16"	29'-3"	48'-5 13/16"	48'-5 9/16"	—	12x 1" ‡	12x 1 3/8" ‡	12x 3/4" ‡	—	13 1/2"	16 1/2"	19 1/2"	24"	24"	13/16"	1 1/8"	13/16"	1/8"	3/16"	1/8"	13/16"	1 5/16"	7/8"
	S3-6	101'-1"	99'-11"	20'-2 1/2"	20'-2 3/8"	29'-9"	49'-1 1/2"	49'-1 3/8"	—	16x 1 1/4" ‡	20x 1 3/8" ‡	16x 7/8" ‡	—	10"	12"	16"	20"	24"	1"	1 3/8"	1"	1/4"	5/16"	1/4"	1 1/16"	1 5/8"	1 1/4"
	S4-6	104'-3 3/8"	102'-1 1 3/8"	20'-8 1/16"	20'-8 1/16"	30'-9"	20'-8 1/16"	20'-8 1/16"	30'-9"	20x 1 1/4" ‡	20x 1 3/4" ‡	16x 7/8" ‡	16x 1 1/4"	8"	9 1/2"	13"	17 1/2"	24"	1 3/16"	1 3/8"	1 3/16"	5/16"	7/16"	5/16"	13/16"	2"	1 1/2"

* Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾"

Note:
Shear lug spacing as shown is typical for both halves of the stringer.

Notes:
For Standard Shoe details see Sheets S1 S2.
For Deck Plan see, Sheet 31.
For Details of diaphragms, see Sheet 31.
For Joint details, see Sheet 49.
For Web to Flange Weld size, see note, Sheet 20.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	08-16-68	⚠	Notes added Shoe Revision & Camber	LRH	4-19-74
CHECKED	SCC	10-21-68	⚠	Dead Load Defl. Steel Added	REG	11-14-74
IN CHARGE			3	As Built	TEM	G-77

R.T.H.

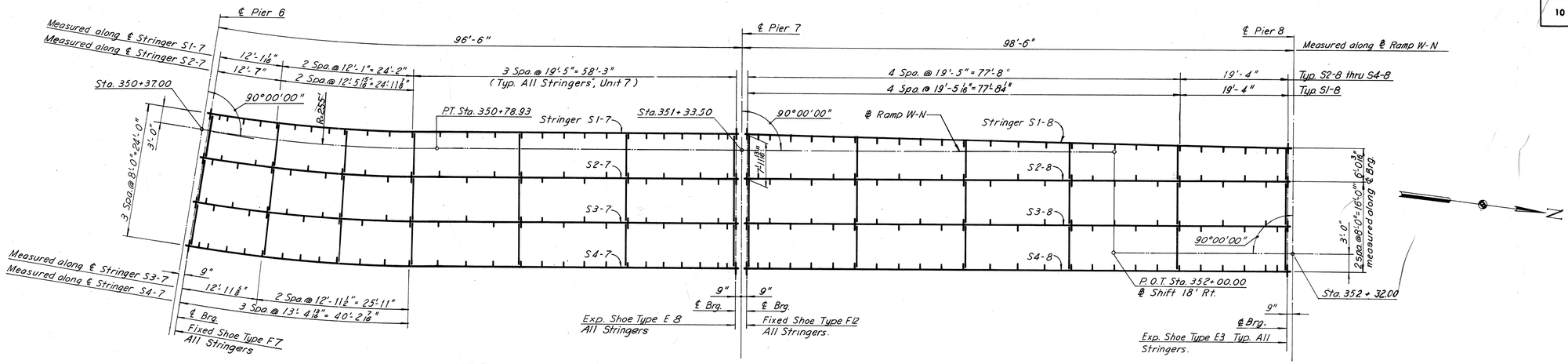
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN – UNITS 5 AND 6

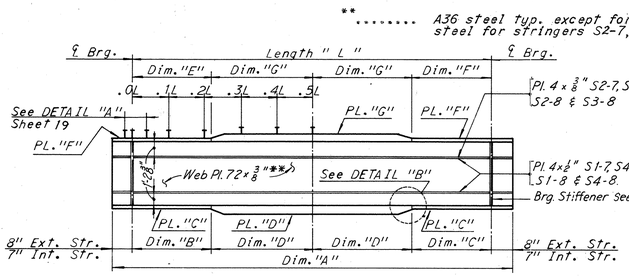
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 21 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	194	265

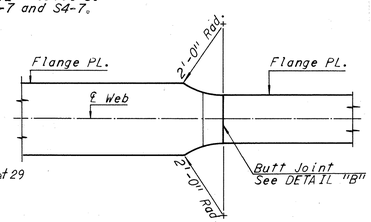


FRAMING PLAN
Scale: 1" = 10'-0"

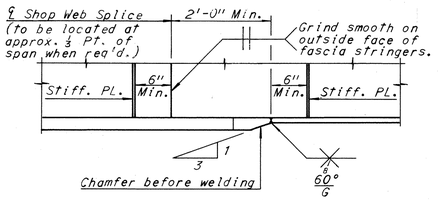


STRINGER ELEVATION
No Scale

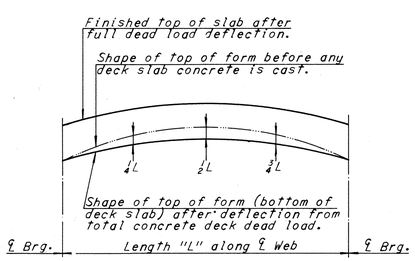
** ..... A36 steel typ. except for A572 - Grade 50 steel for stringers S2-7, S3-7 and S4-7.



FLANGE PLATE SPLICE DETAIL
No Scale



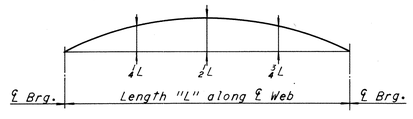
DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E3	4	F7	4
E8	4	F12	4

Notes.
All steel shall be A36 steel unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stingers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5 x ⅜".

Note: *For size of bearing stiffeners located on the out side face of exterior stringers see Sheet 29.*

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "F"	PL "G"≠	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
7	S1-7	95'-10⅛"	94'-6⅛"	18'-9"	18'-9⅛"	28'-6"	47'-3"	47'-3⅛"	-	12x1⅛"	16x1¼"	12x¾"	-	15½"	18"	23"	24"	24"	⅝"	⅞"	⅝"	⅛"	⅜"	⅛"	1 3/16"	1 1/16"	1 1/16"
	S2-7	96'-11⅞"	95'-9⅞"	18'-7⅝"	18'-7⅝"	29'-3"	47'-10⅜"	47'-10⅜"	-	16x1"‡	16x1⅜"‡	12x⅞"‡	-	13½"	16½"	20½"	24"	24"	⅜"	1 1/16"	⅜"	¼"	⅜"	1/16"	1 7/16"	2"	1 15/16"
	S3-7	98'-3⅝"	97'-1⅝"	18'-9⅝"	18'-9⅝"	29'-9"	48'-6⅜"	48'-6⅜"	-	16x1¼"‡	20x1⅜"‡	16x⅞"‡	-	9½"	12"	16"	20"	24"	13/16"	1 1/8"	13/16"	3/16"	¼"	3/16"	1 1/16"	2 1/16"	2"
	S4-7	99'-9⅛"	98'-5⅛"	18'-5⅛"	18'-5⅛"	30'-9"	18'-5⅛"	18'-5⅛"	30'-9"	20x1¼"‡	20x1⅜"‡	16x⅞"‡	16x1¼"	7½"	9½"	13"	17½"	24"	¾"	1 1/16"	¾"	1/16"	5/16"	1/16"	1 1/16"	1 7/8"	1 15/16"
8	S1-8	98'-4¼"	97'-0"	19'-0⅛"	19'-0⅛"	29'-6"	48'-6"	48'-6"	-	12x1"	12x1⅝"	12x¾"	-	10½"	12"	16½"	24"	24"	⅞"	1 3/4"	⅞"	3/16"	5/16"	3/16"	3 1/4"	4"	2 7/8"
	S2-8	98'-2"	97'-0"	48'-6"	48'-6"	-	48'-6"	48'-6"	-	12x1⅝"	-	12x¾"	-	11½"	13½"	18"	23"	24"	⅞"	1 1/4"	⅞"	¼"	5/16"	¼"	3 1/8"	3 7/8"	2 5/8"
	S3-8	98'-2"	97'-0"	48'-6"	48'-6"	-	48'-6"	48'-6"	-	12x1⅝"	-	12x¾"	-	11½"	13½"	18"	23"	24"	15/16"	1 3/8"	15/16"	¼"	5/16"	¼"	3 3/16"	3 7/8"	2 5/8"
	S4-8	98'-4"	97'-0"	19'-0"	19'-0"	29'-6"	48'-6"	48'-6"	-	12x1"	12x1⅝"	12x⅞"	-	10½"	12"	16½"	22"	24"	15/16"	1 5/16"	15/16"	3/16"	5/16"	3/16"	3 1/8"	3 3/4"	2 3/8"

Note:
Shear lug spacing as shown is typical for both halves of the stringer.

* *Spacing begins at termination of 6 spaces @ 4".*
≠ *Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾"*

Notes:
For Standard Shoe details, see Sheets S1 & S2.
For Deck Plan see Sheet 32.
For Details of diaphragms, see Sheet 32.
For Joint Details, see Sheet 49.
For Web to Flange Weld size, see Note, Sheet 20.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	MHH	8-26-68	1	Notes & Camber Added	LRH	4-19-74
CHECKED	SCC	10-22-68	2	Dead Load Defl. of Steel added	REB	11-14-74
IN CHARGE			3	As Built	TEM	6-77

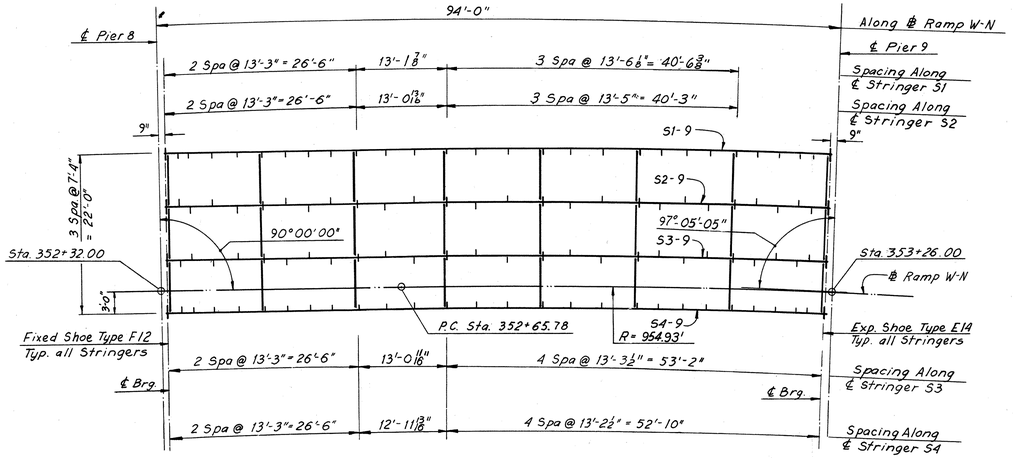
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7 AND 8

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

SCALE: As Noted.
CONTRACT NO.: 10
SHEET NO. 22 OF 54

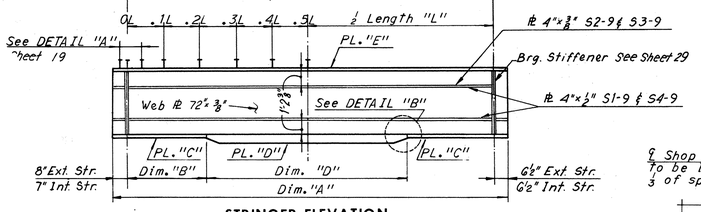
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	195	265



UNIT 9

FRAMING PLAN

Scale: 1" = 10'-0"

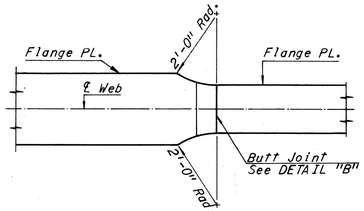


STRINGER ELEVATION

No Scale

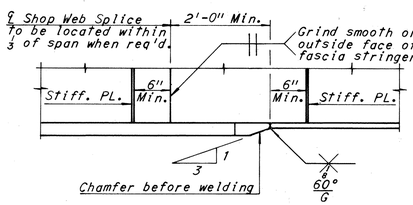
Note: All horizontal dimensions are measured along ℄ Web.

*Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 20.



FLANGE PLATE SPLICE DETAIL

No Scale

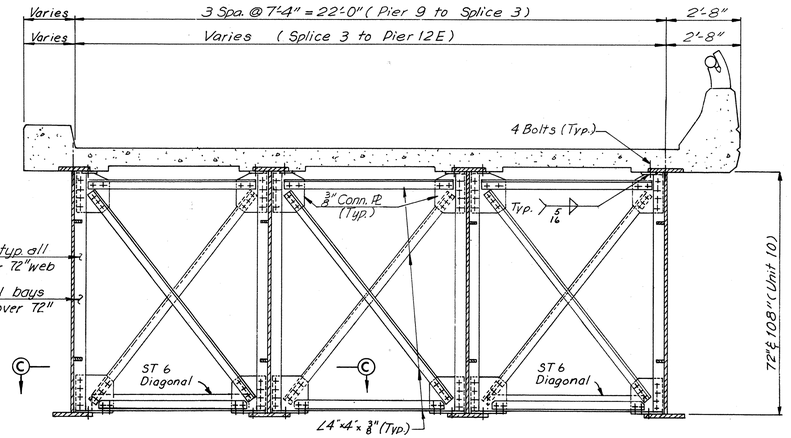


DETAIL "B"

No Scale

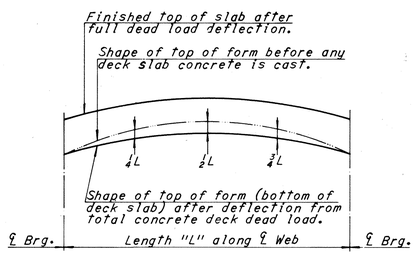
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E14	4	F12	4



TYPICAL INTERMEDIATE DIAPHRAGM-UNIT 10

Scale: ⅜" = 1'-0"

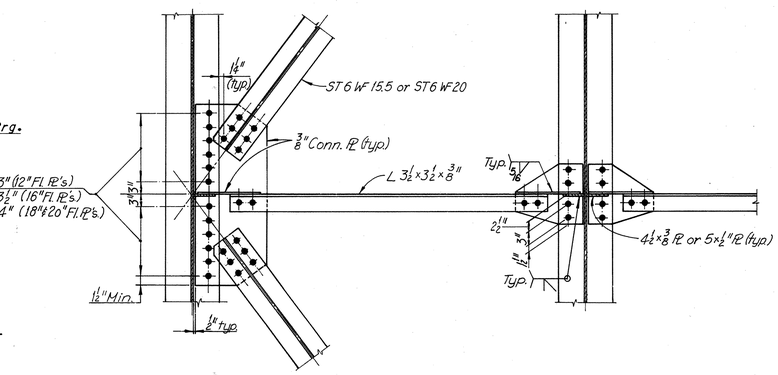


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



SECTION C-C

Scale ¾" = 1'-0"

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
9	S1-9	97'-2 11/16"	96'-0 3/8"	19'-0"		55'-8 3/8"	12"x1"	12"x 1 5/8"	12"x ¾"	10 2/4"	12"	16 2/4"	24"	24"
	S2-9	95'-9 11/16"	94'-8 3/8"	—	—	93'-2 13/16"	—	12"x 1 1/8"	12"x ¾"	13 2/4"	15 2/4"	20 2/4"	24"	24"
	S3-9	94'-4 15/16"	93'-3 7/16"	—	—	92'-8 1/16"	—	12"x 1 5/8"	12"x ¾"	11 2/4"	13 2/4"	18"	23"	24"
	S4-9	93'-1 13/16"	91'-11 5/16"	19'-0"		54'-3 11/16"	12"x1"	12x 1 5/8"	12"x ¾"	10 2/4"	12"	16 2/4"	22"	24"

DEAD LOAD DEFLECTION (CONCRETE ONLY)		
¼L	½L	¾L
13/16"	1/8"	13/16"
13/16"	1/8"	13/16"
11/16"	1"	11/16"
5/8"	7/8"	5/8"

DEAD LOAD DEFLECTIONS (STEEL ONLY)		
¼L	½L	¾L
3/16"	1/4"	3/16"
3/16"	1/4"	3/16"
3/16"	1/4"	3/16"
1/8"	3/16"	1/8"

CAMBER SCHEDULE		
¼L	½L	¾L
4"	5 8/16"	3 7/8"
3 3/4"	5 5/16"	3 11/16"
3 3/8"	4 8/16"	3 3/8"
3 1/8"	4 6/16"	3 1/8"

* Spacing begins at termination of 6 spaces @ 4".

Note: Shear lug spacing as shown is typical for both halves of the stringer.

Notes:
All steel shall be A36 steel unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffenor plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffenors shall be of ℄ 5x⅜"

Notes:
For Standard Shoe details see Sheets S1 & S2.
For Deck Plan see, Sheet 33.
For Details of diaphragms, see Sheet 33.
For Joint details, see Sheet 49.
For Web to Flange Weld size, see Note, Sheet 20.

	BY	DATE
MADE	C.E.B.	3-13-69
CHECKED	AMH	4-18-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note & Camber Added	LRH	4-19-74
2	Dead Load Defl. of steel added	REG	11-14-74
3	As Built	TEM	6-77

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN AND DETAILS
UNIT 9

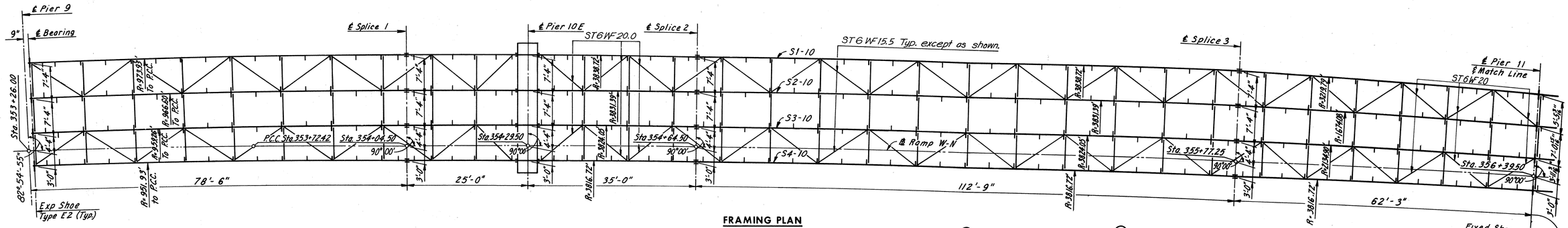
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 23 OF 54

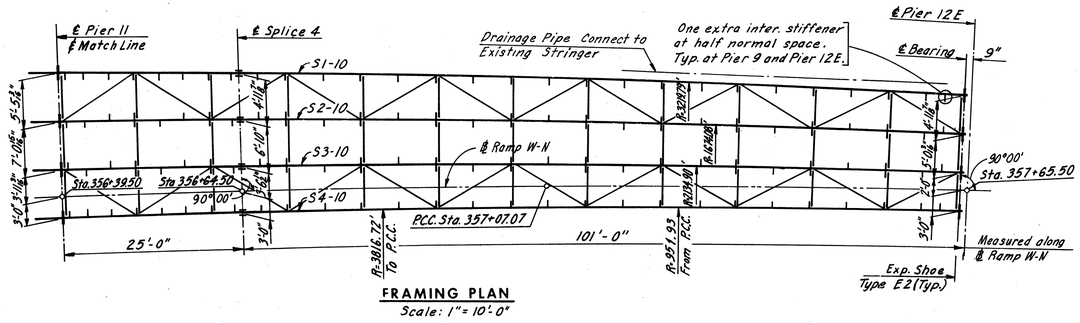
SHOE SCHEDULE			
EXP. SHOE		FIXED SHOE	
TYPE	NO.	TYPE	NO.
E2	8	SP-1	4

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	196	265

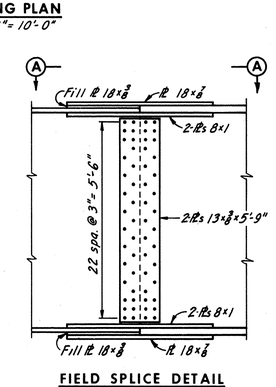
N



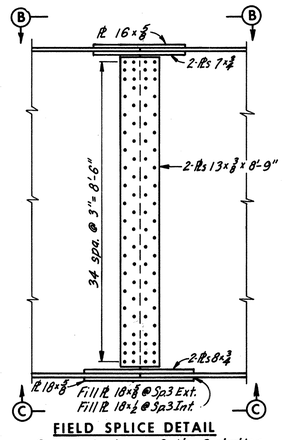
FRAMING PLAN
Scale: 1"= 10'-0"



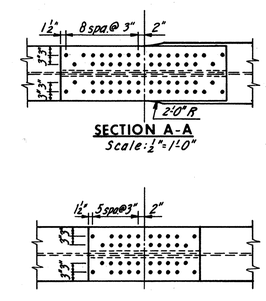
FRAMING PLAN
Scale: 1"= 10'-0"



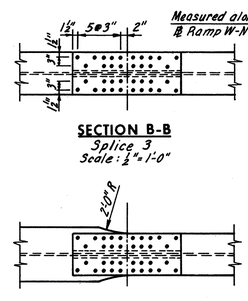
FIELD SPLICE DETAIL
Splice 1 Shown ; Splice 4 similar
Scale: ½"=1'-0"



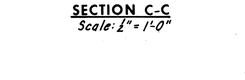
FIELD SPLICE DETAIL
Splice 2 shown; Splice 3 similar
Scale: ½"= 1'-0"



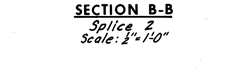
SECTION A-A
Scale: ½"=1'-0"



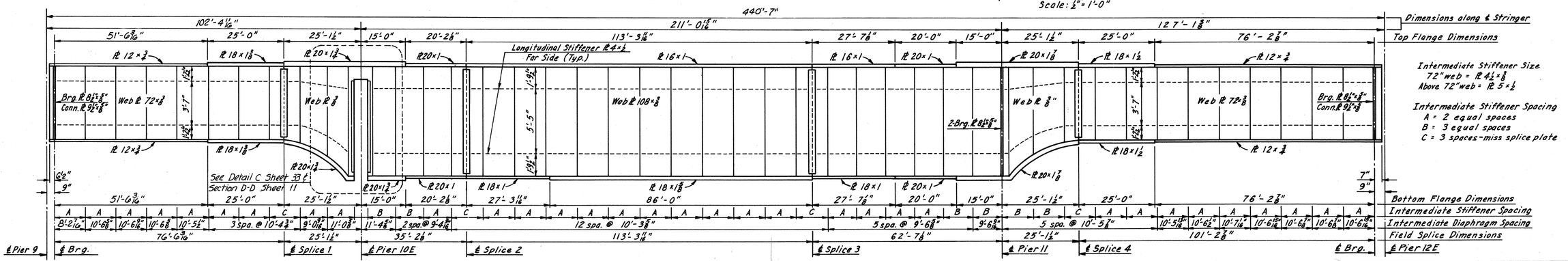
SECTION B-B
Splice 3
Scale: ½"=1'-0"



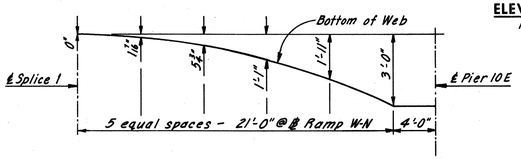
SECTION C-C
Scale: ½"=1'-0"



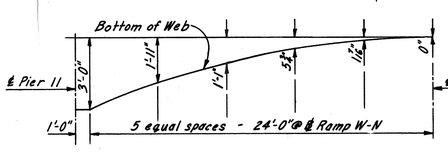
SECTION B-B
Splice 2
Scale: ½"=1'-0"



ELEVATION S1-10
No Scale



HAUNCH DETAIL
No Scale



HAUNCH DETAIL
No Scale

Notes:
For Deck Plan, see Sheet 34.
For Shoe Details, see Sheet S2.
For Details of Intermediate Diaphragms, see Sheet 23.
For Details of End Diaphragms, see Section D-D Sheet 33.
For Details of Lateral Bracing, see Sheet 23.
All steel is A36 unless otherwise noted.
For Joint Details, see Sheet 49.
For Web to Flange Weld, see Note, Sheet 20.

	BY	DATE
MADE	AMH	2-2869
CHECKED	JD	4-26-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note Added	LRH	4-19-74
2	As Built	TEM	6-77

AS BUILT

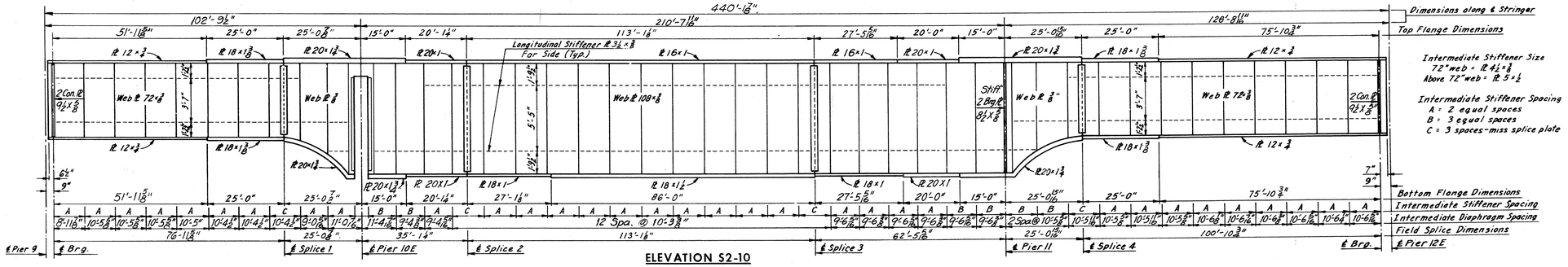
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN- UNIT 10

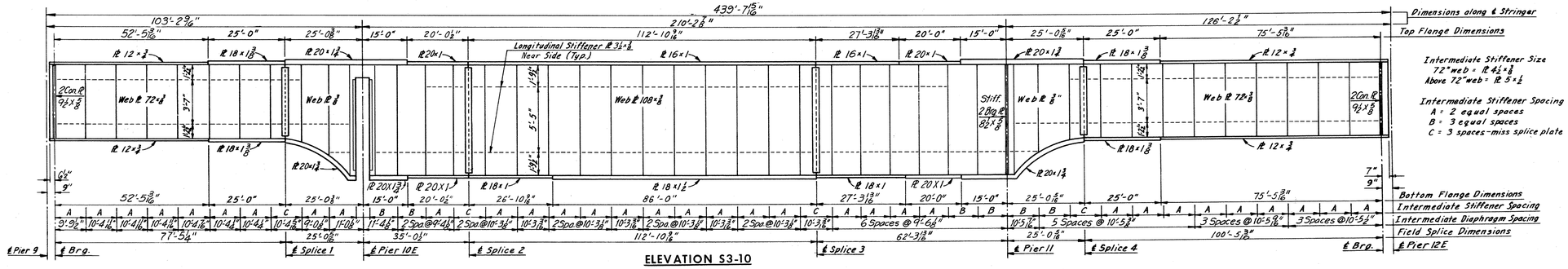
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 54

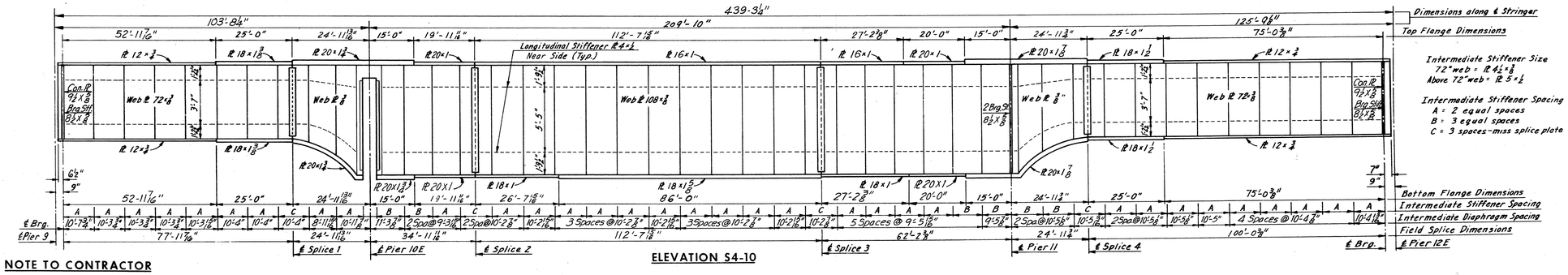
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	197	265



ELEVATION S2-10



ELEVATION S3-10



ELEVATION S4-10

STRINGER	ELEV. A	ELEV. B	ELEV. C	ELEV. D	ELEV. E	ELEV. F
S1-10	88.50	87.37	85.60	80.87	76.81	72.72
S2-10	88.35	87.23	85.46	80.65	76.57	72.42
S3-10	88.21	87.08	85.31	80.43	76.24	72.12
S4-10	88.06	86.93	85.16	80.20	75.93	71.82

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

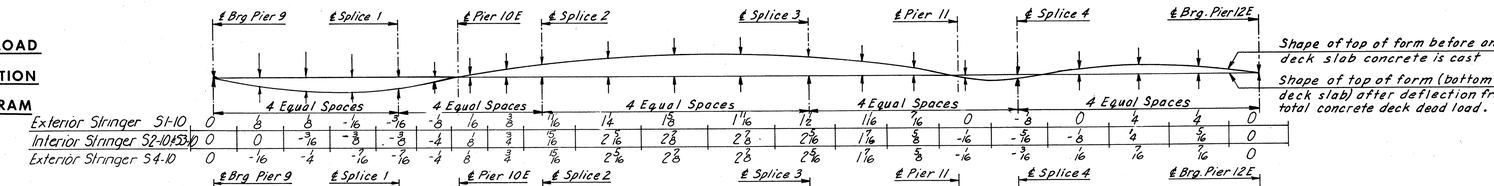
NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

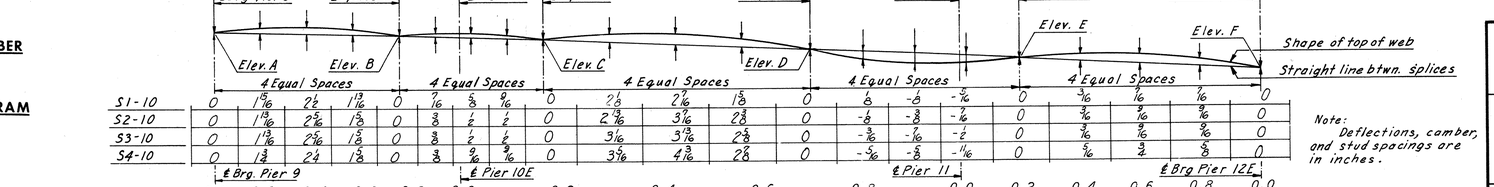
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	2-28-69	2	As Built	TEM	6-77
CHECKED	JD	4-29-69				
IN CHARGE			1	Note Added	LRH	4-19-74

DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM



Note:
Deflections, camber, and stud spacings are in inches.

MAX. SHEAR STUD SPACING

	℄ Brg. Pier 9					℄ Pier 10E										℄ Pier 11										℄ Brg Pier 12E									
	0.0	0.2	0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	0.0									
Exterior Stringers	21	24	24	24	24	24	24	24	24	24	22	24	24	24	24	24	24	24	24	24	21	→	24	24	24	24	24	24	24	24	24	19				
Interior Stringers	21	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	20				

Note:
For Deck Plan, see Sheet 34. All Steel shall be A36 unless otherwise noted.
For Details not shown, see Section D-D, sheet 11, and Detail C, sheet 33.
For Web to Flange Weld size, see Note, Sheet 20.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GIRDER ELEVATIONS - UNIT 10

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

SCALE: No Scale
CONTRACT NO.: 10
SHEET NO. 25 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	198	265

UNIT 13 | UNIT 14 | UNIT 15

℄ Existing Piers 95 & 96 | ℄ Existing FB 16 | ℄ Pier 12 W. | ℄ Brg. | ℄ Pier 13 W. | ℄ Pier 14 & ℄ Bearing (Radial) | 10" @ ℄ R.P.T. | ℄ Bearing Stringers (Radial)

Normal to ℄ Pier 85°31'30" | 1:5¼

119'-5⅜" = 4 Spa. @ 19'-6" = 78'-0" + 4 Spa. @ 19'-6" = 78'-0"

22'-3⅝" | 21'-5 15/16" | 17'-2 13/16" | 16'-11 13/16" | 90°00'00" | 22'-0⅝" | 21'-9 1/16" | 108'-9¾" = 3 Spa. @ 21'-4" = 64'-0" + 3 Spa. @ 21'-4" = 64'-0" | 21'-11⅞" | 21'-9" | 90°00'00" | 89°03'35" | 24'-5⅝" | 24'-4⅛" | 49'-9" | 24'-5⅝" | 24'-4⅛"

Measured Along ℄ Ramp N-W | Measured Along ℄ S-1 | Measured Along ℄ S-2

S1-13 | S2-13 | S1-14 | S2-14 | S1-15 | S2-15 | S1-12

R=1494.39' | R=1432.39' | R=1388.64' | R=1386.88' | R=1131.84' | R=951.93' | R=1380.39'

G13 | G14 | G15 | G16 | G17

Sta. 15+73.60 ℄ Ramp N-W | Sta. 15+73.09 ℄ Ramp N-W | Sta. 14+53.66 ℄ Ramp N-W. | Sta. 13+44.85 ℄ Ramp N-W | Sta. 12+95.10 ℄ Ramp N-W | Sta. 358+92.00 ℄ Ramp W-N. | Sta. 357+65.50 ℄ Ramp W-N. | Sta. 359+69.87 ℄ Ramp W-N. | PC.C. Sta. 357+07.01 ℄ Ramp W-N

Fixed Shoe (Type F4M Typ.) | Exp. Shoe (Type E6 Typ.) | Fixed Shoe (Type F4M Typ.) | Exp. Shoe (Type E1. Typ.) | Fixed Shoe (Type F1M. Typ.) | Fixed Shoe (Type F9 Typ.) | Exp. Shoe (Type E1 Typ.) | Exp. Shoe (Type E4 Typ.)

℄ Pier 96 Sta 1720+44.963 | ℄ Pier 95 Sta 1720+30.397 | Sta 1720+49.115 | ℄ Piers 97 & 98 Sta 1721+58.871 | ℄ Piers 99 & 100 Sta 1722+63.871 | ℄ Brg. of stringers | ℄ Brg. N. Abutment. Sta 1723+11.871

℄ Pier 12 E | ℄ Pier 13 E. | Sta. 359+02.00 | P.C.C. Sta. 359+26.75 Bk. = Sta. 359+29.43 Ahd. ℄ Ramp W-N | ℄ Brg. Stringers | ℄ Brg. N. Abutment.

℄ 1" Long. Jt. | 90° typ. intermediate diaphragms | radial | 90°00'00" | 52'-0"

Note:
Dimensions from ℄ Pier to ℄ Brgs. are normal to ℄ Pier.

Note:
For Stringer Elevation, see Sheet 27.
For Stringer Schedule, see Sheet 27.
For Camber Schedule, see Sheet 27.
For FB 16 Details, see Sheet 28.
For Deck Plan, see Sheet 35.
For Shoe Details, see Sheets S1 & S2.

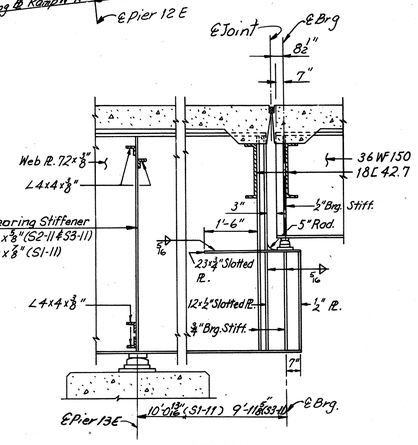
Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms, in Units 13, 14 and 15.

	BY	DATE
MADE	Y.C.P. G.C.C.	2-24-69
CHECKED	K.C.T.	4-2669
IN CHARGE		

NO.	REVISION	BY	DATE
2	Framing Revised Units 12, 13, 14, 15	RBL	12-5-74
1	P.C.C. @ WN	DWB	12-11-74
3	As Built	TEM	6-77

UNIT 11

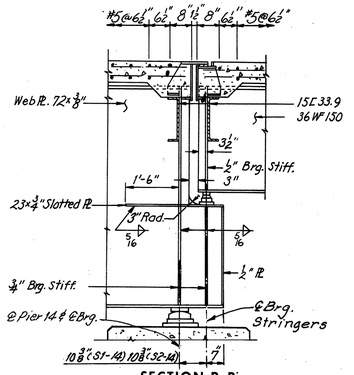
FRAMING PLAN
Scale: 1"=10'-0"



SECTION A-A
Scale: ½"=1'-0"

Note:
Intermediate stiffener Pls. 4×⅜" shall be equally spaces between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

UNIT 12



SECTION B-B
Scale: ½"=1'-0"

AS BUILT

SHOE SCHEDULE

FIXED SHOES		EXPANSION SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
F1	2	E1	4
F1M	2	E4	3
F4M	4	E6	2
F9	3	-	-

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

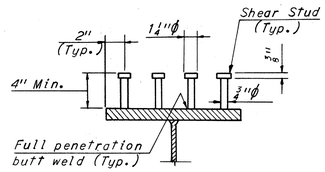
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN – UNITS 11, 12, 13, 14 AND 15

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 26 OF 54

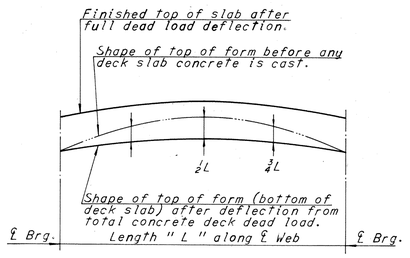
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	199	265



SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE

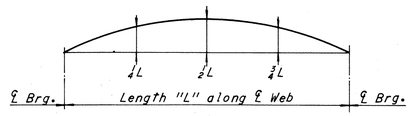
Capacity = 3,400 lbs. per stud.
The Contractor may, if he elects, use three ⅞" diameter studs at the same longitudinal spacing in lieu of the four ¾" diameter studs shown.
Stud rows shall be placed parallel to the main deck reinforcing.
Shear stud spacing shown is maximum spacing.



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

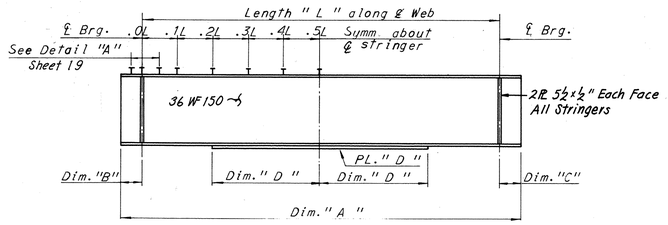


CAMBER DIAGRAM

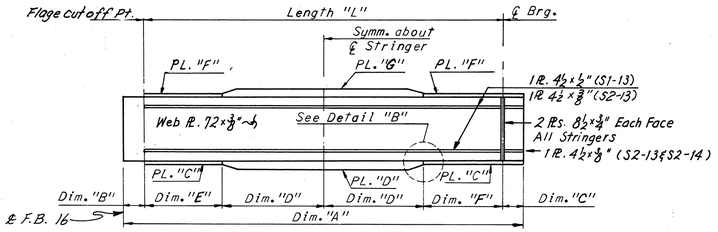
NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

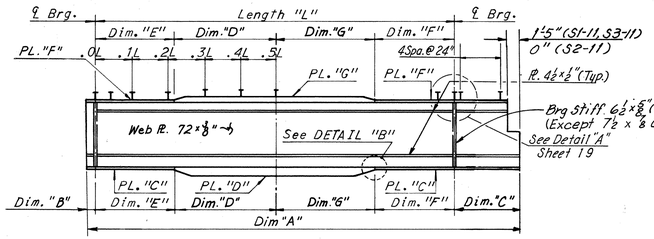
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet



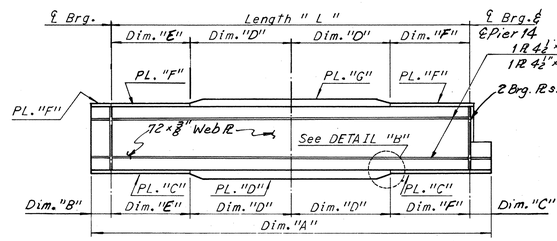
STRINGER ELEVATION
No Scale
(Unit 12 ℄ 15)



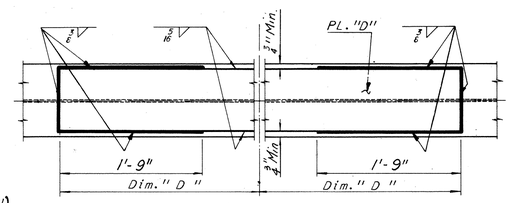
STRINGER ELEVATION
No Scale
(Unit 13)



STRINGER ELEVATION
No Scale
(Unit 11)

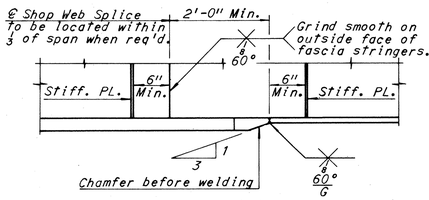


STRINGER ELEVATION
No Scale
(Unit 14)



COVER PLATE DETAIL
No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance, top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in The Camber Diagram, and with minimum distance as shown in cross-section on Sheet 35 .



DETAIL "B"
No Scale
NOTE: Web to flange weld size see sheet 20.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
11	S1-11	138'-1 15/16"	126'-11"	7"	10'-7 15/16"	38'-0"	25'-5½"	25'-5½"	38'-0"	16'-1 9/16"	18 x 2"	12 x1"	16 x 1"	17"	19"	24"	24"	24"
	S2-11	127'-3 5/8"	126'-1 3/16"	7"	7"	31'-6"	31'-6 1/16"	31'-6 1/16"	31'-6"	14 x1 1/2"	16 x 2"	12 x1"	12 x1"	18"	20½"	24"	24"	24"
	S3-11	136'-5 7/8"	125'-4 1/16"	7"	10'-6 5/8"	37'-8"	25'-0 1/16"	18'-6 1/16"	44'-2"	14 x 1"	14x2 "	12x 3/8"	12x1"	22"	24"	24"	24"	24"
12	S1-12	66'-9 7/16"	65'-6 7/16"	7"	8"	24'-0"	--	-	--	36WF150	10½x ⅜ "	-	-	8"	9"	11"	12½"	15"
	S3-12	66'-5 1/8"	65'-0 1/8"	7"	10"	23'-9"	-	-	--	36WF150	10½x ⅜ "	-	-	10"	11"	14½"	17½"	24"
13	S1-13	118'-4 5/8"	116'-7 1/16"	11"	10½"	37'-0"	21'-3 9/16"	21'-3 9/16"	-	18x1"	18x1 3/8"	18x1"	18x1 3/8"	-	-	-	-	-
	S2-13	117'-4 1/4"	115'-6 3/16"	11"	10½"	36'-0"	21'-9 3/8"	21'-9 3/8"	-	18x1"	18x1½"	18x1"	18x1½"	-	-	-	-	-
14	S1-14	110'-4 1/16"	108'-0 3/16"	10½"	10½"	35'-0"	19'-0 1/16"	19'-0 1/16"	-	18x1"	18x1½"	18x1"	18x1½"	-	-	-	-	-
	S2-14	109'-10 3/8"	107'-6 1/2"	10½"	1'-5 3/8"	35'-0"	18'-9 1/4"	18'-9 1/4"	-	18x⅜"	18x1 3/8"	18x⅜"	18x1 3/8"	-	-	-	-	-
15	S1-15	50'-1 1/4"	48'-11 3/16"	3½"	10"	-	-	-	-	36WF150	-	-	-	-	-	-	-	-
	S2-15	49'-8 11/16"	48'-9 7/16"	3½"	8"	-	-	-	-	36WF150	-	-	-	-	-	-	-	-

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1 5/16	1 13/16	1 1/4	2 3/16	3 3/8	2 9/16
1 11/16	2 1/16	1 11/16	2 1/16	4 3/8	3 3/8
1 9/16	2 3/8	1 7/16	2 5/8	4	2 15/16
9/16	3/4	9/16	3/4	1	13/16
1 3/16	1 5/8	13/16	1	1 1/4	1 1/8
1 3/16	1 5/8	1 3/16	1 3/16	1 3/16	1 3/16
1/2	1/2	1/8	1/2	2 1/16	1/2
1	1 3/8	1	1 1/16	1 3/4	1 5/16
7/8	1 1/2	7/8	1 1/4	1 3/8	1 1/4
5/16	7/16	5/16	5/8	1/2	3/8
5/16	3/8	5/16	5/16	1/2	5/16

* Spacing begins at termination of 6 spaces @ 4".

	BY	DATE	△	Framing Revised Units 12, 13, 14, 15	RFJ	12-5-74
MADE	V.C.P. G.C.C.	2-2649	2	As Built	TEM	G-77
CHECKED	K.C.T.	4-2869				
IN CHARGE			NO.	REVISION	BY	DATE

NOTE:
All steel shall be A36 unless otherwise shown.
Longitudinal stiffeners of exterior stringer shall be located on the exterior face of the stringer.

AS BUILT

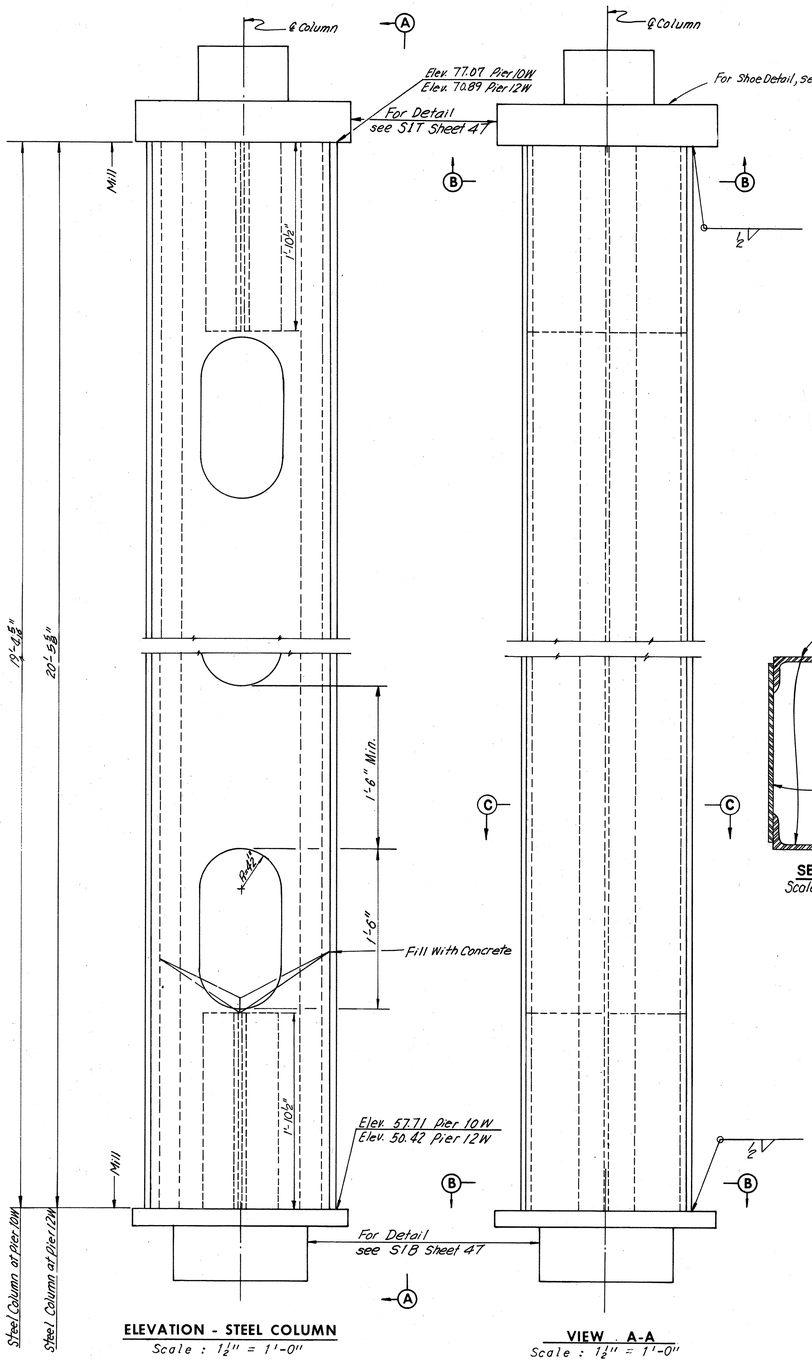
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 11,12,13,14 AND 15

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

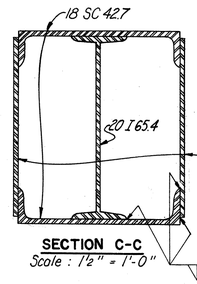
SCALE. No Scale
CONTRACT NO.: 10
SHEET NO. 27 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	200	265



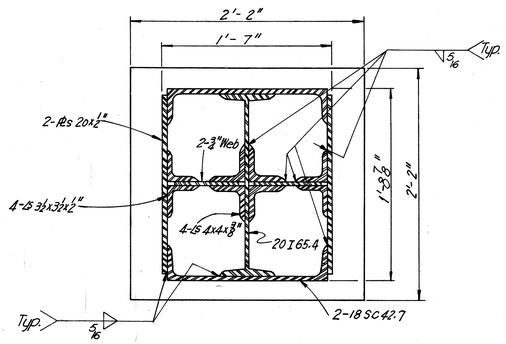
ELEVATION - STEEL COLUMN
Scale : 1½" = 1'-0"

VIEW A-A
Scale : 1½" = 1'-0"

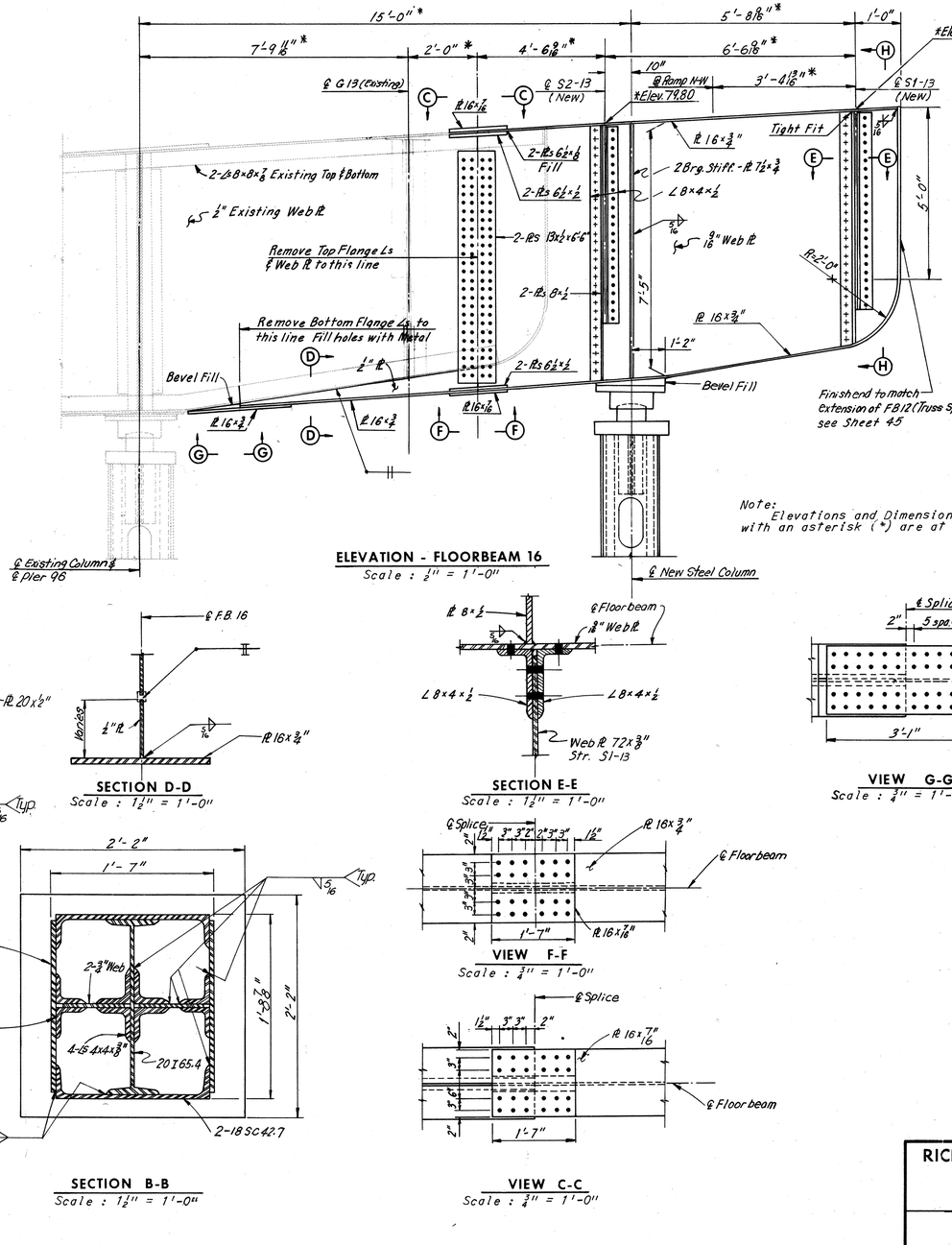


SECTION C-C
Scale : 1½" = 1'-0"

SECTION D-D
Scale : 1½" = 1'-0"

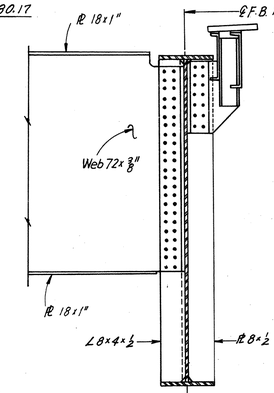


SECTION B-B
Scale : 1½" = 1'-0"



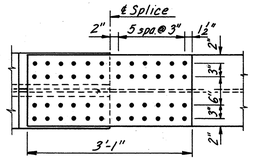
ELEVATION - FLOORBEAM 16
Scale : 1" = 1'-0"

Note:
Elevations and Dimensions denoted with an asterisk (*) are at ℄ F.B. 16.



SECTION H-H
Scale : ½" = 1'-0"

SECTION E-E
Scale : 1½" = 1'-0"



VIEW G-G
Scale : ¼" = 1'-0"

VIEW F-F
Scale : ¾" = 1'-0"

VIEW C-C
Scale : ¾" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	3-11-69	3	As Built	TEM	6-77
CHECKED	S.C.C.	6-13-69	2	Revised Elev.	RGF	1-24-75
IN CHARGE			1	Bolts Deleted Welded Conn.	T.E.M.	10-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FLOORBEAM 16 AND STEEL COLUMNS

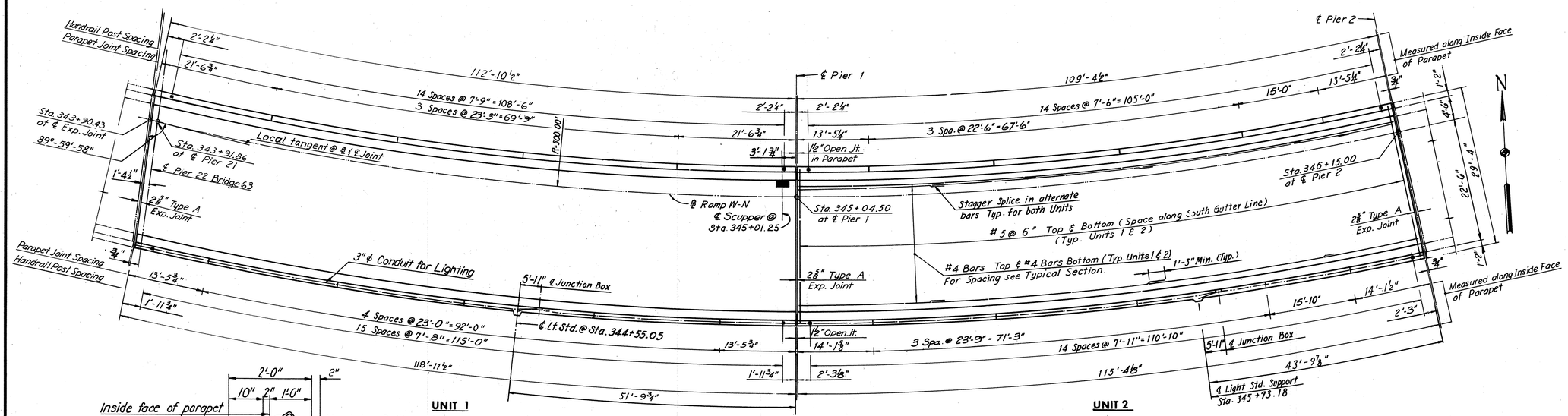
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 28 OF 54

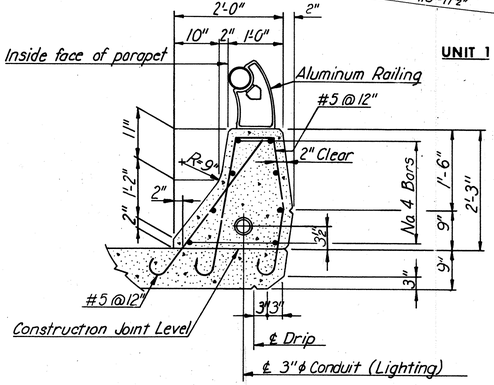
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
'0	DOWNTOWN EXPRESSWAY	201	265

ELEVATION TABLE

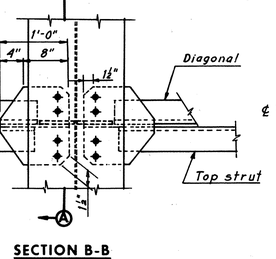
STATION	ELEV. A	ELEV. B	ELEV. C
343+80.00	92.86	93.07	94.36
"			
90.00	92.66	92.87	94.16
90.43	92.65	92.86	94.15
91.86	92.61	92.82	94.11
344+00.00	92.40	92.61	93.90
10.00	92.09	92.30	93.59
20.00	91.73	91.94	93.28
30.00	91.32	91.53	92.82
40.00	90.86	91.07	92.36
50.00	90.34	90.55	91.84
60.00	89.79	90.00	91.29
70.00	89.26	89.47	90.76
80.00	88.72	88.93	90.22
90.00	88.14	88.35	89.64
345+00.00	87.55	87.76	89.05
04.50	87.28	87.49	88.78
10.00	86.94	87.15	88.44
20.00	86.35	86.56	87.85
30.00	85.75	85.96	87.25
40.00	85.17	85.38	86.67
50.00	84.58	84.79	86.08
60.00	84.02	84.23	85.52
70.00	83.46	83.67	84.96
80.00	82.90	83.11	84.40
90.00	82.34	82.55	83.84
346+00.00	81.78	81.99	83.28
10.00	81.22	81.43	82.72
15.00	80.94	81.15	82.44
20.00	80.66	80.87	82.16



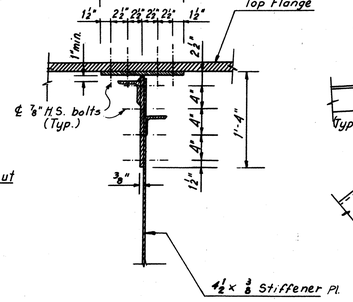
DECK PLAN
Scale: 1" = 10'-0"



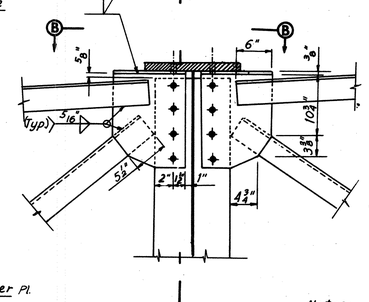
TYPICAL PARAPET DETAIL
Scale: ¾"=1'-0"



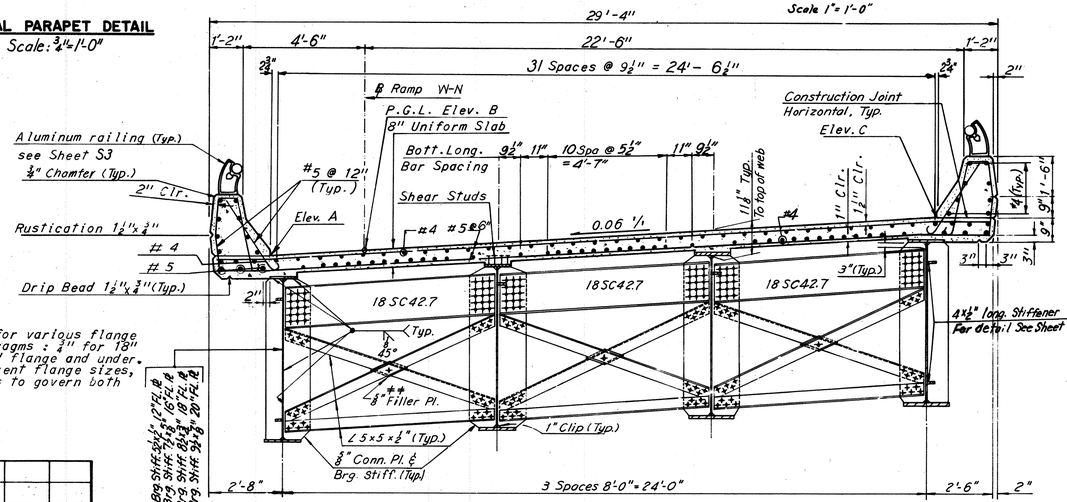
SECTION B-B
Scale 1"=1'-0"



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



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



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜"=1'-0"

Notes:

For Layout of Pier 21 see Sheet 2 of Bridge #65 (Ramp S-W).
For Framing Details of Pier 21 see Sheet 20 of Bridge #66 (E.B. Roadway).
Piers 1 and 2 both are radial to ℄ Ramp N-W (Curve NW-1)
For intermediate diaphragm and transverse stiffener spacing see Sheet 19.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Standard Drainage Details see Support Type 3 Sheet S6.
For Joint Details see Sheet 48.

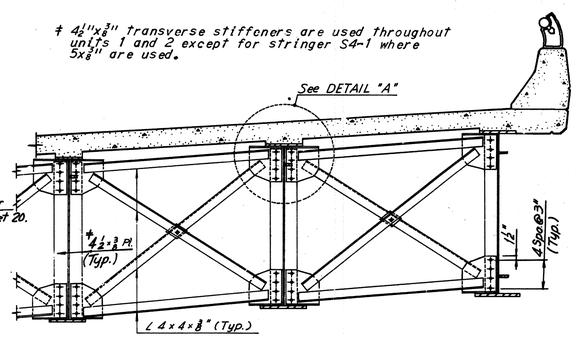
Pier 2 Bridge 63

Use Brg Stiff. 3/8"x 6"PL @ Brg Stiff. 3/8"x 8"PL @ Brg Stiff. 3/8"x 10"PL @ Brg Stiff. 3/8"x 12"PL @ Brg Stiff. 3/8"x 20"PL @

The following conn. ℄ thickness for various flange sizes shall be used at end diaphragms : ⅜" for 12" flange, ½" for 15" and ¾" for 12" flange and under. In bays where girders have different flange sizes, the conn. ℄ for the bigger one is to govern both conn. ℄'s.

Pier 1 Bridge 63

4½"×⅜" transverse stiffeners are used throughout units 1 and 2 except for stringer S4-1 where 5×⅝" are used.



INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

	BY	DATE				
MADE	MHH.	8-17-68				
CHECKED	S.C.C.	11-4-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

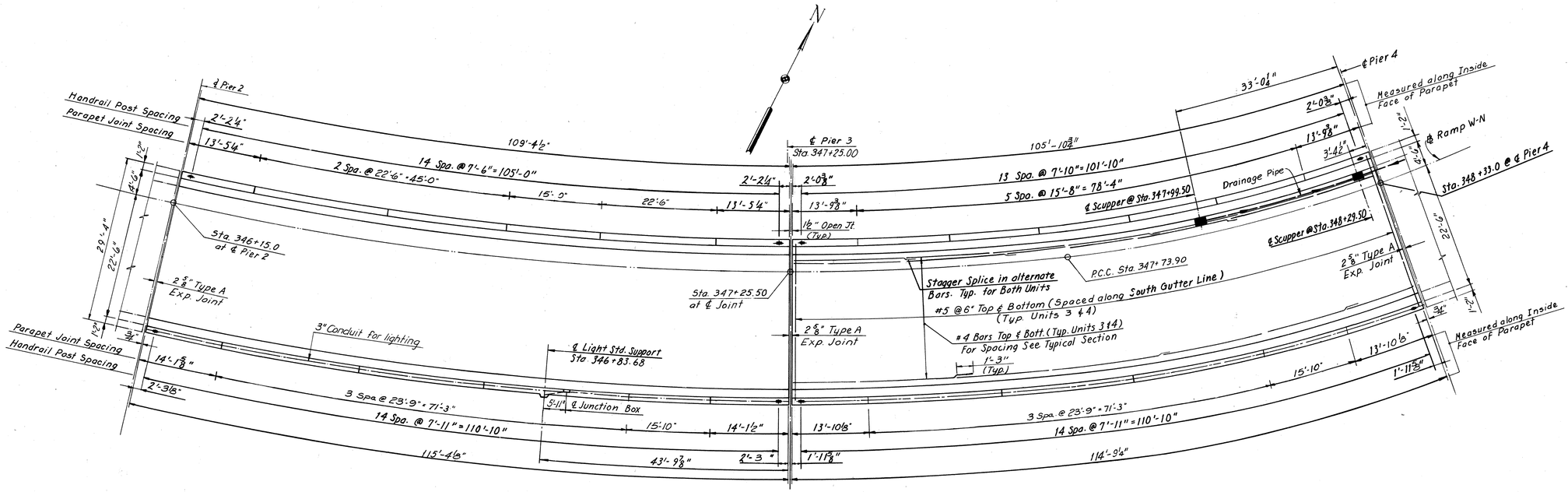
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN - UNITS 1 AND 2

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

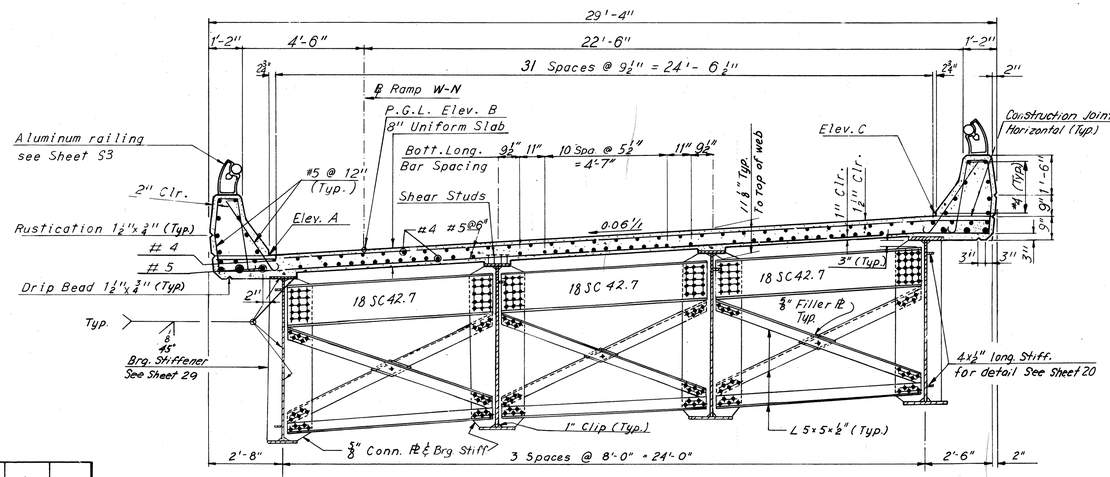
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 29 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	202	265



DECK PLAN
Scale: 1"=10'-0"

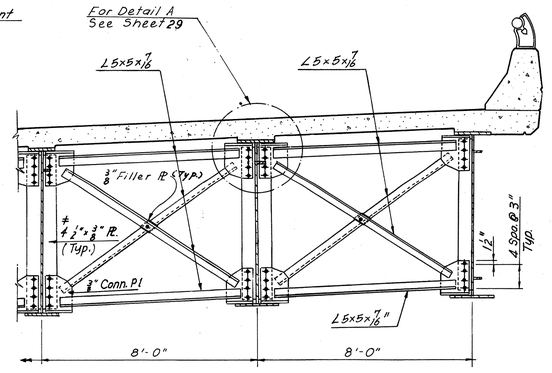
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
346+10.00	81.22	81.43	82.72
+15.00	80.94	81.15	82.44
+20.00	80.66	80.87	82.15
+30.00	80.10	80.31	81.60
+40.00	79.54	79.75	81.04
+50.00	78.98	79.19	80.48
+60.00	78.42	78.63	79.92
+70.00	77.86	78.07	79.36
+80.00	77.30	77.51	78.80
347+00.00	76.18	76.39	77.68
+10.00	75.64	75.85	77.14
+20.00	75.15	75.36	76.65
+25.50	74.89	75.10	76.39
+30.00	74.69	74.90	76.19
+40.00	74.29	74.50	75.79
+50.00	73.92	74.13	75.42
+60.00	73.60	73.81	75.10
+70.00	73.32	73.53	74.82
+80.00	73.08	73.29	74.58
+90.00	72.89	73.10	74.39
348+00.00	72.74	72.95	74.24
+10.00	72.63	72.84	74.13
+20.00	72.57	72.78	74.07
+30.00	72.55	72.76	74.05
+33.00	72.55	72.76	74.05
+40.00	72.57	72.78	74.07



TYPICAL SECTION - END DIAPHRAGM
Scale: ⅜"=1'-0"

* ~~All intermediate~~ diaphragms in Unit 3 and ~~the first three~~ in Unit 4 consist of ~~L5 4x4x⅜ Last five intermediate diaphragms in Unit 4 consist of~~ L5x4x4x½ and L5x5x7/16

4½x⅜ transverse stiffeners are used throughout units 1 and 2 except for stringer S4 ~~4~~ where 5x⅜" are used.



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"

Notes:
Piers 2, 3 and 4 are all radial to ℄ Ramp W-N (Curves WN-1 and WN-2).
For intermediate diaphragm and transverse stiffener spacing see Sheet 20.
For Details of diaphragm connections to top and bottom flanges of stringers see Sheet 29.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Standard Drainage Details see Support Type 3, Sheet S6.
(Pipes between Scuppers in Unit 4 to be connected as shown for Support Type 7, Sheet S6.)
For Typical Parapet Detail, see Sheet 29.
For Joint Details see Sheet 48.

	BY	DATE				
MADE	C.E.B.		2	As Built	TEM	G-77
CHECKED	K.C.T.	11-4-68	⚠	Revised angle Size Intermediate diap.	RSV	1-24-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

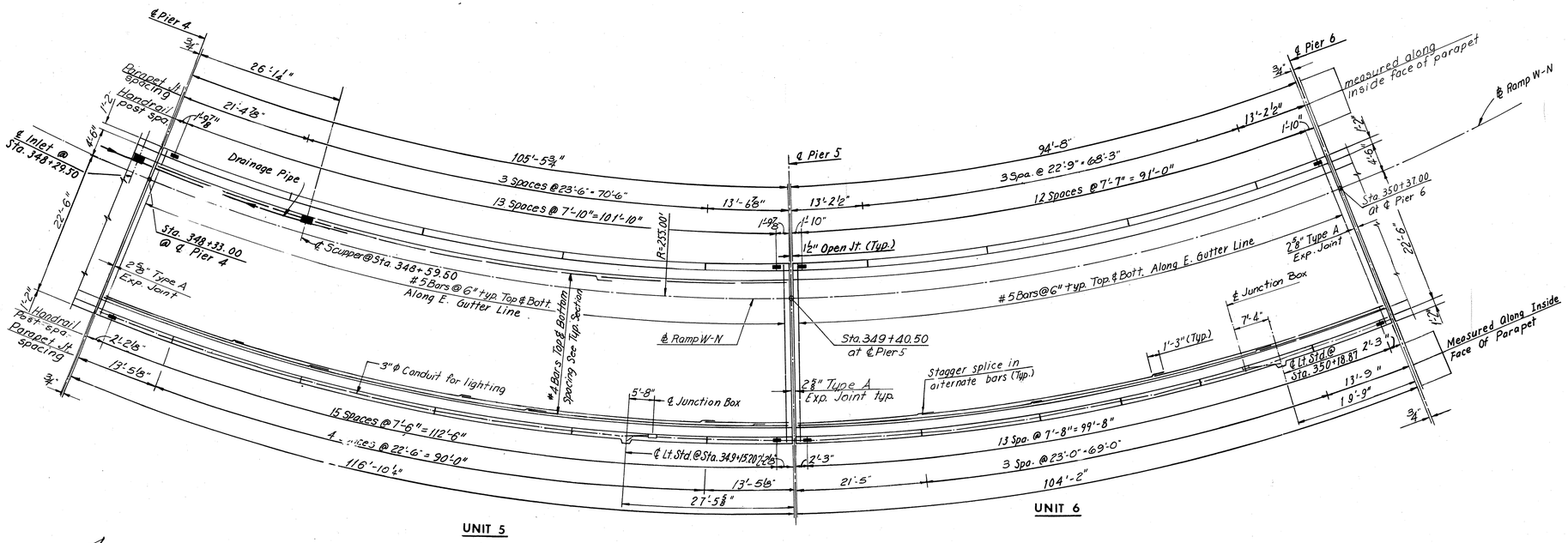
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 3 AND 4

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

SCALE: As noted
CONTRACT NO.: 10
SHEET NO. 30 OF 54

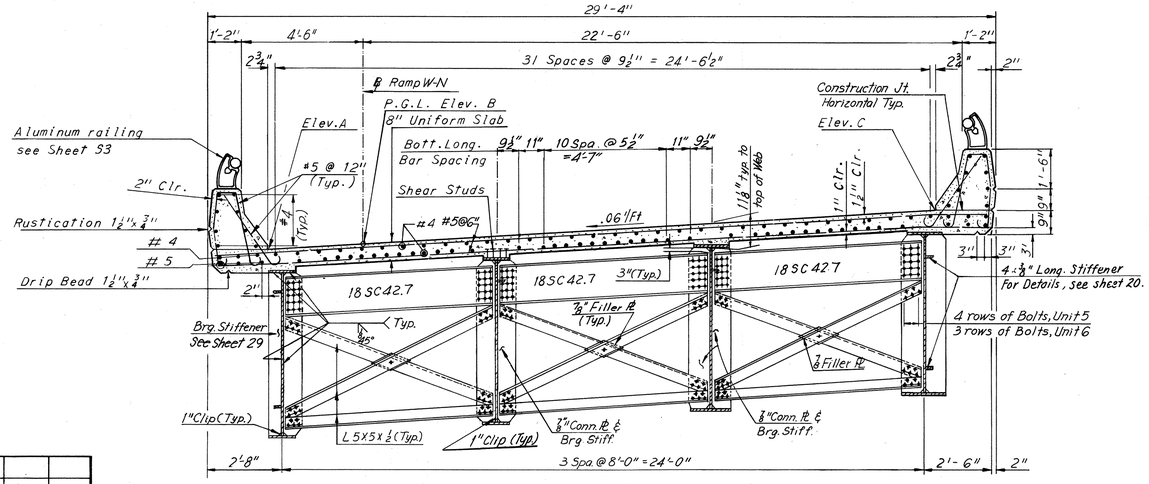
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	203	265

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
348+33.00	72.55	72.76	74.05
+40.00	72.57	72.78	74.07
+50.00	72.64	72.85	74.14
+60.00	72.75	72.96	74.25
+70.00	72.90	73.11	74.40
+80.00	73.10	73.31	74.60
+90.00	73.34	73.55	74.84
349+00.00	73.62	73.83	75.12
+10.00	73.95	74.16	75.45
+20.00	74.31	74.52	75.81
+30.00	74.73	74.94	76.23
+40.00	75.18	75.39	76.68
+40.50	75.21	75.42	76.71
+50.00	75.68	75.89	77.18
+60.00	76.20	76.41	77.70
+70.00	76.72	76.93	78.22
+80.00	77.24	77.45	78.74
+90.00	77.76	77.97	79.27
350+00.00	78.28	78.49	79.78
+10.00	78.80	79.01	80.30
+20.00	79.32	79.53	80.82
+30.00	79.84	80.05	81.34
+37.00	80.21	80.41	81.69
+40.00	80.36	80.57	81.84



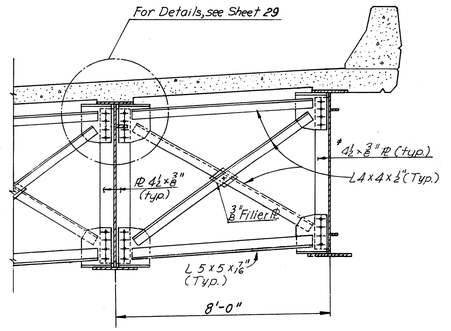
DECK PLAN

Scale: 1" = 10'-0"



TYPICAL SECTION – END DIAPHRAGM

Scale: ⅜" = 1'-0"



INTERMEDIATE DIAPHRAGM

Scale: ⅜" = 1'-0"

Notes:

Piers 4, 5 and 6 are all radial to ℄ Ramp W-N (Curve WN-2)
For Details of diaphragm connections to top and bottom flanges of stringers see Sheet 29.
For intermediate diaphragm and transverse stiffener spacings see Sheet 21.
For Handrail Details see Sheet 53.
For Lighting Details see Sheet 54.
For Standard Drainage Details see Support Type 7 Sheet 56.
For Typical Parapet Detail, see Sheet 29.
For Joint Details see Sheet 48.

4½x⅜ transverse stiffeners are used throughout Units 5 and 6 except for Stringer S4-5 where 5x⅜ are used.

	BY	DATE				
MADE	AHH	8-26-68				
CHECKED	KCT	11-1-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

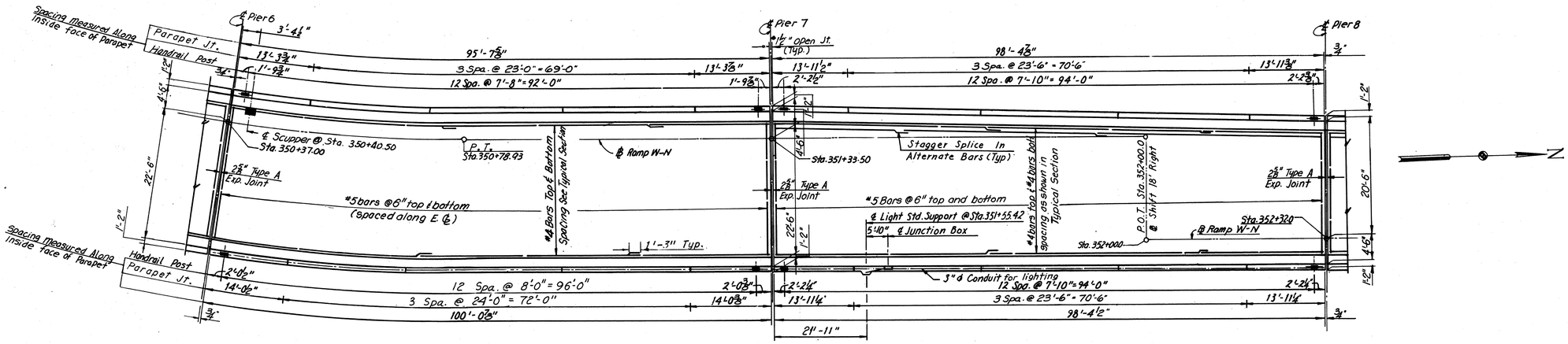
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN–UNITS 5 AND 6

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

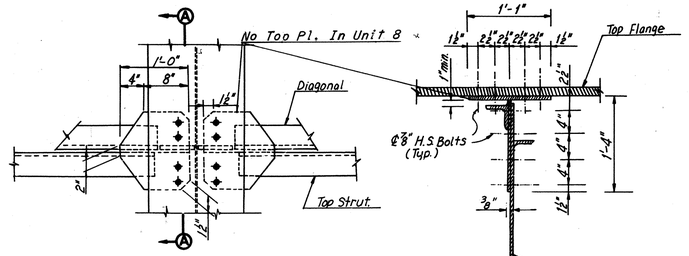
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 31 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	204	265

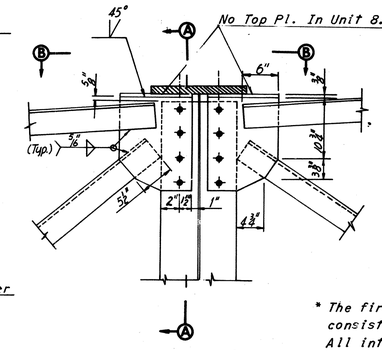
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
350+37.00	80.21	80.41	81.69
+40.00	80.36	80.57	81.84
+50.00	80.89	81.09	82.33
+60.00	81.41	81.61	82.80
+70.00	81.94	82.13	83.25
+80.00	82.49	82.65	83.68
+90.00	83.02	83.17	84.11
351+00.00	83.55	83.69	84.55
+10.00	84.07	84.20	84.97
+20.00	84.56	84.68	85.37
+30.00	85.04	85.13	85.73
+33.50	85.20	85.29	85.86
+40.00	85.49	85.57	86.08
+50.00	85.91	85.97	86.40
+60.00	86.31	86.36	86.70
+70.00	86.69	86.71	86.97
+80.00	87.03	87.05	87.22
+90.00	87.35	87.35	87.44
352+00.00	87.64	87.64	87.64
+10.00	87.97	87.89	87.88
+20.00	88.28	88.13	88.10
+30.00	88.56	88.33	88.30
+32.00	88.62	88.37	88.34



UNIT 7 **DECK PLAN** *Scale 1" = 10'-0"* **UNIT 8**



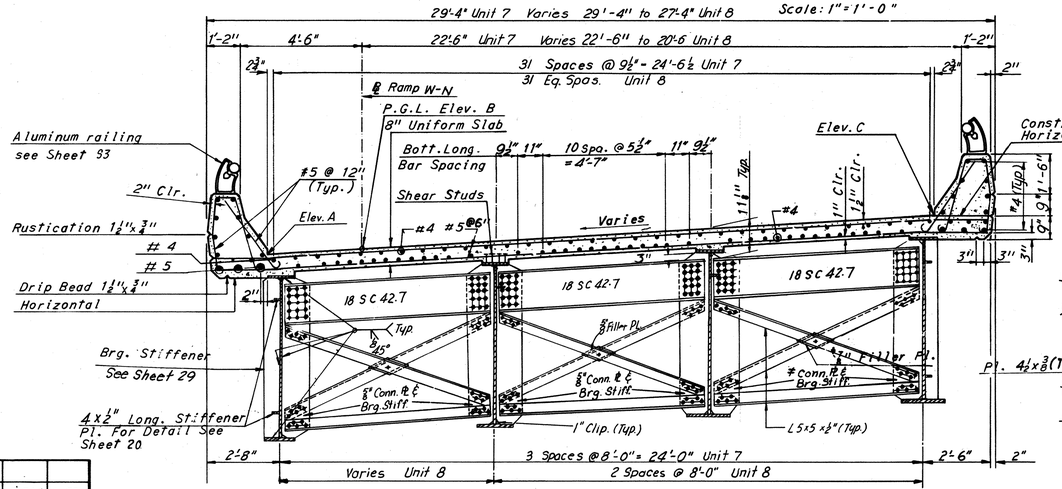
SECTION B-B



SECTION A-A *Scale: 1" = 1'-0"*

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

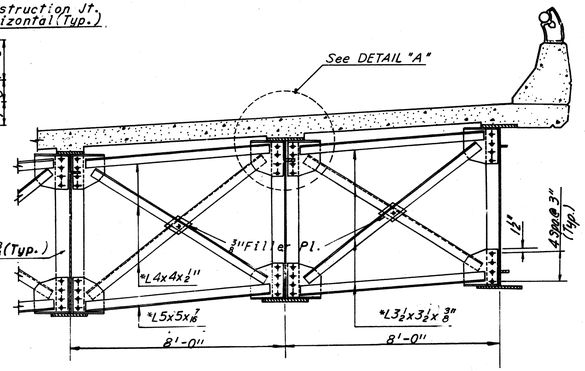
* The first three intermediate diaphragms in Unit 7 consist of L s4x4x½ (curved portion of roadway). All intermediate diaphragms in Unit 8 and the last two in Unit 7 consist of L s3½x3½x⅜ (tangent portion of roadway).



TYPICAL SECTION — END DIAPHRAGM *Scale ⅜" = 1'-0"*

* Use ⅞" ℄ in Unit 7 and ⅝" ℄ in Unit 8

Note: For connection of stringer S4-8 to 18SC42.7 @ end-Diaphragms use 3 rows of bolts instead of 4 rows as shown above for Unit 7.



INTERMEDIATE DIAPHRAGM *Scale ⅜" = 1'-0"*

Notes:
- For intermediate diaphragm and transverse stiffener spacings see Sheet 22.
- For Handrail Details see Sheet 53.
- For Lighting Details see Sheet 54.
- For Standard Drainage Details see Support Type 3 Sheet 36.
- For Typical Parapet Details, see Sheet 29

	BY	DATE
MADE	GSH	08-22-68
CHECKED	KCT	11-1-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	6-77
1	Light Sta. Location	JLK	6-6-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS – 7 AND 8

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 32 OF 54

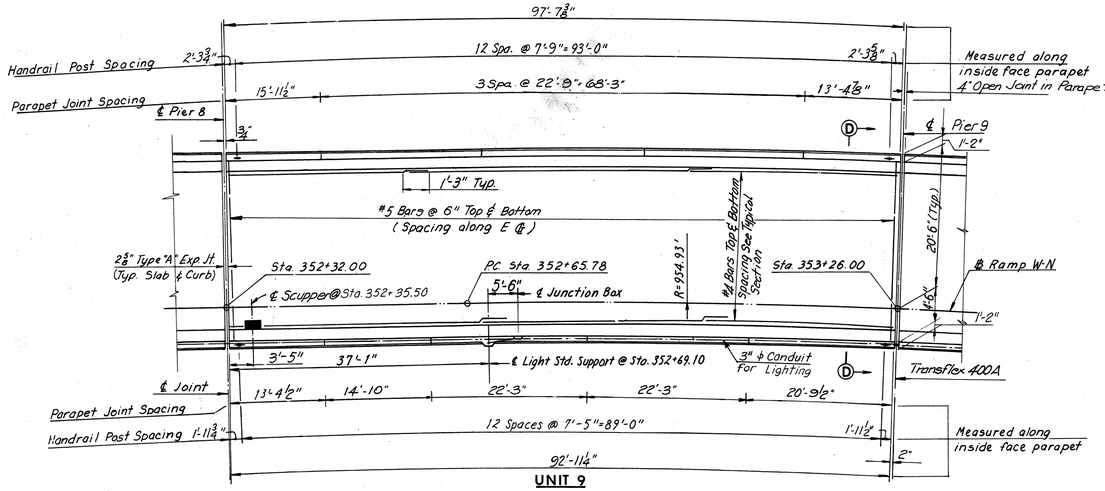
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	205	265

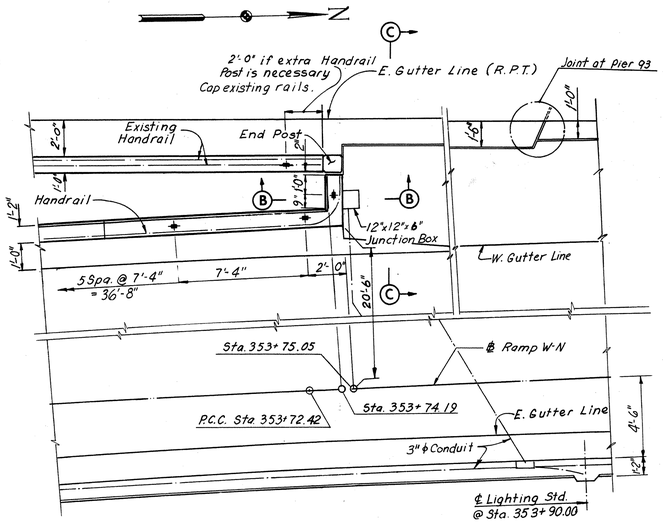
ELEVATION TABLE			
STATION	ELEV A	ELEV B	ELEV C
352+30.00	88.57	88.33	88.29
32.00	88.63	88.37	88.33
40.00	88.83	88.52	88.46
50.00	89.06	88.67	88.60
60.00	89.20	88.81	88.74
70.00	89.30	88.91	88.84
80.00	89.39	89.00	88.93
90.00	89.44	89.05	88.98
353+00.00	89.47	89.08	89.01
10.00	89.48	89.09	89.02
20.00	89.46	89.07	89.00
26.00	89.44	89.05	88.98
30.00	89.42	89.03	88.96

UNIT 9

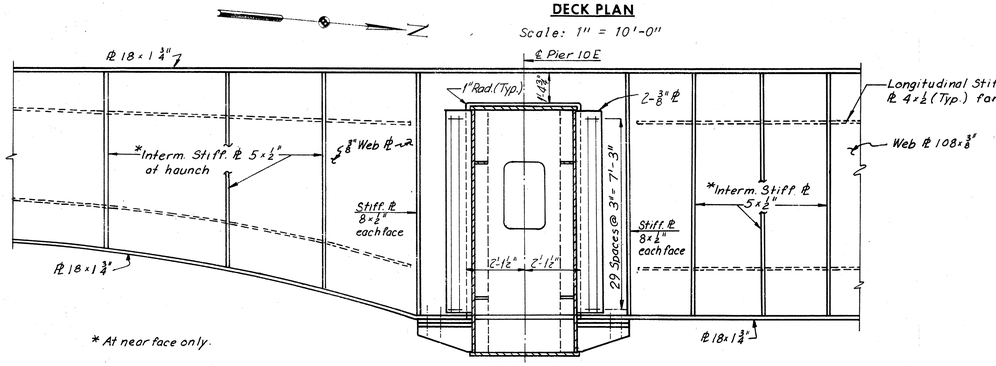
DECK PLAN

Scale: 1" = 10'-0"



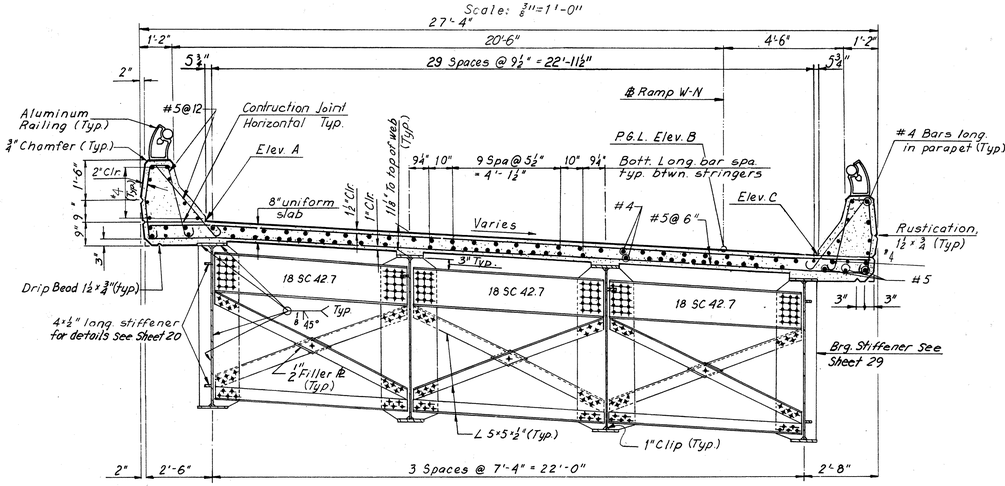


Note: Connect Lighting Conduit in existing structure with Junction Box at nose of new part of structure.



DETAIL C

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



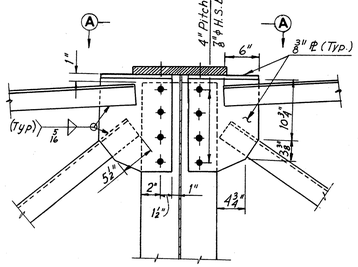
SECTION D-D — END DIAPHRAGM

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

*Unit 9 shown, Unit 10 Diaphragm similar

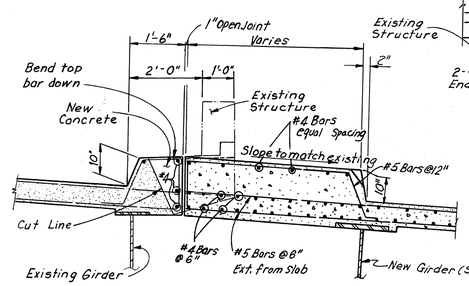
DETAIL A

Scale: 1" = 1'-0"



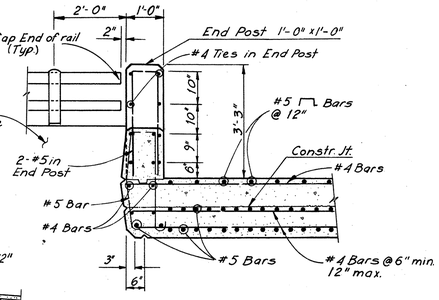
DETAIL B

Scale: 1"=1'-0"



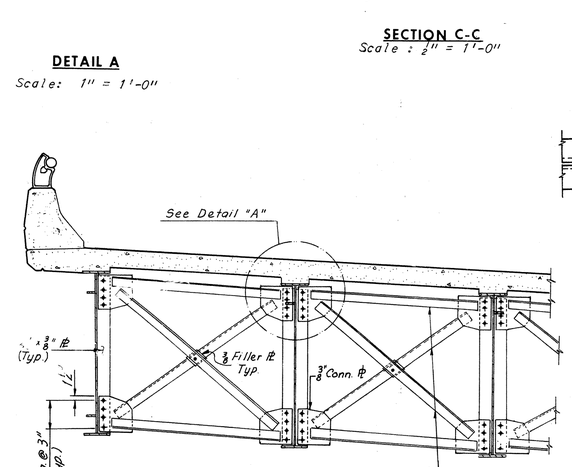
SECTION C-C

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



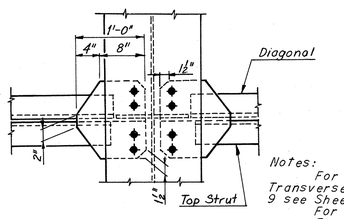
SECTION B-B

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



INTERMEDIATE DIAPHRAGM-UNIT 9

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



VIEW A-A

Scale: 1"=1'-0"

Notes:
For Intermediate Diaphragm and Transverse Stiffener Spacing for Unit 9 see Sheet 23.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Location of Detail B see Sheet 34.
For Standard Drainage Details see Support Type 3 Sheet S6.
For Location of Detail C see Stringer S1-10 Sheet 24.
For Typical Parapet Detail, see Sheet 29.

	BY	DATE				
MADE	C.E.B.	3-7-69	2	As Built	TEM	6-77
CHECKED	A.M.H.	4-21-69	1	Revised ∠ size, Intermediate Diap. Unit 9	RKF	1-24-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN AND SUPERSTRUCTURE DETAILS UNIT 9

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 33 OF 54

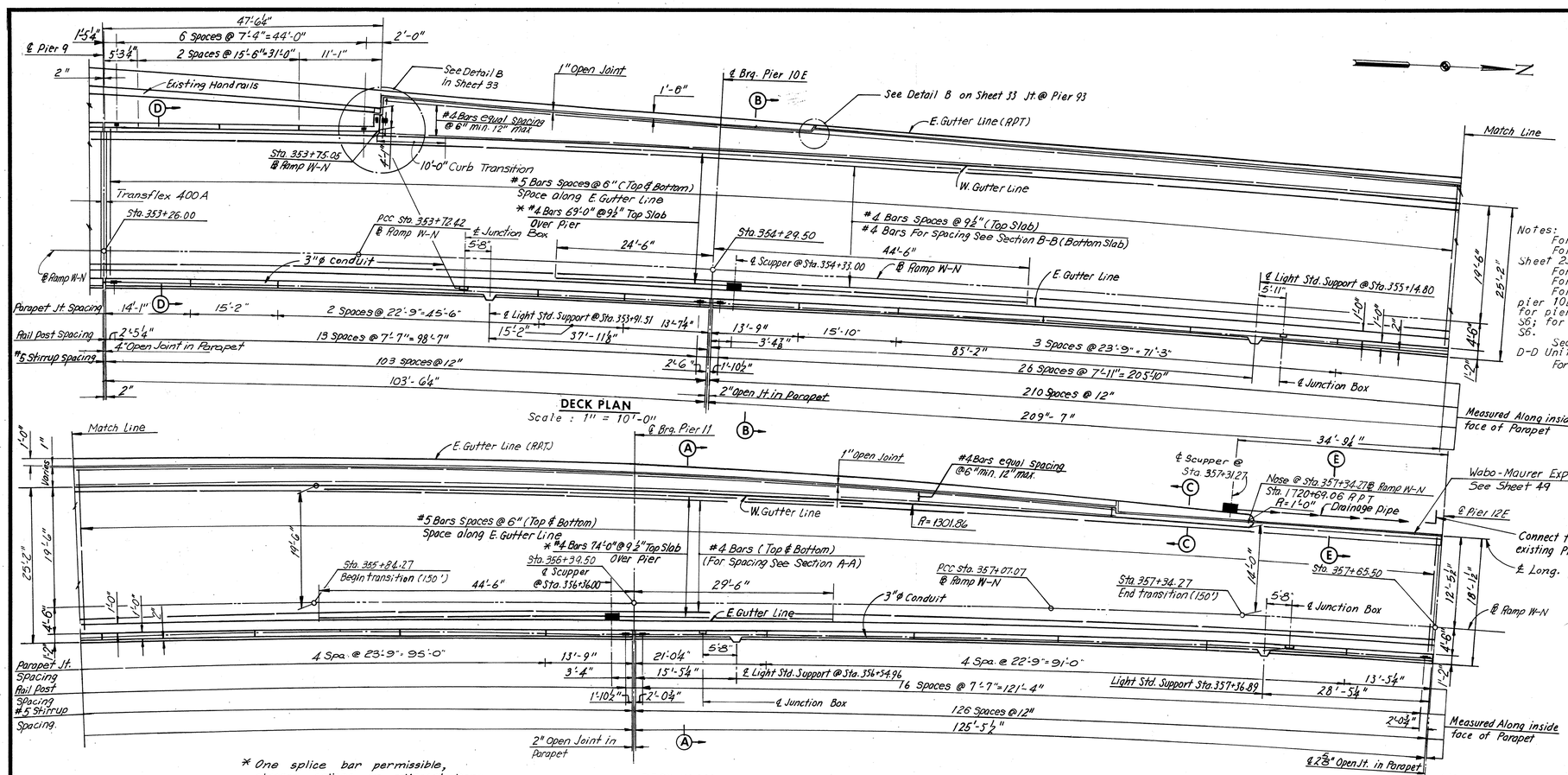
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	206	265

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
353+26.00	88.98	89.05	89.43
+30.00	88.96	89.03	89.41
+40.00	88.89	88.96	89.34
+50.00	88.80	88.87	89.25
+60.00	88.68	88.75	89.13
+70.00	88.54	88.61	88.99
+80.00	88.37	88.44	88.82
+90.00	88.17	88.24	88.62
354+00.00	87.96	88.03	88.41
+10.00	87.72	87.79	88.17
+20.00	87.46	87.53	87.91
+29.50	87.19	87.26	87.64
+30.00	87.17	87.24	87.62
+40.00	86.88	86.95	87.33
+50.00	86.57	86.64	87.02
+60.00	86.24	86.31	86.69
+70.00	85.89	85.96	86.34
+80.00	85.52	85.59	85.97
+90.00	85.13	85.20	85.58
355+00.00	84.72	84.79	85.17
+10.00	84.30	84.37	84.75
+20.00	83.86	83.93	84.33
+30.00	83.41	83.48	83.90
+40.00	82.94	83.02	83.46
+50.00	82.45	82.54	83.02
+60.00	81.97	82.06	82.57
+70.00	81.48	81.57	82.12
+80.00	80.99	81.09	81.68
+90.00	80.49	80.61	81.23
356+00.00	80.00	80.12	80.77
+10.00	79.51	79.64	80.31
+20.00	79.02	79.15	79.85
+30.00	78.53	78.67	79.39
+39.50	78.06	78.21	78.95
+40.00	78.04	78.19	78.92
+50.00	77.55	77.70	78.46
+60.00	77.06	77.22	77.99
+70.00	76.58	76.74	77.53
+80.00	76.11	76.29	77.10
+90.00	75.67	75.86	76.68
357+00.00	75.25	75.45	76.28
+10.00	74.85	75.05	75.88
+20.00	74.44	74.65	75.48
+30.00	74.04	74.25	75.09
+40.00	73.65	73.86	—
+50.00	73.27	73.48	—
+60.00	72.89	73.10	—
+65.50	72.69	72.90	—

Elevations given in the Elevation Table, may require adjustment in the field.

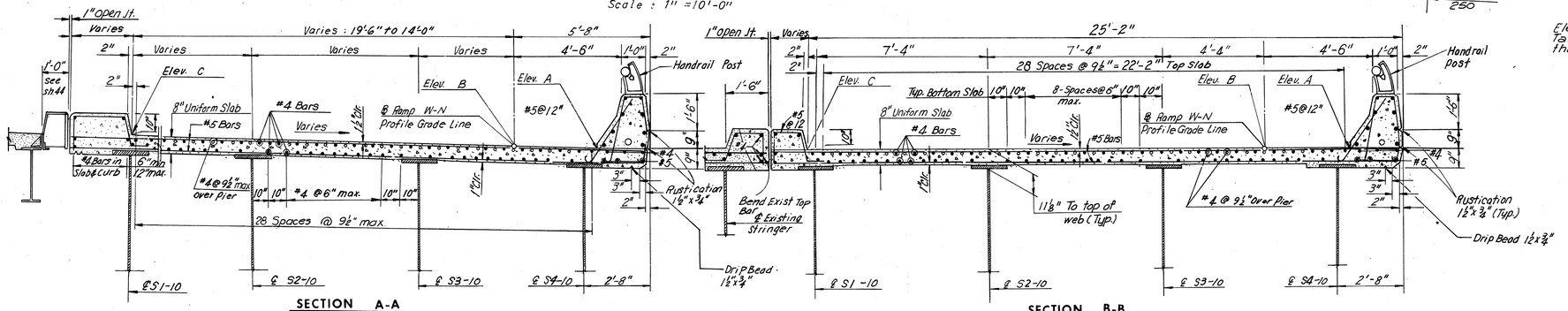
Notes:
For End Diaphragms see, Sheet 33.
For Intermediate Diaphragms see, Sheet 23.
For Handrail Details see, Sheet S3.
For Lighting Details see, Sheet S4.
For Standard Drainage Details for pier 10E see support Type 10, sheet S6; for pier 11 see support Type 5, Sheet S6; for Nose see support Type 9, Sheet S6. Section D-D is similar to Section D-D Unit 9, See Sheet 33
For typical parapet Details, see Sheet 29.



DECK PLAN
Scale : 1" = 10'-0"

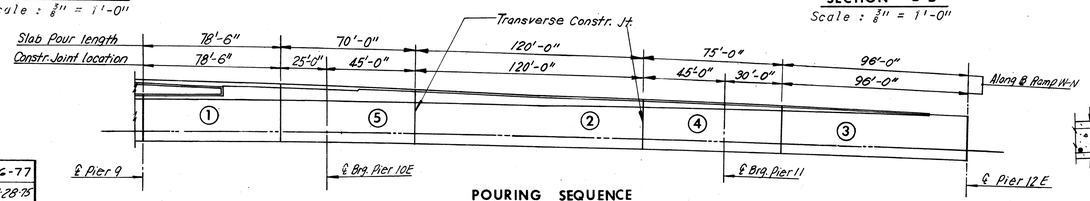
* One splice bar permissible, stagger splices on adjacent bars

DECK PLAN
Scale : 1" = 10'-0"

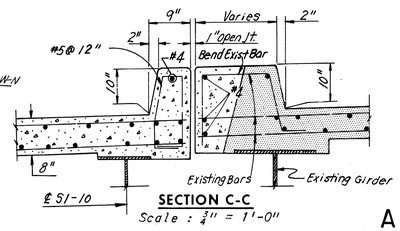


SECTION A-A
Scale : ⅜" = 1'-0"

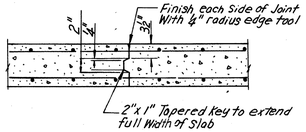
SECTION B-B
Scale : ⅜" = 1'-0"



POURING SEQUENCE
Scale : 1" = 40'-0"



SECTION C-C
Scale : ¾" = 1'-0"



TRANSVERSE CONSTRUCTION

JOINT DETAIL
No Scale

	BY	DATE
MADE	G.S.H	2-26-69
CHECKED	AMH	4-23-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Note for Table of Elevations	DWB	1-28-75
1	Rev. length of bars. Rev. Road width	RKJ	1-24-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

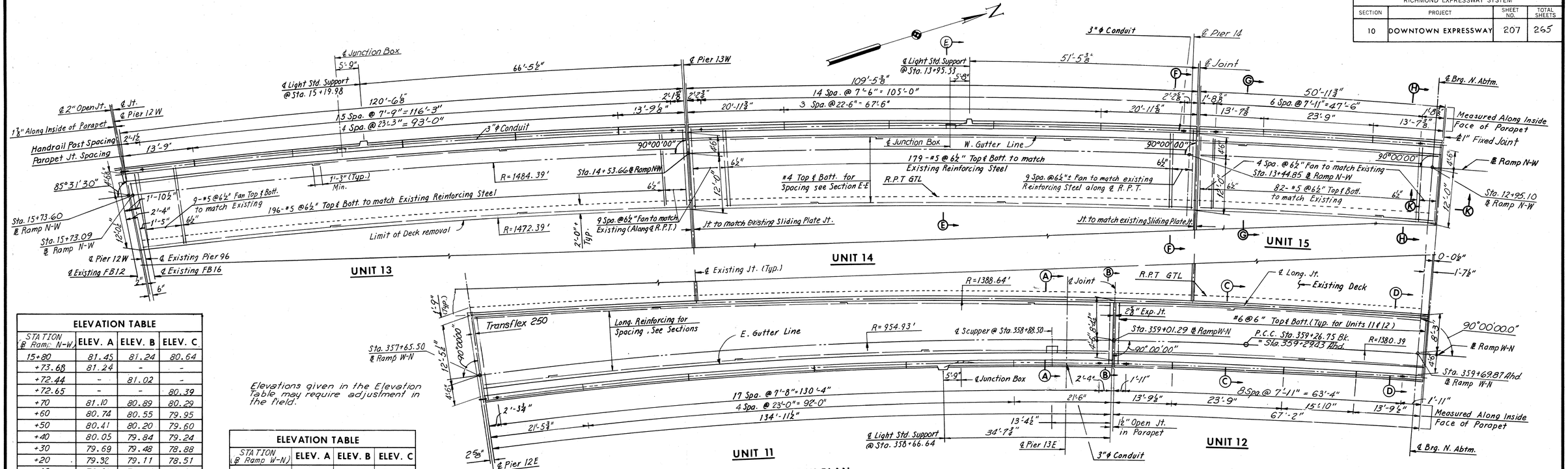
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

DECK PLAN — UNIT 10

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 34 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	207	265



DECK PLAN

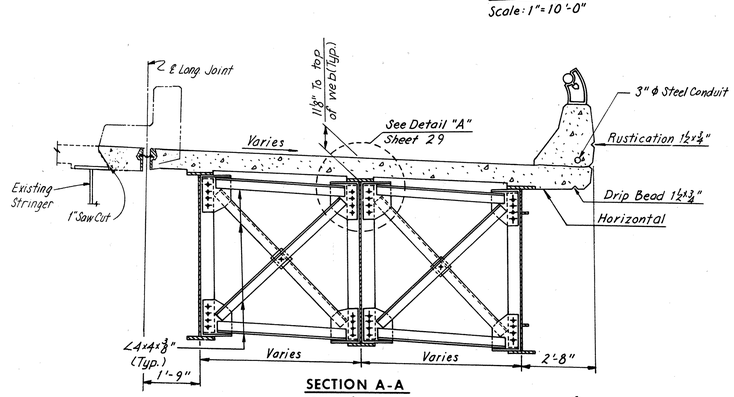
Scale: 1" = 10'-0"

ELEVATION TABLE			
STATION (℄ Ramp N-W)	ELEV. A	ELEV. B	ELEV. C
15+80	81.45	81.24	80.64
+73.68	81.24	-	-
+72.44	-	81.02	-
+72.65	-	-	80.39
+70	81.10	80.89	80.29
+60	80.74	80.55	79.95
+50	80.41	80.20	79.60
+40	80.05	79.84	79.24
+30	79.69	79.48	78.88
+20	79.32	79.11	78.51
+10	78.95	78.74	78.14
15+00	78.57	78.36	77.76
14+90	78.20	77.99	77.39
+80	77.82	77.61	77.01
+70	77.45	77.24	76.64
+60	77.08	76.87	76.27
+53.40	76.85	76.64	76.04
+50	76.72	76.51	75.91
+40	76.37	76.16	75.56
+30	76.02	75.81	75.21
+20	75.67	75.46	74.86
+10	75.31	75.10	74.50
14+00	74.96	74.75	74.15
13+90	74.61	74.40	73.80
+80	74.26	74.05	73.45
+70	73.91	73.70	73.10
+60	73.55	73.34	72.74
+50	73.20	72.99	72.39
+44.61	73.01	72.80	72.20
+40	72.85	72.64	72.04
+30	72.49	72.28	71.68
+20	72.13	71.92	71.32
+10	71.77	71.56	70.96
13+00	71.40	71.19	70.59
12+92.81	71.12	70.91	70.31

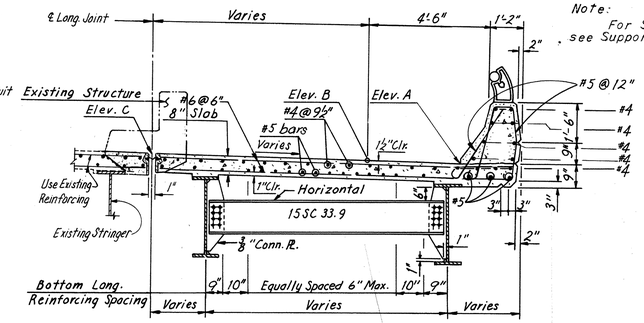
Elevations given in the Elevation Table may require adjustment in the field.

ELEVATION TABLE			
STATION (℄ Ramp W-N)	ELEV. A	ELEV. B	ELEV. C
357+60	72.89	73.10	74.28
+65.50	72.69	72.90	73.65
+70	72.53	72.74	73.48
+80	72.17	72.38	73.09
+90	71.82	72.03	72.70
358+00	71.46	71.67	72.32
+10	71.10	71.31	71.94
+20	70.75	70.96	71.56
+30	70.39	70.60	71.19
+40	70.02	70.23	70.80
+50	69.65	69.86	70.41
+60	69.26	69.47	70.01
+70	68.86	69.07	69.60
+80	68.46	68.67	69.18
+90	68.06	68.27	68.78
+92	67.98	68.19	68.70
359+00	67.67	67.88	68.38
+02.00	67.60	67.81	68.31
+10	67.29	67.50	68.00
+20	66.93	67.14	67.63
+30	66.57	66.78	67.27
+40	66.20	66.41	66.91
+50	65.82	66.03	66.53
+60	65.44	65.65	66.14
+69.39	65.06	65.27	65.78
+70	65.04	65.25	65.75

Note:
For Sections E-E, F-F, G-G and H-H, see Sheet 47.
For Framing Plan, see Sheet 26.
For Joint Details, see Sheet 48 and 49.
Elevation C is to be confirmed by Contractor.
For Handrail Details, see Sheet 53.
For Typical Parapet Details, see Sheet 29.

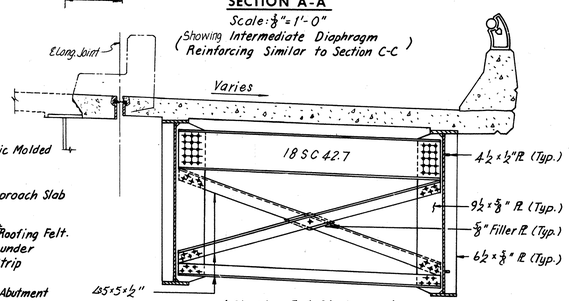


SECTION A-A
Scale: ⅜" = 1'-0"



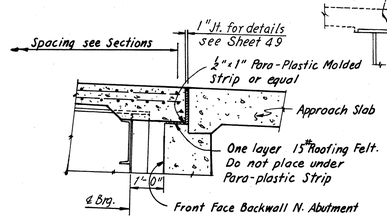
(Showing Intermediate Diaphragm)

Note:
For Standard Drainage Details for Unit 11, see Support Type 3 Sheet 36,

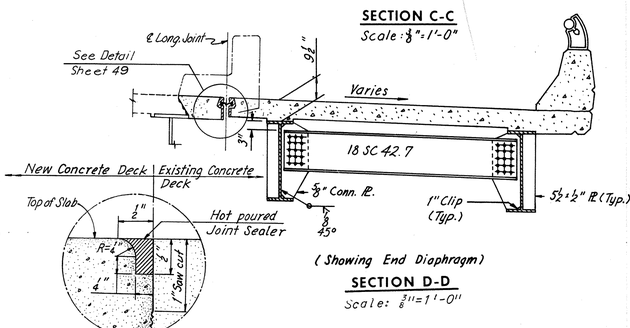


(Showing End Diaphragm)

SECTION B-B
Scale: ⅜" = 1'-0"



SECTION K-K
Scale 2" = 1'-0"



(Showing End Diaphragm)

SECTION D-D
Scale: 8" = 1'-0"

DETAIL C
Full Scale

NOTE:
For the proposed joint details between the existing and the new slab, see Detail C.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P. G.C.C.	2-27-69	3	As Built	TEM	6-77
CHECKED	K.C.T.	5-1-69	2	Note for Table of Elevations	DWB	1-28-75
IN CHARGE			1	Piers & Abutment No. Change	DWB	1-17-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN-UNITS 11, 12, 13, 14 AND 15

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 35 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	208	265

NEW WEST TRUSS

	MEMBER	STRESSES: DEAD LOAD	LIVE LOAD	IMPACT	DESIGN LOAD	ALLOWABLE STRESS	L/r	AREA REQUIRED: GROSS	NET	SECTION	AREA PROVIDED: GROSS	NET
TOP CHORDS	U0WN-U4WN	218C	68	10	296C	15.43	43.4	19.2	—	1-Top PL 24x5/8 2-Web Pls 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	—
	U4WN-U6WN	649C	183	28	860C	15.02	57.1	57.3	—	1-Top PL 24x5/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	—
	U6WN-U8WN	780C	228	35	1043C	14.96	59.0	69.7	—	1-Top PL 24x5/8 2-Web Pls 24x1 1/8 1-Bott. Perf. PL 24x5/8	76.50	—
	U8WN-U10WN	644C	194	30	868C	15.02	57.1	57.8	—	1-Top PL 24x5/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	—
	U10WN-U12WN	257C	79	12	348C	15.06	56.0	23.1	—	1-Top PL 24x5/8 2-Web Pls 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	—
BOTTOM CHORDS	L0WN-L3AWN	0	0	0	0	20.00		—	—	1-Top PL 24x5/8 2-Web Pls 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	51.00
	L3AWN-L5WN	506T	134	20	660T	20.00		—	33.0	1-Top PL 24x7/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L5WN-L7WN	777T	224	34	1035T	20.00		—	51.8	1-Top PL 24x5/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L7WN-L9WN	777T	240	36	1047T	20.00		—	52.4	1-Top PL 24x5/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L9WN-L11WN	508T	160	24	692T	20.00		—	34.6	1-Top PL 24x5/8 2-Web Pls 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L11WN-L12WN	0	0	0	0	20.00		—	—	1-Top PL 24x7/8 2-Web Pls 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	51.00
DIAGONALS	U0WN-L3AWN	394T	132	20	546T	20.00	48.9	—	27.3	1-Top PL 24x9/16 2-Web Pls 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	36.00
	L3AWN-U4WN	380C	134	20	534C	15.32	47.6	34.9	—	1-Top PL 24x9/16 2-Web Pls 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	—
	U4WN-L5WN	226T	100	15	341T	20.00	65.7	—	17.1	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	25.88
	L5WN-U6WN	212C	101	15	328C	14.78	63.8	22.2	—	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	—
	U6WN-L7WN	17T	46C 54T	7 8	36C 79T	14.67 20.00	66.5	2.5	4.0	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	25.88
	L7WN-U8WN	1T	55C 47T	8 7	62C 55T	14.74 20.00	64.7	4.2	2.8	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	25.88
	U8WN-L9WN	188C	87	13	288C	14.64	67.4	19.7	—	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	—
	L9WN-U10WN	210T	88	13	311T	20.00	65.6	—	15.6	2-Web Pls 15x9/16 2-Perf. Pls 24x9/16	30.38	25.88
	U10WN-L11WN	390C	138	21	549C	15.03	56.8	36.5	—	1-Top PL 24x9/16 2-Web Pls 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	—
	L11WN-U12WN	416T	141	21	578T	20.00	55.2	—	28.9	1-Top PL 24x9/16 2-Web Pls 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	36.00
VERTICALS	U0WN-L0WN	394C	137	20	551C	15.50	40.7	35.5	-	2-Web Pls 18x5/8 2-Perf Pls 24x5/8	37.50	—
	U4WN-L4WN TO U10WN-L10WN	0	0	0	0	20.00				2-12[25.0 Intermediate Stay Pls 15x7/16 x1'-11½" End Stay Pls 26x7/16 x1'-11½"	14.64	11.09
	U12WN-L12WN	394C	137	20	551C	15.38	45.4	35.8	—	2-Web Pls 18x5/8 2 Perf. Pls 24x5/8	37.50	—

MEMBER		SECTION	L/r	ALLOWABLE STRESS	GROSS AREA
END SWAY AT P.P. 0	U0WN-L2W	14WF61	93.1	13.40	17.94
	L0WN-L2W	14WF61			17.94
INTERMEDIATE SWAYS	U4WN-M4N M4N-M4N	12BP53	67.1	14.65	15.58
	L4WN-L4W	14WF61	53.0		17.94
END SWAY AT P.P. 12	U12WN-L12W	14WF61	88.2	13.67	17.94
	L12WN-L12W	14WF61	53.0		17.94
CENTER POST	SEE TYPICAL SECTION		58.7	14.97	15.58

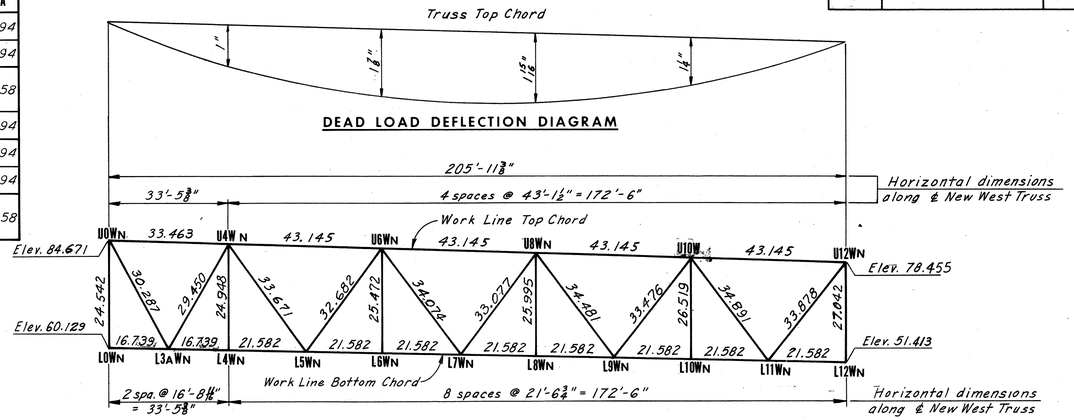
	STRINGERS A: MOMENT	A: REACTION	A: SHEAR	B: MOMENT	B: REACTION	B: SHEAR	C: MOMENT	C: REACTION	C: SHEAR	FLOORBEAMS FB 0: MOMENT	FB 0: SHEAR	FB 4,6,8,10: MOMENT	FB 4,6,8,10: SHEAR	FB 12: MOMENT	FB 12: SHEAR
DEAD LOAD	188	48	26	225	56	31	175	61	32	123	28	546	106	105	33
LIVE LOAD	245	44	17	265	48	19	275	40	20	233	51	321	68	154	50
IMPACT	74	13	5	80	14	6	83	12	6	70	15	96	20	46	15
TOTAL	407	105	48	570	118	56	533	113	58	426	94	963	194	305	98
REQ'D. SEC. MOD.	244			342			320			254		577		183	
SECTION	33 WF 118*			33 WF 130*			33 WF 130*			Web 82½ x ½" Flanges 16x¾"		Web 83 x ½" Flanges 12x¾"		Web 82½ x ½" Flanges 16x¾"	
PROV. SEC. MOD. G	358.3			404.8			404.8								
PROV. SEC. MOD. N										1,227		1,103		1,227	

* Live Load Deflection governs design.

Notes:
Cross-section area of the structural members shown in the tables are in square inches, applied loads, reactions and shears are all given in kips, allowable stresses in kips per square inch and section moduli in inches cubed. C and T in the stress columns denotes respectively compression and tension.

	BY	DATE
MADE	D.E.S.	12-17-68
CHECKED	J.V	5-15-69
IN CHARGE		

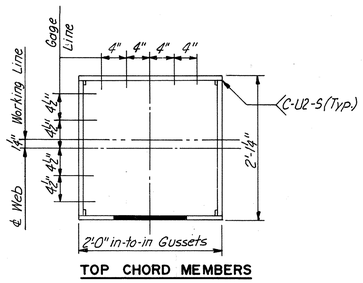
NO.	REVISION	BY	DATE
3	As Built TEM 6-77		
2	Notes Added	E.J.M.	3-5-75
1	Detail C & D added, notes removed, F.B. Web PL size & truss dims. rev.	C.B.P.	2-7-75



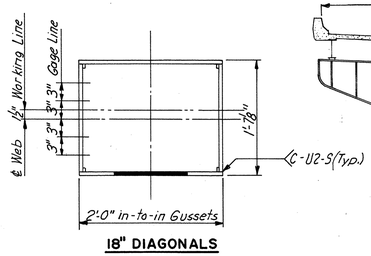
Note: Elevations given must be verified in the field by the contractor. Bottom Chord shall be in the same plane as the bottom chords of the existing trusses.

NEW WEST TRUSS DIMENSIONS

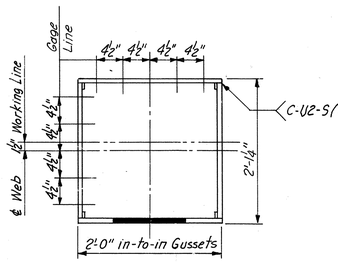
No Scale



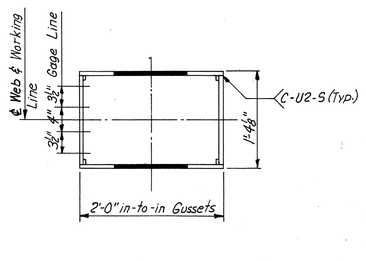
TOP CHORD MEMBERS



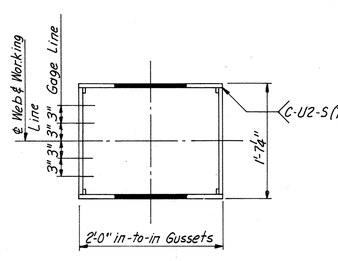
18" DIAGONALS



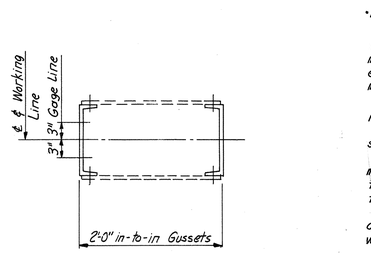
BOTTOM CHORD MEMBERS



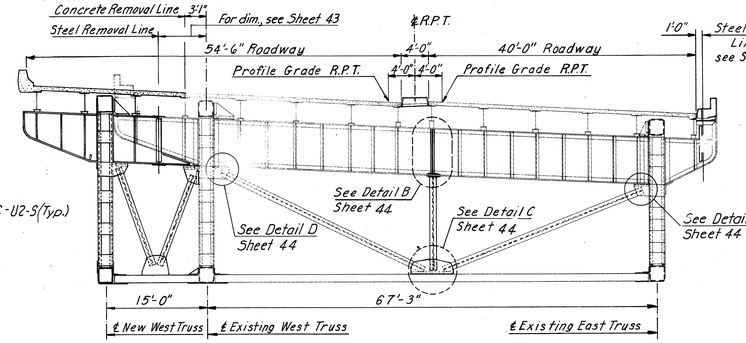
15" DIAGONALS



END VERTICALS



INTERMEDIATE VERTICALS



TYPICAL SECTION

Scale: 3/32" = 1'-0"

GENERAL NOTES FOR TRUSS SPAN

For General Design Notes, see Sheet 4.

Truss and floorbeams shall be cambered for full dead load.

All truss joints shall be detailed to make axes of members conform to full dead load layout of truss. Reaming or drilling of connections shall be done with chords assembled in that position. Reaming of connections for web members shall be made to carefully set metal templets. All chords shall be milled to bear at both ends.

All truss verticals and floorbeams shall lie in truly vertical planes under full dead load.

Prior to removal of any existing structure, the existing floorbeams and sway frames are to be modified by adding posts and strengthening connections. (See Details B, C & D, Sheet 44.) No modification required at Floorbeam 0.

Sway frame connection modifications shall be restricted as follows:

a. Adjacent sway frames shall not be modified simultaneously.

b. Connections in a sway frame are to be modified one at a time. A minimum of one-half the existing connection must be maintained at all times.

c. Holes 3/16" oversize are permitted for connection modifications provided a hardened washer is used under both the head and nut.

d. Traffic on Richmond-Petersburg Turnpike within the truss span shall be limited to 25 MPH during the sway frame modifications.

e. Post connections shall be made after all other sway frame connections at that floorbeam are completed.

The new truss has been designed to carry all the added dead load resulting from the widened roadway.

The new truss shall be temporarily loaded to simulate full dead load prior to making permanent connections to the existing structure.

The concrete deck to be placed after the permanent connections are made and the temporary loads removed.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

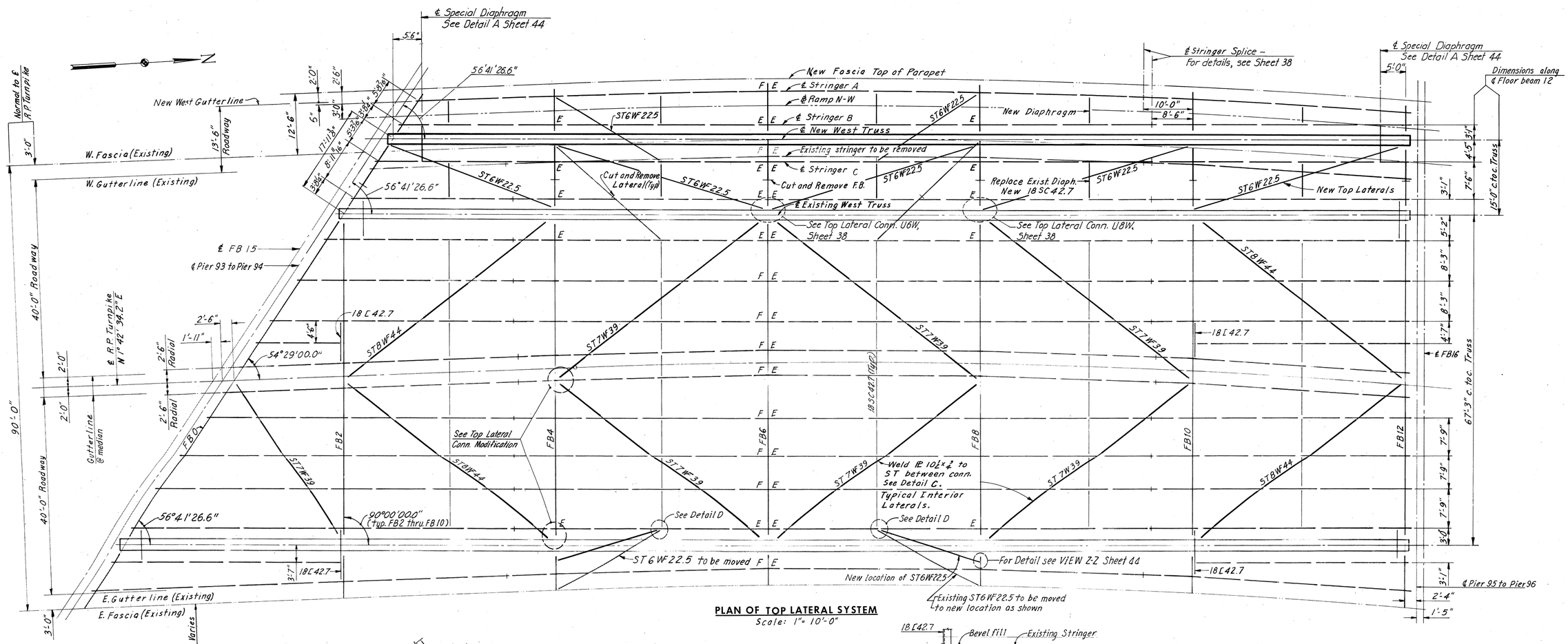
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

STRESS SHEET TRUSS SPAN

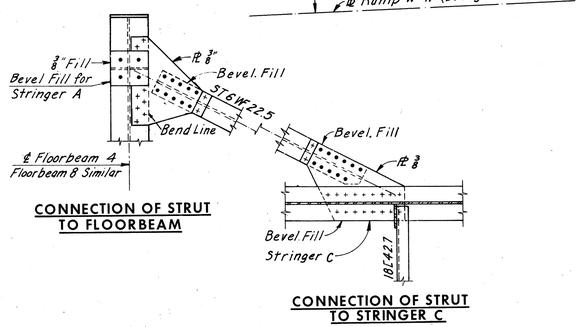
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 36 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	209	265

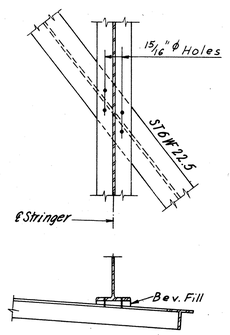


PLAN OF TOP LATERAL SYSTEM
Scale: 1" = 10'-0"



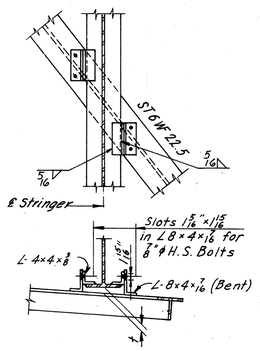
CONNECTION OF STRUT TO FLOORBEAM

CONNECTION OF STRUT TO STRINGER C



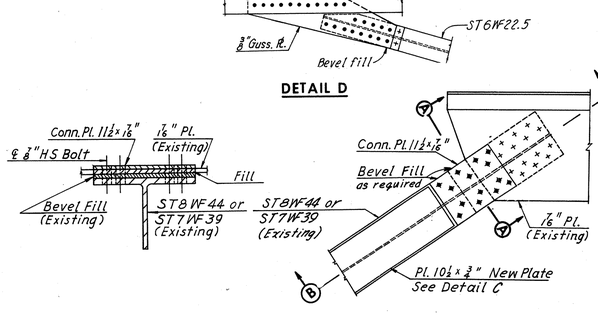
TYPICAL STRINGER TO LATERAL CONNECTION

Bolt with hand tightened ⅝" ϕ erection bolts. Replace erection bolts with ⅞" ϕ bolts after concrete has been poured.



ALTERNATE CONNECTION

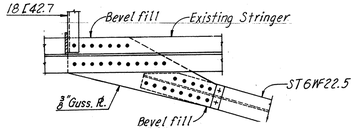
May be used where "t" is greater than 1". Bolt with hand tightened ⅝" ϕ H.S. Bolts during erection tighten bolts with torque wrench after concrete has been poured.



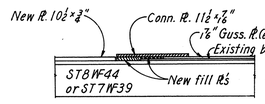
SECTION A-A

DETAIL B

DETAIL C



DETAIL D



SECTION B-B
No Scale

Note: Support at Stringer B. Use details similar to lateral connection.

	BY	DATE				
MADE	AMH	12-2-68	2	As Built	TEM	6-77
CHECKED	JV	5-15-69	1	Dim's & angles revised	C.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

TOP LATERAL CONN. MODIFICATION

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

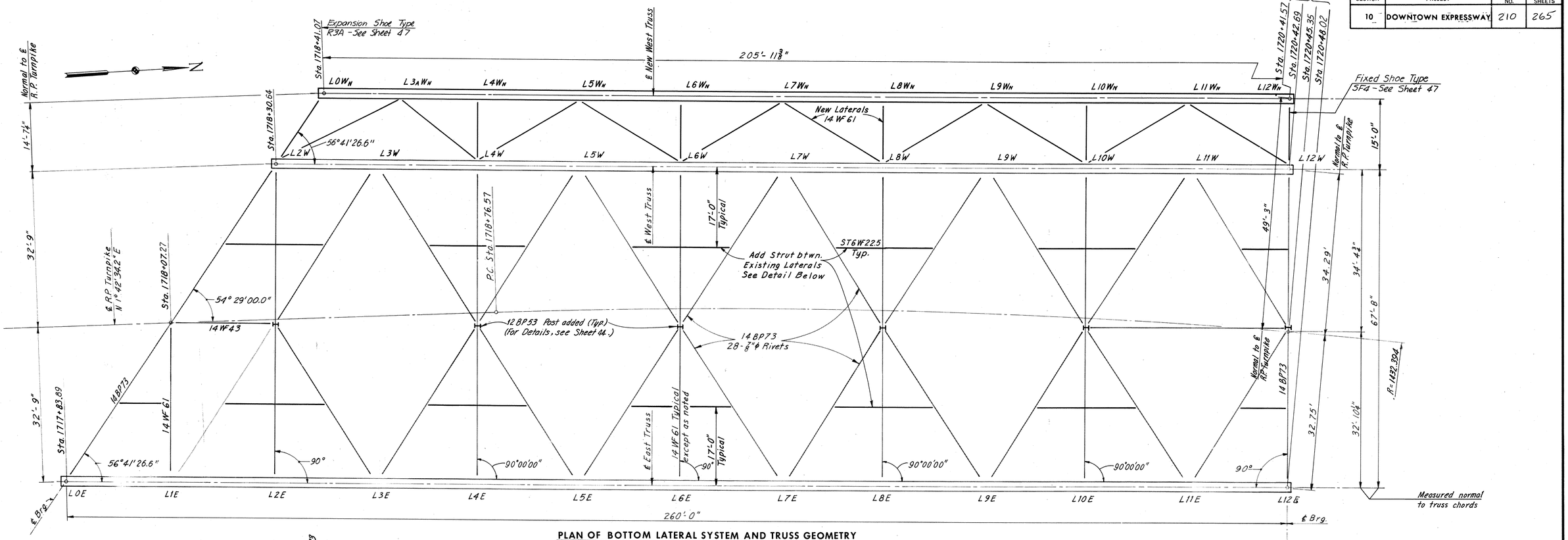
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

TOP LATERAL SYSTEM

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

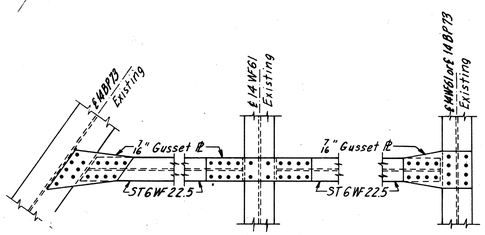
SCALE: 1" = 1'-0" or As Noted
CONTRACT NO.: 10
SHEET NO 37 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	210	265

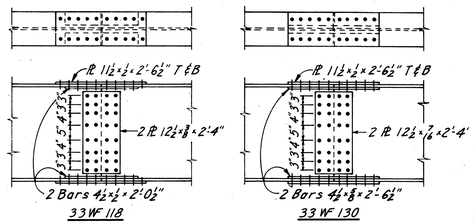


PLAN OF BOTTOM LATERAL SYSTEM AND TRUSS GEOMETRY

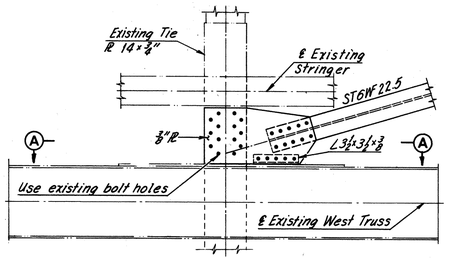
Scale: 1" = 10'-0"



CONNECTION OF STRUT TO BOTTOM LATERAL

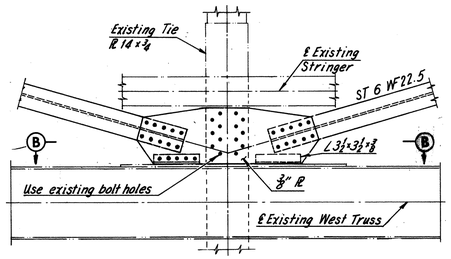


DETAILS OF STRINGER SPLICES

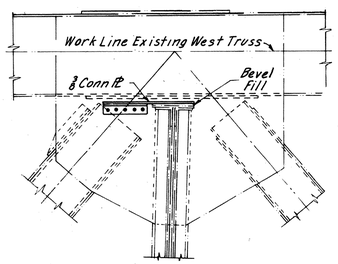


TOP LATERAL CONNECTION U8W

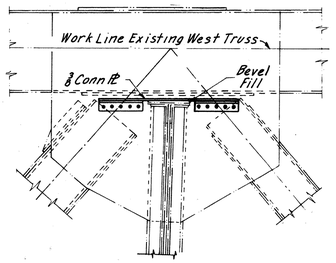
(U10W Typical, U4W Similar)



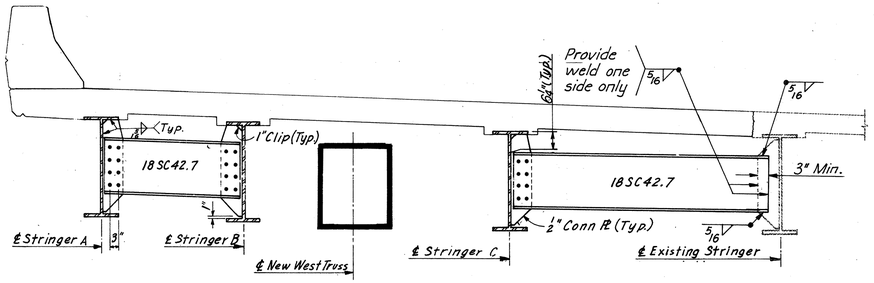
TOP LATERAL CONNECTION U6W



SECTION A-A



SECTION B-B



INTERMEDIATE STRINGER DIAPHRAGM

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	12-4-68	1	Shoes Added	LRH	4-19-74
CHECKED	JV	5-15-69	2	Station & angle chg. & Diagh. conn.	C.B.P.	2-7-75
IN CHARGE			3	Post at PB0 deleted	C.B.P.	3-5-75
			4	As Built	TEM	6-77

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

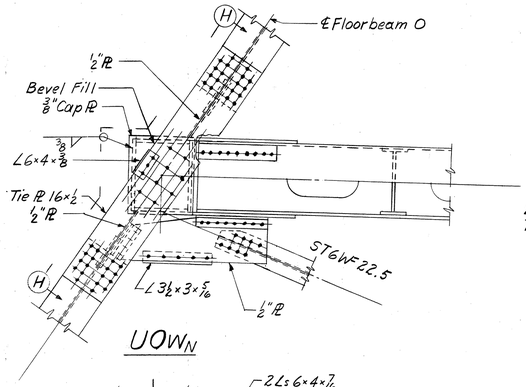
BOTTOM LATERAL SYSTEM

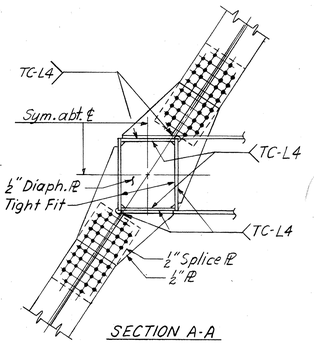
AS BUILT

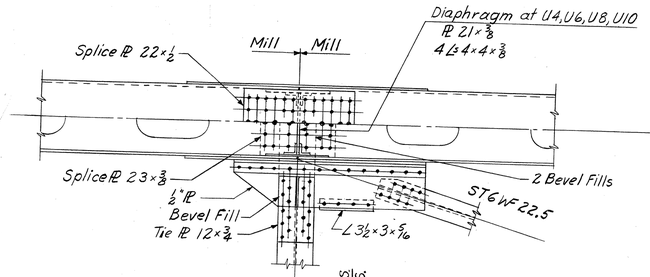
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

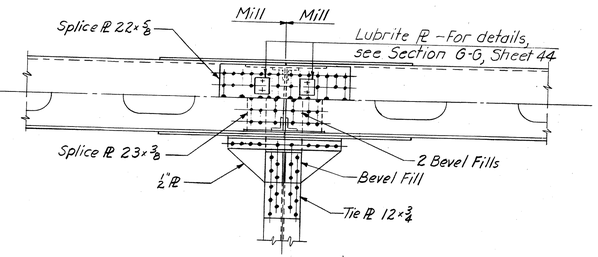
SCALE: 1"=1'-0" or As Noted
CONTRACT NO.: 10
SHEET NO. 38 OF 54

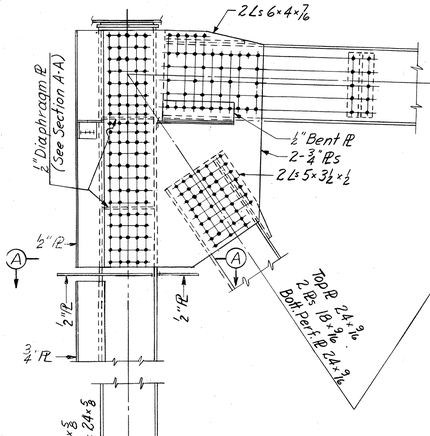
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	211	265

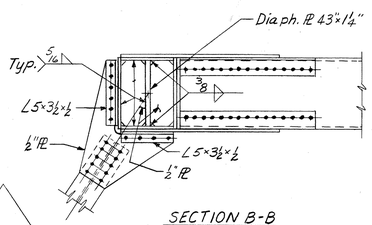


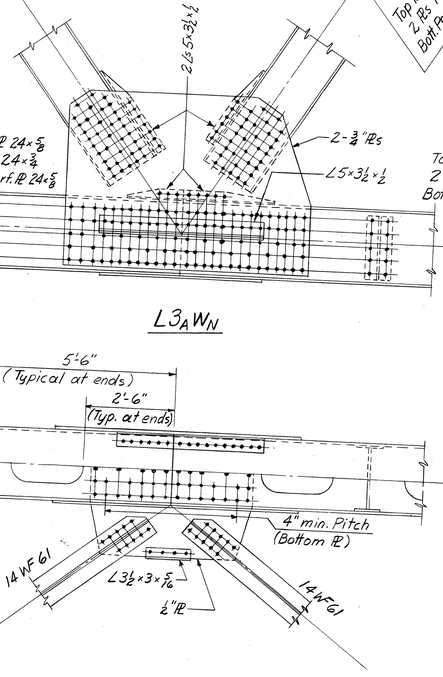


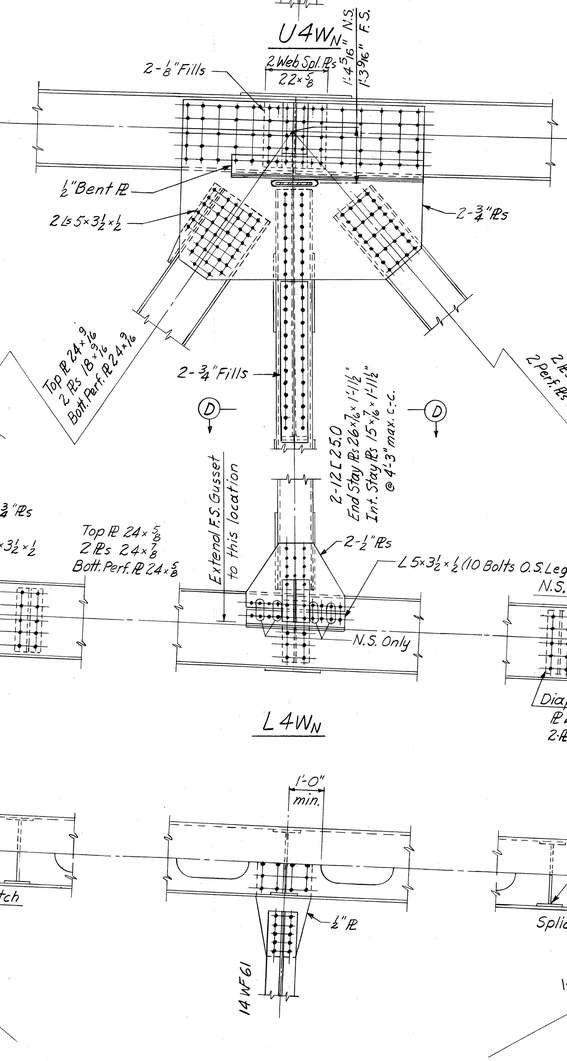


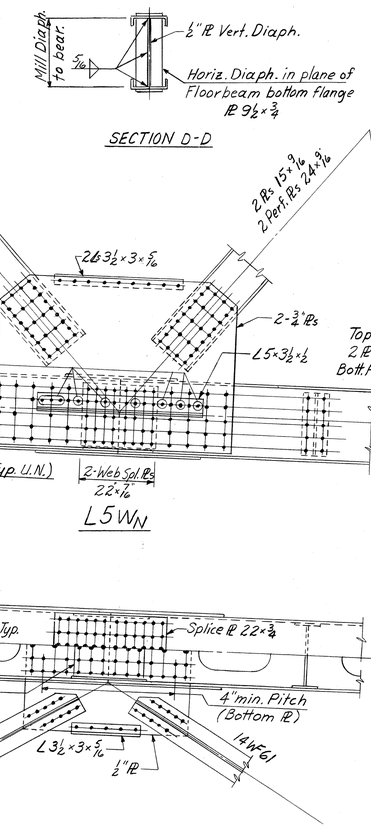


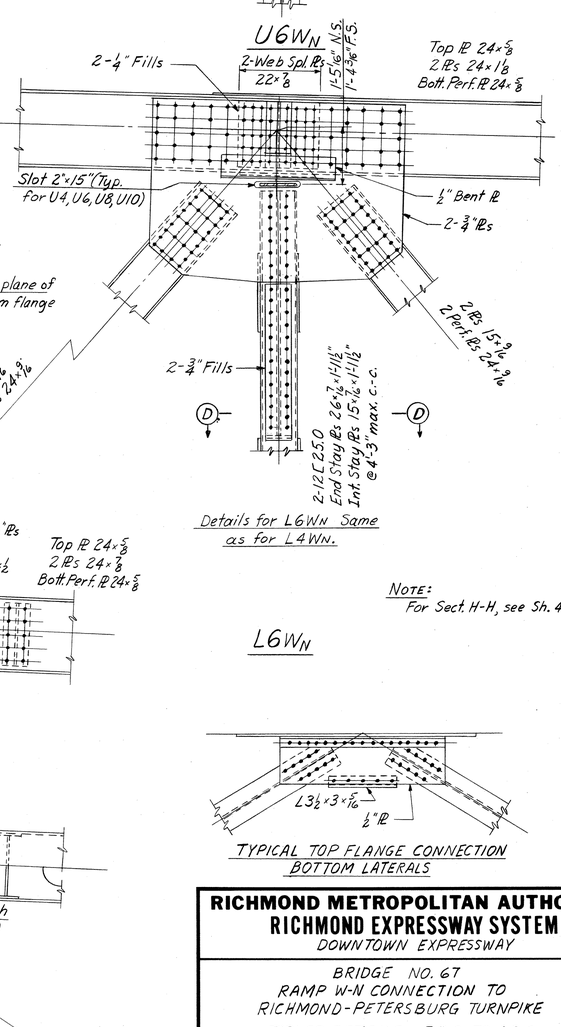




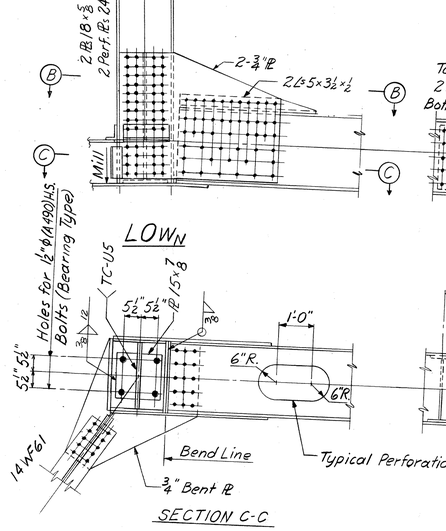








NOTE:
For Sect. H-H, see Sh. 41.



AS BUILT

DESIGNED						
DRAWN	PRY	1-74	2	As Built	TEM	6-77
CHECKED			△	Slot location & misc. changes	J.B.P.	2-7-75
IN CHARGE	PRY		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

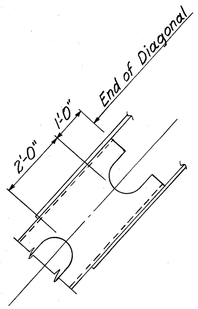
TRUSS DETAILS - P.P.O TO P.P.6

SCALE ½"=1'-0"
DATE

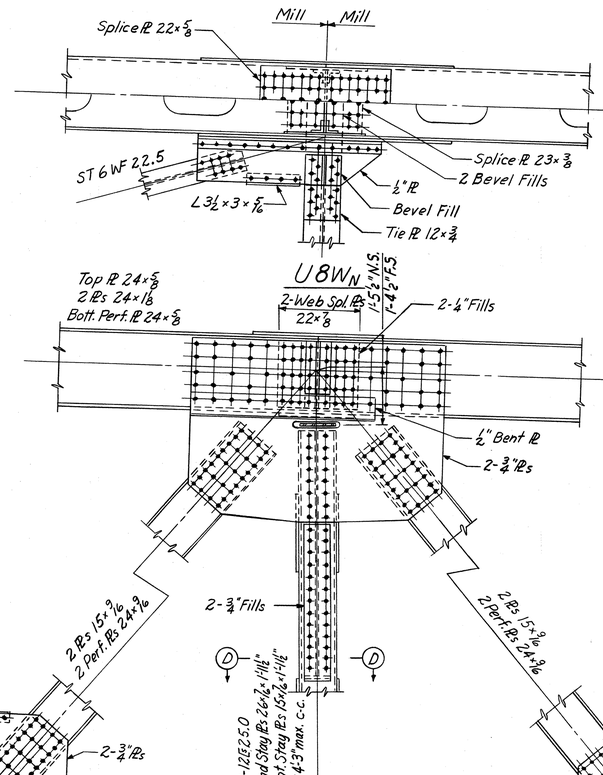
SHEET 39 OF 54

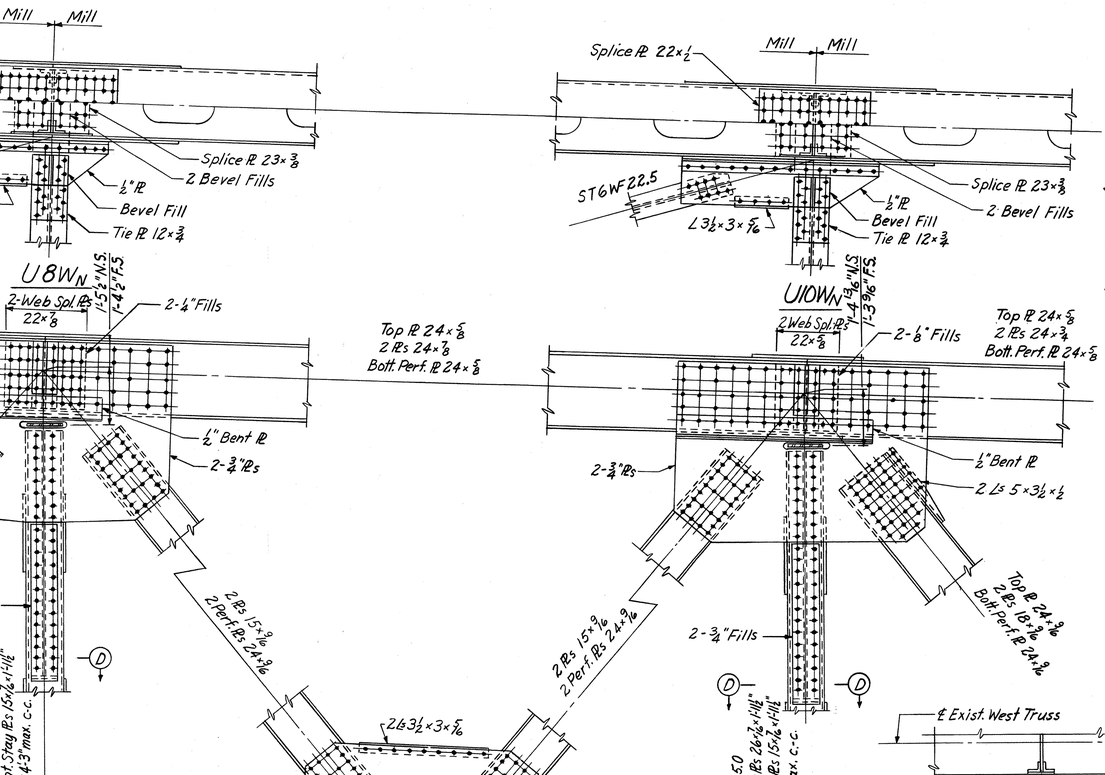
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

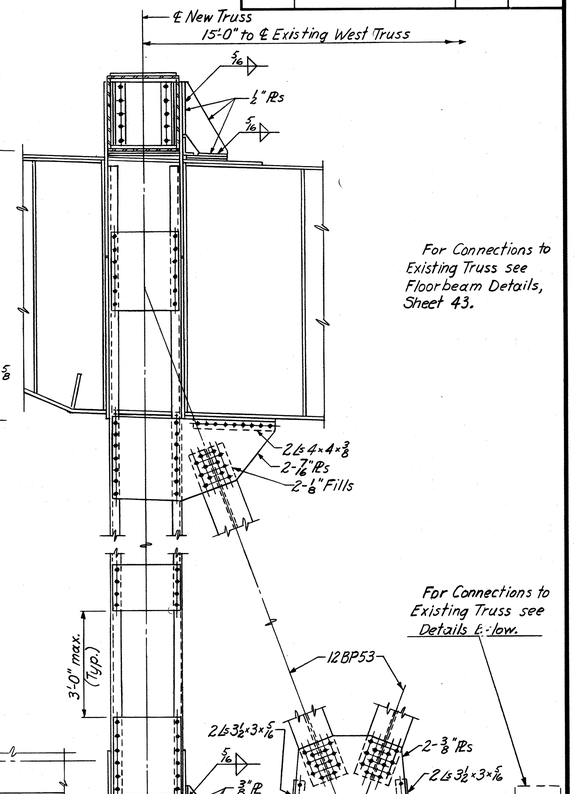
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	212	265



TYPICAL END OF TRUSS
DIAGONAL SHOWING END PERFORATIONS





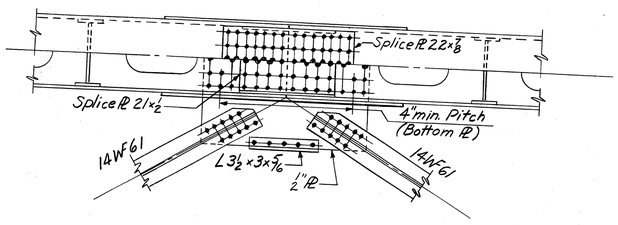


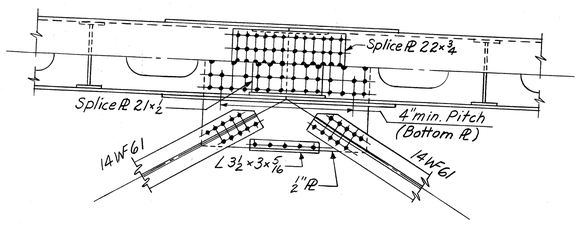
For Connections to Existing Truss see Floorbeam Details, Sheet 43.

For Connections to Existing Truss see Details E-low.

INTERMEDIATE SWAYS AT P.Ps 4, 6, 8 & 10

INT. SWAY CONN. TO EXIST. BOTTOM CHORD





DESIGNED							
DRAWN	PRY	1-74	2	As Built	TEM	6-77
CHECKED			⚠	Slot location	d.B.P.	2-7-75
IN CHARGE	PRY		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
TRUSS DETAILS - P.P.7 TO P.P.10

SCALE ½"=1'-0" U.N.
DATE
SHEET 40 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

For Legend see Sheet 41.

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	213	265

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

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

SECTION R-R

SECTION S-S

SECTION T-T
Scale: 1"=1'-0"

SECTION F-F

SECTION E-E

SECTION G-G

SECTION I-I
END SWAY AT P.P. 12

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

SECTION K-K

SECTION L-L

SECTION H-H
END SWAY AT P.P. 0

SECTION U-U

U12WN

L11WN

L12WN

- ⊕ Indicates existing ⅞"ϕ rivets to remain in place.
- ⊕ Indicates existing ⅞"ϕ rivets to be replaced with ⅞"ϕ H.S. Bolts.
- ⊕ Indicates new holes to be drilled for ⅞"ϕ H.S. Bolts

- ⊕ Indicates existing 1"ϕ rivets to remain in place.
- ⊕ Indicates existing 1"ϕ rivets to be replaced with 1"ϕ H.S. Bolts.
- ⊕ Indicates new holes to be drilled For 1"ϕ H.S. Bolts.

Note: Bott. laterals, gusset Pls & chord not shown.

AS BUILT

DESIGNED			2	As Built	TEM	6-77
DRAWN	PRY	1-74	⚠	Connections to Exist. Truss at P.P.0. added, Depth of Floor Beam, rev. & Spec. Diagn. add.	A.B.P.	2-7-75
CHECKED						
IN CHARGE	PRY		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

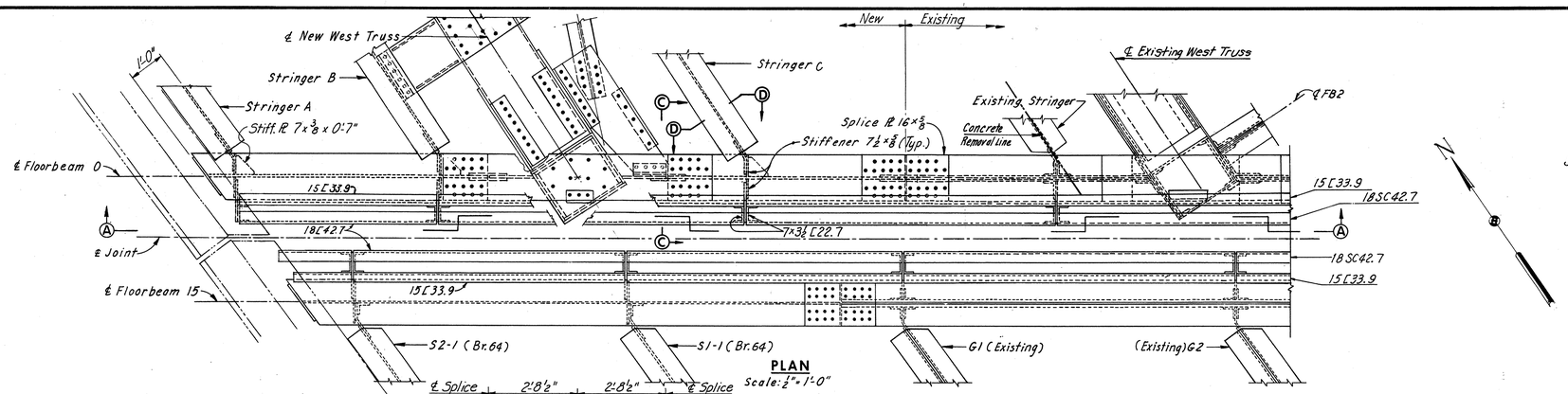
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
TRUSS DETAILS - P.P. 11 & 12

SCALE ½"=1'-0" U.N.
DATE

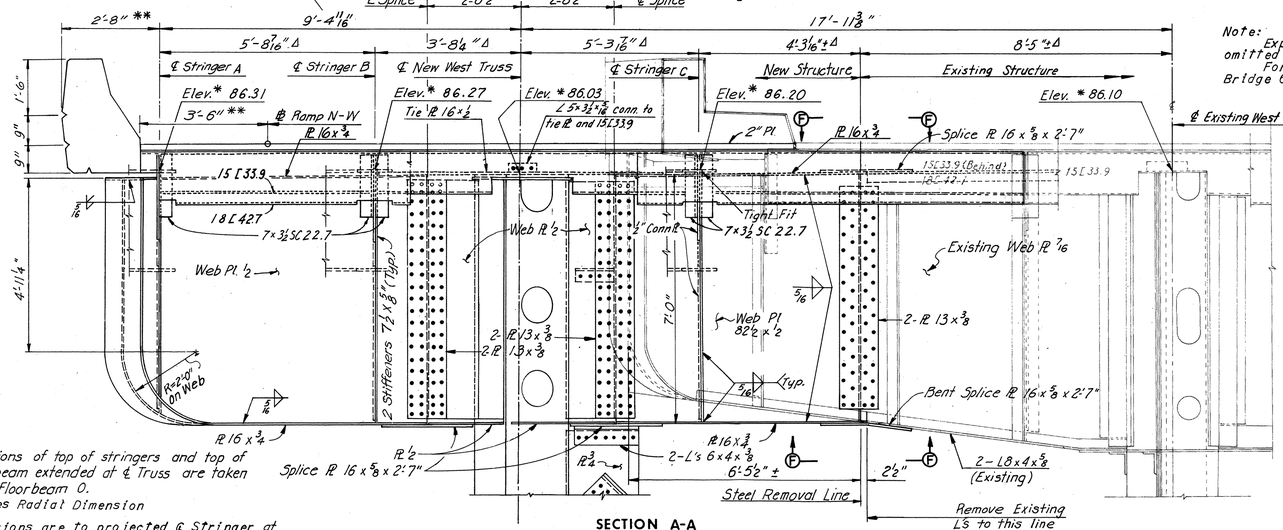
SHEET 41 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	214	265



PLAN
Scale: ½"= 1'-0"



LEGEND:

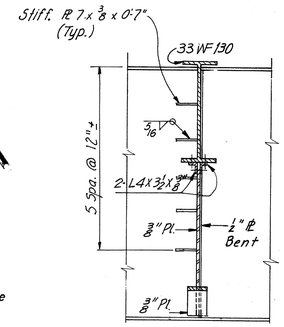
* Elevations of top of stringers and top of Floorbeam extended at ℄ Truss are taken at ℄ Floorbeam 0.

** Denotes Radial Dimension

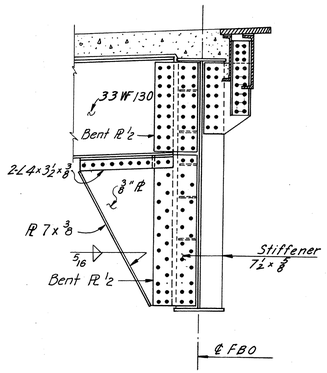
Δ Dimensions are to projected ℄ Stringer at ℄ Floorbeam. Connection - Stiffener Plate shall be located by the Fabricator.

SECTION A-A
ELEVATION-FLOORBEAM 0
Scale : ½" = 1'-0"

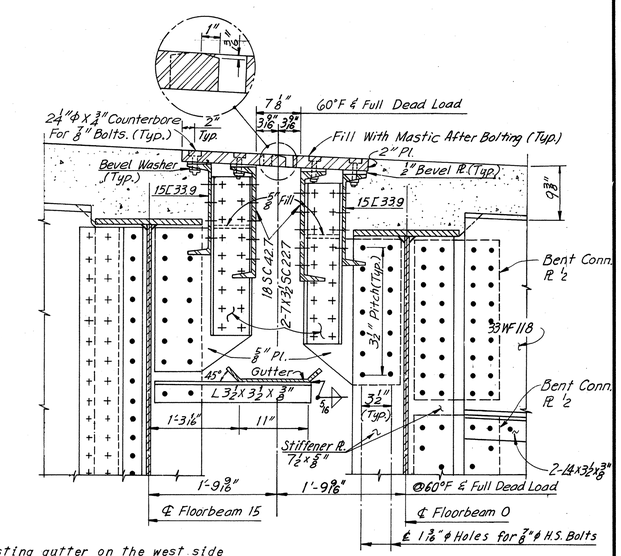
Note: Expansion plates and curb plates are omitted from Plan. For Elevation of Floorbeam 15, see Bridge 64 Sheet 18.



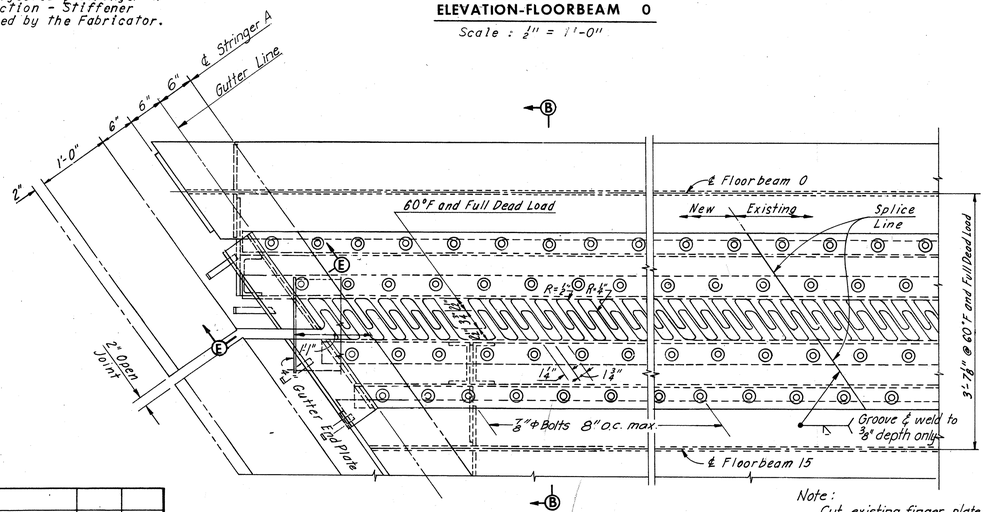
SECTION D-D
Scale: ½"= 1'-0"



SECTION C-C
Scale: ½"=1'-0"

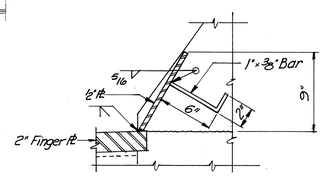


SECTION B-B
Scale: 1"=1'-0"



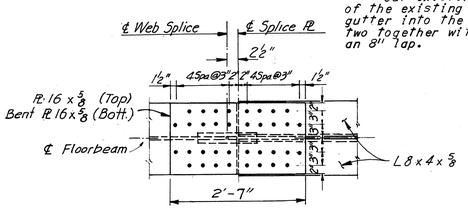
PART PLAN OF EXPANSION DEVICE
Scale: 1" = 1'-0"

Note: Cut existing finger plate as close to the existing gutter line as possible. New plate shall be provided long ℄ cut to exact length after existing plate is cut.



SECTION E-E
Scale = 1½"=1'-0"

Note: Cut existing gutter on the west side of the existing stringer and set the new gutter into the existing gutter. Bolt the two together with existing bolts. Provide an 8" lap.



VIEW F-F
Scale: ¾"=1'-0"
bottom Splice Similar

	BY	DATE
MADE	J.B.P. & R.C.	1-75
CHECKED		
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	6-77
1	New sheet added	J.B.P.	2-7-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FLOORBEAM 0 AND JOINT DETAILS

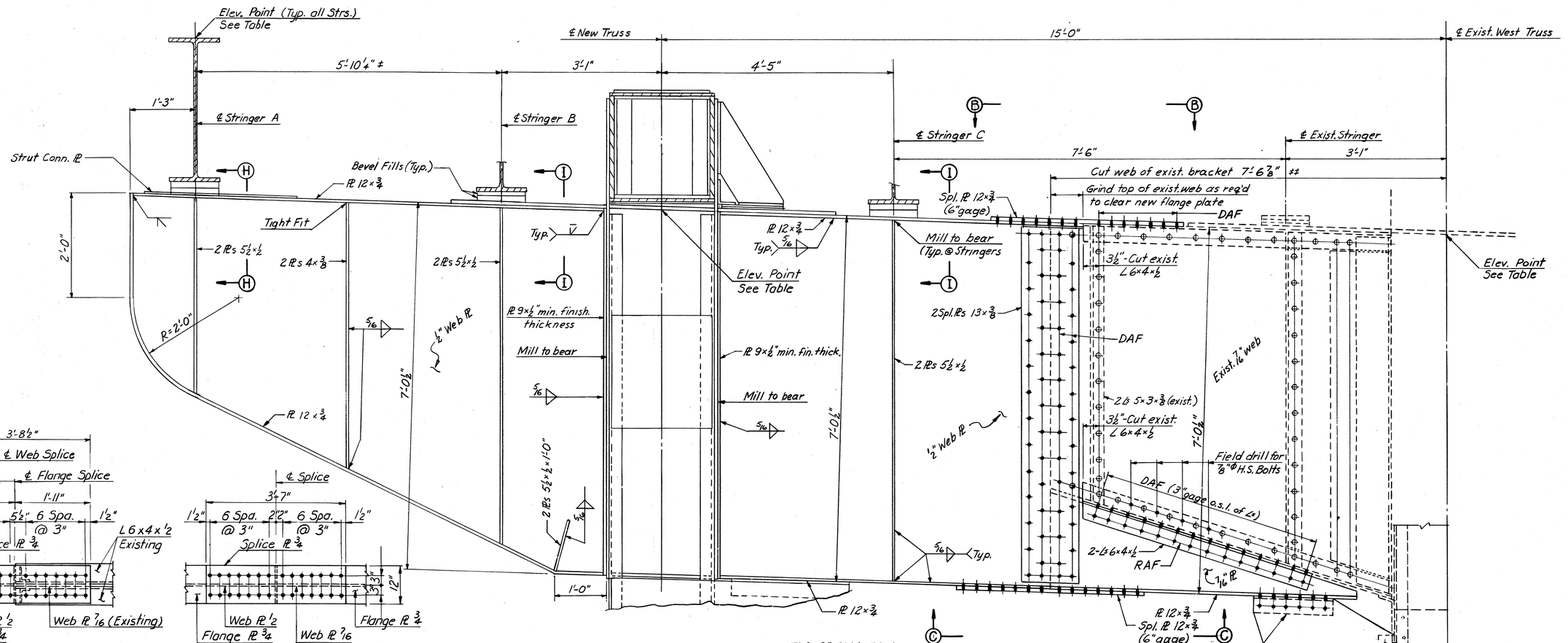
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

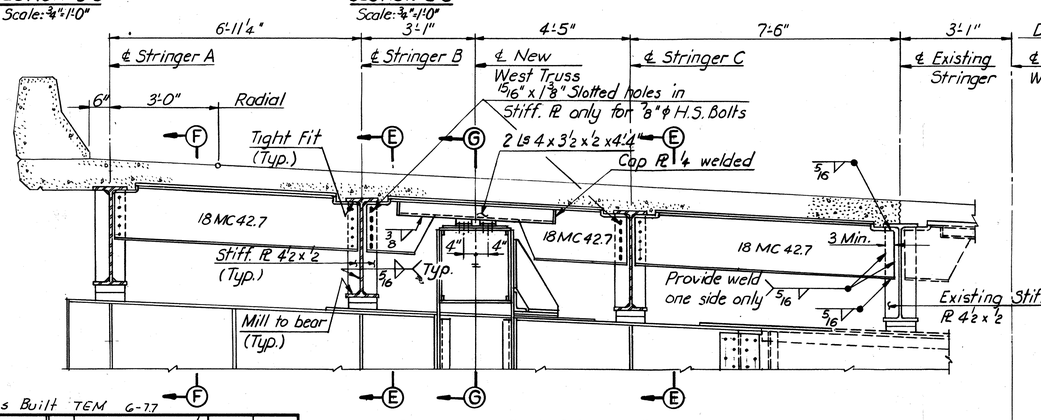
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 42 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWN TOWN EXPRESSWAY	215	265

± 6'-11¼" @ FB6
± 6'-9⅞" @ FB8
± 5'-4⅝" @ FB10

8'-4⅞" @ FB6
8'-0" @ FB8
7'-9⅜" @ FB10





DIAPHRAGMS AT FLOORBEAM FB6 ONLY
Scale: ½"=1'-0"

FLOORBEAM FB4
Details for FB6, FB8 & FB10 Similar
Scale: ¾"=1'-0"
Dims. along ℄ Floorbeam

Notes:

Holes marked RAF are to be subpunched and reamed assembled in the field.

Holes marked DAF are to be drilled in the field with pieces assembled.

Existing shop drawings are available upon request.

For Sections E-E, F-F and G-G see Sheet 44.

TABLE OF ELEVATIONS

LOCATION	STR. A	STR B	STR. C	New TRUSS	EXISTING TRUSS
FB4	85.53	85.33	85.08	82.30	81.85
FB6	84.32	84.04	83.73	80.94	80.41
FB8	83.12	82.79	82.42	79.61	78.97
FB10	81.92	81.62	81.19	78.37	77.62

Note:
Elevations shown are taken at ℄ Floorbeam.

AS BUILT

NO.	REVISION	BY	DATE
2 As Built TEM G-77			
⚠	Table of Elev. & Diaph. Det. added, F.B. Web PL thick. rev. & notes removed & connection added.	C.B.P.	2-7-75

DESIGNED
DRAWN PRY 4-74
CHECKED
IN CHARGE PRY

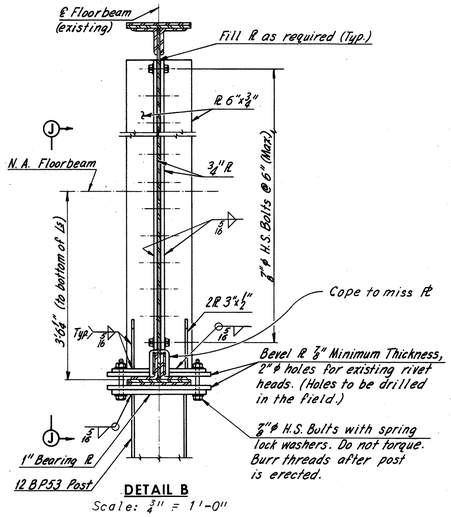
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
INTERMEDIATE FLOORBEAMS

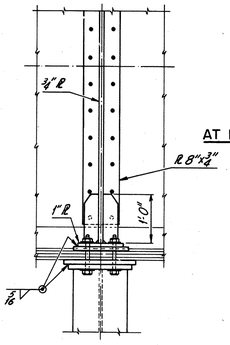
SCALE As Noted
DATE
SHEET 43 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	216	265

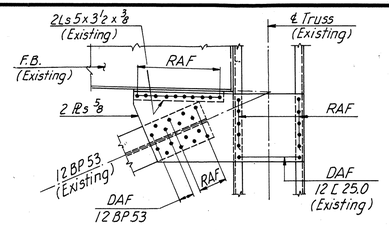


DETAIL B
Scale: 3/4" = 1'-0"

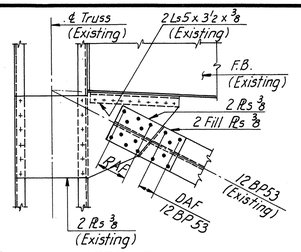


VIEW J-J
Scale: 3/4" = 1'-0"

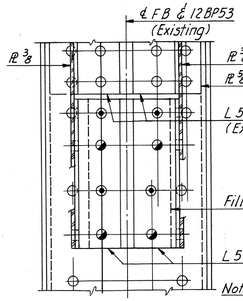
Note:
New bearing stiffeners (also includes 1" PL and 3/4" Min. bevel PL) are to be set with full bearing on the bottom flange angles before drilling holes in existing web. If existing rivets are removed, holes in new stiffeners shall be drilled to match present holes while in bearing on the bottom flange.
The post shall then be drawn into full contact with the bottom of floorbeam by means of the erection bolts.
No welding or cutting will be permitted on existing alloy material.



DETAIL D
AT FB2E, FB4E, FB6E, FB8E, FB10E, FB4W & FB6W
Scale: 1/2"=1'-0"

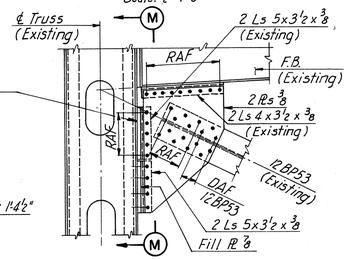


DETAIL D
AT FB8W & FB10W
Scale: 1/2"=1'-0"



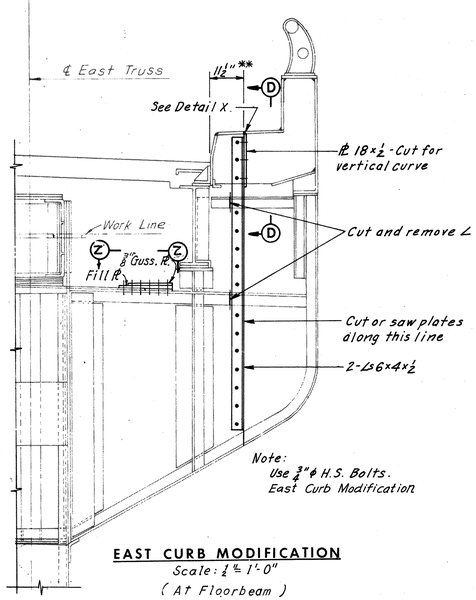
SECTION M-M
Scale: 1 1/2"=1'-0"

Notes:
See Legend, Sheet 41.
Indicates RAF for 1" ϕ H.S. Bolts.
Indicates DAF for 1" ϕ H.S. Bolts



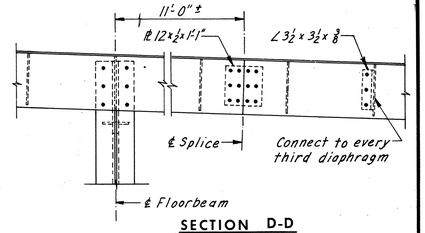
DETAIL D
AT FB12E & FB12W
Scale: 1/2"=1'-0"

** Radial Dimension

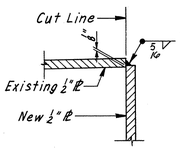


Note:
Use 3/4" ϕ H.S. Bolts. East Curb Modification

EAST CURB MODIFICATION
Scale: 1/4"=1'-0"
(At Floorbeam)

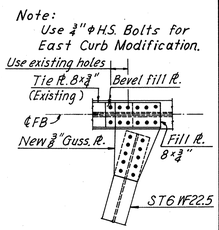


SECTION D-D

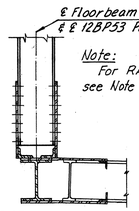


DETAIL X

Note:
Use 3/4" ϕ H.S. Bolts for East Curb Modification.

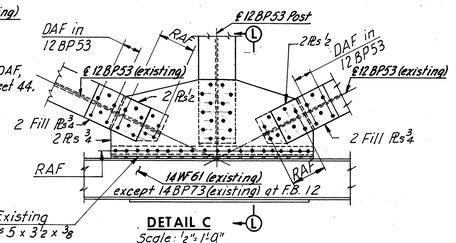


VIEW Z-Z
Scale: 1/2"=1'-0"

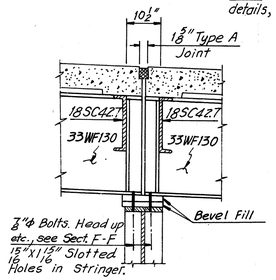


SECTION L-L
Scale: 1/2"=1'-0"

Note:
For RAF ℄ DAF, see Note on Sheet 44.



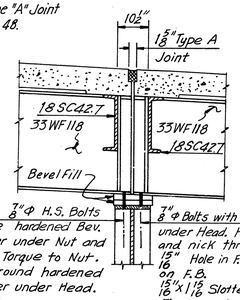
DETAIL C
Scale: 1/2"=1'-0"



3/4" ϕ Bolts. Head up etc., see Sect. F-F
1 3/16" x 1 5/16" Slotted Holes in Stringer.

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

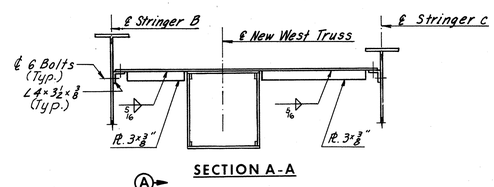
Note: For 1 5/8" Type "A" Joint details, see Sheet 48.



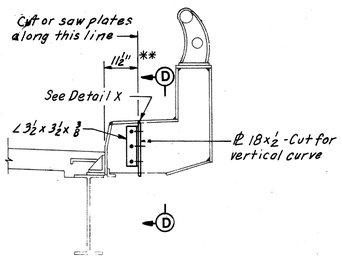
7/8" ϕ H.S. Bolts Use hardened Bev. Washer under Nut and apply Torque to Nut. St'd round hardened Washer under Head.

7/8" ϕ Bolts with Head up Std Washer under Head. Hand tighten Nut and nick thread. 15" Hole in F.B. and Bevel Fills 16 on F.B. 13/16" x 1 5/16" Slotted Holes in Stringer Flange only.

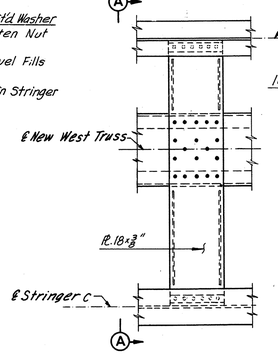
SECTION F-F
Scale: 1/2"=1'-0"



SECTION A-A

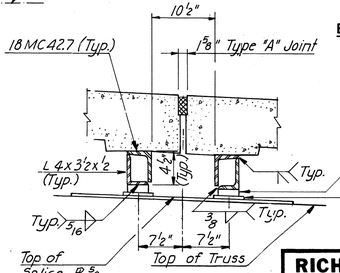


EAST CURB MODIFICATION
Scale: 1/4"=1'-0"
(At Diaphragm)



DETAIL A

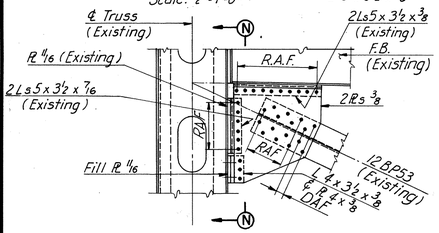
(For location of Detail A see sheet 37.)



Bronze PL 5 x 1/2 x 0'-5" Lubrite or equal, fastened to chord with two 1/2" ϕ Tap Screws or countersunk head bolts (Typ.)

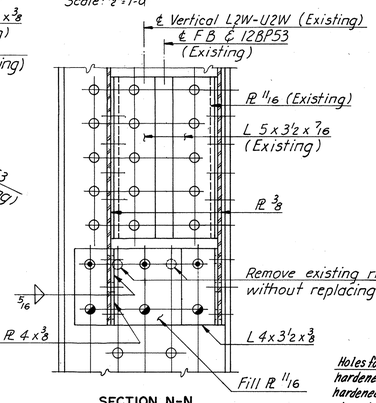
SECTION G-G
Scale: 1"=1'-0"

(For location of Section G-G see Sheet 43.)

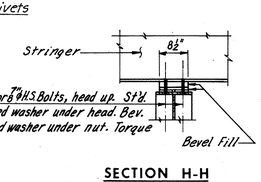


DETAIL D
AT FB2W
Scale: 1/2"=1'-0"

Notes:
See Legend, Sheet 41.
Indicates RAF for 1" ϕ H.S. Bolts.
Indicates DAF for 1" ϕ H.S. Bolts.
3 As Built TEM G-77

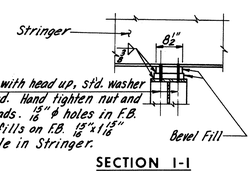


SECTION N-N
Scale: 1/2"=1'-0"



Holes for 7/8" H.S. Bolts, head up. St'd. hardened washer under head. Bev. hardened washer under nut. Torque at nut.

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



7/8" ϕ Bolts with head up, std. washer under head. Hand tighten nut and nick threads. 15/16" ϕ holes in F.B. and bevel fills on F.B. 13/16" x 1 5/16" slotted hole in Stringer.

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

DESIGNED			2	Details B, C & D & Sections J-J, L-L, M-M & N-N added	A.B.P.	3-5-75
DRAWN			1	Post & 1 5/8" Joint Det. deleted	L.B.P.	2-7-75
CHECKED			1	Detail A & Section A-A revised	A.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

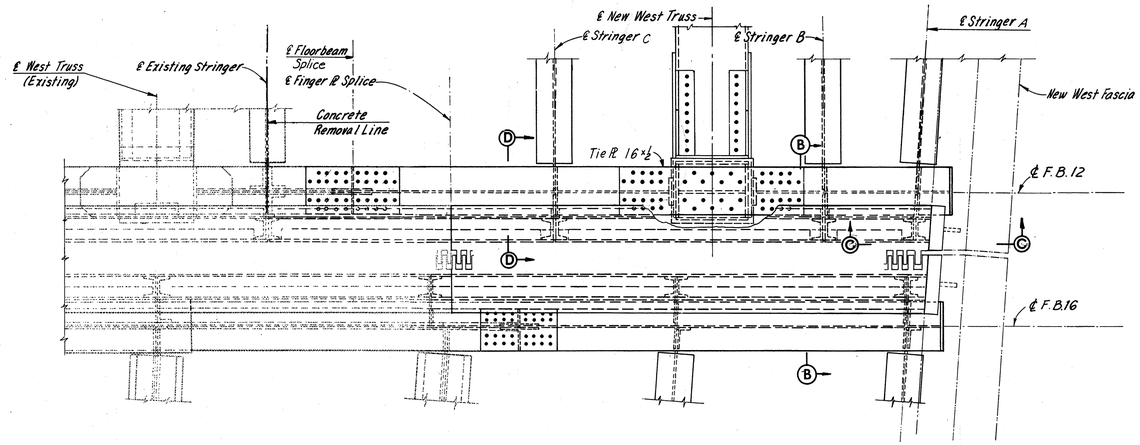
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
MISCELLANEOUS DETAILS

SCALE As Noted
DATE
SHEET 44 OF 54

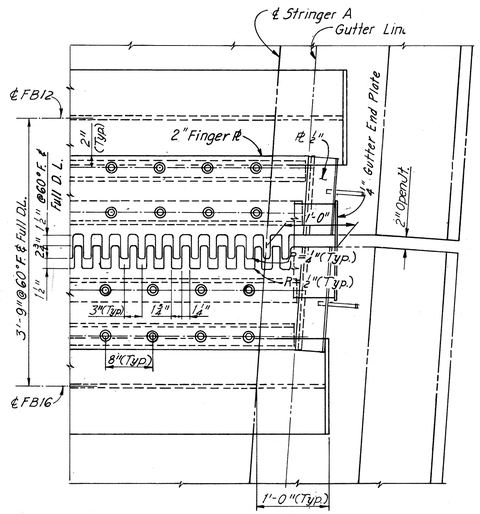
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	217	265



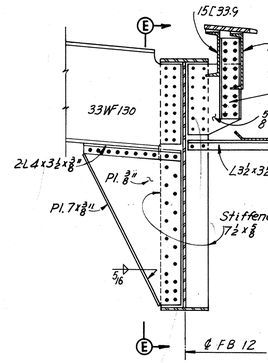
PLAN

Scale: ½" = 1'-0"



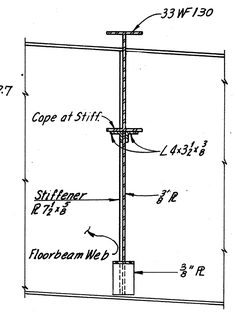
PART PLAN OF EXPANSION DEVICE

Scale: 1" = 1'-0"



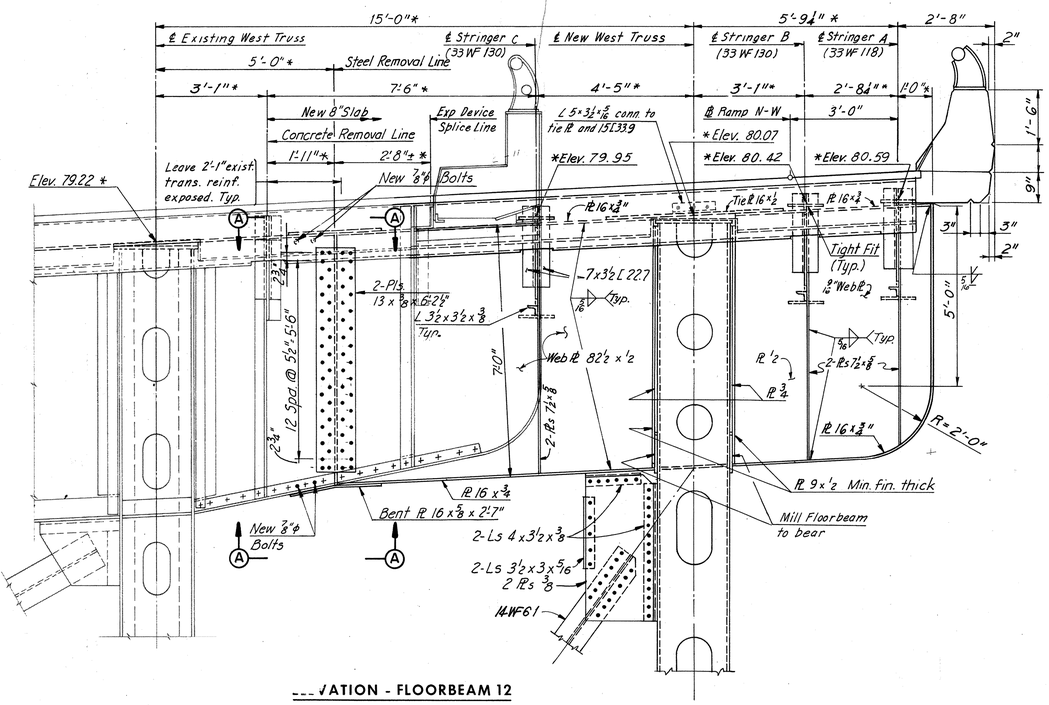
SECTION D-D

Scale: ½" = 1'-0"



SECTION E-E

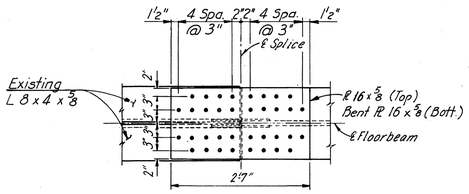
Scale: ½" = 1'-0"



---√ATION - FLOORBEAM 12

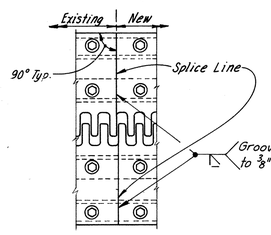
Scale: ½" = 1'-0"

LEGEND:
* Indicates Elevations of top of stringers and top of Floorbeam extended at ℄ Truss are taken at ℄ Floorbeam 12.
○ or • Indicates new ⅞"ϕ H.S. Bolts, for connection to New West Truss, see Sh. 41.



SECTION A-A

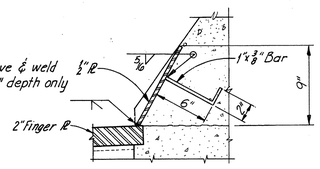
Scale: ¾" = 1'-0"



EXPANSION DEVICE SPLICE DETAIL

Scale: 1" = 1'-0"

Note: Cut existing finger plate as close to the existing gutter line as possible. New plate shall be provided long ℄ cut to exact length after exist. plate is cut.



SECTION B-B

Scale: 1" = 1'-0"

Note: Cut existing gutter on the west side of the existing stringer and set the new gutter into the existing gutter. Bolt the two together with existing bolts. Provide an 8" lap.

SECTION C-C

Scale: 1½" = 1'-0"

	BY	DATE				
MADE	A.B.P./A.H.	1-75	2	As Built	TEM	G-77
CHECKED			1	New sheet added	A.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

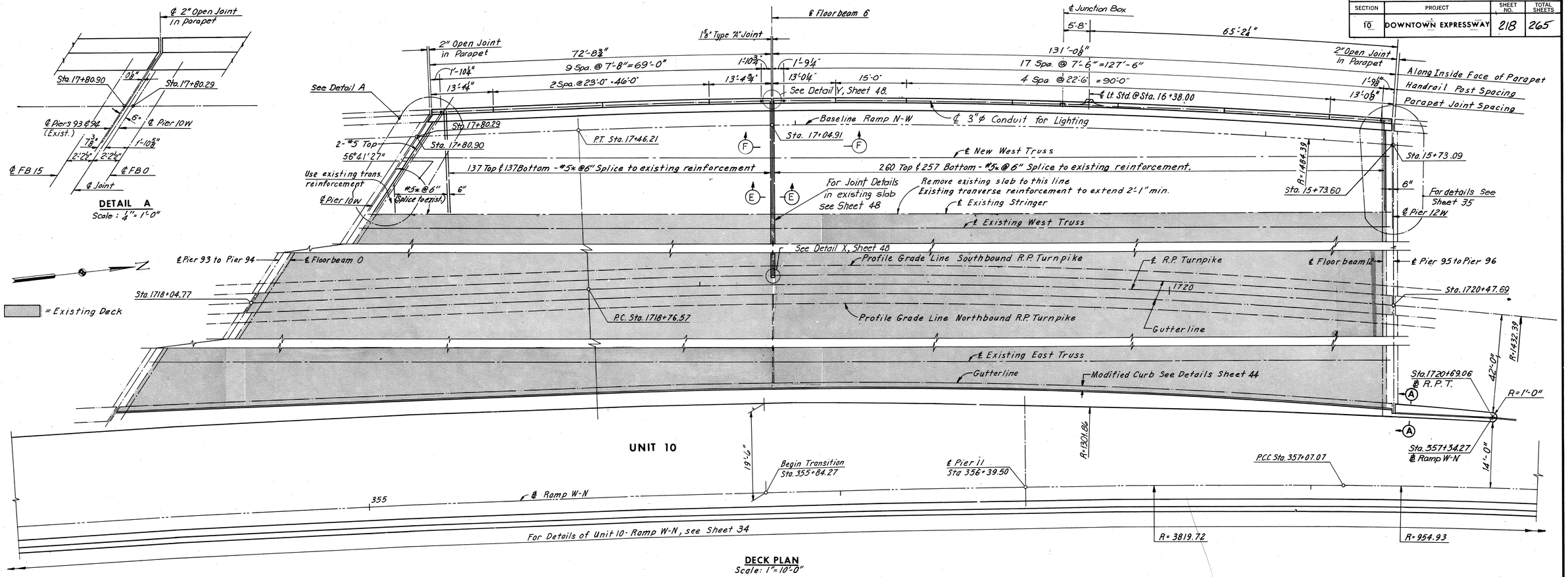
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FLOORBEAM 12 AND JOINT DETAILS

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

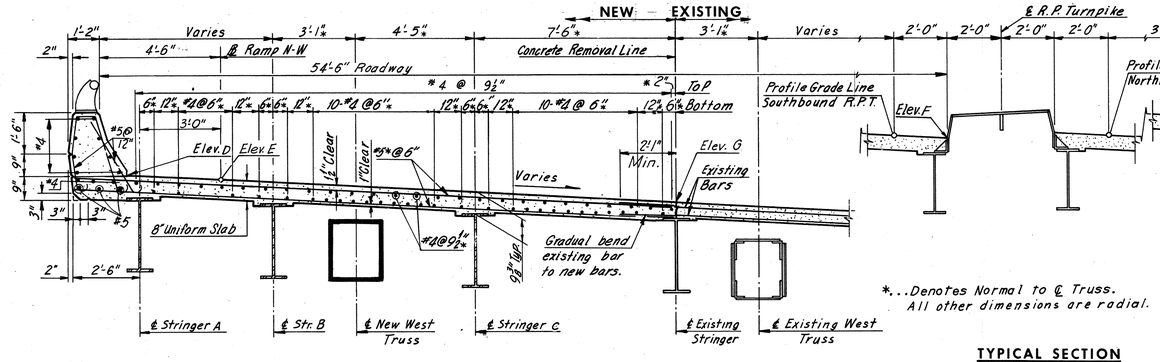
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 45 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	218	265

DETAIL A
Scale: 1/4" = 1'-0"



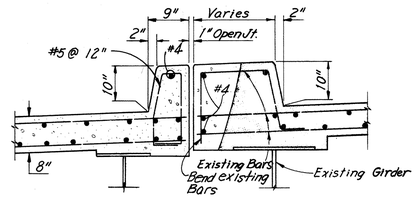
DECK PLAN
Scale: 1" = 10'-0"



*...Denotes Normal to ℄ Truss.
All other dimensions are radial.

TYPICAL SECTION
Scale: ⅜" = 1'-0"

Note:
For Elev. D, Elev. E, Elev. F and Elev. G see Sheet 47.



SECTION A-A
Scale: ¾" = 1'-0"

Note:
For Unit 10 see Sheets 24, 25 and Sheet 34.
For Typical Parapet Detail see sheet 29.
For Section E-E and F-F see sheet 44.

	BY	DATE
MADE	A.M.H.	2-11-69
CHECKED	K.C.T.	6-25-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Joint details at F.B. 6 rev.	L.B.P.	2-25-75
1	Stations, angle & conc. rem. line rev.	L.B.P.	2-7-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

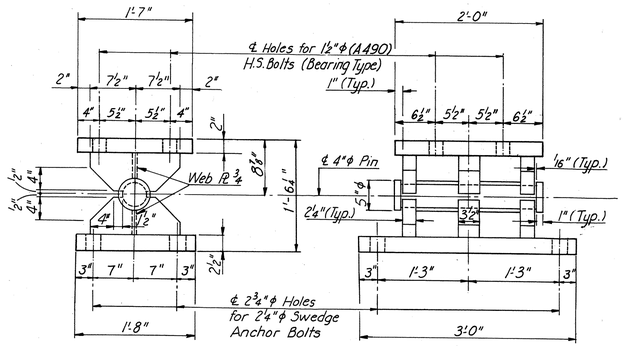
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

DECK PLAN - TRUSS SPAN

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 46 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	219	265



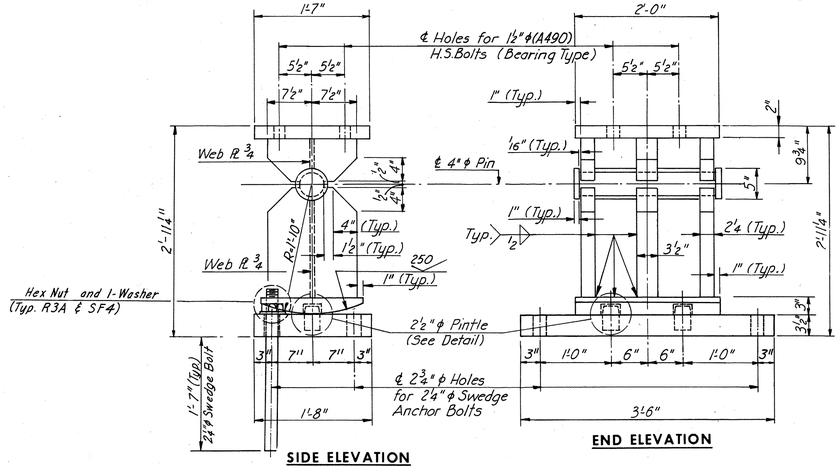
SIDE ELEVATION

END ELEVATION

S F 4

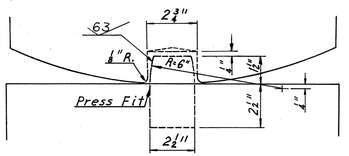
Scale: 1"=1'-0"

NOTE:
For shoe notes, see Standard Shoe Details Sheet S2, except that all material for shoes shall conform to A.S.T.M. A588.



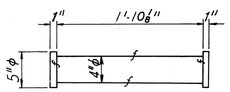
SIDE ELEVATION

END ELEVATION



DETAIL OF PINTLE FOR R3A

Scale: 3"=1'-0"



PIN

R 3 A

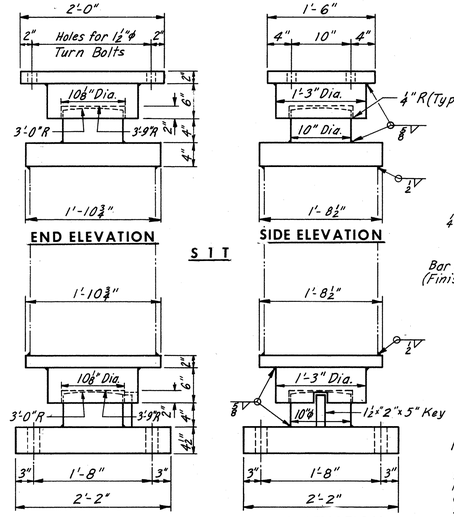
Scale: 1"=1'-0"

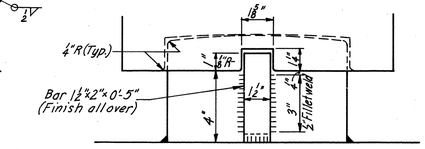
	BY	DATE				
MADE	KCT YCD	12-7-68	2	As Built	TEM	6-77
CHECKED	KCT	6-25-69	1	Shoes SF4 & R3A & Table of Elev rev.	d.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

ELEVATION TABLE				
*STATION	ELEV. D	ELEV. E	ELEV. F	ELEV. G
17+92.49				87.01
+90.00				86.93
+80.90		87.13		
+80.00	87.21	87.11	85.77	86.62
+78.40	87.17			
+70.00	86.94	86.83	85.42	86.31
+60.00	86.66	86.55	85.06	85.99
+50.00	86.39	86.26	84.69	85.66
+46.21	86.27	86.15	84.55	85.53
+40.00	86.10	85.98	84.33	85.33
+30.00	85.82	85.69	83.97	85.00
+20.00	85.55	85.41	83.61	84.68
+10.00	85.27	85.13	83.26	84.36
+05.12				84.20
+04.91		84.98		
+04.88	85.12			
17+00.00	84.99	84.84	82.90	84.04
16+90.00	84.71	84.56	82.54	83.72
+80.00	84.43	84.27	82.18	83.41
+70.00	84.15	83.99	81.82	83.10
+60.00	83.88	83.71	81.46	82.79
+50.00	83.60	83.42	81.10	82.49
+40.00	83.32	83.14	80.75	82.19
+30.00	83.04	82.85	80.39	81.90
+20.00	82.76	82.57	80.03	81.61
+10.00	82.48	82.29	79.67	81.32
16+00.00	82.21	82.00	79.31	81.04
15+90.00	81.92	81.71	78.95	80.77
+80.00	81.56	81.35	78.59	80.45
+73.52	81.33			
+73.09		81.10		
15+71.95				80.19

* The stations are along ℄ Ramp N-W.

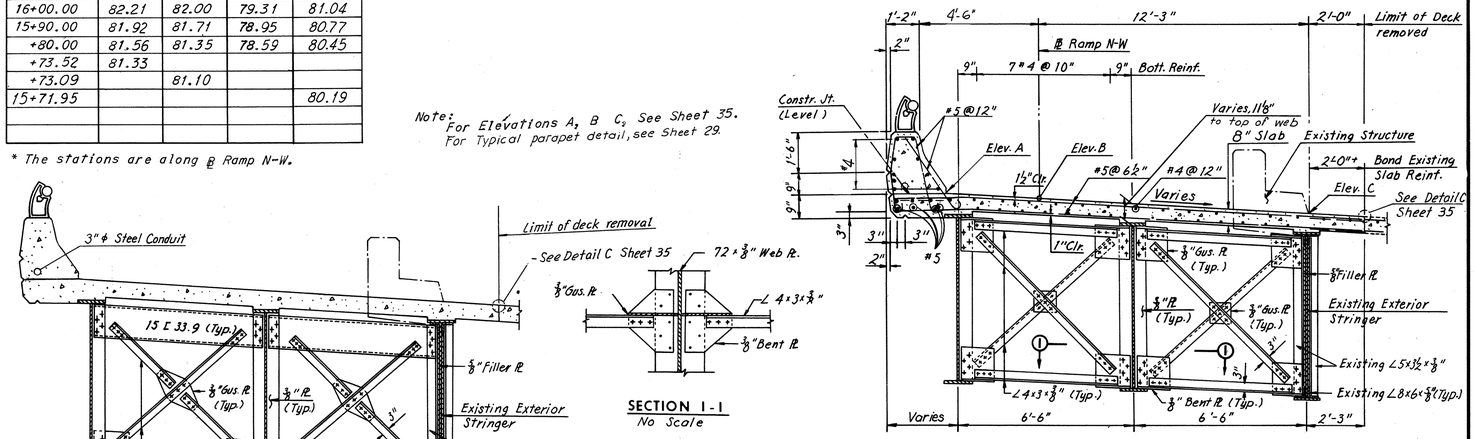
Note:
For Elevations A, B C, See Sheet 35.
For Typical parapet detail, see Sheet 29.





KEY DETAIL

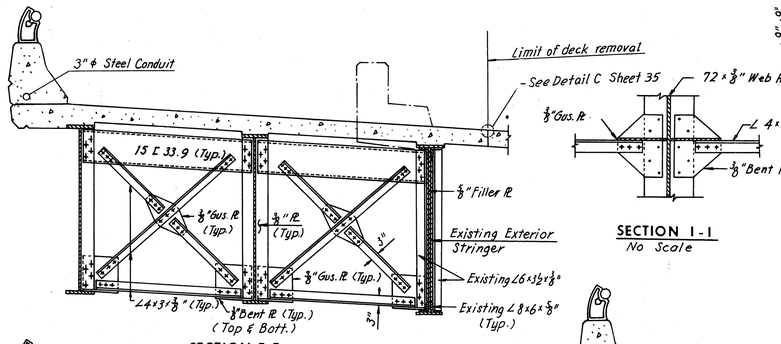
Note:
Location of S1T and S1B shoes are at the top and bottom of steel columns supporting Floorbeam 15 and 16. They rest on Pier 10W and Pier 12W. For details of Floorbeam 15, see Bridge 64.



SECTION E-E

Scale: ⅜" = 1'-0"

(Showing the Intermediate Diaphragms)



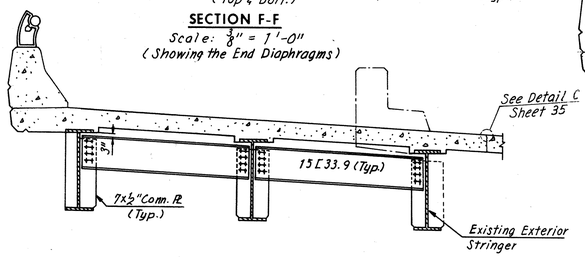
SECTION F-F

Scale: ⅜" = 1'-0"

(Showing the End Diaphragms)

SECTION 1-1

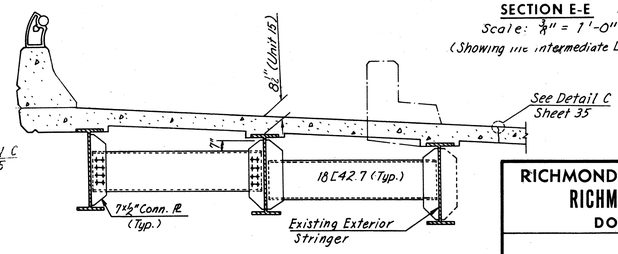
No Scale



(Showing the End Diaphragms)

SECTION H-H

Scale: ⅜" = 1'-0"



SECTION G-G

Scale: ⅜" = 1'-0"

(Showing the Intermediate Diaphragms)

Note:
For locations of Section E-E, F-F, G-G, and H-H see Sheet 35.

AS BUILT

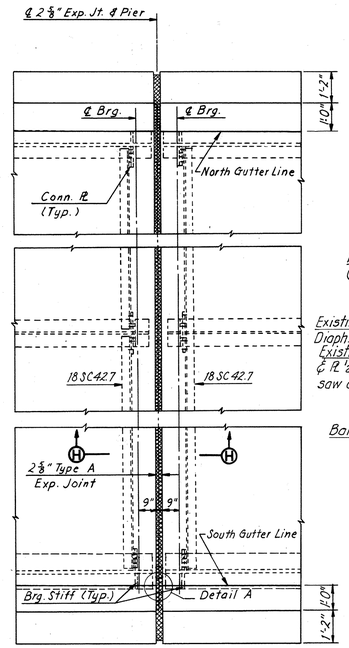
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
SHOE DETAILS AND DECK ELEVATIONS

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

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 47 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	220	265

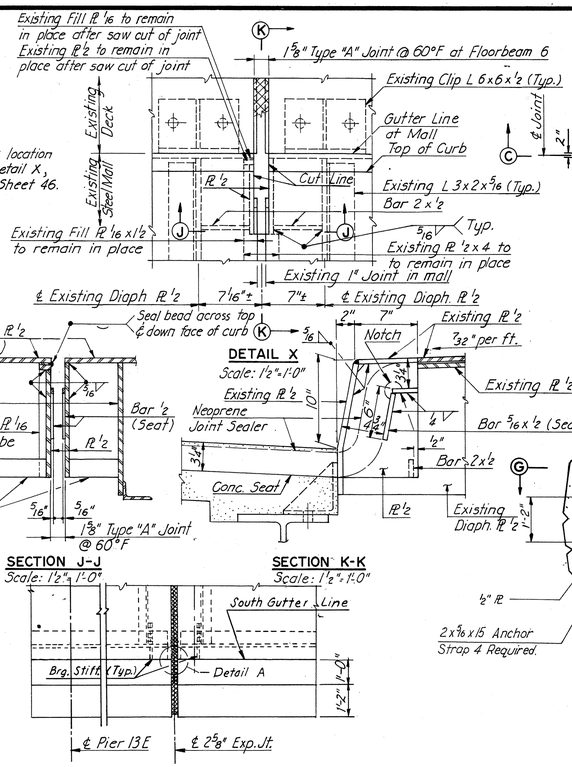


PLAN — JOINT AT PIERS 1 THRU 8

Scale: ⅜" = 1'-0"

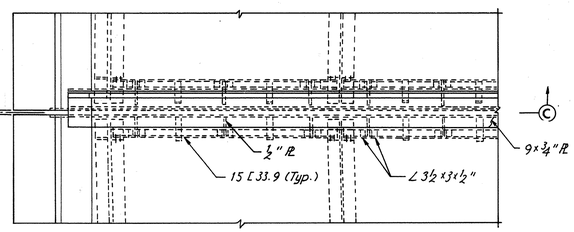
SECTION H-H

Scale: ½" = 1'-0"



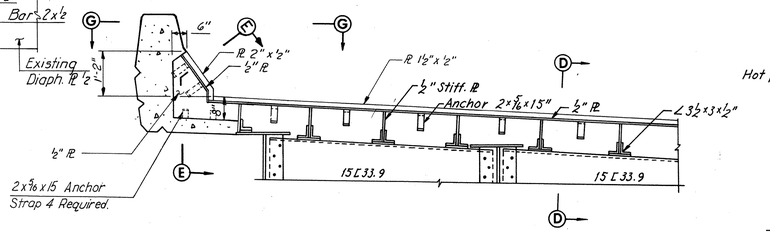
PLAN — JOINT AT PIER 13 E

Scale: ⅜" = 1'-0"



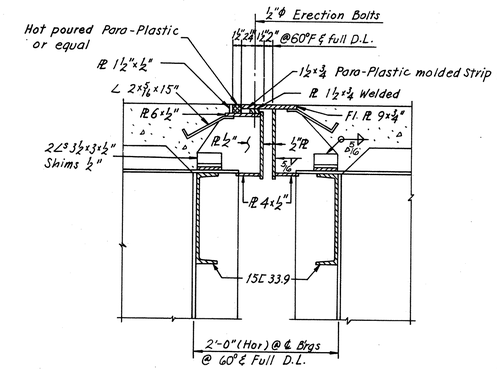
PLAN — JOINT AT PIERS 13W AND 14

Scale: ½" = 1'-0"
(Pier 13 W Shown . Pier 14 Similar)



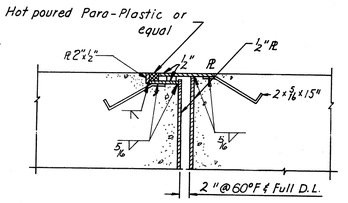
SECTION C-C

Scale: ½" = 1'-0"



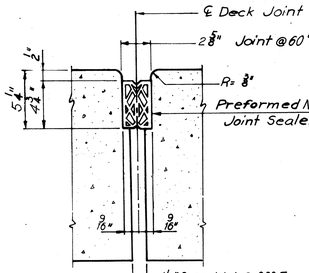
SECTION D-D

Scale: 1" = 1'-0"
(Pier 13 W shown , Pier 14 similar)



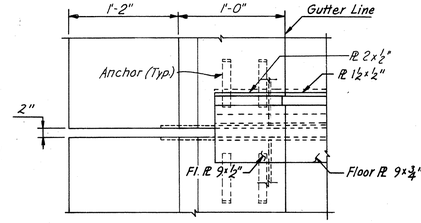
SECTION E-E

Scale: 1" = 1'-0"



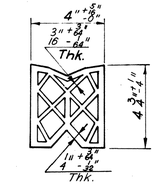
2⅝" TYPE "A" JOINT

No Scale



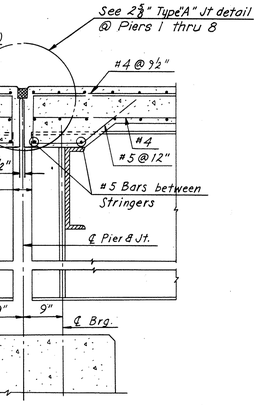
VIEW G-G

No Scale



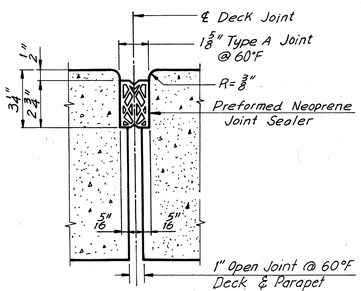
PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT

No Scale



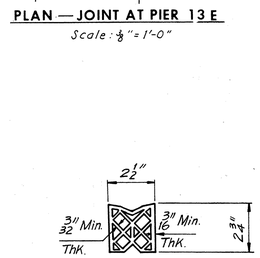
SECTION H-H

Scale: ½" = 1'-0"



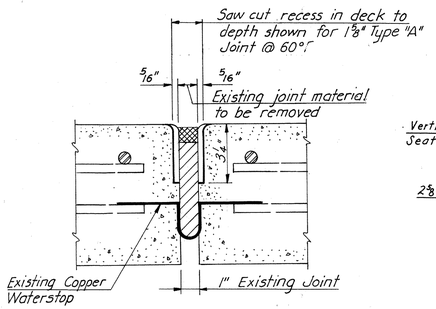
1⅝" TYPE "A" JOINT

Scale: 3" = 1'-0"



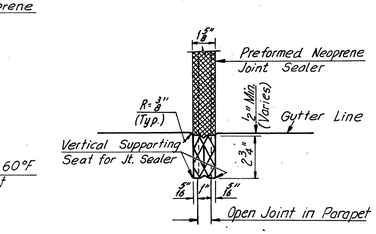
PREFORMED NEOPRENE JOINT SEALER

No Scale



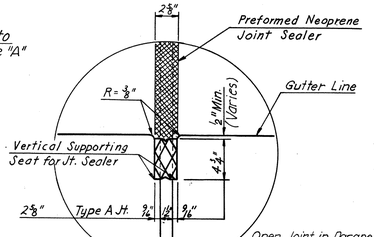
TYPICAL SECTION THRU EXISTING DECK JOINT AT FLOORBEAM 6

Scale: 3" = 1'-0"



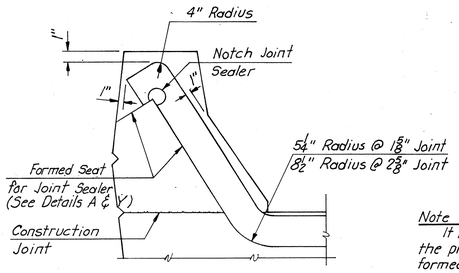
DETAIL Y

No Scale



DETAIL A

No Scale



TREATMENT OF TYPE "A" JOINT AT CURB

No Scale

Note for Type "A" Joints:
It is absolutely essential that the opening for the preformed Neoprene joint seelers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

AS BUILT

	BY	DATE
MADE	Y.C.P	3-25-69
CHECKED	G.S.H.	7-10-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Joint Det. for exist. Joint & Mall added	A.B.P.	2-25-75
1	1⅝" Type "A" Joint details added	A.B.P.	2-7-75

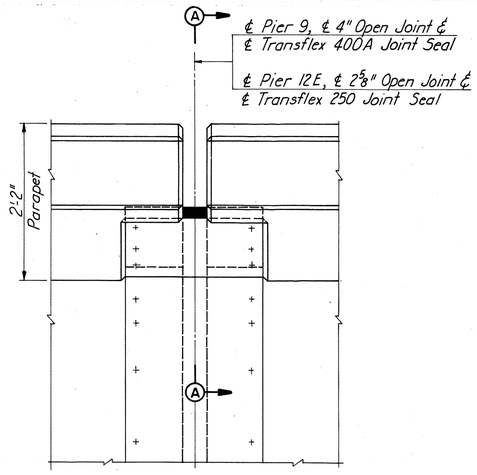
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

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

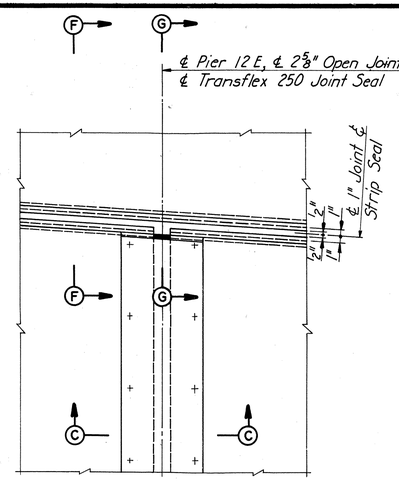
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO 48 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	221	265



PARTIAL PLAN OF JOINTS AT PIERS 9 & 12E

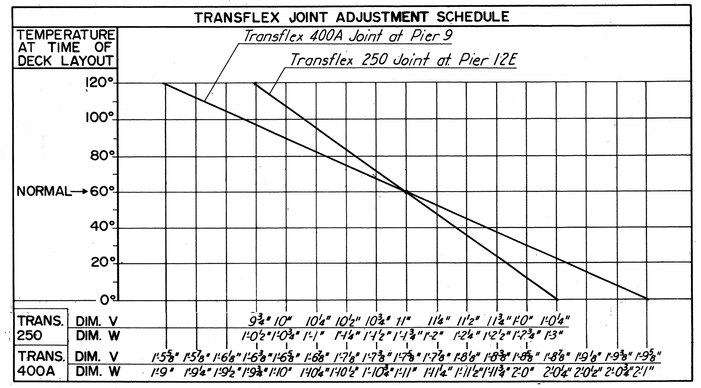
Scale: 1"=1'-0"



PARTIAL PLAN OF JOINT AT PIER 12E

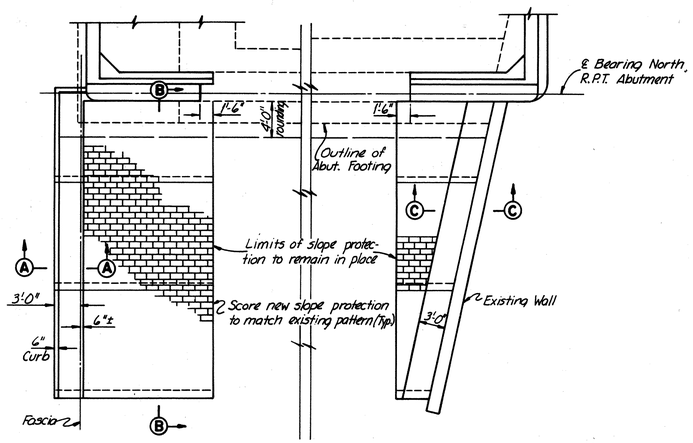
Scale: 1"=1'-0"

TRANSFLEX JOINT ADJUSTMENT SCHEDULE

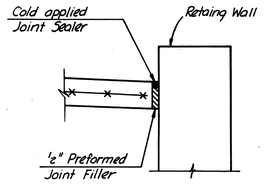


| | | |

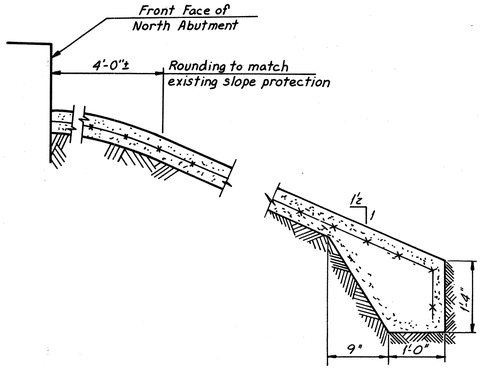
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	222	265



PLAN OF SLOPE PROTECTION
NORTH ABUTMENT
Scale: 1/8" = 1'-0"



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



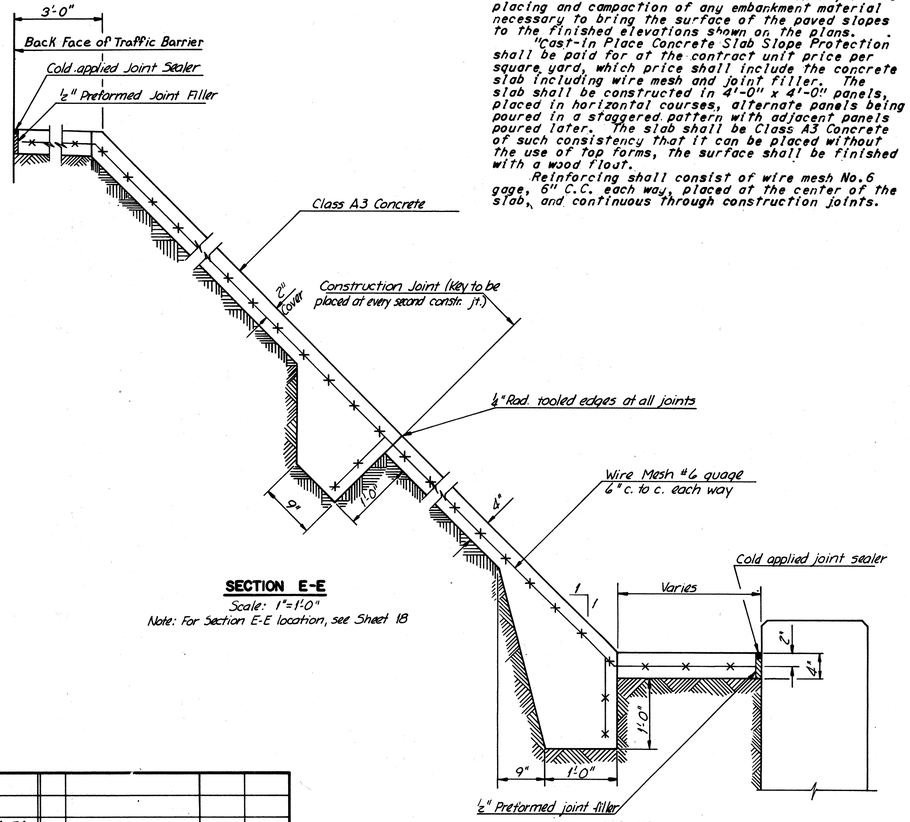
SECTION B-B
Scale: 1"=1'-0"
See Section E-E this sheet for details not shown, except place keys every third construction joint.

SLOPE PROTECTION NOTE

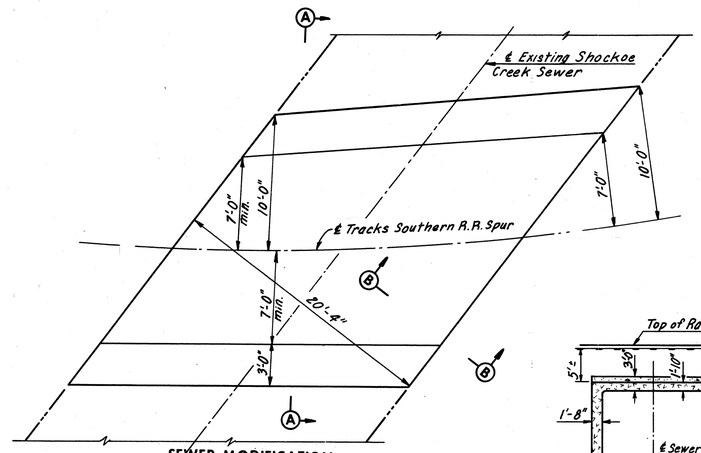
The item "Cast-in-place Concrete Slab Slope Protection" shall include the excavation of, or the placing and compaction of any embankment material necessary to bring the surface of the paved slopes to the finished elevations shown on the plans.

"Cast-in Place Concrete Slab Slope Protection shall be paid for at the contract unit price per square yard, which price shall include the concrete slab including wire mesh and joint filler. The slab shall be constructed in 4'-0" x 4'-0" panels, placed in horizontal courses, alternate panels being poured in a staggered pattern with adjacent panels poured later. The slab shall be Class A3 Concrete of such consistency that it can be placed without the use of top forms, The surface shall be finished with a wood float.

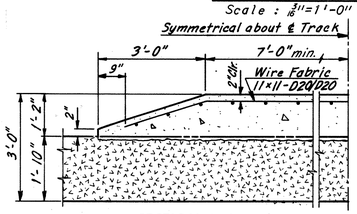
Reinforcing shall consist of wire mesh No.6 gage, 6" C.C. each way, placed at the center of the slab, and continuous through construction joints.



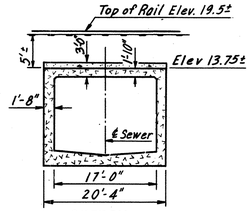
SECTION E-E
Scale: 1"=1'-0"
Note: For Section E-E location, see Sheet 18



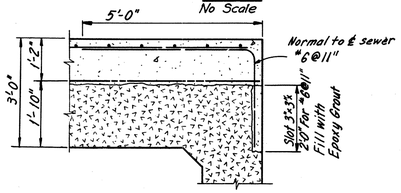
SEWER MODIFICATION
Scale : 3/16"=1'-0"



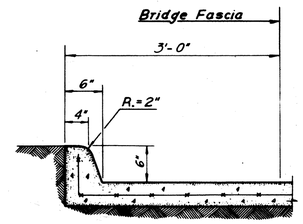
SECTION A-A
Scale: 1/2"=1'-0"



SKETCH
No Scale



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



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

DESIGNED						
DRAWN	JPE	4-74				
CHECKED			1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE
SLOPE PROTECTION DETAILS

SCALE As shown
CONTRACT 10
SHEET 50 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	223	265

BORING DS67-1

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
32.2					32.2	
	8	3 4	S-1	0'-2'		.5 Topsoil
	12	3 3				
	18					
	26					
27.2	32	3 7	S-2	4'-6'		
	16	9 12				
	19					
	22					Brown Clayey Silt, Little C-f Sand,
	26					Trace M-f Gravel, Trace Brick, Cinders
22.2	55	19 16	S-3	9'-11'		(FILL)
	49	29 32				
	48					
	57					
	50					
17.2	66	9 12	S-4	14'-16'		
(0)	36	18 22				
	83				13.7	
	94					
	112					
12.2	64	18 22	S-5	19'-21'		
	26	27 31				
	21					Gray C-f Sand, Some Clayey Silt, Trace
	8					M-f Gravel, Organic, Cinders, Leaves
	9					(FILL)
7.2	7	3 2	S-6	24'-26'		
	7	3 4				
	11	6 8	S-7	26'-28'		
	10	6 5				
	11				4.2	
2.2	16	P P	S-8	29'-31'		
	25	P P				Dark Gray Organic Silt Little F Sand
	16					Trace Clay, Leaves, Wood
	17					(FILL)
	30				-1.8	
-2.8	35	15 17	S-9	34-35.5		
	40	21				Gray C-f Sand and M-f Gravel,
	28					Little Silt
	129				-5.8	
	5Min		C-1	38-43		(C-1: 70% Rec.)
-7.8	8Min					Gray Hard Granite
	12Min					
	14Min					
	12Min					

Bottom Of Hole Elev. -10.8'

BORING DS67-2

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.0	11	43 17	S-1	0'-2'	20.0	.5 Gravel Fill
	13	14 18				Black F Sand, Some Silt, Trace M-f
	12				17.0'	Gravel, Roots, Cinders (FILL)
	18					
15'	11	11 5	S-2	4'-6'		
	18	5 3				
	12					Black Organic Silt, Some M-f
	11					Sand, Trace F Gravel, Brick, Cinders
	11					(FILL)
10'	5	3 2	S-3	9'-11'		
	7	2 1			9.5'	
	8					
	5					
	6					
5'	6	3 2	S-4	14-16		Gray Clayey Silt, Some M-f Sand
	7	1 1				Trace Wood, Cinders
	12					(FILL)
	8					
	7				-0.5'	
0'	10	1 2	S-5	19-21		
	26	10 16				
	58					
	66					Gray Brown Decomposed Granite
	300					
-5'	92	48	100 S-6	24-24.8		
	16Min		C-1	25.5'	5.5'	(C-1: 90% Rec.)
	15Min			30.5'		
	16Min					
	15Min					
-10'	14Min					Gray Hard Granite
	17Min		C-2	30.5'-		(C-2: 91% Rec.)
	15Min			35.5'		
	14Min					
	12Min					
-15	14Min					

Bottom Of Hole Elev. -15.5'

BORING DS67-3

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.5	16	12 44	S-1	0'-2'		Brown Black C-f Sand, Some Clayey Silt
	21	17 15			18.5	Trace M-f Gravel, Brick, Cinders
	30					(FILL)
	50					
15.5	7	8 6	S-2	4'-6'		
	7	6 8				
	13					
	13					Brown Red Clayey Silt, Some C-f
	10					Sand, Trace C-f Gravel, Brick, Cinders
10.5	8	9 10	S-3	9'-11'		(FILL)
	7	12 17				
	13					
	13					
	14					
5.5	13	6 7	S-4	14-16	5.5'	
	8	7 8				
	10					Dark Brown Organic Clayey Silt, Little
	12					M-f Sand, Trace Cinders, Leaves
	14				1.5	(FILL)
0.5	15	5 7	S-5	19-21		
	18	9 21				Brown C-f Sand, Little Clayey Silt
	20					Trace F Gravel
	21					
	20				-4.0	
-4.5	OPEN	12 44	S-6	24-26		
		51 100				Brown Decomposed Granite
		100	S-7	27-27	-6.5'	No Rec.
	25Min		C-1	27-32		Hard Gray Granite
-9.5	30Min					(C-1: 100% Rec.)
	30Min					
	25Min					
	20Min					

Bottom Of Hole Elev. -11.5'

BORING DS67-4

Elev.	Casing Blows/Ft	Spoon Blows Per 6"	Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
17.4	1				17.4	
	4	12 12	S-1	1'-3'		.5 Asphalt
	9	14 16				
	12					
12.4	11	10 11	S-2	4'-6'		
	16	14 21				Brown Clayey Silt, Little M-f Sand,
	25					Trace M-f Gravel, Brick, Cinders
	32					(FILL)
	16					
7.4	18	9 12	S-3	9'-11'		
(0)	11	14 12				
	6					
	6				4.4	
	6					
2.4	2	2 2	S-4	14-16		
	2	2 2				
	2					
	2					
	2					Gray Silt, Some M-f Sand
-2.6'	8	1 1	S-5	19-21		
	8	2 1				
	21					
	21					
	21					
-7.6'	26	13 60	S-6	24-25.3	-7.9	
	8	100				
	114/.6					Gray Green Decomposed Granite
	OPEN					
-12.6		100	S-7	29-29.1	-12.6	No. Rec.
	4Min		C-1	30-35		Gray Hard Granite
	5Min					(C-1: 53% Rec)
	5Min					
-17.6	4Min					
	8Min		C-2	35-40		Gray Hard Granite
	9Min					(C1=100% Rec.)
	10Min					
	8Min					
-22.6'	8Min					

Bottom Of Hole Elev. -22.6'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ϕ)
(c) Samples designated by a "C" number indicate 1⅜" ϕ(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 51 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPESSWAY	224	265

BORING DS67-5

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
17.7	21	7	13	S-1	0'-2'	17.7	
	27	10	10				Brown Clayey Silt, Little M-f Sand, Trace M-f Gravel, Brick, Cinders (FILL)
	37						
	29						
12.7	21	10	12	S-2	4'-6'		
	23	14	16				
	28					10.7	
	26						
	18						
(0) 7.7	17	3	3	S-3	9'-11'		
	16	3	3				
	10						Black Organic Clayey Silt, Little Cinders, Trace Brick (FILL)
	11						
	12						
2.7	6	15	8	S-4	14-16		
	9	2	5				
	12						
	31					-0.3	
	53						
-2.3	6	18	9	S-5	19-21		Gray C-f Sand, Some C-f Gravel Little Silt
	6	7	6				
	25					-4.3	
	31						
	27						
-7.3	OPEN	12	15	S-6	24-26		Gray Green Decomposed Granite
		20	28				
						-11.1	
-12.3	14Min			C-1	28.8'-		Gray Hard Granite (C1: 94% Rec.)
	6Min				33.8'		
	7Min						
	10Min						
	9Min						
							Bottom Of Hole Elev. -16.1'

BORING DS67-6

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20'	3		3	S-1	.5'-2.5'	20'	.5 Concrete
	7	5	2				
	4	2					
	5						
15'	9	3	5	S-2	4'-6'		
	20	12	8				Brown Clayey Silt Some C-f Sand, Trace C-f Gravel, Brick (FILL)
	20						
	18						
	18						
10'	23	5	3	S-3	9'-11'		
	19	5	8				
	24					8.0'	
	39						
	34						
5'	22	5	7	S-4	14'-16'		
	26	10	19				Brown C-f Sand, Some C-f Gravel, Little Silt, Trace Mica
	102						
	58						
(1)	50						
0.0'	52	7	10	S-5	19'-21'	0.0'	
	100/.6	17	50				
	OPEN						Brown Gray Decomposed Granite
						4.0'	
		100		S-6	24'-24'		No Rec.
-5'	7Min			C-1	24'-29'		Gray Hard Granite (C1: 78% Rec.)
	6Min						
	10Min						
	10Min						
	9Min						
-10	6Min			C-2	29'-34'		Gray Hard Granite (C2: 82% Rec.)
	5Min						
	6Min						
	6Min						
	6Min						
							Bottom Of Hole Elev -14'

BORING DS67-7

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
28.5'	7					28.5'	
	9	25	18	S-1	1'-3'		1' Asphalt
	8	11	7				
	6						
23.5	4	2	2	S-2	4'-6'		
	4	3	4				
	4						
	4						
	8						
18.5	2	3	3	S-3	9'-11'		Gray Tan C-f Sand, Some Silt, Little C-f Gravel, Trace Brick, Slate (FILL)
	5	4	3				
	9						
	13						
	15						
13.5	11	19	11	S-4	14'-16'		
	17	10	8				
(1)	52						
	85						
	13					9.5	
8.5	7	2	3	S-5	19'-21'		
	9	3	5				
	13						Gray Brown Clay and Silt, Some C-f Sand, Trace Gravel
	31						
	39					4.5	
3.5	41	19	3	S-6	24'-26'		
	46	27	35				
	OPEN						Gray Pink Decomposed Granite
			100	S-7	27-27.2'		
-1.5						-1.5	
	13Min			C-1	30'-35'		Gray Hard Granite (C1: 93% Rec.)
	10Min						
	13Min						
	20Min						
-6.5	25Min						
							Bottom Of Hole Elev. -6.5'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ denotes the ground water level as measured. (Hours after (00) drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ϕ)
(c) Samples designated by a "C" number indicate 1⅞" ϕ (AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE

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

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 52 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	225	265

BORING DS67-8

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
31.0'	DRILLED					31.0'	.5 Sidewalk
							Brown Clayey Silt, Some M-f Sand, Little Glass, Trace F Gravel, Cinders (FILL)
26	8	8	6	S-1	1½'-6'		
	8	7	7				
	9						
	10					23.0'	
	9						
21	10	8	8	S-2	9'-11'		
	10	8	9				
	11						
	12						
	12						
16	12	3	3	S-3	14'-16'		
	14	3	3				
	3						Brown M-f Sand, Some Silt, Trace F Gravel, Brick, Cinders (FILL)
	8						
	9						
11	11	5	3	S-4	19'-21'		
	12	4	4				
	16						
	24						
	34						
6	41						
	26	23	16	S-5	25'-27'	5.0'	
	104	46	40				
	2Min			C-1	27'-32'		
	2Min						
	2Min						Brown Gray Decomposed Granite
1	3Min						
	2Min						
	4Min			C-2	32'-33'		
	OPEN						
-4							
	4Min			C-3	35.7'-39'	-4.7'	Gray Hard Granite (C-1 30% Rec.)
	4Min						
	6Min						
	9Min						
-9	5Min			C-4	39'-44'		Gray Hard Granite (C-2: 100% Rec.)
	6Min						
	6Min						
	6Min						
	7Min						
							Bottom of Hole Elev. -13.0'

(0)

BORING DS67-9

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
32.7	1		6	S-1	.5'-2.5'	32.7'	.5 Asphalt
	8	31					
	9						
	4						Gray C-f Sand, Some M-f Gravel, Trace Silt, Brick (FILL)
27.7	3	4	11	S-2	4'-6'		
	2	37	9				
	31						
	29					24.7'	
	33						
22.7	12	5	4	S-3	9'-11'		Gray Silt, Some M-f Sand, Little M-f Gravel
	15	4	9			21.7'	
	18						
	30						
	17						
17.7	13	4	5	S-4	14'-16'		
	14	7	9				
	11						Tan Clayey Silt, Some M-f Sand
	13						
	15						
12.7	15	4	5	S-5	19'-21'		
	12	6	7				
	11						
	11						
	8Min			C-1	23.5'-28.5	9.2'	
7.7	10Min						Gray Hard Granite (C-1: 88% Rec.)
	9Min						
	9Min						
	10Min						
							Bottom of Hole Elev. 4.2'

(0)

BORING DS67-10

Elev.	Casing Blows/Ft.	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
56.8	8	5	6	S-1	0'-2'	56.8'	
	12	6	7				
	22						
	36						Gray Tan Clayey Silt, Some M-f Sand, Little M-f Gravel (FILL)
51.8	20	6	6	S-2	4'-6'		
	16	7	9				
	19						
	11						
	8					47.8'	
46.8	8	3	2	S-3	9'-11'		
	11	1	3				
	11						
	5						
	61						Gray Tan Silt, Some M-f Sand, Trace M-f Gravel Trace Clay (FILL)
41.8	4						
	15	26	11	S-4	15'-17'		
	20	5	10				
	17						
	19					37.8'	
36.8	26	7	8	S-5	19-21		
	31	9	12				
	45						
	31						
	24						
31.8	25	8	10	S-6	24'-26'		
	22	8	12				
	191						
	190						
	44						
26.8	25	15	9	S-7	29'-31'		
	22	8	10				Gray Tan Clayey Silt, Some C-f Sand Little M-f Gravel (FILL)
	27						
	36						
	43						
21.8	40	11	23	S-8	34'-36'		
	38	14	12				
	40						
	44						
	37						
16.8	56	10	10	S-9	39'-41'		
	46	12	12				
	43						
	34					13.8'	
	60						
11.8	66	18	24	S-10	44'-46'		
	110	36	42				
	200						
	OPEN						
6.8		100		S-11	49'-49.4		No Rec. Gray Green Decomposed Granite
	5Min			C-1	52'-57'		No Rec.
	5Min						
1.8	9Min						
	12Min						
	14Min					0.2'	
	15Min			C-2	57-62'		Gray Hard Granite (C-1: 91% Rec.)
	12Min						
-3.2	22Min						
	24Min						
	5Min						
							Bottom of Hole Elev. -5.2'

(1)

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ø)
(c) Samples designated by a "C" number indicate 1⅞" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE

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

SCALE: 1" = 6' Vert.
CONTRACT NO.: 10
SHEET NO. 53 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	226	265

BORING DS64-5

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
27.7	5					27.7	
	7		12	S-1	18-3.8	25.9	1.8' Asphalt and Brick
	9	11	8				
	11	6					
22.7	6	5	5	S-2	4'-6'		
	8	5	5				
	11						
	13						
	15						
17.7	9	13	9	S-3	9'-11'		
	12	7	5				Gray-Tan-Black C-f Sand, Some Silt, Little M-f Gravel, Trace Brick (FILL)
	17						
	27						
	27						
12.7	17	15	19	S-4	14-16		
	33	25	27				
	43						
	55						
	57					8.7	
7.7	29	25	100	S-5	19-20.5		
	59	100					
	51						
	69						Gray-Pink Decomposed Granite
	135						
2.7	OPEN	11	8	S-6	24-26		
(0)		10	21				
	9Min			C-1	27-32	0.7	(C-1: 86%)
	11Min						
-2.3	10Min						Gray Hard Granite
	13Min						
	9Min						
							Bottom of Hole Elev. -4.3'

BORING DS64-6

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
31.8	30	8	10	S-1	0-1.5	31.8	
	60	100					
	90						
	110						Red-Black Cinders and Bricks (FILL)
26.8	90	8	8	S-2	4-6		
	8	8	7				
	10						
	20						
(0)	26					22.8	
21.8	29	12	30	S-3	9-11		
	102	40	42				
	83						Gray-Tan C-f Aand, Some M-f Gravel
	157					18.3	
	212						
16.8	OPEN	10	25	S-4	14-16		
		34	46				
							Gray-Green Decomposed Granite
11.8		9	24	S-5	19-21		
		24	20				
	12Min			C-1	22.5-	9.3	(C-1: 83% Rec.)
	7Min				27.5		
6.8	8Min						
	9Min						Gray Hard Granite
	11Min						
							Bottom of Hole Elev. 4.3'

BORING DS64-7

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
68.5	8	2	3	S-1	0'-2'	68.5	
	9	8	6				
	7						
	8						
63.5	9	7	8	S-2	4'-6'		Gray Silt, Some M-f Sand Trace M-f Gravel (FILL)
	8	8	8				
	7						
	4						
	6					59.5	
58.5	5	5	5	S-3	9-11		
	5	5	5				
	6						
	5						
	6						
53.5	7	12	14	S-4	14-16		
	9	12	12				Tan Gray Clayey Sult, Some M-f Sand, Trace F Gravel
	11						
	15						
	19						
48.5	14	8	9	S-5	19-21		
	14	12	12				
	15						
	25						
	21					44.5	
(0) 43.5	26	9	12	S-6	24-26		
	16	14	12				
	17						
	17						
	16						
38.5	12	12	10	S-7	29-31		
	26	8	10				
	31						
	940						
	375	100		S-8	33-33.1		
33.5	265						
	44						
	140						
	144						
	127						
28.5	53	29	49	S-9	39-41		Gray-Tan C-f Sand Some M-f Gravel, Little Silt
	140	59	50				
	452						
	255						
	43						
23.5	41	28	49	S-10	44-46		
	60	34	44				
	90						
	117						
	122						
18.5	241	21	27	S-11	49-51		
	200	31	45				
	175						
	226						
OPEN	OPEN						
13.5		100		S-12	54-54.2		
						11.5	
8.5		32	68	S-13	59-61		
		64	92				
							Gray-Green Decompsoed Granite
3.5	OPEN	100		S-14	64-64.1		
						0.5	
	6Min			C-1	68.2-		(C-1: 97% Rec)
-1.5	7Min				73.2		
	6Min						Gray-Hard Granite
	8Min						
	7Min						
							Bottom of Hole Elev. -4.7'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ϕ)
(c) Samples designated by a "C" number indicate 1⅛" ϕ(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse		trace	1-10%
m-medium		little	10-20%
f-fine		some	20-35%
		and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

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

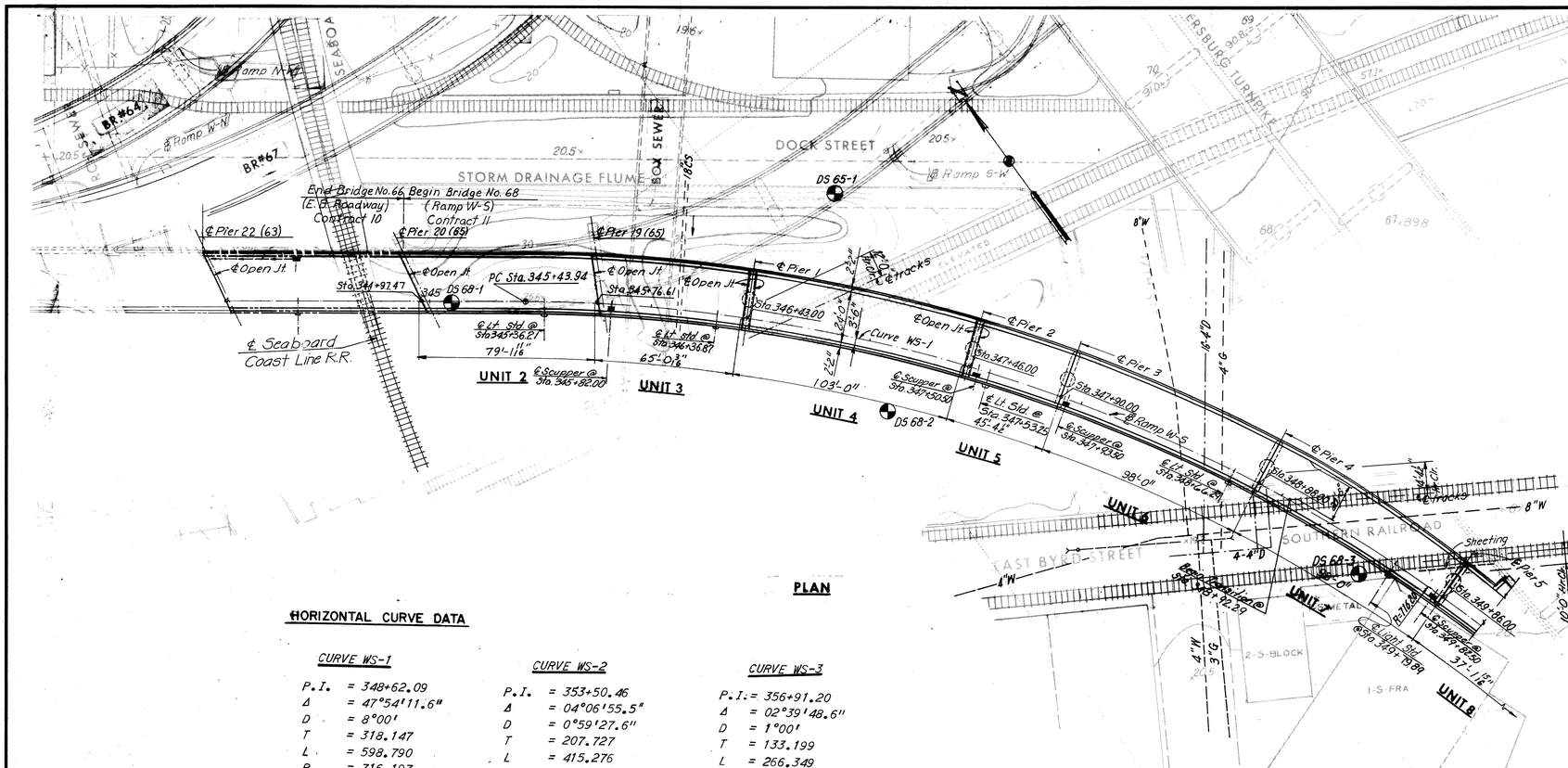
SCALE: 1"= 6' Vert.
CONTRACT NO.: 10
SHEET NO. 54 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	64	97

INDEX

	SHEET
GENERAL PLAN AND ELEVATION	1
GENERAL PLAN AND ELEVATION	2
LAYOUT	3
PIERS 1 AND 2	4 AND 4A
PIER 3	5
PIER 4	6
PIER 5	7
PIERS 6 AND 7	8
PIERS 8,9 AND 10	9
PIERS 11 AND 12	10
PIERS 13 AND 14	11
FRAMING PLAN UNITS 1,2 AND 3	12
FRAMING PLAN UNITS 4,5 AND 6	13
FRAMING PLAN UNITS 7,8, AND 9	14
FRAMING PLAN UNITS 10,11 AND 12	15
FRAMING PLAN UNITS 13 THRU 18	16 AND 16A
FRAMING DETAILS	17
FRAMING DETAILS	18
DECK PLAN UNITS 1,2 AND 3	19
DECK PLAN UNITS 4,5 AND 6	20
DECK PLAN UNITS 7,8 AND 9	21
DECK PLAN UNITS 10,11 AND 12	22
DECK PLAN UNITS 13 THRU 18	23
SUPERSTRUCTURE DETAILS	24
JOINT DETAILS	25 AND 26
BORING LOGS	27 AND 28
STANDARD SHEETS	S1 THRU S6
EXISTING PIERS 42 & 44 MODIFICATIONS	11A

PLAN



HORIZONTAL CURVE DATA

CURVE WS-1

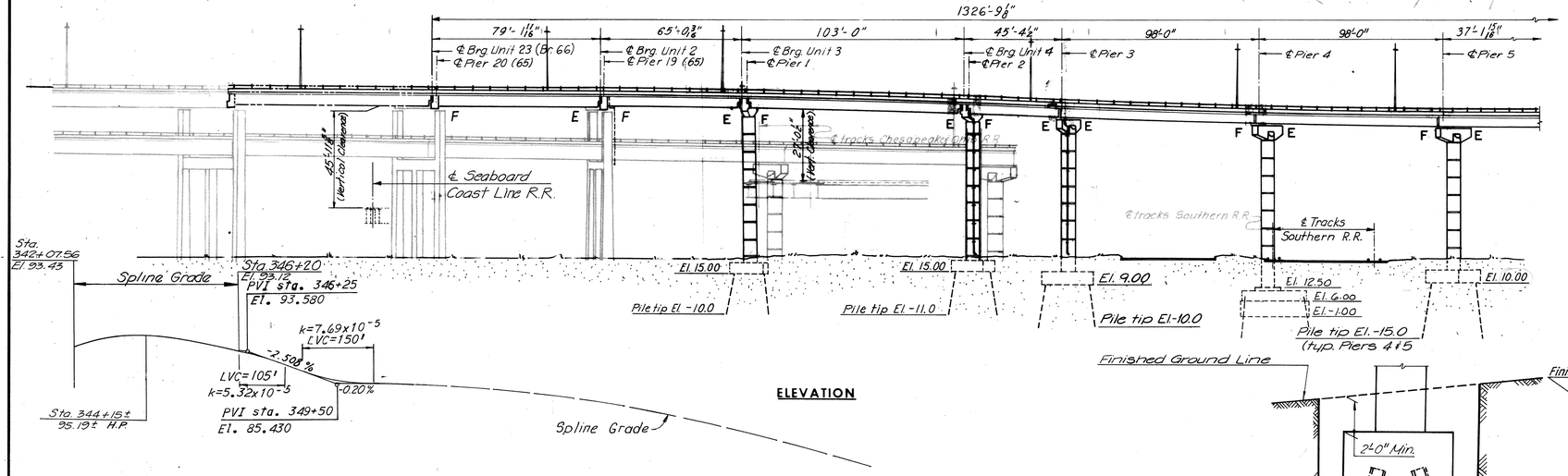
P.I.	= 348+62.09
Δ	= 47°54'11.6"
D	= 8°00'
T	= 318.147
L	= 598.790
R	= 716.197

CURVE WS-2

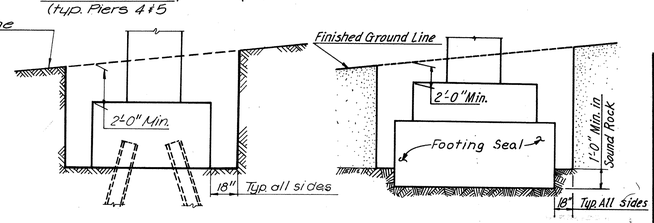
P.I.	= 353+50.46
Δ	= 04°06'55.5"
D	= 0°59'27.6"
T	= 207.727
L	= 415.276
R	= 5,781.578

CURVE WS-3

P.I.	= 356+91.20
Δ	= 02°39'48.6"
D	= 1°00'
T	= 133.199
L	= 266.349
R	= 5,729.578



ELEVATION



LIMITS OF STRUCTURE EXCAVATION

No Scale

GENERAL NOTES

ROADWAY: One 24'-0" clear roadway transitioning into a 13'-6" widening of existing Richmond-Petersburg Turnpike.

CAPACITY: Dead load includes 15lbs. per sq.ft. for future wearing surface. Live load HS 20-44 loading and alternate military loading.

SPECIFICATIONS:

- GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
- DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
- WELDING: 1972 Structural Welding Code of the American Welding Society.

CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete.

DATUM: City of Richmond

TEMPERATURE: The normal temperature referred to in the plans is 60°F. The temperature range for movement is 0°F to 120°F.

DIMENSIONS: All dimensions are measured horizontally and vertically unless otherwise noted.

EXCAVATION: Excavation below subgrade and cut slope template shall be classified as Regular Excavation. All excavation above these limits shall be classified as Regular Excavation and is not included in the Structural Quantities.

FOUNDATIONS: Footings shall rest on firm material. Foundation material shall be dry and special attention is called to Section 401.05 of General Specifications and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing steel shall be deformed bars conforming to ASTM A615 Grade 40. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted.

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572-Grade 50 and A588 as noted. See Special Provisions. All field connections shall be made with high strength bolts. High strength bolts shall be ⅞" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

	BY	DATE
MADE	J.V.	4-2-69
CHECKED	G.S.H.	7-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Rev. Profile Grade & Ramp W-S	SSS	12-75
2	Profile Grade W-S, Index	TEM	8-26-75
1	Seaboard Coast Line Added	TEM	6-74

⚠ PROFILE GRADE ℄ RAMP W-S

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

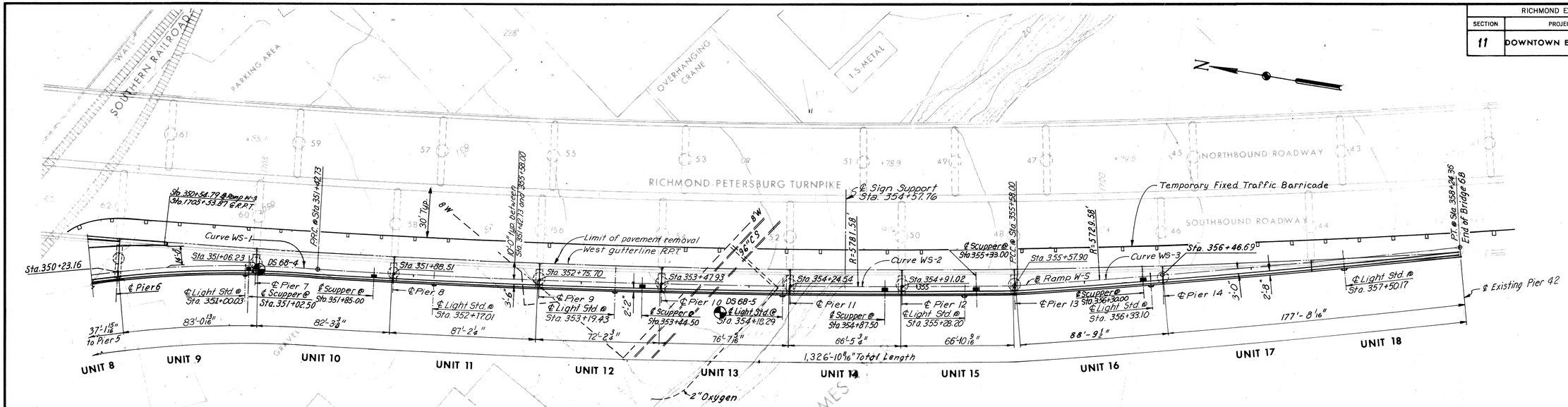
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

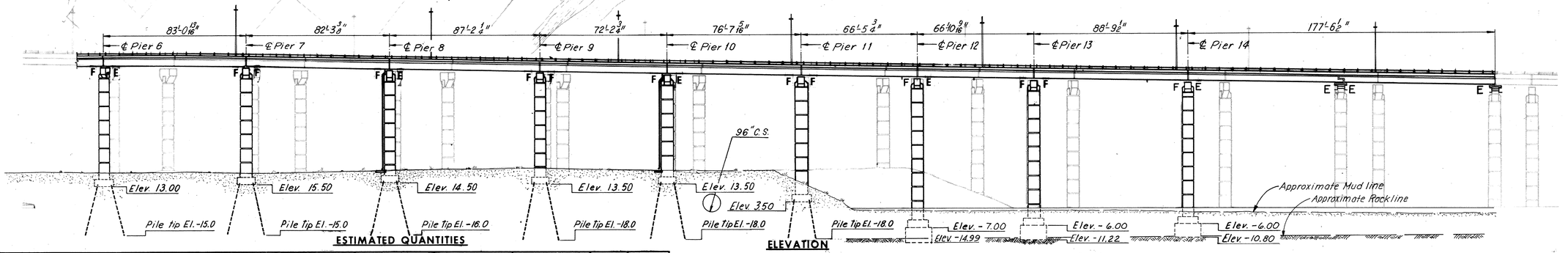
SCALE: 1"=30'
CONTRACT NO.: 11
SHEET NO. 1 OF 28

64

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	65	97



PLAN



ESTIMATED QUANTITIES — **ELEVATION**

	Structure Excavation Cu. Yds.	Concrete (†) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-rail) Lin. Ft.	Steel Piles 10BP42 Lin. Ft.
Superstructure	----	888.7	215,200	600,400	255,600	1,849	-----
Substructure	1,415*	1,751.0	245,300	31,600	8,400	---	2,630
Total	1,415*	2,639.7	460,500	632,000	264,000	1,849	2,630

	Steel Piles 12BP53 Lin. Ft.	Tremie Concrete Class T3 Cu. Yds	Sheeting Pier 5 Lump Sum	Metal Conduit Lin. Ft.	Bridge Drainage Metal work Lbs.	Modifications to R.P. Turnpike Bridge Lump Sum	Modifications to Existing Retaining Wall Cu. Yds.	Temporary Barricade Lin. Ft.
Superstructure	---	---		1310	11,450	1	50	
Substructure	1,412	173.3	1	---	---	-	-	
Total	1,412	173.3	1	1,310	11,450	1	50	990

	BY	DATE
MADE	J.V.	4-3-69
CHECKED	G.S.H.	7-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	At Pier 44 & 42 Struc. Steel Quan.	T.E.M.	8-26-75

* Including 365 Cu. Yds. of " Underwater " Excavation for Piers 12, 13 and 14.

* All concrete for Superstructure shall be Class A4 and for Substructure Class A3. Concrete for Footing Seals shall be Tremie Concrete, Class T3 and is listed separately.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

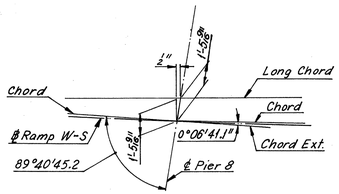
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

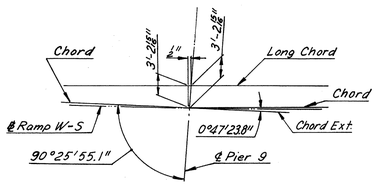
SCALE: 1"=30'
CONTRACT NO. 11
SHEET NO. 2 OF 28

65

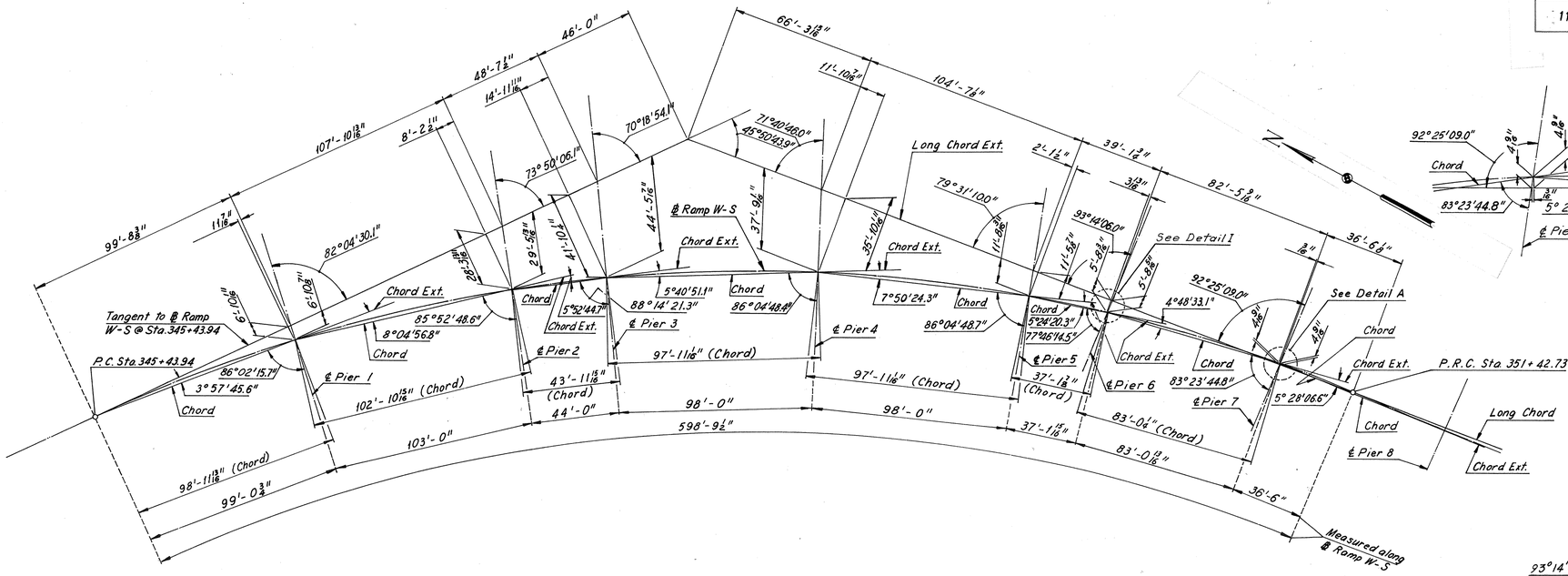
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	66	97

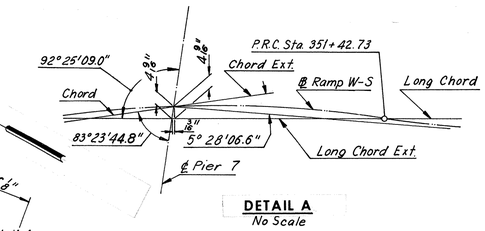


DETAIL B
No Scale

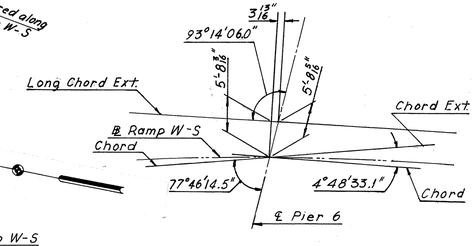


DETAIL C
No Scale

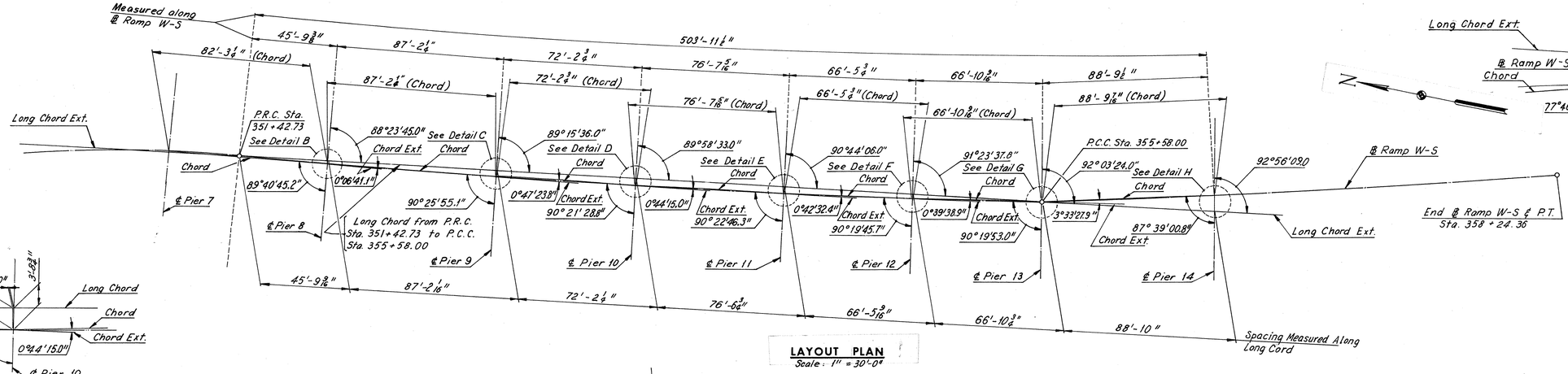




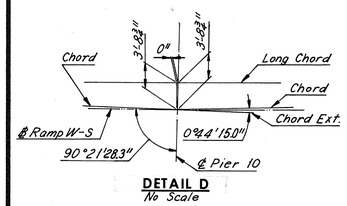
DETAIL A
No Scale



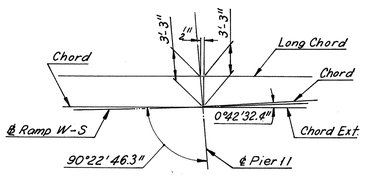
DETAIL I
No Scale



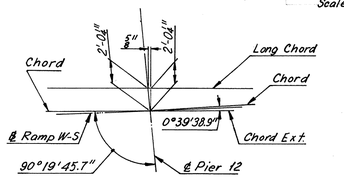
LAYOUT PLAN
Scale: 1" = 30'-0"



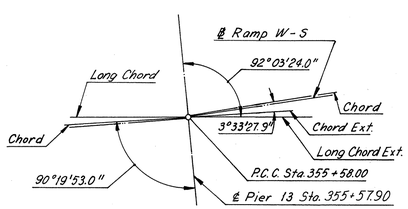
DETAIL D
No Scale



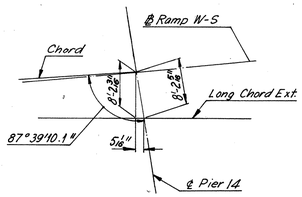
DETAIL E
No Scale



DETAIL F
No Scale



DETAIL G
No Scale



DETAIL H
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	PTA	3-24-69				
CHECKED	JD	4-22-69				
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

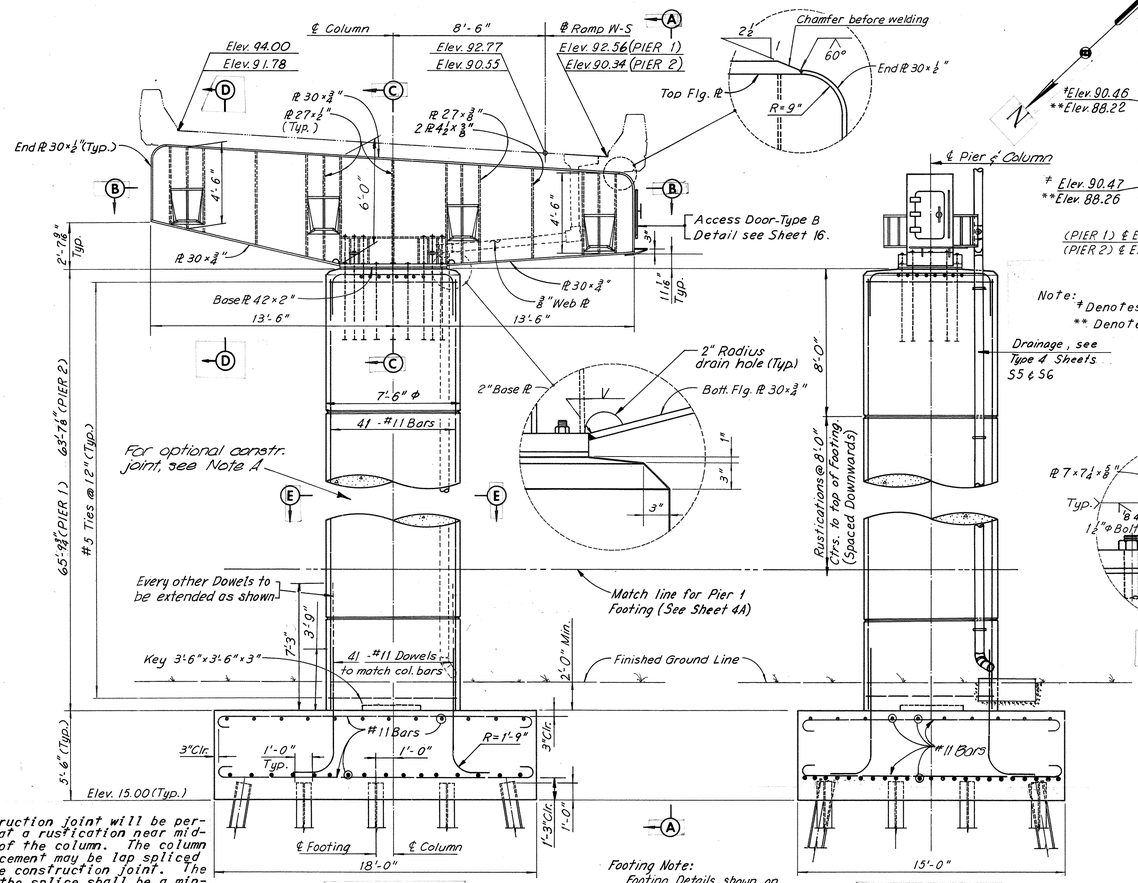
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

LAYOUT

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 3 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	67	97

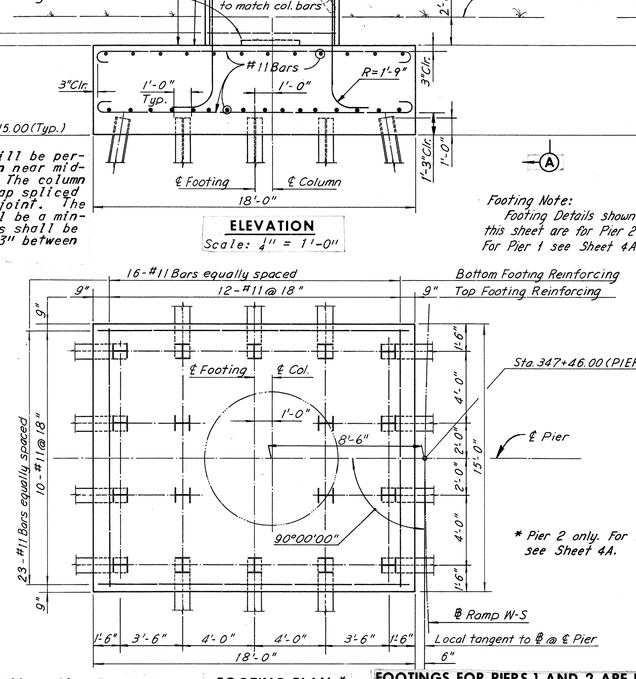


ELEVATION
Scale: ¼" = 1'-0"

VIEW A-A
Scale: ¼" = 1'-0"

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

Footing Note:
Footing Details shown on this sheet are for Pier 2 Only. For Pier 1 see Sheet 4A.



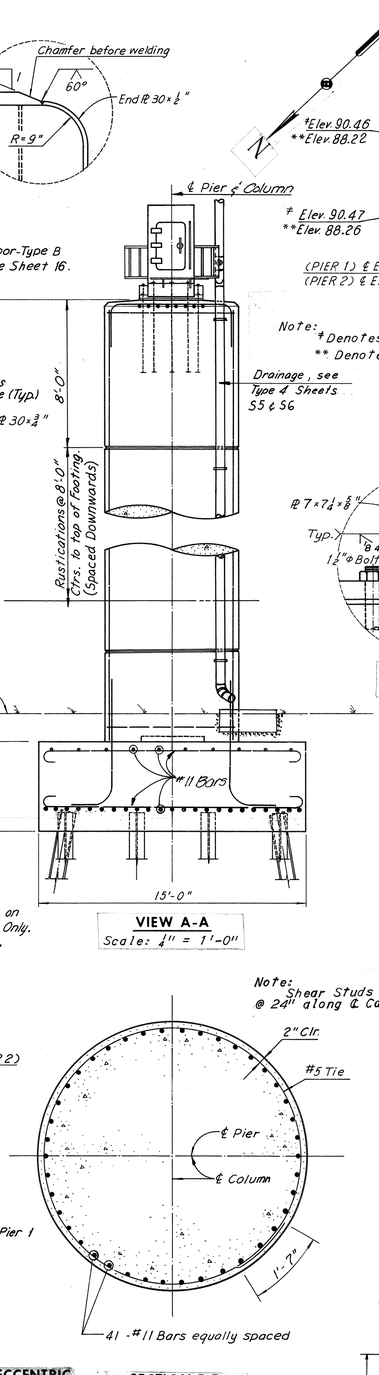
FOOTING PLAN *
Scale: ¼" = 1'-0"

FOOTINGS FOR PIERS 1 AND 2 ARE ECCENTRIC AS SHOWN ON FOOTING PLAN

Note: Batter piles 3" per ft. as shown. All piles are 12 BP53 steel piles (Design Capacity=57 Tons

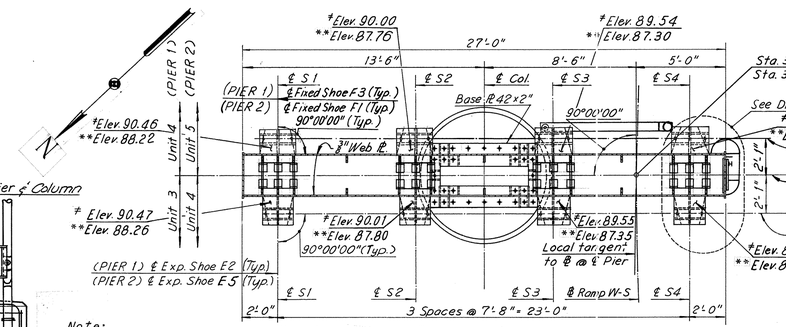
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

	BY	DATE					
MADE	MHH	1-17-69	2	PL Deleted and Dim. added Sect D-D	TEM	8-76
CHECKED	JD	2-13-69	1	Footing Details Pier 1 Deleted	MSD	3-13-75
IN CHARGE			NO.	REVISION	BY	DATE



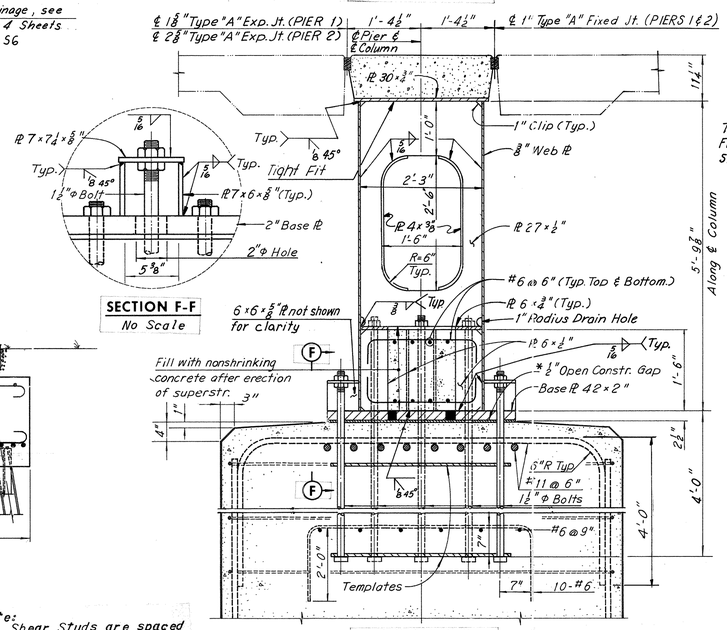
SECTION E-E
Scale: ¼" = 1'-0"

Note:
All Structural Steel for Piers 1 and 2 shall be A36. Steel Cap Beams need not be cambered.



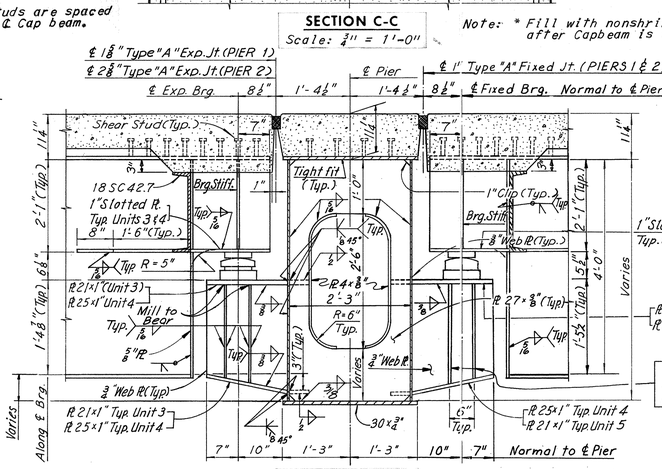
Note:
* Denotes Base PL Elevation on Pier 1.
** Denotes Base ℄ Elevation on Pier 2.

SECTION B-B
Scale: ¼" = 1'-0"



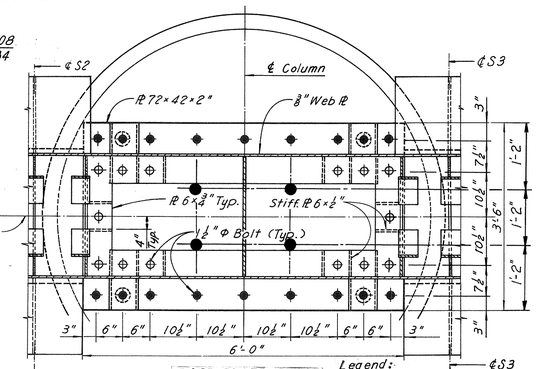
SECTION F-F
No Scale

SECTION C-C
Scale: ¾" = 1'-0"



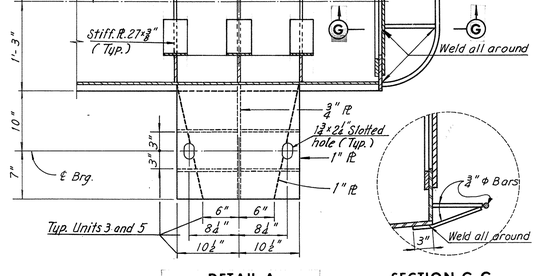
SECTION D-D
Scale: ¾" = 1'-0"

Note:
* Fill with nonshrinking Grout after Capbeam is in final position.



BASE PLATE PLAN
Scale: ¾" = 1'-0"

Legend:
- Anchor bolts bolted to Base PL.
- Adjustment bolts bolted to ⅜" bracket.
- Anchor bolts bolted to ¾" bracket inside cap beam.
- 3" Φ Grout Hole



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

SECTION G-G

Note:
All holes in base PL and bracket PL's for 1½" dia. anchor bolts shall be 2" in dia.

Notes:
For Framing Plan, see Sheet 13.
For Joint Details, see Sheet 25.
For Shear Stud Details, see Sheet 12.
For Shoe Details, see Sheets S1 and S2.
For Bearing pile Details, see Sheet 9.
Estimated pile tip elevation -10.00 for Pier 1 and -11.00 for Pier 2.

Note:
All anchor bolts connecting cap beam to column shall be 1¼" dia., and each nut shall have washer (not shown on details).

For Rustication Detail, see Sheet 5.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

PIERS 1 AND 2

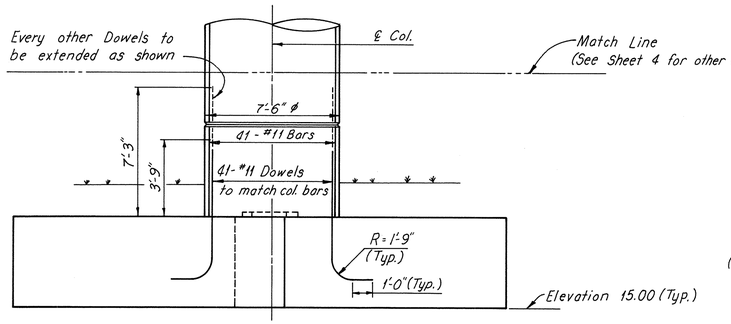
AS BUILT

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 4 OF 28

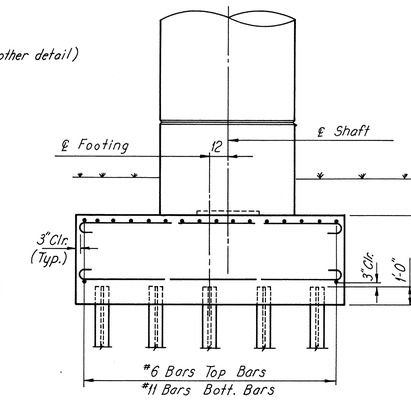
67

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	67A	97

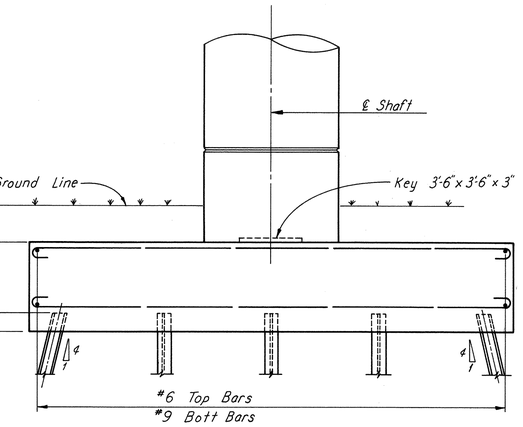


Piles and Footing Reinforcing not shown

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

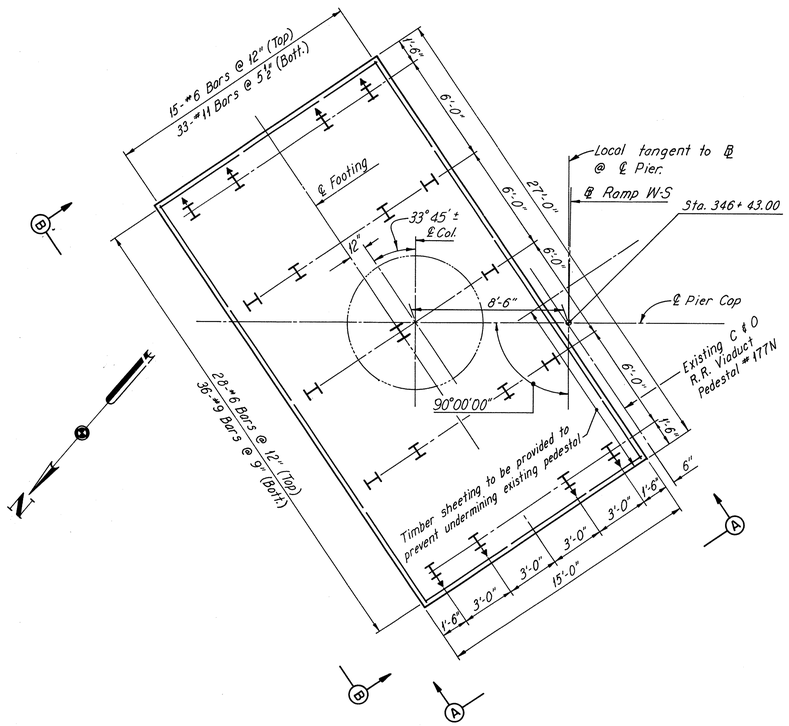


VIEW A-A
Scale: 1/4" = 1'-0"



VIEW B-B
Scale: 1/4" = 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcement shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



Note:
Batter Piles 3" per foot as shown. All piles are 12BP53 steel piles (Pile design capacity = 57 Tons).

FOOTING FOR PIER 1 IS ECCENTRIC AS SHOWN ON FOOTING PLAN & VIEW A-A.

FOOTING PLAN
Scale: 1" = 1'-0"

	BY	DATE				
MADE	JLK	7-17-75				
CHECKED	DNB.	7-21-75	1	Pile Added	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

PIER 1 FOOTING

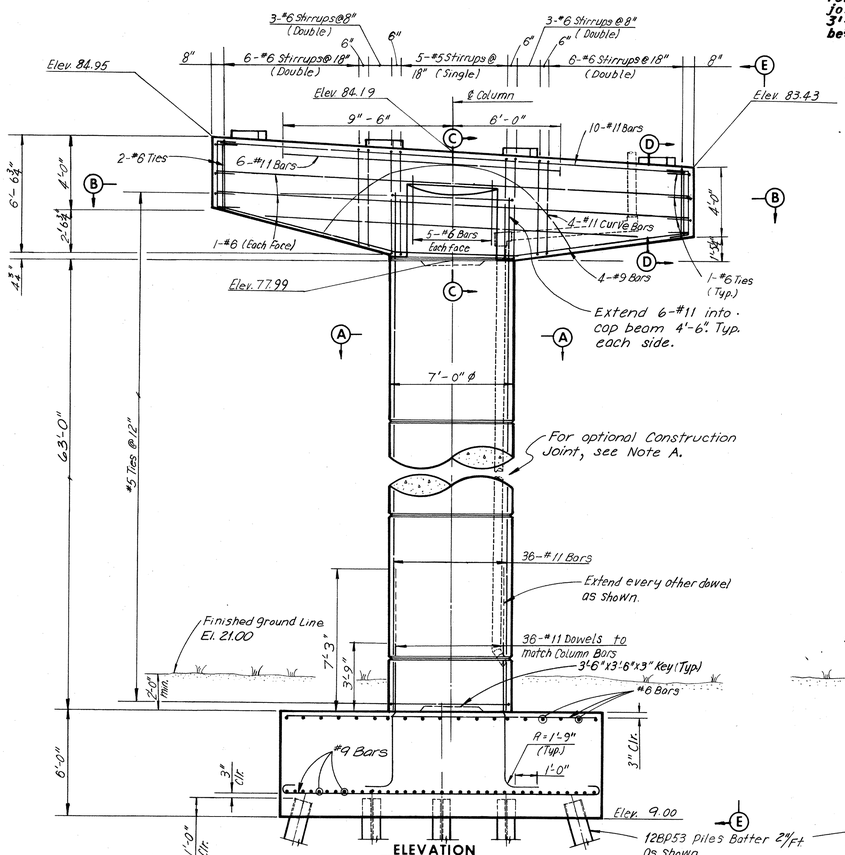
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted.
CONTRACT NO.: 11
SHEET NO. 4A OF 28

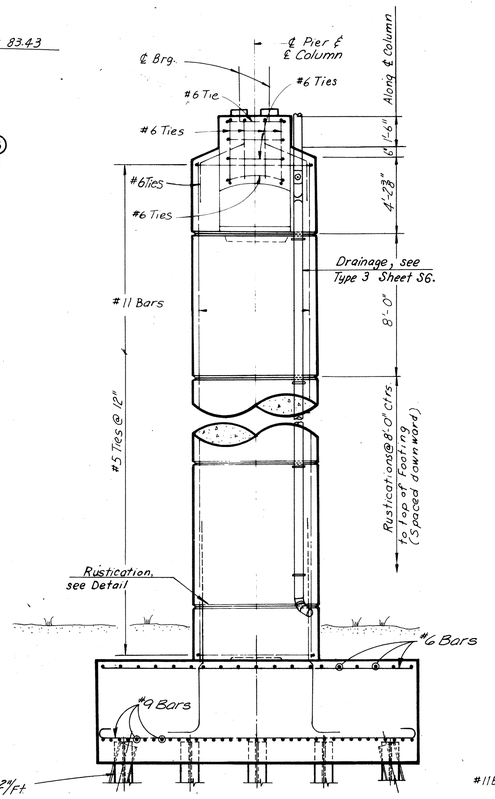
67A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	68	97

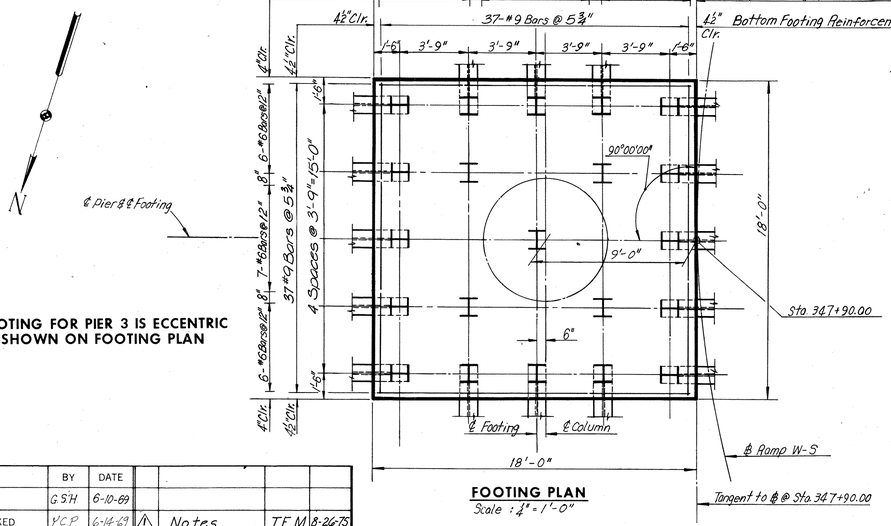
NOTE: A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



ELEVATION
Scale : 1" = 1'-0"

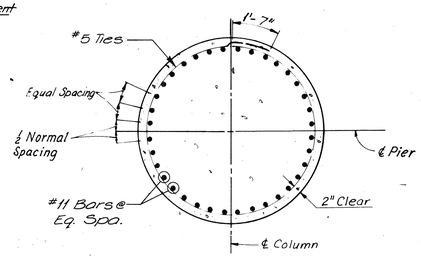


VIEW E-E
Scale: 1"=1'-0"

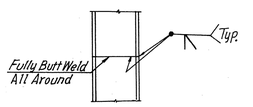


FOOTING PLAN
Scale : 1" = 1'-0"

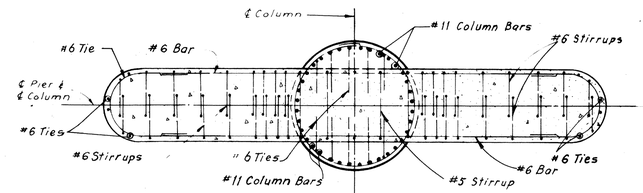
FOOTING FOR PIER 3 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

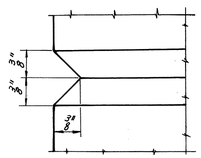


SECTION A-A
Scale: ⅜"=1'-0"



PILE SPLICE DETAIL
No Scale

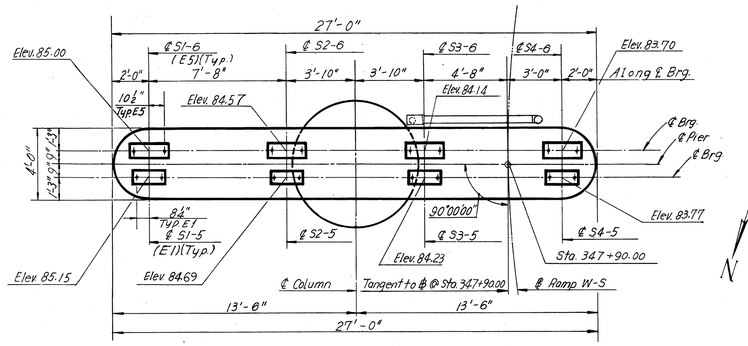




RUSTICATION DETAIL
Full Scale

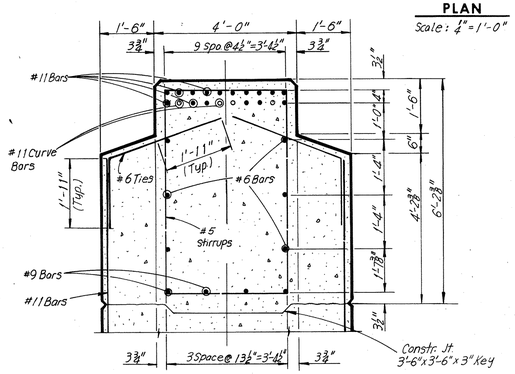
SECTION B-B
Scale: 1"= 1'-0"

Note:
Typical dimensions of concrete pad for E1 shoe is 2'-0½"x1'-0" and for E5 shoe is 2'-5"x1'-1½".

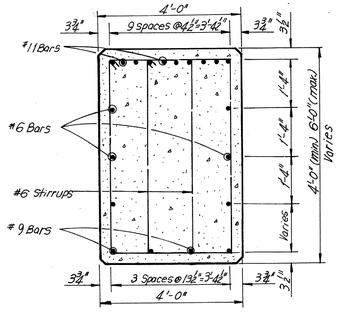


Note:
All elevations are @ top of Concrete Pad.

PLAN
Scale: 1"=1'-0"



SECTION C-C
Scale : ½ = 1'-0"



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

Note:
Footing Elevations are approximate only and maybe varied to suit field conditons as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2ft., redesign will be required.

Notes:
All piles shall be 12BP53 Steel Piles (design capacity =57tons)

For Standard Shoe Detail, see sheets S1 and S2.
For Framing Plan, see Sheet 13.
For Quantities of concrete and Steel see Sheet 2.
Estimated pile tip elevation is -10.0.

	BY	DATE				
MADE	G.S.H.	6-10-69				
CHECKED	V.C.P.	6-14-69	1	Notes	T.E.M.	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

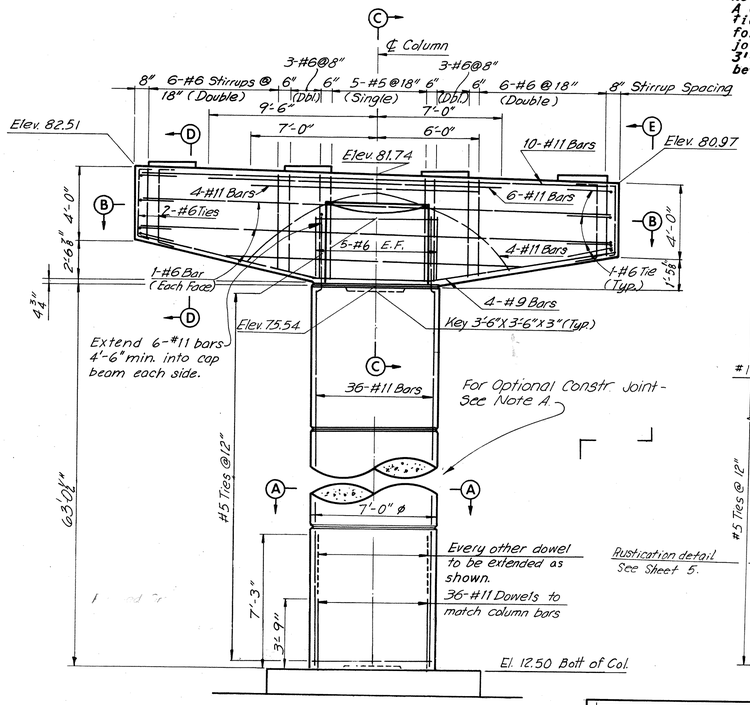
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 3

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

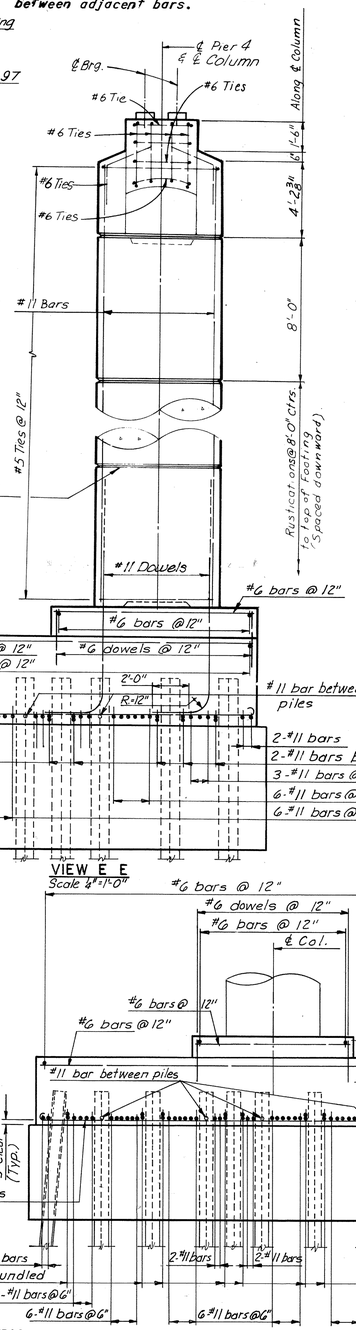
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 5 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	69	97

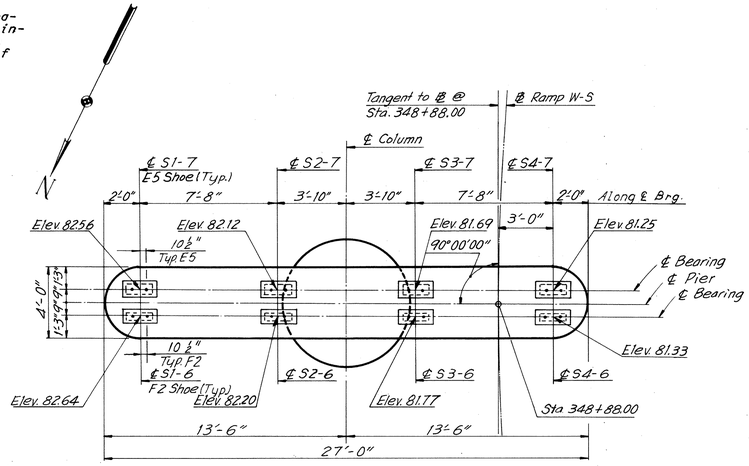
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 31'-6". Splices shall be staggered of least 3'-3" between adjacent bars.



ELEVATION
Scale ¼"=1'-0"



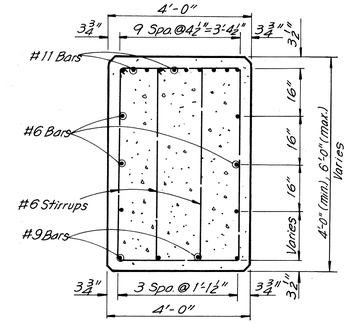
VIEW E-E
Scale ¼"=1'-0"



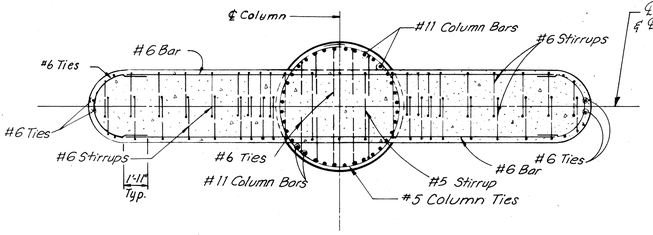
PLAN
Scale: ¼"=1'-0"

Note:
Typical dimensions of concrete pad for E5 shoe is 2'-5"x1'-1½" and for F2 shoe is 2'-6"x11".

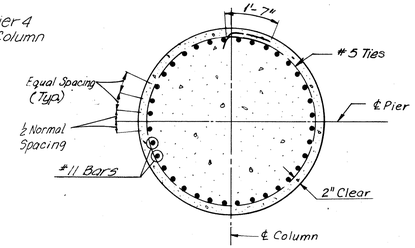
Note:
All elevations are @ top of Concrete Pad at ℄ Bearing.



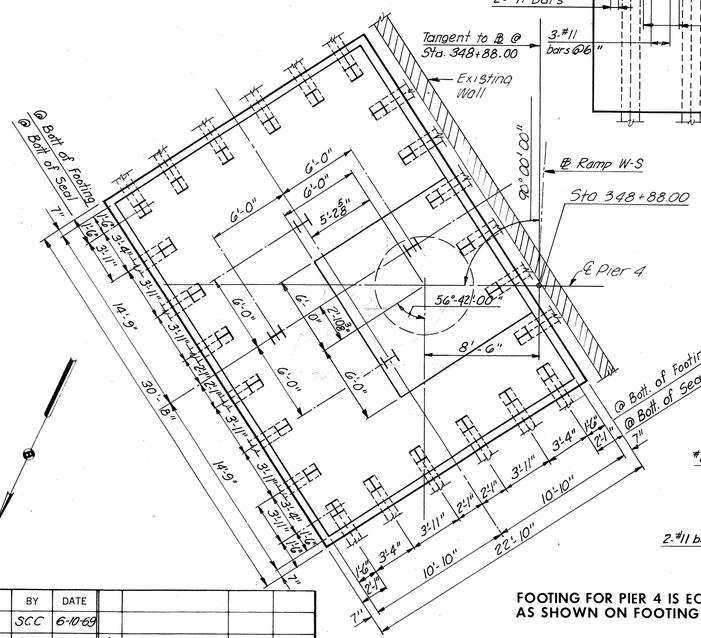
SECTION D-D
Scale: ½"=1'-0"



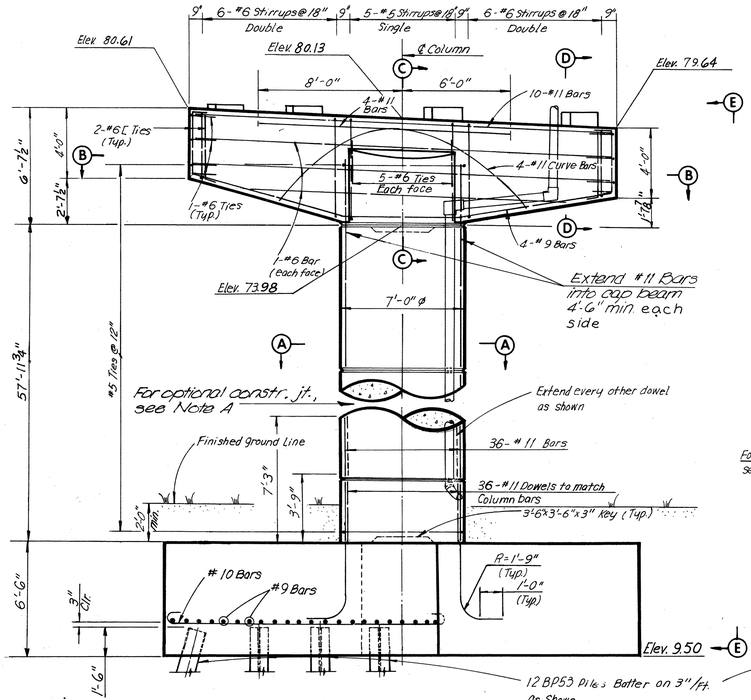
SECTION B-B
Scale: ¼"= 1' - 0"



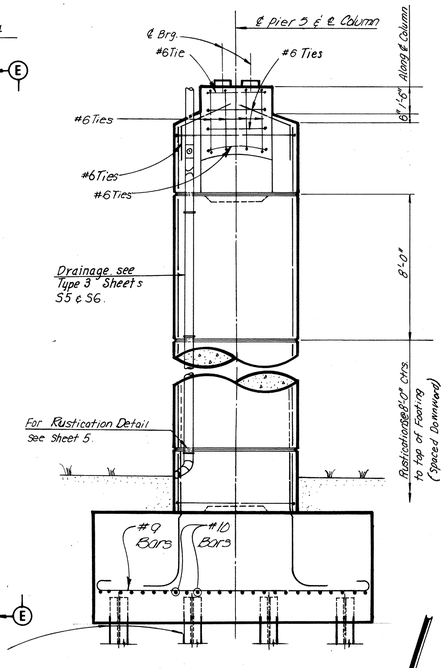
SECTION A-A
Scale: ⅜"=1'-0"


Tangent to ℄ @ Sta. 348+88.00
Existing Wall
@ Bott. of Footing
@ Bott. of Seal
7"
1'-6"
3'-11"
3'-11"
3'-11

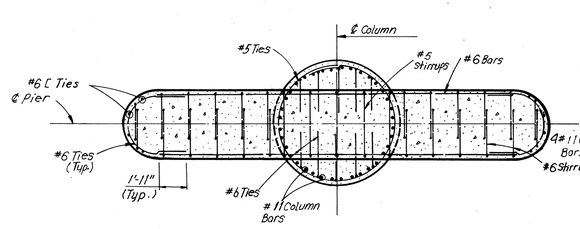
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	70	97



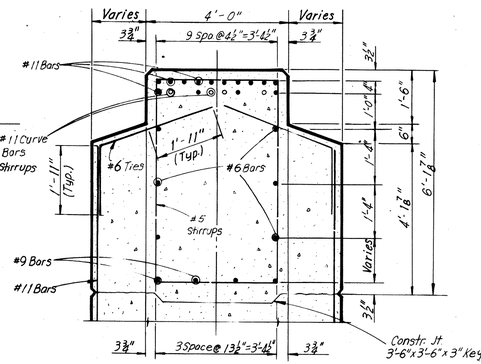
ELEVATION
Scale : 4" = 1'-0"



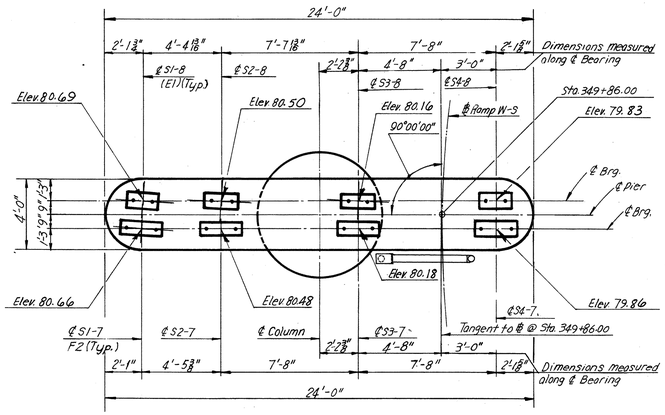
VIEW E-E
Scale : 4" = 1'-0"



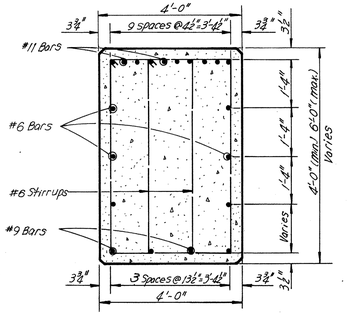
SECTION B-B
Scale : 4" = 1'-0"



SECTION C-C
Scale : ½" = 1'-0"

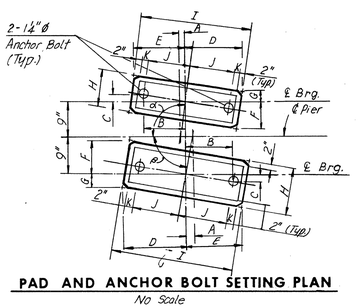


PLAN
Scale : 4" = 1'-0"



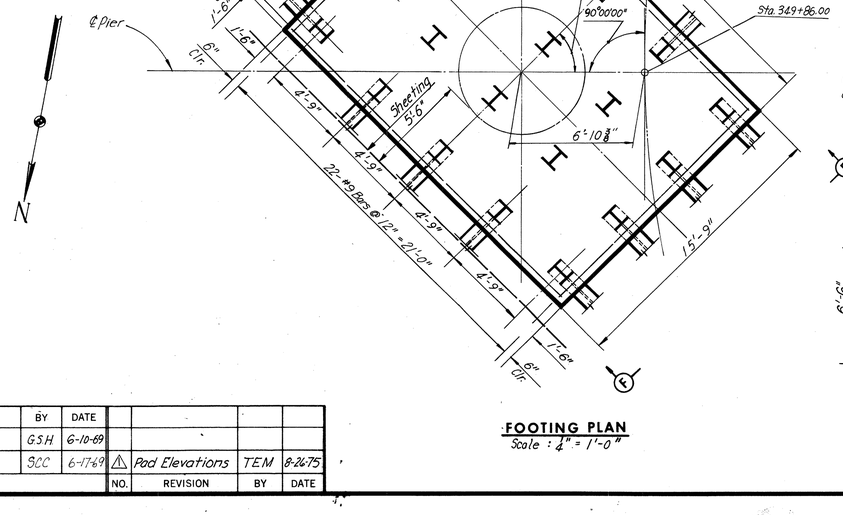
SECTION D-D
Scale : 4" = 1'-0"

Note: All elevations are @ top of Concrete Pad.



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN												
Stringers	α	β	A	B	C	D	E	F	G	H	I	J	K
S1-7	—	87°45'28"	5/16"	10½"	3/8"	15⅜"	14⅝"	6 1/16"	4 15/16"	1'-11"	2'-6"	10½"	2½"
S2-7	—	90°00'00"	0"	10½"	0"	15 "	15 "	5½"	5½"	1'-11"	2'-6"	10½"	2½"
S3-7	—	90°00'00"	0"	10½"	0"	15"	15"	5½"	5½"	1'-11"	2'-6"	10½"	2½"
S4-7	—	90°00'00"	0"	10½"	0"	15"	15"	5½"	5½"	1'-11"	2'-6"	10½"	2½"
S1-8	93°50'24"	—	5/16"	8¼"	3/16"	12⅝"	11⅞"	6 1/16"	5 5/16"	1'-0"	2'-0¼"	8¼"	2"
S2-8	92°38'34"	—	5/16"	8¼"	3/16"	12¼"	12"	6½"	5½"	1'-0"	2'-0¼"	8¼"	2"
S3-8	91°27'44"	—	¼"	8¼"	3/16"	12⅜"	12⅛"	6 5/16"	5 5/16"	1'-0"	2'-0¼"	8¼"	2"
S4-8	91°27'44"	—	¼"	8¼"	3/16"	12⅜"	12⅛"	6 5/16"	5 5/16"	1'-0"	2'-0¼"	8¼"	2"

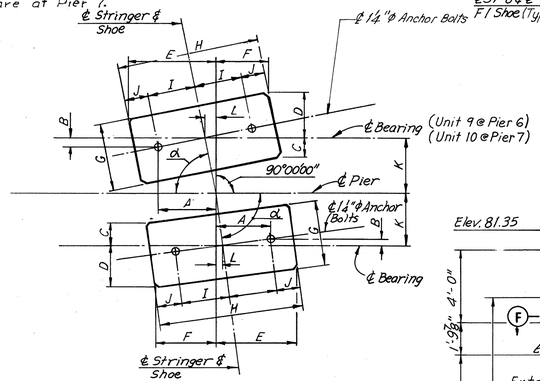

Extend every other dowel as shown.
3'-6"x3'-6"x3" Key
℄ Column
36-#11 Bars
36-#11 Dowels
7'-3"
3'-9"
R=1'-9"
3"
6'-6"
1'-6"
1'-0"
℄ Pier
6" Clr.
1'-6"
4'-9"
4'-3"
4'-3"
4'-3

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	71	97

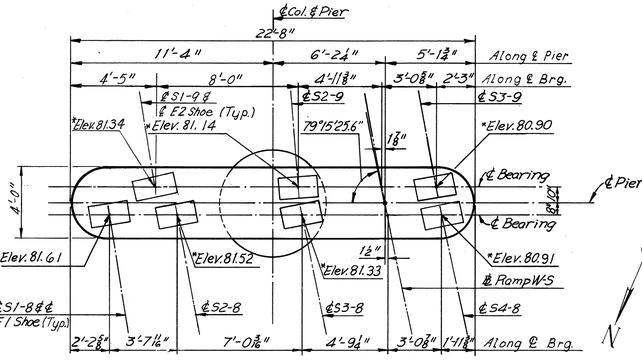
DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L
*S1-9	88°31'17"	8½	7⅞	7⅞	7⅞	13⅜	12⅝	15	2'-2½"	8¼	5	10	¼
*S2-9	85°33'46"	9	6½	6½	6½	13½	13⅜	15	2'-2½"	8¼	5	10	¾
*S3-9	79°16'37"	10	6⅛	4⅞	9⅛	16¼	9¼	15	2'-2½"	8¼	5	10	1⅞
S1-10	89°35'33"	8¼	5⅛	5⅛	5⅛	12⅜	11⅞	15	2'-1"	8	4½	9	0
S2-10	88°51'44"	8⅜	5½	5½	6	12⅝	12⅜	11½	2'-1"	8	4½	9"	⅜
S1-8	90°07'28"	9¼	6⅜	4⅞	8⅝	15⅞	10¾	13½	2'-3"	8	5½	8	1⅝
S2-8	78°55'37"	9⅝	7⅛	4	9⅛	16¼	10⅛	13½	2'-3"	8	5½	8	1⅝
S3, 4-8	77°44'47"	9⅝	7⅛	3⅞	9⅛	16½	10⅛	13½	2'-3"	8	5½	8	1¾
** S1-9	89°20'16"	¼	5⅜	5⅜	5⅜	12⅝	12⅝	11½	2'-1"	8	4½	9	1/16
** S2-9	86°22'45"	8⅜	6½	4⅝	6½	13⅜	11⅛	11½	2'-1"	8	4½	9	5/16
** S3-9	86°38'50"	8⅜	5	6½	6½	13⅜	11⅝	11½	2'-1"	8	4½	9	½

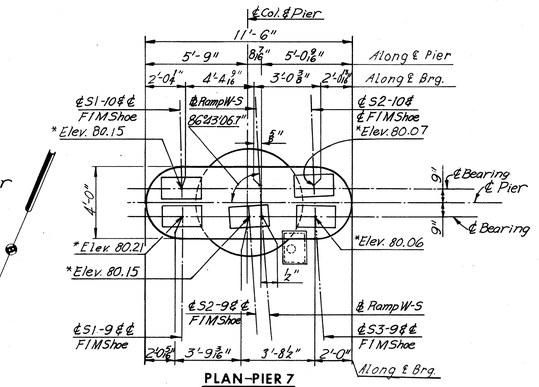
NOTE: Dimensions are in inches unless shown otherwise. Stringers denoted with * are at Pier 6 and with ** are at Pier 7.



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

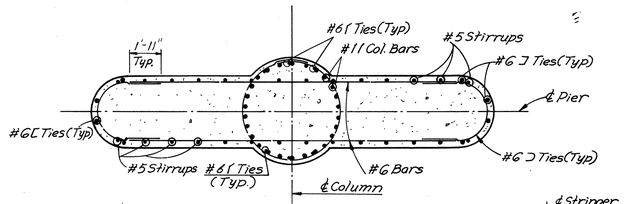


PLAN–PIER 6
Scale: ¼" = 1'-0"

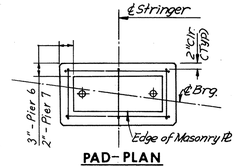


PLAN–PIER 7
Scale: ¼" = 1'-0"

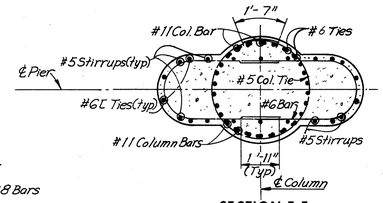
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



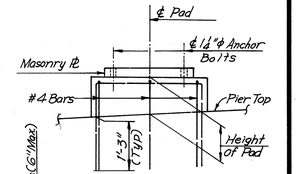
SECTION F-F
Scale: ¼" = 1'-0"



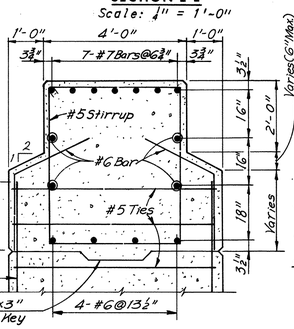
PAD-PLAN



SECTION E-E
Scale: ¼" = 1'-0"

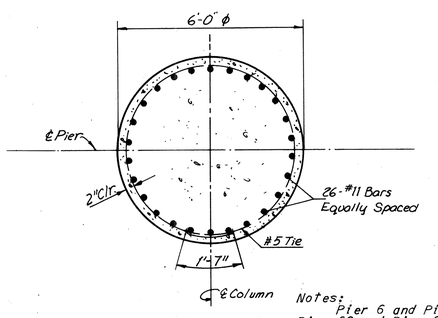


PAD-ELEVATION
No Scale



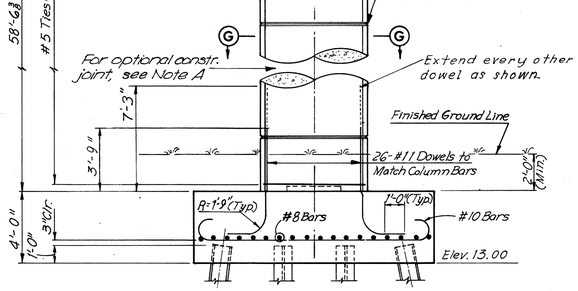
SECTION D-D
Scale: ¼" = 1'-0"

Notes:
Pads with heights of 4" or less shall not be reinforced. Pads with heights between 4" and 8" use #4 bars.
For Standard Shoe Details see Sheets 51 & 52.
For Framing Plans, see Sheets 14 & 15.
For Quantities of Concrete & Steel, see Sheet 2.

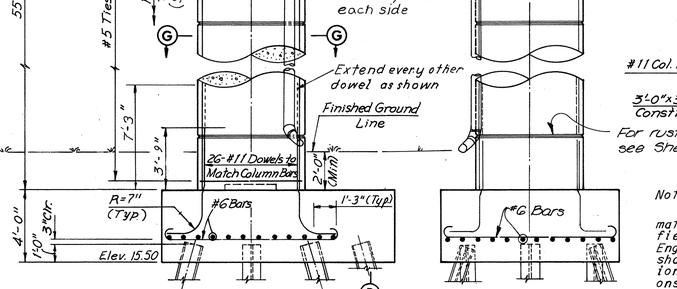


SECTION G-G
No Scale

Notes:
Pier 6 and Pier 7 are to match existing Pier 62 and Pier 60 respectively. The stations shown on the plans shall be verified by the contractor in the field.



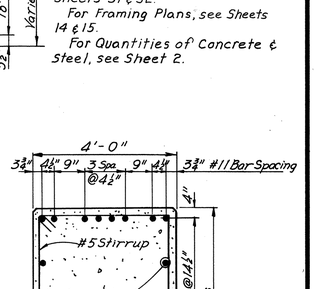
ELEVATION – PIER 6
Scale: ¼" = 1'-0"



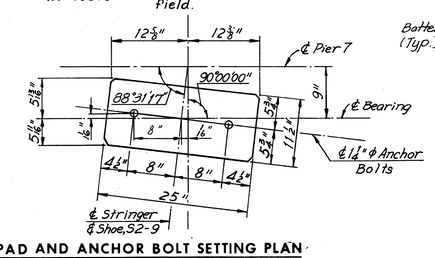
ELEVATION – PIER 7
Scale: ¼" = 1'-0"

VIEW B-B
Scale: ¼" = 1'-0"

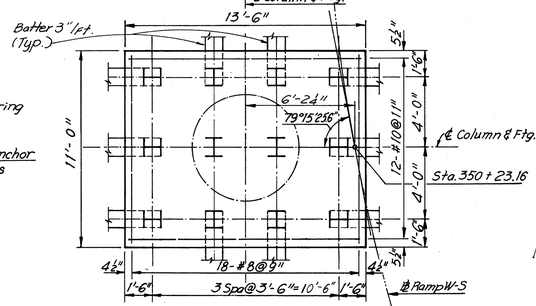
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.



SECTION A-A
Scale: ¼" = 1'-0"

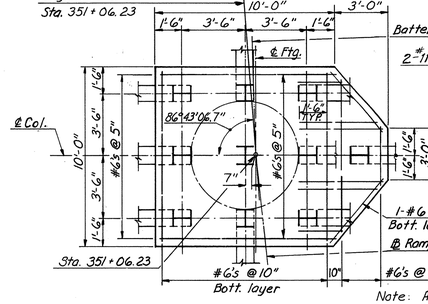


PAD AND ANCHOR BOLT SETTING PLAN
No Scale (S2-9 Only)



ELEVATION – PIER 6
Scale: ¼" = 1'-0"

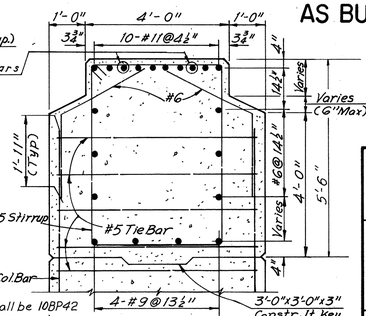
Note: Estimated Pile tip Elevations: -15.0



FOOTING-PLAN PIER 7
Scale: ¼" = 1'-0"

Note: All piles shall be 10BP42 (Design Capacity = 45 Tons)
Batter piles 3" per ft. where shown.

AS BUILT



SECTION C-C
Scale: ¼" = 1'-0"

	BY	DATE				
MADE	AHH	01-27-69	2	Footing Dowel Pier 7	TEM	8-26-75
CHECKED	YCP	2-5-69	1	Pad Elevations	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

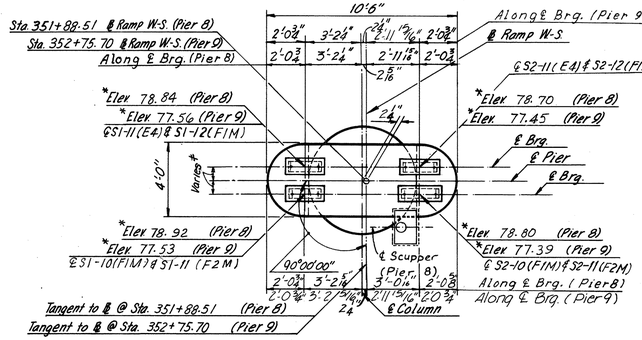
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 6 AND 7

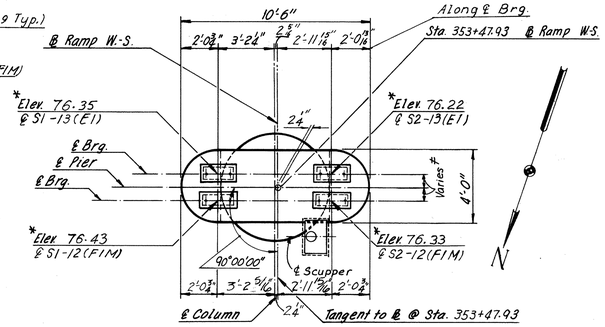
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 8 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	72	97



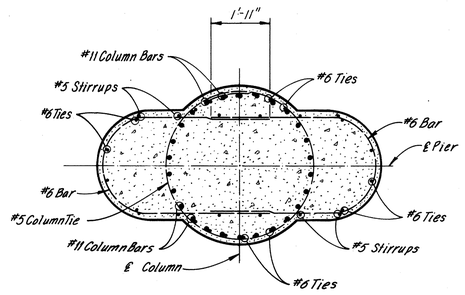
PIER CAP PLAN-PIERS 8 AND 9
Scale: ¼"= 1'-0"



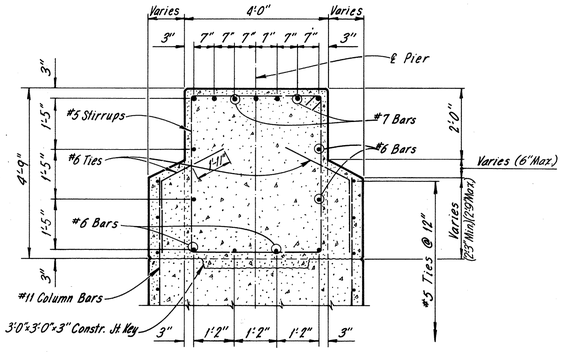
PIER CAP PLAN-PIER 10
Scale: ¼"= 1'-0"

* Denotes top elevations of pad.

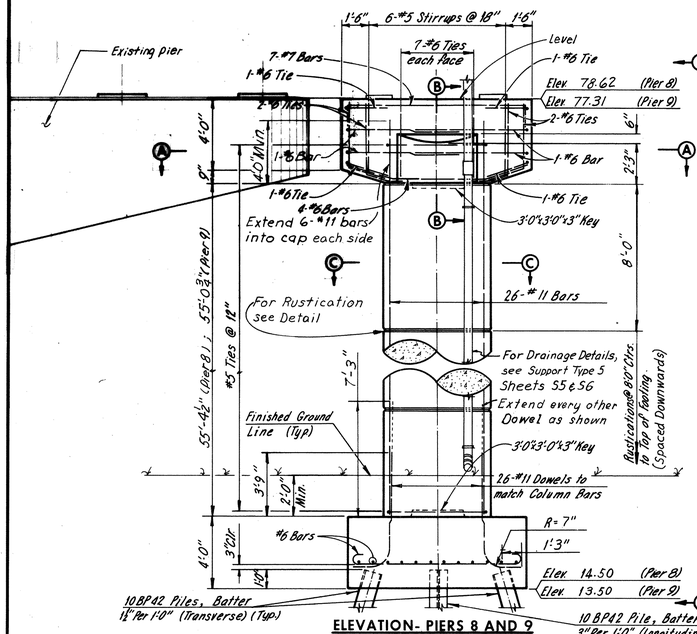
‡ The distances from ℄ Brg. to ℄ Pier are shown on the Table "Dimensions for pad and anchor bolt setting plan".



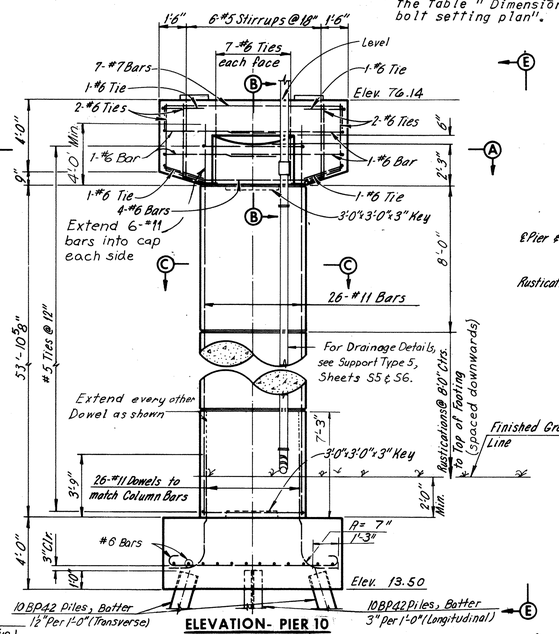
SECTION A-A
Scale: ⅜" = 1'-0"



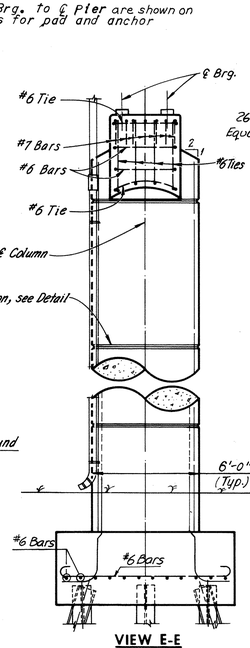
SECTION B-B
Scale: ½" = 1'-0"



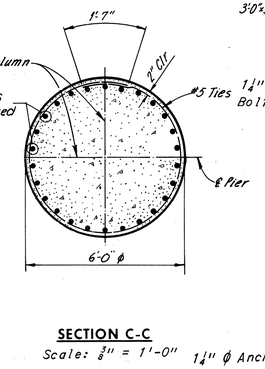
ELEVATION- PIERS 8 AND 9
Scale: ¼"= 1'-0"



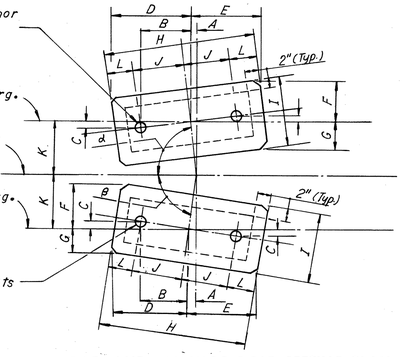
ELEVATION- PIER 10
Scale: ¼"= 1'-0"



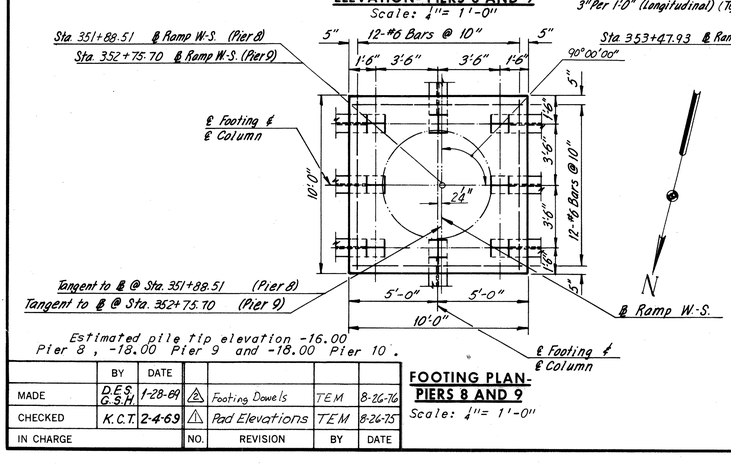
VIEW E-E
Scale: ¼" = 1'-0"



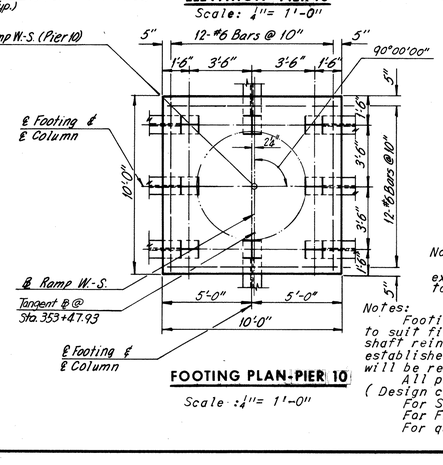
SECTION C-C
Scale: ⅜" = 1'-0"



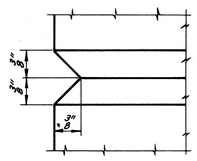
PAD AND ANCHOR BOLT SETTING PLAN
NO Scale



FOOTING PLAN- PIERS 8 AND 9
Scale: ¼"= 1'-0"



FOOTING PLAN-PIER 10
Scale: ¼"= 1'-0"



RUSTICATION DETAIL
Full Scale

Note:
Overexcavation will not be permitted between existing pier and newpier. Piers 8, 9 and 10 are to match existing piers 58, 56 and 54 respectively. The contractor shall verify the stations in the field.

Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.
All piles shall be 10BP42 Steel Piles.
(Design capacity = 45 Tons.)
For Standard Shoe Details, see Sheets 51 & 52.
For Framing Plans, see Sheets 15 and 16.
For quantities of concrete and steel, see Sheet 2.

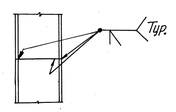
Estimated pile tip elevation -16.00 Pier 8, -18.00 Pier 9 and -18.00 Pier 10.

	BY	DATE
MADE	DES. G.S.H	1-28-69
CHECKED	K.C.T.	2-4-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Footing Dowels	TEM	8-26-76
1	Pad Elevations	TEM	8-26-75

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Pier	Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
8	S1-10	–	89°36'33"	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 7/16"	5 5/16"	2'-1"	11 2/16"	8"	9"	4 4/16"
	S2-10	–	90°19'22"	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 7/16"	5 5/16"	2'-1"	11 2/16"	8"	9"	4 4/16"
	S1-11	90°25'55"	–	16 1/16"	10 2/16"	16 1/16"	1'-2 2/16"	1'-2 2/16"	6 5/16"	6 4/16"	2'-5"	1'-0 2/16"	10 2/16"	9"	4"
	S2-11	90°25'55"	–	16 1/16"	10 2/16"	16 1/16"	1'-2 2/16"	1'-2 2/16"	6 5/16"	6 4/16"	2'-5"	1'-0 2/16"	10 2/16"	9"	4"
9	S1-11	–	89°34'05"	16 1/16"	10 2/16"	16 1/16"	1'-3 1/16"	1'-3 1/16"	5 8/16"	5 8/16"	2'-6"	11"	10 2/16"	8"	4 2/16"
	S2-11	–	89°34'05"	16 1/16"	10 2/16"	16 1/16"	1'-3 1/16"	1'-3 1/16"	5 8/16"	5 8/16"	2'-6"	11"	10 2/16"	8"	4 2/16"
	S1-12	90°21'29"	–	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 7/16"	5 5/16"	2'-1"	11 2/16"	8"	10"	4 2/16"
	S2-12	90°21'29"	–	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 8/16"	5 8/16"	2'-1"	11 2/16"	8"	10"	4 2/16"
10	S1-12	–	90°21'29"	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 7/16"	5 5/16"	2'-1"	11 2/16"	8"	9"	4 2/16"
	S2-12	–	90°21'29"	16 1/16"	8 1/16"	16 1/16"	1'-0 2/16"	1'-0 2/16"	5 7/16"	5 5/16"	2'-1"	11 2/16"	8"	9"	4 2/16"
	S1-13	89°38'31"	–	16 1/16"	8 4/16"	16 1/16"	1'-0 4/16"	1'-0 4/16"	6 8/16"	5 7/16"	2'-0 2/16"	1'-0"	8 4/16"	9"	4"
	S2-13	89°38'31"	–	16 1/16"	8 4/16"	16 1/16"	1'-0 4/16"	1'-0 4/16"	6 8/16"	5 8/16"	2'-0 2/16"	1'-0"	8 4/16"	9"	4"



PILE SPLICE DETAIL
No Scale

AS BUILT

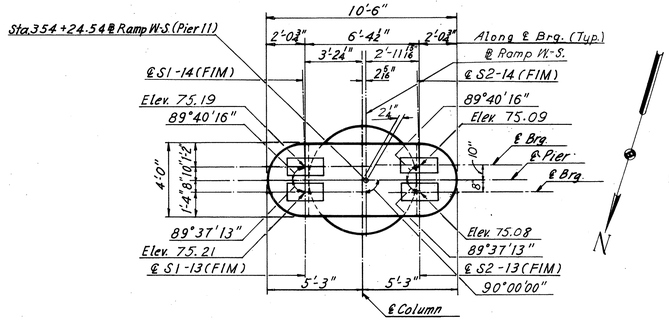
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 8, 9 AND 10

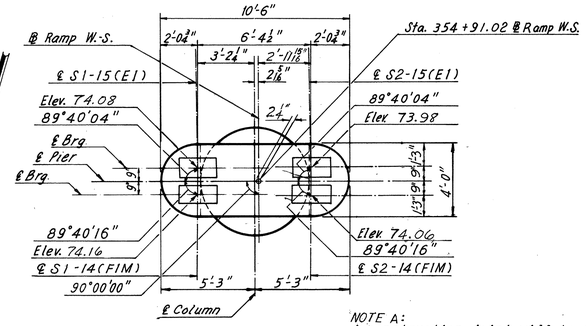
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 9 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	73	97

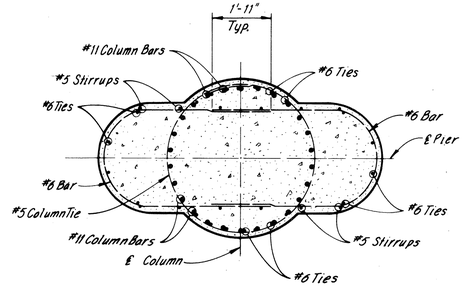


PIER CAP PLAN-PIER 11
Scale: ¼"= 1'-0"

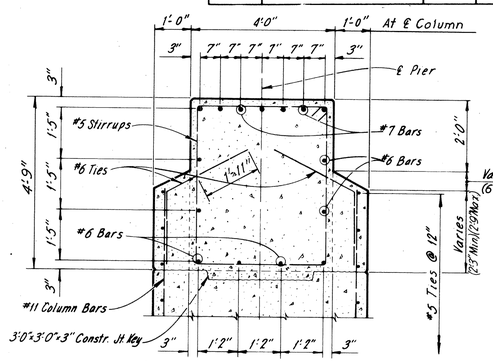


PIER CAP PLAN- PIER 12
Scale: ¼"= 1'-0"

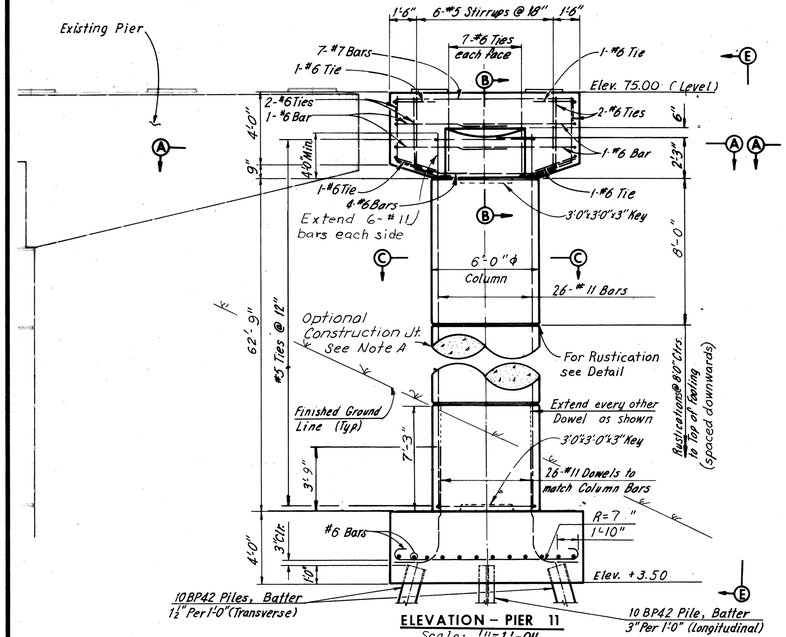
NOTE A:
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



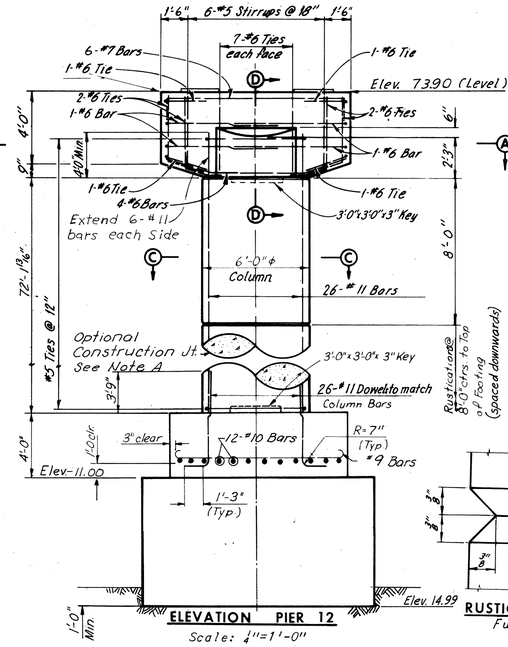
SECTION A-A
Scale: ⅜" = 1'-0"



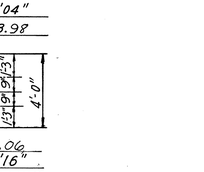
SECTION B-B
Scale: ½" = 1'-0"



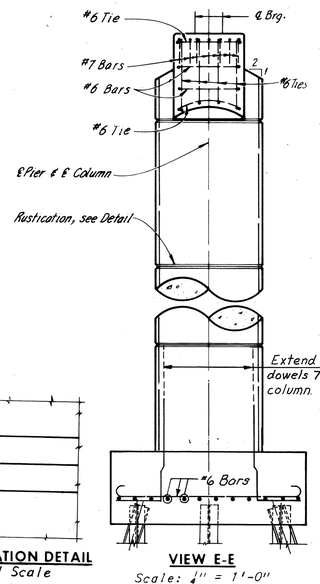
ELEVATION – PIER 11
Scale: ¼"=1'-0"



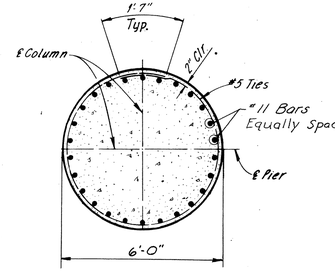
ELEVATION PIER 12
Scale: ¼"=1'-0"



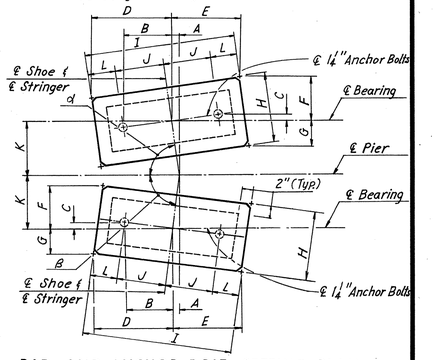
RUSTICATION DETAIL
Full Scale



VIEW E-E
Scale: ¼" = 1'-0"
(Pier 11 shown, Pier 12 similar except for Footing.)



SECTION C-C
Scale: ⅝" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN												
Pier	Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
11	S1-13	——	89° 37'13"	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	8"	4½"
	S2-13	——	89° 37'13"	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	8"	4½"
	S1-14	89° 40'16"	——	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	8"	4½"
	S2-14	89° 40'16"	——	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	10"	4½"
12	S1-14	——	89° 40'16"	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	9"	4½"
	S2-14	——	89° 40'16"	16"	8"	16"	12⅛"	12⅛"	5⅜"	5⅜"	11⅛"	2'-1"	8"	9"	4½"
	S1-15	89° 40'04"	——	16"	8¼"	16"	12¼"	12¼"	6⅜"	5⅜"	12"	2'-0½"	8¼"	9"	4"
	S2-15	89° 40'04"	——	16"	8¼"	16"	12¼"	12¼"	6⅜"	5⅜"	12"	2'-0½"	8¼"	9"	4"

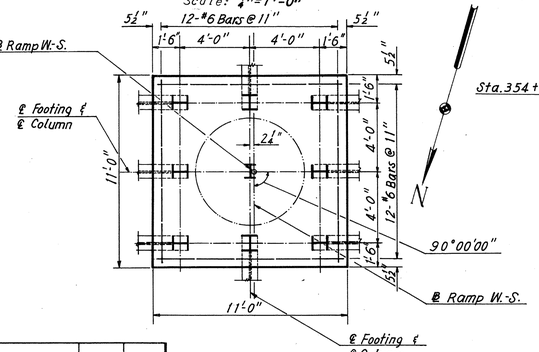
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Overexcavation will not be permitted between existing pier and new pier.

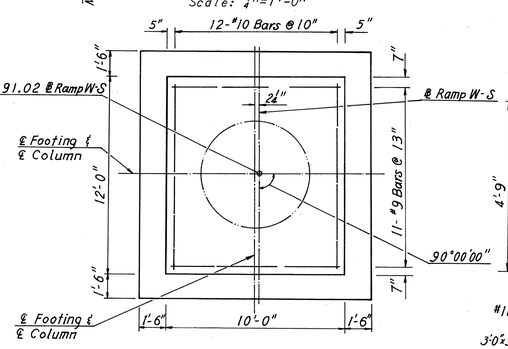
Pier 11 and pier 12 are to match existing pier 52 and pier 50 respectively, the Contractor shall verify the stations in the field.

All piles shall be 10BP42 Steel Piles.
(Design capacity = 45 Tons.)

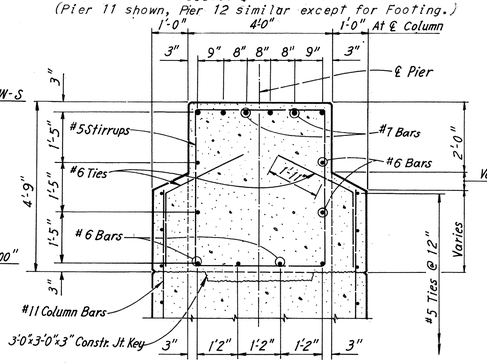
For Steel and Concrete quantities, see Sheet 2.



FOOTING PLAN PIER 11
Scale: ¼"=1'-0"



FOOTING PLAN – PIER 12
Scale: ¼"=1'-0"



SECTION D-D
Scale: 2" = 1'-0"

Note
For Standard Shoe Details see Sheets S1 and S2
For Framing Plans see Sheet 16.
Estimated Pile Tip Elevation -18.00 for Pier 11.

	BY	DATE				
MADE	K C T	1-22-69	2	Footing Dowels	TEM	8-26-76
CHECKED	R C	2-1-69	1	Pad Elevations	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

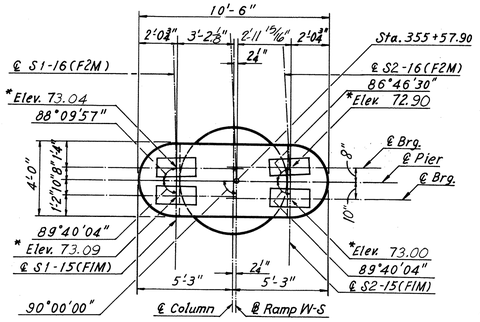
PIERS 11 AND 12

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

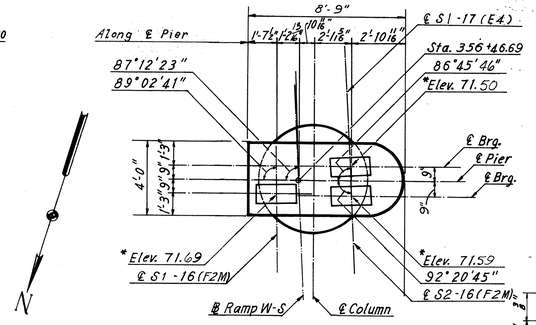
SCALE: As Noted
CONTRACT NO: 11
SHEET NO: 10 OF 28

73

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	74	97

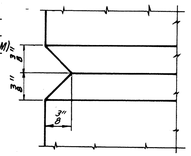


PIER CAP PLAN - PIER 13
Scale: 1/4"=1'-0"

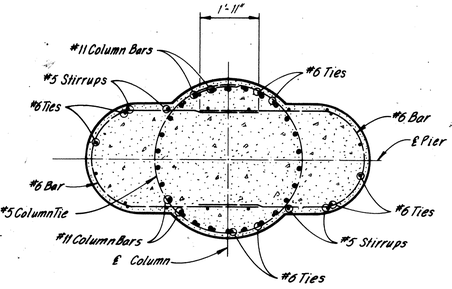


PIER CAP PLAN-PIER 14
Scale: 1/4"= 1'-0"

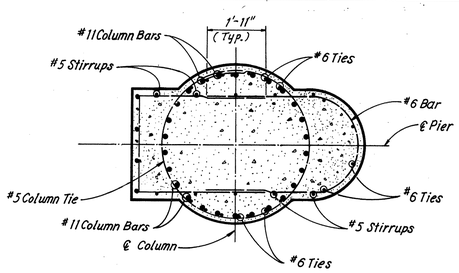
* Denotes top elevation of pad.



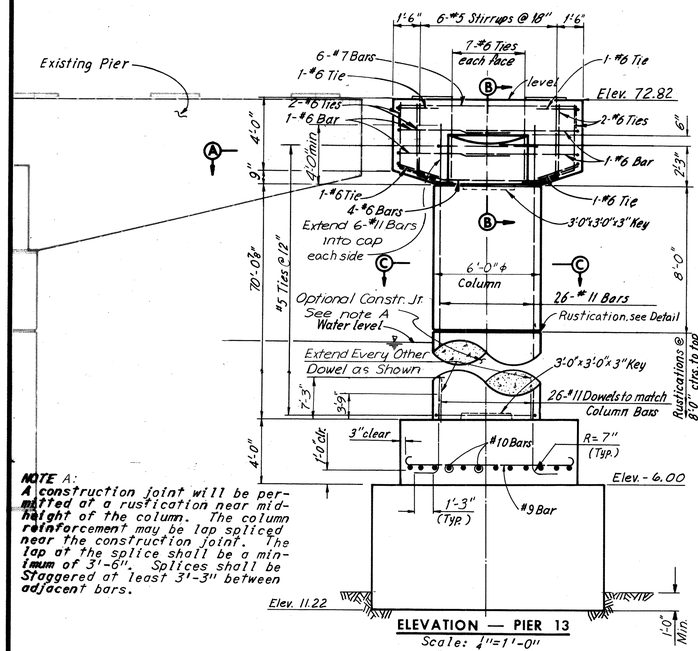
RUSTICATION DETAIL
Full Scale



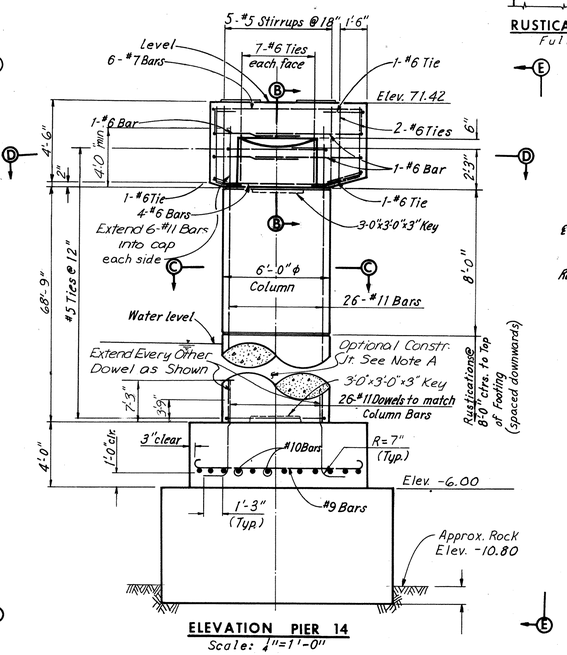
SECTION A-A
Scale: 3/8" = 1'-0"



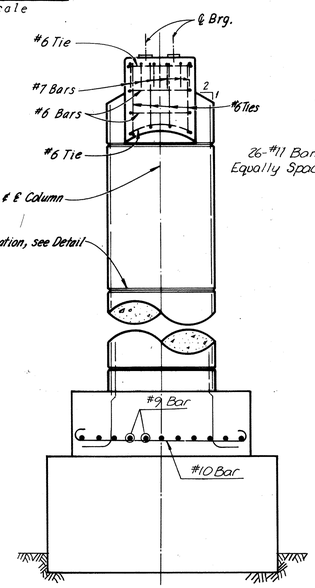
SECTION D-D
Scale: 3/8"=1'-0"



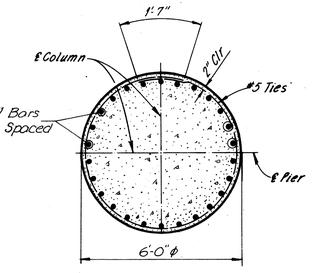
ELEVATION — PIER 13
Scale: 1/4"=1'-0"



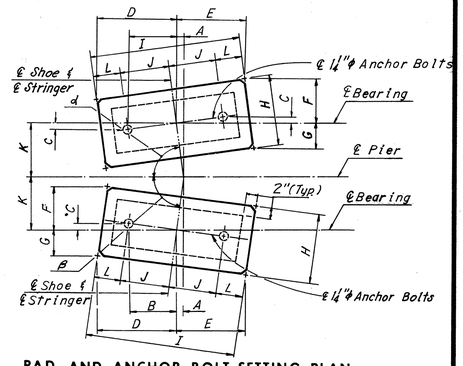
ELEVATION PIER 14
Scale: 1/4"=1'-0"



VIEW E-E
Scale: 1/4"=1'-0"



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



PAD AND ANCHOR BOLT SETTING PLAN
NO Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

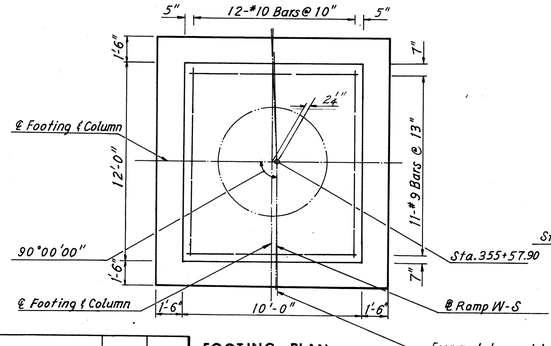
Pier	Stringer	d	B	A	B	C	D	E	F	G	H	I	J	K	L
13	S1-15	—	89°40'04"	1/16"	8"	1/16"	12 7/16"	12 2/16"	5 7/16"	5 5/16"	11 1/16"	2'-1"	8"	10"	4 1/16"
	S2-15	—	89°40'04"	1/16"	8"	1/16"	12 1/16"	12 2/16"	5 7/16"	5 5/16"	11 1/16"	2L1"	8"	10"	4 1/16"
	S1-16	88°09'57"	—	4/16"	10 2/16"	3/16"	15 5/16"	14 8/16"	6"	5"	11"	2'-6"	10 2/16"	8"	4 1/16"
	S2-16	86°46'30"	—	7/16"	10 2/16"	3/16"	15 1/16"	14 2/16"	6 3/16"	4 8/16"	11"	2'-6"	10 1/16"	8"	4 1/16"
14	S1-16	—	90°57'19"	6/16"	10 1/16"	3/16"	15 1/16"	14 2/16"	5 3/16"	5 1/16"	11"	2'-6"	10 1/16"	9"	4 1/16"
	S2-16	—	92°20'45"	8/16"	10 1/16"	1/16"	15 4/16"	14 3/16"	6 1/16"	4 7/16"	11"	2'-6"	10 2/16"	9"	4 1/16"
	S1-17	86°45'29"	—	2/16"	10 2/16"	5/16"	15 1/16"	13 8/16"	7"	5 2/16"	12 2/16"	2'-5"	10 1/16"	9"	4"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

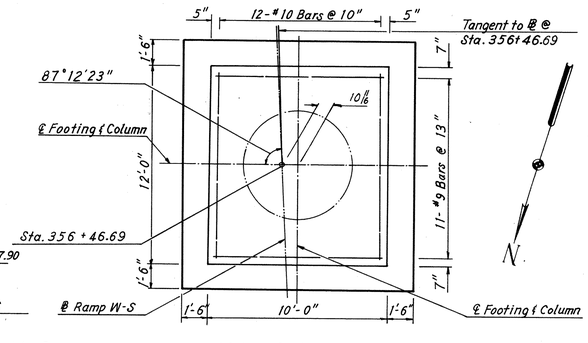
Overexcavation will not be permitted between existing pier and new pier.

Pier 13 and pier 14 are to match existing pier 48 and pier 46 respectively, The Contractor shall verify the stations in the Field.

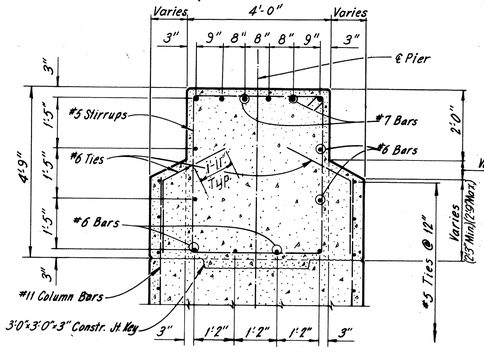
NOTE A:
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



FOOTING PLAN
PIER 13
Scale: 1/4"=1'-0"



FOOTING PLAN PIER 14
Scale: 1/4"=1'-0"



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

For Standard Shoe Details, see Sheets S1 and S2.
For Framing Plans, see Sheet 16.
For Steel and Concrete quantities, see Sheet 2.

	BY	DATE				
MADE	KCT	1-28-69				
CHECKED	GSH	2-3-69	⚠	Pad Elevations Angle @ S1-17	T.E.M.	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

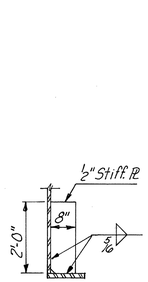
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIERS — 13 AND 14

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

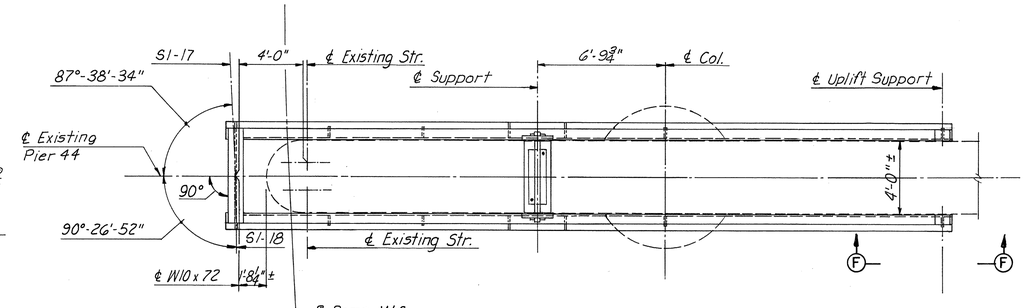
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 11 OF 28

AS BUILT

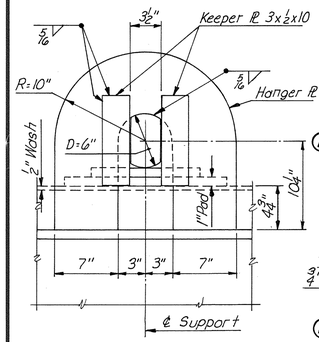
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	74A	97



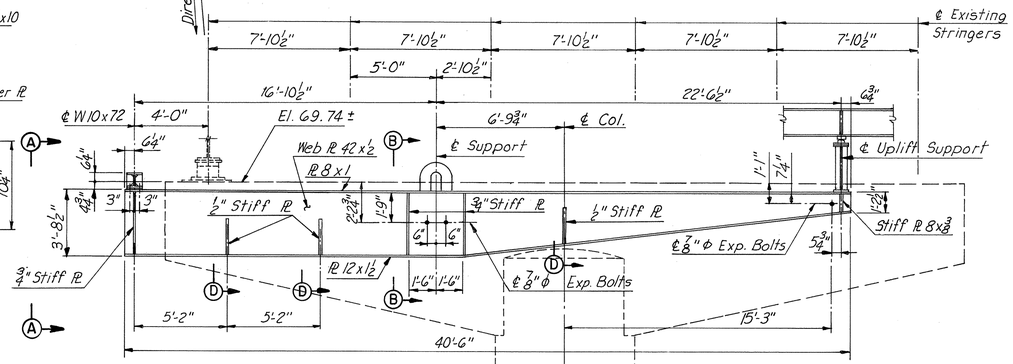
SECTION D
Scale 1½"=1'-0"

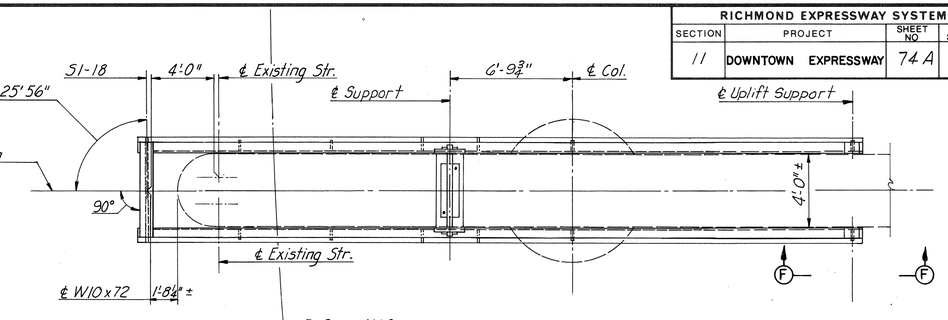


PLAN OF EXISTING PIER 44
Scale: ¼"=1'-0"

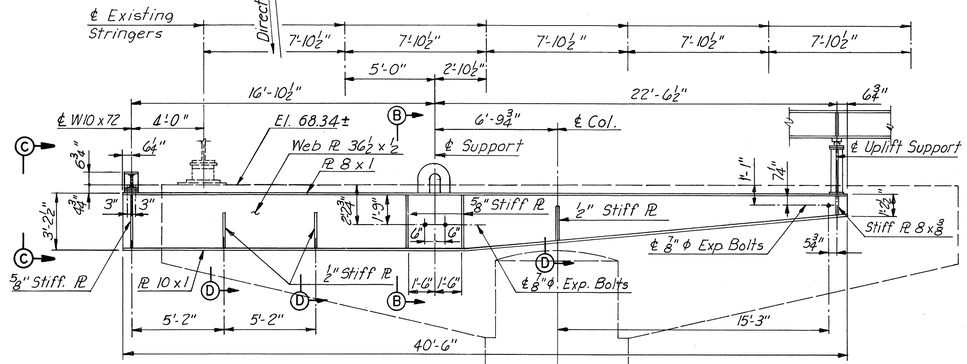


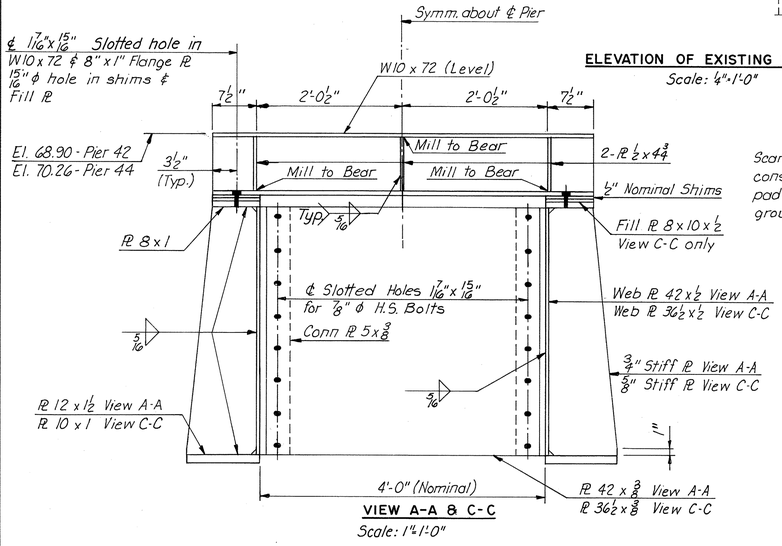
VIEW E-E
Scale 1½"=1'-0"





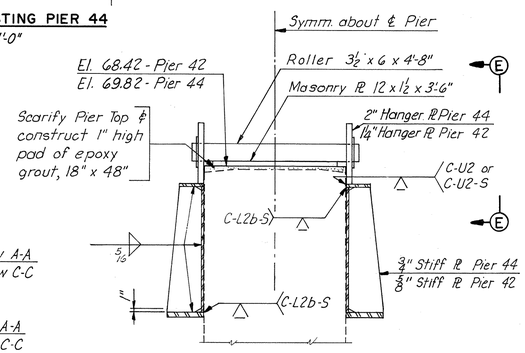
PLAN OF EXISTING PIER 42
Scale: ¼"=1'-0"



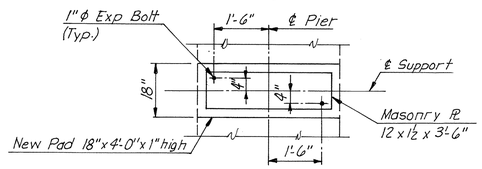


VIEW A-A & C-C
Scale: 1"=1'-0"

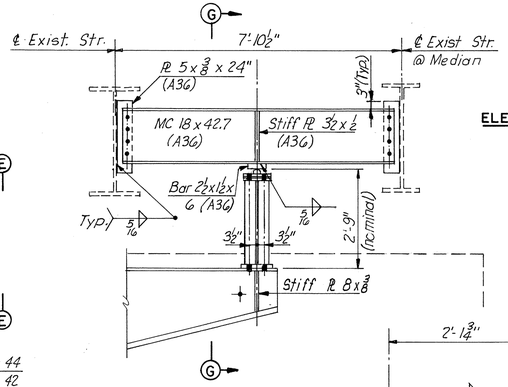
ELEVATION OF EXISTING PIER 44
Scale: ¼"=1'-0"



SECTION B-B
Scale: ½"=1'-0"



PAD PLAN
Scale ½"=1'-0"



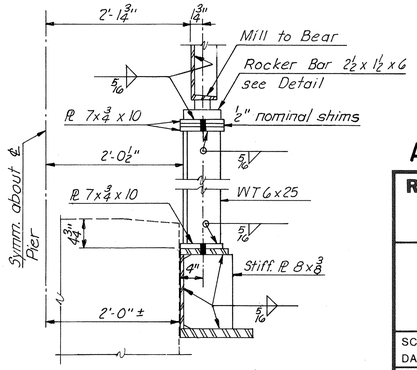
VIEW F-F
Scale ½"=1'-0"

ELEVATION OF EXISTING PIER 42
Scale: ¼"=1'-0"

NOTES:

Structural steel shall be A588 except as noted.

ROCKER BAR DETAIL
No Scale



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

AS BUILT

DESIGNED						
DRAWN	TEM/dBP	8-11-76	2	Entire Sheet	TEM	10-76
CHECKED	PRY	10-15-76	1	New Sheet added	d.B.P.	
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

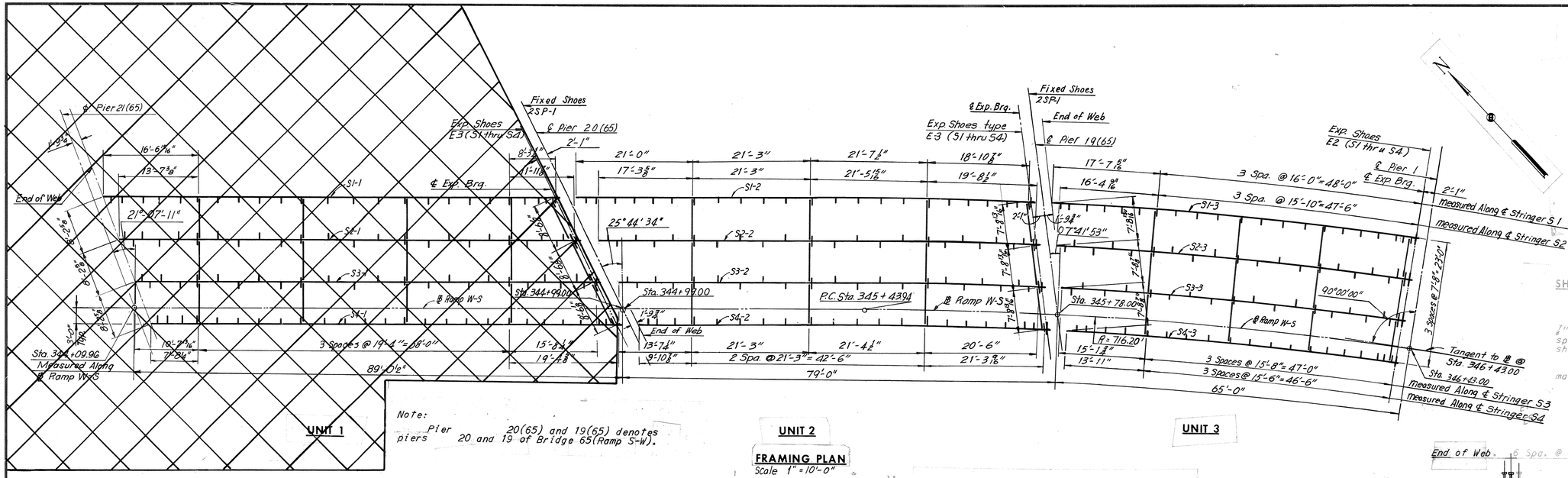
BRIDGE NO. 68
RAMP W-5 CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
EXISTING PIERS 42 & 44 MODIFICATIONS

SCALE As Noted
DATE
SHEET 11A OF 28

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

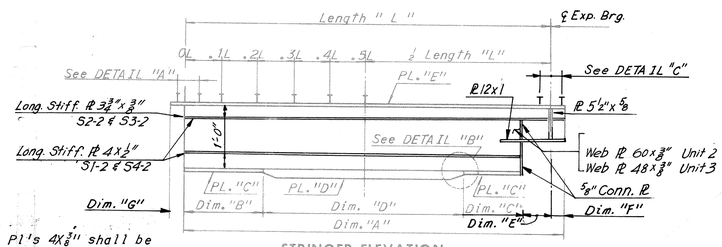
74A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	75	97



Note:
Pier piers 20(65) and 19(65) denotes 20 and 19 of Bridge 65(Ramp S-W).

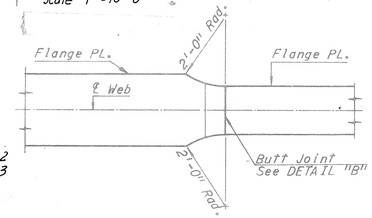
FRAMING PLAN
Scale 1" = 10'-0"



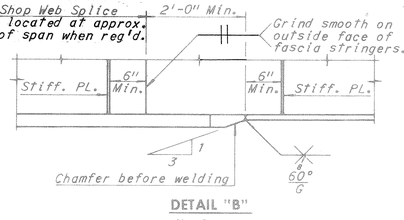
STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

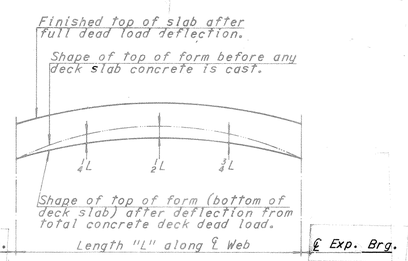
Note :
Intermediate stiffener Pl's 4X⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.



FLANGE PLATE SPLICE DETAIL
No Scale

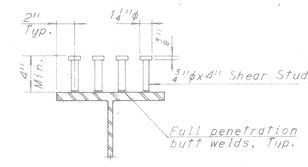


DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

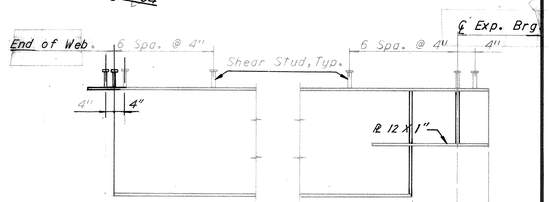
NOTE TO CONTRACTOR
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



SHEAR STUD DETAIL
No Scale

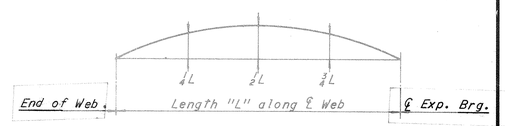
SHEAR STUD NOTE
Contractor may, if he elects, use three ¾" diameter studs at the same longitudinal spacing in lieu of the four ¾" diameter studs shown.

Stud rows shall be placed parallel to the main deck reinforcement.



DETAIL "A"
No Scale

DETAIL "C" (Normal to ℄ Pier)
No Scale



CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 13.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	4	Sp-1	4
E3	4		

Notes:
For Framing Details @ piers 20(65), 19(65) and 1, see Sheet 17.
For Diaphragm connections see Sheet 19.
For Shoe Details, see Sheet S1 and S2
For superstructure steel quantities, see sheet 2.
For joint details, see Sheet 25.
Exterior stringer longitudional stiffeners shall be located on the exterior face of the stringer.
Longitudional stiffeners not to be used in Unit 3.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
1	S1 - 1	83'-6 3/16"	82'-10 11/16"	9'-5¼"	8'-6 1/16"	64'-0"	11⅛"	7⅜"	6 11/16"	12 x ¾"‡	12 x 1⅛"	12 x ¾"‡	11½"	13½"	17"	20½"	24"	1"	1⅜"	1"	1⅜"	1⅜"	1⅜"
	S2 - 1	84'-3"	83'-7¼"	11'-3⅞"	10'-4⅝"	61'-0"	11⅛"	7⅜"	6 11/16"	12 x ¾"‡	12 x 1¼"	12 x ¾"‡	11½"	14½"	17½"	20½"	24"	11/16"	1⅛"	11/16"	1⅜"	1⅜"	1⅜"
	S3 - 1	84'-11 13/16"	84'-4 1/16"	14'-8¼"	10'-6⅝"	61'-0"	11⅛"	7⅜"	6 11/16"	12 x ¾"‡	12 x 1¼"	12 x ¾"‡	11½"	14½"	17½"	20½"	24"	1⅛"	1⅛"	1⅛"	1⅜"	1⅜"	1⅜"
	S4 - 1	85'-8⅜"	85'-0⅛"	10'-6⅞"	9'-7 5/16"	64'-0"	11⅛"	7⅜"	6 11/16"	12 x ¾"‡	12 x 1⅜"	12 x ¾"‡	11½"	13½"	17"	20½"	24"	1⅛"	1 9/16"	1⅛"	1½"	2 1/16"	1½"
2	S1 - 2	83'-4 1/16"	82'-9⅜"	12'-10 11/16"	12'-0 3/16"	57'-0"	10⅛"	7 1/16"	6 11/16"	12 x ¾"	12 x 1¼"	12 x ¾"	12½"	14½"	17½"	21½"	24"	3/4"	1 1/16"	3/4"	1 5/16"	2 1/16"	1 7/16"
	S2 - 2	80'-4 1/16"	79'-9 1/16"	14'-4½"	13'-6 3/16"	51'-0"	10⅛"	7 1/16"	6 11/16"	12 x ¾"	12 x 1¼"	12 x ¾"	13"	14½"	18"	20½"	24"	11/16"	1"	11/16"	1¼"	1 5/16"	1 7/16"
	S3 - 2	77'-3 15/16"	76'-8 3/16"	—	—	75'-10 3/16"	10⅛"	7 1/16"	6 11/16"	—	12 x 1¼"	12 x ¾"	13½"	15½"	17½"	20½"	24"	5/8"	7/8"	5/8"	1⅛"	1 13/16"	1⅜"
	S4 - 2	74'-3½"	73'-8 1/16"	—	—	72'-10 3/16"	10⅛"	7 1/16"	6 11/16"	—	12 x 1⅛"	12 x ¾"	13"	15"	17½"	21"	24"	½"	11/16"	½"	1 1/16"	1 9/16"	1 3/16"
3	S1 - 3	66'-2 13/16"	65'-7 13/16"	10'-3 3/16"	9'-5 5/16"	45'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1¼"	12 x ¾"	10"	11½"	14"	17"	22"	½"	11/16"	½"	3/8"	2 3/8"	1 5/8"
	S2 - 3	64'-5 5/16"	63'-10 3/16"	9'-11¼"	9'-1 5/16"	44'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1¼"	12 x ¾"	10½"	12"	14"	16"	19½"	7/16"	5/8"	7/16"	1 9/16"	2 1/16"	1 7/16"
	S3 - 3	62'-8¾"	62'-1¾"	11'-0 7/16"	10'-2 7/16"	40'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1⅛"	12 x ¾"	12"	13½"	16"	18½"	22"	3/8"	9/16"	3/8"	1 1/16"	1½"	1 1/16"
	S4 - 3	61'-0"	60'-5"	—	—	59'-7"	10"	7"	6 1/16"	—	12 x 1¼"	12 x ¾"	12"	14"	16"	19½"	24"	5/16"	7/16"	5/16"	3/4"	1"	3/4"

Note : All steel shall be A36 unless shown otherwise.

* Spacing begins at termination of 6 spaces @ 4"

‡ Denotes A572-Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾".

	BY	DATE
MADE	GSH	12-1068
CHECKED	JD	4-28-69
IN CHARGE		

NO.	REVISION	BY	DATE
⚠	Stringer Elev. Diaph. locat. Unit 3	T.E.M.	826-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

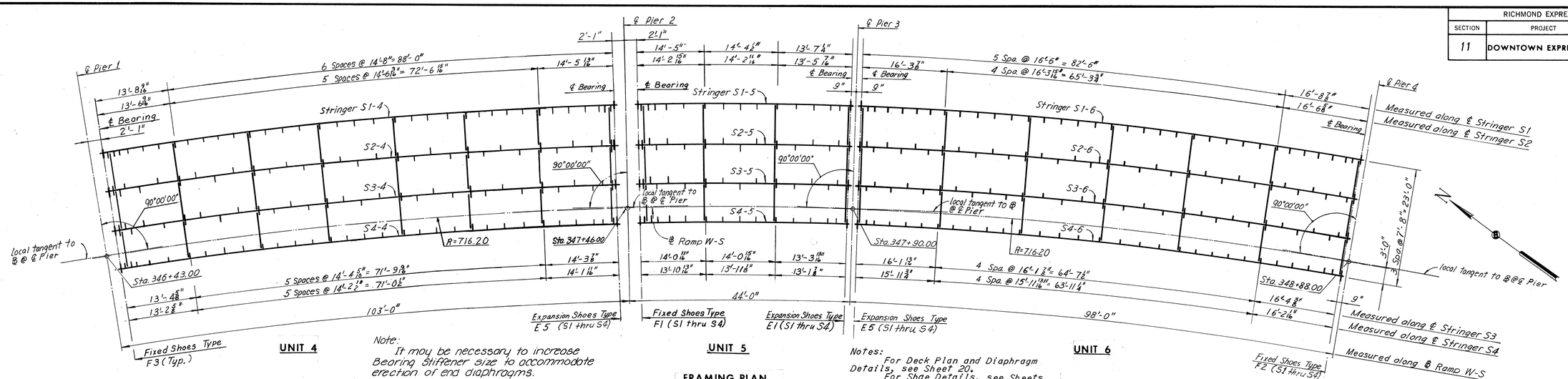
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 1,2 AND 3

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 12 OF 28

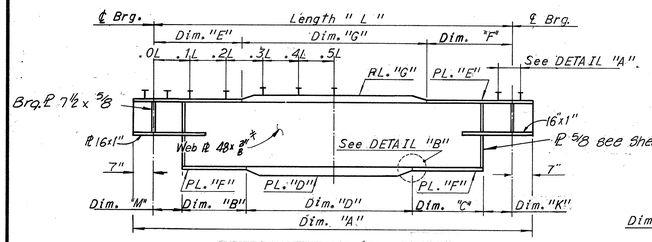
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	76	97



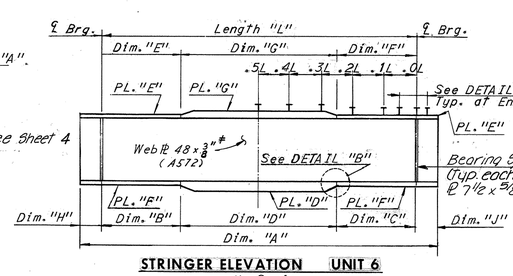
Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

FRAMING PLAN
Scale: 1" = 10'-0"

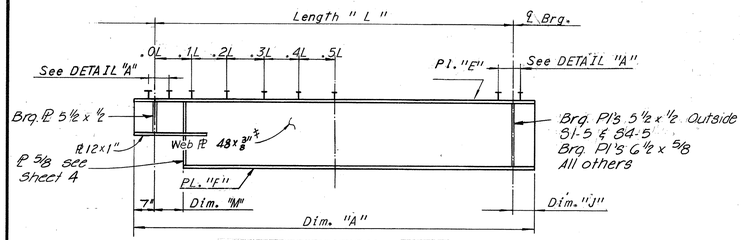
Notes:
For Deck Plan and Diaphragm Details, see Sheet 20.
For Shoe Details, see Sheets S1 and S2.
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.



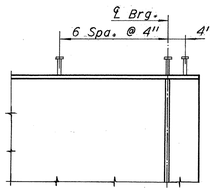
STRINGER ELEVATION - UNIT 4
No Scale



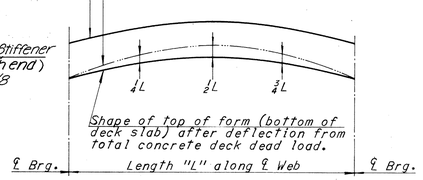
STRINGER ELEVATION UNIT 6
No Scale



STRINGER ELEVATION - UNIT 5
No Scale



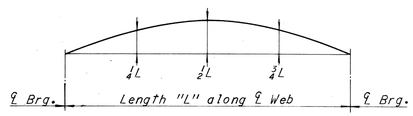
DETAIL "A"
No Scale



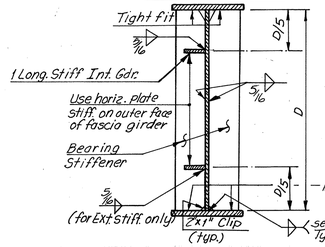
DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.
Note:
For "Note to Fabricator" see Sheet 12.



CAMBER DIAGRAM

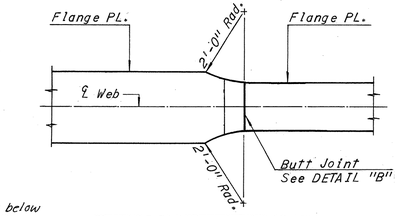


WELD SIZE TABLE

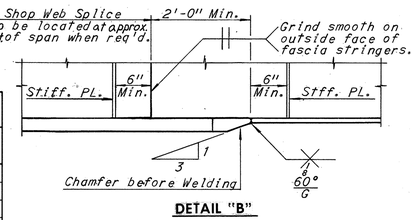
To 1/2"	over 1/2 to 3/4"	over 3/4
5/16 weld	3/8 weld	1/2 weld

WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
(No scale)

Note:
Web to flange weld size shall be determined by flange thickness as follows:



FLANGE PLATE SPLICE DETAIL
No Scale



DETAIL "B"
No Scale

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
	4		4
	8		4
–	–	F3	4
–	–	–	–

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "J"	Dim. "K"	Dim. "M"	PL. "D"‡	PL. "E"‡	PL. "F"‡	PL. "G"‡	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
4	S1 - 4	102'-10 13/16"	101'- 8 9/16"	19'- 0 1/4"	19'- 0 5/8"	62'-0"	19'- 10 1/4"	19'- 10 5/8"	62'-0"	—	—	10"	10"	24 x 1 1/2"	16 x 7/8"	20 x 1 3/8"	16 x 1 1/4"	9 1/2"	11"	13 1/2"	17"	22"
	S2 - 4	101'- 9 3/8"	100'- 7 5/16"	18'- 5 11/16"	18'- 5 5/16"	62'-0"	19'- 3 1/16"	19'- 3 5/16"	62'-0"	—	—	10"	10"	20 x 1 1/4"	12 x 3/4"	16 x 1 3/8"	16 x 7/8"	10"	11 1/4"	14"	17"	21"
	S3 - 4	100'- 8 1/16"	99'- 6 1/16"	18'-11 1/16"	18'-11"	60'-0"	49'- 9 11/16"	49'- 0"	–	–	–	10"	10"	16 x 1 5/8"	12 x 3/4"	16 x 1 1/4"	–	11"	12 1/4"	15 1/2"	18 1/2"	22 1/2"
	S4 - 4	99'- 6 15/16"	98'- 4 13/16"	20'- 4 7/16"	20'- 4 3/8"	56'-0"	49'- 2 7/16"	49'- 2 3/8"	–	–	–	10"	10"	16 x 1 1/8"	12 x 3/4"	12 x 1"	–	10"	13"	16 1/2"	19 1/2"	24"
5	S1 - 5	43'- 7 1/4"	42'- 4 3/4"	—	—	—	—	—	—	—	—	8"	—	10"	–	12 x 3/4"	12 x 3/4"	–	24"	24"	24"	24"	24"
	S2 - 5	43'- 1 3/8"	41'-11 1/4"	—	—	—	—	—	—	—	—	7"	—	10"	–	12 x 3/4"	12 x 3/4"	–	24"	24"	24"	24"	24"
	S3 - 5	42'- 7 5/16"	41'- 5 3/16"	—	—	—	—	—	—	—	—	7"	—	10"	–	12 x 1/2"	12 x 3/4"	–	24"	24"	24"	24"	24"
	S4 - 5	42'- 2 15/16"	40'-11 15/16"	—	—	—	—	—	—	—	—	8"	—	10"	–	12 x 3/4"	12 x 3/4"	–	24"	24"	24"	24"	24"
6	S1 - 6	100'-6 3/4"	99'-2 3/4"	22'-7 1/16"	22'-7 1/16"	54'-0"	18'-1 3/16"	18'-1 7/16"	63'-0"	8"	8"	—	—	16 x 2 5/8"	12 x 1 1/4"	16 x 2"	12 x 1 3/8"	7 1/2"	9"	12"	16"	21 1/2"
	S2 - 6	99'-4 1/4"	98'-2 1/4"	24'-1 1/16"	24'-1 1/16"	50'-0"	22'-1 1/16"	22'-1 1/16"	54'-0"	7"	7"	—	—	16 x 1 5/8"	12 x 1 1/4"	16 x 1 3/4"	12 x 1 5/8"	9"	10"	13 1/2"	17"	22"
	S3 - 6	98'-3 11/16"	97'-1 11/16"	20'-10 3/8"	20'-0 7/8"	57'-0"	48'-6 15/16"	48'-6 7/16"	—	7"	7"	—	—	16 x 1 1/8"	12 x 1 1/4"	16 x 1 3/4"	—	9 1/2"	11"	14 1/2"	18"	23"
	S4 - 6	97'-5 7/16"	96'-1 7/16"	22'-0 7/8"	22'-0 7/8"	52'-0"	48'-0 9/16"	48'-0 1/2"	—	8"	8"	—	—	16 x 1 3/8"	12 x 3/4"	16 x 1 1/8"	—	9 1/2"	11 1/2"	14 1/2"	19"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
1 3/4"	2 7/16"	1 3/4"	3 7/16"	4 11/16"	3 5/16"
2 1/16"	2 7/8"	2 1/16"	3 13/16"	5 3/16"	3 11/16"
2 1/8"	3"	2 1/8"	3 7/8"	5 1/4"	3 3/4"
1 15/16"	2 11/16"	1 15/16"	3 7/16"	4 11/16"	3 3/8"
1/8"	3/16"	1/8"	1/8"	3/16"	1/8"
1/8"	1/8"	1/8"	1/8"	3/16"	1/8"
1/8"	1/8"	1/8"	1/8"	3/16"	1/8"
1/16"	1/8"	1/16"	1/8"	1/8"	1/8"
1 1/2"	2 1/8"	1 1/2"	2"	2 3/4"	2"
1 1/2"	2 1/8"	1 1/2"	1 15/16"	2 3/4"	1 15/16"
1 1/8"	2 1/16"	1 1/2"	1 15/16"	2 11/16"	1 15/16"
1 3/8"	2 1/4"	1 3/8"	1 15/16"	2 11/16"	1 15/16"

* Spacing begins at termination of 6 spaces @ 4".
‡ Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Notes:
All horizontal dimensions are measured along ℄ of web.
All steel shall be A36 unless otherwise shown.
All intermediate stiffeners shall be 4x3/8" unless where the width of top flange plate is 20" or over, Pls 5x3/8" shall be used.

The intermediate stiffeners shall be equally spaced between diaphrams as shown. The first two intermediate stiffener spaces at the ends of stringers shall be one-half the normal spacing whthin the panel.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	12-09-68				
CHECKED	PTA	4-29-69	1	Diaph. locat. Unit 4 & 5	TEM	8-26-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

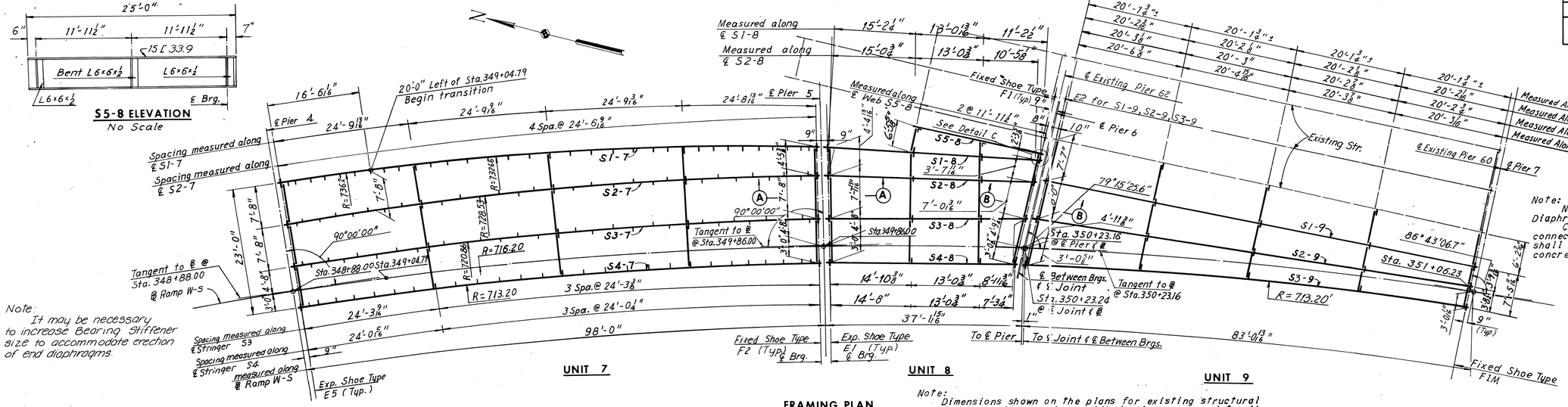
FRAMING PLAN - UNITS 4, 5 AND 6

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 13 OF 28

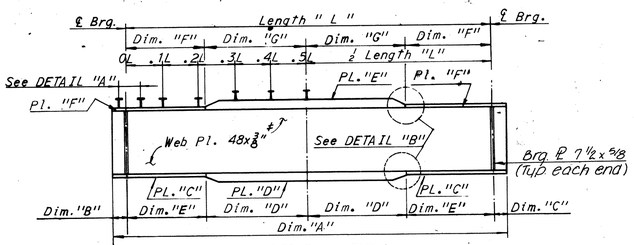
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	77	97

S5-8 ELEVATION
No Scale



Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

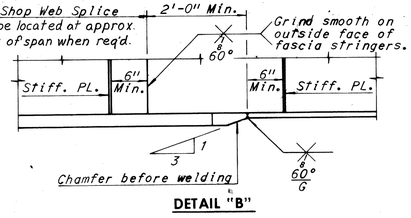
FRAMING PLAN
Scale: 1"=10'-0"



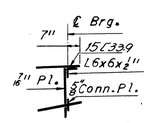
STRINGER ELEVATION
UNIT 7
No Scale

Note:
Detail " A " see Sheet 13.

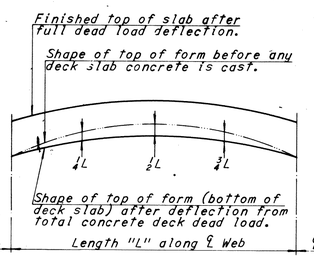
Note:
All horizontal dimensions are measured along ℄ Web.



DETAIL "B"

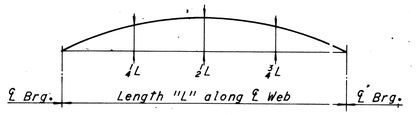


DETAIL C
No scale



DEAD LOAD DEFLECTION DIAGRAM

Note:
All horizontal dimensions are measured along ℄ Web.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

NOTE TO CONTRACTOR

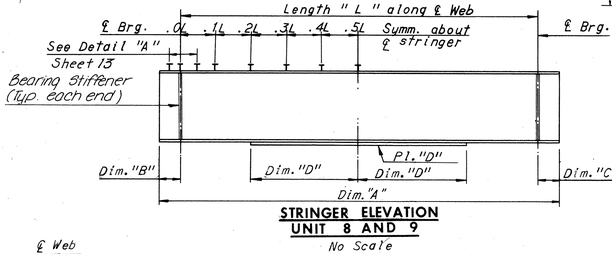
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

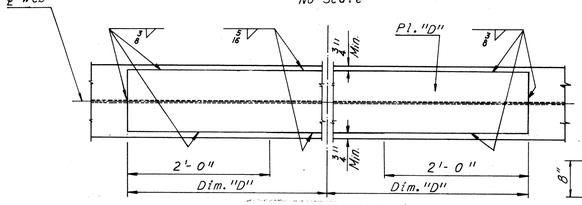
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 21.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.



STRINGER ELEVATION
UNIT 8 AND 9
No Scale



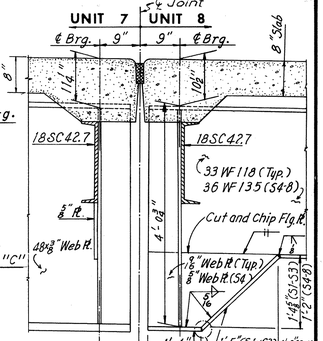
COVER PLATE DETAIL
No Scale

Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 13.

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	4	F1	4
E2	3	F2	4
E5	4	F1M	3



STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C" or Rolled sect.	PL. "D"	PL. "E"	PL. "F"	MAX. SHEAR STUD SPACING* 0.0L-0.1L	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
7	S1-7	100'-5⅜"	99'-1⅜"	8"	8"	27'-0"	22'-6"	18'-0⅛"	31'-6"	16x21#	16x25½"#	12x13⅜"#	12x1¼"#	7½"	9"	12"	16"	21½"
	S2-7	99'-4½"	98'-2½"	7"	7"	25'-0"	24'-1½"	22'-1⅛"	27'-0"	16x14⅝"#	16x26¼"#	12x15"#	12x1⅛"#	9"	10"	13½"	17"	22"
	S3-7	98'-3⅛"	97'-1⅛"	7"	7"	28'-6"	20'-0⅝"	48'-6⅝"	—	16x15⅜"#	16x16"#	—	12x1¼"#	9½"	11"	14½"	18"	23"
	S4-7	97'-5⅛"	96'-1⅛"	8"	8"	26'-0"	22'-0½"	48'-0½"	—	16x16"#	16x12"#	—	12x¾"#	9½"	11½"	14½"	19"	24"
8	S1-8	40'-9⅛"	39'-5⅛"	8"	8⅛"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S2-8	39'-8⅜"	38'-6⅜"	7"	7⅛"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S3-8	38'-0⅞"	36'-10⅝"	7"	7⅛"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S4-8	36'-4⅜"	35'-0"	8"	8⅜"	—	—	—	—	36WF135	—	—	—	24"	24"	24"	24"	24"
	S5-8	25'-0"	—	—	—	—	—	—	—	15 L 33.9	—	—	—	—	—	—	—	—
9	S1-9	81'-10½"	80'-8½"	7"	7"	32'-0"	—	—	—	36WF170	10½x 1"	—	—	10"	11½"	13½"	16"	19"
	S2-9	82'- 1½"	80'-11⅜"	7"	7"	32'-0"	—	—	—	36WF170	10½x 1"	—	—	10"	11½"	13½"	16"	19"
	S3-9	82'-10⅜"	81'-6⅜"	8⅛"	8"	32'-0"	—	—	—	36WF194	10½x 1½"	—	—	12"	13½"	16"	19½"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1 3/8"	1 7/8"	1 5/16"	1 7/16"	2 1/16"	1 7/16"
1 7/16"	2"	1 3/8"	1"	1 5/8"	1 1/8"
1 1/2"	2 1/16"	1 1/2"	11/16"	1 1/16"	3/4"
1 3/8"	2 1/8"	1 5/8"	9/16"	5/8"	1/2"
3/16"	5/16"	3/16"	1/8"	3/8"	1/4"
1/8"	3/16"	1/8"	3/16"	1/4"	3/16"
1/8"	3/16"	1/8"	3/16"	1/4"	3/16"
1/16"	1/8"	1/16"	1/8"	1/8"	1/8"
1/16"	1/8"	1/16"	1/8"	1/16"	3/16"

* Spacing begins at termination of 6 spaces @ 4".
# Denotes A572-Grade 50 steel for thicknesses of ¾" and under and A588 Steel for thicknesses over ¾".

Note:
Intermediate stiffener Pls. 4x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

Note:
All Steel shall be A-36 unless denoted otherwise.

Notes:
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.
For Shoe Details, see Sheet S1 and S2.
For Diaphragm Details, see Sheet 21.
For Shear Stud Details, see Sheet 12.

AS BUILT

	BY	DATE
MADE	K.C.T	11-12-68
CHECKED	D.E.S.	1-1369
IN CHARGE		

NO.	REVISION	BY	DATE
1	Deleted end diaph. conn. ℄ shoe rate at U 9	T.E.M.	8-26-75

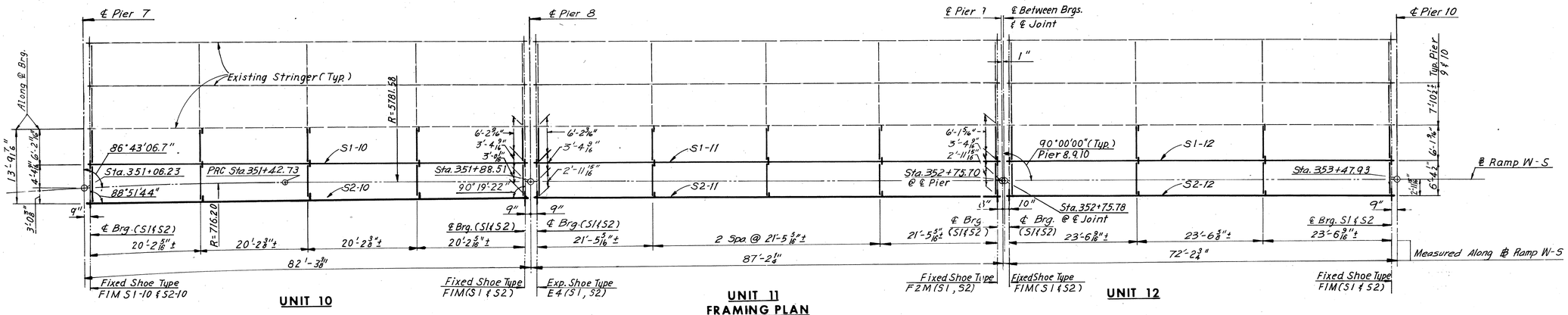
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7, 8 AND 9

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 14 OF 28

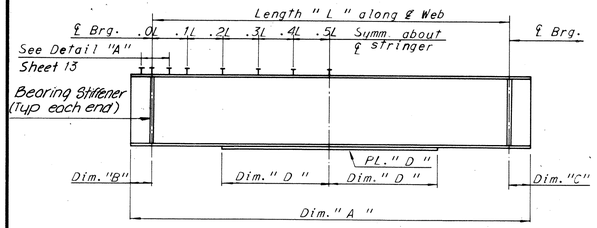
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	78	97



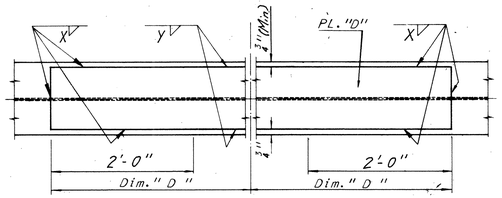
UNIT 10 **UNIT 11** **UNIT 12**

FRAMING PLAN

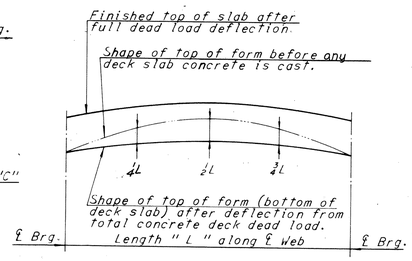
Scale : 1" = 10'-0"



STRINGER ELEVATION
No Scale



COVER PLATE DETAIL
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Unit	Stringer	X	Y
10	S1-10	½	3/16
	S2-10	⅜	⅜
11	S1-11	⅝	5/16
	S2-11	⅝	⅜
12	S1-12	⅜	5/16
	S2-12	7/16	5/16

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
10	S1-10	36 WF 150	81'-10½"	80'-8½"	7"	7"	28'-9"	10½"X1⅜"	19"	20"	24"	24"	24"
	S2-10	36 WF 170	81'-11¾"	80'-9¾"	7"	7"	28'-9"	10½"X1⅝"	20"	21"	24"	24"	24"
11	S1-11	36 WF 160	86'-10⅝"	85'-8⅝"	7"	7"	30'-6"	10½"X1½"	21"	22"	24"	24"	24"
	S2-11	36 WF 194	86'-11¾"	85'-9¾"	7"	7"	29'-0"	10½"X1¾"	23"	24"	24"	24"	24"
12	S1-12	36 WF 135	71'-9¼"	70'-7¼"	7"	7"	23'-6"	10½"X ⅞"	20"	22"	23"	24"	24"
	S2-12	36 WF 135	71'-10-3/16"	70'-8-3/16"	7"	7"	24'-6"	10½"X 1⅛"	21"	22"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1¼"	1¾"	1¼"
1¼"	1⅜"	1¼"
1 7/16"	2"	1 7/16"
1 5/16"	1 5/16"	1 5/16"
⅞"	1¼"	⅞"
1"	1⅜"	1"

CAMBER SCHEDULE

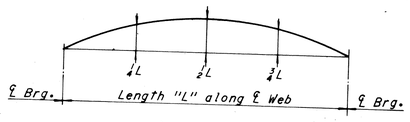
¼L	½L	¾L
1 11/16"	2 5/16"	1⅝"
1⅝"	2⅜"	1⅝"
1 15/16"	2¾"	2"
1⅞"	2⅝"	1⅞"
1 3/16"	1⅝"	1 3/16"
1 3/16"	1 11/16"	1 3/16"

* Spacing begins at termination of 6 spaces @ 4".

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

Notes :
All steel shall be A-36 unless denoted otherwise.
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.
For New Shoe Details, see Sheet S1 and S2.
For Diaphragm Details, see Sheet 22.
For Shear Stud Detail, see Sheet 12.

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to the existing structure, shall not be fully tightened before new concrete deck slab has been placed.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 22.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	2	F1M	8
—	—	F2M	2

AS BUILT

	BY	DATE
MADE	SCC	11-12-68
CHECKED	D.E.S.	1-15-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Deleted end diaph. conn. @ exist str.	TEM	8-26-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 10, 11 AND 12

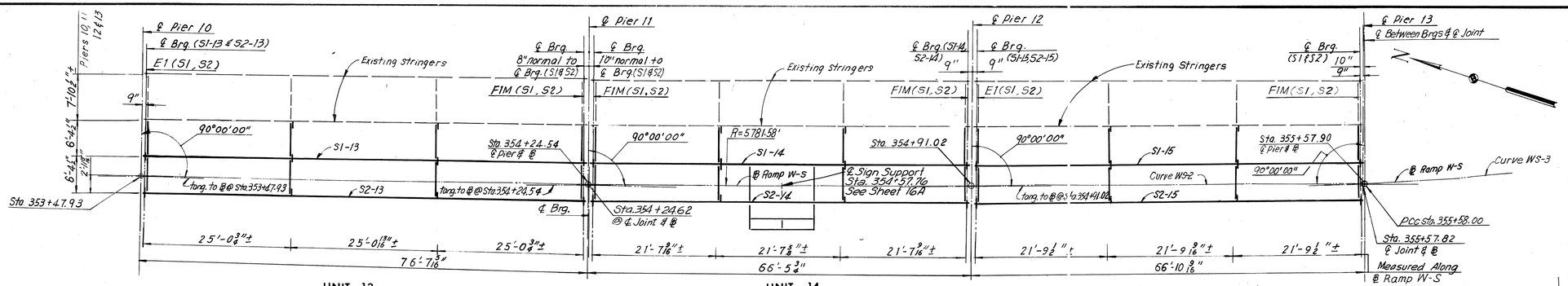
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 15 OF 28

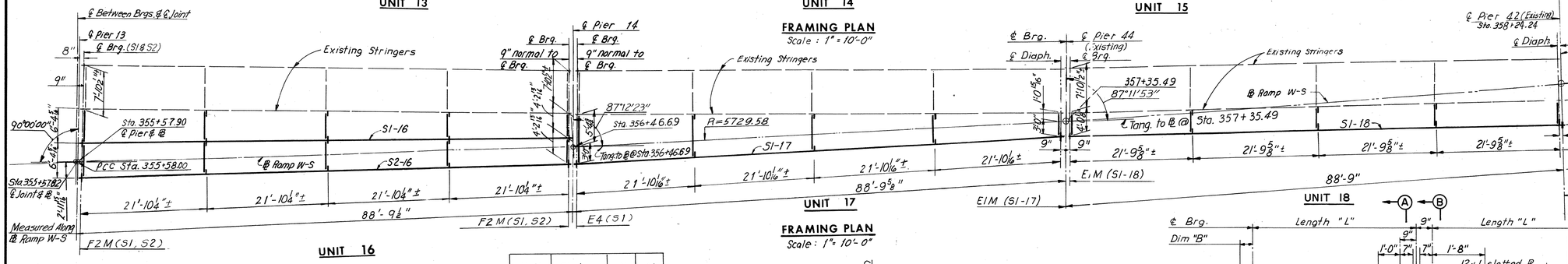
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	79	97

SHOE SCHEDULE

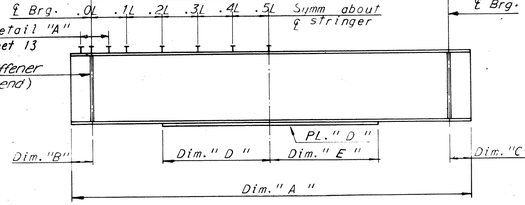
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	4	F1M	8
E4	1	F2M	4
E1M	3		



FRAMING PLAN
Scale : 1" = 10'-0"

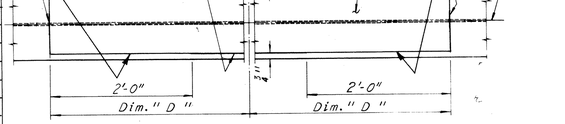


Note:
New Diaphragms are to match the existing Diaphragms on R. F. Turnpike structure.
Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.



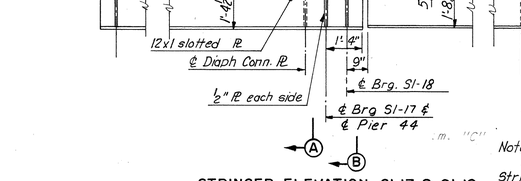
STRINGER ELEVATION UNITS 13 THRU 16
No Scale

Unit	Stringer	X	Y
13	S1-13	7/16	5/16
	S2-13	7/16	5/16
14	S1-14	5/16	5/16
	S2-14	5/16	5/16
15	S1-15	5/16	5/16
	S2-15	5/16	5/16
16	S1-16	1/2	5/16
	S2-16	5/8	3/8
17	S1-17	5/8	3/8
18	S1-18	3/8	5/16



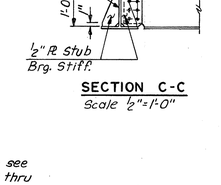
COVER PLATE DETAIL
No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 23 .
(Typical all A36 WF except as shown otherwise.)

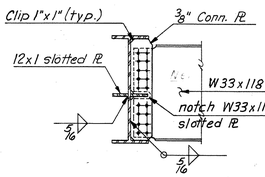


STRINGER ELEVATION S1-17 & S1-18
No Scale

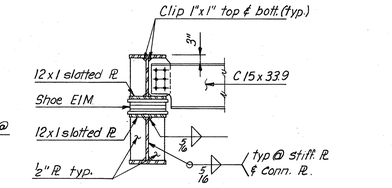
Note:
For Details not shown see Stringer Elevation Unit 13 thru 16.



SECTION C-C
Scale ½"=1'-0"



SECTION A-A
Scale ½"=1'-0"



SECTION B-B
Scale ½"=1'-0"

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	PL. "D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
13	S1-13	36 WF 135	76'-3 13/16"	75'-1 13/16"	7"	7"	26'-3"	26'-3"	10½x1⅛"	20"	21"	24"	24"	24"
	S2-13	36 WF 150	76'-4 13/16"	75'-2 13/16"	7"	7"	26'-0"	26'-0"	10½x1¼"	22"	23"	24"	24"	24"
14	S1-14	36 WF 135	66'-0 5/16"	64'-10 5/16"	7"	7"	18'-6"	18'-6"	10½x⅝"	20"	22"	23"	24"	24"
	S2-14	36 WF 135	66'-1 3/16"	64'-11 3/16"	7"	7"	20'-6"	20'-6"	10½x¾"	21"	22"	24"	24"	24"
15	S1-15	36 WF 135	66'-5⅜"	65'-3⅜"	7"	7"	18'-6"	18'-6"	10½x⅝"	20"	22"	23"	24"	24"
	S2-15	36 WF 135	66'-6"	65'-4"	7"	7"	20'-6"	20'-6"	10½x¾"	21"	22"	24"	24"	24"
16	S1-16	36 WF 150	88'-5⅛"	87'-3⅛"	7"	7"	31'-3"	31'-3"	10½x1 3/8"	21"	23"	24"	24"	24"
	S2-16	36 WF 182	88'-7"	87'-5"	7"	7"	30'-6"	30'-6"	10½x1¾"	23"	24"	24"	24"	24"
17	S1-17	36 WF 194	90'-0 3/16"	88'-1 3/16"	7"		31'-6"	31'-6"	10½ x1⅝"	20"	21"	24"	24"	24"
18	S1-18	36 WF 150	89'-1 9/16"	87'-11 9/16"			28'-6"	28'-6"	10½ x1"	24"	24"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L
1 1/16"	1½"	1 1/16"
1 1/16"	1½"	1 1/16"
¾"	1"	¾"
¾"	1 1/16"	¾"
¾"	1"	¾"
⅜"	1"	⅜"
1½"	2"	1 7/16"
1 9/16"	2 1/16"	1½"

CAMBER SCHEDULE ¼L	½L	¾L
1⅜"	1 15/16"	1⅜"
1⅜"	1 15/16"	1⅜"
15/16"	1 5/16"	15/16"
1"	1⅜"	1"
15/16"	1¼"	15/16"
15/16"	1 5/16"	15/16"
2"	2¾"	2"
2"	2¾"	2"
2"	2¾"	2"
2 1/16"	2⅞"	2 1/16"

Notes :
For Camber Diagram and Dead Load Deflection Diagram see Sheet 12.

Note :
All ± Dimensions are calculated dimensions to be verified by contractor in the field.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

Note:
All Steel s ll be A-36 unless denoted otherwise.

#Denotes A572 - Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾"

* Spacing begins at termination of 6 spaces @ 4".

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	11-18-68	⚠	Deleted end diaph. conn. PL @ exist str.	T.E.M.	8-18-75
CHECKED	SCC	1-17-69	⚠	Diaph. spa. Unit 16 Str. & Diaph Units 17&18	T.E.M.	8-18-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

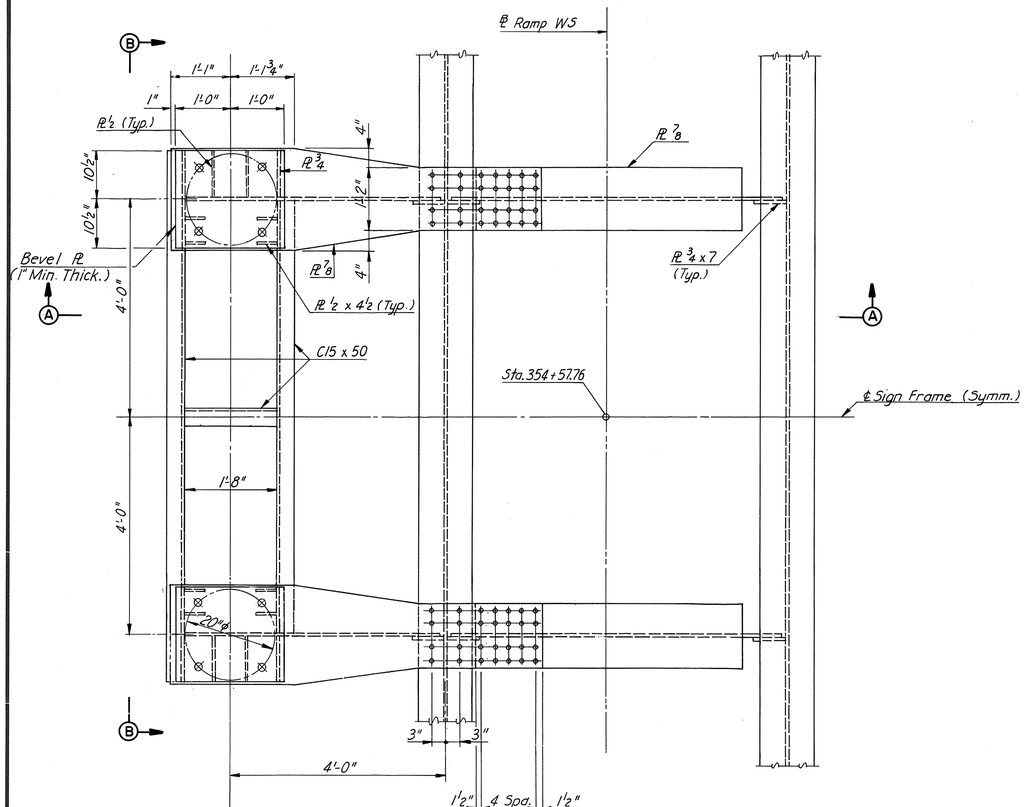
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 13 THRU. 18

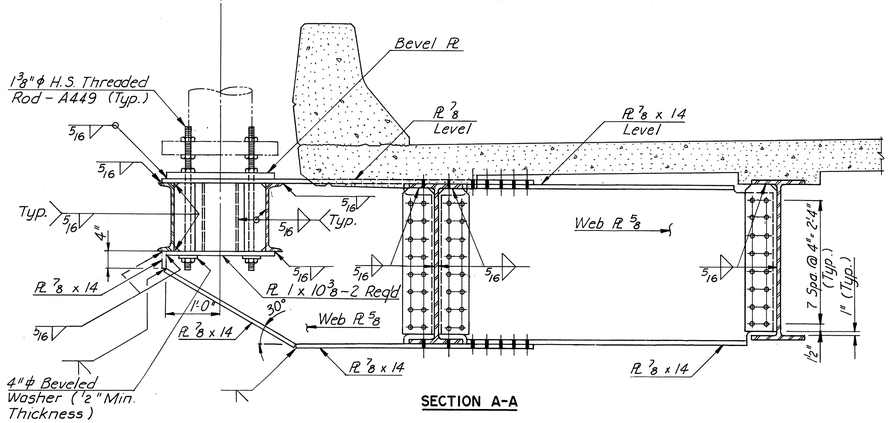
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 16 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	79A	97

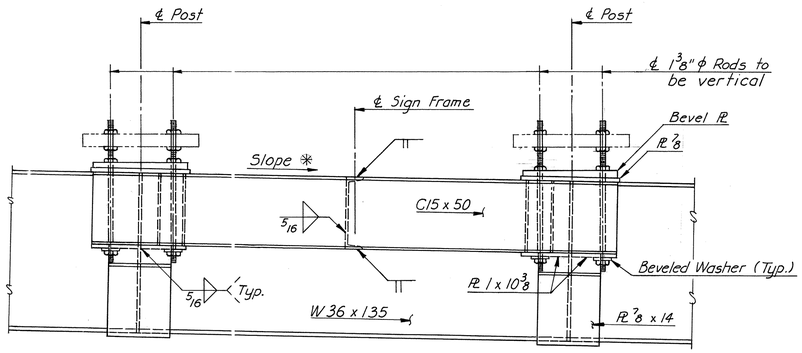


PLAN



SECTION A-A

* Slope of Sign Frame to match slope of exterior str.



VIEW B-B

Notes:
1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the anchor rods.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞" ϕ H.S. unless noted otherwise.

DESIGNED	T.E.M.	3-76				
DRAWN	A.B.P.	3-76				
CHECKED	T.E.M.	3-76	1	New Sheet added	A.B.P.	3-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

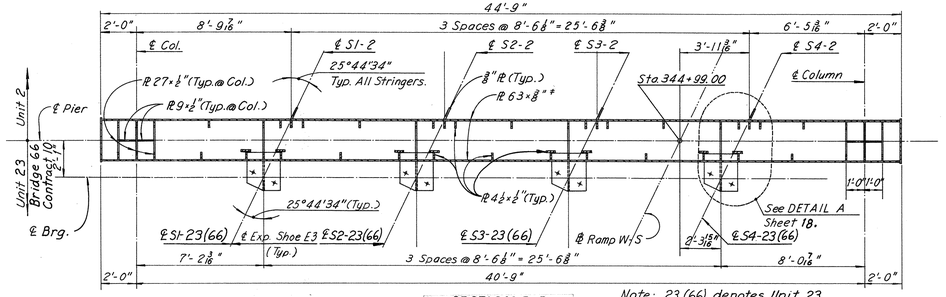
BRIDGE NO. 68
RAMP W-S CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

SIGN SUPPORT BRACKET DETAILS-UNIT 14

SCALE ¾"=1'-0" | CONTRACT NO. 11
DATE | SHEET 16A OF 28

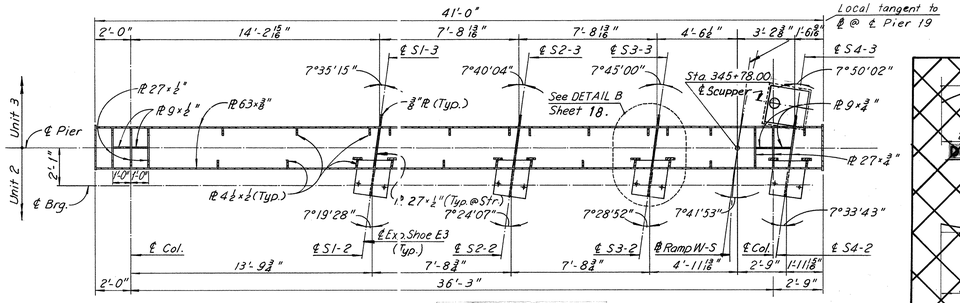
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	80	97

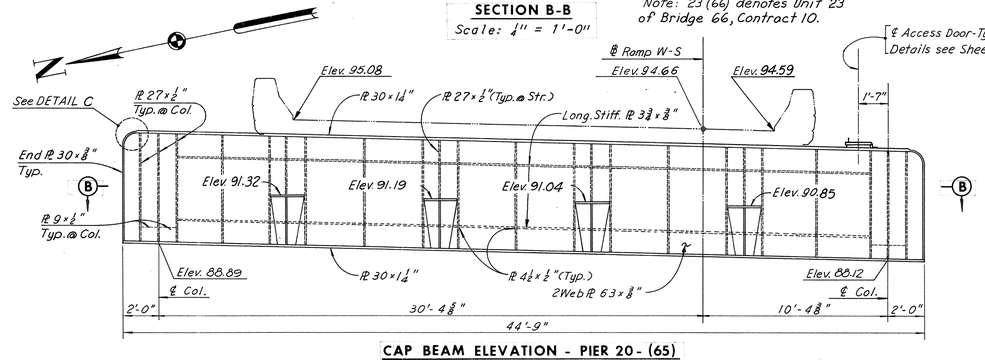


SECTION B-B
Scale: 1/4" = 1'-0"

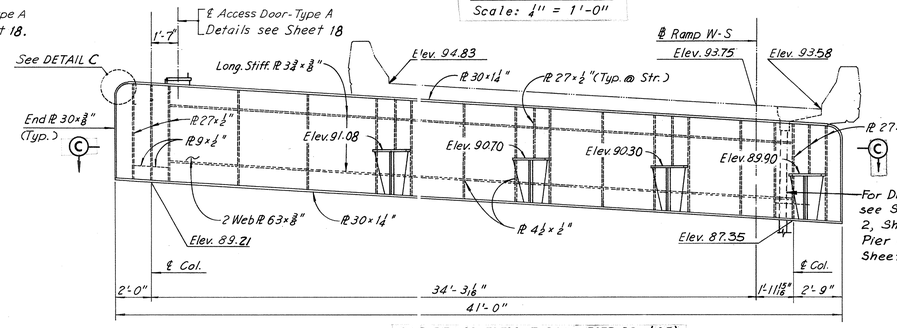
Note: 23(66) denotes Unit 23 of Bridge 66, Contract 10.



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

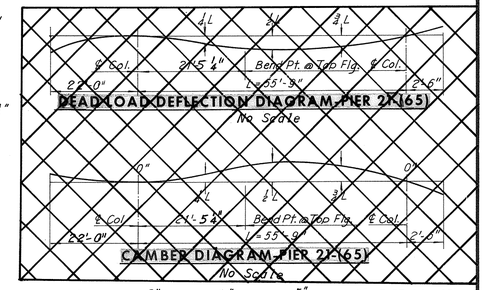


CAP BEAM ELEVATION - PIER 20-(65)
Scale: 1/4" = 1'-0"

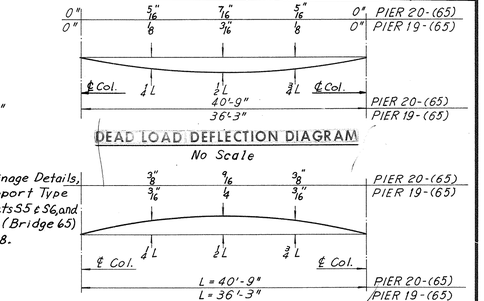


CAP BEAM ELEVATION - PIER 19-(65)
Scale: 1/4" = 1'-0"

Note: TYPICAL SECTION for PIER 20-(65) and PIER 19-(65) see TYPICAL SECTION Sheet 18.



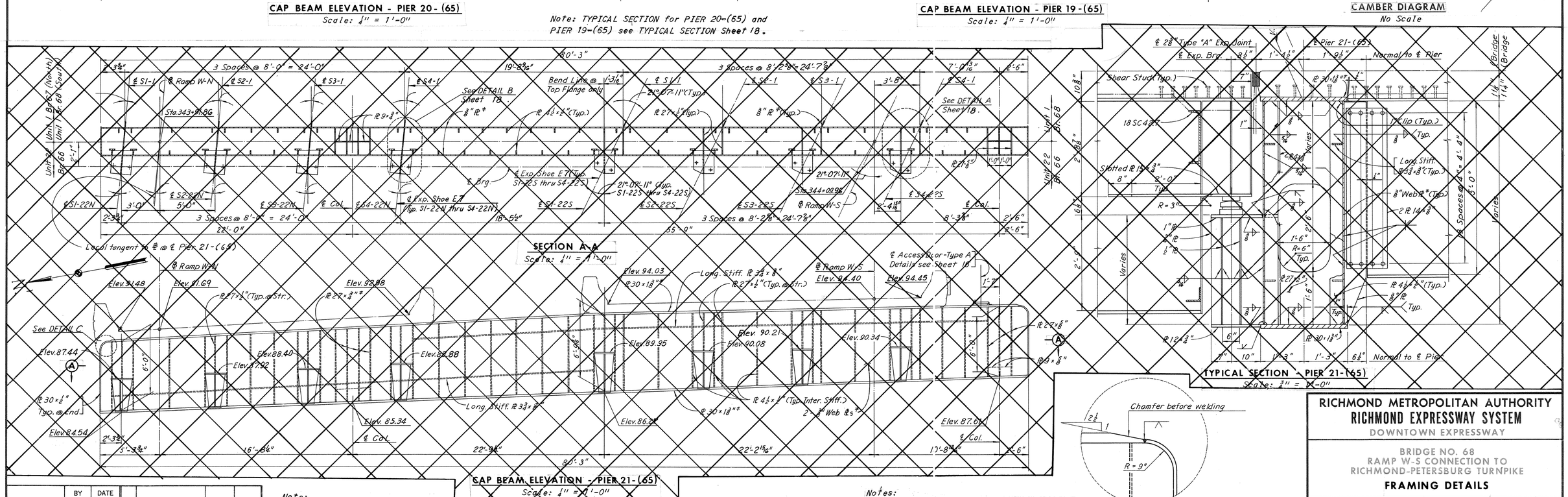
DEAD LOAD DEFLECTION DIAGRAM
No Scale



CAMBER DIAGRAM
No Scale

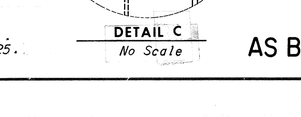
DEAD LOAD DEFLECTION DIAGRAM-PIER 21-(65)
No Scale

CAMBER DIAGRAM
No Scale



CAP BEAM ELEVATION - PIER 21-(65)
Scale: 1/4" = 1'-0"

TYPICAL SECTION - PIER 21-(65)
Scale: 3/4" = 1'-0"



DETAIL C
No Scale

	BY	DATE
MADE	MHH	2-1-69
CHECKED	JD	6-6-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Pad & Deck Elev.	TEM.	3-76
1	Rev. Elevations	SSS	12-75

Note:
All steel shall be A36 unless denoted otherwise.
* Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Notes:
Provide Drain Holes at lower end.
All elevations shown are final elevations.

For Framing Plan, see Sheet 12.
For Joint Details, see Sheet 25.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

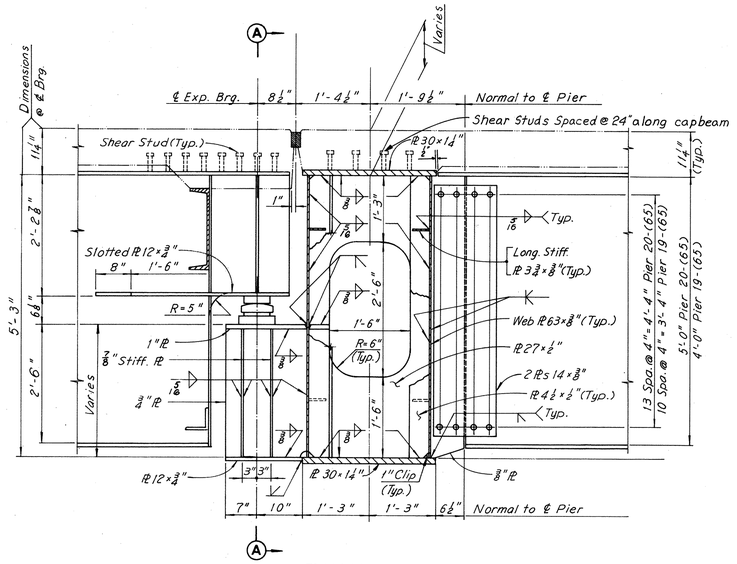
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING DETAILS

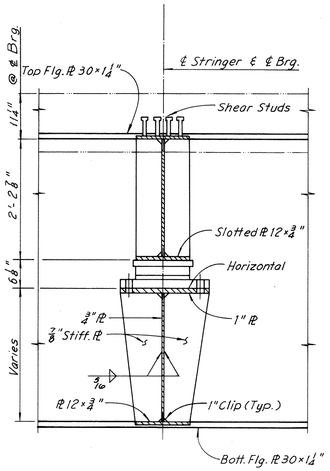
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 17 OF 28

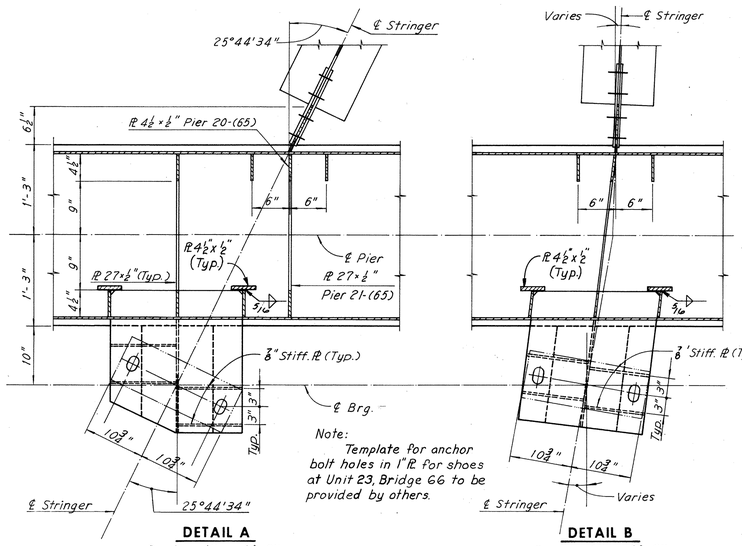
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	81	97



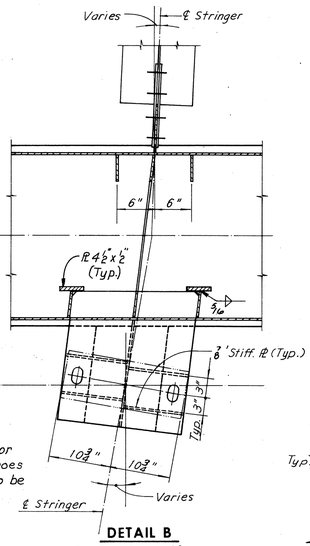
TYPICAL SECTION
Scale: ¾" = 1'-0"



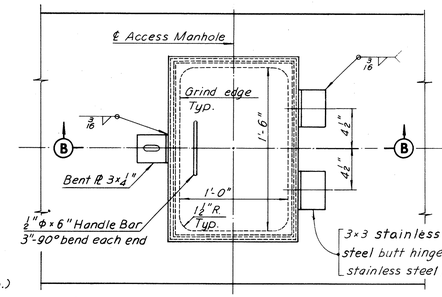
SECTION A-A
Scale: ¾" = 1'-0"



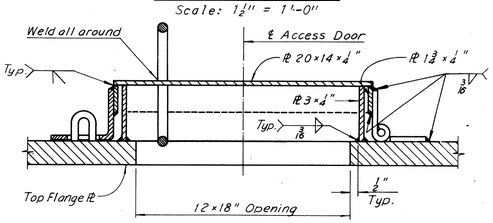
DETAIL A
Scale: 1" = 1'-0"



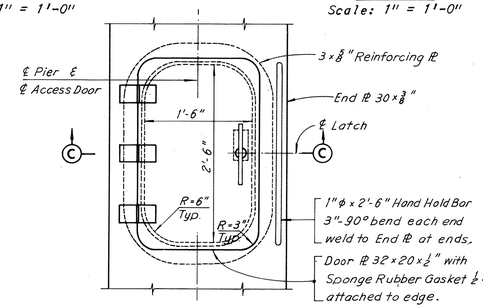
DETAIL B
Scale: 1" = 1'-0"



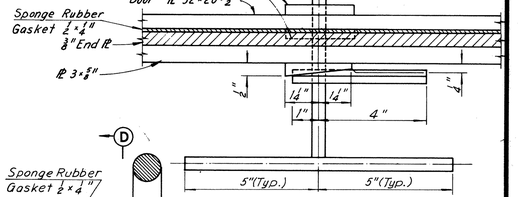
ACCESS DOOR - TYPE A
Scale: 1½" = 1'-0"



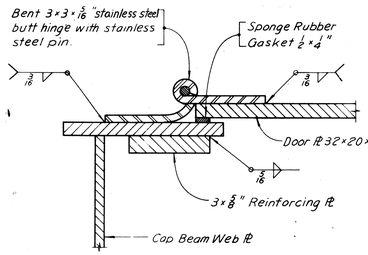
SECTION B-B
No Scale

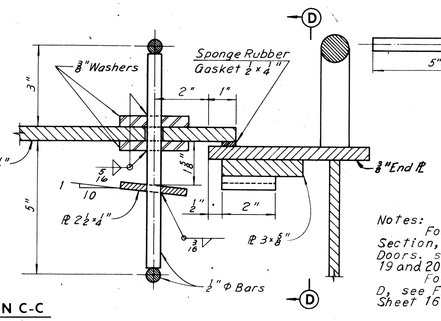


ACCESS DOOR - TYPE B
Scale: 1" = 1'-0"



SECTION D-D
No Scale





SECTION C-C
No Scale

Notes:
For location of Typical Section, Details A and B, and Access Doors, see Framing Details for Piers 19 and 20, Sheet 17.
For location of Details C and D, see Framing Plan Units 17 and 18, Sheet 16.

	BY	DATE				
MADE	MHH	1-31-69				
CHECKED	JD	5-2-69	1	Dim and weld size	TEM	9-30-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

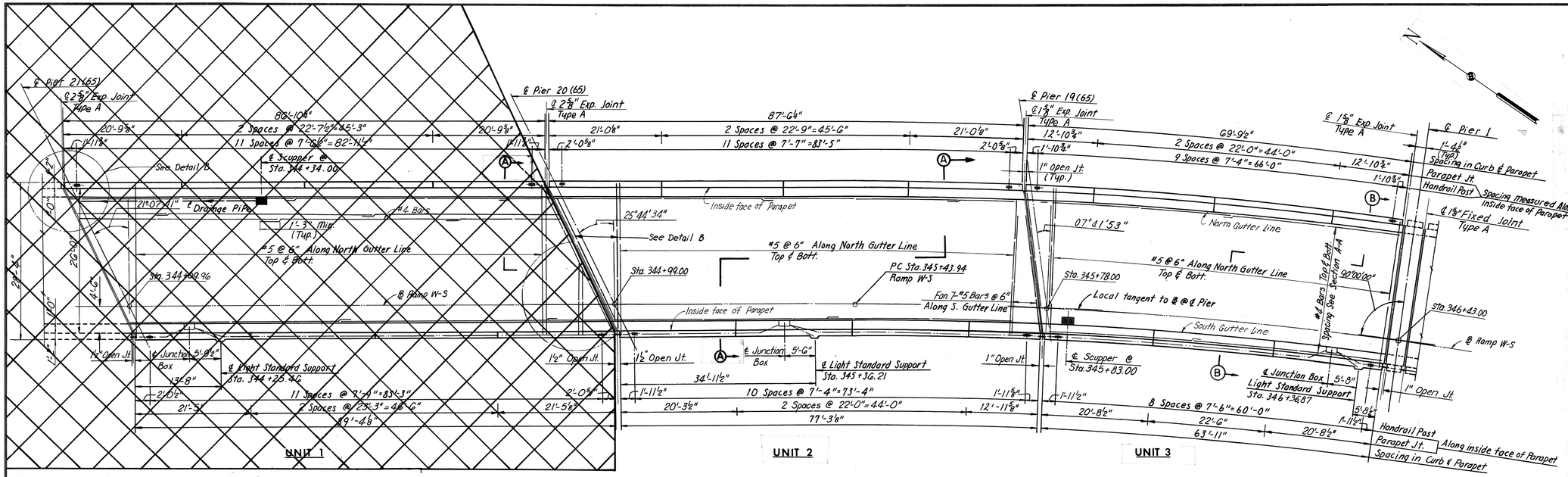
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 18 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	82	97



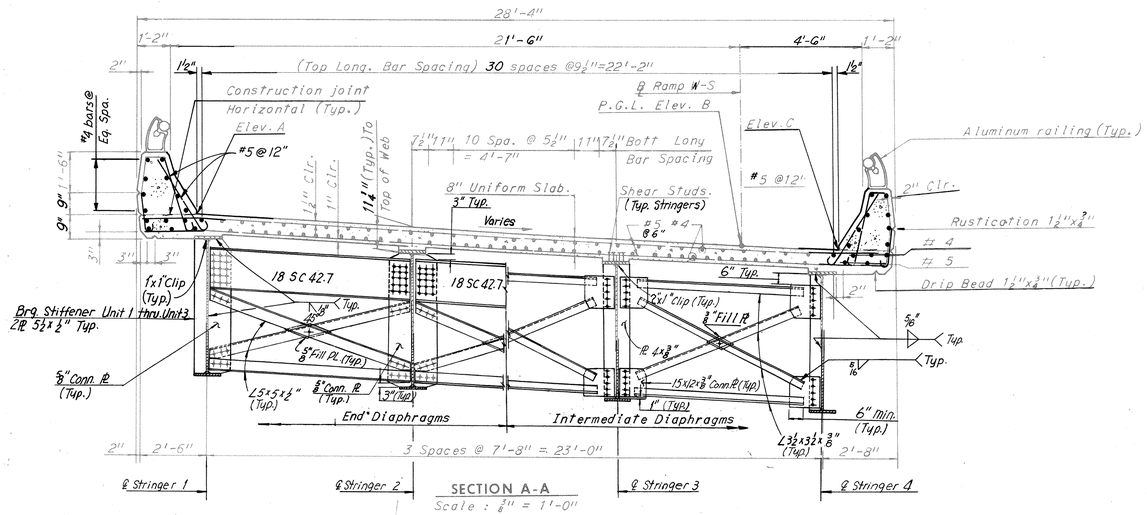
Note:
Pier 20(65) and Pier 19(65) denotes Piers 21, 20 and 19 of Bridge 65(Ramp S-W).

DECK PLAN
Scale: 1"=10'-0"

Note:
Section B-B, see Sheet 20.

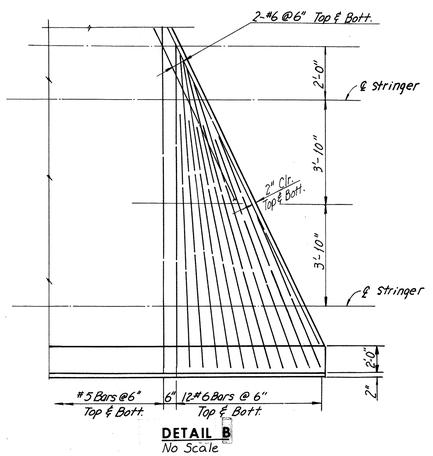
ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
344+00.57	94.89	------	------
344+00.00	94.89	95.16	95.21
+09.84	------	------	95.22
+09.96	------	95.18	------
+10.00	94.96	95.18	95.22
+20.00	95.02	95.18	95.21
+30.00	95.06	95.17	95.19
+40.00	95.08	95.13	95.14
+50.00	95.08	95.08	95.08
+60.00	95.10	95.02	95.01
+70.00	95.10	94.94	94.91
+80.00	95.10	94.85	94.81
+87.57	95.08	------	------
+90.00	95.08	94.75	94.69
+99.16	------	------	94.59
344+99.00	------	94.66	------
345+00.00	95.06	94.65	94.58
+10.00	95.03	94.54	94.46
+20.00	95.01	94.44	94.34
+30.00	94.99	94.33	94.22
+40.00	94.96	94.22	94.09
+50.00	94.92	94.10	93.96
+60.00	94.88	93.98	93.84
+70.00	94.84	93.86	93.69
+73.84	94.82	------	------
+77.08	------	------	93.58
+78.00	------	93.75	------
+80.00	94.79	93.72	93.54
345+90.00	94.74	93.59	93.39
346+00.00	94.67	93.44	93.23
+10.00	94.51	93.28	93.07
+20.00	94.35	93.12	92.91
+30.00	94.20	92.97	92.76
+40.00	94.05	92.82	92.61
+41.63	---	---	92.59
+41.66	94.02	---	---

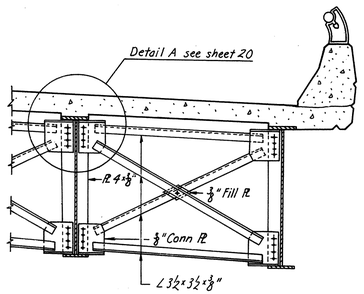


SECTION A-A
Scale: ⅜"=1'-0"

Note:
End Diaphragm for Unit 3, see Sheet 20.



DETAIL B
No Scale



SECTION A-A
Scale: ⅜"=1'-0"
(Intermediate Diaphragm near Pier 19 Unit 2 only)

Notes
For Framing Plan, see Sheet 12.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 2 Sheets S5 and S6.
For Joint Details, see Sheet 25.
For Standard Handrail Details, see Sheet S3.

AS BUILT

	BY	DATE				
MADE	G.S.H.	10-29-68	2	Elev. Table	T.E.M.	3-76
CHECKED	A.H.H	12-13-68	1	Rev. Elev. Table	SSS	12-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

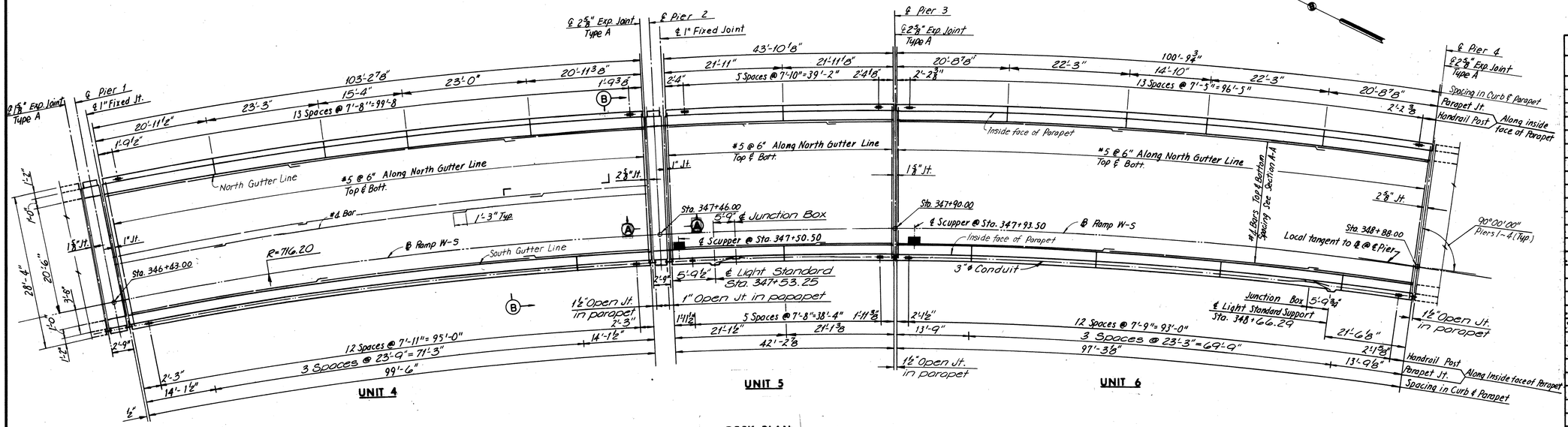
DECK PLAN — UNITS 1,2 AND 3

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 19 OF 28

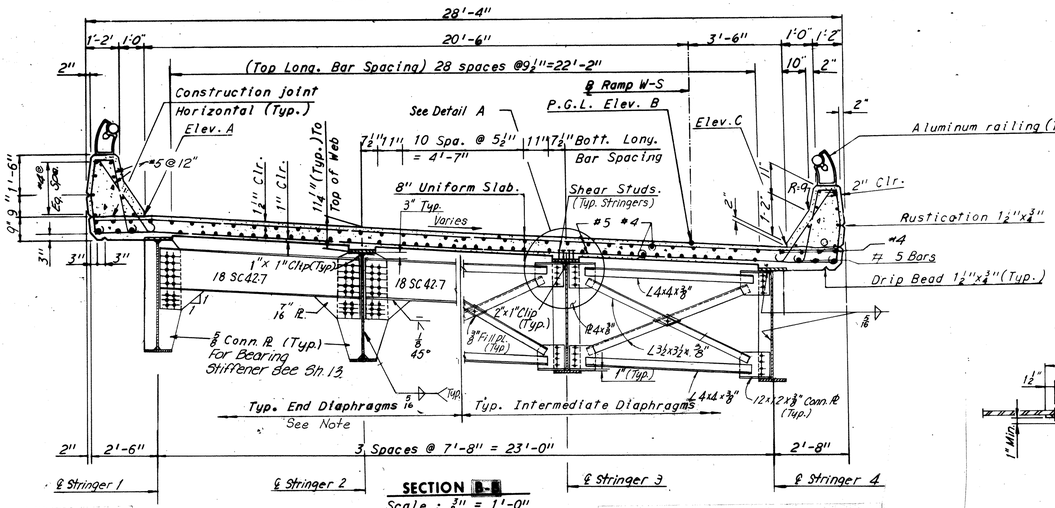
82

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	83	97



DECK PLAN
Scale : 1"=10'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
346+43.00	94.00	92.77	92.56
+50.00	93.88	92.65	92.44
+60.00	93.71	92.48	92.27
+70.00	93.32	92.29	92.08
+80.00	93.32	92.09	91.88
346+90.00	93.11	91.88	91.67
347+00.00	92.90	91.67	91.46
+10.00	92.67	91.44	91.23
+20.00	92.43	91.20	90.99
+30.00	92.18	90.95	90.74
+40.00	91.93	90.70	90.49
+44.62	---	---	90.37
+44.66	91.81	---	---
+46.00	91.78	90.55	90.34
+50.00	91.68	90.45	90.24
+60.00	91.42	90.19	89.98
+70.00	91.17	89.94	89.73
+80.00	90.92	89.69	89.48
347+90.00	90.67	89.44	89.23
348+00.00	90.42	89.19	88.98
+10.00	90.17	88.94	88.73
+20.00	89.92	88.69	88.48
+30.00	89.67	88.44	88.23
+40.00	89.42	88.19	87.98
+50.00	89.17	87.94	87.73
+60.00	88.92	87.69	87.48
+70.00	88.67	87.44	87.23
+80.00	88.42	87.19	86.98
348+88.00	88.23	87.00	86.79

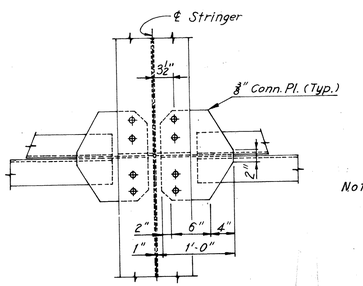


SECTION D-D
Scale : 3/8" = 1'-0"

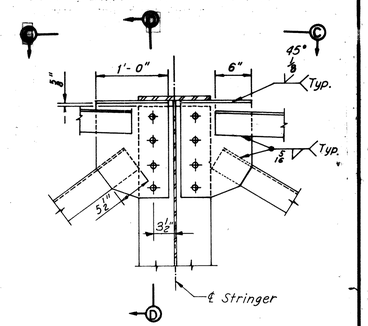
Note: End Diaphragm shown at Piers 3,4 and 5. Piers 1 and 2 similar. 7/16" R. not required at Piers 1 and 2.

SECTION D-D
No Scale

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



VIEW C-C
No Scale



DETAIL A
No Scale

Notes
For Framing Plan see Sheet 13.
For Joint Details see Sheet 25.
For Standard Lighting Details see Sheet S4.
For Standard Handrail Details see Sheet S3.
For Standard Drainage Details see Support Type 4 Sheets S5 & S6.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-31-68	2	Dim. in Det A and view C-C	TEM	8-76
CHECKED	AHH	12-13-68	1	Corrected Dimension	SSS	12-75
IN CHARGE						

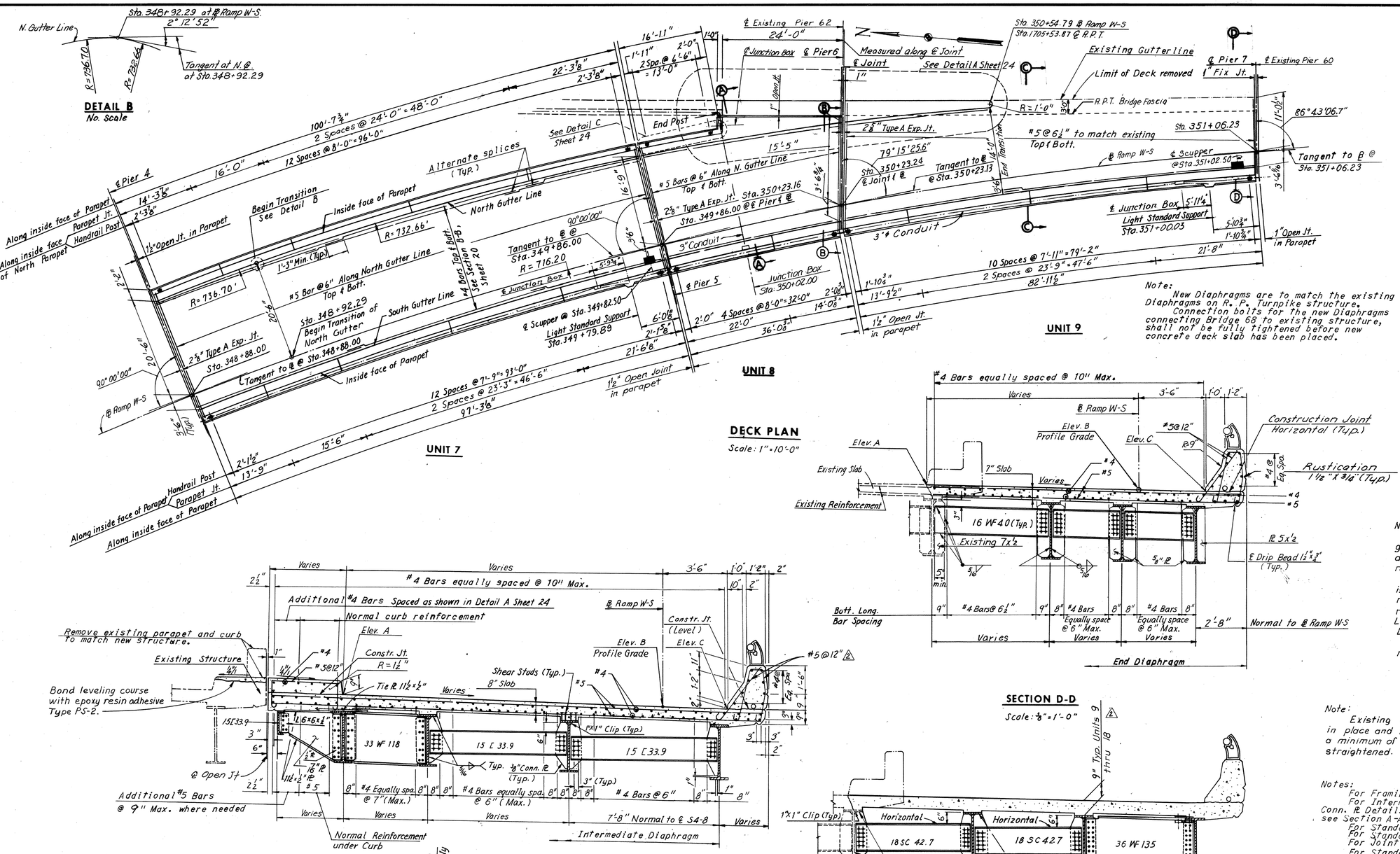
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

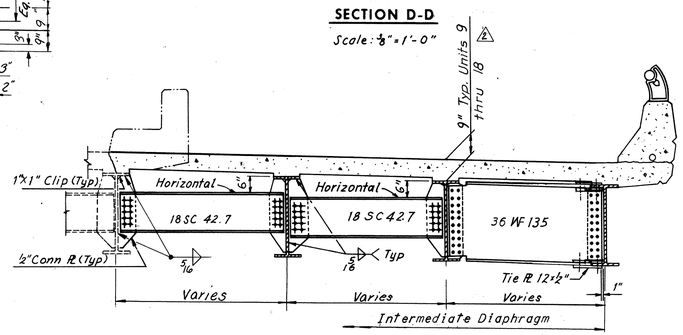
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
DECK PLAN — UNITS 4, 5 AND 6

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 20 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	84	97





ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
348+88.00	88.20	87.00	86.79
+90	88.18	86.95	86.74
349+00.00	87.94	86.73	86.52
+10	87.72	86.53	86.32
+20	87.50	86.34	86.13
+30	87.30	86.16	85.95
+40	87.12	86.01	85.80
+50	86.95	85.86	85.65
+60	86.72	85.74	85.54
+70	86.51	85.62	85.44
+80	86.32	85.53	85.36
+86	86.21	85.48	85.32
+90	86.15	85.44	85.30
350+00.00	85.99	85.38	85.25
+10	85.85	85.33	85.21
+20	85.74	85.29	84.19
+22.57	—	—	85.18
+23.24	—	85.28	—
+26.05	85.76	—	—
+30	85.72	85.26	85.15
+40	85.49	85.18	85.10
+50	85.32	85.05	84.94
+54.79	85.25	85.03	84.94
+60	85.17	84.88	84.81
+70	84.99	84.71	84.64
+80	84.85	84.60	84.52
+90	84.69	84.45	84.37
351+00.00	84.51	84.29	84.21
—	—	—	—
+06.23	84.40	84.31	84.29
—	—	—	—

Note A:
Elev. A between Sta. 348+88 and 350+54.79 is given along the East Gutter Line Ramp W-S and are radial to the Base Line Ramp W-S at the respective stations
Elev. A from Sta. 350+54.79 to the End of Bridge is given along existing Gutter Line R.P.T. and are radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp W-S. Cross Slope is radial to the Base Line R.P.T.
Elev. A is to be field verified. Minor adjustments may be required.

Note:
Existing No. 5 transverse steel top & bottom to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinf. shall be straightened.

Notes:
For Framing Plan Details see Sheet 14.
For Intermediate Diaphragm Details, Conn. ℞ Details and Reinforcement in Unit 7, see Section A-A of Sheet 20.
For Standard Handrail Details, see Sheet S3.
For Standard Lighting Details, see Sheet S4.
For Joint Details, see Sheet 25.
For Standard Drainage Details for Unit 7 see Support Type 3 and for Unit 9 see Support Type 5, both on Sheets S5 & S6.
End Diaphragms for Unit 7 @ pier 4 and-5 see Section A-A Sheet 20.

	BY	DATE
MADE	Y.C.P	11-8-68
CHECKED	D.E.S.	1-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Revised Elev. Table	TEM	8-26-75
1	End Diaph. Conn. at exist. String.	TEM	8-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

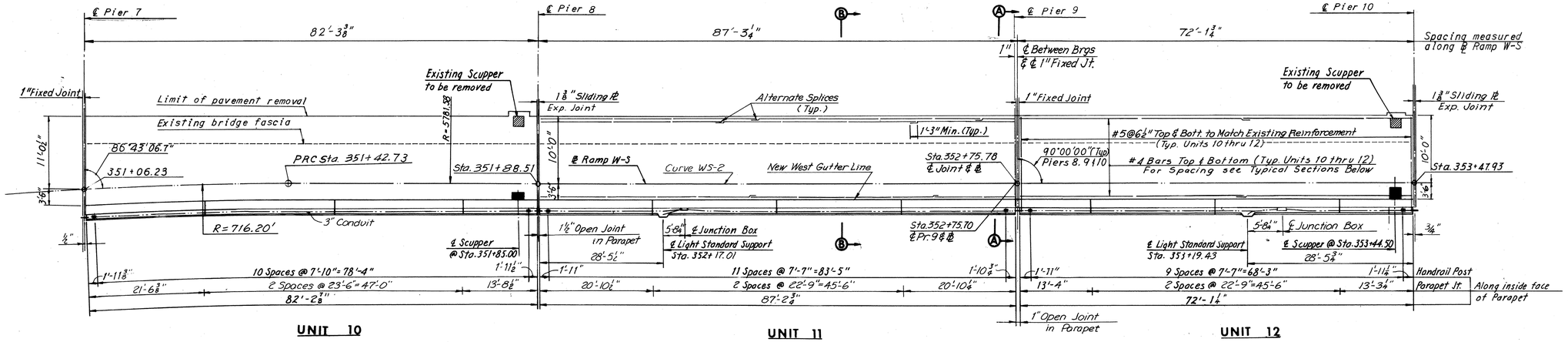
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN-UNITS 7, 8 AND 9

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

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 21 OF 28

84

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	85	97



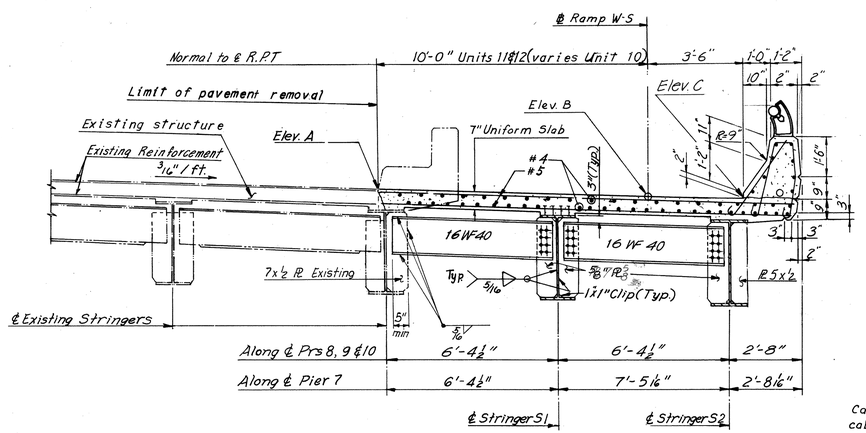
DECK PLAN

Scale: 1"=10'-0"

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.

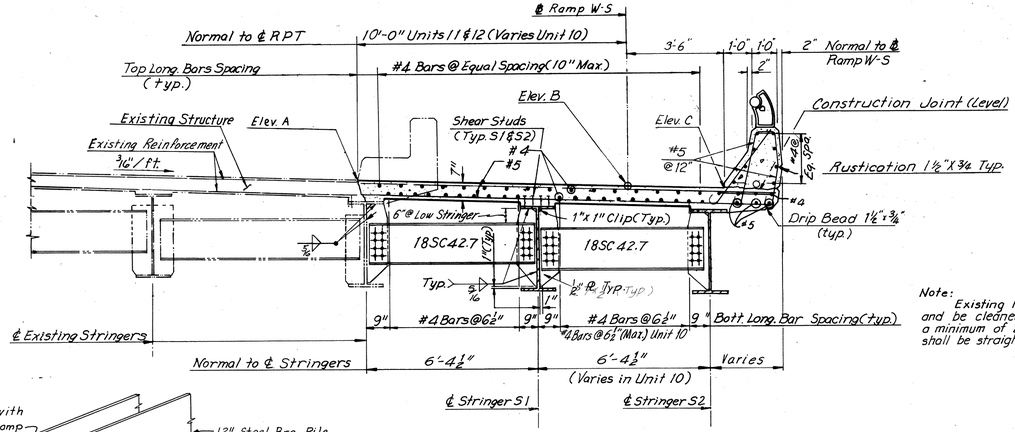
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
+06.23	84.52	84.34	84.29
+ 10	84.39	84.18	84.10
+ 20	84.23	84.02	8 . 94
+ 30	84.07	83.85	83.78
+ 40	83.90	83.70	83.62
+ 50	83.77	83.57	83.49
+ 60	83.56	83.36	83.28
+ 70	83.42	83.21	83.15
+ 80	83.26	83.05	82.99
+88.51	83.13	83.03	82.99
+ 90	83.12	83.01	82.98
352 + 00	82.94	82.85	82.82
+ 10	82.76	82.69	82.66
+ 20	82.60	82.53	82.50
+ 30	82.45	82.37	82.34
+ 40	82.29	82.21	82.19
+ 50	82.17	82.06	8203
+ 60	82.01	81.90	81.87
+ 70	81.85	81.74	81.71
+75.78	81.81	81.67	81.62
+ 80	81.73	81.60	81.55
+ 90	81.56	81.44	81.39
353 + 00	81.41	81.28	81.23
+ 10	81.25	81.12	81.08
+ 20	81.04	80.95	80.92
+ 30	80.93	80.80	80.76
+ 40	80.75	80.64	80.60
+47.93	80.65	80.52	80.48

Note:
See Note A Sheet 21 ... for ... ...



END DIAPHRAGM
TYPICAL SECTION A-A

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

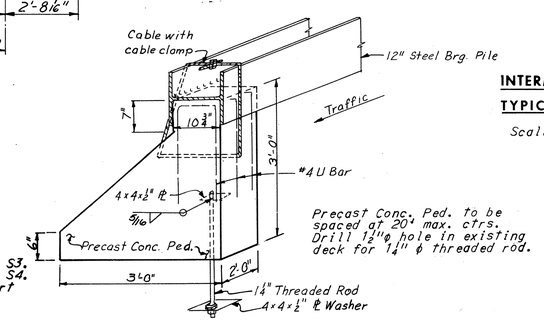


Note: Existing No. 5 transverse steel to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinf. shall be straightened.

INTERMEDIATE DIAPHRAGM
TYPICAL SECTION B-B

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

Notes
For Framing Plan Details see Sheet 15
For Joint Details see Sheet 25
For Quantities see Sheet 2.
For Standard Handrail Details, see Sheet S3.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 9 on Sheets S5 & S6.



Precast Conc. Ped. to be spaced at 20' max. ctrs. Drill 1 1/2" ϕ hole in existing deck for 1 1/4" ϕ threaded rod.

PROPOSED TEMPORARY FIXED TRAFFIC BARRICADE

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	12-3-68	1	Revised Elev. Table & Note Deleted	TEM	8-26-75
CHECKED	D.E.S.	1-15-69	2	End Diaph. Conn. at exist. String.	TEM	8-26-75
IN CHARGE						

AS BUILT

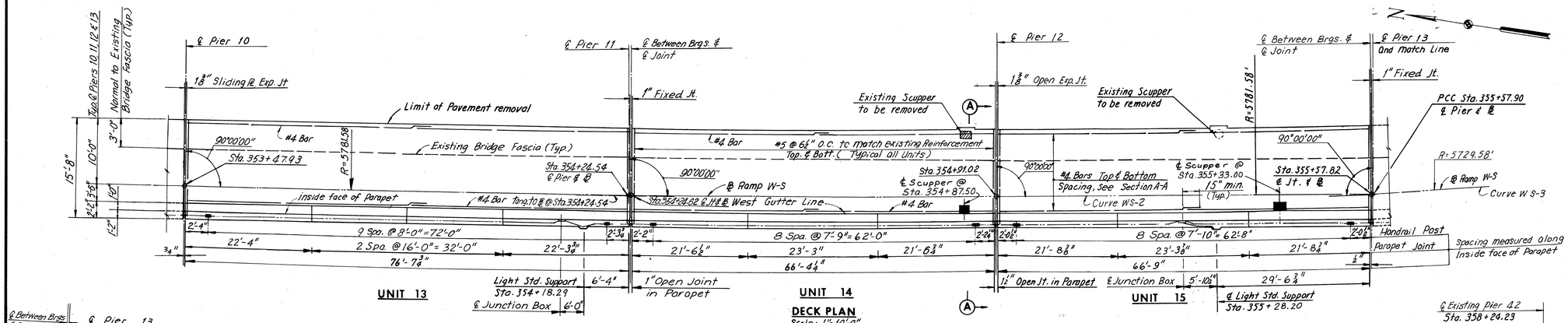
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

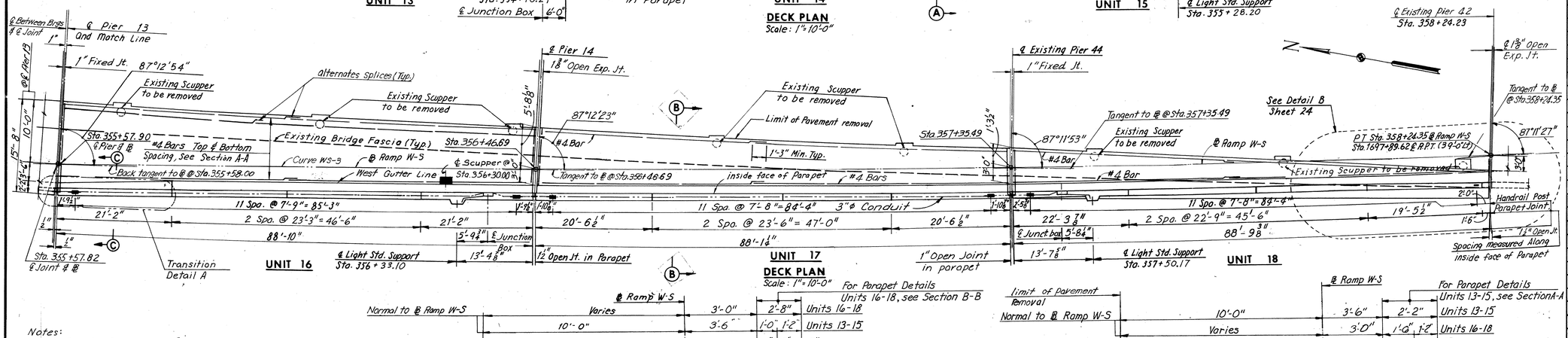
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN – UNITS 10, 11 AND 12

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

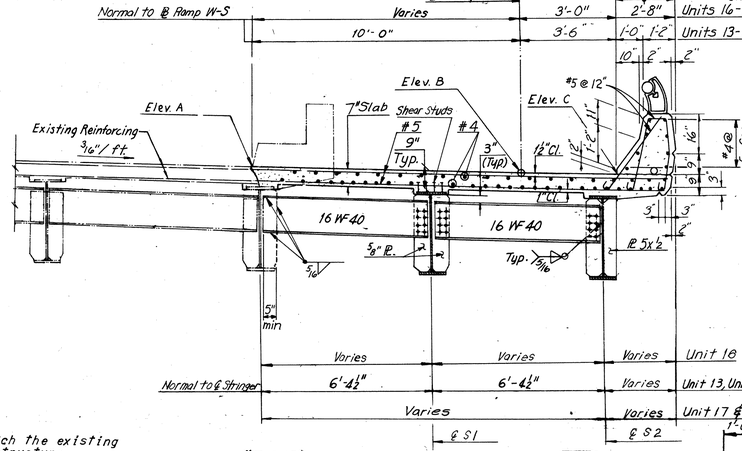
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 22 OF 28

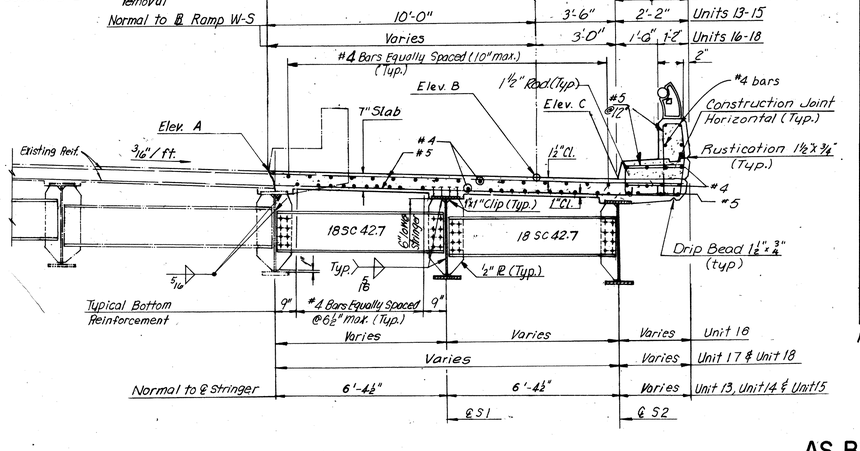
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	86	97





Notes:
For Framing Plan, see Sheet 16.
For Joint Details, see Sheet 25.
For Standard Handrail Details, see Sheet S3.
For Quantities, see Sheet 2.
Elevation A at Existing Gutter Line is to be confirmed by contractor.
For Standard Drainage Details see Support Type 6 Sheets S5 & S6.
For Standard Lighting Details, see Sheet S4.

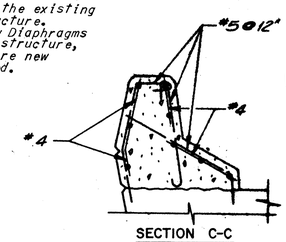




ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
353 + 47.93	80.65	80.52	80.48
+ 50	80.63	80.49	80.44
+ 60	80.43	80.32	80.28
+ 70	80.29	80.17	80.12
+ 80	80.11	80.00	79.97
+ 90	79.97	79.85	79.81
354 + 00.00	79.82	79.69	79.65
+ 10	79.64	79.53	79.49
+ 20	79.48	79.37	79.33
+ 24.62	79.43	79.30	79.26
+ 30	79.33	79.22	79.17
+ 40	79.18	79.06	79.01
+ 50	79.00	78.89	78.86
+ 60	78.85	78.74	78.70
+ 70	78.69	78.58	78.54
+ 80	78.51	78.41	78.38
+ 90	78.35	78.25	78.22
+ 91.02	78.34	78.24	78.21
355 + 00.00	78.18	78.09	78.06
+ 10	78.06	77.95	77.90
+ 20	77.85	77.77	77.75
+ 30	77.67	77.61	77.59
+ 40	77.54	77.46	77.43
+ 50	77.36	77.29	77.27
+ 57.82	77.27	77.17	77.15
+ 60	77.22	77.14	77.11
+ 70	77.03	76.98	76.96
+ 80	76.85	76.82	76.81
+ 90	76.66	76.66	76.66
356 + 00.00	76.50	76.51	76.51
+ 10	76.34	76.35	76.36
+ 20	76.17	76.20	76.21
+ 30	76.03	76.05	76.06
+ 40	75.87	75.90	75.91
+ 46.69	75.80	75.80	75.81
+ 50	75.71	75.74	75.76
+ 60	75.73	75.66	75.60
+ 70	75.35	75.40	75.45
+ 80	75.24	75.27	75.30
+ 90	75.11	75.13	75.15
357 + 00.00	74.94	74.96	75.00
+ 10	74.78	74.81	74.85
+ 20	74.65	74.67	74.70
+ 30	74.52	74.53	74.55
+ 35.49	74.44	74.45	74.47
+ 40	74.35	74.36	74.40
+ 50	74.17	74.18	74.25
+ 60	74.01	74.01	74.10
+ 70	—	74.00	73.94
+ 80	—	73.85	73.79
+ 90	—	73.70	73.64
358 + 00.00	—	73.55	73.49
+ 10	—	73.39	73.33
+ 20	—	73.24	73.19
+ 24.24	—	73.18	73.13

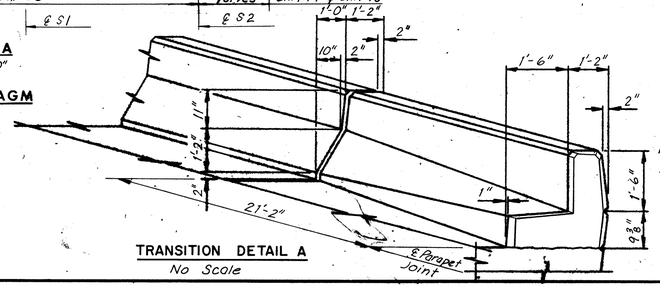
Note:
See Note A Sheet 21.

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure.
Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.



SECTION C-C
No Scale

SECTION A-A
Scale: ⅜"=1'-0"
END DIAPHRAGM



TRANSITION DETAIL A
No Scale

SECTION B-B
Scale: ⅜"=1'-0"
INTERMEDIATE DIAPHRAGM

Note:
Cross Slope in Units 16, 17 and 18 should be normal to ℄ R.P.T.

	BY	DATE
MADE	GSH	11-12-68
CHECKED	D.E.S.	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Revised Elev. Table	TEM	8-26-75
1	End Diaph. Conn. at exist. String.	TEM	8-26-75

AS BUILT

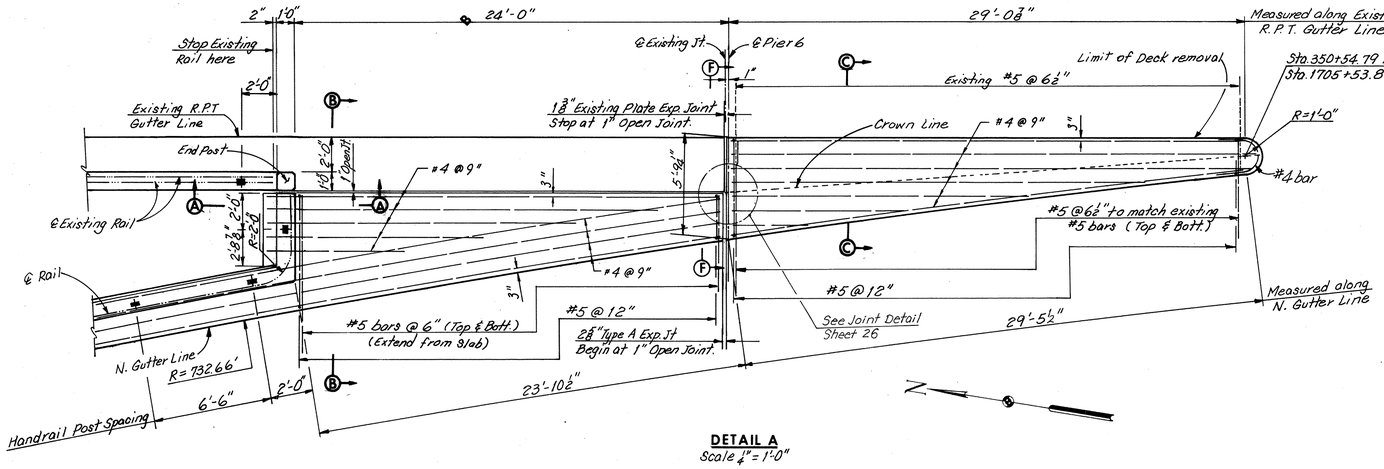
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
DECK PLAN — UNITS 13 THRU. 18

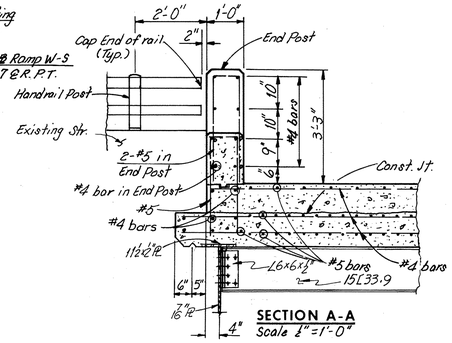
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 23 OF 28

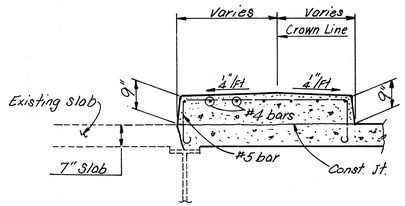
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	87	97



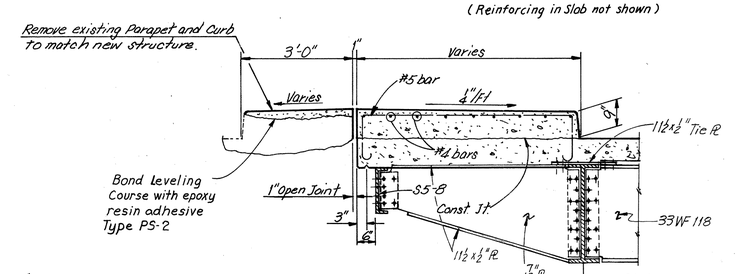
DETAIL A
Scale ¼"= 1'-0"



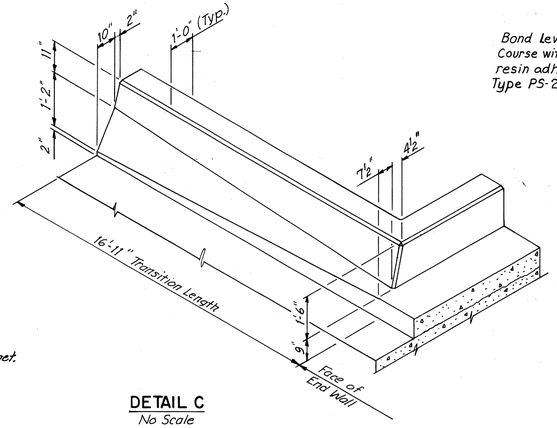
SECTION A-A
Scale ½"=1'-0"



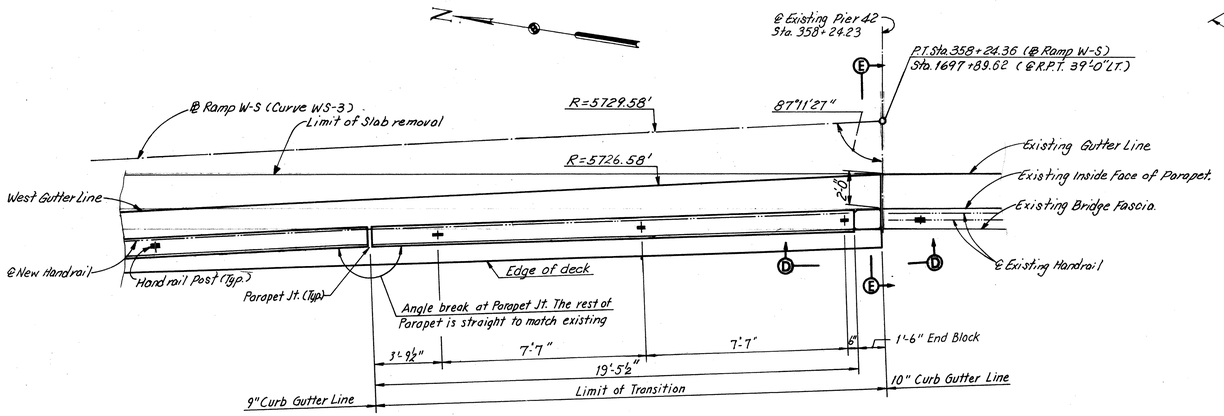
SECTION C-C
Scale ½"=1'-0"
(Reinforcing in Slab not shown)



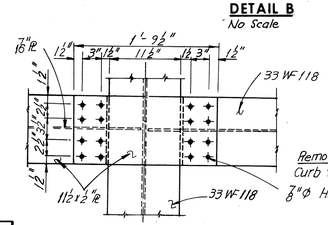
SECTION B-B
Scale ½"= 1'-0"
(Reinforcing in Slab not shown)



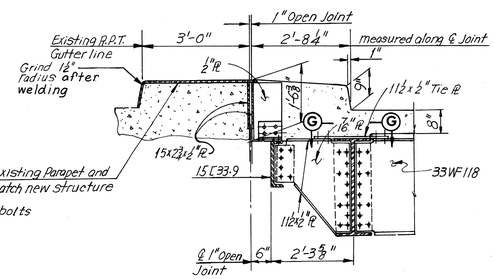
DETAIL C
No Scale



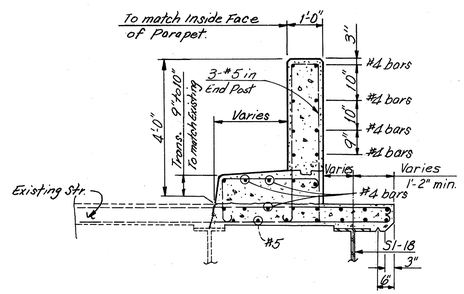
DETAIL B
No Scale



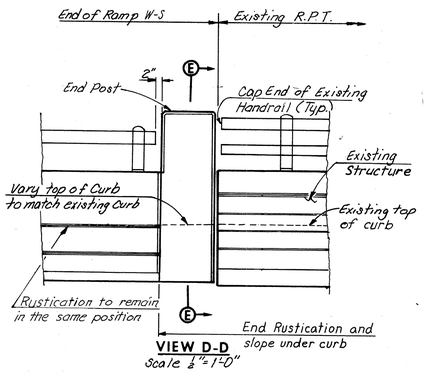
SECTION G-G
Scale : 1"= 1'-0"



SECTION F-F
Scale : ½"= 1'-0"



SECTION E-E
Scale ½"= 1'-0"



VIEW D-D
Scale ½"=1'-0"

Notes:
For location of Details A and C, see Sheet 21.
For location of Detail B, see Sheet 23.

AS BUILT

	BY	DATE
MADE	G.C.C.	1-29-69
CHECKED	Y.C.P	2-3-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Det. A & Sect. A-A	TEM	4-76
1	Section E-E	TEM	8-26-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

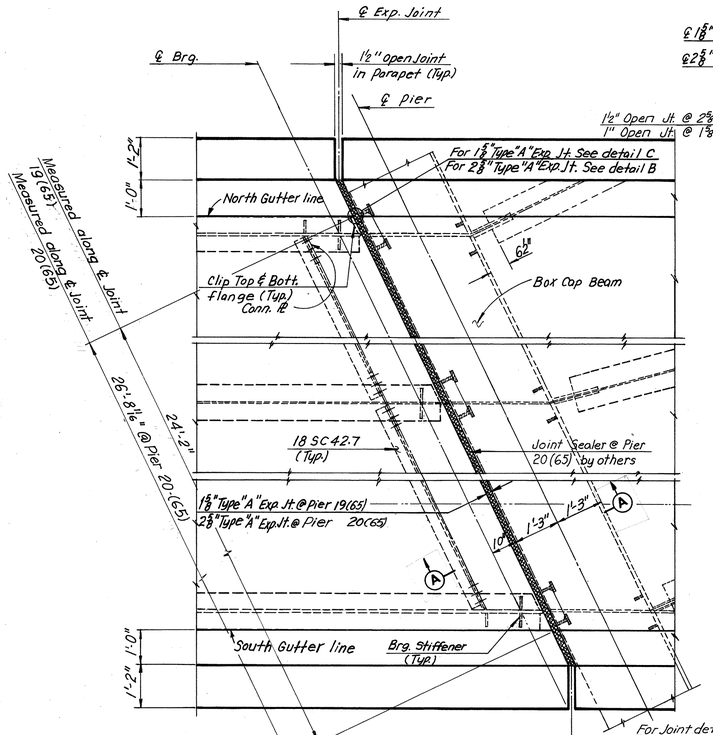
SUPERSTRUCTURE DETAILS

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

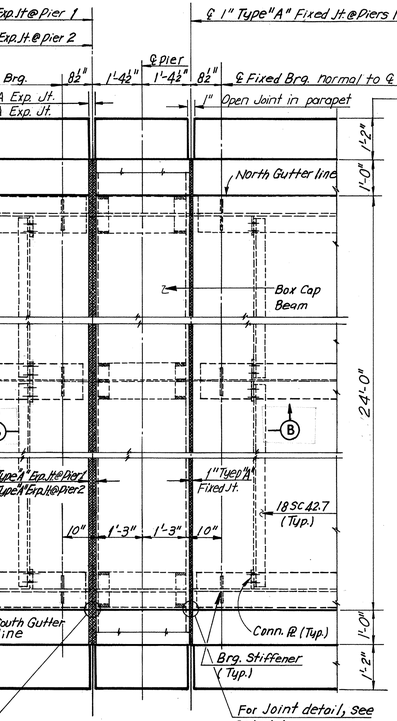
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 24 OF 28

87

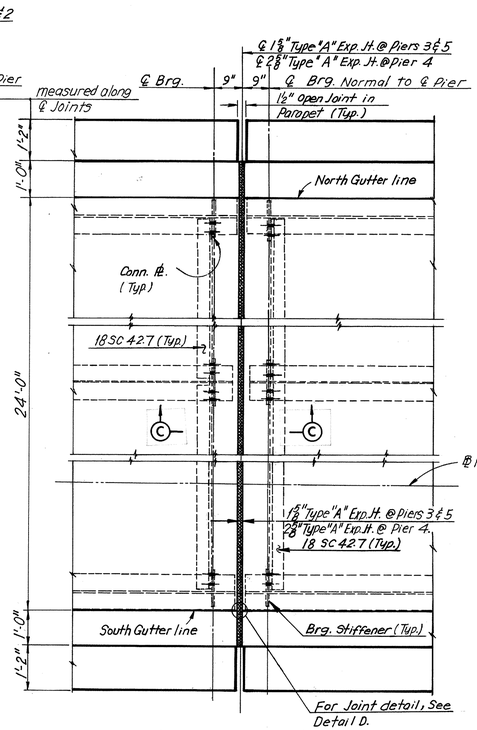
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	88	97



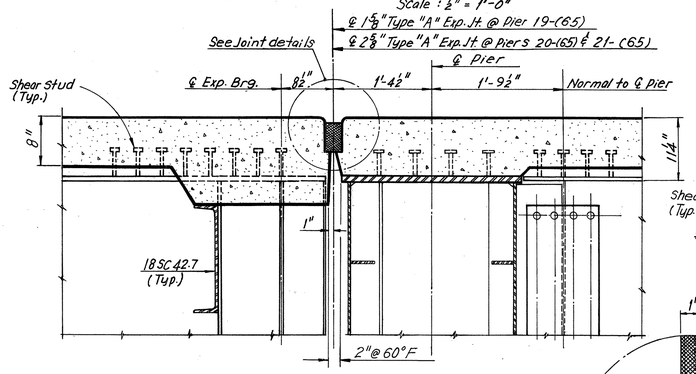
PLAN - JOINT AT PIERS 19 (65) AND 20(65)
Scale : ½" = 1'-0"



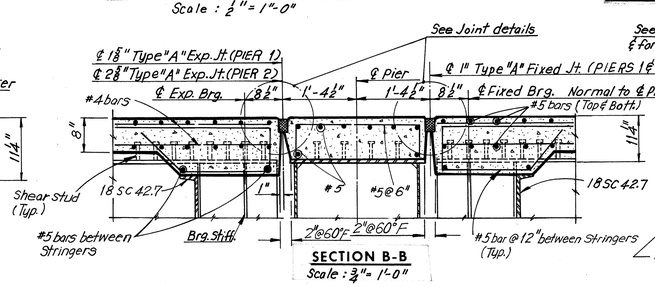
PLAN - JOINT AT PIERS 1 AND 2
Scale : ½" = 1'-0"



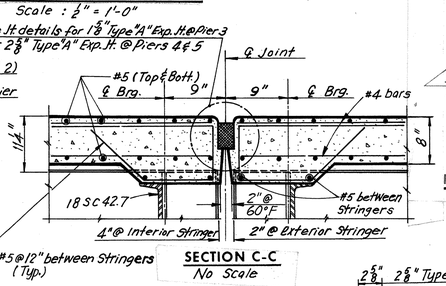
PLAN - JOINT AT PIERS 3,4 AND 5
Scale : ½" = 1'-0"



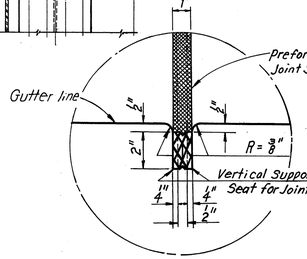
SECTION A-A
Scale : 1" = 1'-0"



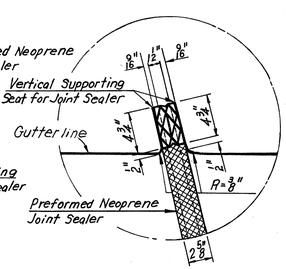
SECTION B-B
Scale : ¾" = 1'-0"



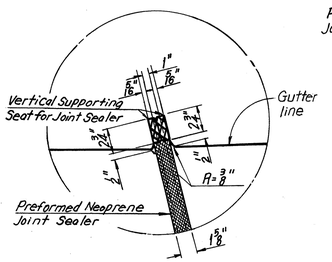
SECTION C-C
No Scale



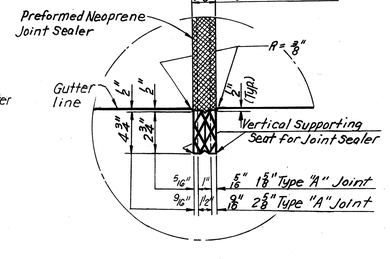
DETAIL A
Scale : 3" = 1'-0"



DETAIL B
Scale : 1½" = 1'-0"



DETAIL C
Scale : 1½" = 1'-0"

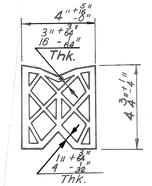


DETAIL D
No Scale

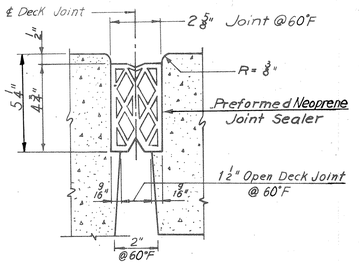
Note:
Reinforcings of Section A-A are similar to Section B-B.

Note:
Horizontal dimensions as shown in the cross sections are normal to ℄ Joint.

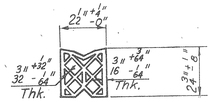
	BY	DATE				
MADE	G.S.H.	9-26-69				
CHECKED	V.C.P.	10-1-69	1	Diaph conn. ℙ @ Piers 3,4 & 5	T.E.M.	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE



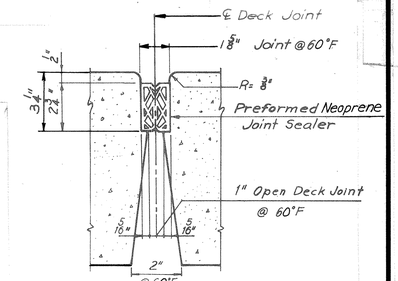
PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT



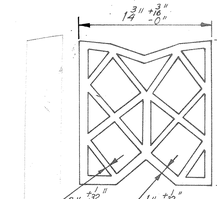
2⅝" TYPE "A" JOINT



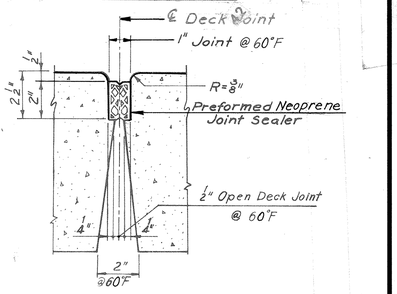
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" JOINT



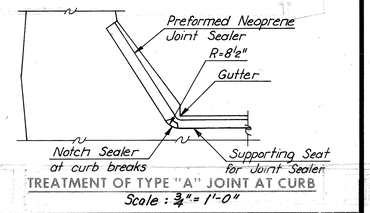
1⅝" TYPE "A" JOINT



PREFORMED NEOPRENE JOINT SEALER FOR 1" TYPE "A" JOINT



1" TYPE "A" JOINT



TREATMENT OF TYPE "A" JOINT AT CURB
Scale : ¾" = 1'-0"

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

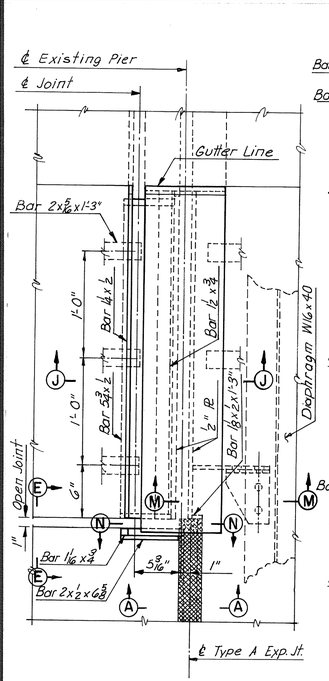
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 25 OF 28

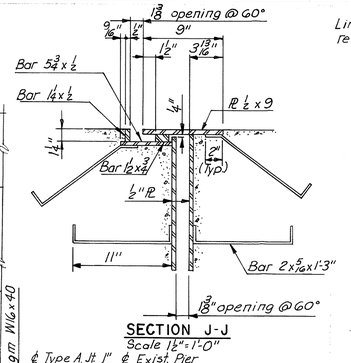
AS BUILT

88

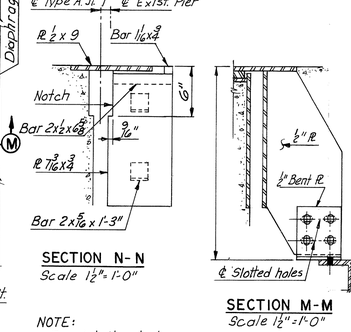
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	89	97



PLAN-JOINT AT PIER 6
Scale 1½"=1'-0"



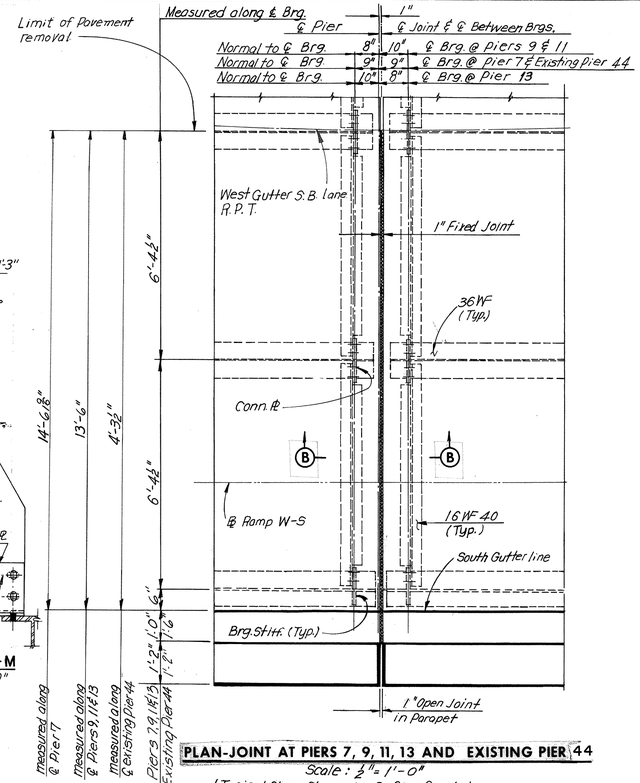
SECTION J-J
Scale 1½"=1'-0"



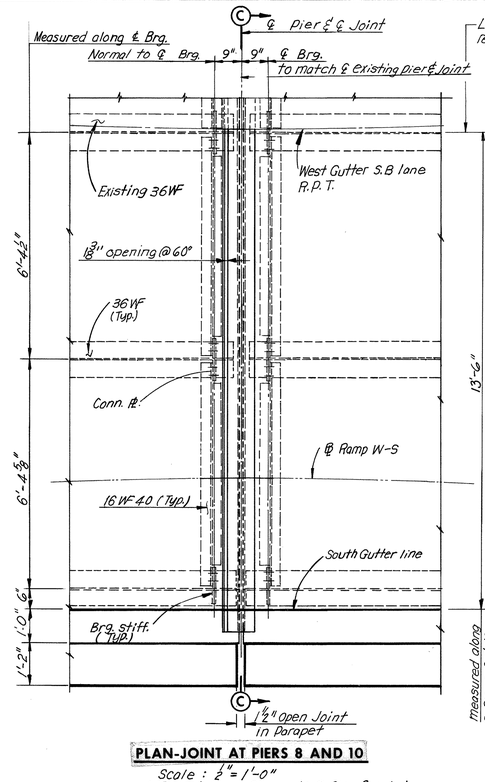
SECTION N-N
Scale 1½"=1'-0"

NOTE:
For detail not shown
see Section F-F.

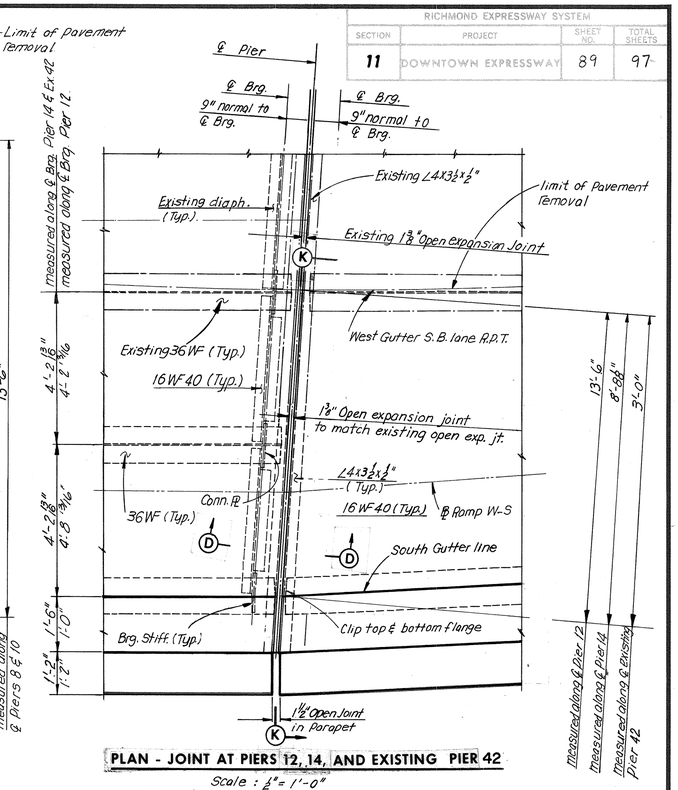
SECTION M-M
Scale 1½"=1'-0"



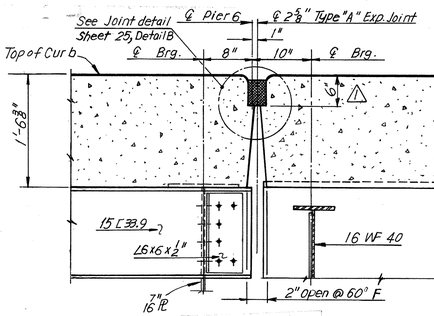
PLAN-JOINT AT PIERS 7, 9, 11, 13 AND EXISTING PIER 44
Scale : ½"= 1'-0"
(Typical Plan Shown is @ Pier 9 only)



PLAN-JOINT AT PIERS 8 AND 10
Scale : ½"=1'-0"
(Typical Plan Shown is @ Pier 8 only)

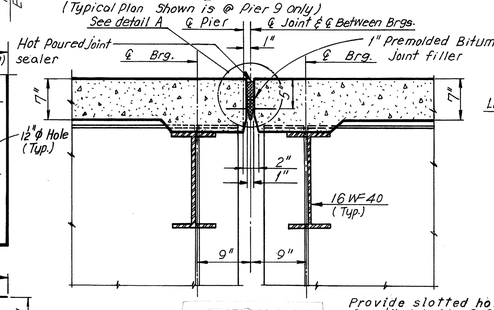


PLAN - JOINT AT PIERS 12, 14, AND EXISTING PIER 42
Scale : ½"= 1'-0"
(Typical Plan Shown is @ Pier 14 only)



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

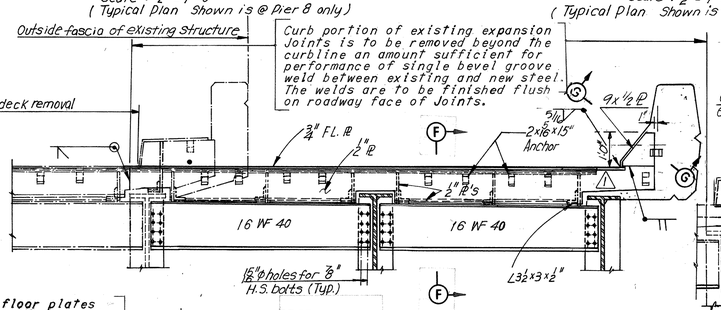
DETAIL A
Scale: 3" = 1'-0"



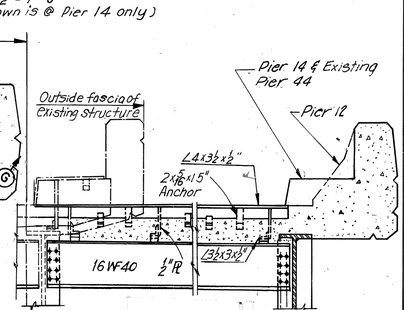
SECTION B-B
Scale : 1" = 1'-0"

JOINT BETWEEN FIXED BEARINGS

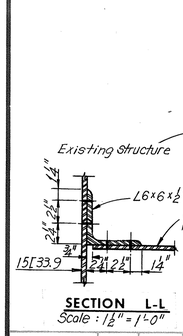
Provide slotted holes in floor plates for ¾" ø bolts @ 2'-0" a.c. for erection. Fill holes with hot poured joint sealer after bolts are removed.



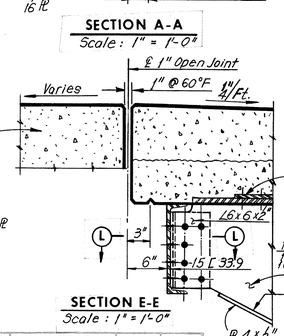
SECTION C-C
Scale : ½"= 1'-0"



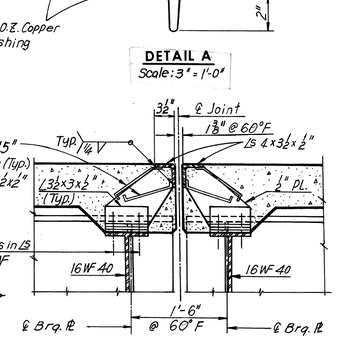
SECTION K-K
Scale : ½"= 1'-0"



SECTION L-L
Scale : ½"= 1'-0"

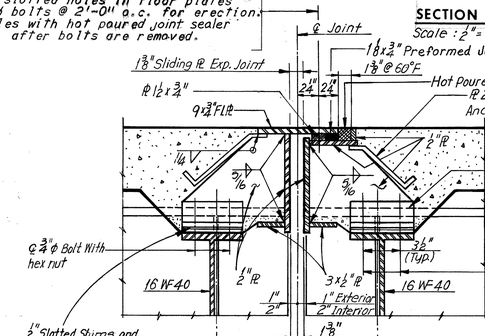


SECTION E-E
Scale : 1" = 1'-0"



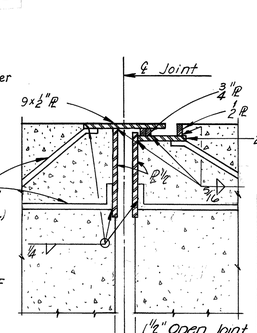
SECTION D-D
Scale : 1" = 1'-0"

Note:
Reinforcing of all Sections are not Shown.



SECTION F-F
Scale : ½"=1'-0"

Note:
All fillet welds are ¼" unless otherwise shown.



SECTION G-G
Scale : ½"= 1'-0"

Note:
Horizontal dimensions as shown in the Cross sections are normal to ℄ joint.

Note:
Joints for piers 7 through 14 and existing piers 42 ℄ 44 have to match existing joints.

	BY	DATE				
MADE	G.S.H.	10-10-69				
CHECKED	V.C.P.	10-17-69	1	Joint Details @ Piers 6, 8 & 10	T.E.M.	12-8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

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

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 26 OF 28

89

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	90	97

BORING DS68-1

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
26.1	7	9	9	S-1	0'-2'	26.1	
	9	7	7				
	11						
	13						
21.1'	8	7	7	S-2	4'-6'		Brown C-f Sand Little C-f Gravel
	6	5	7				Trace Roots, Brick and Cinders
	9						(FILL)
	16						
	18						
16.1'	5	11	10	S-3	9-11		
	9	7	7				
	11					14.1'	
	7						Gray Clayey Silt, Trace F
	10						Sand Trace Wood, Brick and Cinders
11.1	3	1	1	S-4	11'-15.5'	11.1	(FILL)
	4	1	100				
	109						
	31						
	6						
6.1	18	1	3	S-5	19-21		Brown C-f Sand, Little Clayey
	11	3	4				Silt, Little C-f Gravel, Trace
	18						Brick and Cinders (FILL)
	17						
	8						
1.1	12	2	2	S-6	24-26		
	13	2	15				
	15					-0.9	
	70						
	90						Brown C-f Sand, and C-f
-3.9	OPEN	12	11	S-7	29-31		Gravel Trace Silt, Brick and Cinders
		14	10				(FILL)
						-7.4	
	25Min			C-1	33.5'-		
-8.9	25Min				38.5'		(C-1: 90% Rec.)
	25Min						
	25Min						Gray Hard Granite
	12Min						

Bottom of Hole Elev. -12.4'

BORING DS68-2

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
23.0	10	10	12	S-1	0-2	23.0	
	11	29	12				
	9						
	10						
18.0	5	4	3	S-2	4-6		
	10	3	7				
	11						
	39						Brown C-f Sand, Little Bricks,
	12						Trace C-f Gravel, Trace Silt,
13.0	12	5	5	S-3	9-11		Trace Cinders (FILL)
	6	4	4				
	10						
	5						
▼ 8.0	4						
(1)	9	3	2	S-4	14-16		
	6	2	2				
	6						
	4					5.0	
	7						
3.0	9	1	1	S-5	19-21		Gray Clayey Silt, Trace F
	18	2	1				Sand, Trace Wood, Cinders and Brick
	20						(FILL)
	30					0.0	
	25						
-2.0	30	15	7	S-6	24-26		
	28	13	14				Brown C-f Sand Some M-f
	24						Gravel, Little Silt, Trace Brick and
	24						Cinders (FILL)
	30						
-7.0	21	100		S-7	29-29.4		No Rec.
	6Min			C-1	30.8-	7.8	
	3Min				35.8		(C-1: 88% Rec.)
	4Min						
	3Min						
-12.0	2Min						
	4Min			C-2	35.8-		(C-2: 3% Rec.)
	3Min				40.8		
	3Min						
	2Min						Hard Gray Granite
-17.0	2Min						
	3Min			C-3	40.8-		(C-3: 75% Rec.)
	4Min				45.8		
	3Min						
	3Min						
-22.0	6Min						

Bottom of Hole Elev. -22.8'

BORING DS68-3

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
19'	8		8	S-1	.5-2.5	19.0'	.5' Cobblestone
	14	12	16				
	21	20					
	36						Brown Black C-f Sand, Some Cinders
14'	41	15	20	S-2	4'-6'		And Brick
	18	18	16				(FILL)
	12						
	14					11.0'	
	11						
9'	9	2	2	S-3	9'-11'		TSF.75
	10	3	3				
	8						
	7						Gray Silt and Clay, Trace F
	8						Sand
4'	10	3	3	S-4	14'-16'		
	12	4	4				
	18						
	22						
	27					0.0'	
▼ (0) 1'	31	10	12	S-5	19'-21'		No Rec.
	29	11	9				
	20	9	11	S-6	21'-23'		
	30	14	17				
	19						Dark Gray C-f Sand, Some M-f
-6'	17						Gravel, Little Clayey Silt
	12						
	29	2	2	S-7	26'-28'		
	33	3	2				
	40					19.0'	
-11'	OPEN	100		S-8	29-29.2	-11.7'	Decomposed to Wash. No Rec.
				C-1	30.7'-		Hard Gray Granite
	4Min				35.7'		(C-1: 95% Rec.)
	4Min						
	4Min						
	5Min						
-16'	5Min						
	9Min						

Bottom of Hole Elev. -16.7'

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ø).
(c) Samples designated by a "C" number indicate 1⅞" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BORING LOGS

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

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

SCALE: 1"= 6' Vert.
CONTRACT NO.: 11
SHEET NO. 27 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	91	97

BORING DS68-4

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
22.7	2	15	20	S-1	0-2	22.7	
	10	38	46			20.7	Asphalt, Trace Wood and Cinders
	14					20.2	Cobblestone
	30					19.7	
17.7	60						
	70						
	9						
	8						
	11						
12.7	9	2	3	S-2	9-11		(No Rec.)
	9	3	5				
	13						
	9						
	17						
7.7	29	P	P	S-3	14-16		(No Rec.)
	16	P	P				
	12	5	5	S-4	16-18		Red Brick Little M-F Sand,
	11	4	5				Trace Silt, Trace Cinders (FILL)
	28						
2.7	27						
	18	2	8	S-5	20-22		
	17	10	10				
(0)	26						
	35						
-2.3	21	10	11	S-6	24-26		(No Rec.)
	19	9	12			-3.3	
	16	14	7	S-7	26-28		
	33	6	8				
	33						Brown C-F Sand, Some C-F
-7.3	30						Gravel, Trace Silt, Trace Brick
	29	11	15	S-8	30-32		And Cinders (FILL)
	92	15	67				
	OPEN						
-12.3	▼	100		S-9	34-34.2	-12.3	(No. Rec.)
	2Min			C-1	35-40		(C-1: 77% Rec.)
	3Min						
	3Min						Gray Hard Granite
-17.3	4Min						
	4Min			C-2	40-45		(C-2: 77% Rec.)
	3Min						
	3Min						
	4Min						
-22.3	4Min						

Bottom of Hole Elev. -22.3'

BORING DS68-5

Elev.	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev.	Materials & Remarks
20.2'	5	12	10	S-1	0'-2'	20.2	
	8	9	6				
	7						
	6						
15.2	5	2	2	S-2	4'-6'		
	4	4	4				
	6						
	7						
	8						
10.2	2	1	1	S-3	9'-11'		
	3	1	1				
	3						
	2						
	4						
5.2	10	6	8	S-4	14'-16'		
	18	9	11				Brown Black C-F Sand, Some
	37						Cinders and Brick, Trace Silt
	20						(FILL)
	25						
(0) 2'	6	6	6	S-5	19'-21'		
	10	7	6				
	18						
	30						
	22						
-4.8	11	4	4	S-6	24-26		
	18	6	9				
	20						
	21						
	23						
-9.8'	26	8	12	S-7	29'-31'		
	30	13	11				
	47						
	150						
	300	100		S-8	33-33.5		(No Rec.)
-14.8	OPEN					-14.8	
	1Min			C-1	35'-40'		Gray Hard Granite
	6Min						(C-1: 85% Rec.)
	6Min						
	5Min						
-19.8	6Min						

Bottom of Hole Ele. -19.8'

BORING DS65-1

Elev. 21'	Casing Blows/Ft	Spoon Blows Per 6"		Sample No.	Sample Depth	Strata Elev. 21'	Materials & Remarks
	3		8	S-1	5'-2.5'		.5 Cobblestone
	5	12	16				
	9	26					Brown M-F Sand, Some Wood, Little Silt
	20						Trace M-F Gravel (FILL)
16	27	12	18	S-2	4'-6'		
	31	21	22				
	8					16.0	
	10						
	11						Black Organic Clayey Silt, Little
11	12	1	2	S-3	9'-11'		M-F Sand, Trace Granite, Cinders
	14	3	10				(FILL)
	16						
	21						
	24						
6	8	11	W	S-4	14-16		
	8	7	8				
	9						
(0)	12						
	16						
1	24	20	18	S-5	19-21		
	11	17	12				
	14						
	14						Brown C-F Sand, Some Silt, Trace
	21						C-F Gravel
-4	35						
-5	25	18	21	S-6	25-27		
	23	17	14				
	19	10	10	S-7	27-29		
	20	14	14				
-9	21						
	8						
	12						
	20						
	100/ 5			C-1	33.5-	-12.5	(C-1: 50% Rec)
-14	1.5Min				38.5'		
	1.0Min						
	1.4Min						
	1.6Min						Gray Hard Granite
	1.6Min			C-2	38.5'-		
-19	22Min				43.5'		(C-2: 75% Rec.)
	1.8Min						
	1.6Min						
	1.6Min						
	24Min						
-24							

Bottom of Hole Elev. -22.5

GENERAL NOTES

(1) The first elevation noted is the existing ground surface.

(2) ▼ (00) denotes the ground water level as measured. (Hours after drilling).

(3) (a) Casing Blows are the blows per foot for a 300 pound hammer falling 24 inches except where noted otherwise.
(b) Also noted in Casing Blows column (where applicable) are rock drilling times in minutes per foot.

(4) (a) Spoon Blows are the blows per 6 inches for a 2" OD, 1⅜" ID Split Spoon Sampler using a 140 pound hammer falling 30 inches.
(b) W denotes penetration under weight of hammer.
(c) P denotes penetration by hydraulic pressure.

(5) (a) Samples designated by an "S" number indicate Split Spoon Samples.
(b) Samples designated by a "U" number indicate Undisturbed Shelby Tube Samples (3⅜" ø).
(c) Samples designated by a "C" number indicate 1⅝" ø(AX) Rock Cores.

(6) Sample descriptions are based on field visual identification by the boring inspector.

(7) Abbreviation and quantitative terms:

c-coarse	trace	1-10%
m-medium	little	10-20%
f-fine	some	20-35%
	and	35-50%

	BY	DATE	NO.	REVISION	BY	DATE
MADE						
CHECKED						
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

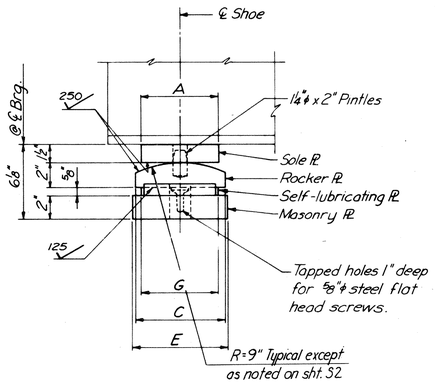
BORING LOGS

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

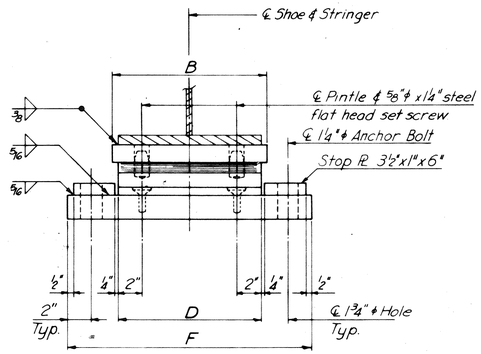
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"= 6' Vert.
CONTRACT NO.: 11
SHEET NO. 28 OF 28

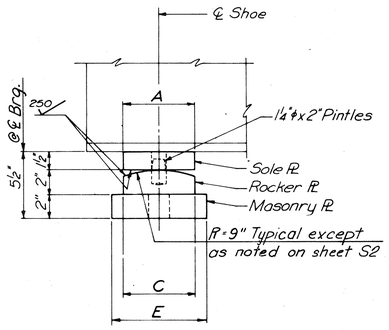
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	92	97



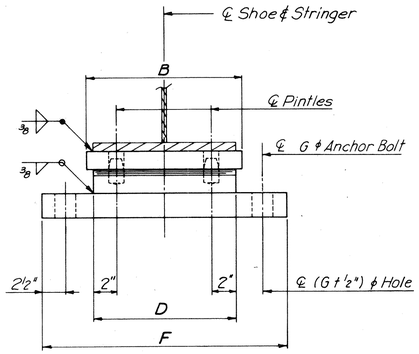
SIDE ELEVATION



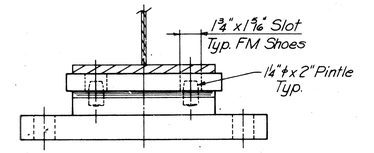
END ELEVATION



SIDE ELEVATION



END ELEVATION

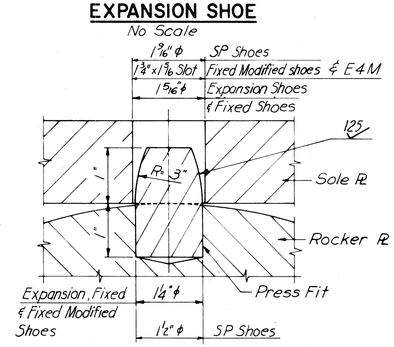


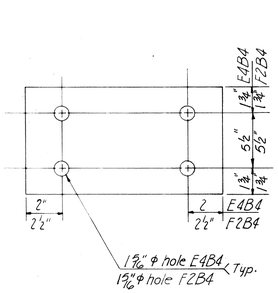
Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

END ELEVATION

EXPANSION SHOE

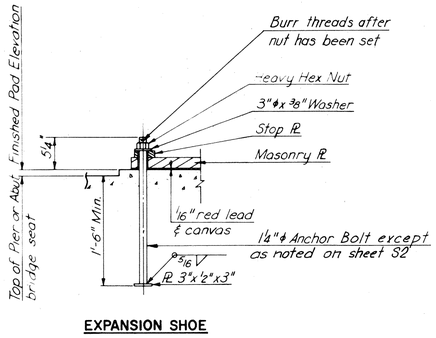
No Scale



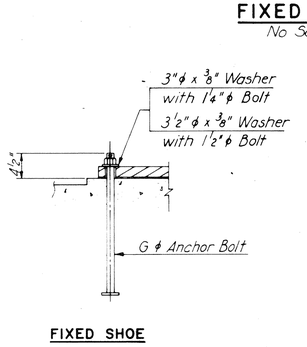


MASONRY PLATE DETAIL
E4B4 & F2B4

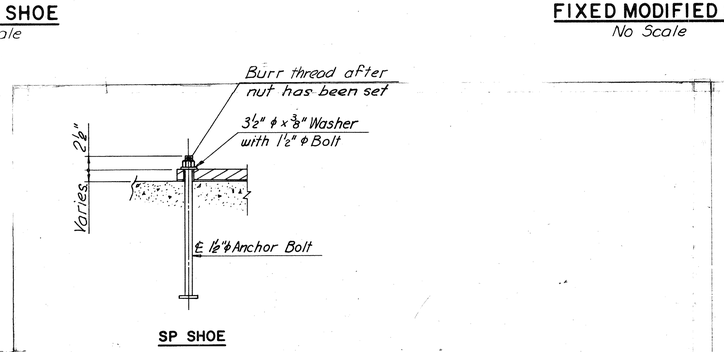
PINTLE DETAIL
Scale: ¾"=1"



EXPANSION SHOE



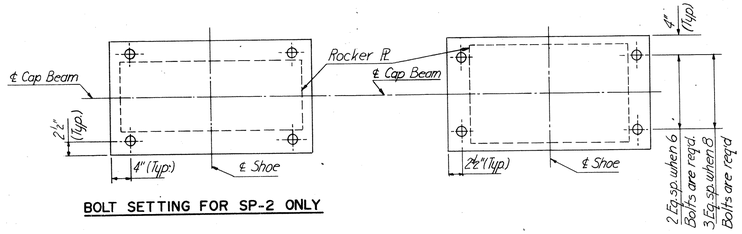
FIXED SHOE



SP SHOE

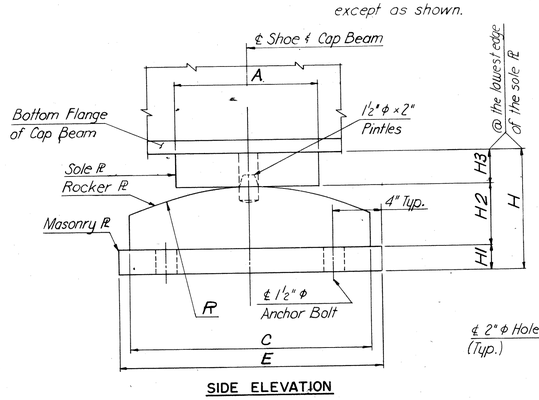
ANCHOR BOLT DETAIL
No Scale

Note:
Anchor Bolt for Fixed Shoes & SP Shoes same as Anchor Bolt for Exp Shoes except as shown.

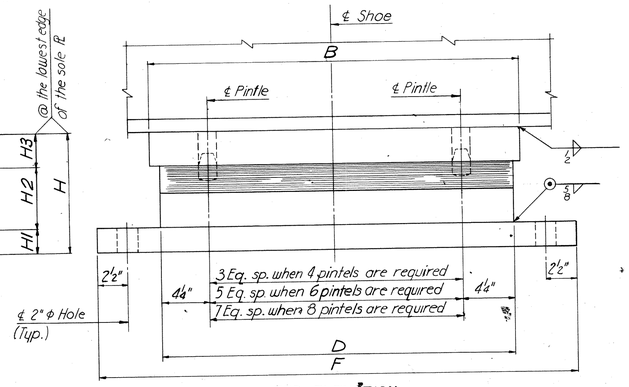


BOLT SETTING FOR SP-2 ONLY

MASONRY PLATE PLAN
SP SHOE



SIDE ELEVATION



END ELEVATION

SP SHOE

Note:
For shoe schedules, see sheet S2.
For shoe notes, see sheet S2.

	BY	DATE
MADE	HBW	7-68
CHECKED	FGC	7-68
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
1	Dimension Changes	TEM	5/76

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

STANDARD
SHOE DETAILS

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

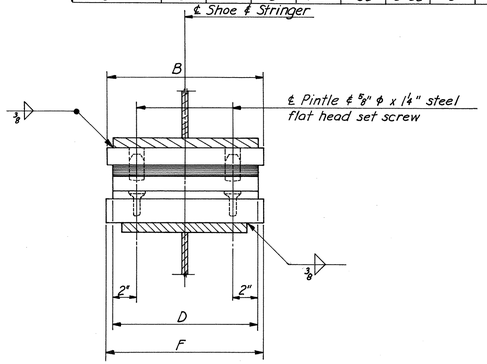
SCALE: AS NOTED
CONTRACT NO. C-11
SHEET NO. 51 OF 6

92

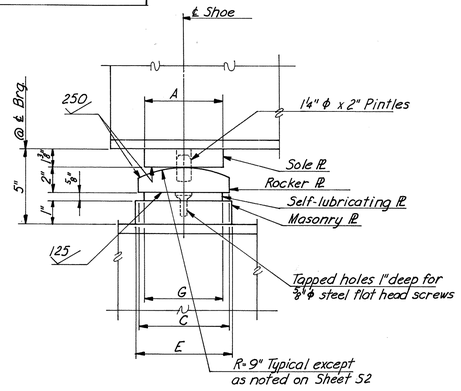
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	93	97

EXPANSION SHOE DIMENSIONS

TYPE	A	B	C	D	E	F	G	REMARKS
E1	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	
E2	6"	1'-1"	8½"	1'-0"	9"	1'-8½"	6½"	
E3	6"	1'-1"	9"	1'-1"	9½"	1'-9½"	7"	
E4	6"	1'-5½"	8"	1'-4½"	8½"	2'-1"	6"	
E4B4	6"	1'-5½"	8"	1'-4½"	9"	2'-1"	6"	4 Bolts in Masonry ℄
E5	6"	1'-5½"	9"	1'-4½"	9½"	2'-1"	7"	
E9	6"	1'-9"	10"	1'-8"	11"	2'-4½"	7½"	
E15	6"	1'-5"	10"	1'-4"	11½"	2'-4½"	7½"	R = 12"
E1M	6"	1'-1"	7½"	1'-0"	8"	1'-1"	6"	
E1K	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	
E6	6"	1'-7"	8"	1'-6"	8½"	2'-2½"	6"	



END ELEVATION



SIDE ELEVATION

EXPANSION SHOE E1M

SHOE SCHEDULE

EXPANSION SHOES				FIXED SHOES			
TYPE	BRIDGE B-65	BRIDGE B-68	TOTAL	TYPE	BRIDGE B-65	BRIDGE B-68	TOTAL
E1	10	12	22	F1		8	8
E2	2	7	9	F1M	16	19	35
E3		4	4	F2	32	8	40
E4	26	3	29	F2M	4	6	10
E4B4	6	12	18	F2B4	6		6
E5	12		12	F3	8	4	12
E9	8		8	F7	8		8
E15	4		4	SP-1		4	4
E1M	4	3	7				
E1K	1		1				
E6	1		1				

Shoe Notes:

Material for shoes (exclusive of self-lubricating plates) shall be high strength, low alloy structural steel conforming to ASTM specification A-588.

Top of masonry plates, bottom of rocker plates and top and bottom of sole plates shall be planed, straightened or otherwise treated to secure true level surfaces.

Contact surfaces noted on the plans with finish symbols shall be finished in accordance with the American Standards Association surface roughness requirement as defined in ASA B46.1-55, Surface Roughness, Waviness and Lay, Part I.

The plates comprising the expansion shoes shall be set so as to be truly centered under full dead load at a temperture of 60°F.

Concrete pads shall be formed integral with abutment or pier and not less than ⅛" or more than ¼" above finished elevation. Dress down pads by rubbing, grinding or as otherwise approved by the Engineer, to true level surfaces at the finished elevation.

Anchor bolt assemblies shall conform to A.S.T.M. A-307-66 and shall be hot-dip galvanized conforming to A.S.T.M. A-153-66.

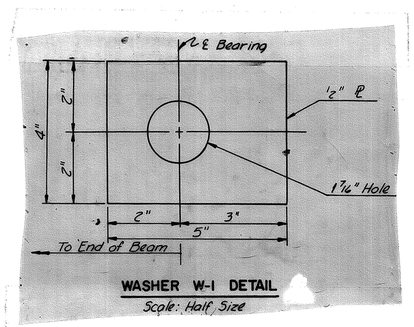
Templates shall be used to accurately set the anchor bolts.

FIXED SHOE DIMENSIONS

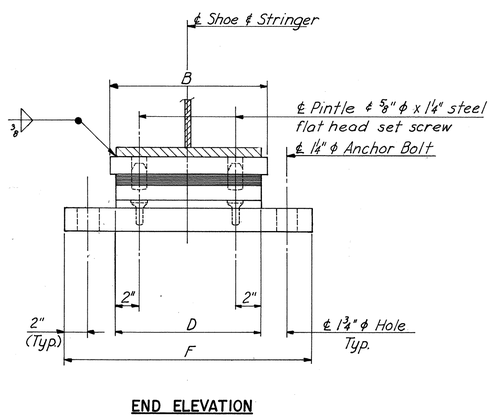
TYPE	A	B	C	D	E	F	G	REMARKS
F1	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"	
F1M	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"	
F2	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"	
F2M	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"	
F2B4	6"	1'-5½"	6"	1'-4½"	9"	2'-2"	1¼"	
F3	6"	1'-5½"	6"	1'-4½"	8"	2'-2"	1¼"	
F7	6"	1'-9"	6"	1'-8"	8"	2'-6"	1½"	

SPECIAL SHOE DIMENSIONS

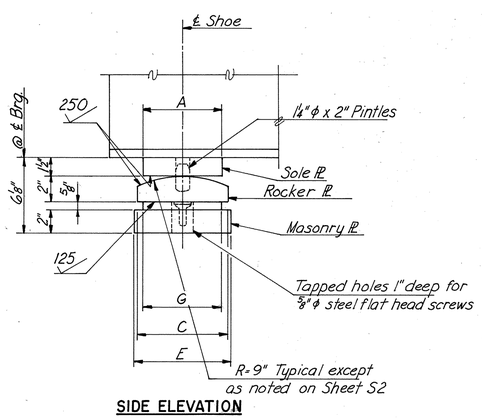
TYPE	A	B	C	D	E	F	H1	H2	H3	H	R	NO. OF BOLTS OR PINTLES
SP-1	1'-0"	1'-11"	1'-6"	1'-11"	1'-8"	2'-8"	2"	4½"	3"	9½"	1'-6"	4



WASHER W-1 DETAIL
Scale: Half Size



END ELEVATION



SIDE ELEVATION

EXPANSION SHOE E1K

			6	Shoe Type E6 added	T.E.M.	7-76
			5	Drw. E. Shoes F4B4 & F2B4	T.E.M.	5-76
DESIGNED			4	Shoe Schedule B65	T.E.M.	4-76
DRAWN			3	Shoe SP-1	T.E.M.	3-76
CHECKED			2	Shoe Schedule rev.	T.E.M.	8-25-75
IN CHARGE			NO.	REVISION	BY	DATE

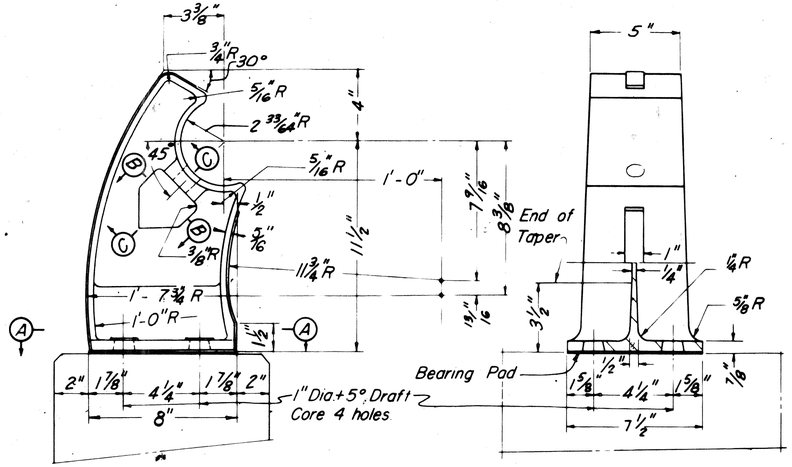
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD SHOE DETAILS

SCALE As shown
CONTRACT 11
SHEET S2 OF 6

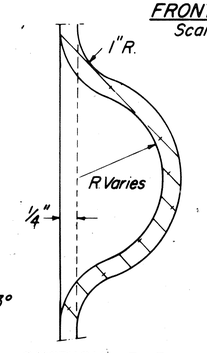
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	94	97



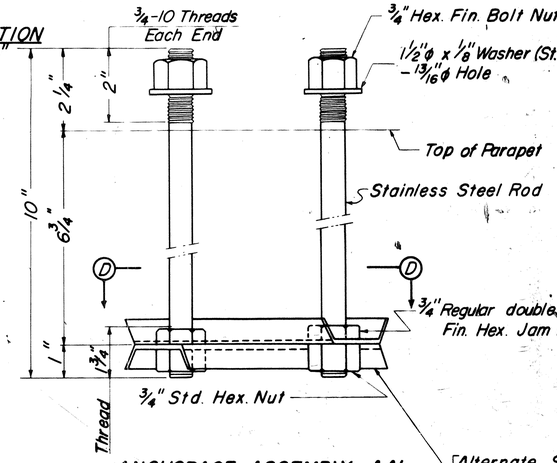
SIDE ELEVATION
Scale: 3"=1'-0"

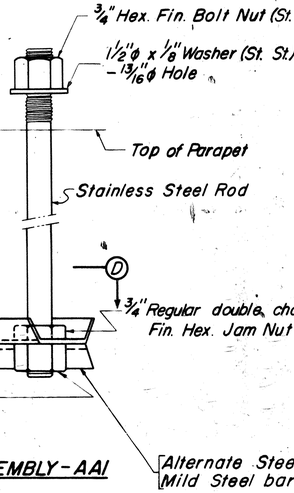
SECTION A-A
Scale: 3"=1'-0"



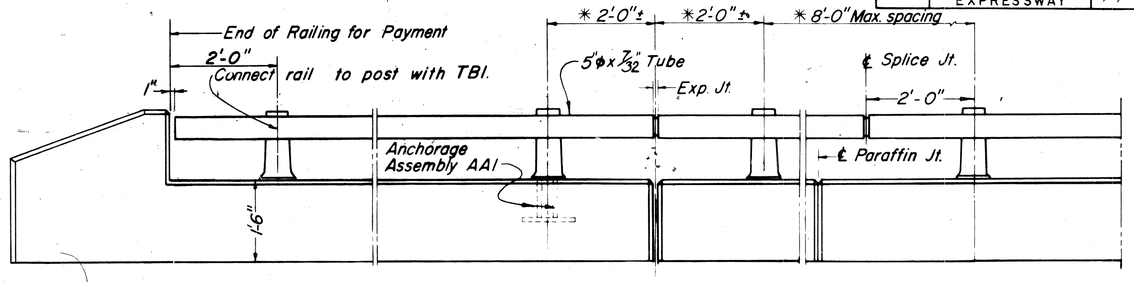
SECTION B-B

FRONT ELEVATION
Scale: 3"=1'-0"





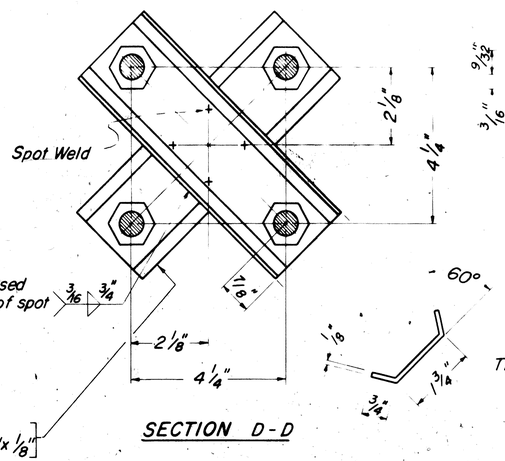
ANCHORAGE ASSEMBLY-AAI



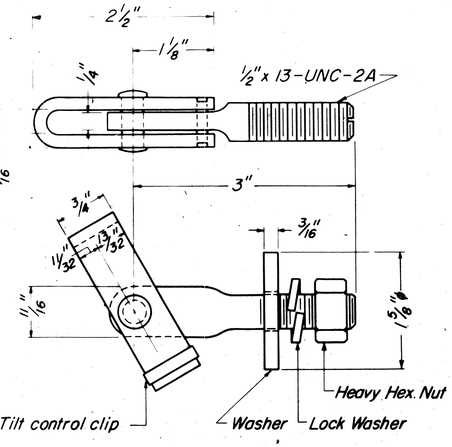
ELEVATION
Scale: 3/4"=1'-0"

NOTES:
Rail to be continuous over a minimum of 3 posts before splicing, unless otherwise shown.
* Post spacing to be measured along inside face of parapet. See plans each bridge.

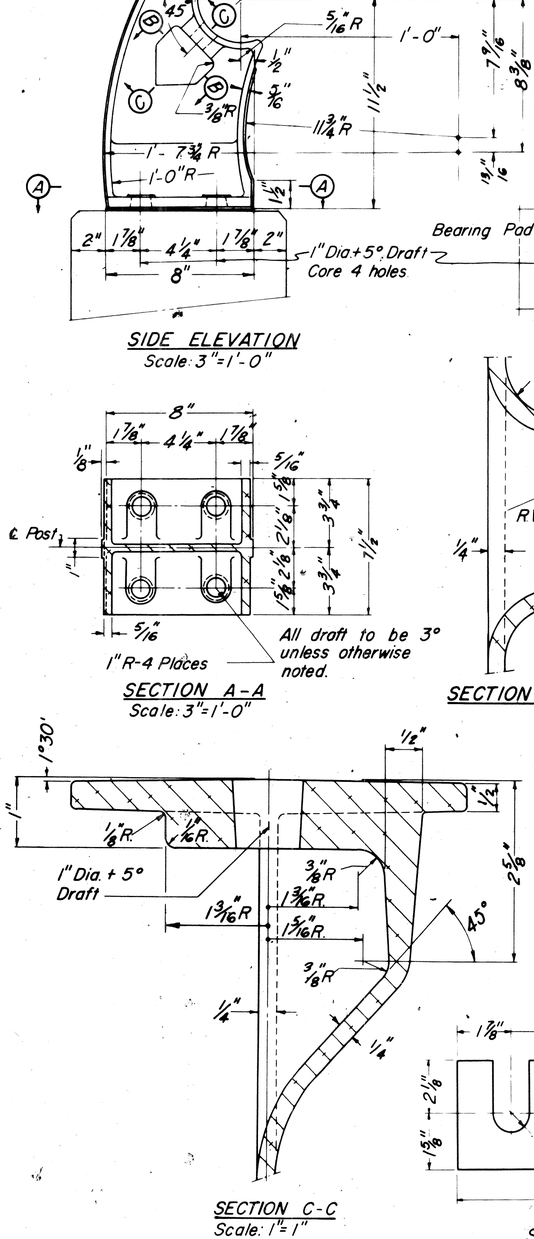
℄ 2" Open joint in parapet @ ℄ Pier or front face of Abutment Backwall



SECTION D-D

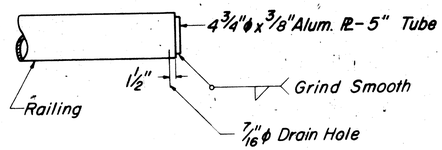


TOGGLE BOLT ASSEMBLY-TBI
TRAFFIC RAIL



SECTION C-C
Scale: 1"=1"

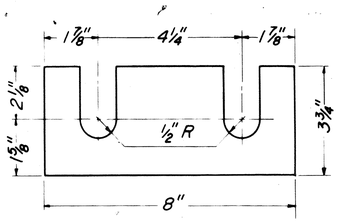
AAI - Steel Spacer — ASTM A425, or A36 (As shown)
AAI { Nuts (Top) — ASTM A276, Type 304
Top Washers — Stainless Steel
Rods — ASTM A-276, Type 304 Annealed, Hot-finished
Nuts (Bottom) — ASTM A307
Threads on all rods may be rolled or cut.



RAIL END CAP

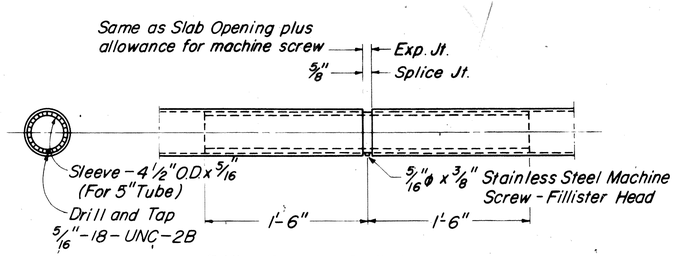
Material for toggle bolt assembly TBI shall be carbon or stainless steel having a minimum elongation of 12%. Any non stainless component to be either galvanized to ASTM-A153 or cadmium plated to ASTM-A165, Type NS.

Required minimum tensile load to equal 9000 lbs. when in an open position and tested thru a 1"ϕ hole.



SHIM DETAIL

Shims to be made from 1/16" or 1/8" material. Shims shall not project outside of post base.



RAIL SPLICE & EXP. JOINT

NOTES:
Posts shall be seated on neoprene bearing pads 1/16" minimum thickness, having a nominal durometer hardness of 70. Pads shall conform to post base dimensions.
Aluminum shims may be used for adjusting post alignment, maximum thickness of shim build-up not to exceed 1/8". Where more tilting of the post is required, the concrete area shall be ground down.
Posts shall be cast aluminum.
Rail members shall be aluminum extruded tube.
Anchor bolts may be set normal to profile grade.
Bi-metallic anchor rods may be used as an alternate for the stainless steel rods. See Special Provisions.

	BY	DATE
MADE	A.B.P.	8-67
CHECKED	A.J.S	8-67
IN CHARGE	P.R.Y.	

NO.	REVISION	BY	DATE

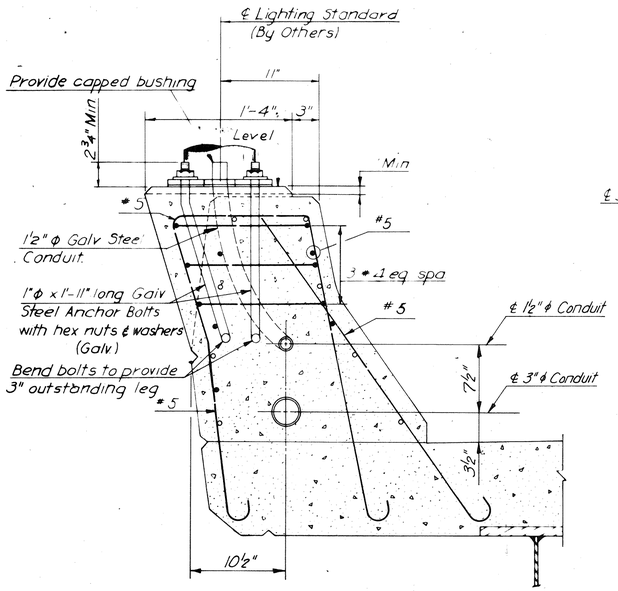
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD
ALUMINUM RAILING DETAILS
(1 RAIL)

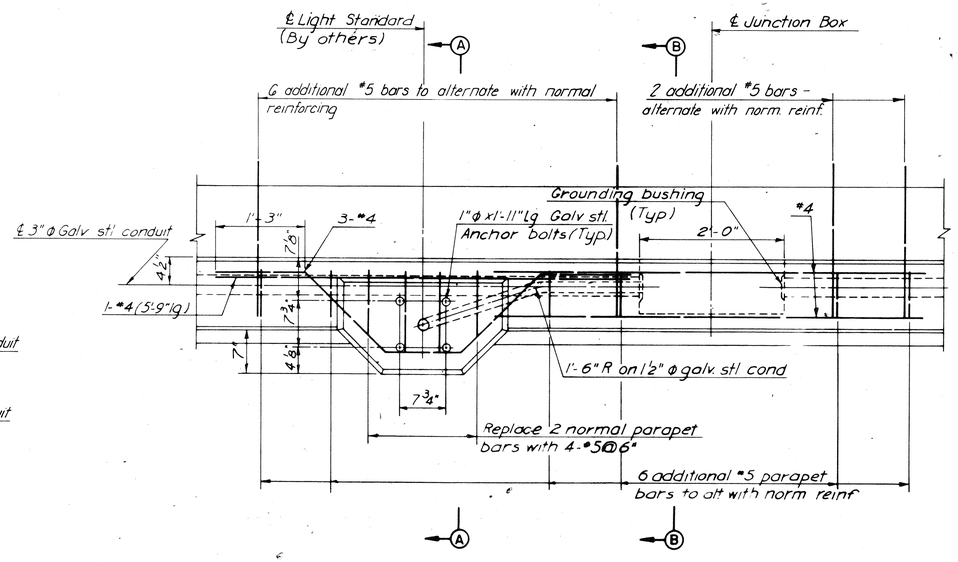
HOWARD NEEDLES TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE AS SHOWN
CONTRACT NO. 11
SHEET NO. 53 OF 6

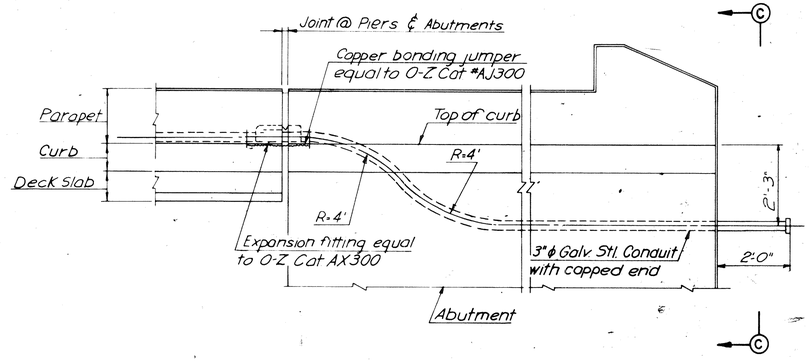
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	95	97



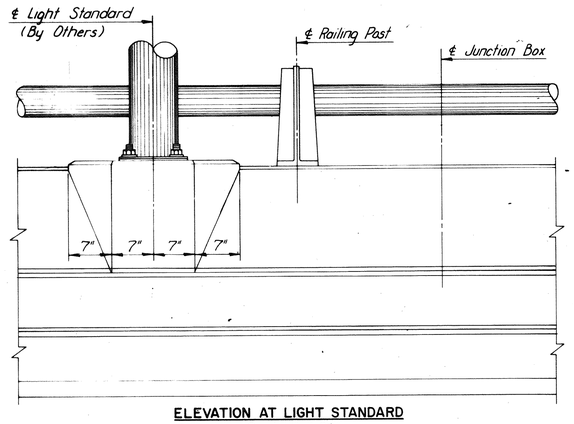
SECTION A-A
Scale 1½"=1'-0"



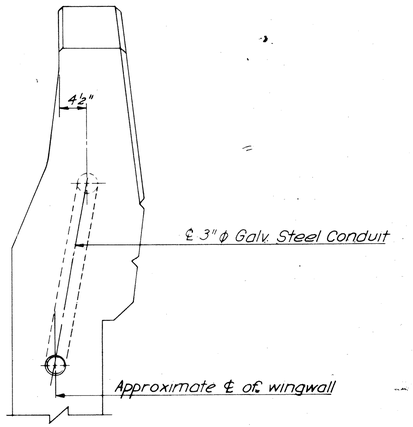
PLAN AT LIGHT STANDARD
Scale 1"=1'-0"



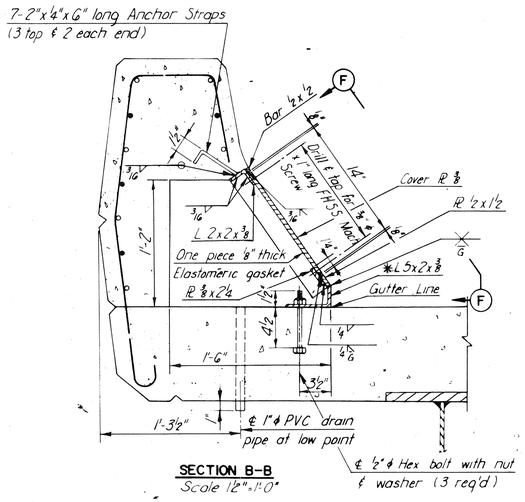
TYPICAL CONDUIT INSTALLATION DETAILS AT DECK JOINTS AND ABUTMENT WINGWALL
No Scale



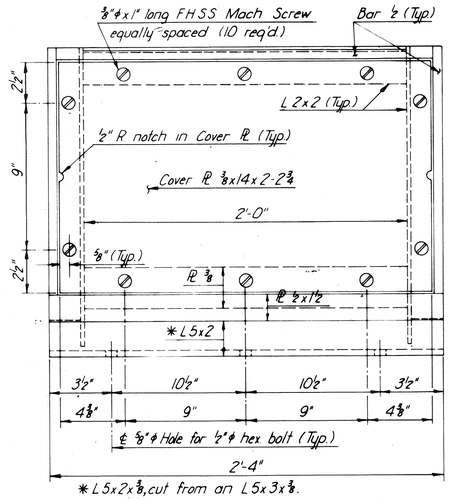
ELEVATION AT LIGHT STANDARD
Scale: 1"=1'-0"



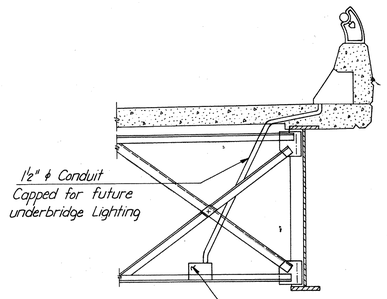
VIEW C-C
No Scale



SECTION B-B
Scale 1½"=1'-0"



VIEW F-F
No Scale



DETAIL FOR FUSE BOX FOR UNDERDECK LIGHTING
No Scale

NOTES:

All conduits shall be terminated in Junction Boxes with grounding bushings equal to O-Z type IGB.

Anchor bolt assemblies shall conform to ASTM A307 and shall be hot dip galv. after fabrication in accordance with ASTM A153.

Junction Box and cover shall be hot galvanized after fabrication in accord with ASTM A123.

Only additional or replacement reinf. is shown on this sheet For normal reinf. see individual bridge Cross Section and Deck Plan sheets

	BY	DATE
MADE	D.L.A.	3-68
CHECKED	P.R.Y.	3-68
IN CHARGE	PRY	

NO	REVISION	BY	DATE

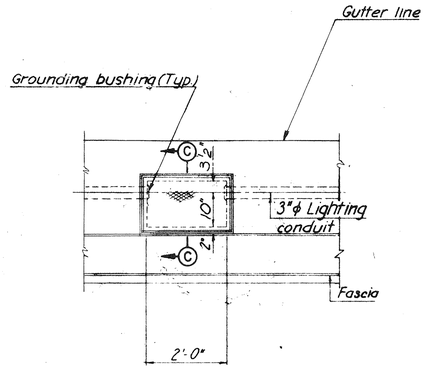
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM -
DOWNTOWN EXPRESSWAY

STANDARD ELECTRICAL DETAILS (BRIDGES CARRYING EXP. SYSTEM)

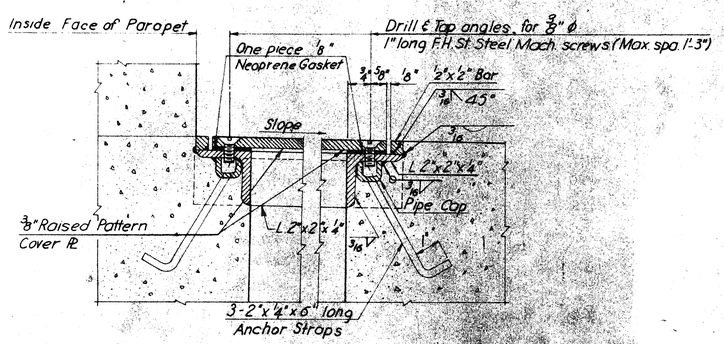
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE:
CONTRACT No.: 11
SHEET No. S4 OF 6

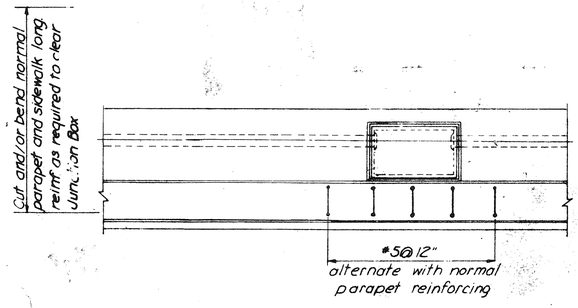
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	95A	



PLAN AT JUNCTION BOX



SECTION C-C



PLAN OF ADDITIONAL REINFORCING AT JUNCTION BOX

NOTES:

Only additional or replacement reinforcing is shown on this sheet. For normal reinforcing see individual bridge Cross Section and Deck Plan Sheets.

Note
Typical for Junction Box Unit BW BG5 and Unit 8 BG8 only

	BY	DATE				
MADE	D.L.A.	2-68				
CHECKED	PPY	2-68	1	New Sheet	TEM	9-29-76
IN CHARGE	RGC		NO.	REVISION	BY	DATE

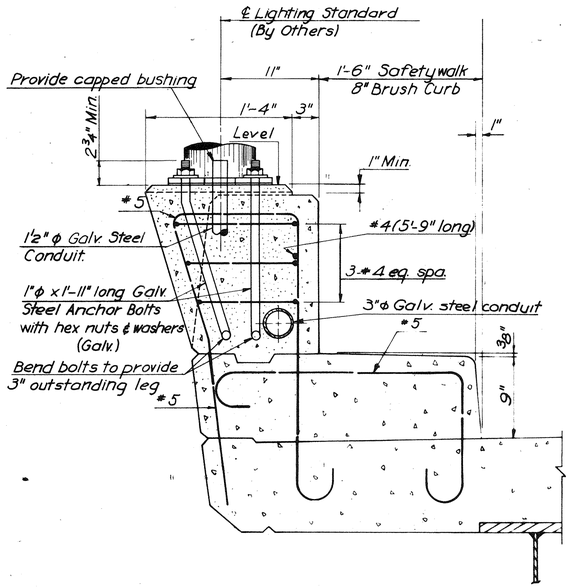
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD ELECTRICAL DETAILS (BRIDGES CARRYING CITY STREETS)

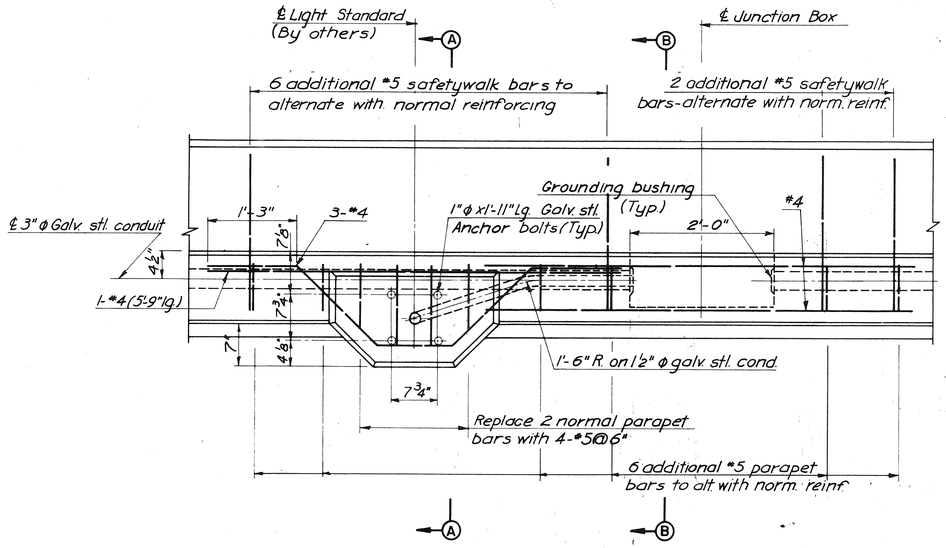
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: NONE
CONTRACT NO.
SHEET NO. 94A OF

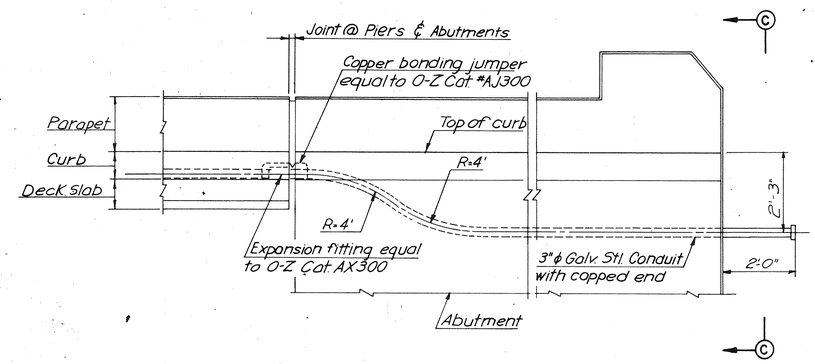
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11		95B	



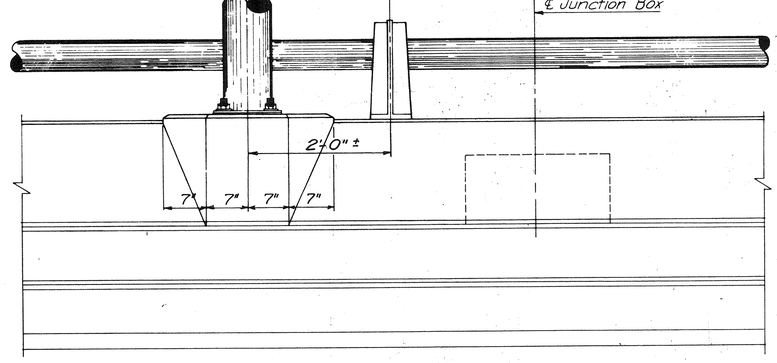
SECTION A-A
Scale: 1½" = 1'-0"



PLAN AT LIGHT STANDARD
Scale: 1" = 1'-0"

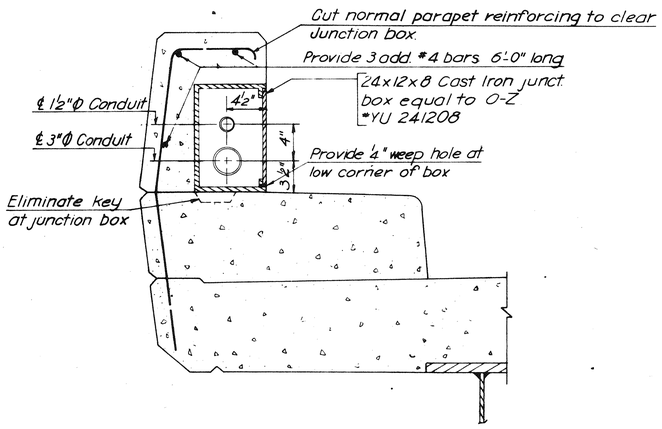


TYPICAL CONDUIT INSTALLATION DETAILS AT DECK JOINTS AND ABUTMENT WINGWALL
No Scale



ELEVATION AT LIGHT STANDARD
Scale: 1" = 1'-0"

VIEW C-C
Scale: 1½" = 1'-0"



SECTION B-B
Scale: 1½" = 1'-0"

NOTES:

All conduits shall be terminated in Junction Boxes with grounding bushings equal to O-Z type IGB.

Anchor bolt assemblies shall conform to ASTM A307 and shall be hot-dip galv. after fabrication in accordance with ASTM A153.

Junction Box and cover shall be hot-galvanized after fabrication in accord. with ASTM A123.

Only additional or replacement reinf. is shown on this sheet. For normal reinf. see individual bridge Cross Section and Deck Plan sheets.

Typical for Unit 12 BG5
Units 16 & 18 BG8

^	BY	DATE				
MADE	D.L.A.	3-68				
CHECKED	P.R.Y.	3-68	1	New Sheet	TEM	9-29-76
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

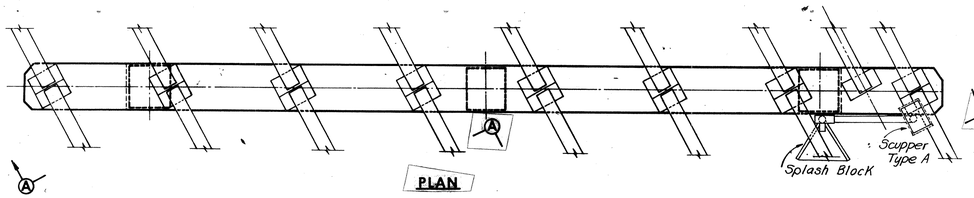
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

STANDARD
ELECTRICAL DETAILS
(BRIDGES CARRYING EXP. SYSTEM)

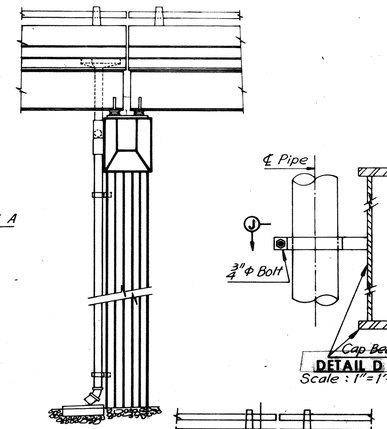
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

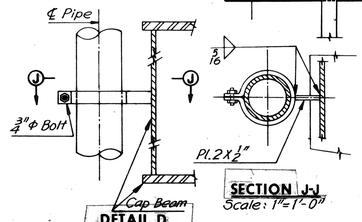
SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO. S4B OF

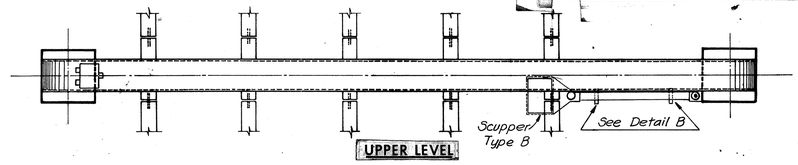
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
II	DOWNTOWN EXPRESSWAY	96	97



VIEW A-A
ELEVATION
SUPPORT TYPE 1
Scale : 3/16"=1'-0"



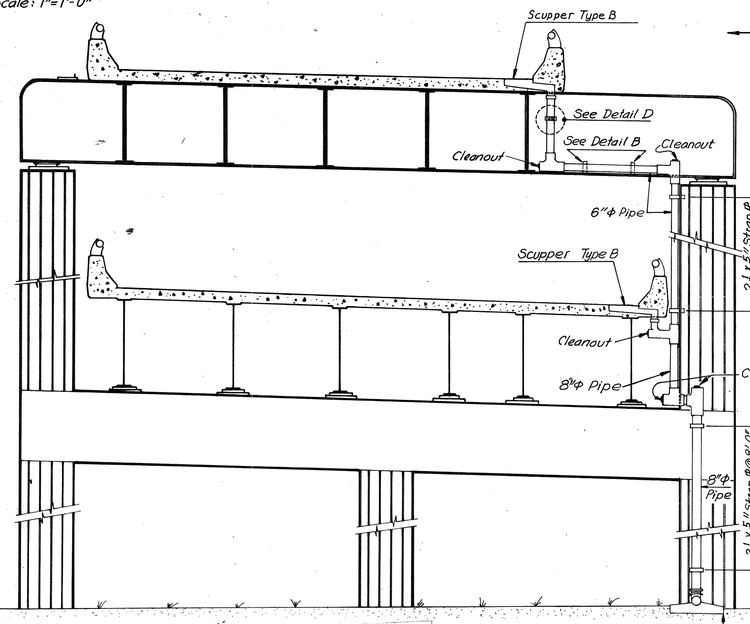




SECTION J-J
Scale : 1"=1'-0"

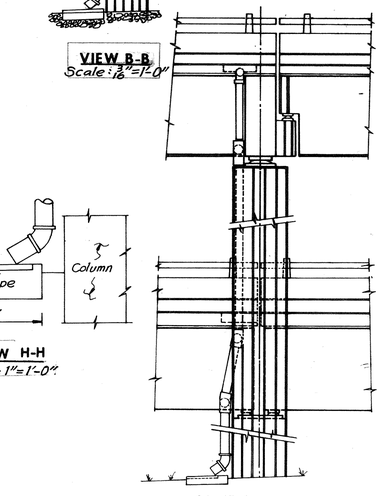
PLAN

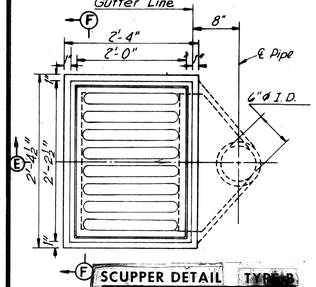
Note: Remove existing scuppers at widening portions
Also remove enough concrete around these scuppers
to provide required bond length (about 2'-0").



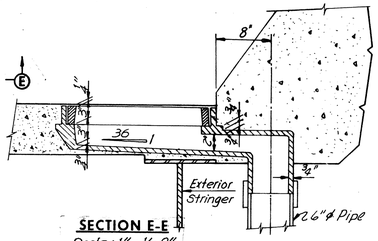
ELEVATION

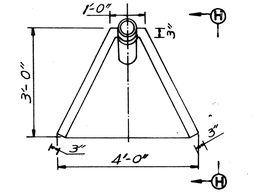
SUPPORT TYPE 2
Scale : 3/16"=1'-0"

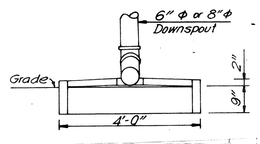


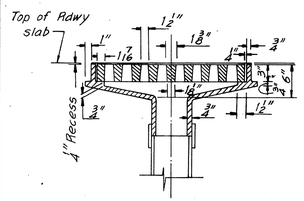


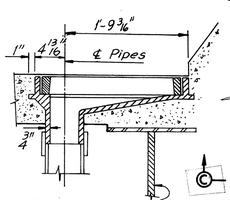
Note: For dimensions not given, see Scupper Detail, Type A.

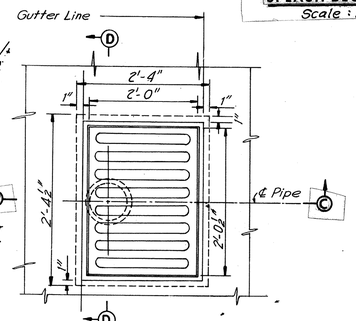


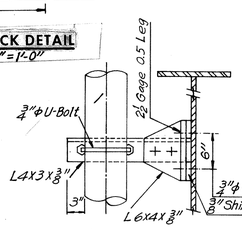


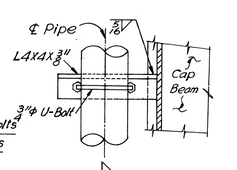


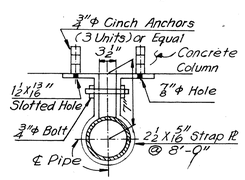












Note: Where existing scuppers are to be removed, concrete shall be removed 2'-0" minimum from the edges of scuppers.

	BY	DATE	REVISION	BY	DATE
MADE	G.S.H.	10-10-69	A Parapet Changed PRMS		4-19-74
CHECKED					
IN CHARGE			NO.		

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

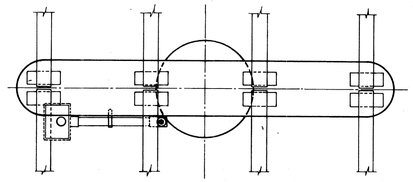
STANDARD DRAINAGE DETAILS

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

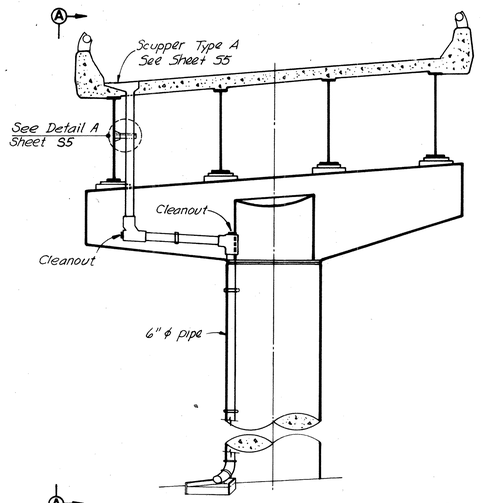
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. S5 OF 6

96

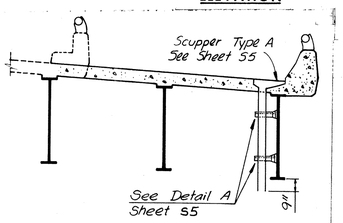
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	97	97



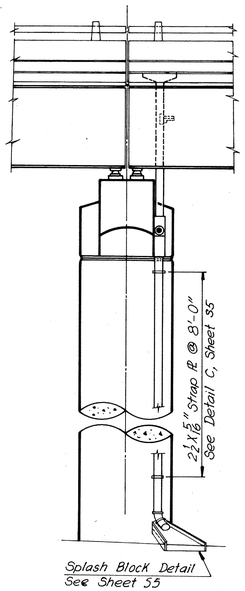
PLAN



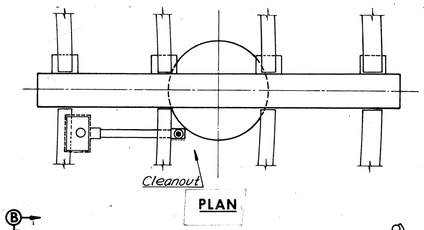
ELEVATION



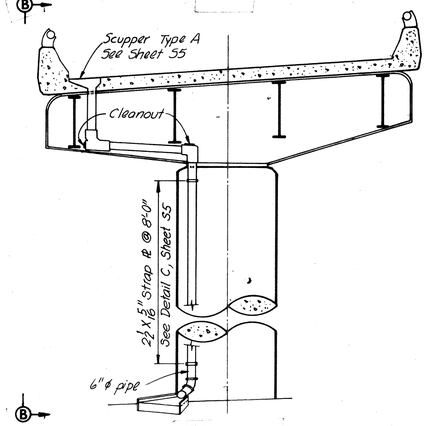
SUPPORT TYPE 6
Scale: 3/16"=1'-0"



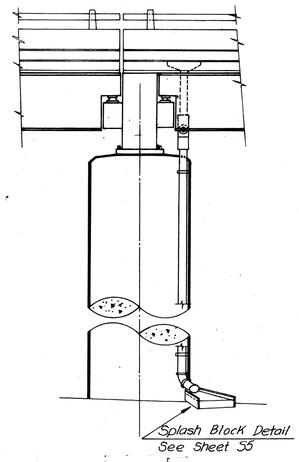
VIEW A-A



PLAN

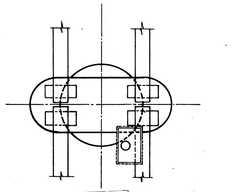


ELEVATION

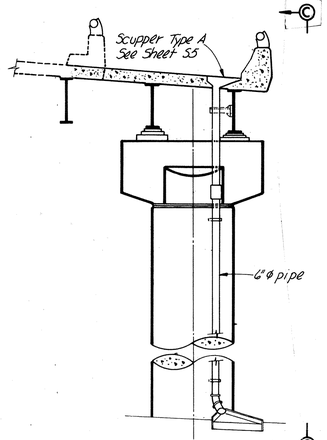


VIEW B-B

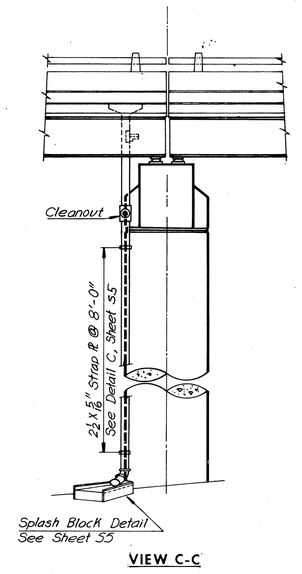
SUPPORT TYPE 4
Scale: 3/16"=1'-0"



PLAN



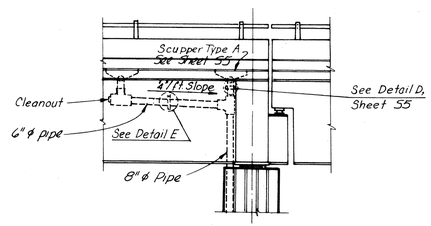
ELEVATION



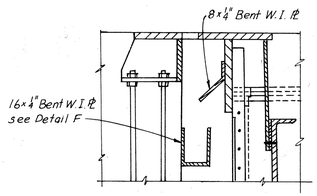
VIEW C-C

SUPPORT TYPE 6
Scale: 3/16"=1'-0"

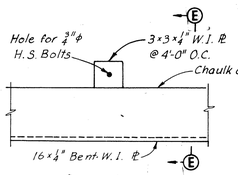
SUPPORT TYPE 3
Scale: 3/16"=1'-0"



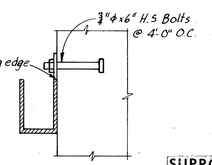
SUPPORT TYPE 7
Scale: 3/16"=1'-0"



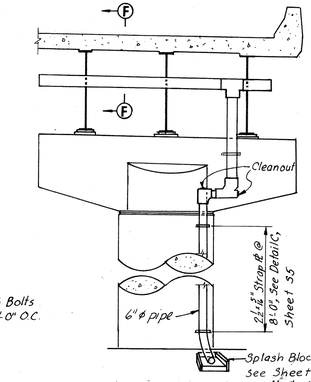
SECTION F-F
Scale: 1"=1'-0"



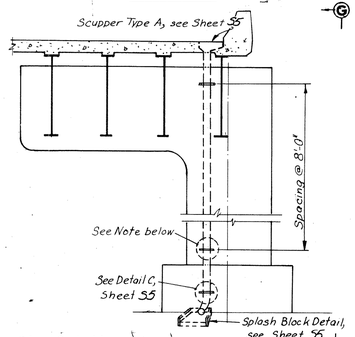
DETAIL F
Scale: 1½"=1'-0"



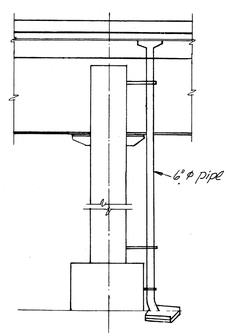
SECTION E-E
Scale: 1½"=1'-0"



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

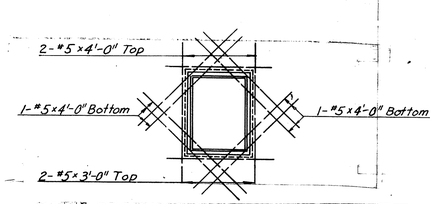


ELEVATION



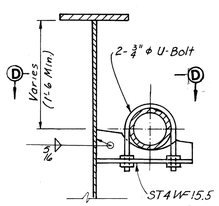
VIEW G-G

SUPPORT TYPE 5
Scale: 3/16"=1'-0"

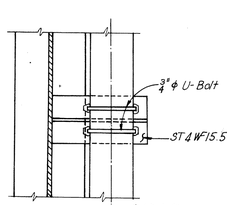


DETAIL OF REINFORCING STEEL AT CAST SCUPPER
No Scale

Note:
Bend bottom and top slab bars at Cast Scuppers where interference occurs.
Weight of Reinforcing Bars at Scupper: 48 lbs.

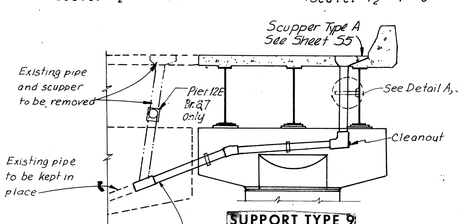


DETAIL E
Scale: 1"=1'-0"



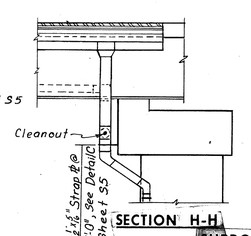
SECTION D-D
Scale: 1"=1'-0"

Note:
For Details below top of upper column, see Support Type 2, Sheet 55.

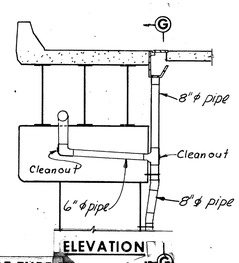


SUPPORT TYPE 9
No Scale

SUPPORT TYPE 8



SECTION H-H



ELEVATION

SUPPORT TYPE 11
No Scale

SUPPORT TYPE 10
Scale: 1" =1'-0"

	BY	DATE				
MADE	SCC	1.29.69	1	Parapet Changed	P.R.M.	4-19-74
CHECKED	G.S.H.	2-13-69				
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD DRAINAGE DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. S6 OF 6

97

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	[redacted]	15	

ROLL NO.

	BY	DATE
MADE	R.F.D.	6/68
CHECKED	PHT	9/69
IN CHARGE	UPF	

NO.	REVISION	BY	DATE

CONTRACT C-10 — CONTRACT C-11

STA. 344+97.47

Ramp W-S

Ramp W-N

-.02'/Ft. S.E. | 75' Trans. | Level | 150' Trans. | +.06'/Ft. S.E. | 100' Trans.

20.5' Wide Lt.

Trans. 20.5' to 14' in 150'

164.88

PVI 343+50
El. 94.03

PVI 346+25
El. 93.38

Profile Grade Line

+0.84%

-0.38%

-2.50%

-0.48%

100' V.C.

200' V.C.

150' V.C.

BEGIN RAMP W-S
STA. 342+07.56

℄ Chesapeake & Ohio R.R.

℄ Seaboard Airline R.R.

℄ 16th St.

Existing Ground Line

℄ 17th St.

℄ Southern R.R.

℄ Byrd St.

PVI 349+50
El. 85.43

Dist. to Break Line		20'	20'	20'	20'	20'	20'	20'
Break Line		93.03	93.18	93.39	93.60	93.81	93.98	94.08
Lt Edge								94.23
P.G.L.	93.43	93.58			94.21	94.38	94.48	94.50
	10736							

	94.00	94.11	94.13	94.25	94.36	94.45	94.47	94.50	94.46	94.67	94.61	93.05	92.65	92.20	91.67	91.07		87.31	86.72	86.23	85.81	85.48	85.23	85.88
	94.44				94.06			93.90	93.84	93.04	93.38									87.38	86.90	86.34	85.88	
					10742																			

340 341 342 343 344 345 346 347 348 349 350

90 80 70 60 50 40 30 20

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

RAMP W-S PROFILE

44.5

15