RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

PC-2023
APPENDIX

RECORD DRAWINGS

RMTA BRIDGES 4, 5, (8 Original and 8 Widening), 12, 13, 17, 36, 37, 50, 51, 54, 55, 56, 57, 58, and 60

(NOTE: Additional As-built Plans are Available upon Request to the Engineer)

RMTA

System Map

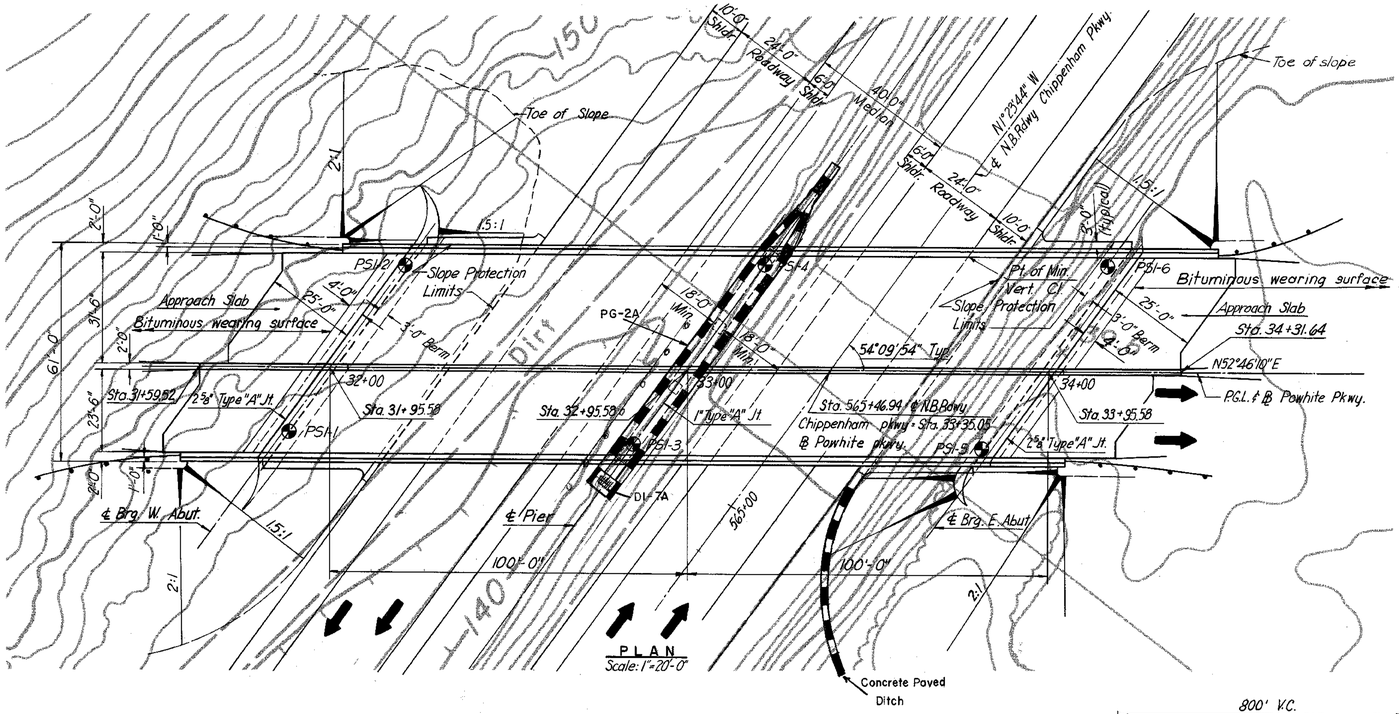

RICHMOND EXPRESSWAY SYSTEM
Scale:
0 1000 2000 3000ft.
48 - Bridge Number
RMTA Facilities Shown in Red
RMTA
RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY
RICHMOND
JOSEPH BRYAN PARK
Toll Booths
BRYAN PARK INTERCHANGE
LABURNUM AVE.
WESTWOOD AVE.
BROOKLAND PARK BLVD.
OVERBROOK RD.
NORTH AVE.
CHAMBERLAYNE AVE.
BROOK RD.
NORTH AVE.
UNIVERSITY OF RICHMOND
THREE CHOPT RD.
LIBBIE AVE.
MONUMENT AVE.
BROAD ST.
PATTERSON AVE.
GROVE AVE.
CARY STREET ROAD
COMMONWEALTH AVE.
MALVERN AVE.
HAMILTON ST.
KENT RD.
THOMPSON ST.
Visitor Information Center
The Diamond
Science Museum Of Virginia
VIRGINIA UNION UNIVERSITY
HERMITAGE RD.
RICHMOND PETERSBURG TURNPIKE
BROOK RD.
SEABOARD COAST LINE
CLAY ST.
MARSHALL ST.
LEIGH ST.
FAIRFIELD AVE.
MECHANICSVILLE
HUGUENOT BRIDGE
RIVERSIDE DR.
HUGUENOT ROAD
Williams Island
DOVER RD.
(C. & O. RY.)
JAMES
RIVER
Section Two Connection To I-195
PORTLAND PL.
IDLEWOOD AVE.
MAPLEWOOD AVE.
CITY STADIUM
Toll Booths
STADIUM INTERCHANGE
GRANT RD.
DOUGLASDALE RD.
R. F. & P. R.R.
Water Works
I-195
Virginia Museum Of Fine Arts
Downtown Expressway Extension
ELWOOD AVE.
FLOYD AVE.
MAIN ST.
CARY ST.
PARKWOOD AVE.
BOULEVARD INTERCHANGE
NANSEMOND ST.
SHEPPARD ST.
THE BOULEVARD
ROBINSON ST.
PARK AVE.
Virginia Commonwealth University
WILLIAM BYRD PARK
Connection to Downtown Expressway
Section Three
MAYMONT PARK
Toll Plaza
Toll Plaza
GRAYLAND AVE.
IDLEWOOD AVE.
LAKEVIEW AVE.
MEADOW ST.
ALLEN AVE.
RANDOLPH ST.
HARRISON ST.
Monroe Park
The Mosque
FRANKLIN ST.
ADAMS ST.
Public Library
COLISEUM
Toll Booths
Downtown Expressway State Rte. 195
CHERRY ST.
LAUREL ST.
BELVIDERE
State Penetentiary
Chamber of Commerce
City Hall
Med. Col. Of Va. (VCU)
STATE CAPITOL
Shockoe Slip Historic District
Toll Booths
MAIN ST. STATION
DOWNTOWN I-95 INTERCHANGE
JAMES RIVER BRIDGE
MANCHESTER BRIDGE
MAYOS BRIDGE
ROBERT E. LEE BRIDGE
COLORADO AVE.
MT. CALVARY CEMETERY
HOLLYWOOD CEMETERY
RIVERVIEW CEMETERY
Section Four Downtown Expressway
CSX RAILWAY
MOSBY ST.
CARRINGTON ST.
NINE MILE RD.
25TH ST.
MARSHALL ST.
BROAD ST.
CLAY ST.
Chimborazo Park
SOUTHERN RAILWAY
Section One
WILLOW OAKS
COUNTRY CLUB
FOREST HILL AVE.
Toll Booths
POWHITE BRIDGE OVER THE JAMES RIVER
FOREST HILL AVE. INTERCHANGE
Powhite Parkway State Rte 76
Toll Plaza (SB)
Toll Plaza (NB)
(SOUTHERN RAILWAY)
PARKWAY
CHIPPENHAM PARKWAY INTERCHANGE
CHIPPENHAM
Powhite Parkway Extension (VDOT Toll Road)
BLILELY RD.
JAHNKE RD.
SEABOARD COAST LINE CSX RAILWAY
WESTOVER HILLS BLVD.
BOULEVARD BRIDGE 7500# Limit
NORFOLK SOUTHERN (SOUTHERN RAILWAY)
FOREST HILL PARK
FOREST HILL AVE
SEMMES AVE.
HULL ST.
COMMERCE RD.
MAURY ST.

Bridge 4

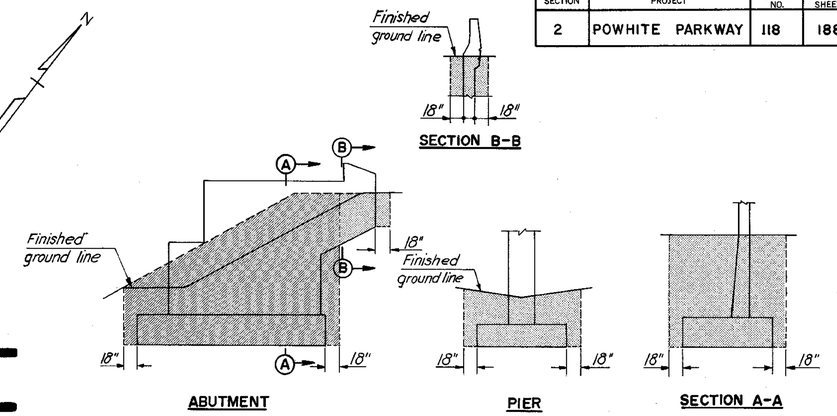
Southbound Powhite Parkway (VA-76)
Over
Both directions of Chippenham Parkway (VA 150)

Partial Record Set of Plans

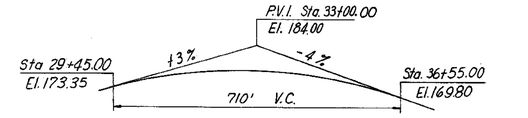
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	118	188



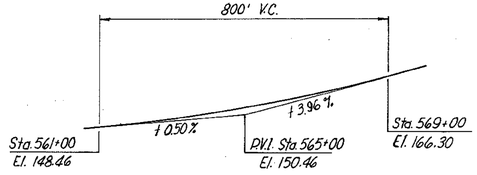
PLAN
Scale: 1"=20'-0"



PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

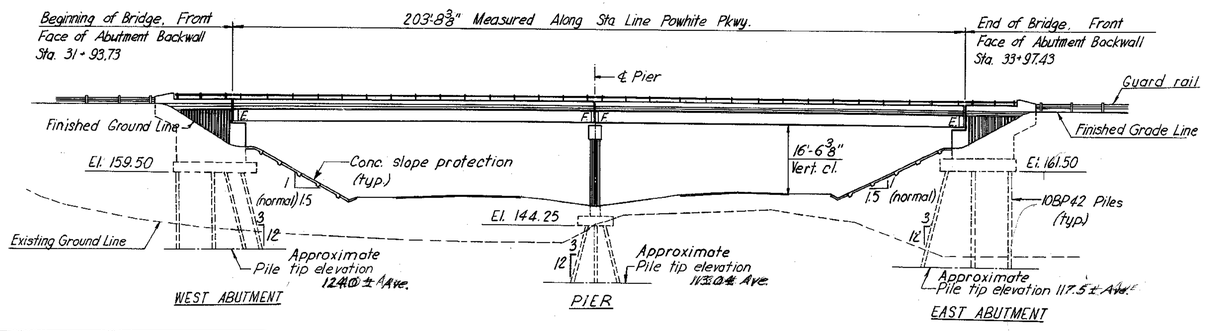


PROFILE GRADE DATA
POWHITE PKWY.
No Scale



PROFILE GRADE DATA
CHIPPENHAM PKWY.
No Scale

INDEX	
NO.	DESCRIPTION
1.	General Plan and Elevation
2.	General Notes and Quantities
3.	West Abutment
4.	East Abutment
5.	Abutment Details (1)
6.	Abutment Details (2)
7.	Pier Details
8.	Framing Plan
9.	Cross Section
10.	Deck Plans
11.	Joint Details
12.	Approach Slab and Slope Protection
13.	Boring Logs
14.	Boring Logs
S1.	Standard Shoe Details
S2.	Standard Aluminum Railing Details
S7.	Standard Architectural Details



ELEVATION
Scale: 1"=20'-0"

BORINGS: ⊕ Indicates location of 2½"ϕ cased hole boring.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.
F-30 (Copper Weld Rod) Elevation 218.82
G-111 (Copper Weld Rod) Elevation 150.10

AS BUILT

NO.	REVISION	BY	DATE
3	As Built	JRC	3-73
2	Parapet	J.G.V.	12-70
1	Dimension	T.E.M.	5-68
	MADE	T.E.M.	9-1967
	CHECKED	D.S.B.	3-27-68
	IN CHARGE	PRY	

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04

GENERAL PLAN & ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO.: C-2
SHEET NO. 1 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	119	188

GENERAL NOTES

ROADWAY CAPACITY: One 31'-6" and one 23'-6" clear roadway.
Dead Load-Includes 15 lbs. per sq. ft. for future wearing surface.
Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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.

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.

[redacted]

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform to A.S.T.M. 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. Specification A36 except as noted.
All field connections shall be made with high strength bolts.
High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.
F30(Copper Weld Rod) Elevation 218.82
G-11(Copper Weld Rod) Elevation 150.10

ESTIMATED QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (1 RAIL) L.F.	POROUS BACKFILL C.Y.	STEEL PILES 10BP42 L.F.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6" ϕ L.F.
SUPERSTRUCTURE				380.39	103,414	427,036	407					
WEST ABUTMENT	540	294.15			12,729		36	45	1934.8	228	140	111
PIER I	175	136.91			24,625				1174.5			
EAST ABUTMENT	460	217.95			10,872		24	26	1634.6	228	91	94
APPROACH SLABS			204.77		57,934							
TOTAL	1,175	649.01	204.77	380.39	209,574	427,036	467	71	4743.9	456	231	205

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EVR	3-68	3	As Built	JRC	3-73
CHECKED	PRY	3-68	2	Parapet	HBW	12-70
IN CHARGE	PRY		1	General	J.G.V.	10-70

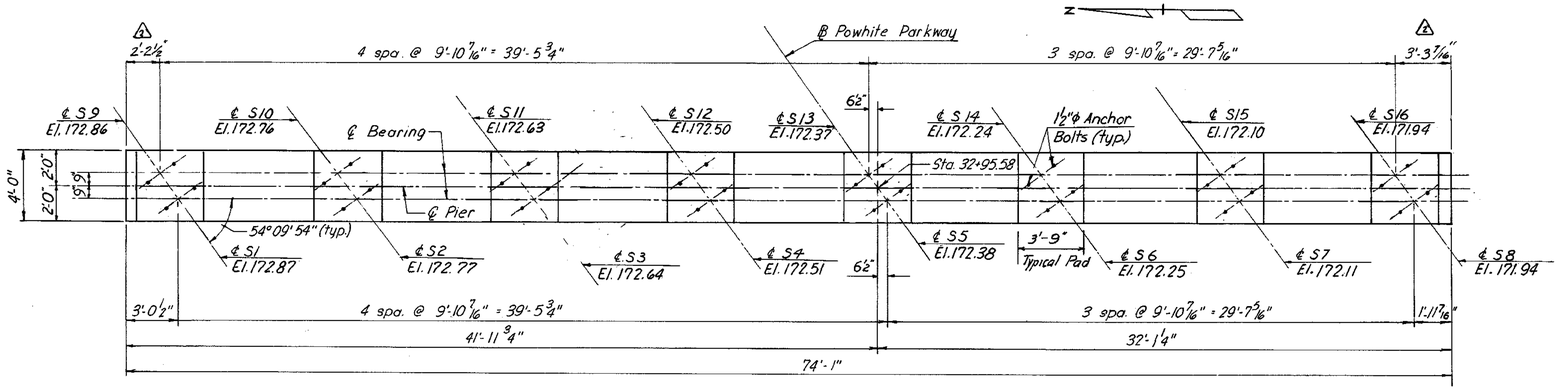
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

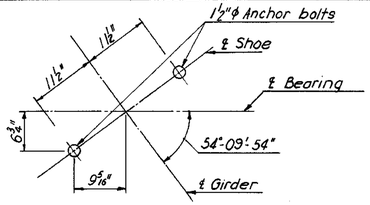
POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04
GENERAL NOTES AND QUANTITIES

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

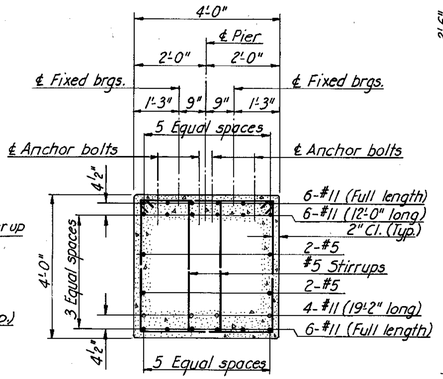
SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 2 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	124	188

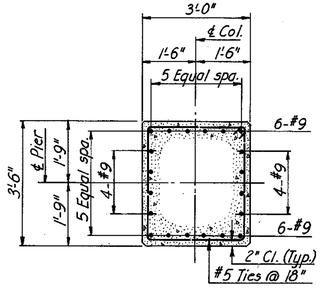




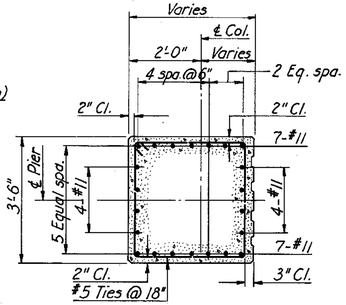
BOLT SETTING PLAN
No Scale



SECTION A-A
Scale: ½"=1'-0"

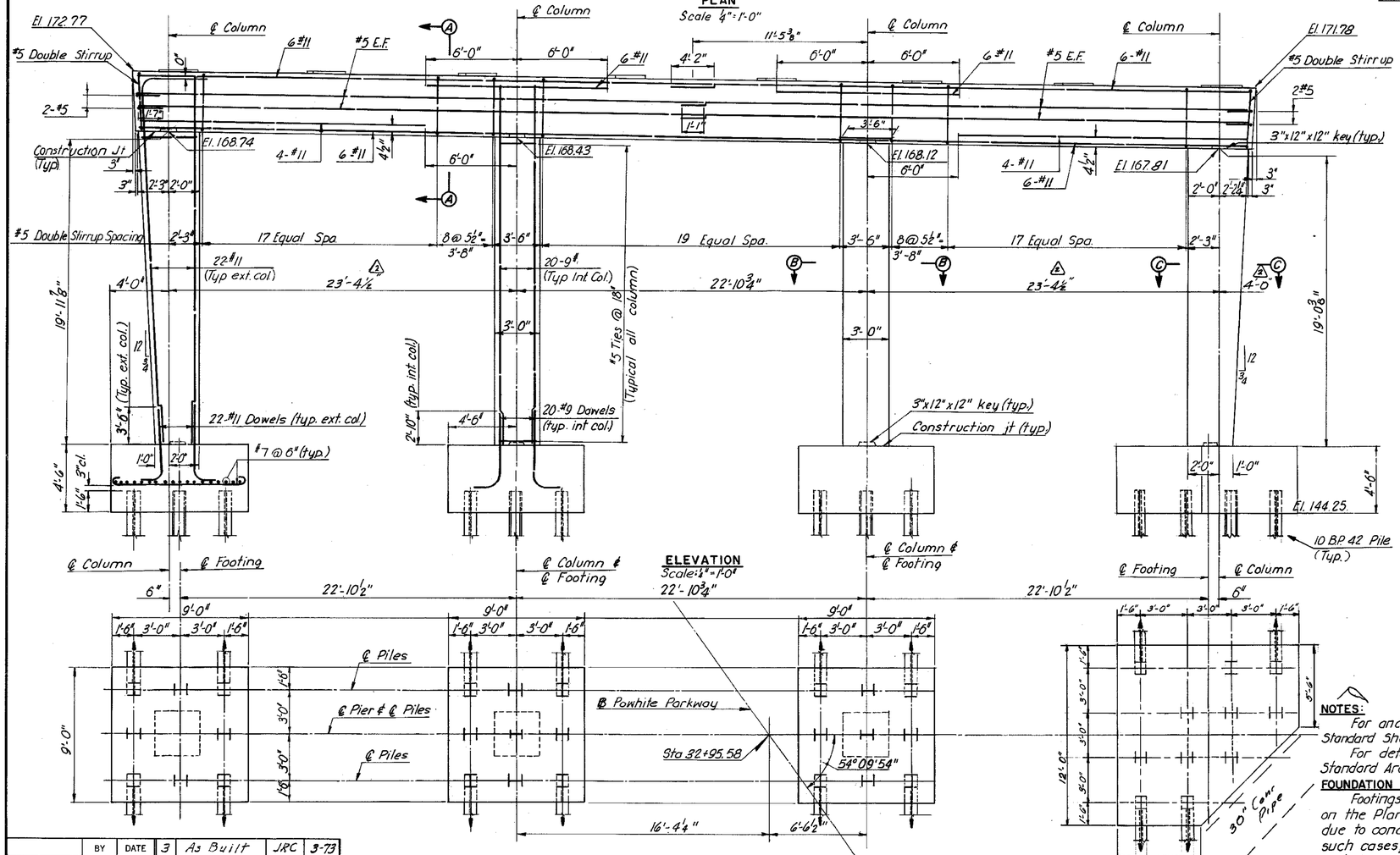


SECTION B-B
Scale: ½"=1'-0"



SECTION C-C
Scale: ½"=1'-0"

PLAN
Scale ¼"=1'-0"



ELEVATION
Scale: ¼"=1'-0"

FOOTING PLAN
Scale: ¼"=1'-0"

Note: Arrows indicate direction of 2 in 12 batter piles.

DETAIL OF STEEL PILE SPLICE

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTES:

Footings shall be founded at the elevation shown on the Plans unless otherwise directed by the Engineer due to conditions at the site during construction. In such cases, the Engineer will determine the extent of redesign necessary and will advise the Contractor before construction begins.

All piles shall be 10 BP 42 Steel Piles (Design Capacity = 45 tons).

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EF	10.67	3	As Built	JRC	3-73
CHECKED	TEM	10-1967	2	Revised Dim. & Reinf. Steel	JRC	10-71
IN CHARGE	PRY		1	General	HBW	10-70

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

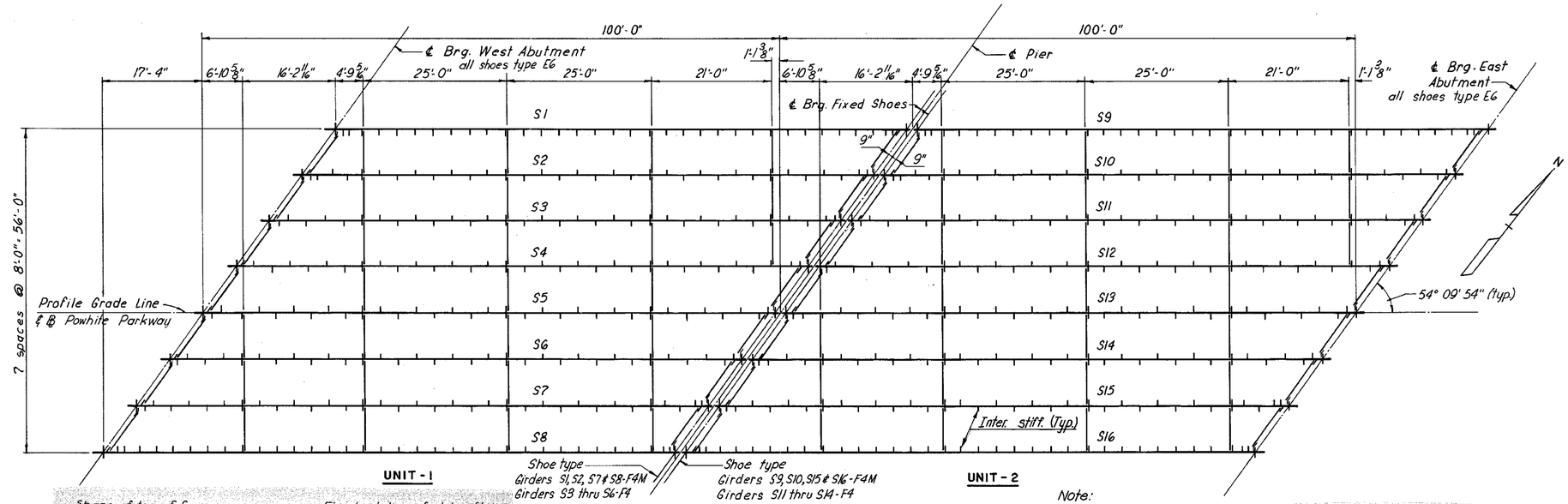
POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04

PIER DETAILS

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

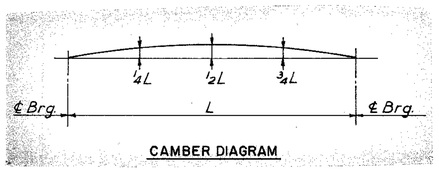
SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 7 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	125	188



FRAMING PLAN
3/32" = 1'-0"

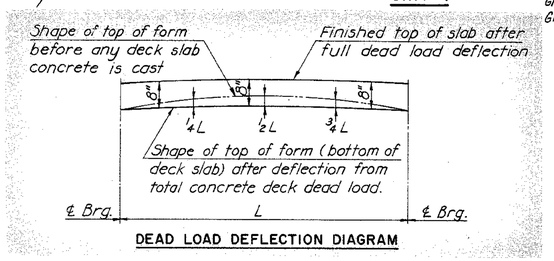
Note:
Intermediate stiffeners shall be equally spaced between diaphragms. End 2 spaces at each stringer end shall be at ½ normal spacing.



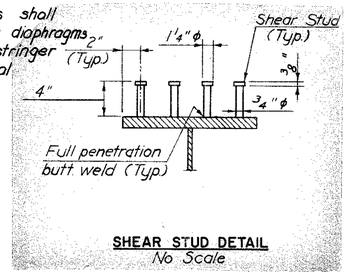
CAMBER DIAGRAM

CAMBER SCHEDULE							
STR.	¼L	½L	¾L	STR.	¼L	½L	¾L
S1	2 5/8"	3½"	2 5/8"	S9	2 5/8"	3½"	2 5/8"
S2	2 5/8"	3½"	2 5/8"	S10	2 5/8"	3½"	2 5/8"
S3	2 5/8"	3½"	2 5/8"	S11	2 5/8"	3½"	2 5/8"
S4	2 5/8"	3½"	2 5/8"	S12	2 5/8"	3½"	2 5/8"
S5	2 5/8"	3½"	2 5/8"	S13	2 5/8"	3½"	2 5/8"
S6	2 5/8"	3½"	2 5/8"	S14	2 5/8"	3½"	2 5/8"
S7	2 5/8"	3½"	2 5/8"	S15	2 5/8"	3½"	2 5/8"
S8	2 5/8"	3½"	2 5/8"	S16	2 5/8"	3½"	2 5/8"

NOTE TO FABRICATOR:
The above 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.



DEAD LOAD DEFLECTION DIAGRAM

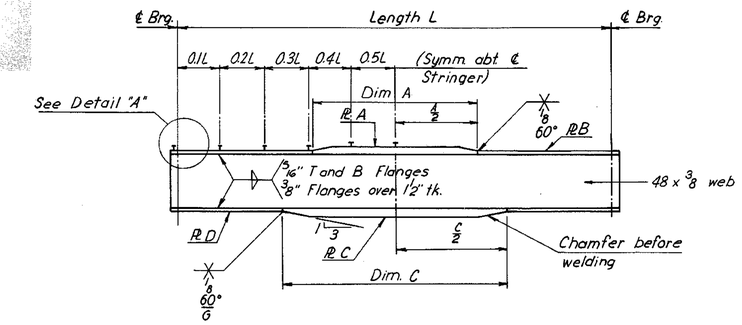


SHEAR STUD DETAIL
No Scale

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E6	16	F4	8
		F4M	8

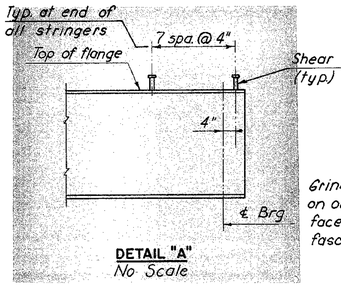
DEFLECTION SCHEDULE					
STR.	¼L & ¾L	½L	STR.	¼L & ¾L	½L
S1	1½"	2⅞"	S9	1½"	2⅞"
S2	1½"	2⅞"	S10	1½"	2⅞"
S3	1½"	2⅞"	S11	1½"	2⅞"
S4	1½"	2⅞"	S12	1½"	2⅞"
S5	1½"	2⅞"	S13	1½"	2⅞"
S6	1½"	2⅞"	S14	1½"	2⅞"
S7	1½"	2⅞"	S15	1½"	2⅞"
S8	1½"	2⅞"	S16	1½"	2⅞"

NOTE TO CONTRACTOR:
The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.

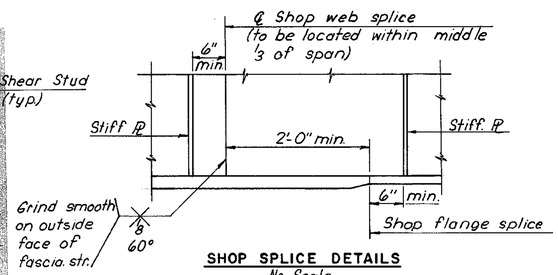


STRINGER ELEVATION

STRINGER SCHEDULE												
STR.	LENGTH ℄ BRG. TO ℄ BRG.	℄ A	DIM. A	℄ B	℄ C	DIM. C	℄ D	SHEAR STUD SPACING				
								0.1L	0.2L	0.3L	0.4L	0.5L
S1 & S9	99'-0⅞"	16 x 1¼	52'-0"	16 x ⅞	18 x 2	60'-0"	18 x 1⅜	10½"	12½"	14½"	20"	23"
S2 & S10	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S3 & S11	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S4 & S12	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S5 & S13	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S6 & S14	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S7 & S15	99'-0⅞"	16 x 1⅛	54'-0"	16 x ¾	18 x 1⅞	62'-0"	18 x 1¼	11"	12½"	15½"	18½"	23"
S8 & S16	99'-0⅞"	16 x 1¼	52'-0"	16 x ⅞	18 x 2	60'-0"	18 x 1⅜	10½"	12½"	14½"	20"	23"



DETAIL "A"
No Scale



SHOP SPLICE DETAILS
No Scale

SHEAR STUD NOTE:
Capacity = 3,400 lbs. per stud.
The 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 reinforcing.
Shear stud spacing shown is maximum spacing.

AS BUILT

	BY	DATE				
MADE	T.E.M.	5-9-67				
CHECKED	D.E.K.	10-24-67	1	As Built	J.P.C.	3-73
IN CHARGE	PRY		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

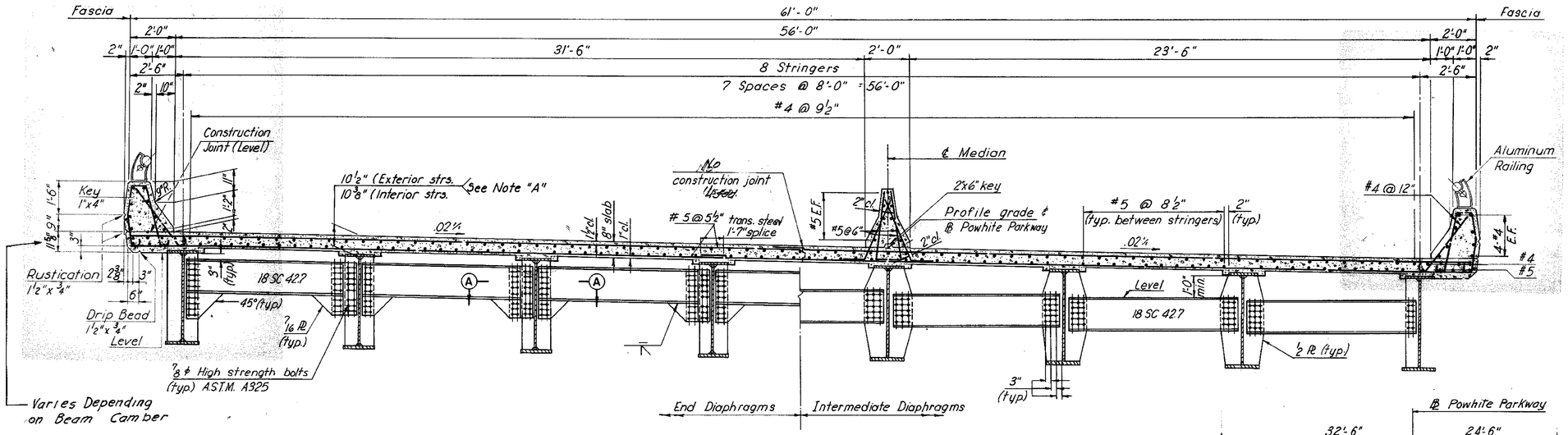
POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04

FRAMING PLAN

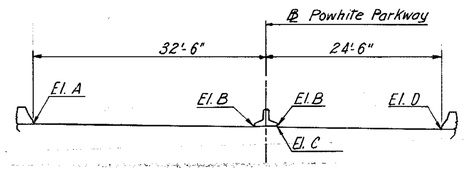
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 8 OF 14

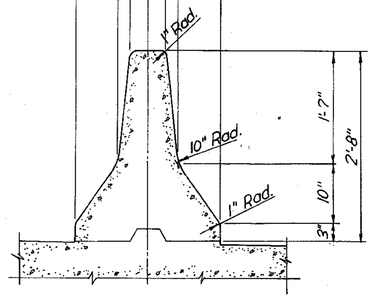
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	126	188



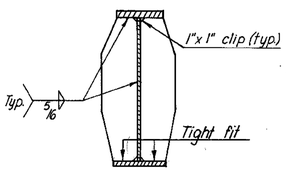
TYPICAL CROSS SECTION
Scale ⅜" = 1'-0"



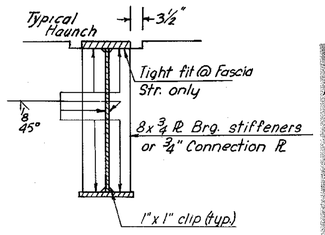
NOTE "A":
Dimension shown is measured from top of web to top of slab at the intersection of the centerline of stringer and the centerline of bearing. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.



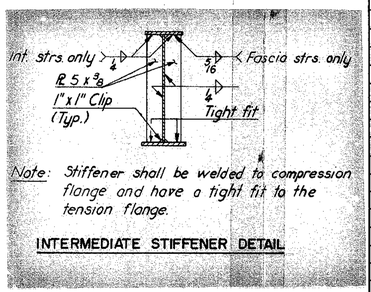
TYPICAL MEDIAN SECTION
Scale 1" = 1'-0"

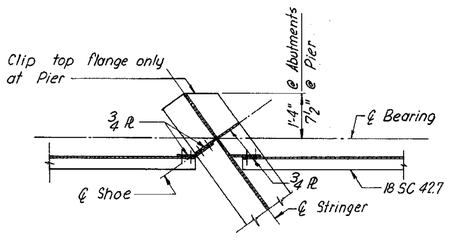


INTERIOR DIAPHRAGM CONNECTION PLATE
Scale ½" = 1'-0"



END DIAPHRAGM CONNECTION PLATE AND/OR BEARING STIFFENERS





SECTION A-A
Scale ½" = 1'-0"

GUTTER LINE ELEVATION				
STATION	EL. A	EL. B	EL. C	EL. D
31+60.00	178.17	177.54	177.50	177.03
70.00	178.25	177.62	177.58	177.11
76.04	——	——	——	177.16
80.00	178.33	177.70	177.66	177.19
90.00	178.39	177.76	177.72	177.25
93.01	——	——	177.73	——
94.45	——	177.78	——	——
32+00.00	178.44	177.81	177.77	177.30
10.00	178.49	177.86	177.82	177.35
17.20	178.51	——	——	——
20.00	178.52	177.89	177.85	177.38
30.00	178.55	177.92	177.88	177.41
40.00	178.56	177.93	177.89	177.42
50.00	178.56	177.93	177.89	177.42
60.00	178.56	177.93	177.89	177.42
70.00	178.54	177.91	177.87	177.40
77.89	——	——	——	177.39
80.00	178.52	177.89	177.85	177.38
90.00	178.48	177.85	177.81	177.34
94.86	——	——	177.79	——
96.30	——	177.83	——	——
33+00.00	178.44	177.81	177.77	177.30
10.00	178.38	177.75	177.71	177.24
19.05	178.33	——	——	——
20.00	178.32	177.69	177.65	177.18
30.00	178.24	177.61	177.57	177.10
40.00	178.16	177.53	177.49	177.02
50.00	178.06	177.43	177.39	176.92
60.00	177.96	177.33	177.29	176.82
70.00	177.85	177.22	177.18	176.71
79.74	——	——	——	176.58
80.00	177.72	177.09	177.05	176.58
90.00	177.59	176.96	176.92	176.45
96.71	——	——	176.83	——
98.51	——	176.85	——	——
34+00.00	177.45	176.82	176.78	176.31
10.00	177.29	176.66	176.62	176.15
20.00	177.13	176.50	176.46	175.99
20.90	177.12	——	——	——
30.00	176.95	176.32	176.28	175.81

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.E.M.	9-21-67	2	As Built	JRC	3-73
CHECKED	D.E.K.	10-67	1	Parapet	EVR	12-70
IN CHARGE						

AS BUILT

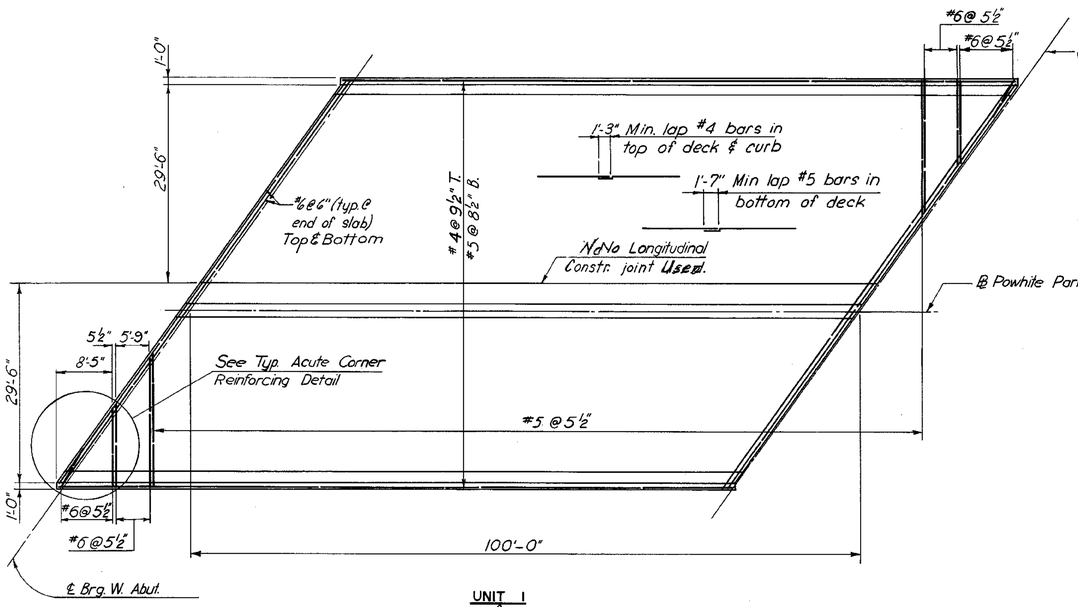
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04
CROSS SECTION

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

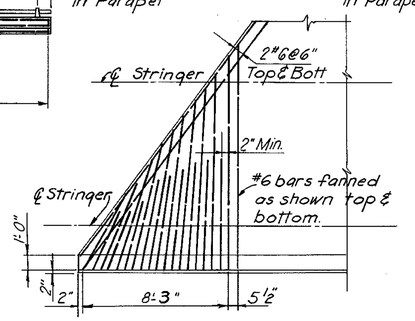
SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 9 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	127	188

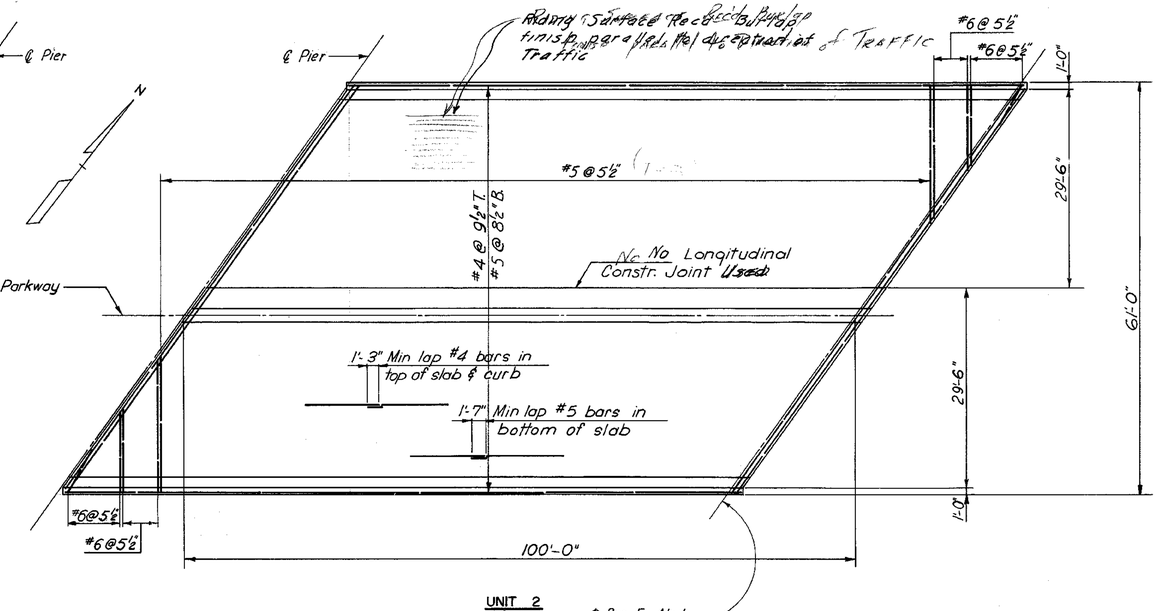


UNIT 1
Scale 3/32"=1'-0"

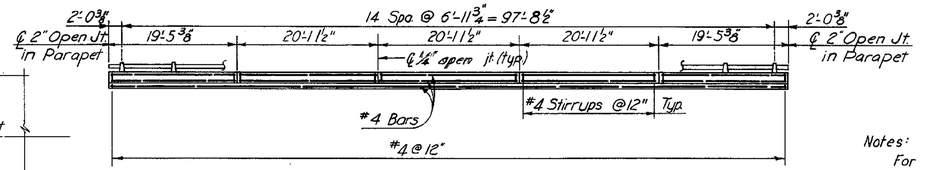
CURB AND PARAPET ELEVATION
No Scale



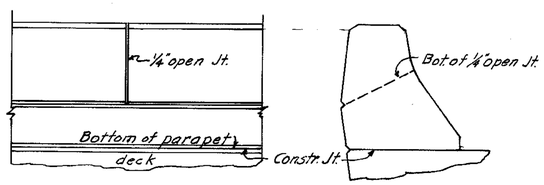
TYPICAL ACUTE CORNER REINFORCING DETAIL
No Scale



UNIT 2
Scale 3/32"=1'-0"



CURB AND PARAPET ELEVATION
No Scale



JOINT IN CURB
No Scale

Notes:
For location and spacing of deck reinforcing, parapet reinforcing see Cross Section sheet.
For location and spacing of reinforcing in haunch over end diaphragm, see Joint Details sheet.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EVE	9-21-67	2	As Built	JRC	3-73
CHECKED	TEM	10-23-67	1	Parapet	HBW	12-70
IN CHARGE	PRY					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

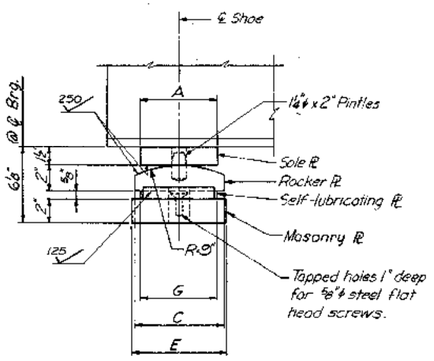
POWHITE PARKWAY OVER CHIPPENHAM PARKWAY
BRIDGE B-04

DECK PLANS

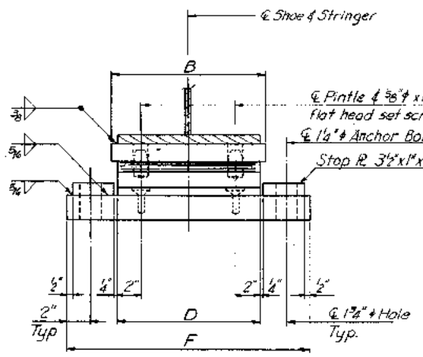
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 10 OF 14

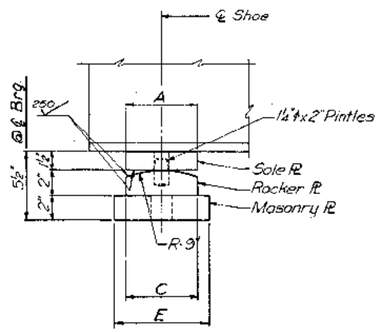
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	182	188



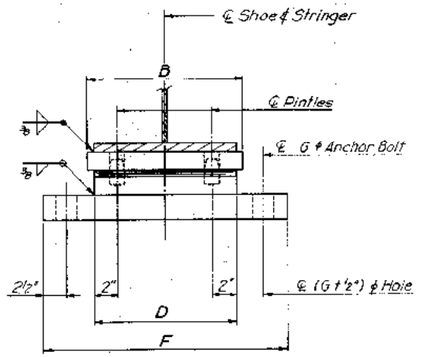
SIDE ELEVATION



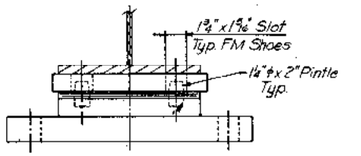
END ELEVATION



SIDE ELEVATION



END ELEVATION

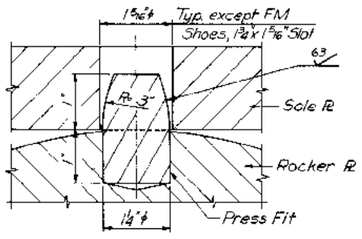


Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

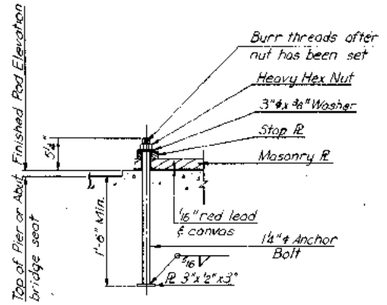
END ELEVATION

Note:
Sole PL is to be beveled to compensate for grade.

EXPANSION SHOE
No Scale

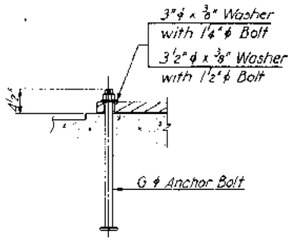


PINTLE DETAIL
Scale: ¾"=1"



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

FIXED MODIFIED SHOE
No Scale

SHOE DIMENSIONS

EXPANSION SHOES									FIXED SHOES							
TYPE	NO. REQD.	A	B	C	D	E	F	G	TYPE	NO. REQD.	A	B	C	D	E	F	G
E1	29	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	F1	40	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"
E2	8	6"	1'-1"	8½"	1'-0"	9"	1'-8½"	6½"									
E3	3	6"	1'-1"	9"	1'-1"	9½"	1'-9½"	7"	F4	8	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"
E6	16	6"	1'-7"	8"	1'-6"	8½"	2'-2½"	6"	F4M	8	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"

Shoe Notes:

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 plane surfaces.

Contact surfaces noted on the plans with finish sumbols shall be finished in accordance with the American Standards Association surface roughness requirement as defined in ASA B461, 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 of 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 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 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.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.E.M	1-17-68				
CHECKED	A.B.P.	3-68	1	General	J.G.V.	10-70
IN CHARGE	P.R.Y.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

STANDARD
SHOE DETAILS
Bridges 4 and 5

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

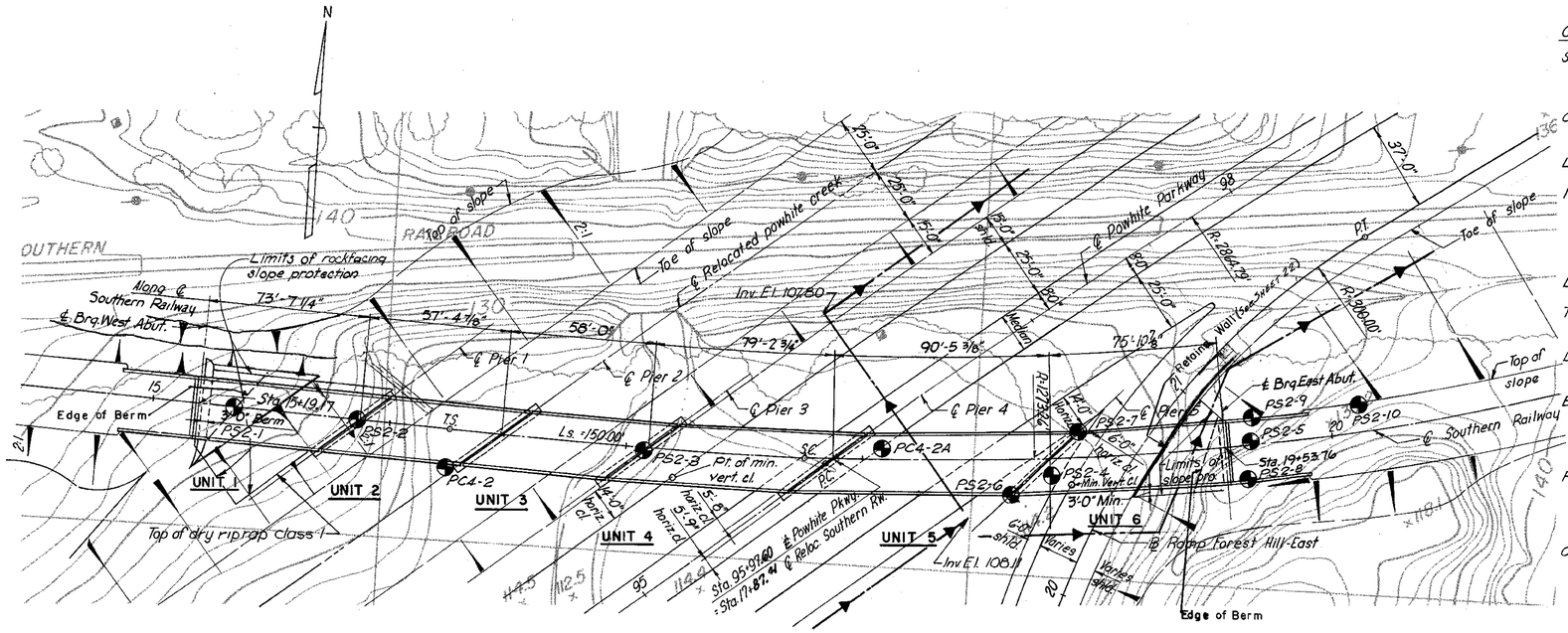
SCALE AS SHOWN
CONTRACT NO. 2
SHEET NO S1 OF

Bridge 5

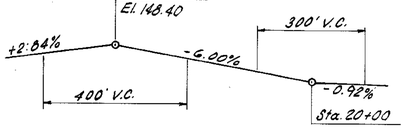
Single Track of Railroad operated by Norfolk Southern Railroad
Over
Southbound Powhite Parkway “Cash” Lanes, Southbound Powhite Parkway “Express” Lanes and a Single Lane Ramp from Westbound Forest Hill Ave. to Northbound Powhite Parkway

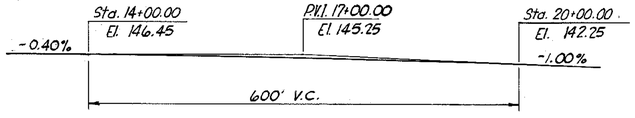
Record Set Plans

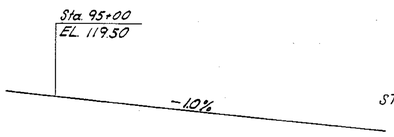
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	132	188



PLAN
Scale 1"=30'-0"



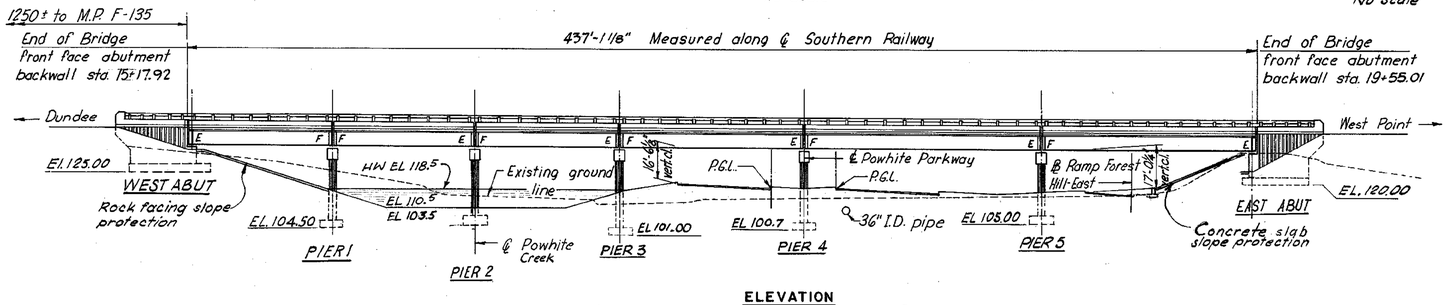




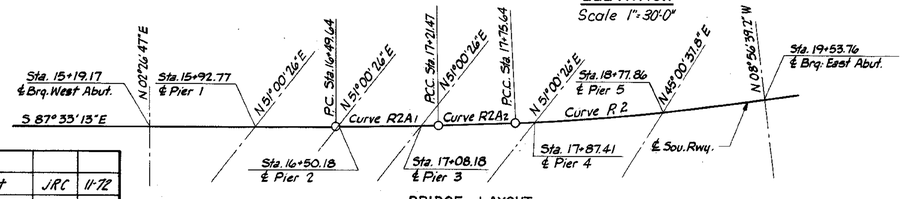
PROFILE GRADE
RAMP F-E
No Scale

PROFILE GRADE
SOUTHERN RAILWAY
No Scale

PROFILE GRADE
POWHITE PARKWAY
No Scale



ELEVATION
Scale 1"=30'-0"



BRIDGE LAYOUT
No Scale

Curve R2A1 (Arc Defin.)	Curve R2A2 (Arc Defin.)	Curve R2 (Chord Defin.)
R = 3353.53	R = 1445.00'	R = 1273.26'
Δ = 1°13'38.4"	Δ = 2°08'51.5"	L = 384.45'
T = 35.92'	T = 27.08'	D = 4°30'
L = 71.84'	L = 54.17'	
D = 1°42'30.7"	D = 3°57'54.4"	

	BY	DATE				
MADE	JOB	1-68	2	As Built	JRC	11-72
CHECKED	JGD	2-68	1	Dim. Unit 6 Brg. E. Abut.	TEM.	6-68
IN CHARGE	JGD		NO.	REVISION	BY	DATE

GENERAL NOTES :

SPECIFICATIONS :
A.R.E.A., current.
WELDING - 1969 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.

LIVE LOAD :
Cooper's E-80

IMPACT :
Diesel impact plus rolling effect. Concrete Slab Derailment Impact :

$$LL \times \frac{LL}{DL + LL}$$

Structural Steel Derailment Impact :
0.9 x LL

DATUM :
CITY OF RICHMOND

TEMPERATURE :
The normal temperature referred to on the plan 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.

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 kept dry and special attention is called to Section 401.05 of the General Specifications, and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES :
Concrete in superstructure shall be Class A4 with a maximum slump of 2½ inches. All other 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 gradient is over 2%).

Finishing concrete surfaces : See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform to A.S.T.M. 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. Specification A36 except as Noted.

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.

BENCH MARK :
See Reference Ties and Field Control Data sheet in highway plans.
F-17 (Copper Weld Rod) Elevation 139.03
F-20 (Copper Weld Rod) Elevation 145.80

INDEX

Note :
See sh. 2 for Slab Elevations and Estimated Quantities.

⊕ — 2½" ϕ Cased Holes

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER POWHITE PARKWAY
BRIDGE B-05

GENERAL PLAN & ELEVATION

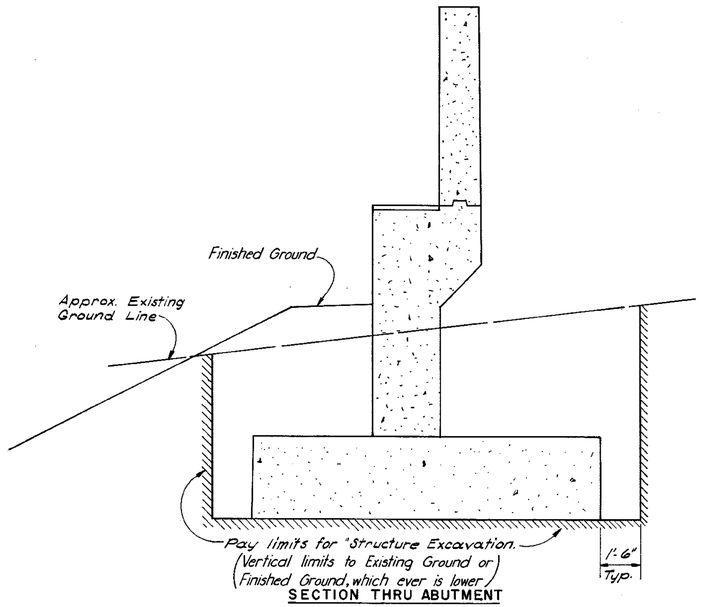
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

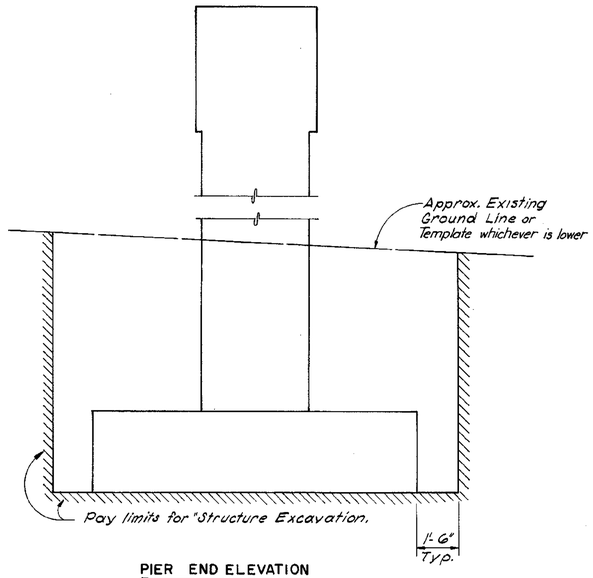
SCALE: AS SHOWN
CONTRACT NO.: C-2
SHEET NO. 1 OF 19

SOUTHERN RY. M.P F-135

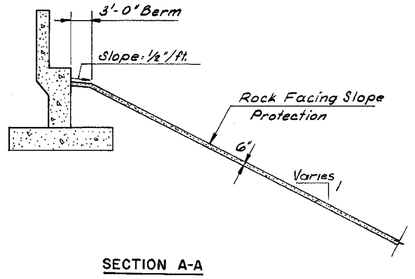
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	133	188



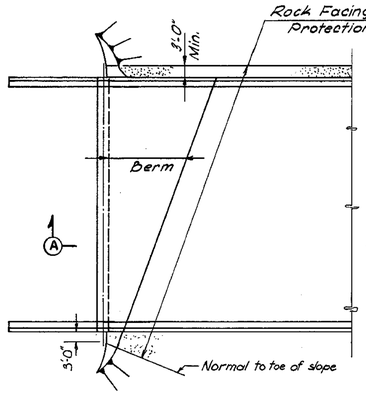
SECTION THRU ABUTMENT



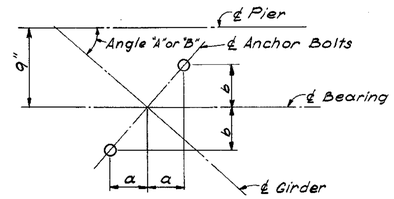
PIER END ELEVATION



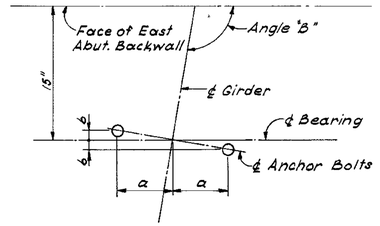
SECTION A-A



PLAN OF SLOPE PROTECTION
WEST ABUTMENT
(East Abutment Similar)
with concrete slope protection.



PIER ANCHOR BOLT SETTING DIAGRAM
Scale: 1½" = 1'-0"



EAST ABUTMENT ANCHOR BOLT SETTING DIAGRAM
Scale: 1½" = 1'-0"

ESTIMATED QUANTITIES

	Structure Excavation C.Y.	Concrete (a) C.Y.	Reinforcing Steel Lbs.	Structural Steel Lbs.	Aluminum Br. Railing 1 Rail L.F.	Bridge Drainage System L.S.	Porous Backfill C.Y.	Rock Facing Slope Protec. 6" Thick S.Y.	Asphalt Damp proofing S.Y.	Concrete Class A-3 Retg. Wall C.Y.	Concrete Slab Slope Protection S.Y.
		(b)			(c)	(d)					
Superstructure		544.88	83,283	1,482,037	1,008	1					
West Abutment	445	225.15	21,598				44	326	102		
Pier 1	304	184.45	40,506								
Pier 2	138	174.28	24,870								
Pier 3	263	203.09	41,816								
Pier 4	498	264.45	31,414								
Pier 5	356	231.15	41,800								
East Abutment	393	241.92	25,359				55		127	17	113
Total	2,397	1,524.49 (a) 544.88 (b)	310,646	1,482,037	1,008	1	99	326	229	17	113

(a) Class A3, Unless noted.
(b) Class A4.
(c) Includes that portion on abutments & wingwalls.
(d) Includes underdrains

SLAB ELEVATIONS

Location	Lt. Curb Elev.	Crown Elev.	Rt Curb Elev.
Face of Bkwl. West Abut.	143.98	144.10	143.98
℄ Pier 1	143.50	143.69	143.65
℄ Pier 2	143.13	143.34	143.30
℄ Pier 3	142.73	142.94	142.92
℄ Pier 4	142.13	142.35	142.35
℄ Pier 5	141.36	141.60	141.60
Face of Bkwl. East Abut.	140.76	140.88	140.76

ANCHOR BOLT SETTING DIMENSIONS

Girder	Angle "A" or "B" a	Angle "A" or "B" b	Girder	Angle "A" a	Angle "A" b	Angle "B" a	Angle "B" b
S1-S16	7 5/8"	8 5/8"	S33	7 3/16"	10 1/4"	8 3/16"	9 7/16"
S17	7 1/2"	8 3/4"	S34	7 3/16"	10 5/16"	8 1/4"	9 7/16"
S18-S22	7 1/8"	8 11/16"	S35-S38	7 1/4"	10 3/16"	8 5/16"	9 3/8"
S23	7 9/16"	8 5/8"	S39	7 5/16"	10 1/8"	8 5/16"	9 5/16"
S24	7 5/8"	8 5/8"	S40	7 3/8"	10 1/16"	8 3/8"	9 1/4"
S25	7 3/4"	9"	S41-S46	7 1/16"	9 1/16"	11 1/2"	0 3/8"
S26	7 1/4"	8 15/16"	S47 & S48	7 5/8"	9 1/8"	1'-0 1/2"	9 3/8"
S27-S31	7 1/4"	8 7/16"					
S32	7 5/16"	8 7/8"					

	BY	DATE	NO.	REVISION	BY	DATE
			4	As Built	R.J.H.	11-72
			3	General	J.G.V.	10-70
MADE	JDB	2-68	2	Anchor Bolt set. dim.	T.E.M.	6-68
CHECKED	JGD	3-68	1	Quantity	DSB	5-68
IN CHARGE	JGD					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

QUANTITIES & MISC. DETAILS

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

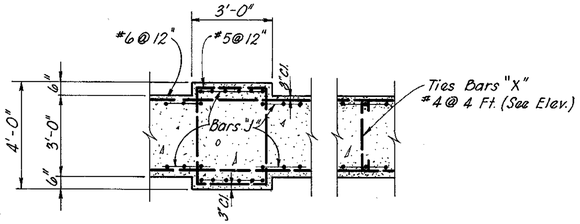
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 2 OF 19

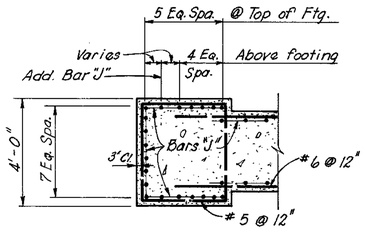
SOUTHERN RY. M.P F-135.2

A2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	138	188



SECTION B - B

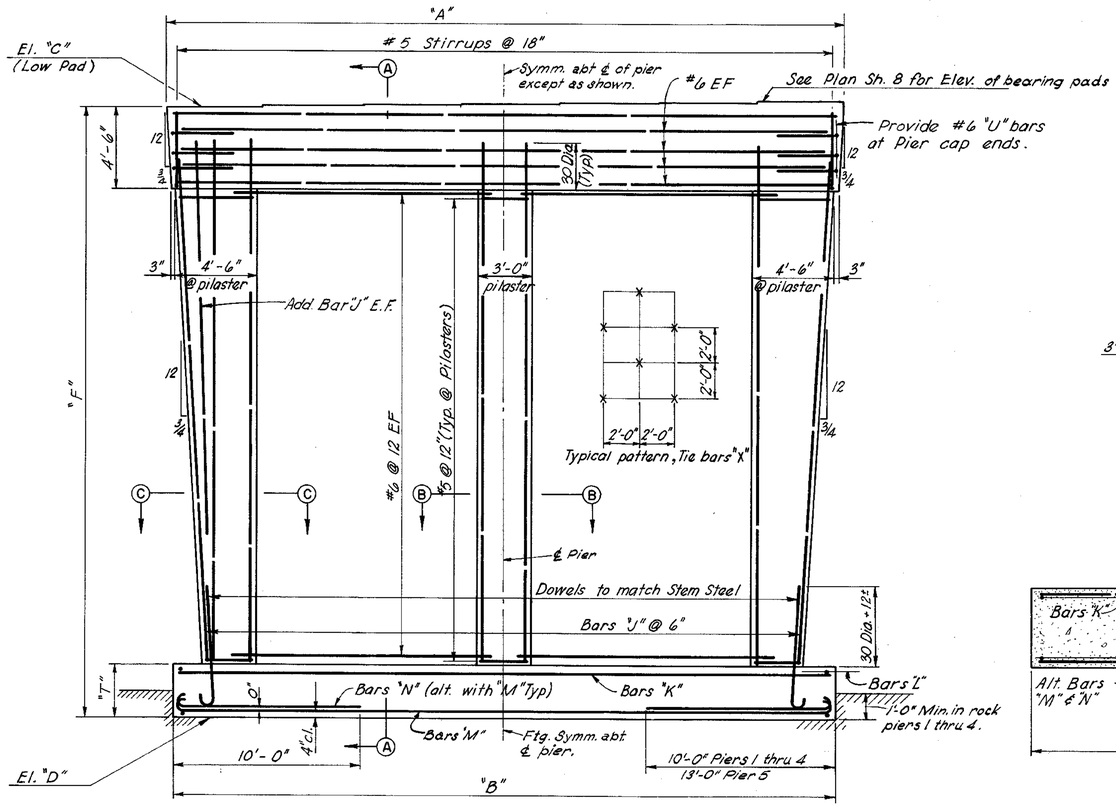


SECTION C - C

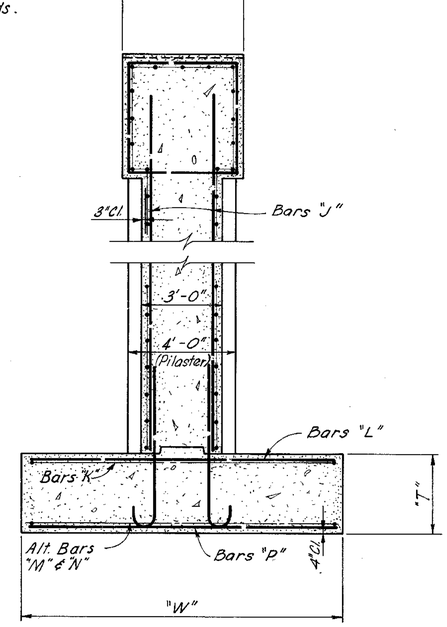
Note to Contractor

Attention is called to the apparent erratic location of the top of rock in the vicinity of Pier 5. If, after excavation for Pier 5, the majority of founding material located at Elevation 105 is rock, all pockets of decomposed material within the limits of the excavation shall be removed and backfilled with Class A3 concrete. Conversely, if the majority of founding material is decomposed rock, areas of projecting bedrock shall be removed to an elevation one foot below the footing elevation and backfilled to the footing elevation with a blanket of well compacted granular material similar in nature to the majority founding material.

Any additional excavation required by the above will be paid for at the unit price bid for Structure Excavation. Additional Class A3 concrete required, amounting to 1 cubic yard or more, will be paid for at the unit price bid for Concrete, Class A3, Substructures. No additional payment will be made for backfilling with granular material.



TYPICAL ELEVATION
(Looking ahead on stationing)



SECTION A - A

PIER	ELEVATION "C"	ELEVATION "D"	DIMENSION "A"	"B"	"F"	"W"	"T"	ALLOW.
1	136.07	104.5	37'-9"	37'-0"	31.57	12'-0"	3'-6"	7 ton
2	135.52	103.5	37'-9"	37'-0"	32.02	9'-0"	3'-6"	7 ton
3	135.31	101.0	38'-6"	40'-0"	34.31	12'-0"	3'-6"	6 ton
4	134.66	100.7	40'-6"	45'-0"	33.92	17'-0"	4'-3"	4 ton
5	133.87	105.0	39'-0"	45'-0"	28.87	17'-0"	4'-0"	4 ton

PIER	REINFORCING STEEL "J"	"K"	"L"	"M"	"N"	"P"	
1	#11	#5@18"	#6@12"	#6@14"	#6@14"	#10@6"	
2	#9	–	–	#6@16"	#6@16"	#7@7"	
3	#11	#5@18"	#6@12"	#8@16"	#8@16"	#9@8"	
4	#10	–	–	#6@15"	#6@15"	#9@8"	
5	#9	–	–	#9@14"	#9@14"*	#9@7"	* 13' long

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	WCJ	1-68	1	Note added	TEM.	4-68
CHECKED	THN	2-68	2	Pad El & Dim.	TEM.	6-68
IN CHARGE	JGD		3	As Built	RH	11-72

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER POWHITE PARKWAY
BRIDGE B-05

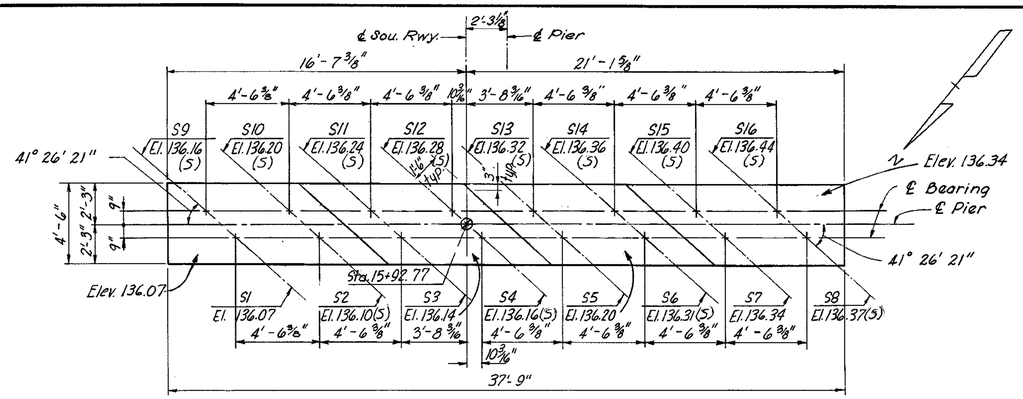
PIER DETAILS

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

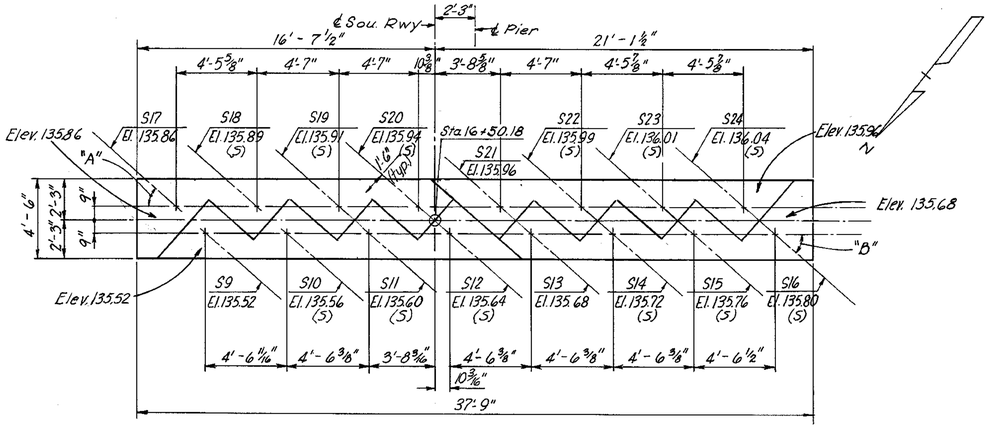
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: 3/8" = 1'-0"
CONTRACT NO: 2
SHEET NO. 7 OF 19

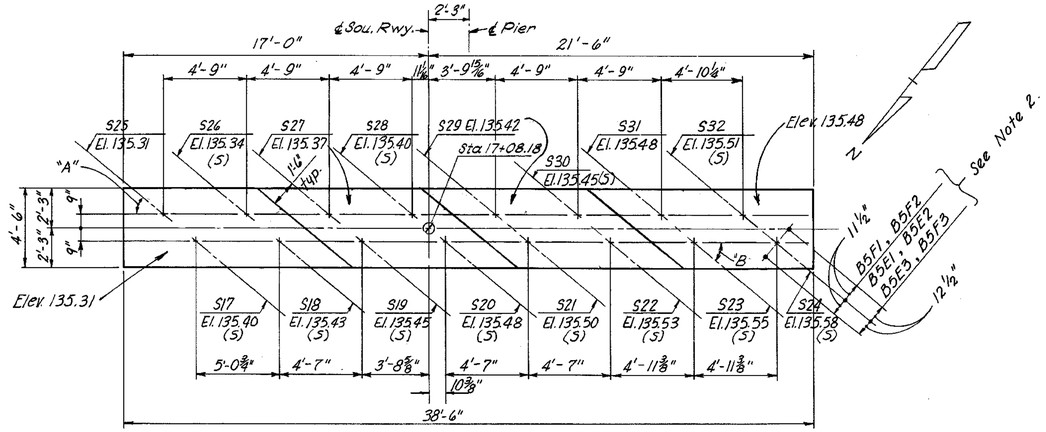
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	139	188



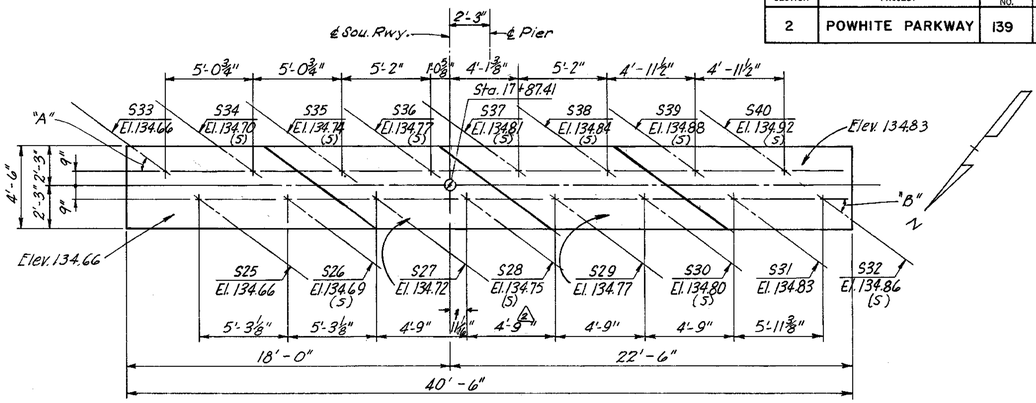
PLAN - PIER 1



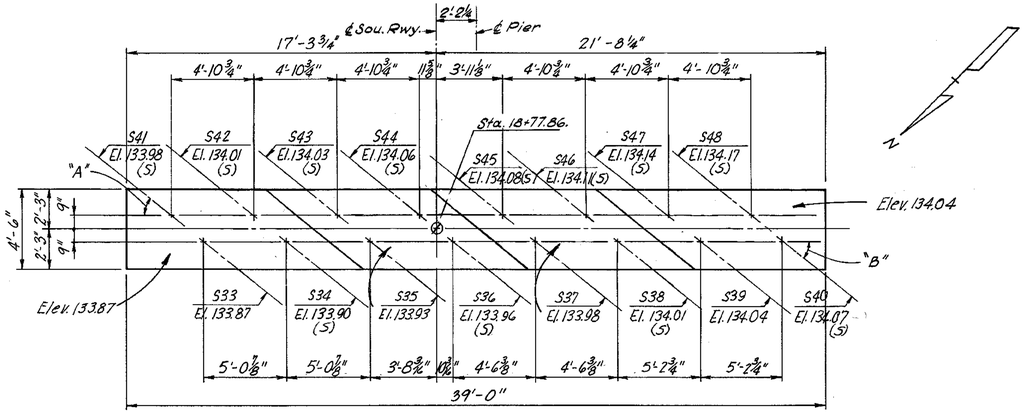
PLAN - PIER 2



PLAN - PIER 3



PLAN - PIER 4



PLAN - PIER 5

Notes :

1. For angles "A" or "B" See Sheet 9.
2. For anchor bolt location see Anchor Bolt Setting Dimensions - Sheet 2.
3. (S) = Shimmed to Elevation shown. Shim constructed of single steel plate of required thickness.

AS BUILT

	BY	DATE
MADE	WCJ	1-68
CHECKED	THN	2-68
IN CHARGE	JGD	

NO.	REVISION	BY	DATE
3	As Built	JRC	11-72
2	Dim. Pier #4	JRC	6-17-71
1	Pad El. & dim	TEN.	6-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

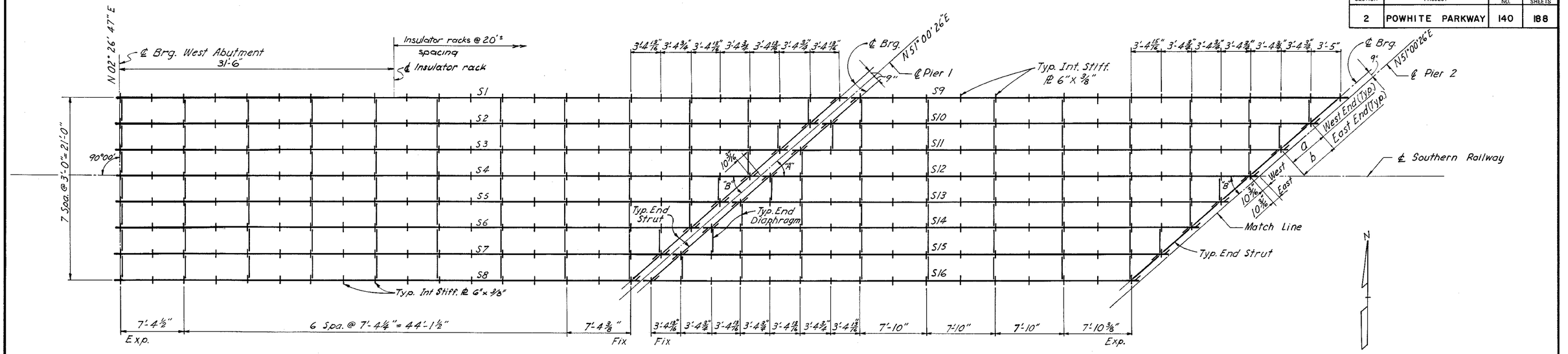
SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05
PIER DETAILS

SCALE: 1/4" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 8 OF 19

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

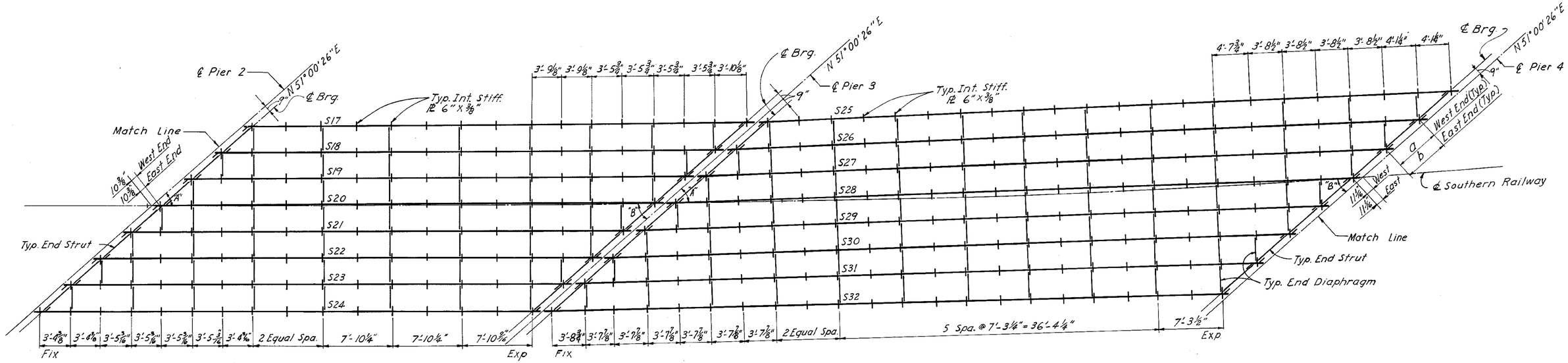
SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	140	188



UNIT 1

UNIT 2



UNIT 3

UNIT 4

GIRDER	ANGLE "A"	ANGLE "B"	GIRDER	ANGLE "A"	ANGLE "B"	GIRDER	ANGLE "A"	ANGLE "B"
S1 Thru S8	90°00'00"	41°26'21"	S25	38°41'28"	38°41'28"	S39	35°52'18"	41°52'07"
S9	41°25'19"	41°25'19"	S26	38°55'32"	38°55'32"	S40	36°14'36"	42°14'24"
S10 Thru S16	41°26'21"	41°26'21"	S27 Thru S31	39°09'45"	39°09'45"	S41 Thru S48	37°45'11"	91°42'28"
S17	40°30'28"	40°30'28"	S32	39°41'14"	39°41'14"			
S18 Thru S22	40°53'59"	40°53'59"	S33	34°56'27"	40°56'15"			
S23	41°12'35"	41°12'35"	S34	35°13'16"	41°13'04"			
S24	41°31'24"	41°31'24"	S35 Thru S38	35°29'58"	41°29'46"			

Note:
See sh. 10 for shoe schedule.
See Girder Details, Sheet 11, for dimensions not shown.
Int. stiff. fls. to be placed halfway between diaphragm connectors, unless otherwise shown.

AS BUILT

	BY	DATE
MADE	H.B	1-68
CHECKED	T.H.N.	2-68
IN CHARGE	JGD	

NO.	REVISION	BY	DATE
2	As Built	JEC	11-72
1	Diaph. spa.	DSB	6-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

FRAMING PLAN

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

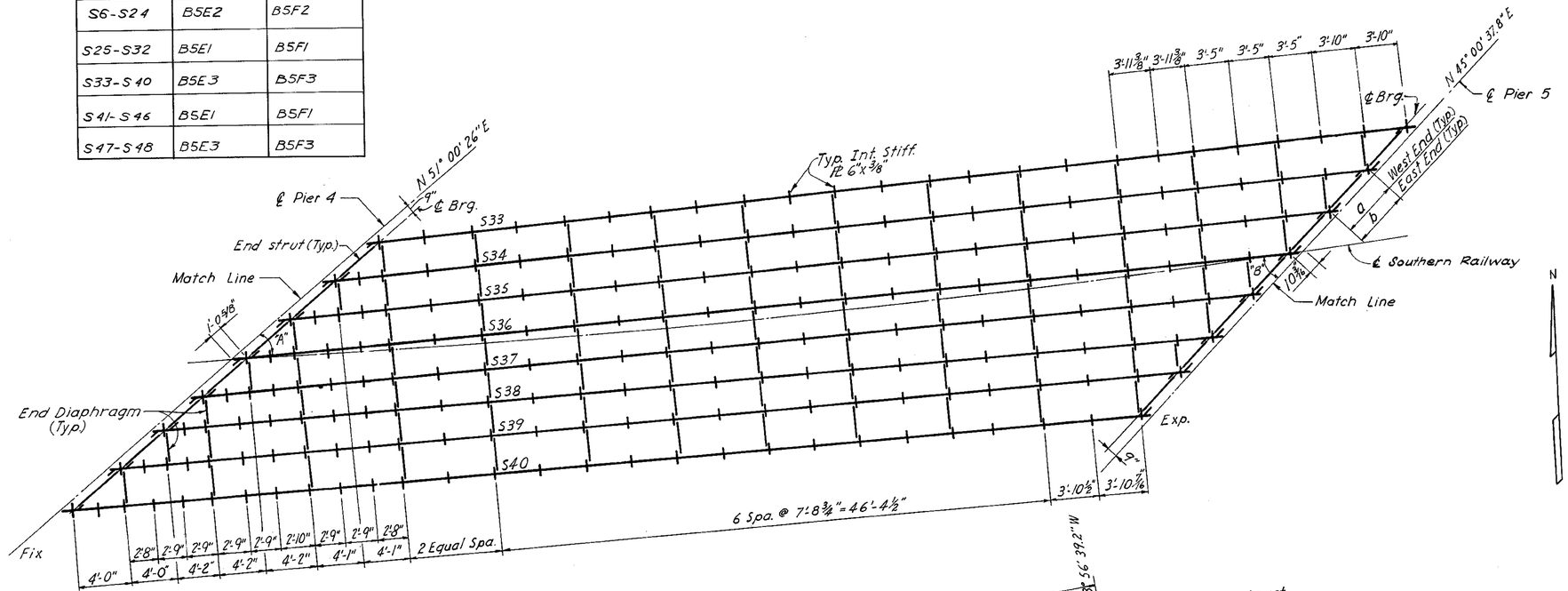
SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 9 OF 19

SOUTHERN RY. M.P F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	141	188

Dimensions given along ℄ Brg.		
Location	West a	East b
S1-S2	3'-0"	4'-6 3/8"
S2-S3	3'-0"	4'-6 3/8"
S3-S4	3'-0"	4'-6 3/8"
S4-S5	3'-0"	4'-6 3/8"
S5-S6	3'-0"	4'-6 3/8"
S6-S7	3'-0"	4'-6 3/8"
S7-S8	3'-0"	4'-6 3/8"
S9-S10	4'-6 3/8"	4'-6 11/16"
S10-S11	4'-6 3/8"	4'-6 3/8"
S11-S12	4'-6 3/8"	4'-6 3/8"
S12-S13	4'-6 3/8"	4'-6 3/8"
S13-S14	4'-6 3/8"	4'-6 3/8"
S14-S15	4'-6 3/8"	4'-6 3/8"
S15-S16	4'-6 3/8"	4'-6 1/2"
S17-S18	4'-5 5/8"	5'-0 3/4"
S18-S19	4'-7"	4'-7"
S19-S20	4'-7"	4'-7"
S20-S21	4'-7"	4'-7"
S21-S22	4'-7"	4'-7"
S22-S23	4'-5 7/8"	4'-11 3/8"
S23-S24	4'-5 7/8"	4'-11 3/8"
S25-S26	4'-9"	5'-3 1/8"
S26-S27	4'-9"	5'-3 1/8"
S27-S28	4'-9"	4'-9"
S28-S29	4'-9"	4'-9"
S29-S30	4'-9"	4'-9"
S30-S31	4'-9"	4'-9"
S31-S32	4'-10 1/8"	5'-11 3/8"
S33-S34	5'-0 3/4"	5'-0 1/8"
S34-S35	5'-0 3/4"	5'-0 1/8"
S35-S36	5'-2"	4'-6 3/8"
S36-S37	5'-2"	4'-6 3/8"
S37-S38	5'-2"	4'-6 3/8"
S38-S39	4'-11 1/2"	5'-2 3/4"
S39-S40	4'-11 1/2"	5'-2 3/4"
S41-S42	4'-10 3/4"	3'-0"
S42-S43	4'-10 3/4"	3'-0"
S43-S44	4'-10 3/4"	3'-0"
S44-S45	4'-10 3/4"	3'-0"
S45-S46	4'-10 3/4"	3'-0"
S46-S47	4'-10 3/4"	3'-0"
S47-S48	4'-10 3/4"	3'-0"

SHOE SCHEDULE		
Stringers	Exp. Shoe Type	Fix Shoe Type
S1-S5	B5E1	B5F1
S6-S24	B5E2	B5F2
S25-S32	B5E1	B5F1
S33-S40	B5E3	B5F3
S41-S46	B5E1	B5F1
S47-S48	B5E3	B5F3



AS BUILT

	BY	DATE
MADE	H.B.	1-68
CHECKED	T.H.N.	2-68
IN CHARGE	JGD	

NO.	REVISION	BY	DATE
2	As Built	JRC	11-72
1	Diaph. s.o.s. ℄ Brg. Dim.	DSB	6-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

FRAMING PLAN

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

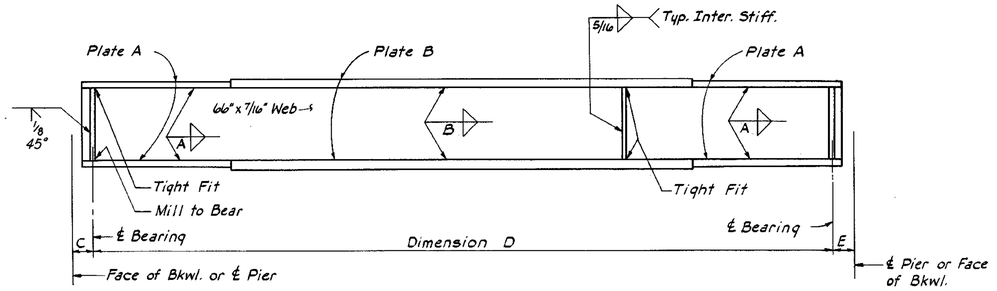
SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 10 OF 19

SOUTHERN RY. M.P. F-135.2

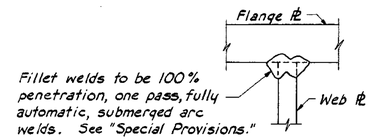
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	142	188

GIRDER SUMMARY

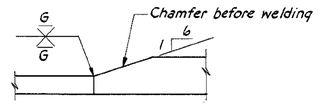
Girder Mark	PLATE A			PLATE B			Dimension			Brg. Stiff.
	Size	Length	Weld A	Size	Length	Weld B	C	D	E	Size
S1	18"x1 7/8"	16'-9 1/4"	3/8	18"x2 3/4"	51'-0"	1/2	1'-3"	82'-7 7/8"	1'-1 5/8"	8"x1"
S2	18"x1 3/4"	16'-10 5/8"	3/8	18"x2 1/2"	47'-6"	1/2		79'-3 1/16"		
S3	18"x1 1/2"	15'-1 5/16"	5/16	18"x2 1/4"	47'-6"	3/8		75'-10 5/16"		
S4	18"x1 1/2"	16'-5 3/16"	5/16	18"x2 1/8"	41'-6"	3/8		72'-5 1/2"		
S5	18"x1 1/4"	14'-9 1/8"	5/16	18"x1 7/8"	41'-6	3/8		69'-0 3/16"		
S6	18"x1 1/8"	14'-3 3/16"	5/16	18"x1 5/8"	39'-0"	3/8		65'-7 1/16"		
S7	18"x1"	13'-7 7/8"	5/16	18"x1 1/2"	37'-0"	5/16		62'-3 3/16"		
S8	18"x 7/8"	13'-2"	5/16	18"x1 1/4"	34'-6"	5/16	1'-3"	58'-10 3/8"	1'-1 5/8"	8"x1"
S9	18"x 7/8	14'-0 5/8"	5/16	18"x1 1/8"	29'-0"	5/16	1'-1 5/8"	55'-2 5/16"	1'-1 5/8"	8"x 3/4"
S10-S16	18"x 7/8"	14'-0 1/2"	5/16			5/16	1'-1 5/8"	55'-1 3/16"	1'-1 5/8"	
S17	18"x 7/8"	14'-7"	5/16			5/16	1'-1 7/8"	56'-6 1/4"	1'-1 7/8"	
S18	18"x 7/8"	14'-6 9/16"	5/16			5/16	1'-1 3/4"	55'-8 3/8"	1'-1 3/4"	
S19	18"x 7/8"	14'-6 9/16"	5/16			5/16	1'-1 3/4"	55'-8 3/8"	1'-1 3/4"	
S20	18"x 7/8"	14'-4 3/16"	5/16			5/16	1'-1 3/4"	55'-8 3/8"	1'-1 3/4"	
S21	18"x 7/8"	14'-6 9/16"	5/16			5/16	1'-1 3/4"	55'-8 3/8"	1'-1 3/4"	
S22	18"x 7/8"	14'-6 9/16"	5/16			5/16	1'-1 3/4"	55'-8 3/8"	1'-1 3/4"	
S23	18"x 7/8"	14'-2"	5/16			5/16	1'-1 5/8	55'-4 3/8"	1'-1 5/8"	
S24	18"x 7/8"	13-11 7/8"	5/16	18"x1 1/8"	29'-0"	5/16	1'-1 7/8"	55'-0 5/8"	1'-1 7/8"	8"x 3/4"
S25	18"x1 5/8"	16'-3 5/16"	3/8	18"x 2 3/8"	47'-0"	1/2	1'-2 3/8"	77'-7 1/8"	1'-2 5/8"	8"x 7/8"
S26	18"x1 5/8"	16'-1 1/2"	3/8	18"x 2 3/8"	47'-0"	1/2	1'-2 5/16"	77'-2 3/16"	1'-2 5/16"	8"x 7/8"
S27		15'-11 1/16"	3/8			1/2	1'-2 1/4"	76'-9 5/8"	1'-2 1/4"	
S28		15'-11 1/16"	3/8			1/2	1'-2 1/4"	76'-9 5/8"	1'-2 1/4"	
S29		15'-11 1/16"	3/8			1/2	1'-2 1/4"	76'-9 5/8"	1'-2 1/4"	
S30		15'-11 1/16"	3/8			1/2	1'-2 1/4"	76'-9 5/8"	1'-2 1/4"	
S31		15'-11 1/16"	3/8			1/2	1'-2 1/4"	76'-9 5/8"	1'-2 1/4"	
S32	18"x1 5/8"	15'-5 3/16"	3/8	18"x 2 3/8"	47'-0"	1/2	1'-2 1/8"	75'-11 1/2"	1'-2 1/8"	8"x 7/8"
S33	20"x 2"	17'-4"	3/8	20"x 2 7/8"	54'-0"	1/2	1'-3 3/4"	86'-6 1/2"	1'-1 3/4"	9"x1"
S34		17'-5 3/16	3/8			1/2	1'-3 5/16"	86'-10 3/8"	1'-1 5/8"	
S35		17'-7 1/16"	3/8			1/2	1'-3 1/2"	87'-2 1/4"	1'-1 5/8"	
S36		18'-0 9/16"	3/8	20"x 2 7/8"	54'-0"	1/2	1'-3 1/2"	88'-0"	1'-1 5/8"	9"x1"
S37		16'-11 7/16"	3/8	20"x3"	57'-0	1/2	1'-3 1/2"	88'-9 3/4"	1'-1 5/8"	
S38		17'-8 5/16"	3/8			1/2"	1'-3 1/2"	89'-7 1/2"	1'-1 5/8"	
S39		17'-4 13/16"	3/8			1/2	1'-3 5/8"	89'-9"	1'-1 1/2"	
S40	20"x2"	17'-5 5/16"	3/8	20"x3"	57'-0"	1/2	1'-3 1/4"	89'-10 5/16"	1'-1 5/8"	9"x1"
S41	18"x 1 1/8"	14'-2 1/2"	5/16	18"x 1 5/8"	36'-6"	1/2	1'-2 5/8"	62'-9 3/8"	1'-3"	8"x1"
S42	18"x1 1/4"	14'-5 1/4"	5/16	18"x1 3/4"	40'-0"	3/8	1'-2 5/8"	66'-8 7/8"	1'-3"	
S43	18"x1 3/8"	14'-8 1/16"	5/16	18"x2"	43'-6"	3/8	1'-2 5/8"	70'-8 1/2"	1'-3"	
S44	18"x1 1/2"	15'-1 3/16"	5/16	18"x2 1/4"	46'-6"	3/8	1'-2 5/8"	74'-8 1/8"	1-3"	
S45	18"x 1 3/4"	16'-7 5/16"	3/8	18"x2 1/2"	47'-6"	1/2	1'-2 5/8"	78'-7 5/8"	1'-3"	
S46	18"x1 1/8"	16'-6 9/16"	3/8	18"x2 3/4"	51'-6"	1/2	1'-2 7/8"	82'-6 1/4"	1'-3"	8"x1"
S47	20"x1 3/8"	17'-7 9/16"	3/8	20"x 2 3/4"	53'-6"	1/2	1'-2 5/8"	86'-6 3/4"	1'-3"	9"x1"
S48	20"x 2"	17'-10"	3/8	20"x 3"	57'-0	1/2	1'-2 5/8"	90'-6 3/8"	1'-3"	9"x1"



GIRDER DETAIL
No Scale



FLANGE PLATE WELDS
No Scale

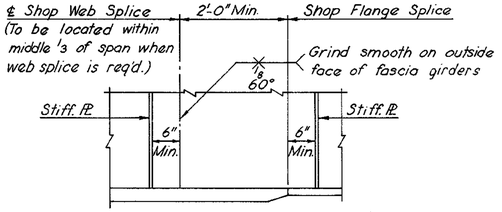


FLANGE THICKNESS TRANSITION
No Scale

DEAD LOAD DEFLECTION SUMMARY

Girder Mark	Total Dead Load Defl. @ ℄ Girder
S1, S2	1/2"
S3	7/16"
S4	3/8"
S5, S6	5/16"
S7, S8	1/4"
S9, S24	3/16"
S25, S32	7/16"
S33, S38	9/16"
S39, S40	5/8"
S41	1/4"
S42	5/16"
S43, S44	3/8"
S45	7/16"
S46	1/2"
S47	9/16"
S48	5/8"

The above deflections are those anticipated to occur in the girder upon placement of the total dead load. The girders shall not be cambered to compensate for this deflection.



SHOP SPLICE DETAILS
Scale: 3/4"=1'-0"

AS BUILT

	BY	DATE
MADE	H.B.	1-68
CHECKED	THN	2-68
IN CHARGE	JGD	

NO.	REVISION	BY	DATE
2	As Built	JRC	11-72
1	Girder Summary	T.E.M.	6-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER POWHITE PARKWAY
BRIDGE B-05

GIRDER DETAILS

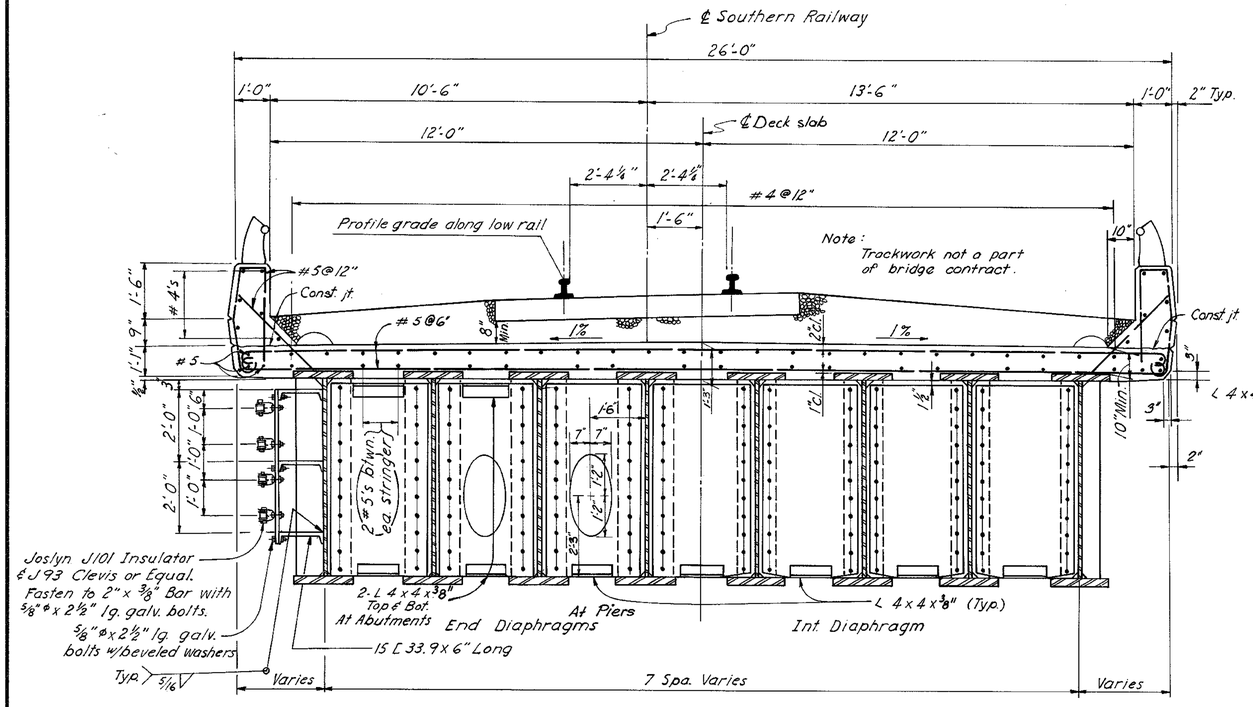
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

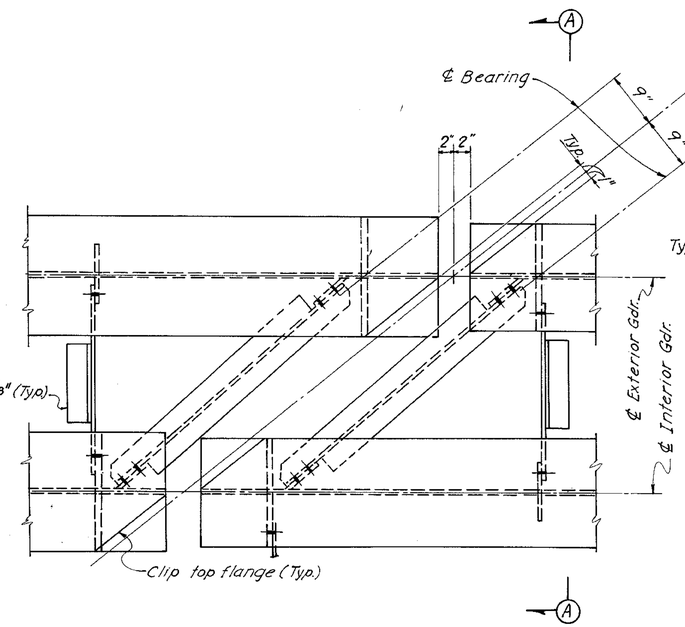
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: NO SCALE
CONTRACT NO.: 2
SHEET NO. 11 OF 19

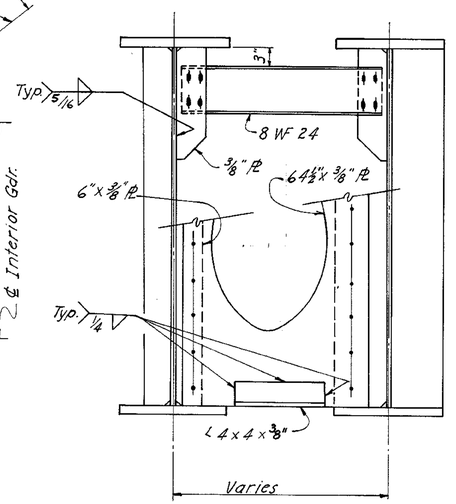
SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	143	188



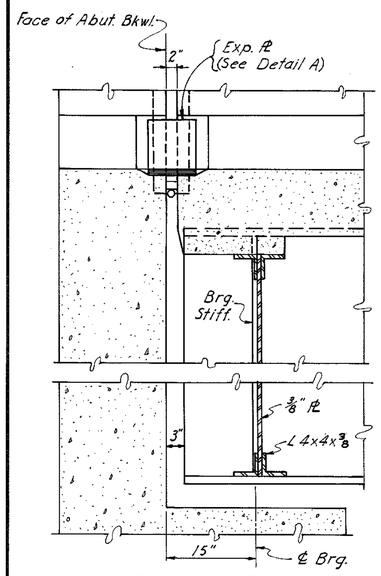


DETAIL OF END DIAPHRAGM
Scale: 1" = 1'-0"



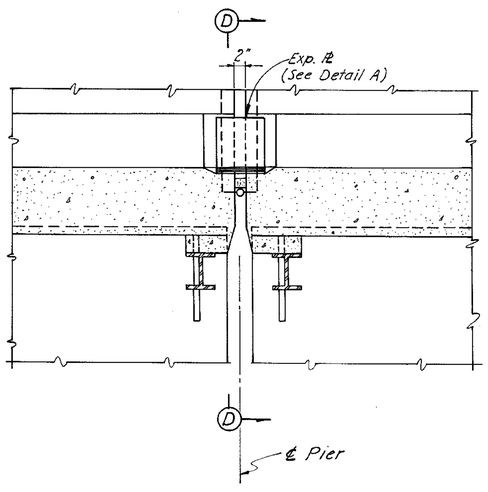
SECTION A-A
Scale: 1" = 1'-0"

NOTE:
Space rocks 20'-0" apart along girders. Fasten high frequency wires to inside of insulators (Max. tension 250 #).

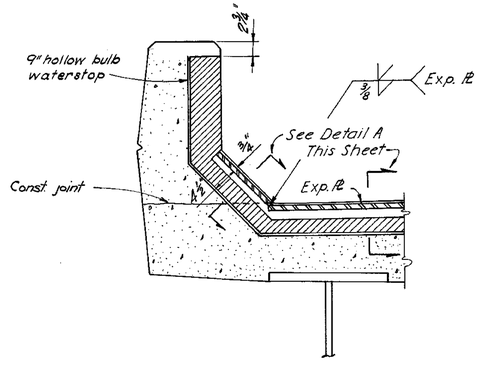


SECTION AT ABUTMENT
Scale: 1" = 1'-0"

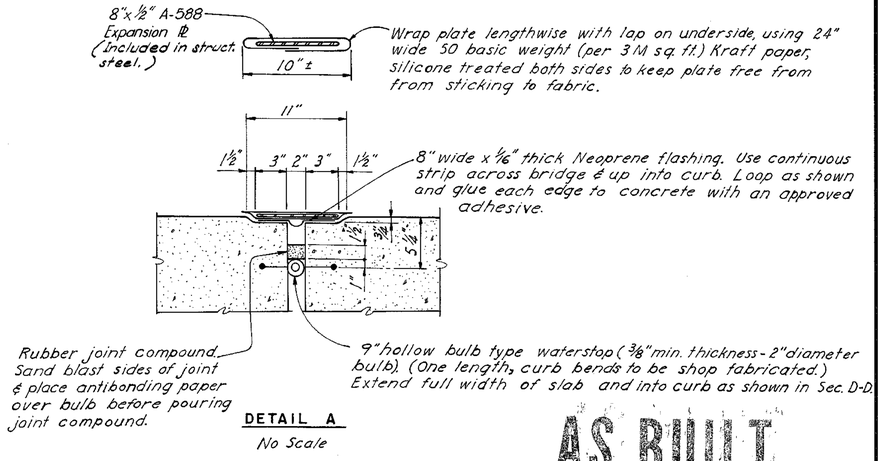
TYPICAL TRANSVERSE SECTION
Scale: ½" = 1'-0"



SECTION AT PIER
Scale: 1" = 1'-0"



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



DETAIL A
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
			3	As Built	JRC	11-72
MADE	HB	1-68	2	General	J.G.V.	10-70
CHECKED	THN	2-68	1	End diaph & dim.	TEM	6-68
IN CHARGE	JGD					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER POWHITE PARKWAY
BRIDGE B-05

SUPERSTRUCTURE DETAILS

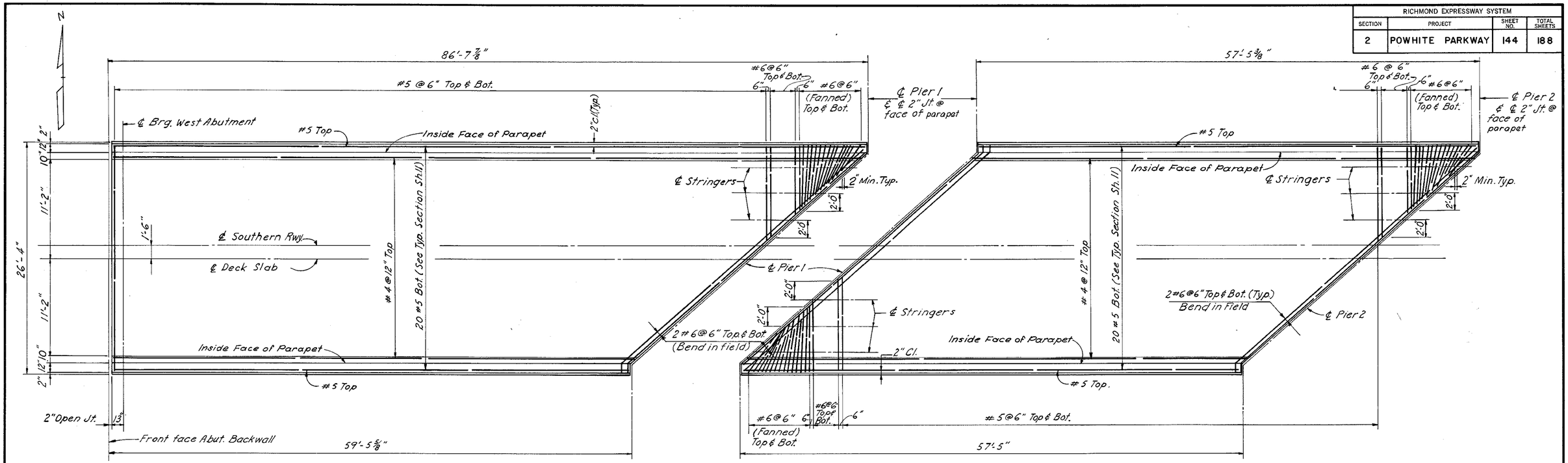
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS SHOWN
CONTRACT NO.: 2
SHEET NO. 12 OF 19

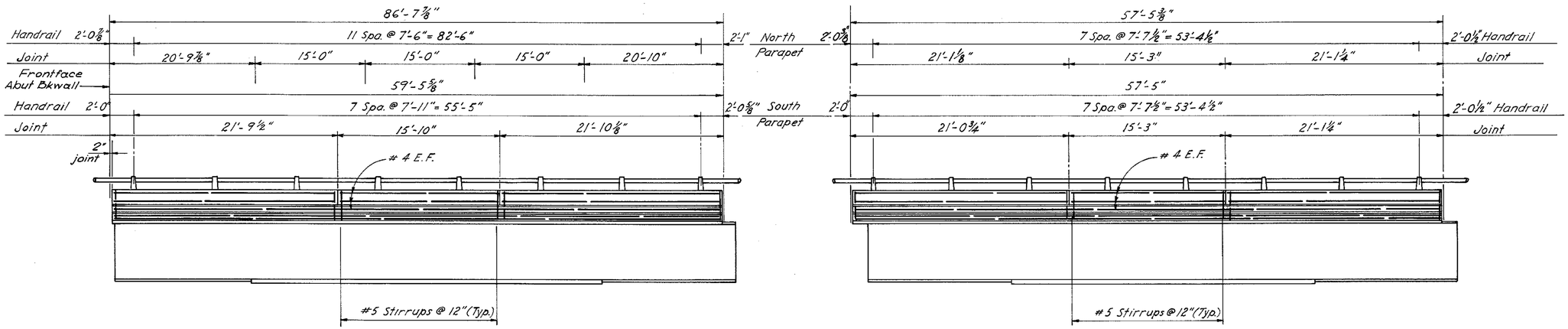
SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	144	188



UNIT 1

UNIT 2



CURB AND PARAPET ELEVATION

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AJP	1-68	2	As Built	JRC	11-72
CHECKED	THN	2-68	1	℄ Deck Slab.	T.E.M	6-68
IN CHARGE	JGD					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

DECK PLANS - UNITS 1 & 2

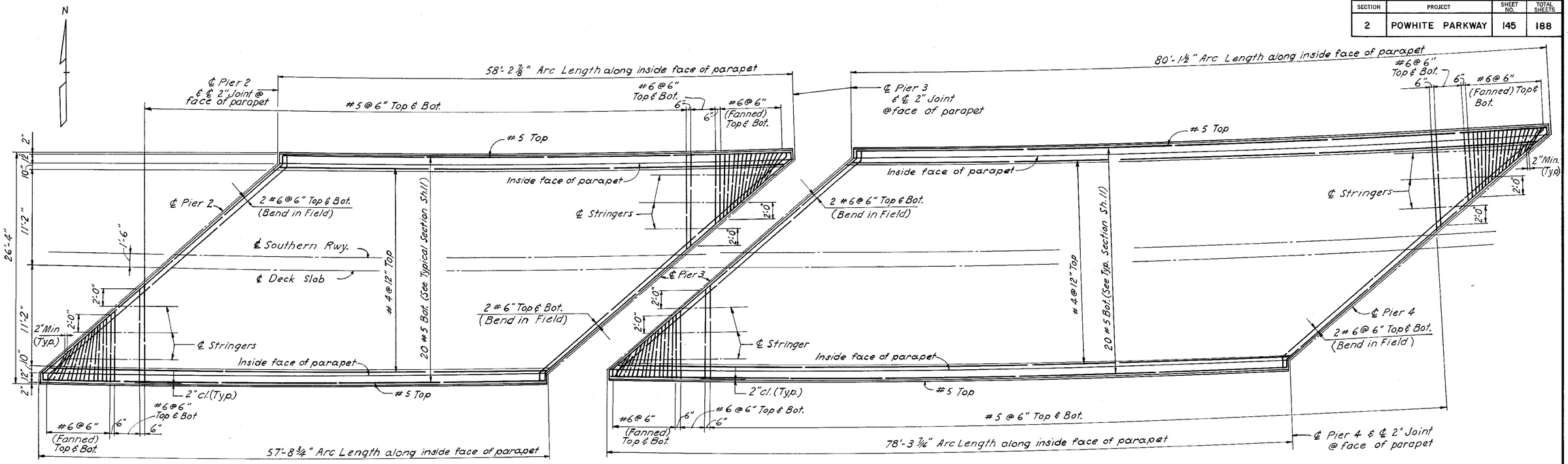
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 13 OF 19

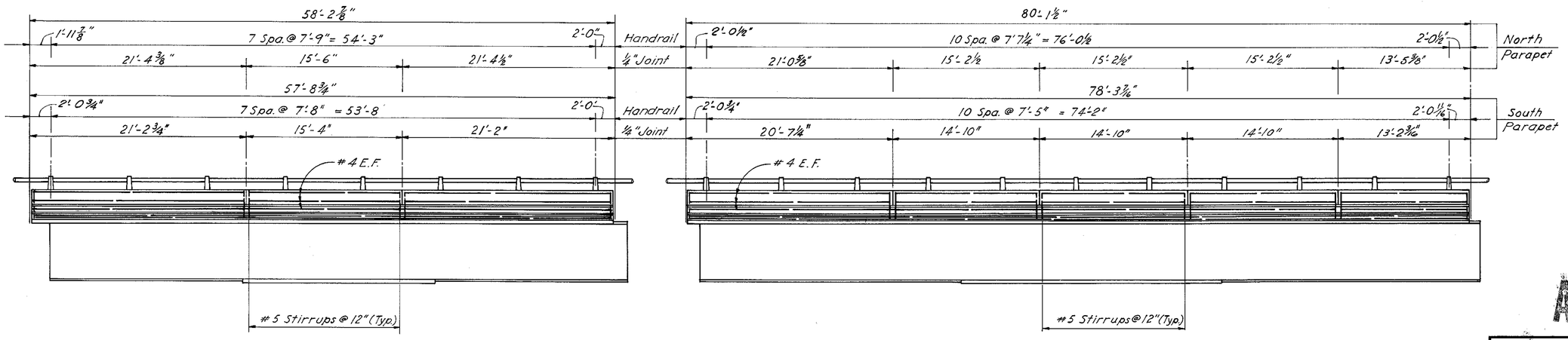
SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	145	188



UNIT 3

UNIT 4



CURB AND PARAPET ELEVATION

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AJP	1-68	2	As Built	JRC	11-72
CHECKED	THN	2-68	1	℄ Deck Slab	T.E.M.	6-68
IN CHARGE	JGD					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

DECK PLANS - UNITS 3 & 4

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

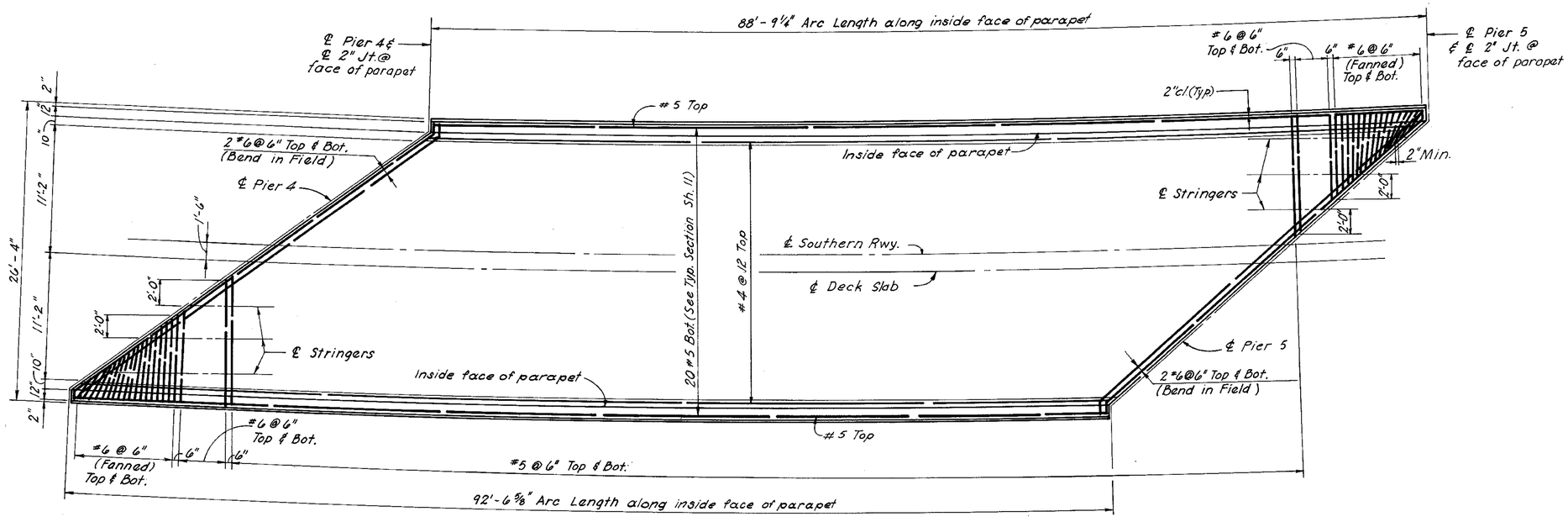
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 14 OF 19

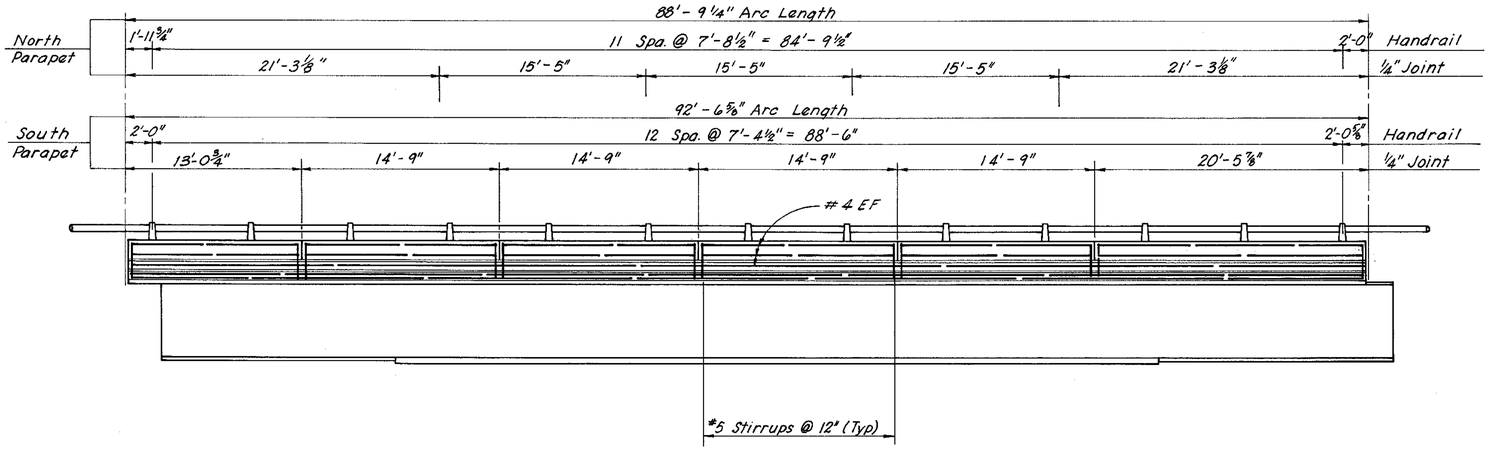
SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	146	188

N



UNIT 5



CURB AND PARAPET ELEVATION

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AJP	1-68	2	As Built	JRC	11-72
CHECKED	THN	2-68	1	℄ Deck Slab	TEM	6-68
IN CHARGE	JGD					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER POWHITE PARKWAY
BRIDGE B-05

DECK PLANS - UNIT 5

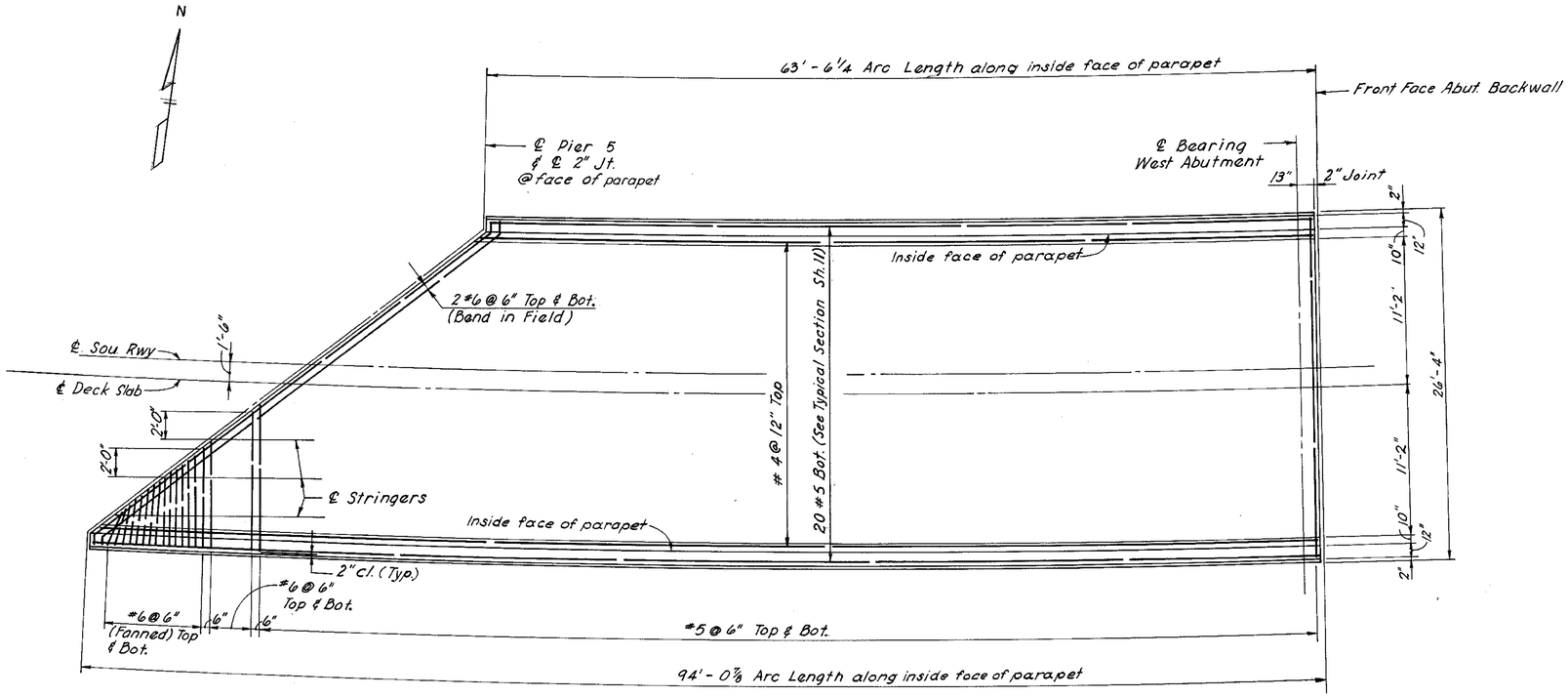
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

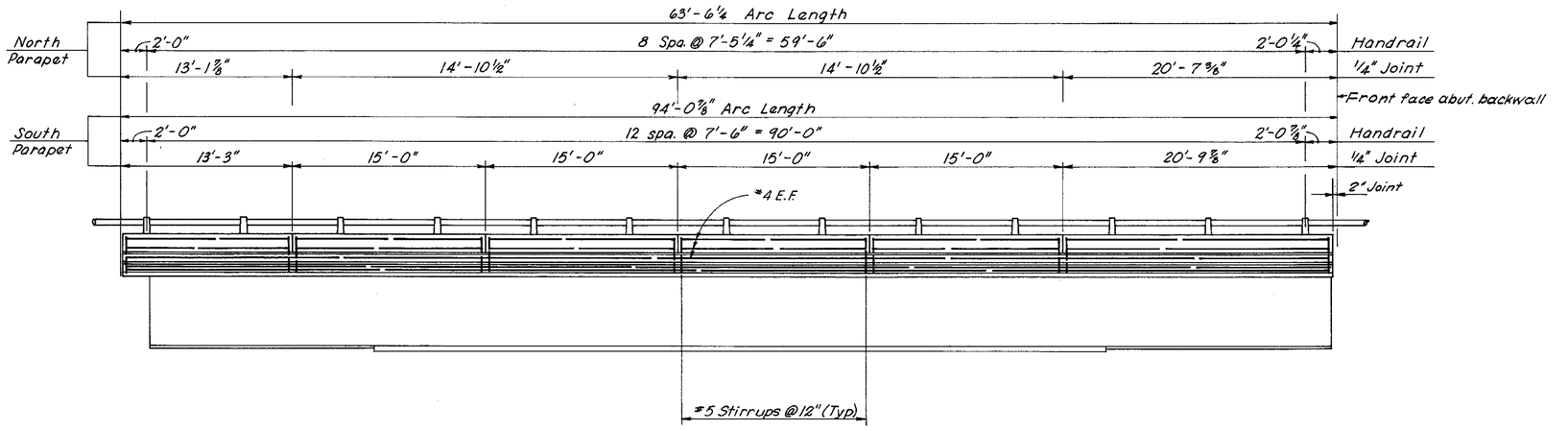
SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 15 OF 19

SOUTHERN RY. M.P. F-135.2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	147	188



UNIT 6



CURB AND PARAPET ELEVATION

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AJP	1-68	2	As Built	R.J.H.	11-72
CHECKED	THN	2-68	1	℄ Deck Slab	TEM.	6-68
IN CHARGE	JGD					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

DECK PLANS-UNIT 6

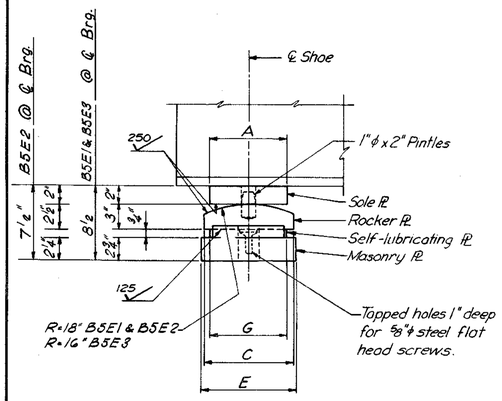
HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

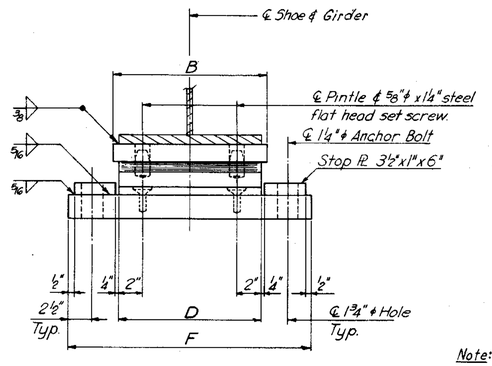
SCALE: 3/16" = 1'-0"
CONTRACT NO.: 2
SHEET NO. 16 OF 19

SOUTHERN RY. M.P. F-135.2

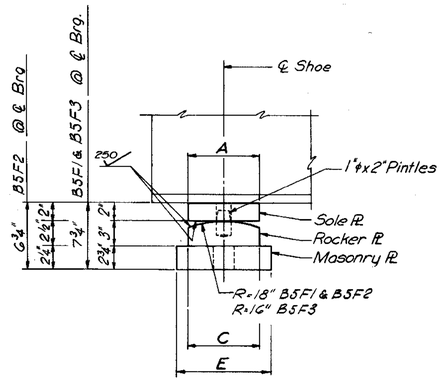
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	POWHITE PARKWAY	148	188



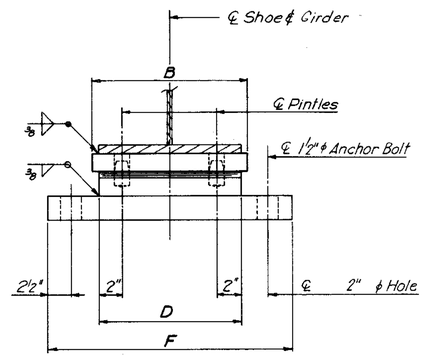
SIDE ELEVATION



END ELEVATION



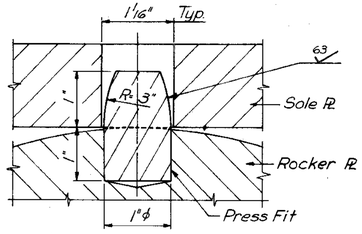
SIDE ELEVATION



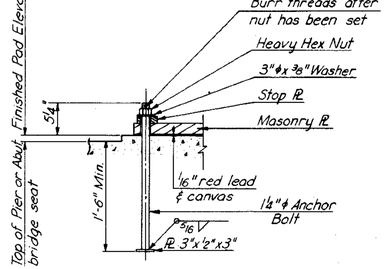
END ELEVATION

Note:
Sole Pl is to be beveled to compensate for grade.

EXPANSION SHOE
No Scale

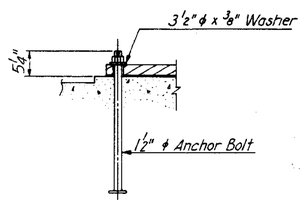


PINTLE DETAIL
Scale: ¾"=1"



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 shall be planed, straightened or otherwise treated to secure true plane 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, 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 ½" or more than 1" above finished elevation. Dress down pads by rubbing, grinding or as otherwise approved by the Engineer, to true level surfaces at the finished elevation.

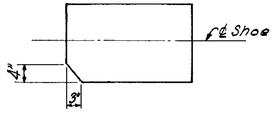
Anchor bolt assemblies shall conform to A.S.T.M. A-307 and shall be hot-dip galvanized conforming to A.S.T.M. A-153.

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.



TYPICAL DETAIL OF MASONRY Pl.
No Scale

SHOE DIMENSIONS

EXPANSION SHOES									FIXED SHOES							
TYPE	NO. REQD.	A	B	C	D	E	F	G	TYPE	NO. REQD.	A	B	C	D	E	F
B5E1	19	12"	19"	13½"	17"	17⅛"	28"	12"	B5F1	19	12"	19"	13½"	17"	17½"	28"
B5E2	19	10"	19"	11½"	17"	14⅛"	28"	10"	B5F2	19	10"	19"	11½"	17"	14⅛"	28"
B5E3	10	12"	21"	14"	19"	17⅛"	30"	12"	B5F3	10	12"	21"	14"	19"	17⅛"	30"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.E.M	1-17-68	2	General	J.G.V.	10-70
CHECKED	T.H.N.	2-68	1	Review Comm.	T.E.M.	6-68
IN CHARGE	J.G.D.		3	As Built	R.J.H.	11-72

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
POWHITE PARKWAY

SOUTHERN RAILWAY OVER
POWHITE PARKWAY
BRIDGE B-05

SHOE DETAILS

HAYES, SEAY, MATTERN & MATTERN
Associate Engineers

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS SHOWN
CONTRACT NO: 2
SHEET NO. 17 OF 19

Bridge 8

Northbound and Southbound Powhite Parkway (VA-76) Parallel Bridges
Over
The James River, Kanawha Canal and CSXT Railroad Tracks

<u>Original</u> Construction Plans for Bridge 8N and 8S

Record Set 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

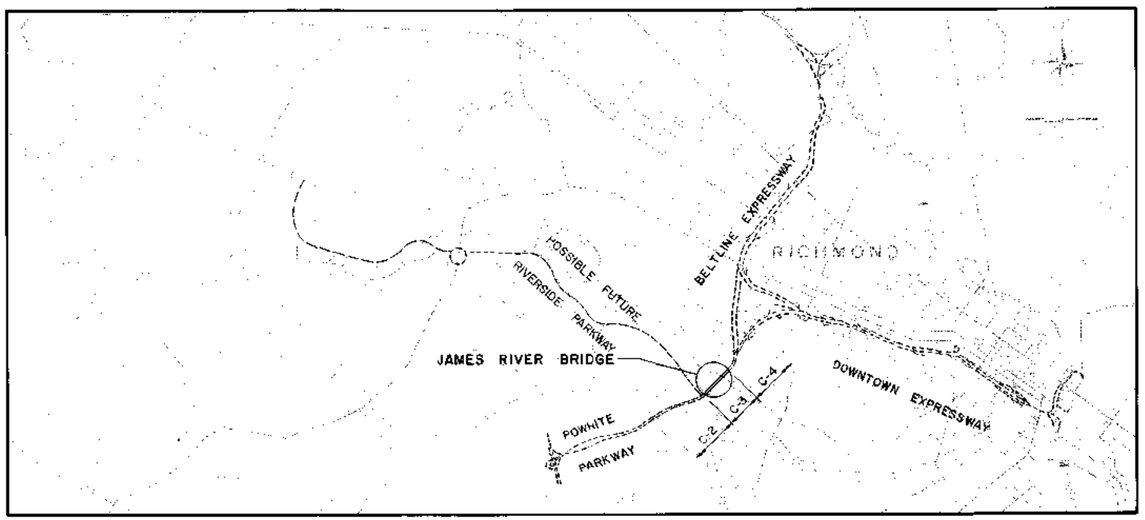
RICHMOND
METROPOLITAN AUTHORITY

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

SUBMITTED BY	
Date	
1-22-71 Date	John P. Fowler JR HOWARD, NEEDLES, TAMMEN & BERGENDOFF general consultants

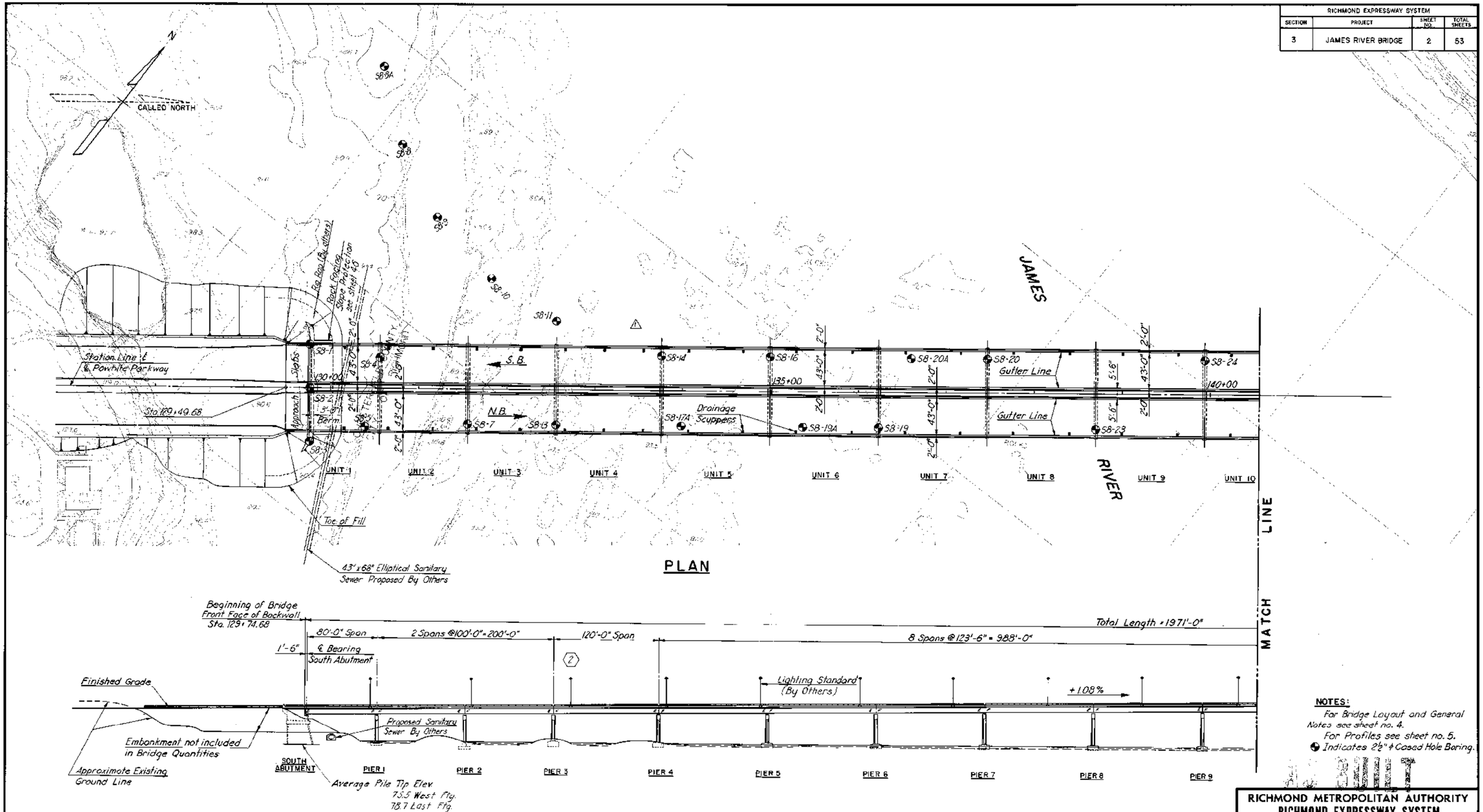
RECOMMENDED BY	
Date	
1-22-71 Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

APPROVED BY	
1-22-71 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	5-12-72		

⚠ Index Revised J.G.V. 2-20-71

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



PLAN

ELEVATION

⚠

CURVE DATA SUMMARY																	
CURVE NO.	Δ	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"	572.96'	40.06'	80.00'	S52°46'10.5"W	S60°46'10.5"W	P.C. 10+00.00	52,689.09	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'	183.46'	331.30'	S60°46'10.5"W	N57°59'54.0"W	P.C.C. 10+30.00	52,647.09	50,869.14	12+63.45	52,557.50	50,709.05	P.C.C. 14+11.30	52,654.72	50,553.48
3	30°20'00"	18°00'00"	572.96'	153.52'	300.00'	N57°59'54.0"W	N27°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

NOTES:

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

For Profiles see sheet no. 5.

Indicates 2½" ϕ Cased Hole Boring.

	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
⚠	Remove Ramp Taper	H.B.W	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. 2 OF 53

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

N

CALLED NORTH

JAMES RIVER

MATCH LINE

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

S8-26 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

Gutter Line

Gutter Line

℄ 60"ϕ Water Main

Point of Min. Vert. Clear

145+00

90°00' Typ. Except as Noted

75°00'

60°00'

60°00'

75°00'

Drainage Scuppers

Rip Rap by others

Slabs

Approach

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

150+00

℄ B

Station Line and ℄ Powhite Parkway

Sta. 149+70.68

N.B

Rock Facing Slope Protection

2'-0" 5'-6" 43'-0" 2'-0" 2'-0" 5'-6" 2'-0" 43'-0" 2'-0"

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 (By Others)

Finished Grade

Approximate Existing Ground Line

Embankment not included in Bridge Quantities

24'-0¼" Min. Vert. Clear

℄ Tracks

Steel Piles (12BP53)

Steel Piles (10BP42)

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

Average Pile Tip Elev. 68.0 West 58.7 East

Ave. Pile Tip Elev. 75.7 West Ftg. 61.4 East Ftg.

Average Pile Tip Elev. 68.0 West Ftg. 47.5 East Ftg.

ELEVATION

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

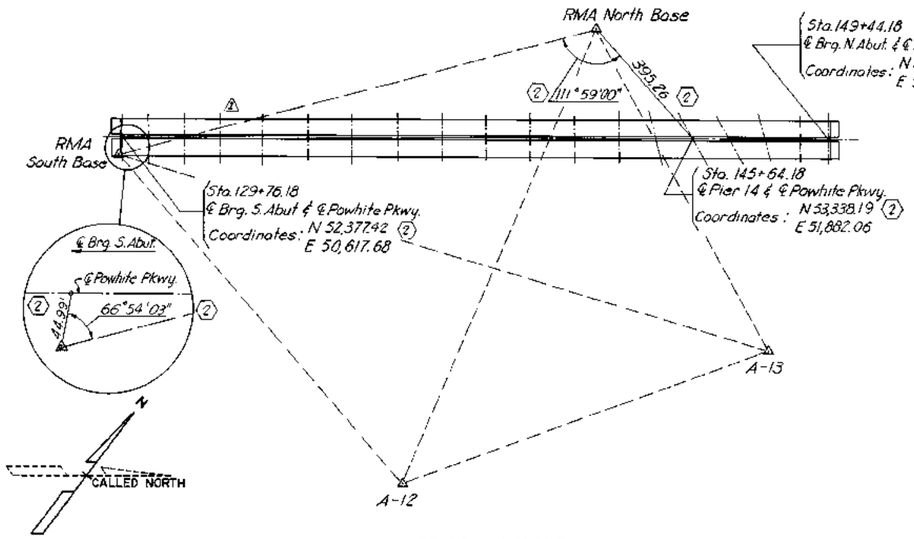
JAMES RIVER BRIDGE

GENERAL PLAN AND ELEVATION

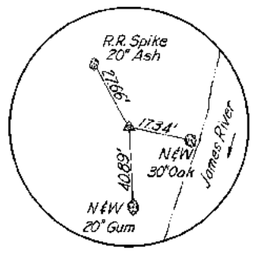
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 50'
CONTRACT NO. 0-3
SHEET NO. 3 OF 53

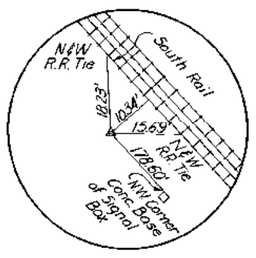
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	4	53



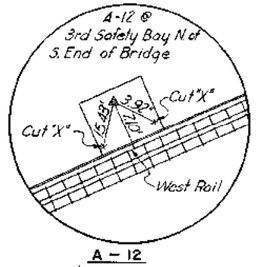
BRIDGE LAYOUT



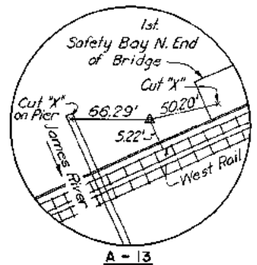
RMA SOUTH BASE
(Conc. Post w/ copper weld rod)
Elevation : 89.91
Coordinates : N 52,338.08
E 50,659.50



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 52,055.36



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

ESTIMATE OF QUANTITIES (3)

	Struct. Excav. at 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	(1)	Rock Facing Slope Protect. 60" Thick	Water Borings & Cored Holes Incl. Sampling	NX Core Borings in Rock	(1)
	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 (1)		1,345,522 (1)	6,310,579 (1)	7965							
South Abutment		624	48		1520.8		295.0				13465			142	133		170			
North Abutment		608	48		3.72.3		286.7				13465			144	136		844			
Pier 1		323 (1)					270.9 (1)				44586 (1)									(1)
Pier 2		358 (1)					262.6 (1)				44586 (1)									(1)
Pier 3		123 (1)					274.5 (1)				44434 (1)									(1)
Pier 4		97 (1)					311.8 (1)				44435 (1)									(1)
Pier 5		156 (1)					324.2 (1)				44434 (1)									(1)
Pier 6		132 (1)					298.1 (1)				44435 (1)									(1)
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		494			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									
		(1)					(1)		(1)		(1)	(1)	(1)							
TOTAL	2678	5,808	96	7920	5049.8	3515	7075.1	238.6	60598	473.7	2,361,755	6,310,579	7,965	286	269		1014	80	234.5	(1)

GENERAL NOTES:

ROADWAY — Twin Roadways 45'-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			
MADE	HBW	11-67	(3) As Built	J.A.C.	12-72
CHECKED	FXH	2-68	(2) Bridge Layout	H.B.W.	4/5/71
IN CHARGE	FXH		(1) Quantities & Ramp Widening	H.B.W. BB	2/20/71
			NO. REVISION	BY	DATE

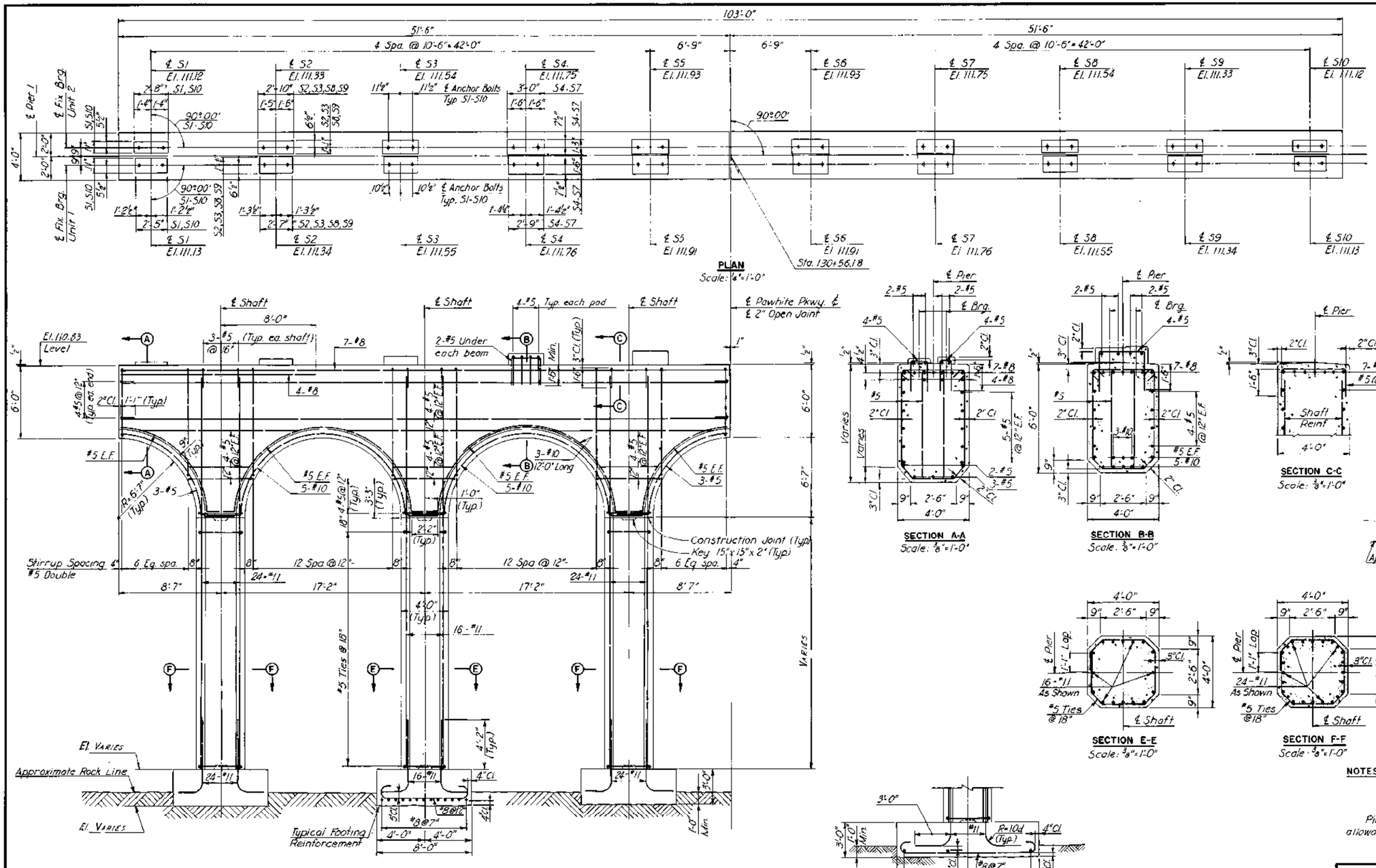
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
BRIDGE LAYOUT
GENERAL NOTES
ESTIMATE OF QUANTITIES

HOWARD, NEEBLES, 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: 1/8"=1'-0"

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

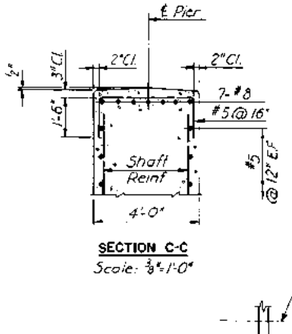
Note:
Pier symmetrical about ℄ Powhite Pkwy.

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

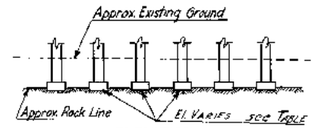
I = Pier No.
L-C-R = Left - Center - Right
W-E = West - East

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

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

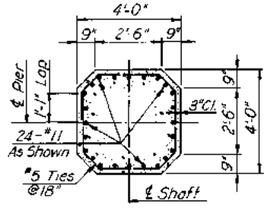


SECTION C-C
Scale: 3/8"=1'-0"

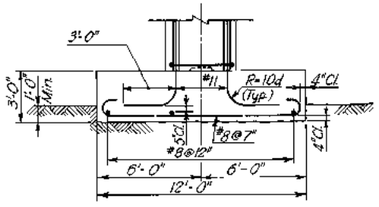


ELEVATION
Scale: 1"=30'-0"

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:

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	1	Complete	J.G.V.	12-2071
IN CHARGE	FXH		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

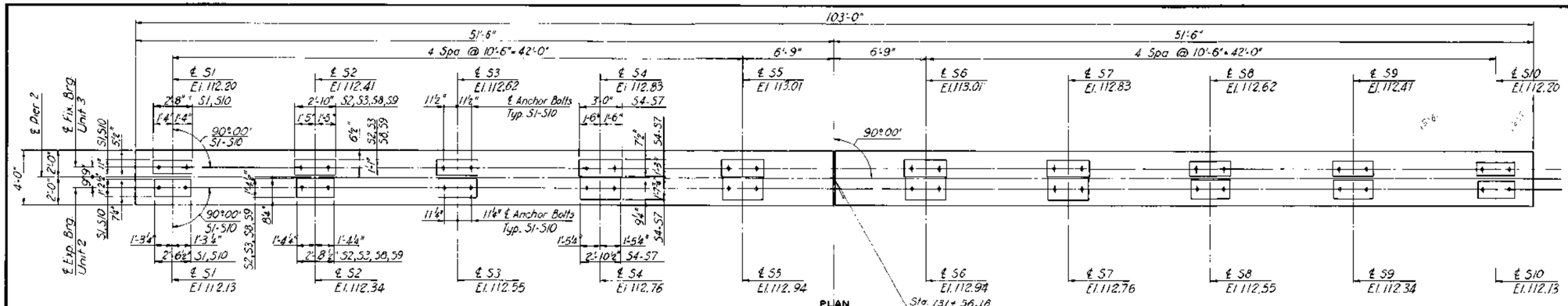
JAMES RIVER BRIDGE

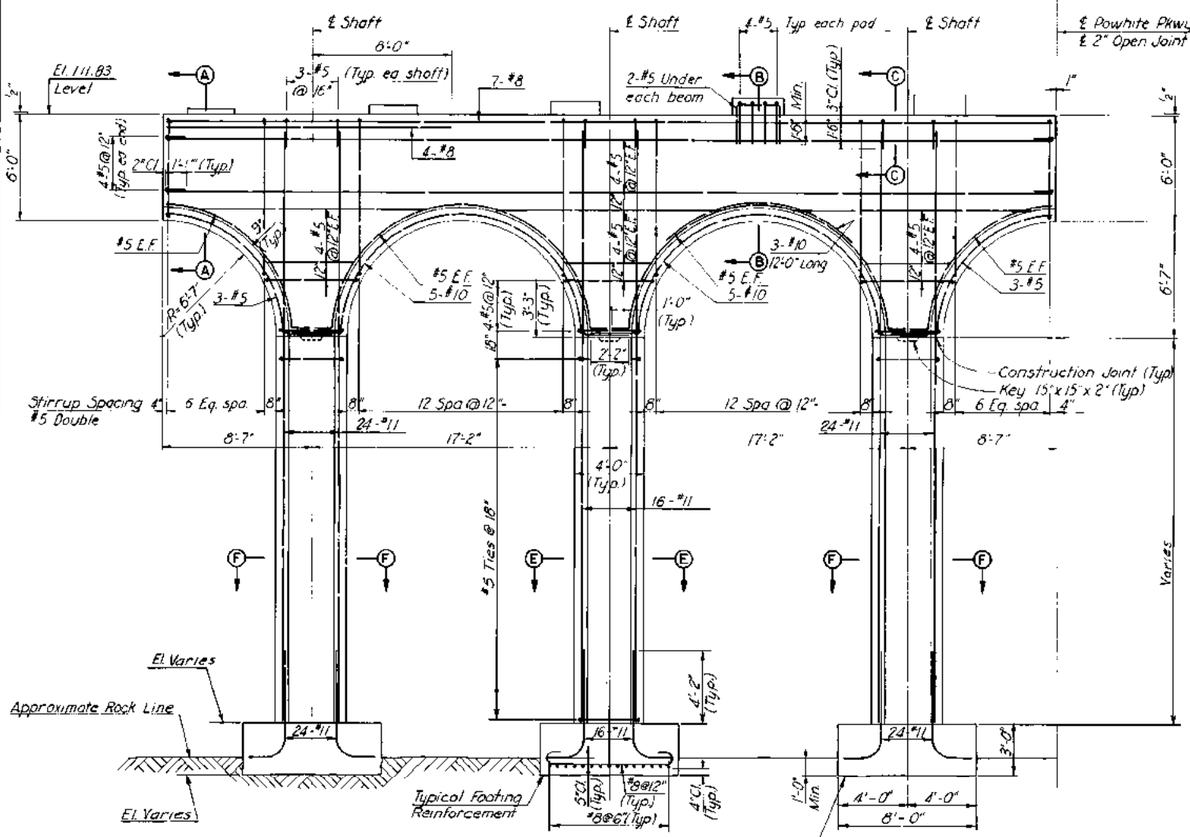
PIER 1

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

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

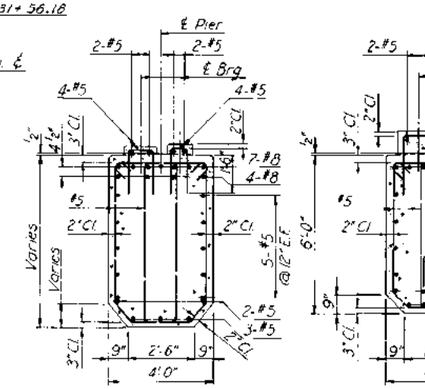
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	10	53



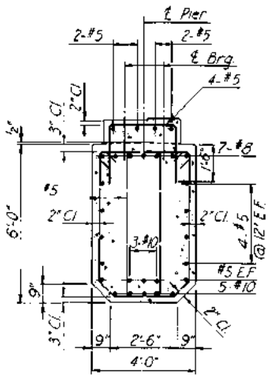


HALF ELEVATION
Scale: ¼"=1'-0"

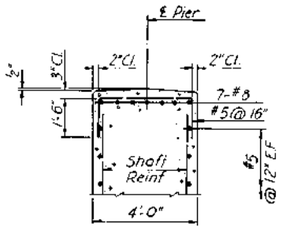
Note:
Pier symmetrical about ℄ Powhite Pkwy.



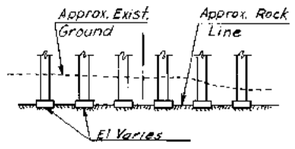
SECTION A-A
Scale: ⅜"=1'-0"



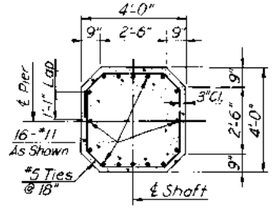
SECTION B-B
Scale: ⅜"=1'-0"



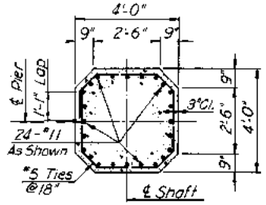
SECTION C-C
Scale: ⅜"=1'-0"



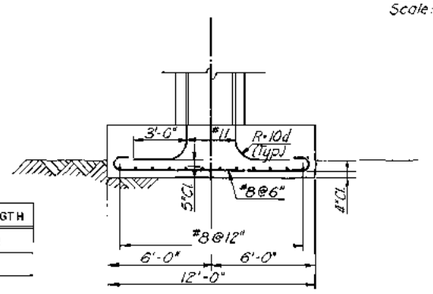
ELEVATION
Scale: 1"=30'-0"



SECTION E-E
Scale: ⅜"=1'-0"



SECTION F-F
Scale: ⅜"=1'-0"



FOOTING END VIEW
Scale: ¼"=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:

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	H.B.W.	2/20/71
IN CHARGE	FXH		NO	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

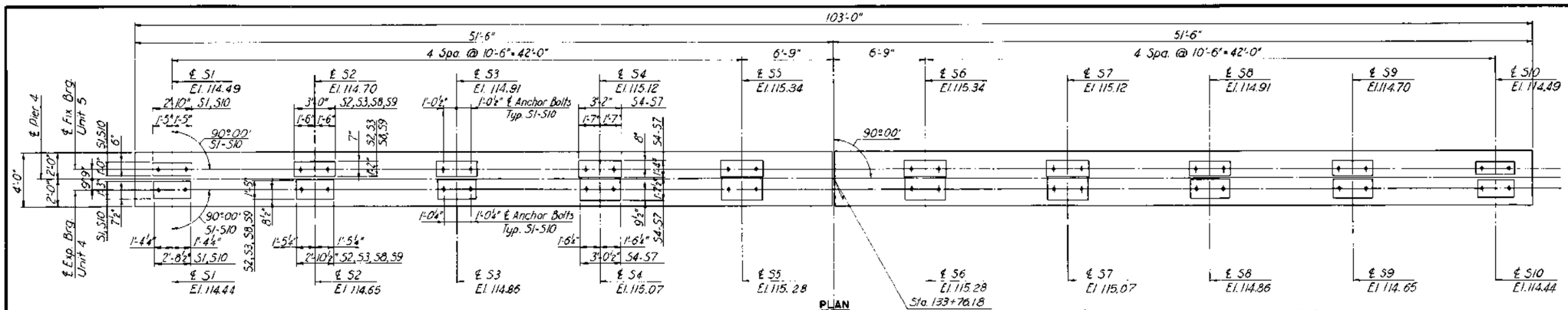
JAMES RIVER BRIDGE

PIER 2

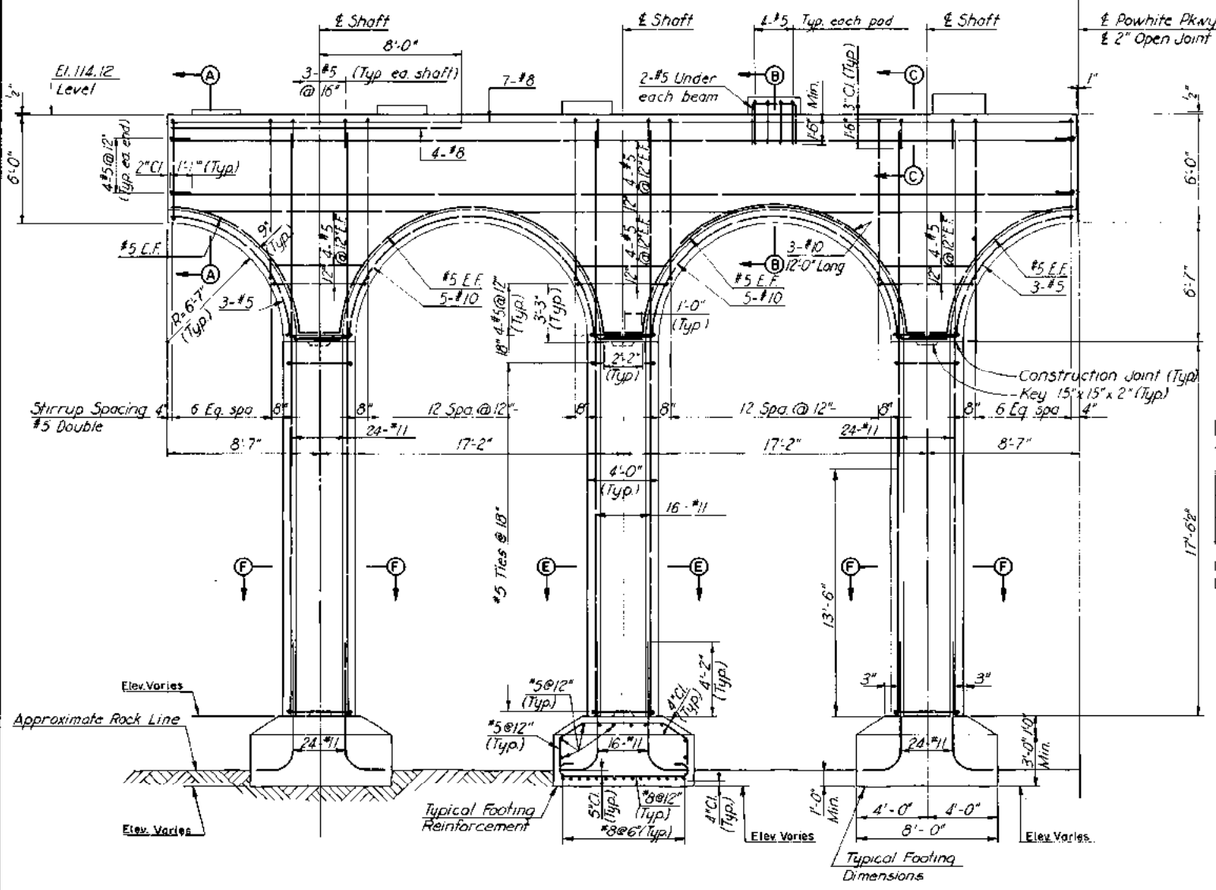
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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



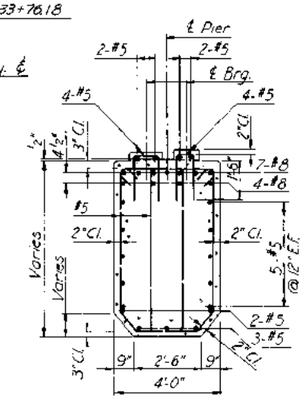
PLAN
Scale: 1/4"=1'-0"



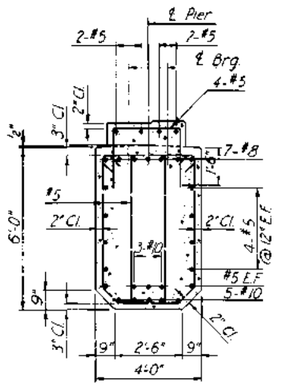
HALF ELEVATION
Scale: 1/4"=1'-0"

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

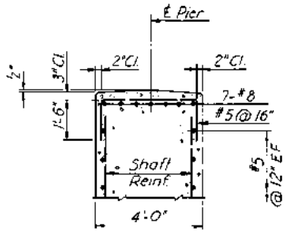
FOOTING NO.	AVE. BOTTOM ELEV.
4 L W	77.83
4 C W	77.24
4 R W	77.57
4 L E	77.86
4 C E	77.79
4 R E	77.93



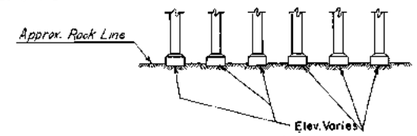
SECTION A-A
Scale: 3/8"=1'-0"



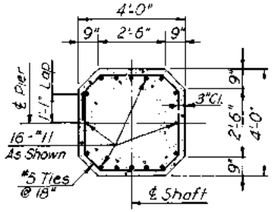
SECTION B-B
Scale: 3/8"=1'-0"



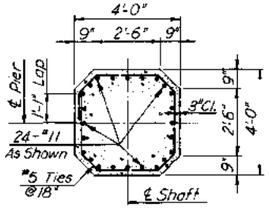
SECTION C-C
Scale: 3/8"=1'-0"



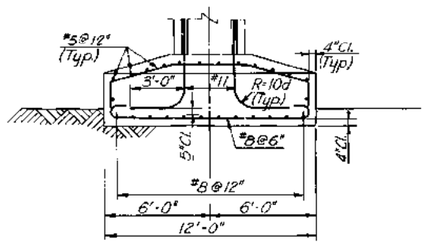
ELEVATION
Scale: 1"=30'-0"



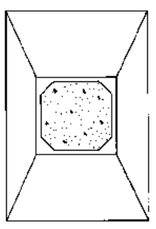
SECTION E-E
Scale: 3/8"=1'-0"



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



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	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

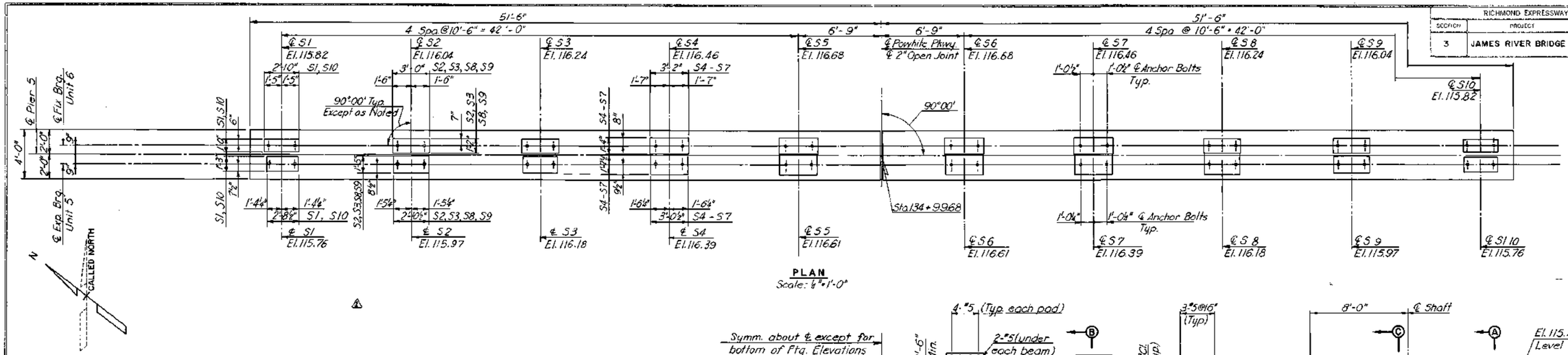
JAMES RIVER BRIDGE

PIER 4

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

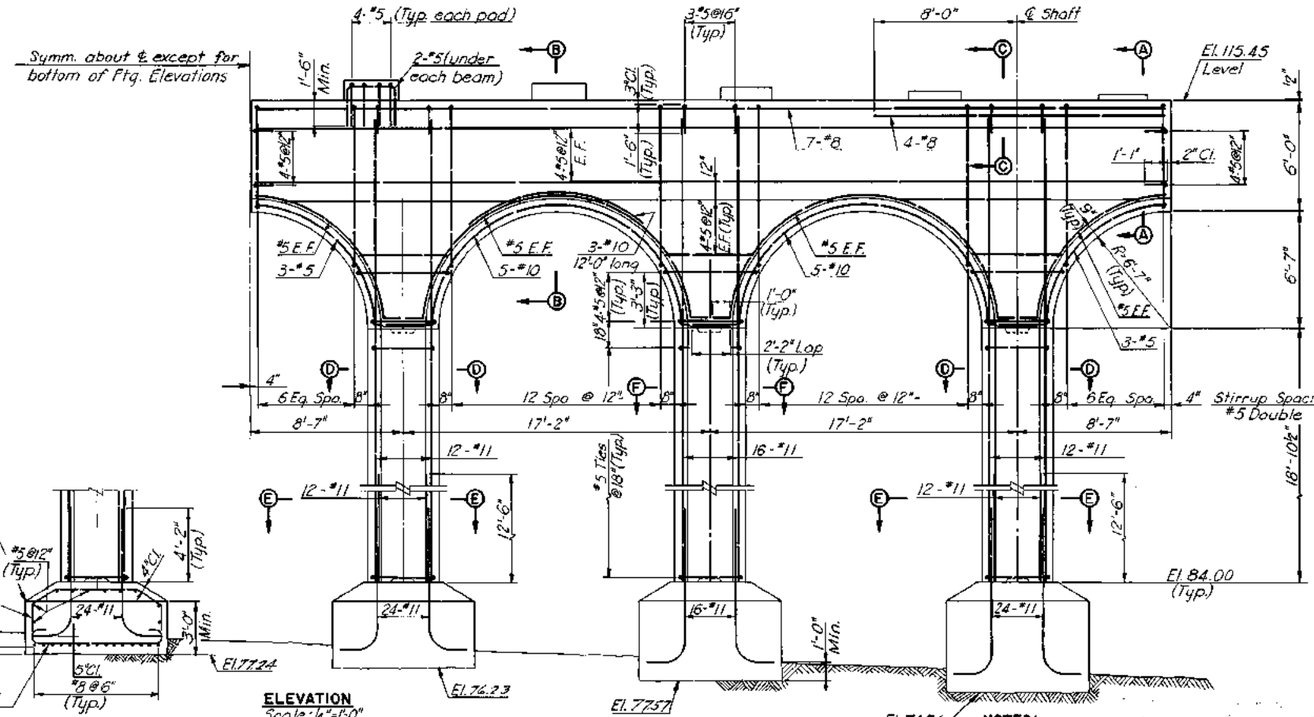
SCALE AS SHOWN
CONTRACT NO. C-3
SHEET NO. 13 OF 53

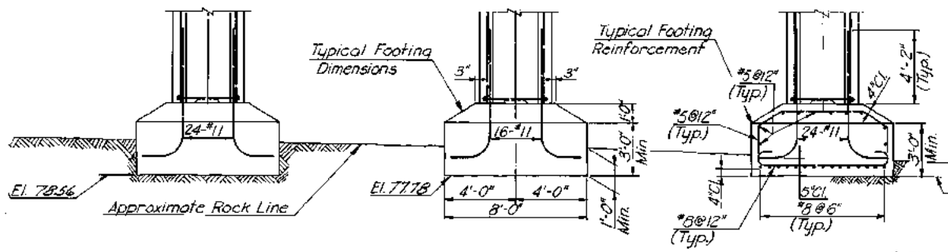
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	15	53



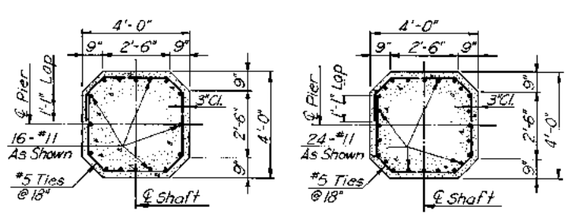
PLAN
Scale: ⅛"=1'-0"

FOOTING NO.	AVE. BOTTOM ELEV.
5 LW	78.56
5 CW	77.78
5 RW	77.24
5 LE	76.23
5 CE	77.57
5 RE	76.71



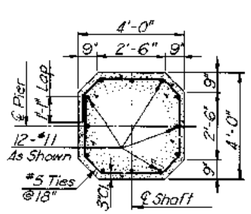


ELEVATION
Scale: ¼"=1'-0"

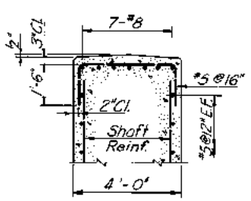


SECTION F-F
Scale: ⅜"=1'-0"

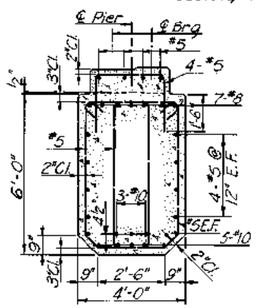
SECTION E-E
Scale: ⅜"=1'-0"



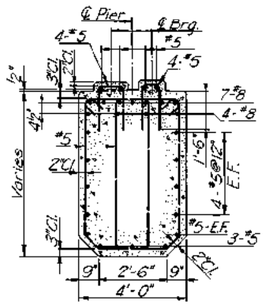
SECTION D-D
Scale: ⅜"=1'-0"



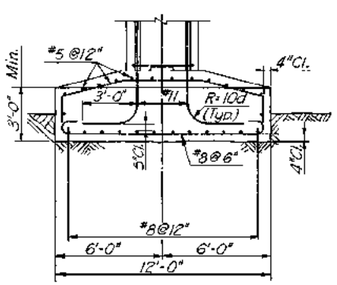
SECTION C-C
Scale: ⅜"=1'-0"



SECTION B-B
Scale: ⅜"=1'-0"



SECTION A-A
Scale: ⅜"=1'-0"



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

NOTES:

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

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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

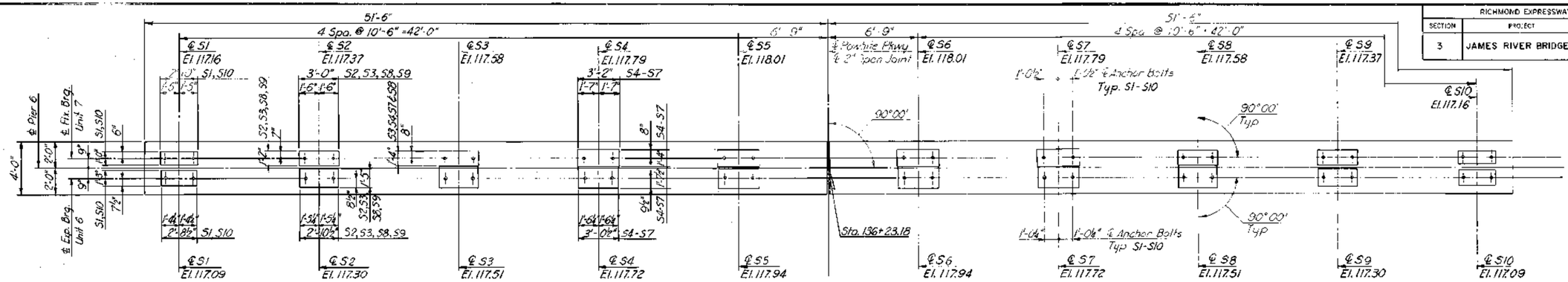
JAMES RIVER BRIDGE

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

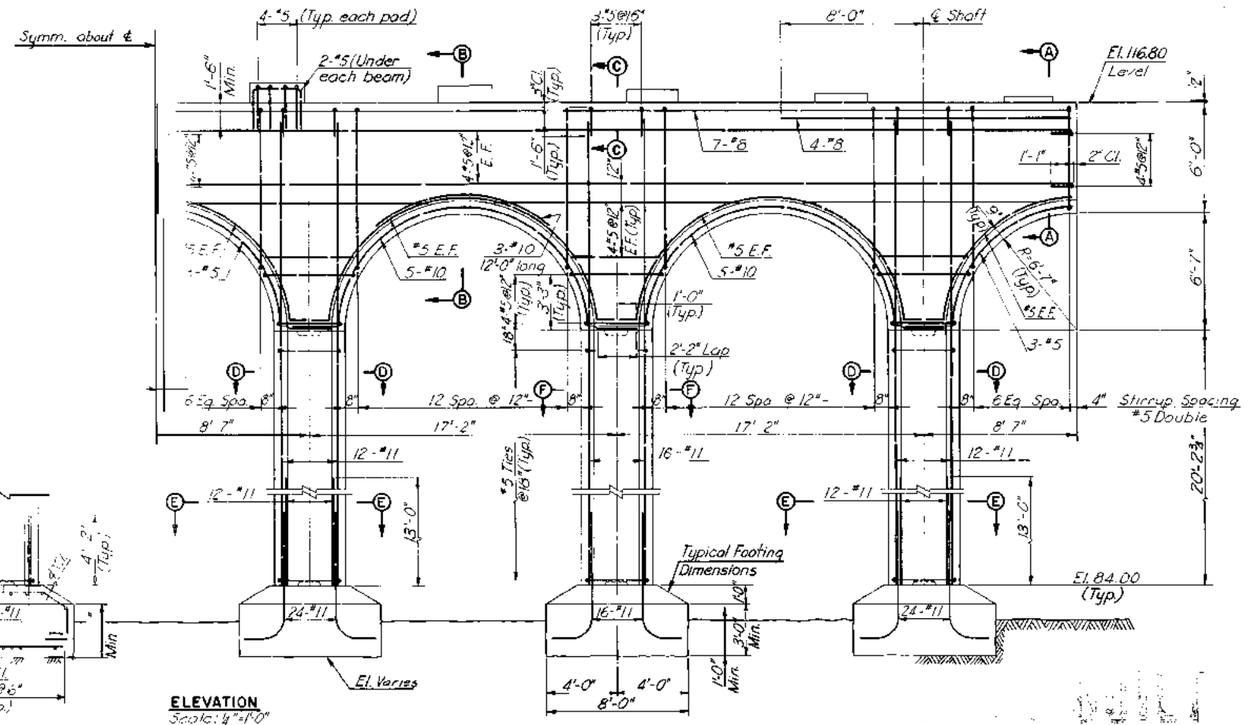
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	16	53



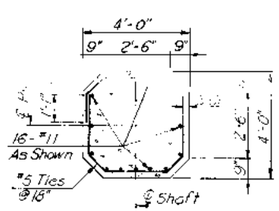
PLAN
Scale: 1/8"=1'-0"

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

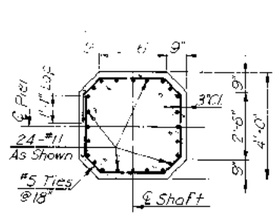
⚠



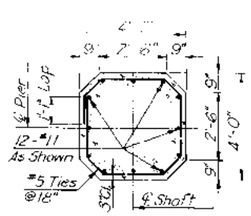
ELEVATION
Scale: 1/4"=1'-0"



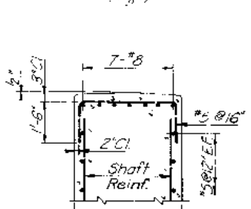
SECTION F-F
Scale: 3/8"=1'-0"



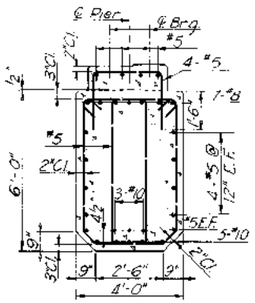
SECTION E-E
Scale: 3/8"=1'-0"



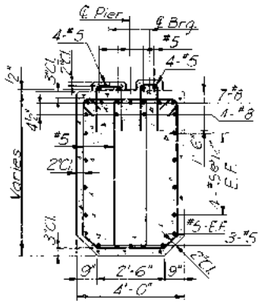
SECTION D-D
Scale: 3/8"=1'-0"



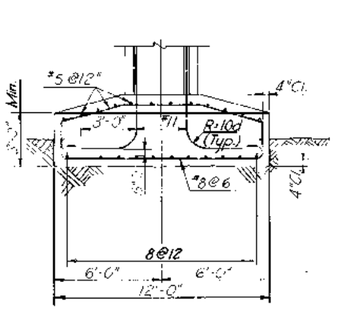
SECTION C-C
Scale: 3/8"=1'-0"



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



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



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

NOTES:

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

	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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

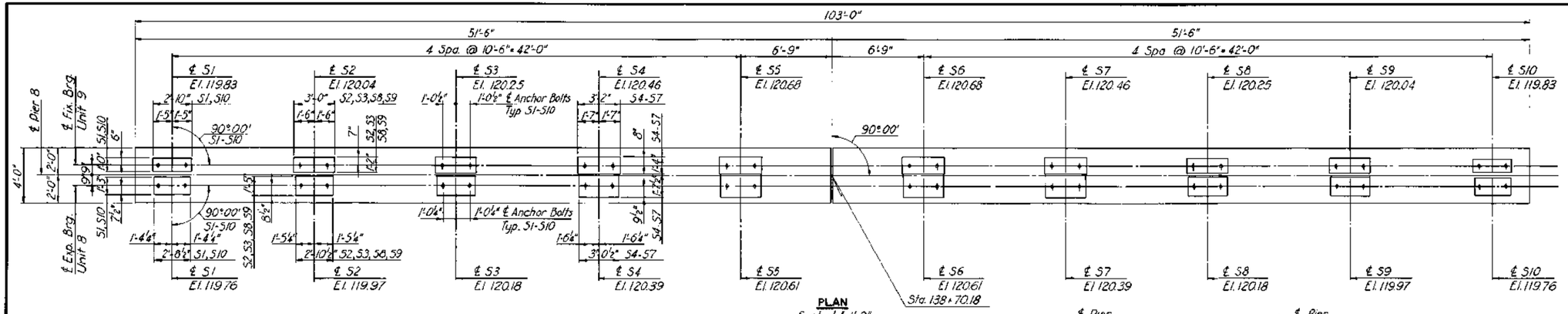
JAMES RIVER BRIDGE

PIER 6

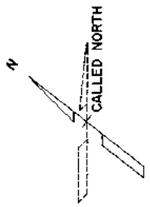
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

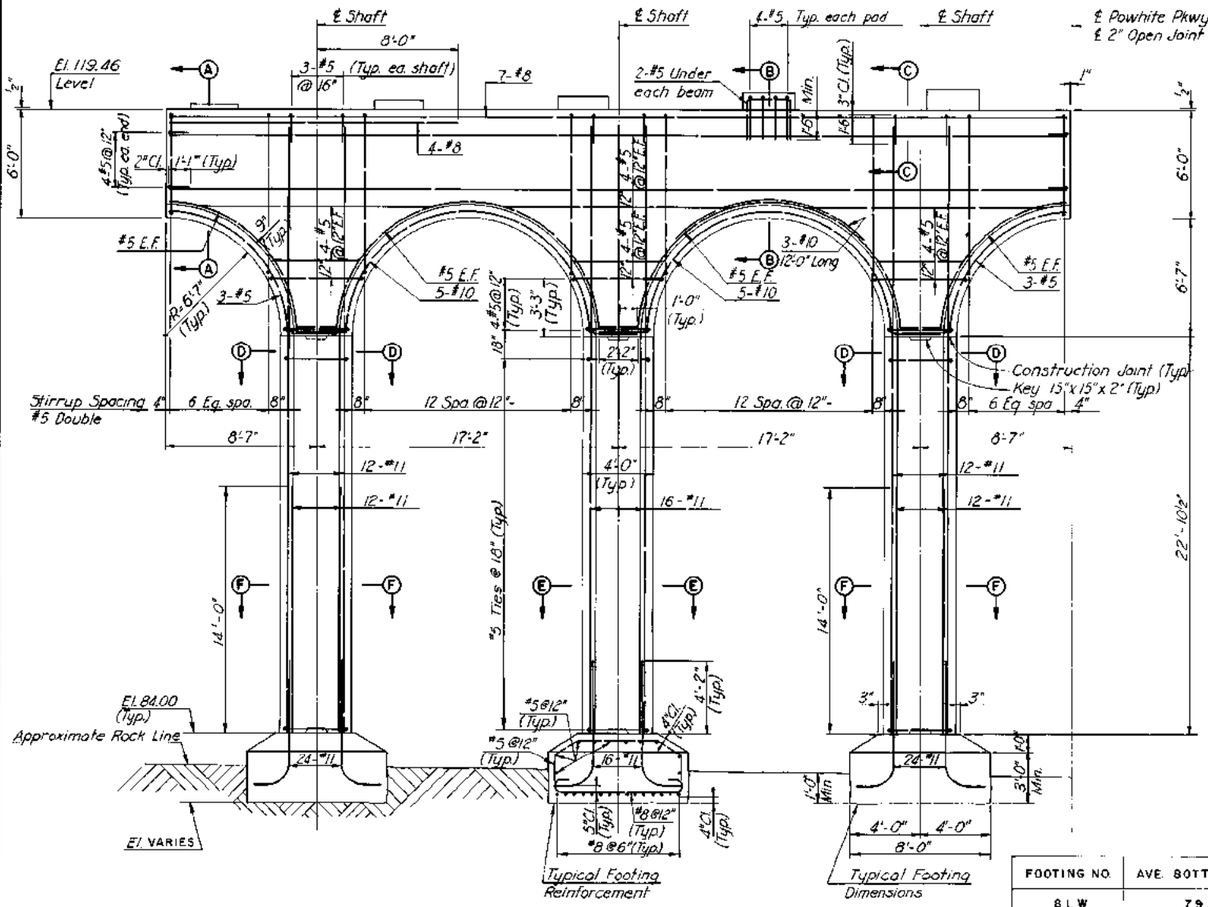
SCALE AS SHOWN
CONTRACT NO C-3
SHEET NO 16 OF 53

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



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

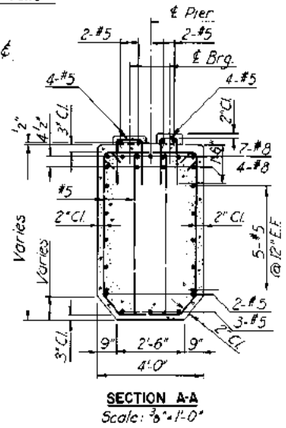




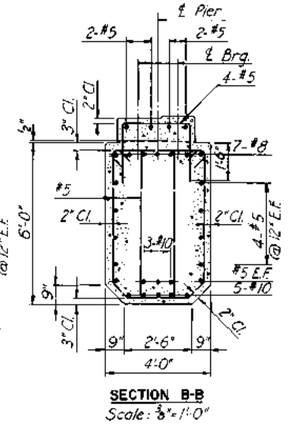
HALF ELEVATION
Scale: 1/4"=1'-0"

Note:
Pier symmetrical about ℄ Powhite Pkwy.

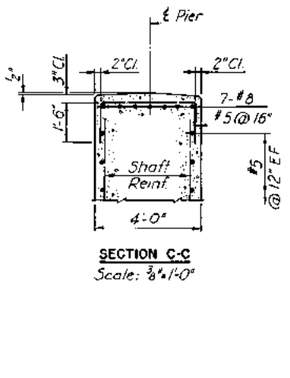
FOOTING NO.	AVE. BOTTOM ELEV.
8LW	79.3
8CW	78.4
8RW	78.3
8LE	76.8
8CE	76.7
8RE	74.4



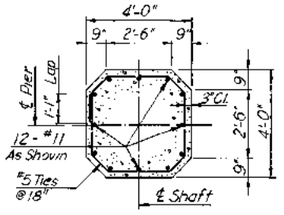
SECTION A-A
Scale: 3/8"=1'-0"



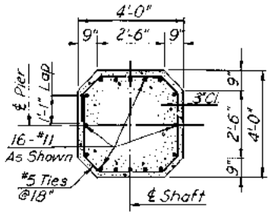
SECTION B-B
Scale: 3/8"=1'-0"



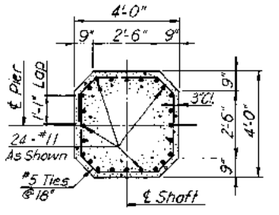
SECTION C-C
Scale: 3/8"=1'-0"



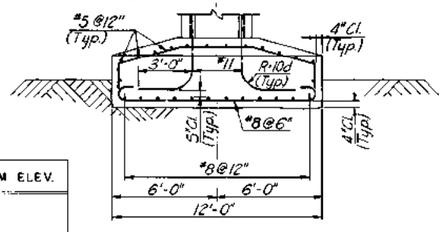
SECTION D-D
Scale: 3/8"=1'-0"



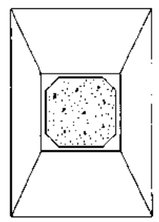
SECTION E-E
Scale: 3/8"=1'-0"



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

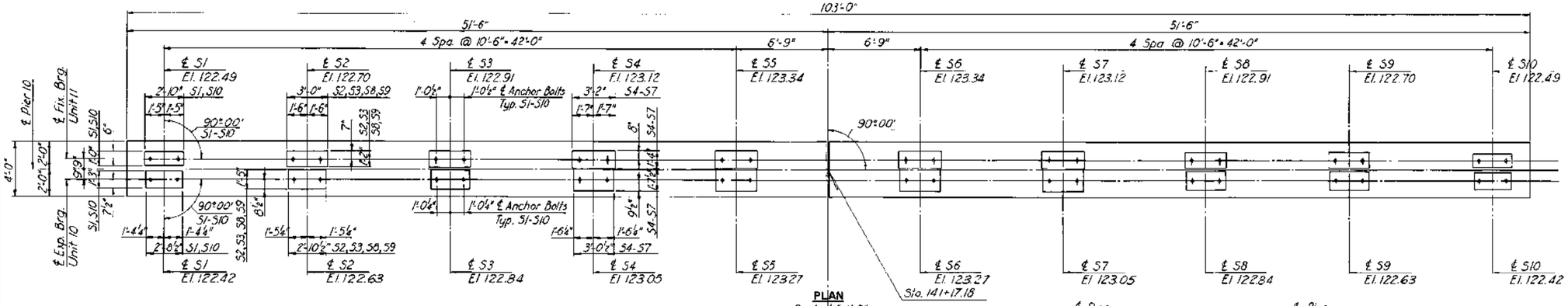
JAMES RIVER BRIDGE

PIER 8

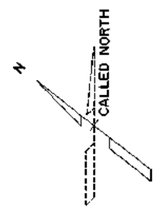
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

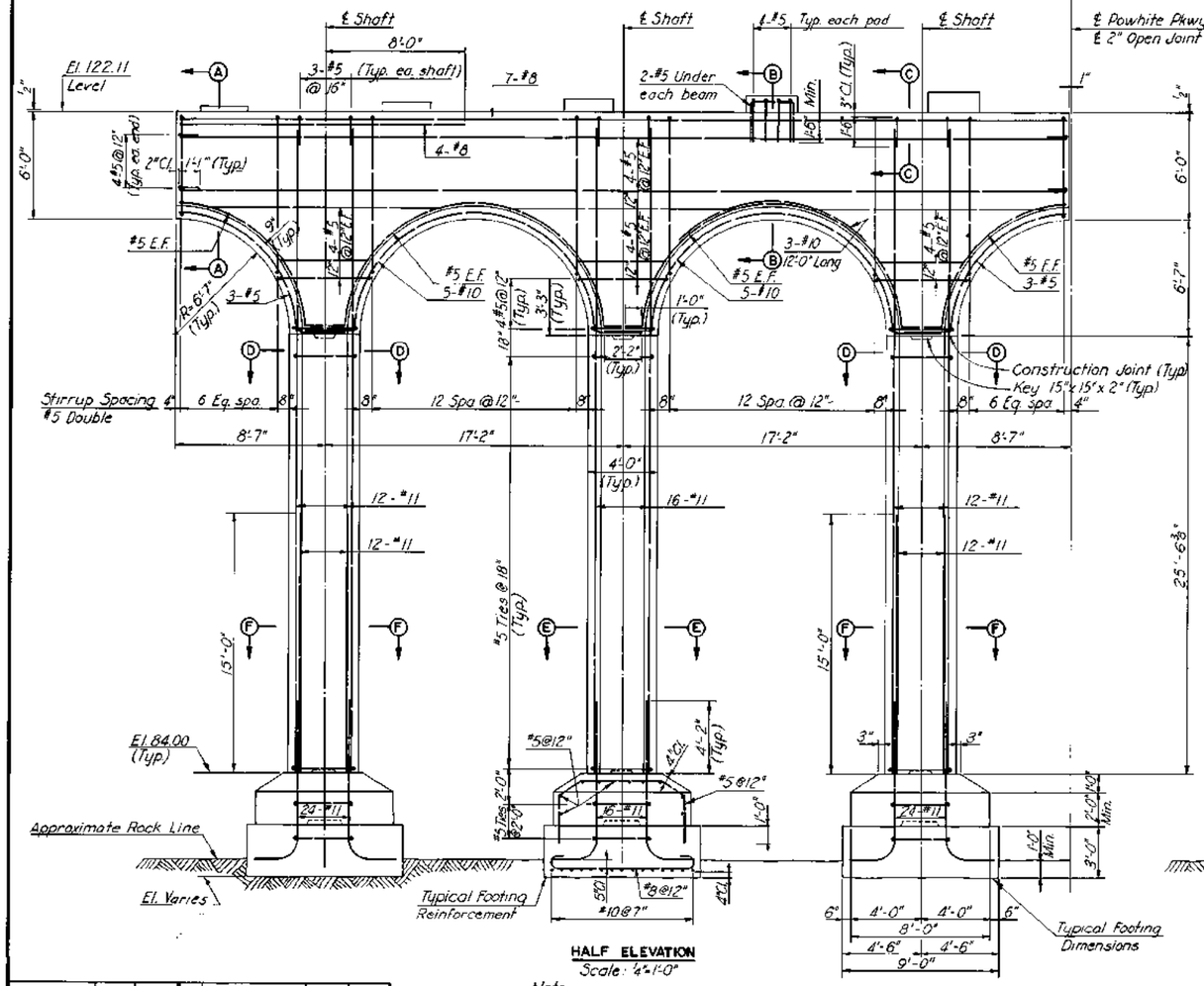
SCALE: AS SHOWN
CONTRACT NO C-3
SHEET NO. 18 OF 53

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



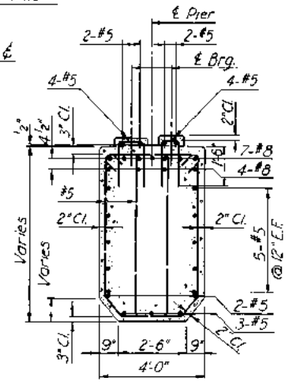
PLAN
Scale: 1/4"=1'-0"



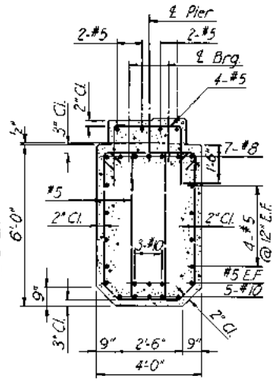


HALF ELEVATION
Scale: 1/4"=1'-0"

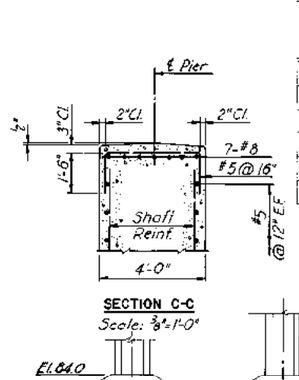
Note:
Pier symmetrical about ℄ Powhite Pkwy.



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

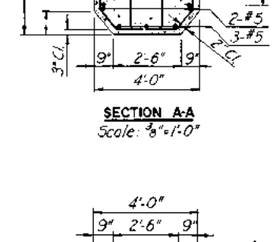


SECTION B-B
Scale: 3/8"=1'-0"



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

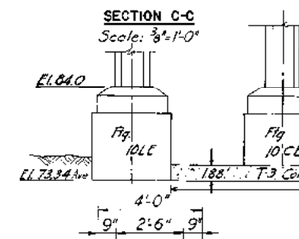
FOOTING NO.	AVE. BOTTOM ELEV.
10 L W	77.78
10 C W	76.95
10 R W	76.24
10 L E	73.34
10 C E	See Below
10 R E	" "



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

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

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

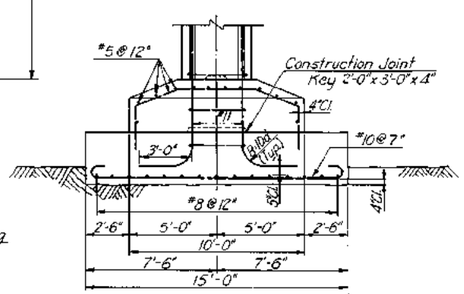


FOOTING EAST SIDE ONLY
Scale 1/8" = 1'

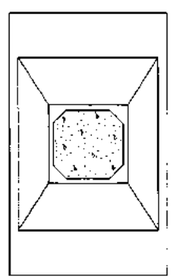
NOTES:

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

AS BUILT



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



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

	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

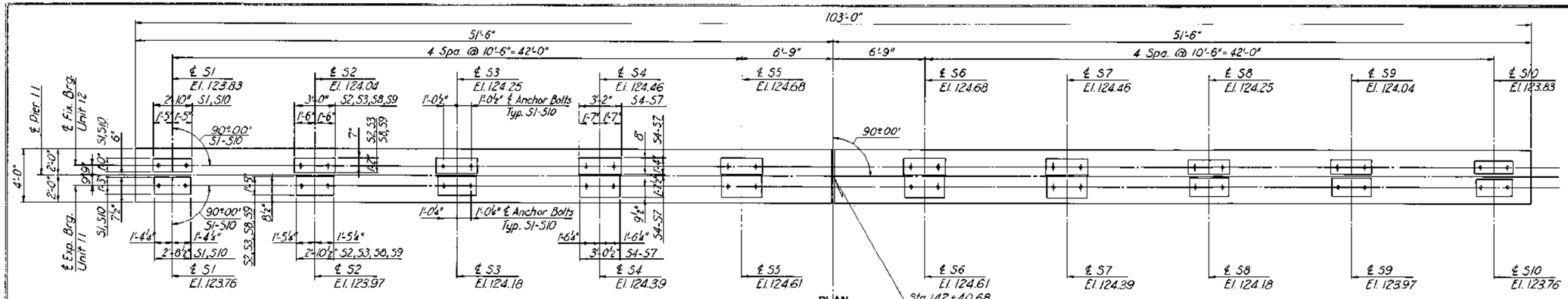
JAMES RIVER BRIDGE

PIER 10

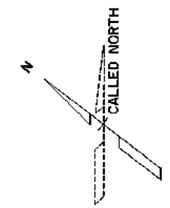
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

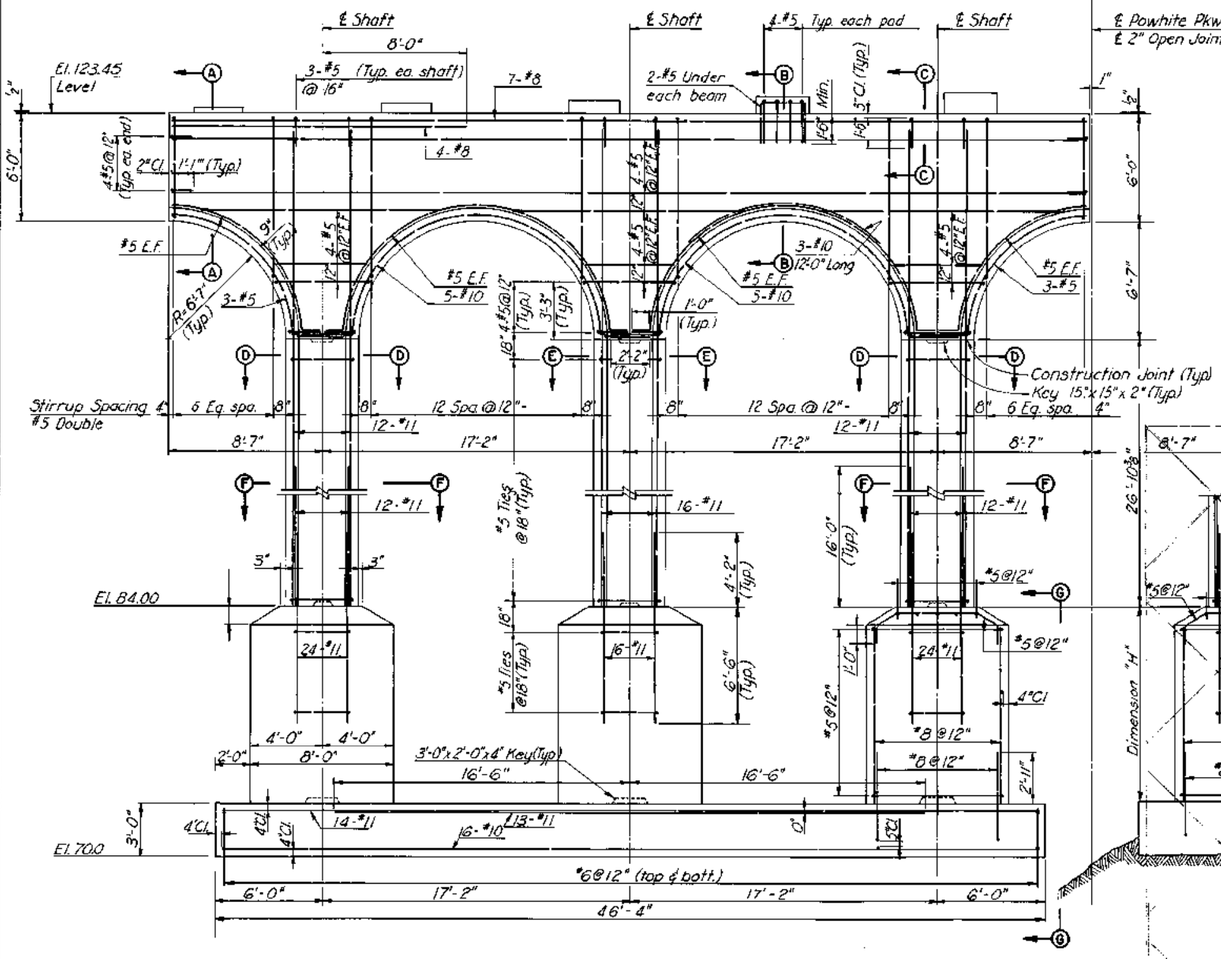
SCALE AS SHOWN
CONTRACT NO. C-3
SHEET NO 20 OF 53

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



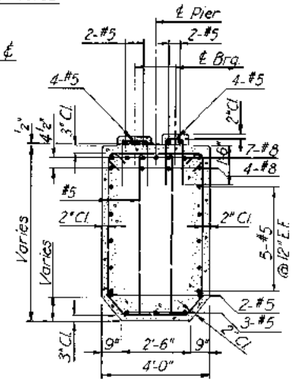
PLAN
Scale: 1/16" = 1'-0"



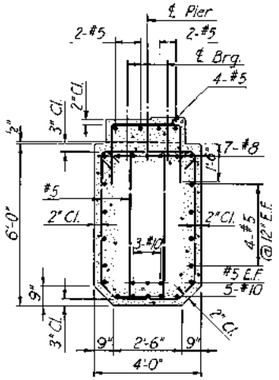


ELEVATION
Scale: 1/4" = 1'-0"

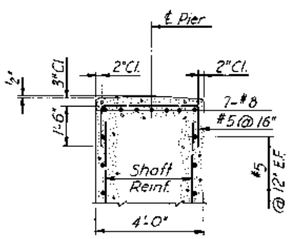
Note:
Pier symmetrical about ℄ Powhite Pkwy. except as shown.



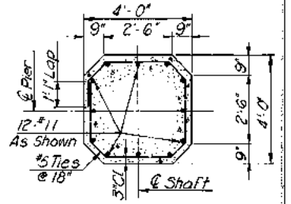
SECTION A-A
Scale: 3/8" = 1'-0"



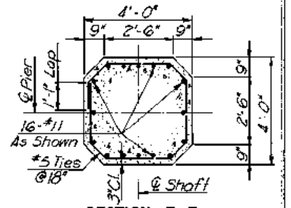
SECTION B-B
Scale: 3/8" = 1'-0"



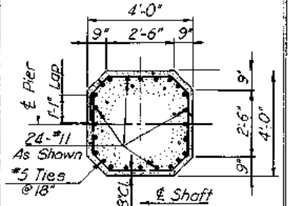
SECTION C-C
Scale: 3/8" = 1'-0"



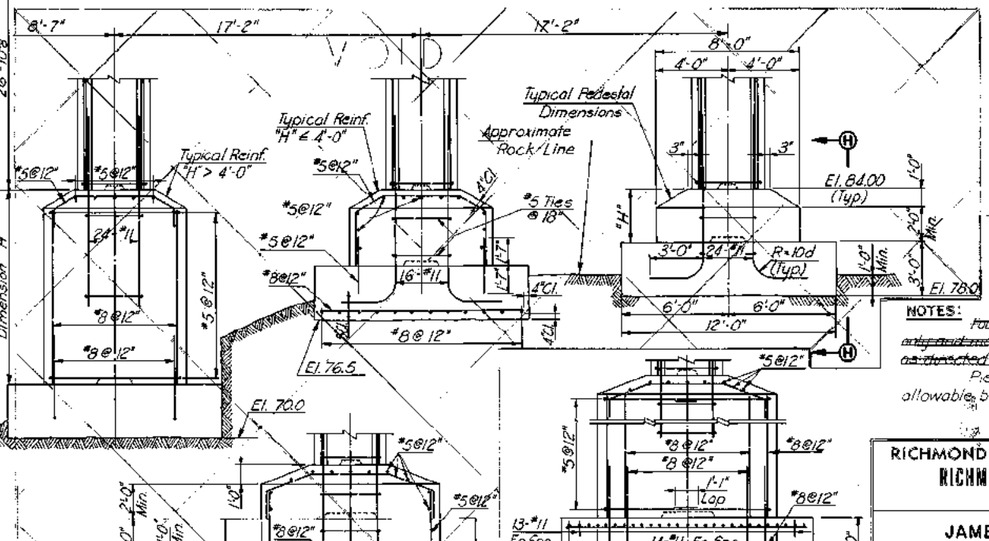
SECTION D-D
Scale: 3/8" = 1'-0"



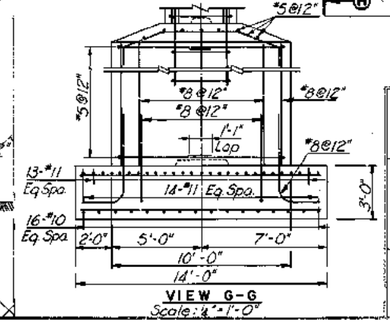
SECTION E-E
Scale: 3/8" = 1'-0"



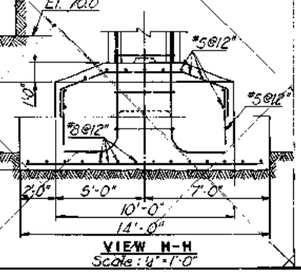
SECTION F-F
Scale: 3/8" = 1'-0"



NOTES:
~~Foundation elevations are approximate 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.



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



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

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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

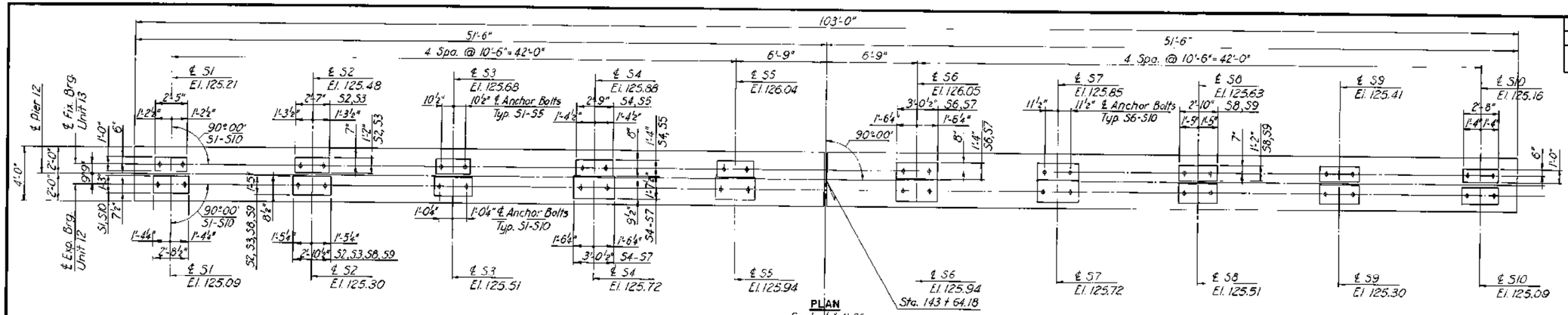
JAMES RIVER BRIDGE

PIER 11

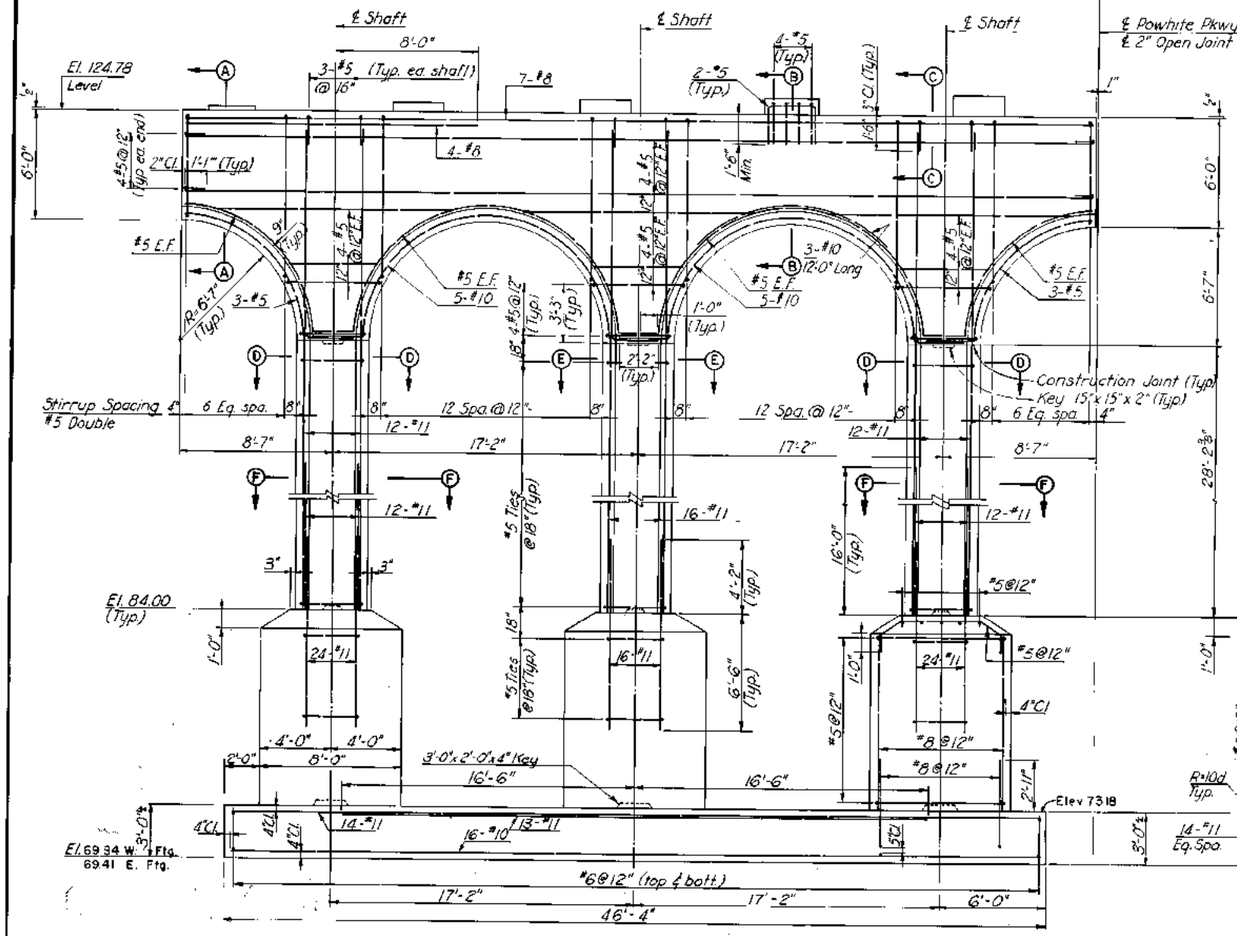
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

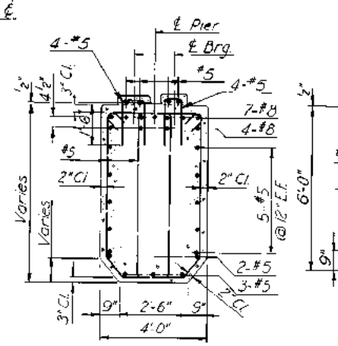


PLAN
Scale: 1/4"=1'-0"

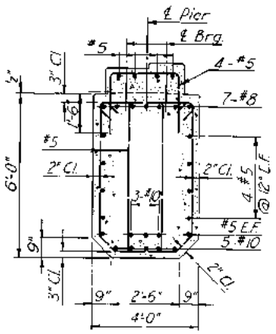


HALF ELEVATION
Scale: 1/4"=1'-0"

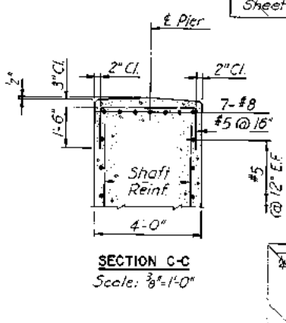
Note:
Pier symmetrical about ℄ Powhite Pkwy.



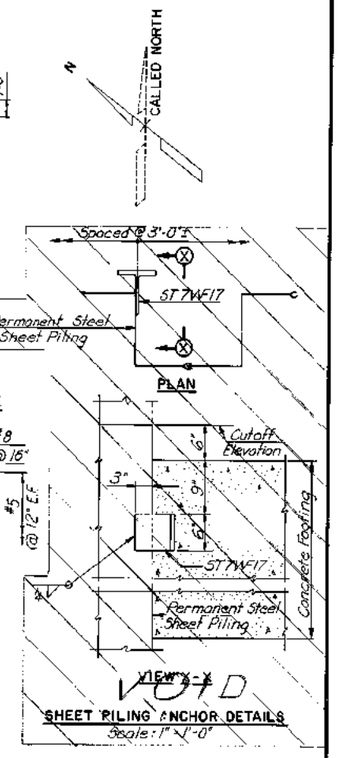
SECTION A-A
Scale: 3/8"=1'-0"



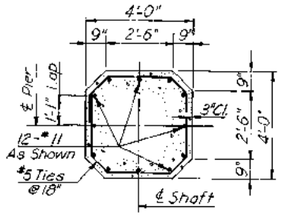
SECTION B-B
Scale: 3/8"=1'-0"



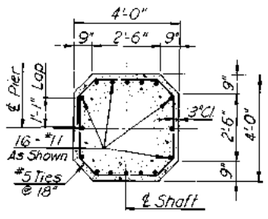
SECTION C-C
Scale: 3/8"=1'-0"



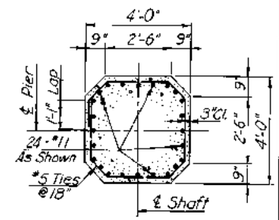
SHEET PILING ANCHOR DETAILS
Scale: 1" = 1'-0"



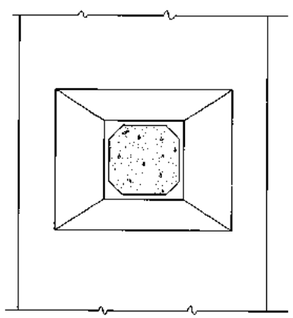
SECTION D-D
Scale: 3/8"=1'-0"



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



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



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

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

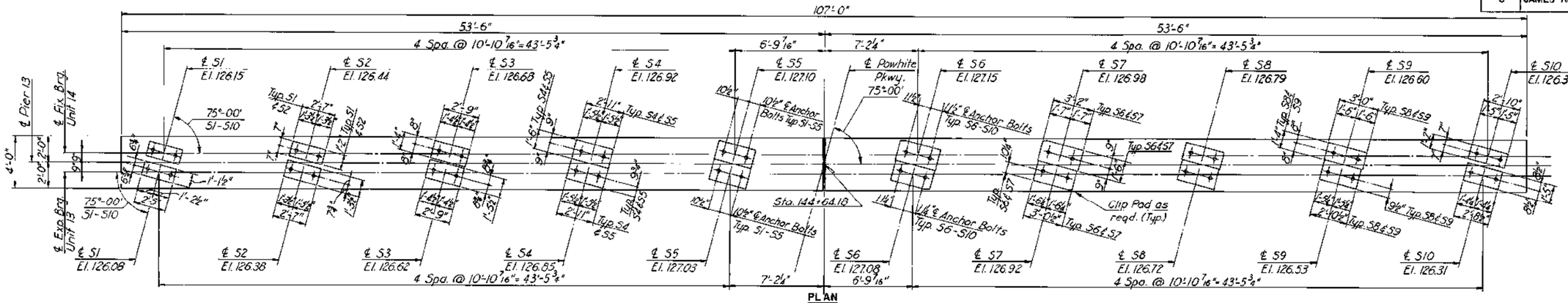
JAMES RIVER BRIDGE

PIER 12

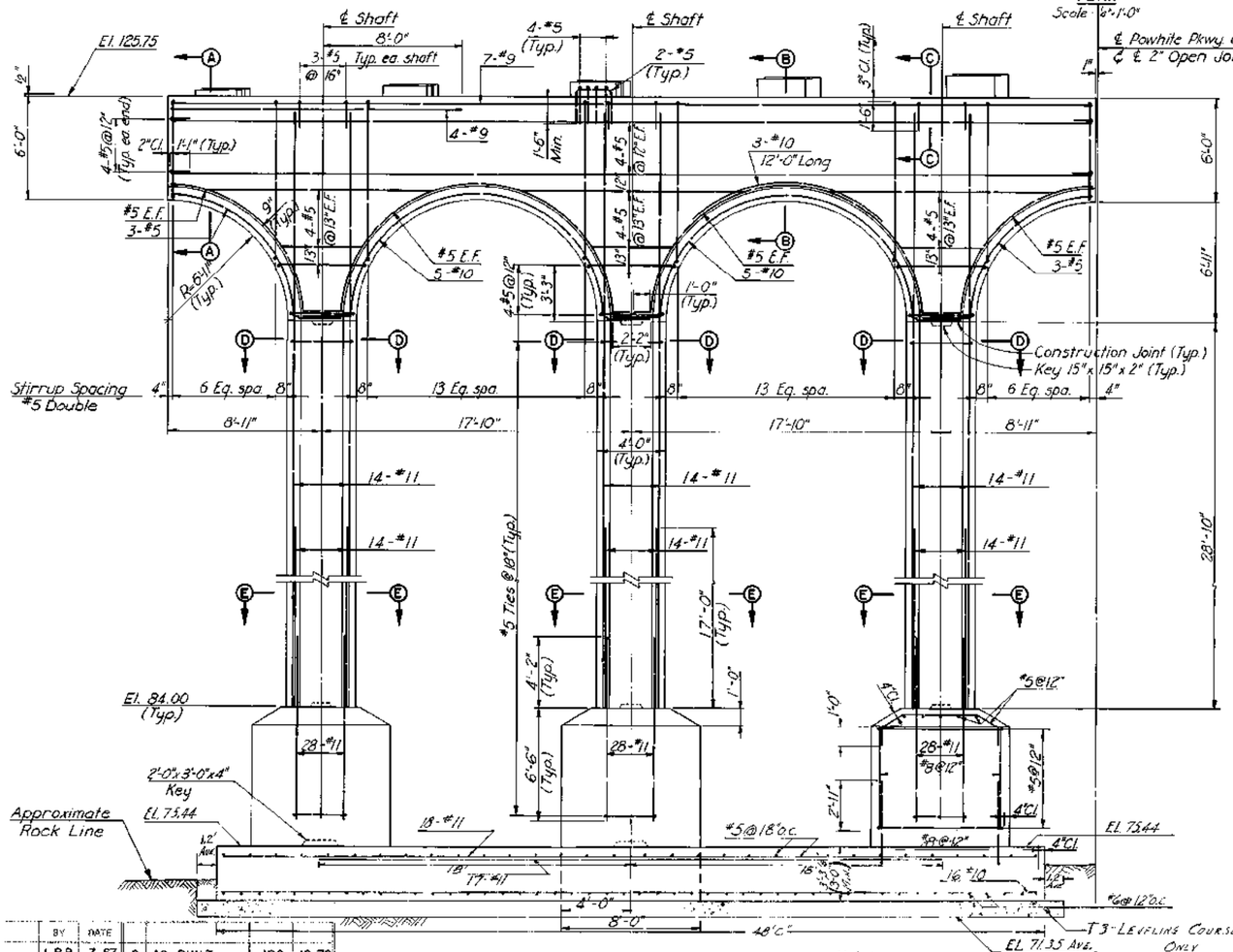
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

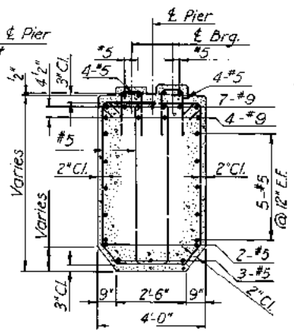


PLAN
Scale: 1/8"=1'-0"

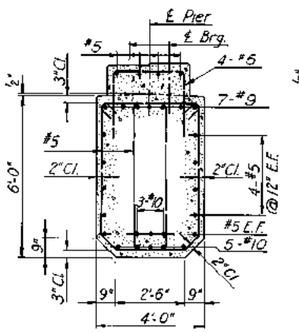


HALF ELEVATION
Scale: 1/4"=1'-0"

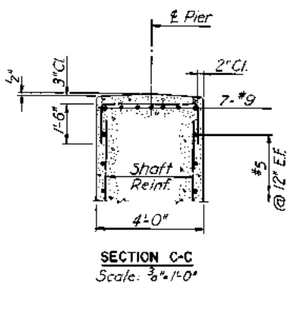
Note:
Pier symmetrical about ℄ 2" Open Joint except as shown.



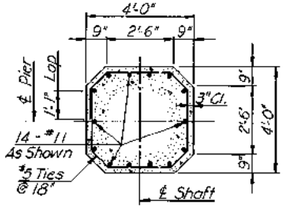
SECTION A-A
Scale: 3/8"=1'-0"



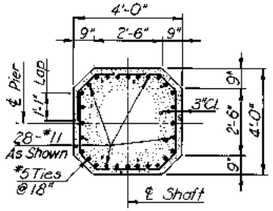
SECTION B-B
Scale: 3/8"=1'-0"



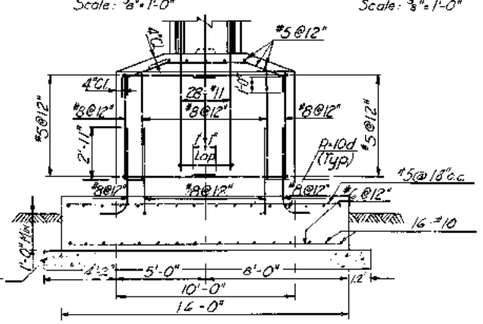
SECTION C-C
Scale: 3/8"=1'-0"



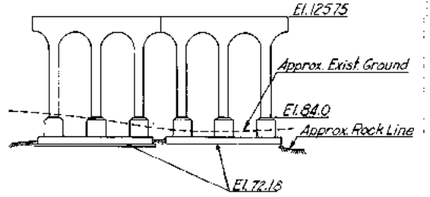
SECTION D-D
Scale: 3/8"=1'-0"



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.

	BY	DATE				
DRAWN	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

JAMES RIVER BRIDGE

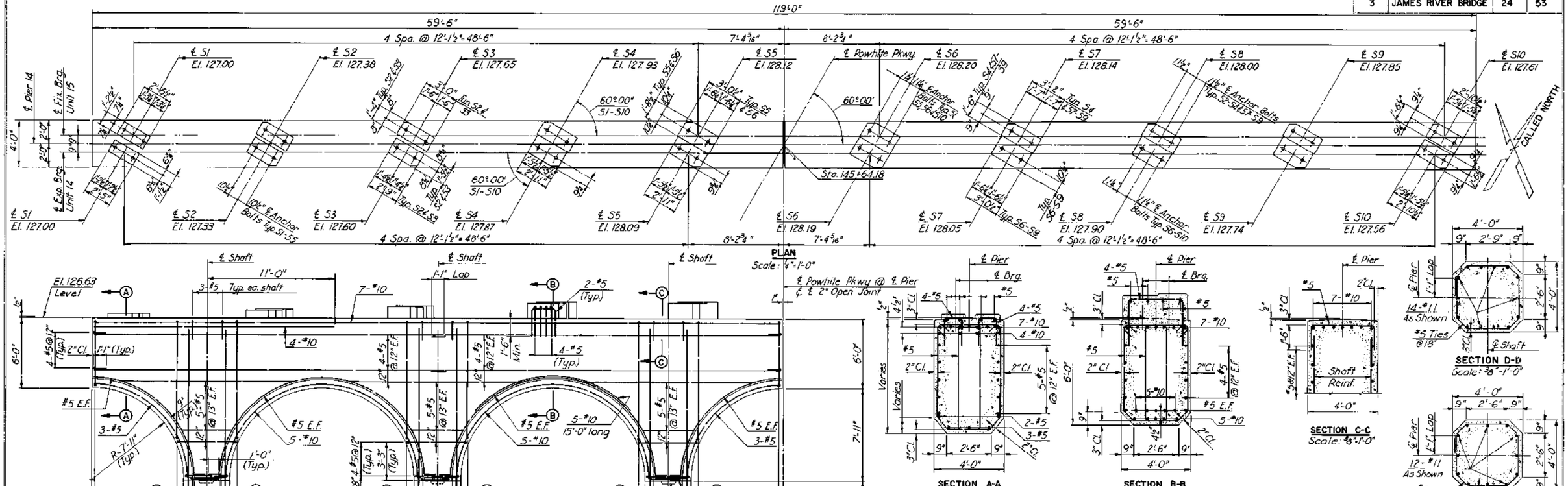
PIER 13

AS SHOWN

C-3

23 53

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



	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

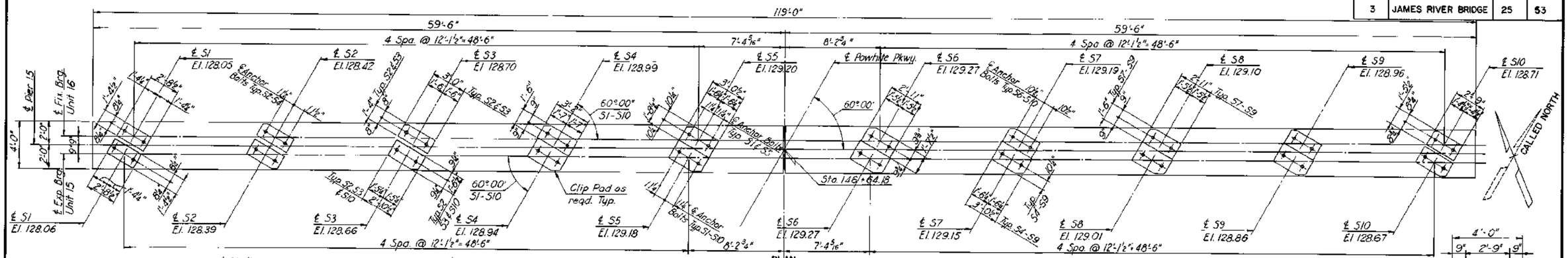
JAMES RIVER BRIDGE

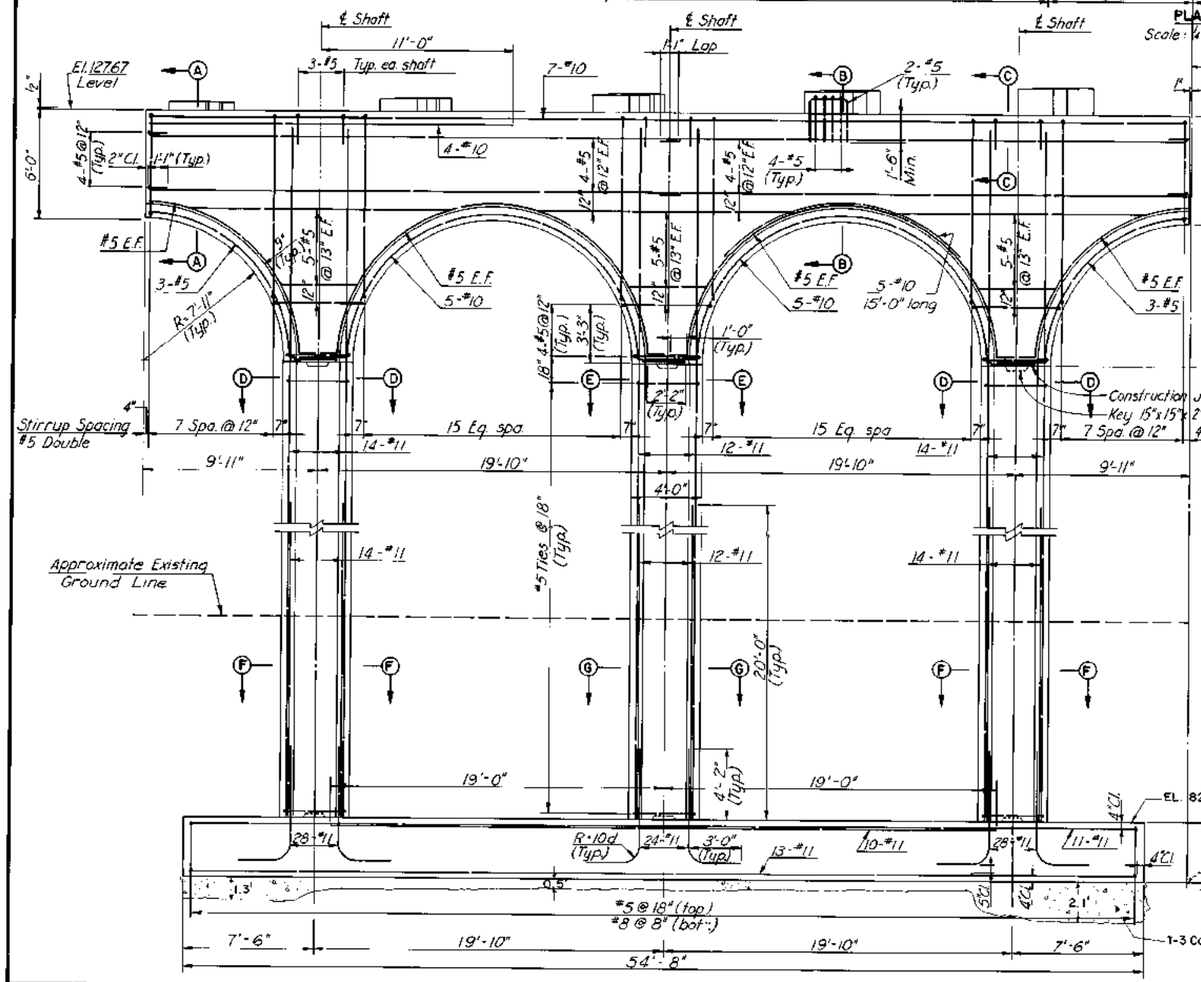
PIER 14

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

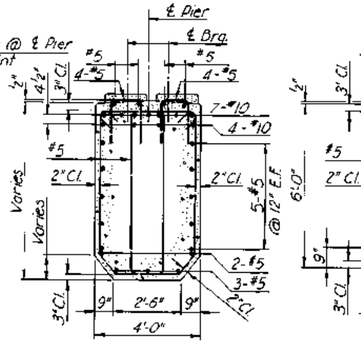
SCALE: AS SHOWN
CONTRACT NO. C-3
SHEET NO. 24 OF 53

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

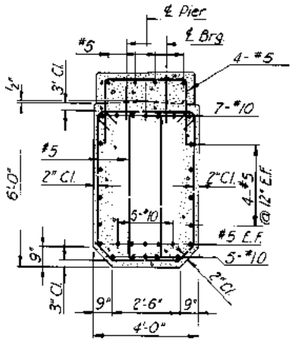




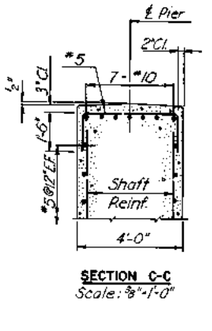
PLAN
Scale: ¼"=1'-0"



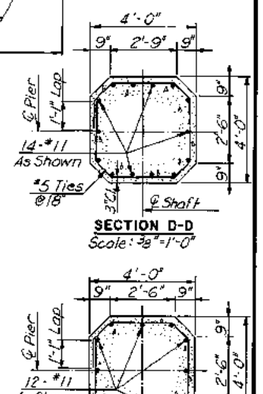
SECTION A-A
Scale: ⅜"=1'-0"



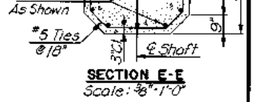
SECTION B-B
Scale: ⅜"=1'-0"



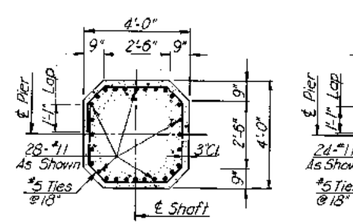
SECTION C-C
Scale: ⅜"=1'-0"



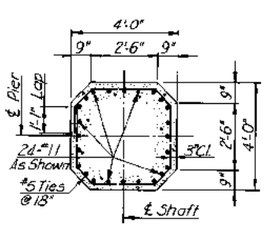
SECTION D-D
Scale: ⅜"=1'-0"



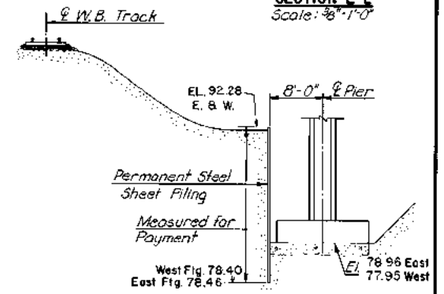
SECTION E-E
Scale: ⅜"=1'-0"



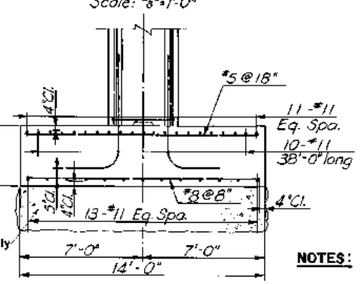
SECTION F-F
Scale: ⅜"=1'-0"



SECTION G-G
Scale: ⅜"=1'-0"



END ELEVATION
Scale: ⅜"=1'-0"



FOOTING END VIEW
Scale: ¼"=1'-0"

HALF ELEVATION
Scale: ⅛"=1'-0"

Note:
Pier symmetrical about ℄ 2" open joint.

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

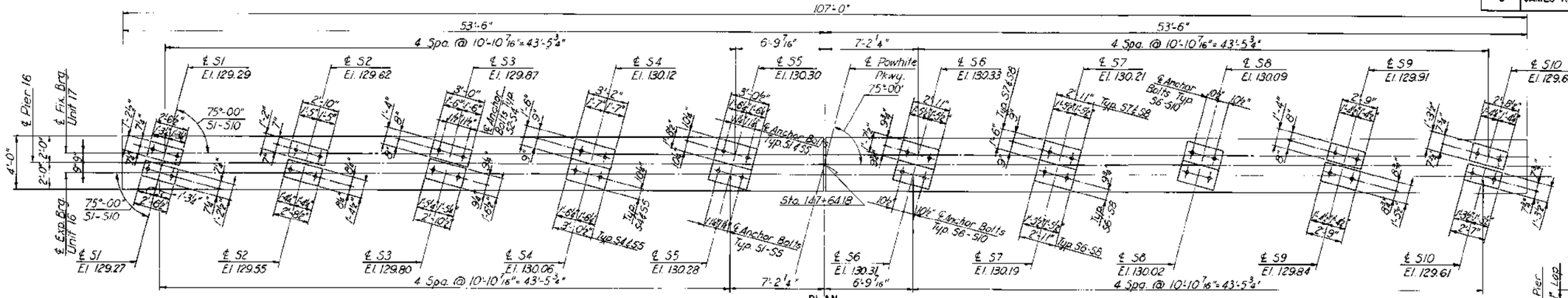
JAMES RIVER BRIDGE

PIER 15

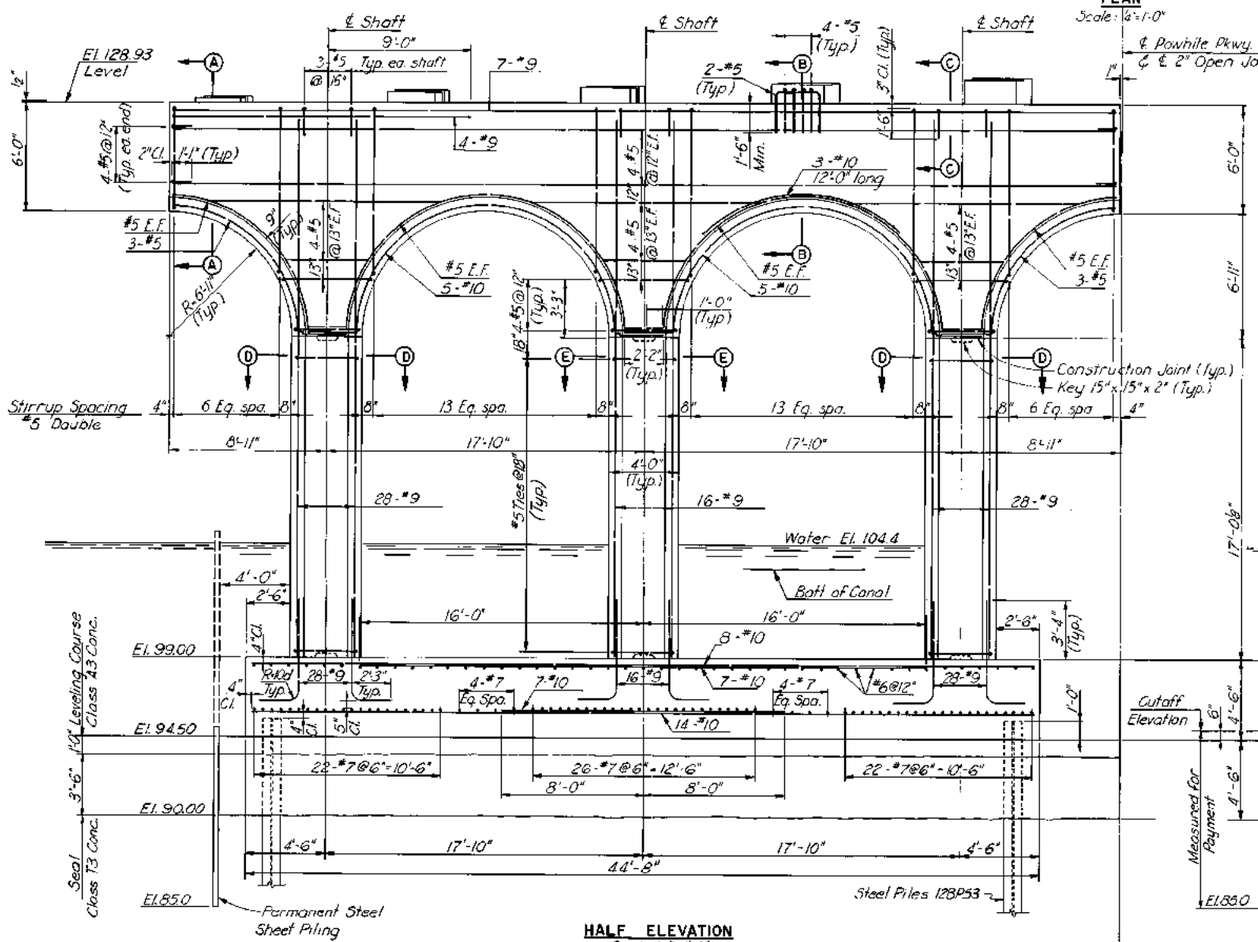
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

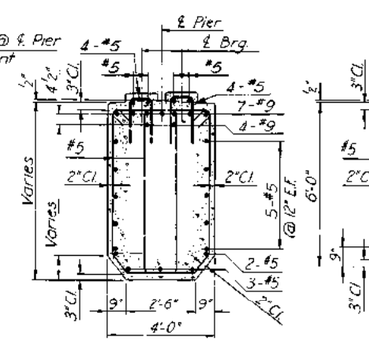


PLAN
Scale: 1/16"=1'-0"

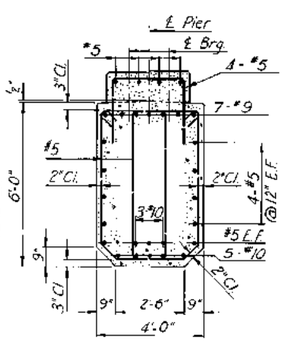


HALF ELEVATION
Scale: 1/4"=1'-0"

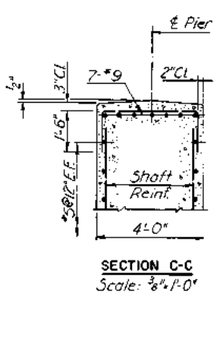
Note:
Pier symmetrical about ℄ 2" Open Joint.



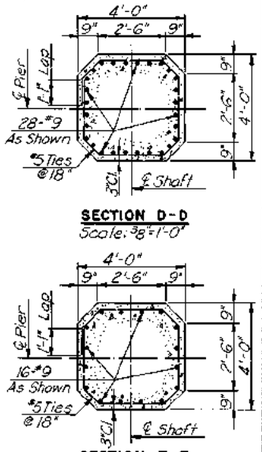
SECTION A-A
Scale: 3/8"=1'-0"



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

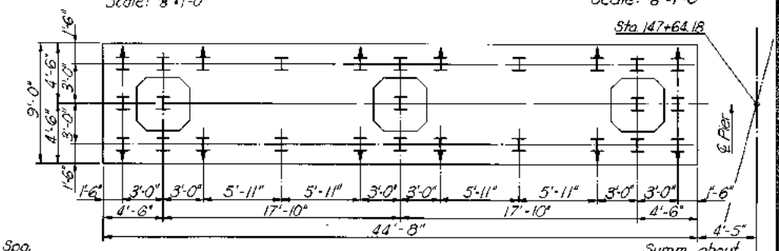


SECTION C-C
Scale: 3/8"=1'-0"



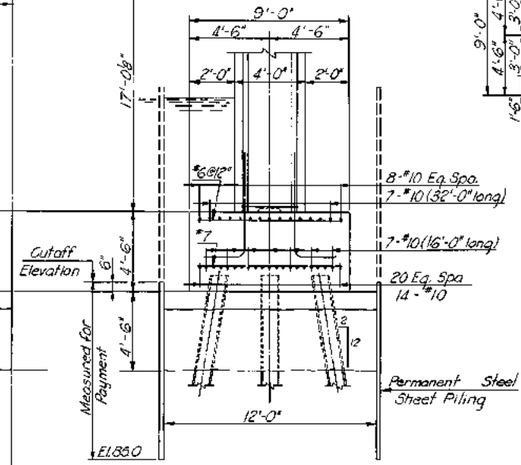
SECTION D-D
Scale: 3/8"=1'-0"

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. = 73.7
East Fig. = 61.4



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

	BY	DATE
MADE	HBW	7-67
CHECKED	FXH	3-68
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
1	AS BUILT		12-72

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

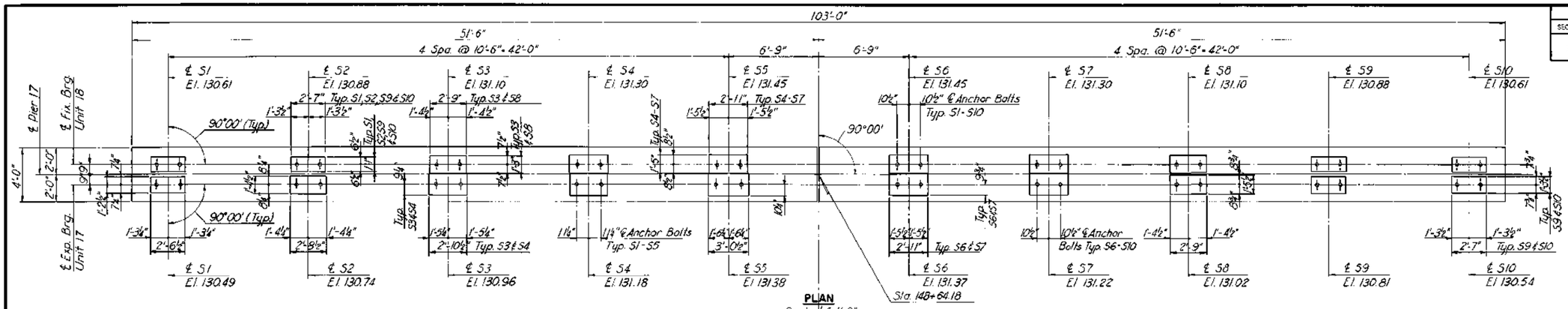
JAMES RIVER BRIDGE

PIER 16

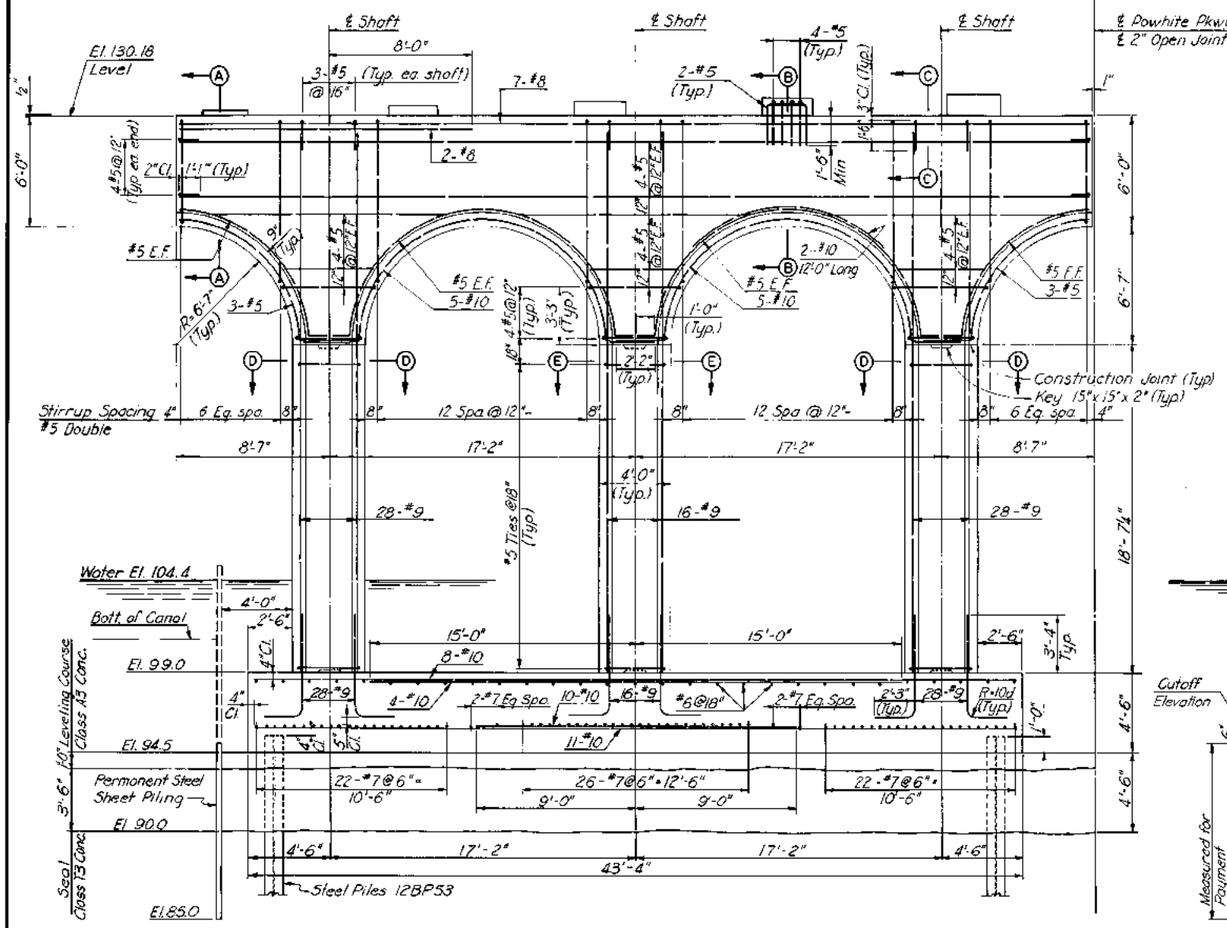
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

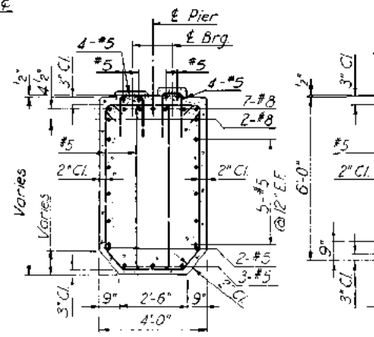


PLAN
Scale: 1/4"=1'-0"

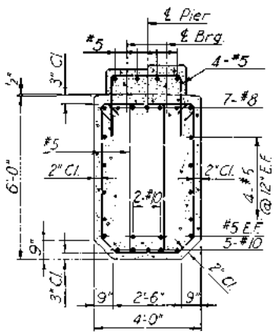


HALF ELEVATION
Scale: 1/4"=1'-0"

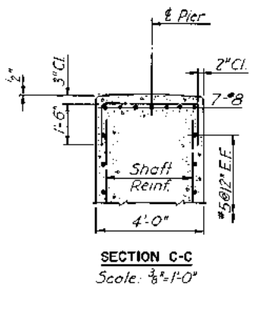
Note:
Pier symmetrical about ℄ Powhite Pkwy



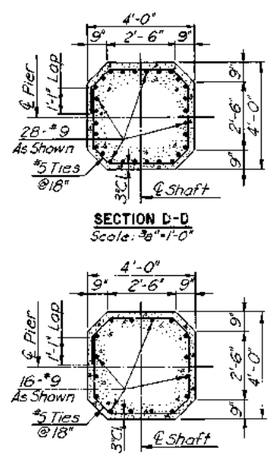
SECTION A-A
Scale: 3/8"=1'-0"



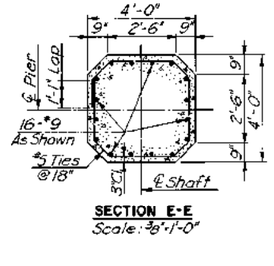
SECTION B-B
Scale: 3/8"=1'-0"



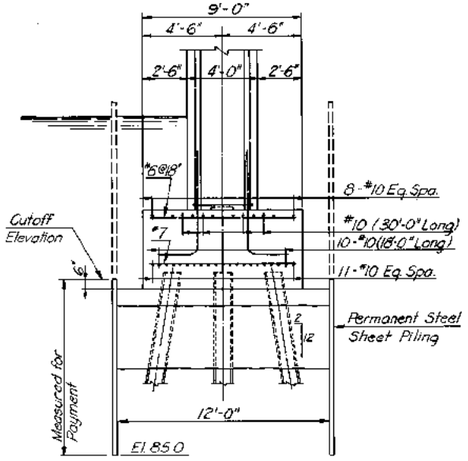
SECTION C-C
Scale: 3/8"=1'-0"



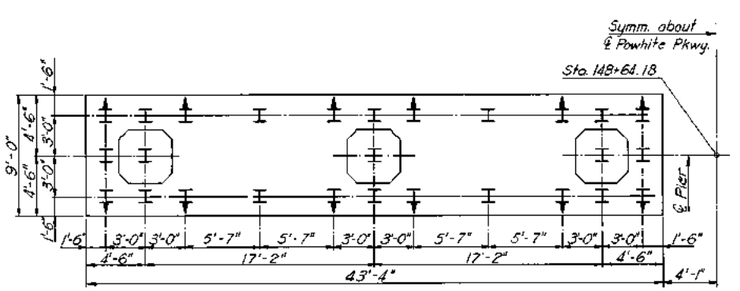
SECTION D-D
Scale: 3/8"=1'-0"



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



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



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

Pile Notes:
I denotes vertical pile.
⊥ 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)

	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

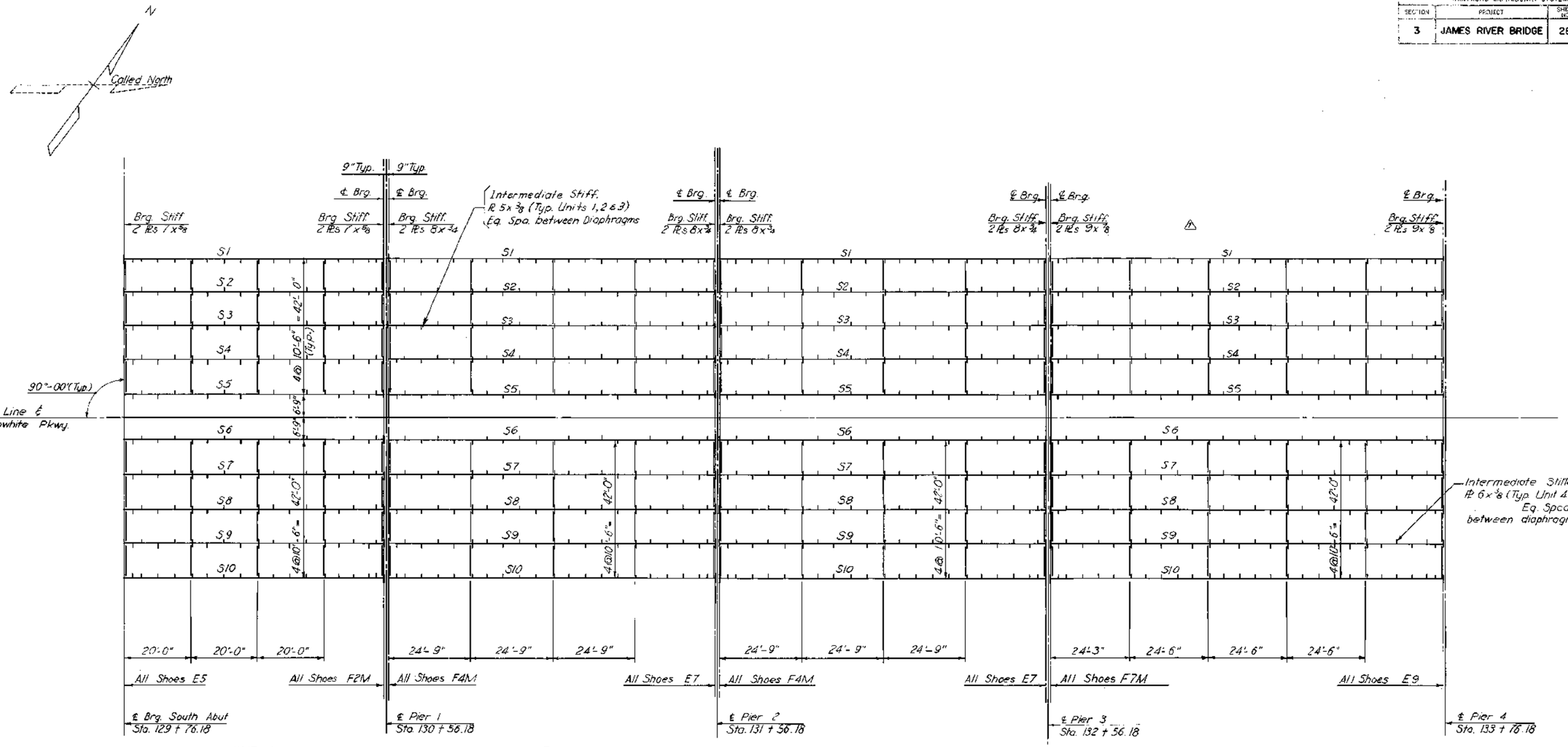
JAMES RIVER BRIDGE

PIER 17

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

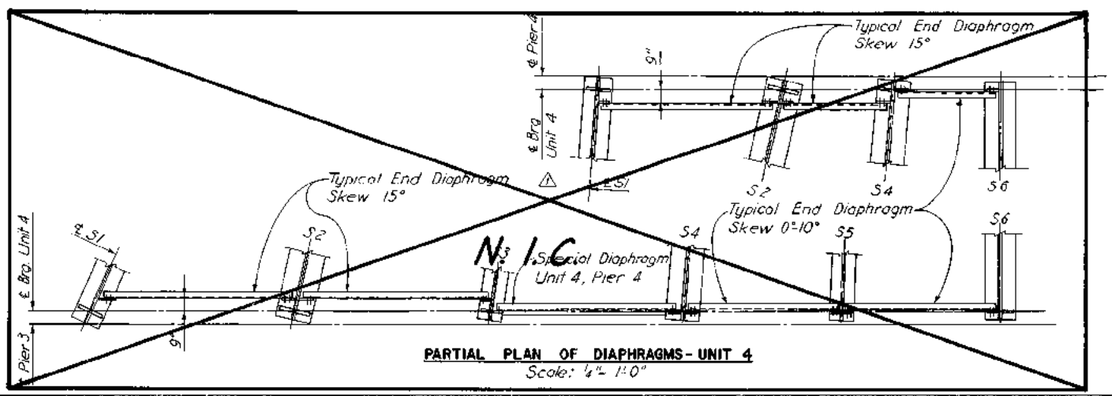
SCALE: AS SHOWN
CONTRACT NO.: C-3
SHEET NO. 27 OF 53

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"

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

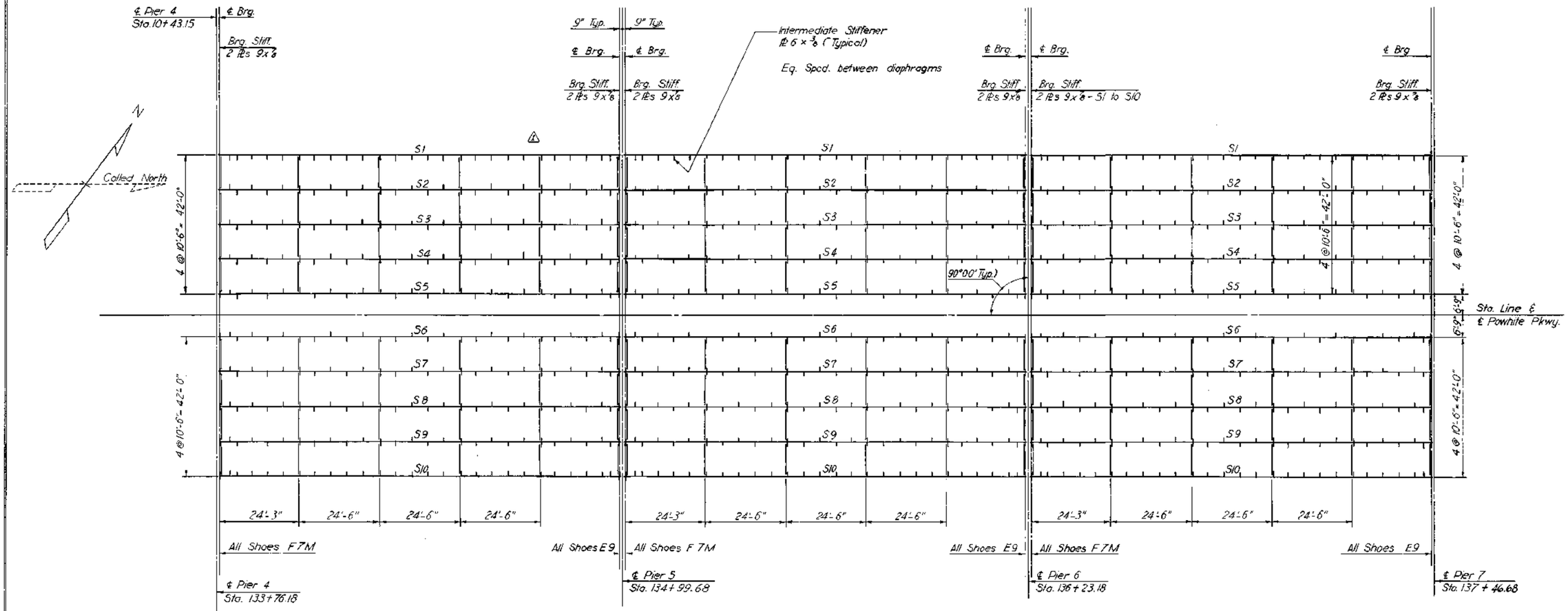
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
FRAMING PLAN UNITS 1, 2, 3 & 4

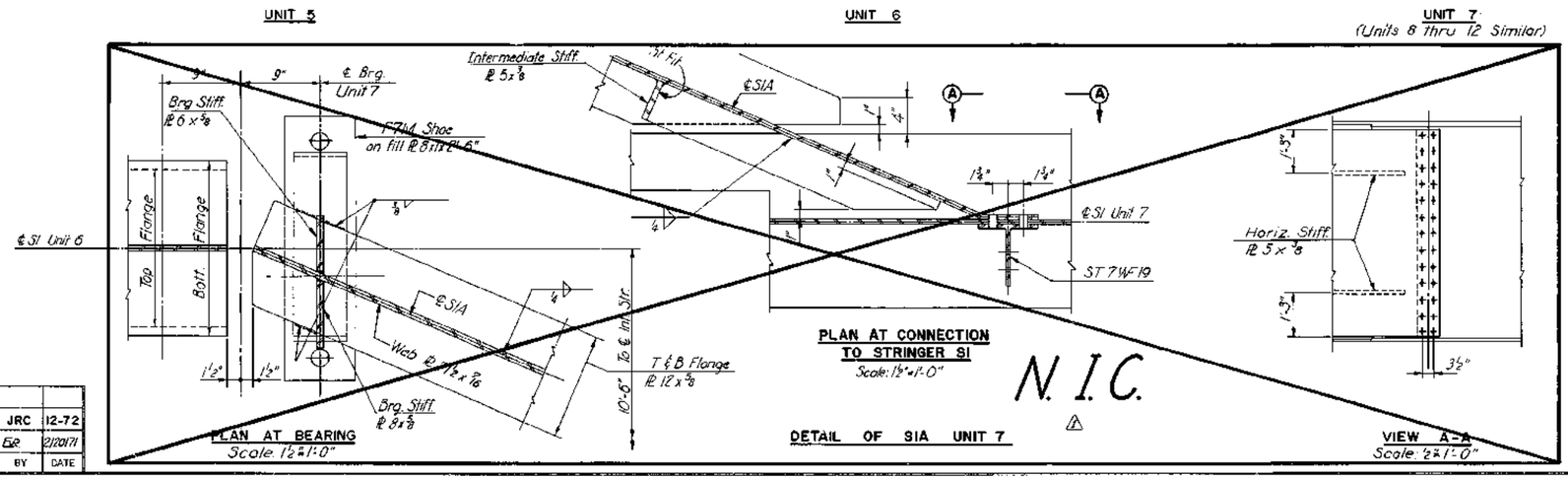
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=15' (Unless Noted)
CON RACT 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	EVR	2/20/71
IN CHARGE	FXH		NO.	REVISION	BY	DATE

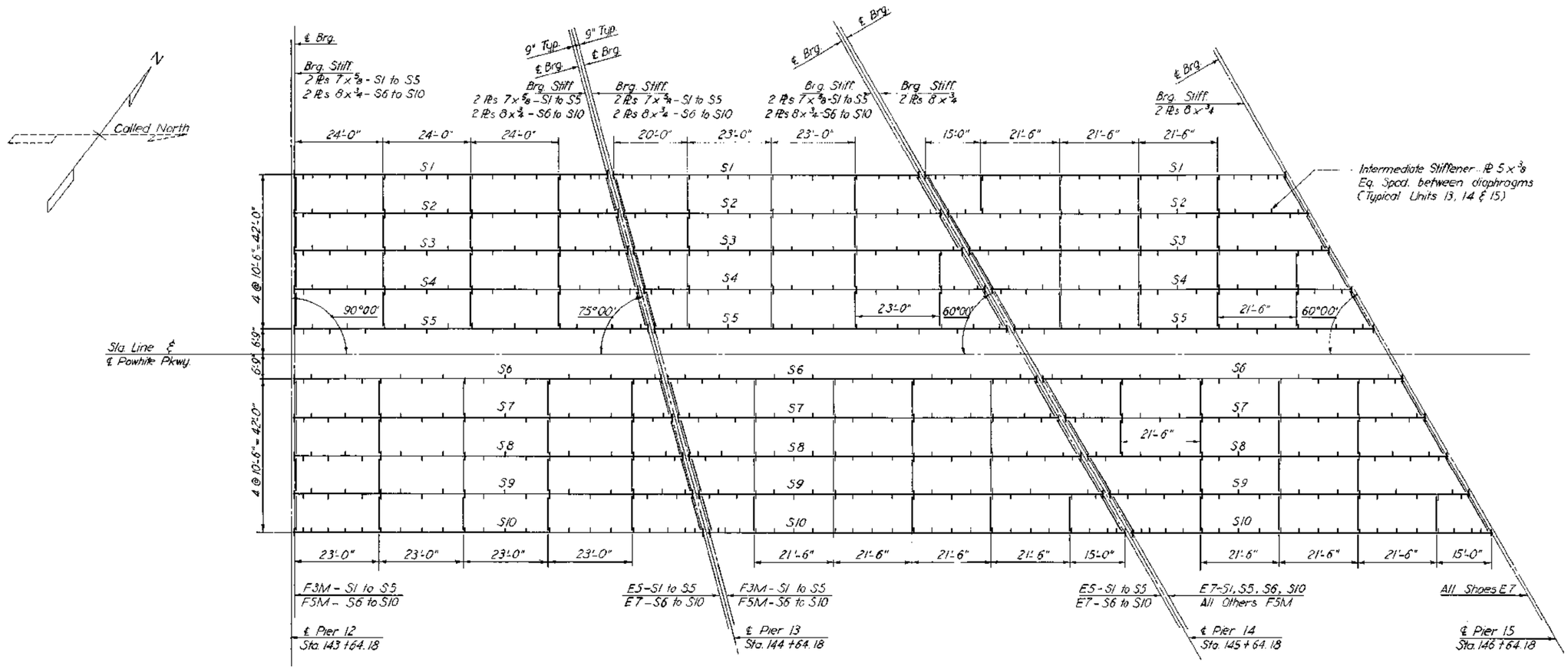
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
FRAMING PLAN UNITS 5 THRU 12

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

SCALE: 1"=5' (Unless Noted)
CON RACT 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				
MADE	EVR	7-67				
CHECKED	FXH	8-67	1	AS BUILT	JRC	12-72
IN CHARGE	FXH		NO.	REVISION	BY	DATE

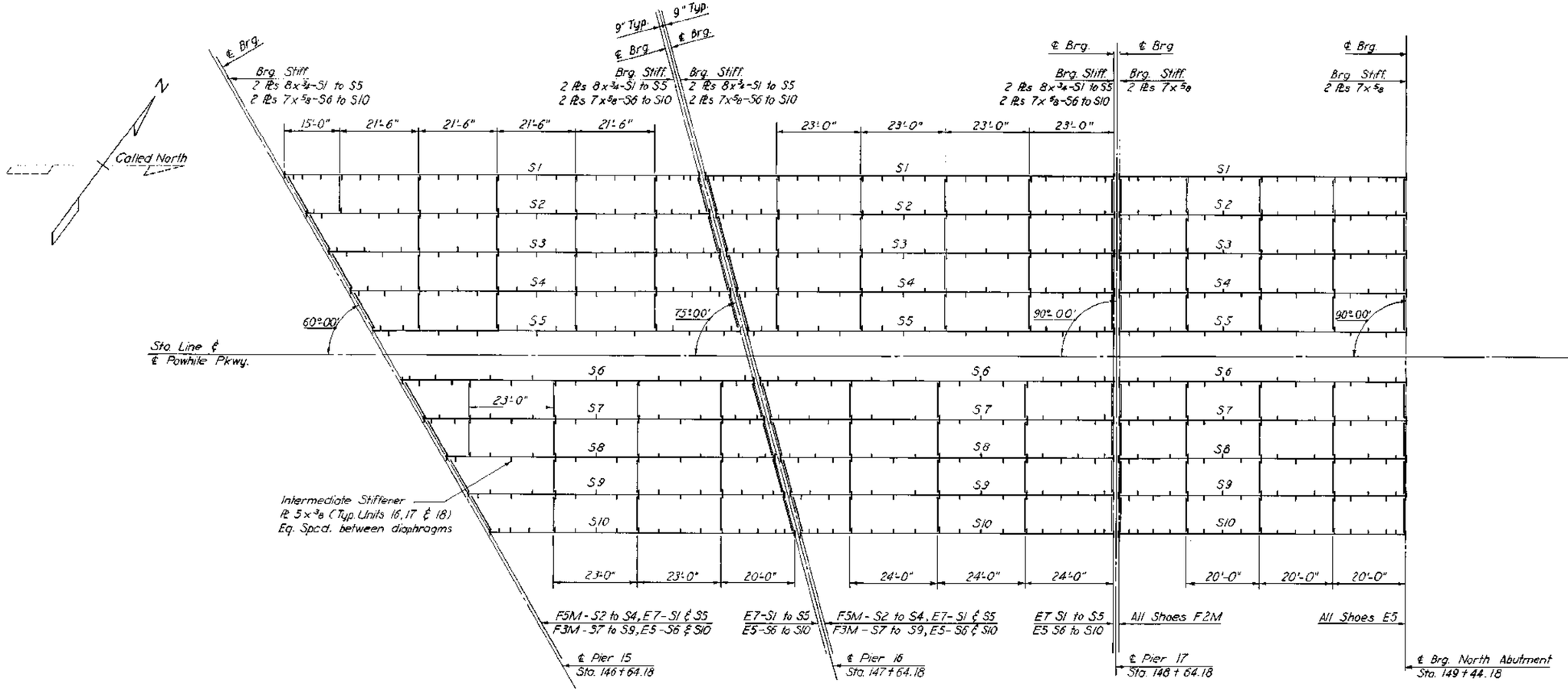
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
FRAMING PLAN UNITS 13, 14 & 15

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

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

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



STRINGER LENGTHS
(c to c Bearing)

Unit	Stringer	Length	Unit	Stringer	Length	Unit	Stringer	Length
16	S1	113'-5 9/16"	16 (cont'd)	S8	89'-9¼"	17 (cont'd)	S5	100'-3 3/8"
	S2	110'-2 9/16"		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 7/16"		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

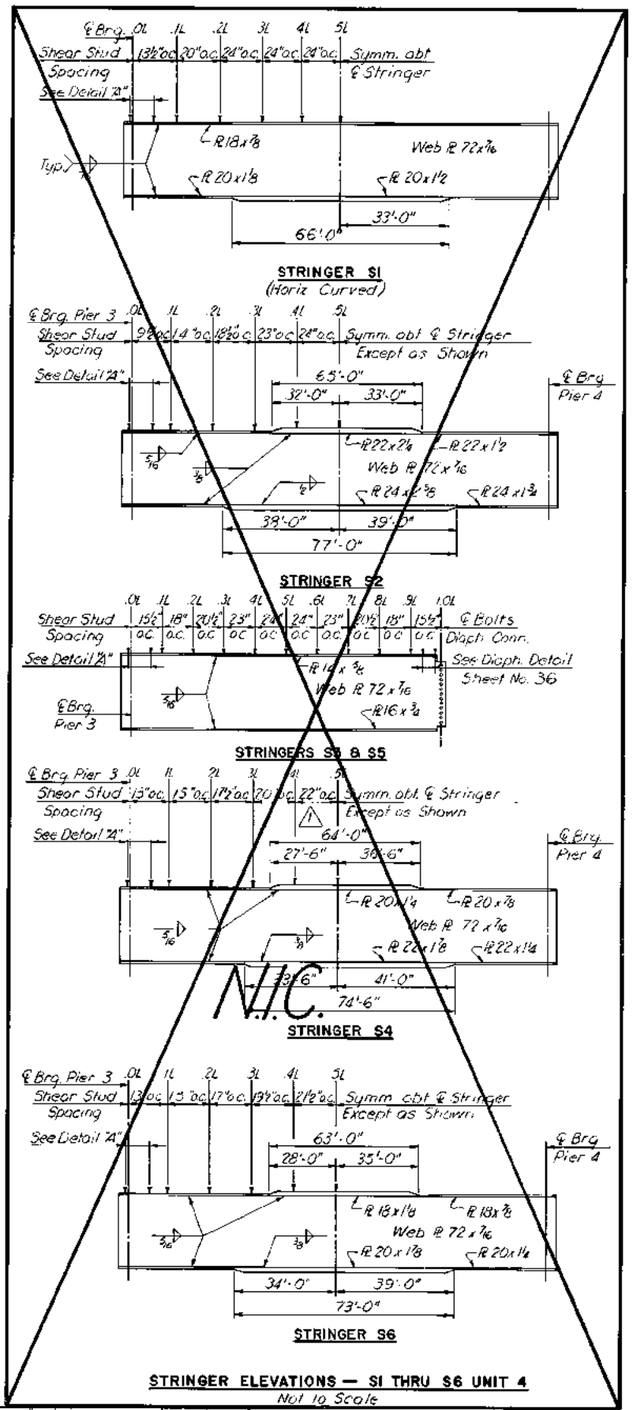
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

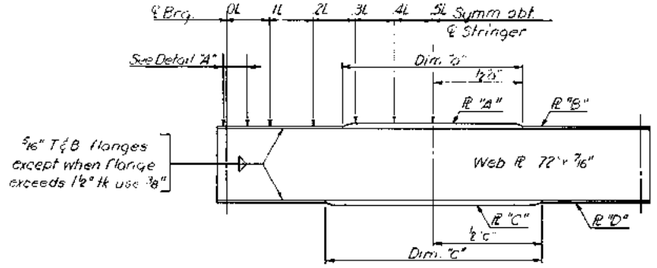
JAMES RIVER BRIDGE
FRAMING PLAN UNITS 16,17 & 18

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

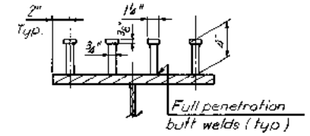
SCALE 1" = 15'-0"
CONTRACT NO. C-3
SHEET NO. 31 OF 53

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

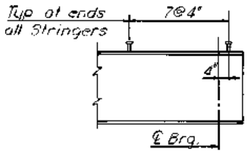




TYPICAL STRINGER ELEVATION
Not to Scale



SHEAR STUD DETAIL
Not to Scale



DETAIL "A"
Not to Scale

SHEAR STUD NOTE:

Capacity = 34.0 kips 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.

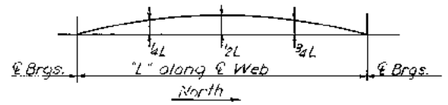
Shear stud spacing shown is maximum spacing.

STRINGER SCHEDULE

UNIT	STRINGER	R "A"	Dim. "a"	R "B"	R "C"	Dim. "c"	R "D"	SHEAR STUD SPACING 0L-1L	1L-2L	2L-3L	3L-4L	4L-5L
1	S5&S6	14 x ⅞	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	11⅝"	13⅞"	15⅞"	18"	20"
2	~~———~~	~~16 x ⅞~~	~~F.L.~~	~~———~~	~~10 x 1⅛~~	~~54'-0"~~	~~10 x ⅞~~	~~13¼"~~	~~15¾"~~	~~18¼"~~	~~20¾"~~	~~23"~~
	~~———~~	~~16 x ¾~~	~~F.L.~~	~~———~~	~~16 x 1⅛~~	~~52'-6"~~	~~18 x ⅞~~	~~13¼"~~	~~16"~~	~~18¾"~~	~~21½"~~	~~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.~~	~~———~~	~~16 x 1⅛~~	~~56'-6"~~	~~16 x ⅞~~	~~12"~~	~~14"~~	~~17½"~~	~~20½"~~	~~23½"~~
⚠1	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 Plng Sheet										
	S1-S4,S7-S10	18 x 1⅛	62'-0"	18 x ⅞	20 x 1⅜	70'-6"	20 x 1¼	12½"	14½"	17½"	21"	23"
	S5 & S6	18 x 1⅛	53'-0"	18 x ⅞	20 x 1⅜	77'-0"	20 x 1¼	12½"	14½"	18½"	23½"	24"
5	~~———~~	~~18 x 1⅛~~	~~60'-0"~~	~~18 x ⅞~~	~~20 x 1⅝~~	~~73'-6"~~	~~20 x 1⅛~~	~~13½"~~	~~15½"~~	~~20"~~	~~24"~~	~~24"~~
	~~———~~	~~18 x 1~~	~~F.L.~~	~~———~~	~~20 x 1⅝~~	~~75'-0"~~	~~20 x 1⅛~~	~~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 1⅛	63'-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 1⅛	68'-6"	18 x ¾	20 x 2	75'-6"	20 x 1⅜	12½"	14½"	17½"	21½"	23½"
7 thru 12	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 1⅛	63'-6"	18 x ⅞	20 x 2	75'-6"	20 x 1⅜	12½"	14½"	17½"	21½"	23½"
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 1⅛	51'-0"	16 x ⅞	11½"	13½"	15½"	18"	20"
	S3	14 x ⅝	F.L.	—	16 x 1⅜	55'-6"	16 x ⅞	11⅝"	13⅝"	15½"	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 1⅜	61'-0"	18 x 1⅛	12"	14"	16"	19½"	21"
	S8	16 x 1	51'-0"	16 x ¾	18 x 1⅜	66'-6"	18 x 1⅛	12"	14"	17"	19½"	21½"
	S9	16 x 1	57'-0"	16 x ⅞	18 x 1⅜	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.	—	18 x 1½	58'-6"	18 x 1	12"	14"	16"	19"	21"
	S5&S6	16 x ¾	F.L.	—	18 x 1⅜	60'-6"	18 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 1⅜	67'-0"	18 x 1¼	12"	14"	17"	20"	22"
	S3	16 x 1	51'-0"	16 x ¾	18 x 1⅜	66'-6"	18 x 1⅛	12"	14"	17"	19½"	21½"
	S4	16 x ⅞	F.L.	—	18 x 1⅜	61'-0"	18 x 1⅛	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	18 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	53'-0"	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"	13"	15½"	18"	20"
	S10	14 x ⅝	F.L.	—	16 x 1⅜	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 upward camber amounting to (see table). This will provide approximate compensation for deflection under full dead load.

CAMBER SCHEDULE

UNIT	STRINGER	¼ & ¾	½	UNIT	STRINGER	¼ & ¾	½
1	S1 - S10	¾"	1"	13 & 14	S6	1⅜"	1⅞"
2	~~———~~	~~1¼"~~	~~1⅞"~~		S7	1½"	2⅛"
	~~———~~	~~1¼"~~	~~1⅝"~~		S8	1⅝"	2¼"
	S1 - S10	1⅜"	1¾"		S9	1⅝"	2¼"
3	~~———~~	~~1¼"~~	~~1⅞"~~		S10	1⅞"	2½"
	S1 - S10	1⅜"	1⅞"	15	S1 - S10	1⅜"	1⅞"
4	S1 - S10	2"	2¾"	16 & 17	S1	1⅞"	2⅝"
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	1⅝"	1⅞"
7 thru 12	S1-S4,S7-S10	2⅛"	2⅞"		S6&S7	1¼"	1¾"
	S5&S6	2⅛"	3"		S8	1⅛"	1½"
13 & 14	S1	⅝"	1⅛"		S9	1"	1⅜"
	S2	1"	1⅜"		S10	⅞"	1⅛"
	S3	1⅛"	1½"	18	S1 - S10	¾"	1"
	S4 & S5	1¼"	1¾"				

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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

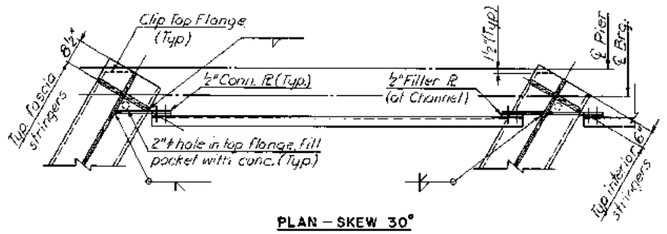
JAMES RIVER BRIDGE

STRUCTURAL STEEL DETAILS

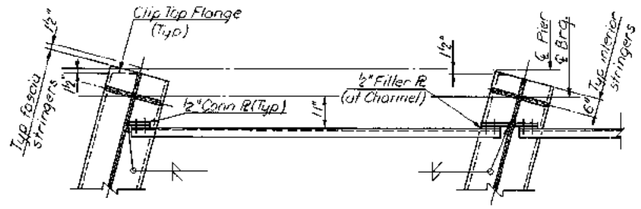
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

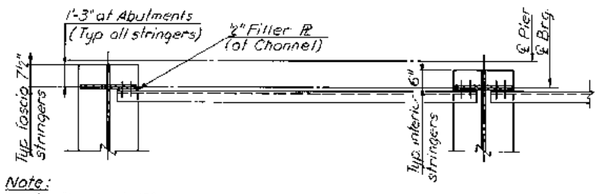
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	33	53



PLAN – SKEW 30°

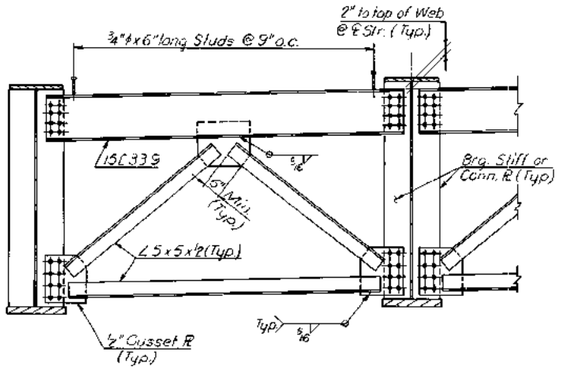


PLAN – SKEW 15°



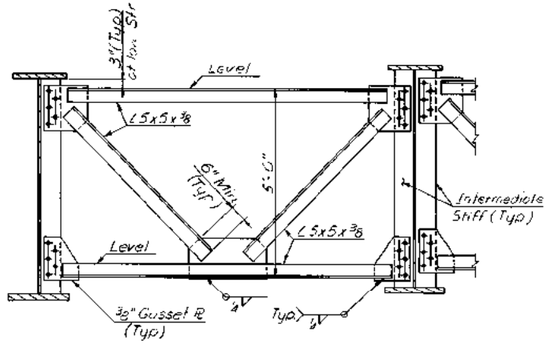
Note:
For Skew up to 10° Bearing Stiffeners to be parallel to ℄ Brg.

PLAN – SKEW 0° THRU 10°

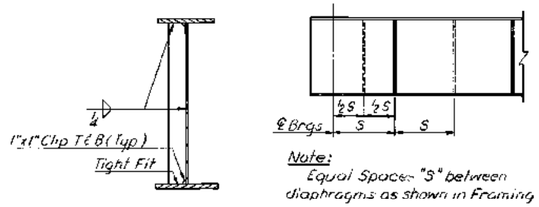


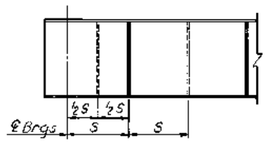
ELEVATION

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



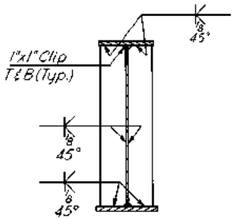
TYPICAL INTERMEDIATE DIAPHRAGM
Scale: ½"=1'-0"



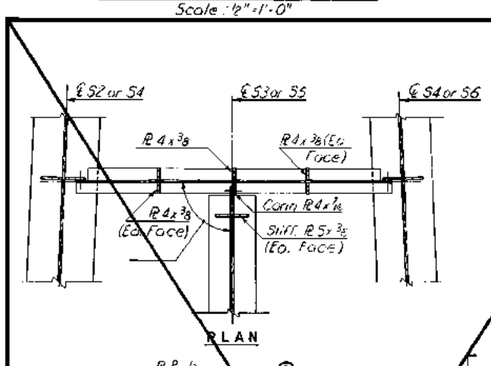


Note:
Equal Spaces "S" between diaphragms as shown in Framing Plan.

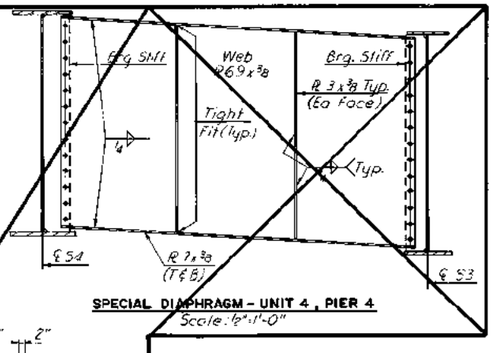
INTERMEDIATE STIFFENER DETAILS
Not to Scale



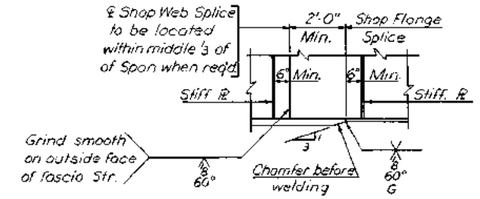
BEARING STIFFENER DETAIL
Not to Scale



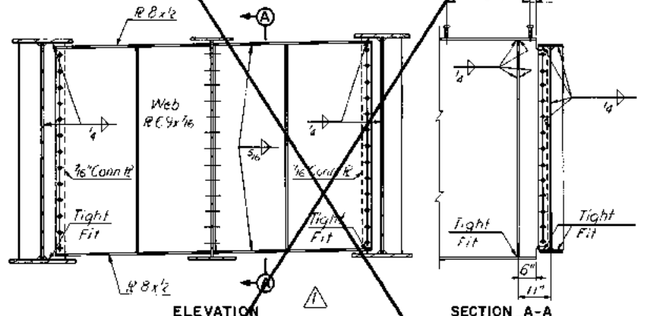
PLAN



SPECIAL DIAPHRAGM – UNIT 4, PIER 4
Scale: ½"=1'-0"



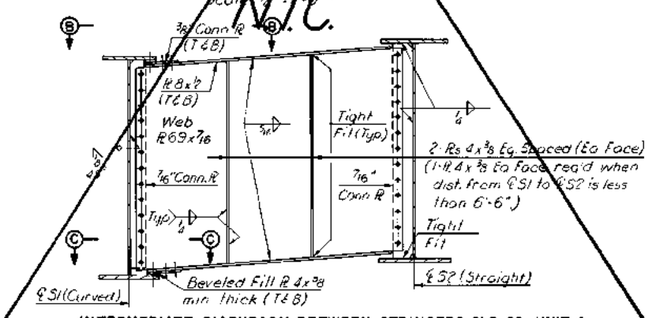
SHOP SPLICE DETAIL
Not to Scale



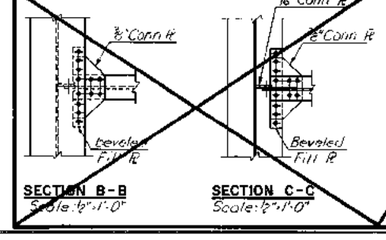
ELEVATION

SECTION A-A

DETAILS OF DIAPHRAGM AT END OF STRINGER S3 & S5 – UNIT 4
Scale: ½"=1'-0"



INTERMEDIATE DIAPHRAGM BETWEEN STRINGERS S1 & S2 – UNIT 4
Scale: ½"=1'-0"



SECTION B-B
Scale: ½"=1'-0"

SECTION C-C
Scale: ½"=1'-0"

	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

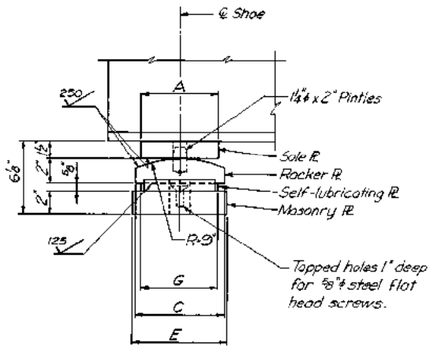
JAMES RIVER BRIDGE

STRUCTURAL STEEL DETAILS

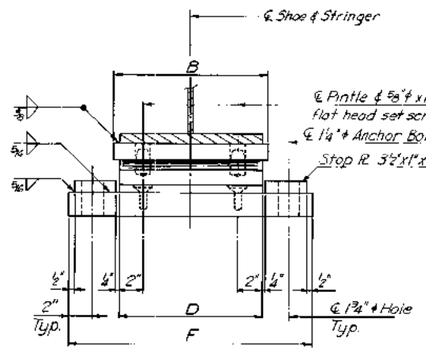
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CON RACK NO: C-3
SHEET NO 33 OF 53

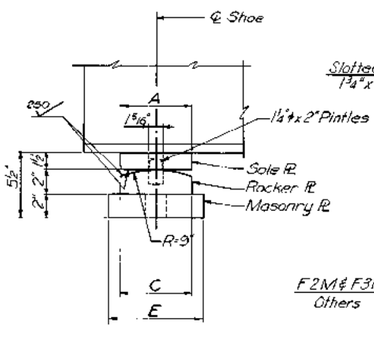
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	34	53



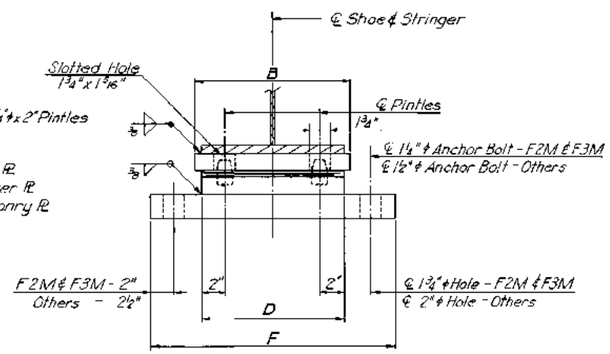
SIDE ELEVATION



END ELEVATION

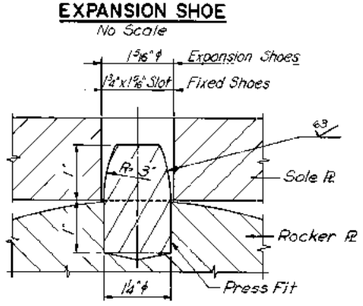


SIDE ELEVATION

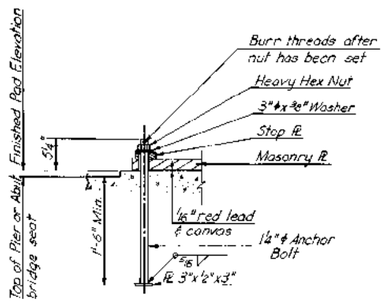


END ELEVATION

EXPANSION SHOE
No Scale

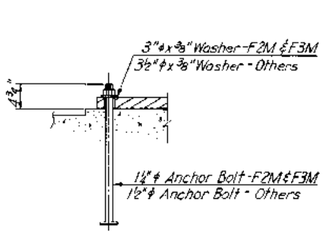


PINTLE DETAIL
Scale: ¾"=1"



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 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 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
E2	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"	10"	2'-2"	6"
E7	6"	1'-7"	9½"	1'-6"	10"	2'-2"	7½"
E8	6"	1'-9"	10"	1'-8"	11"	2'-4½"	6"
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"	10"	2'-0"	11"	2'-8½"	6"
E14	6"	2'-1"	1'-0"	2'-2"	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"	8"	1'-8"	7"	2'-6"
F7M	6"	1'-9"	6"	1'-8"	8"	2'-6"
F8M	6"	1'-11"	6"	1'-10"	8"	2'-8"
F9M	6"	2'-1"	6"	2'-0"	7"	2'-8"

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

NO.	REVISION	BY	DATE
2	AS BUILT	JRC	12-72
1	Delete Shoes.	H.B.W.	2/20/73

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

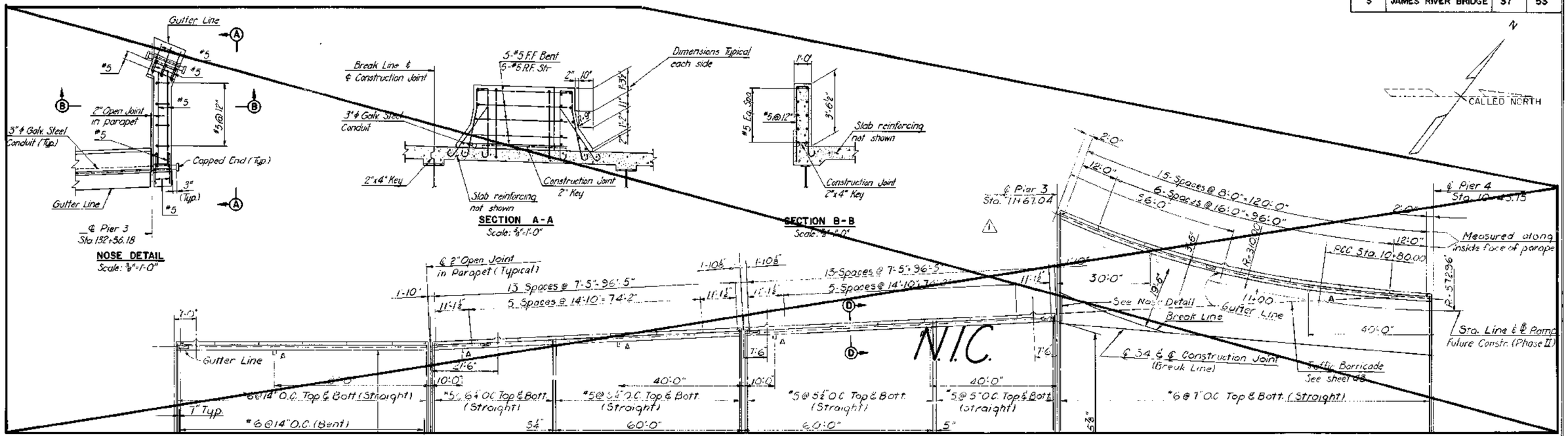
JAMES RIVER BRIDGE

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



	BY	DATE				
MADE	DEK.	7-67	3	AS BUILT	JRC	12-72
CHECKED	H.B.W.	9-67	②	Light Std Location	J.G.V.	3/19/71
IN CHARGE	F.X.H.		⚠	Remove Ramp Taper	J.G.V.	2-20-71
			NO.	REVISION	BY	DATE

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.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

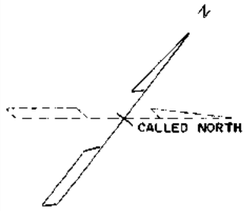
JAMES RIVER BRIDGE

DECK PLAN - UNITS 1,2,3&4

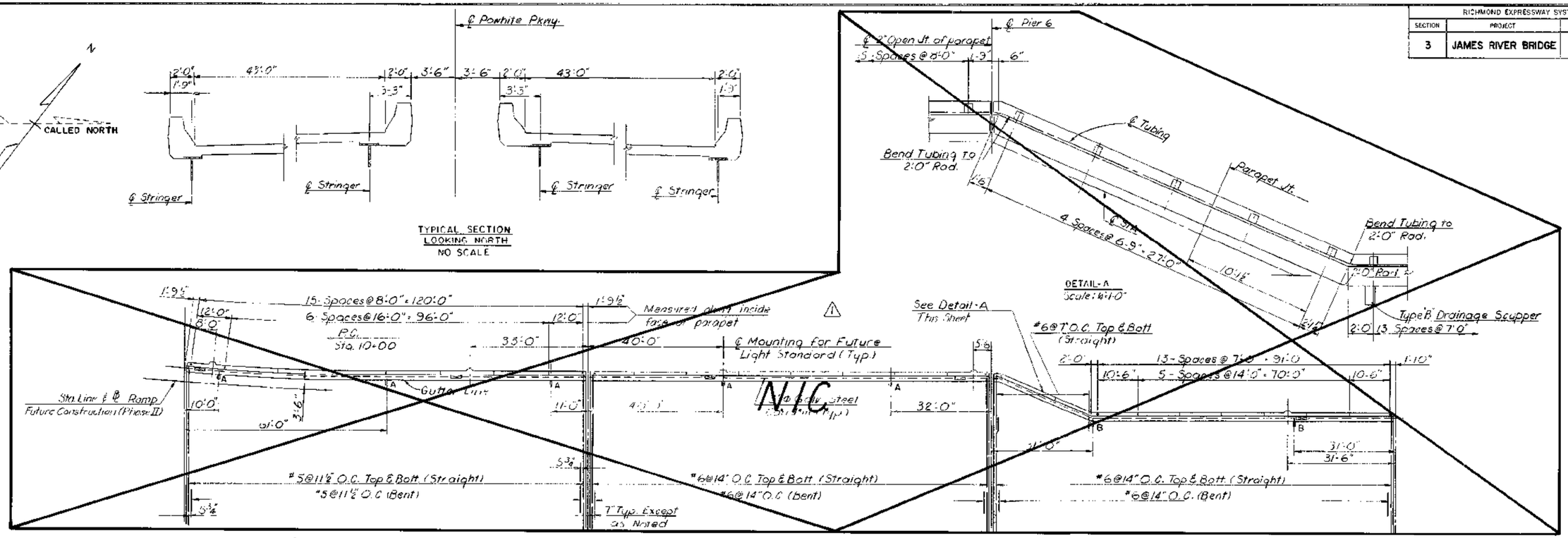
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

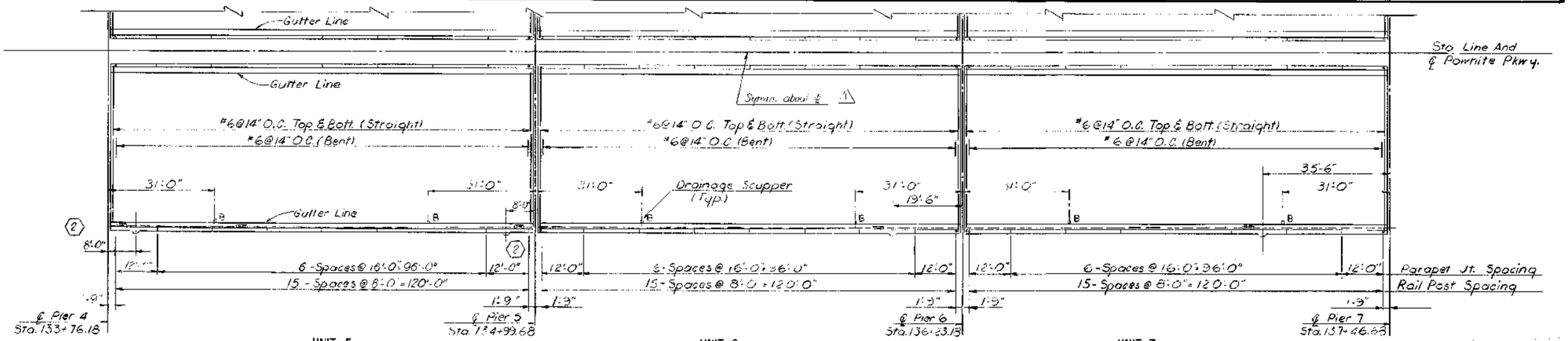
SCALE: 1"=15' UNLESS NOTED
CONTRACT NO. C-3
SHEET NO. 37 OF 53

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



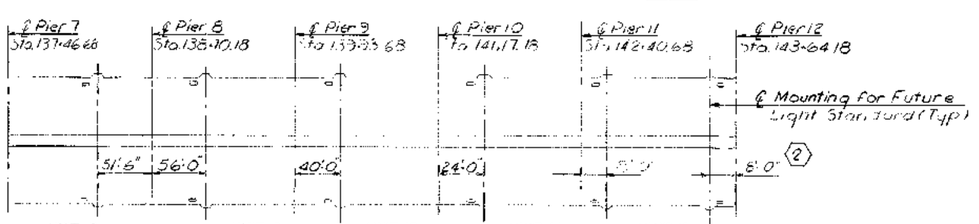
TYPICAL SECTION
LOOKING NORTH
NO SCALE





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
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
1	Remove Ramp Widening	J.G.V.	2-20-71

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

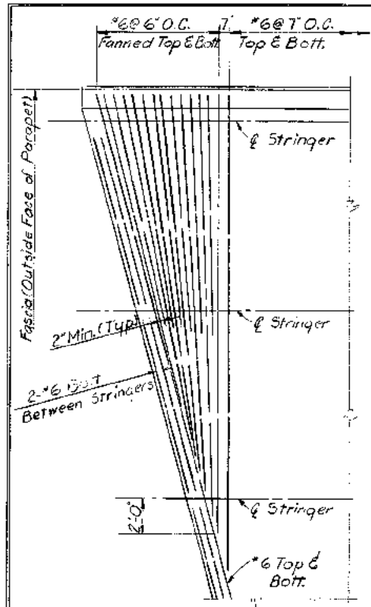
JAMES RIVER BRIDGE

DECK PLAN-UNITS 5 THRU 12

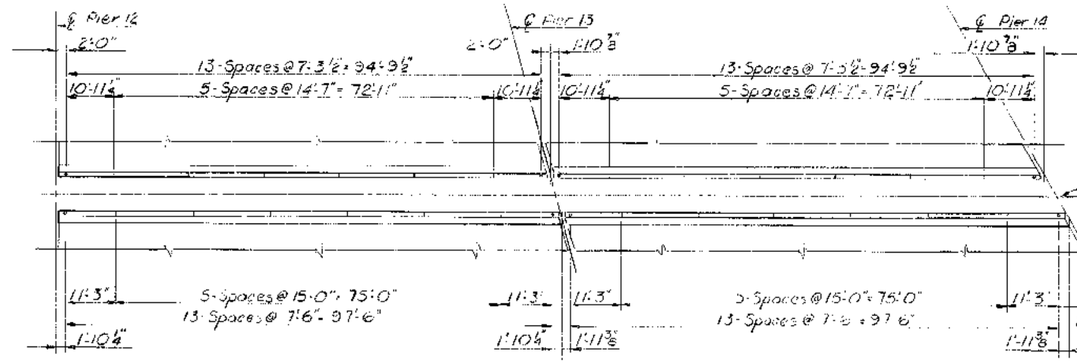
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

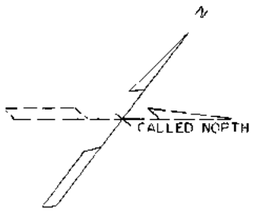
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	39	53

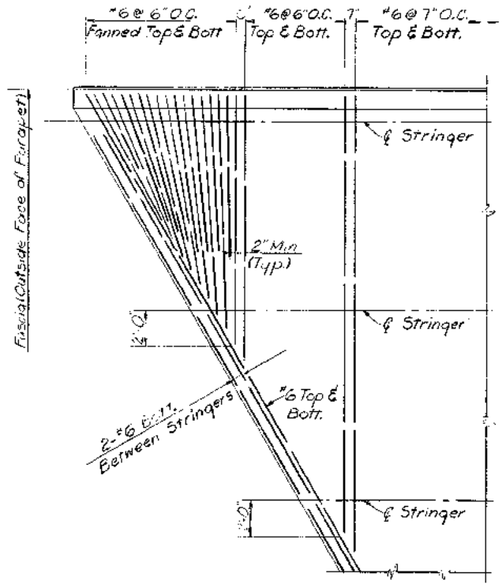


CORNER DETAIL
15° SKEW
Scale: 1/4"=1'-0"

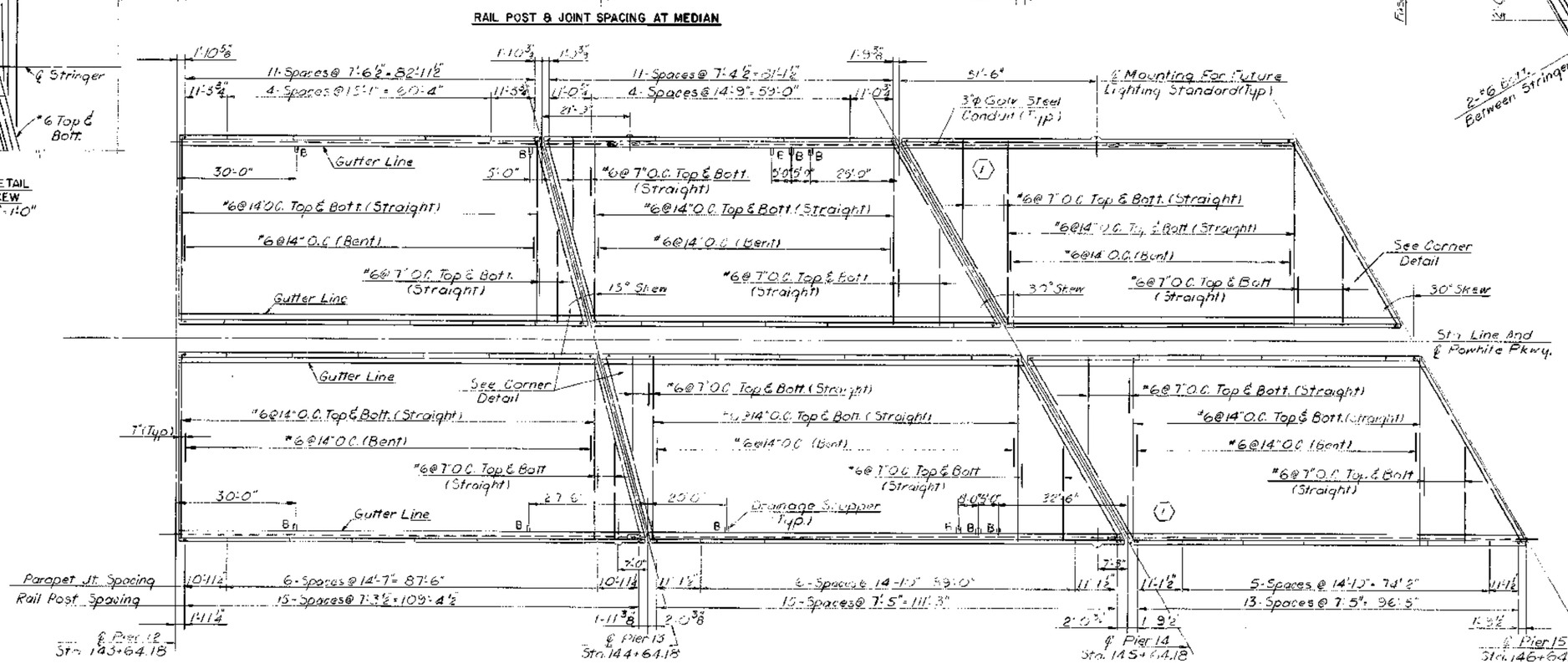


RAIL POST & JOINT SPACING AT MEDIAN

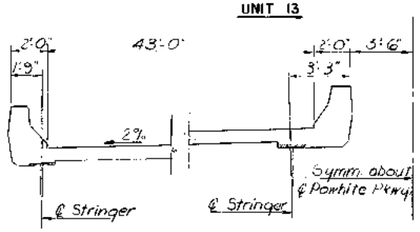




CORNER DETAIL
30° SKEW
Scale: 1/4"=1'-0"



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	J.R.C.	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

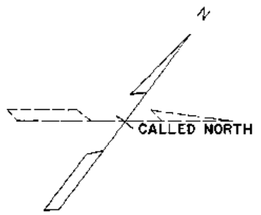
JAMES RIVER BRIDGE

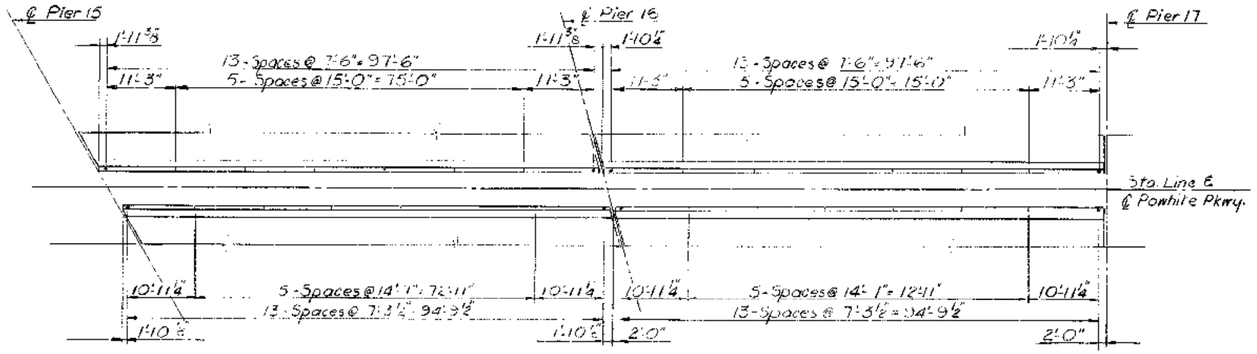
DECK PLAN – UNITS 13, 14 & 15

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

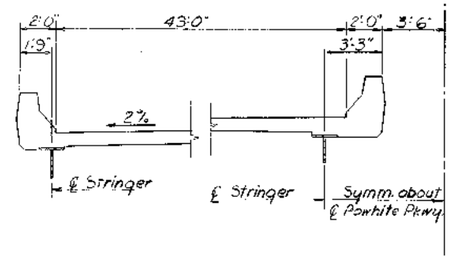
SCALE: 1"=5' UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 39 OF 53

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

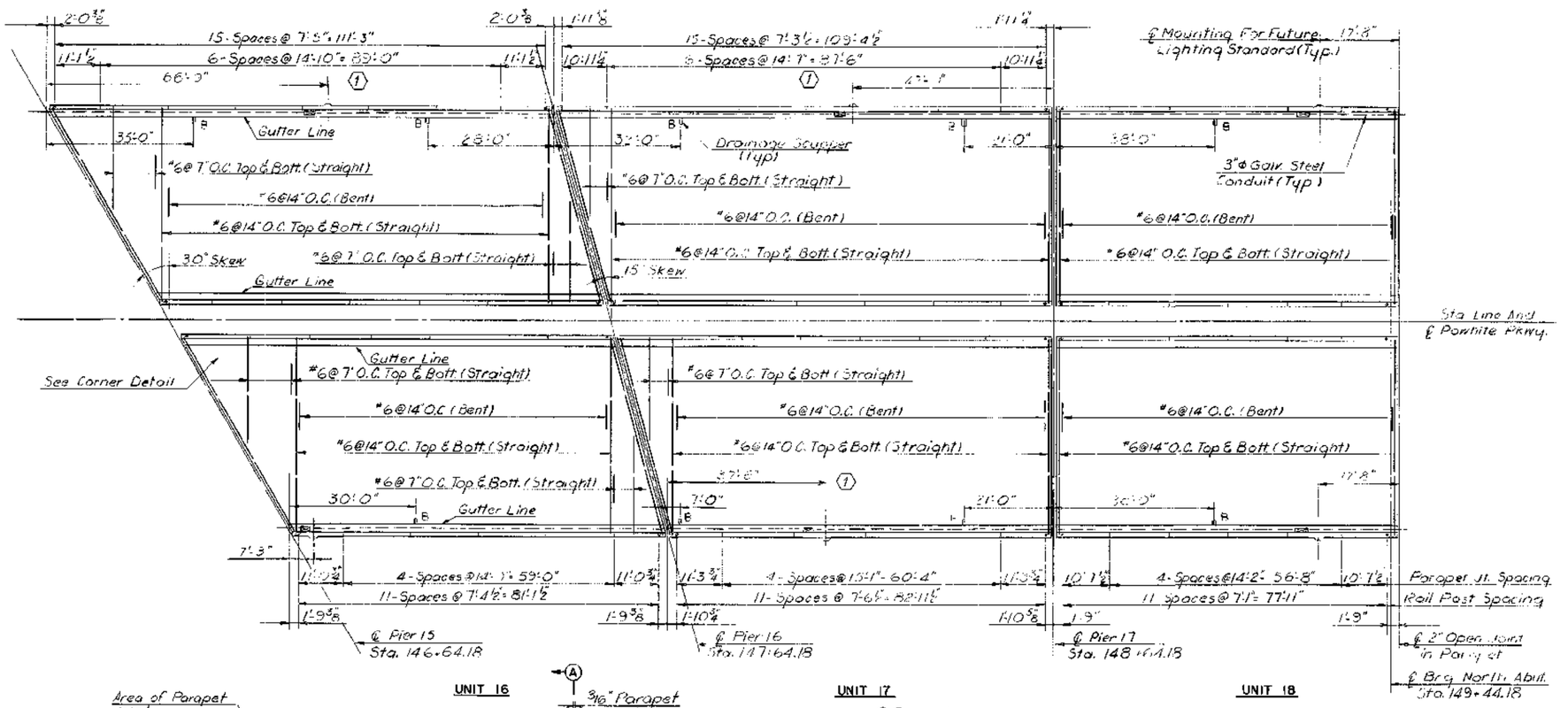


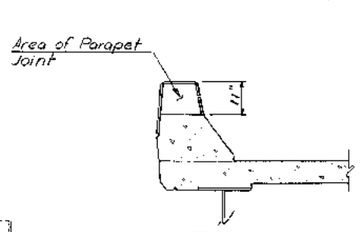


RAIL POST & JOINT SPACING AT MEDIAN

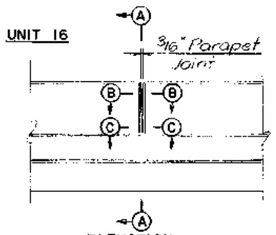


TYPICAL SECTION
SCALE: 1/4" = 1'-0"

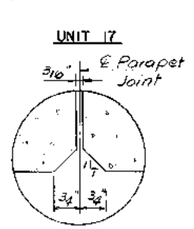




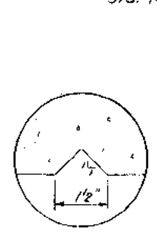
SECTION A-A
Scale: 1/2" = 1'-0"



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



SECTION B-B
Half Size



SECTION C-C
Half Size

UNIT 18

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

PARAPET JOINT DETAILS

	BY	DATE				
MADE	D.E.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

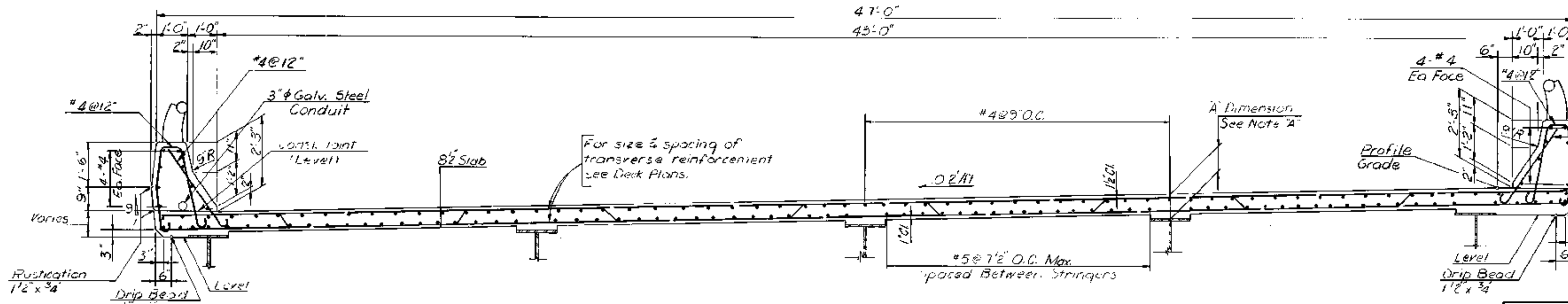
JAMES RIVER BRIDGE

DECK PLAN - UNITS 16, 17 & 18

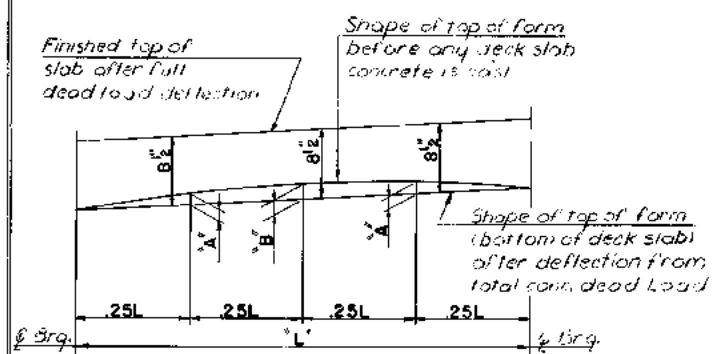
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

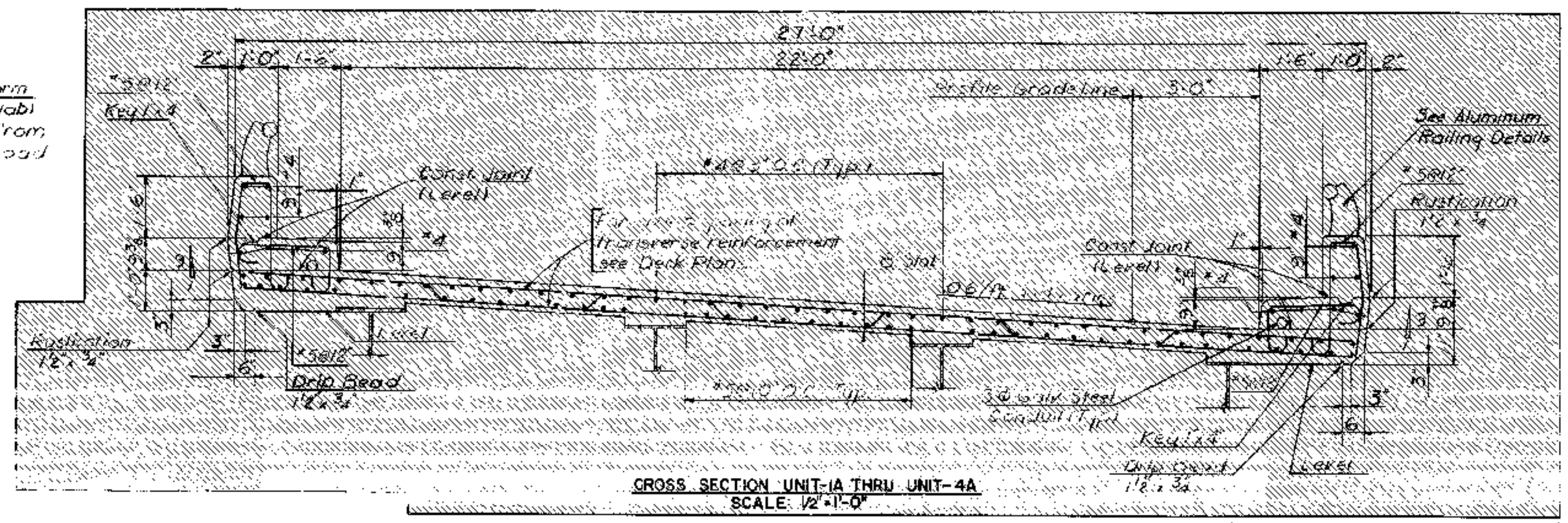
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
3	JAMES RIVER BRIDGE	41	53



TYPICAL CROSS SECTION S.B. (N.B. OPPOSITE HAND)
SCALE: 1/2" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM
NO SCALE



CROSS SECTION UNIT-1A THRU UNIT-4A
SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR

The deflections [illegible] 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 fillet between the bottom of the slab & the top of stringer, without alteration of the slab thickness.

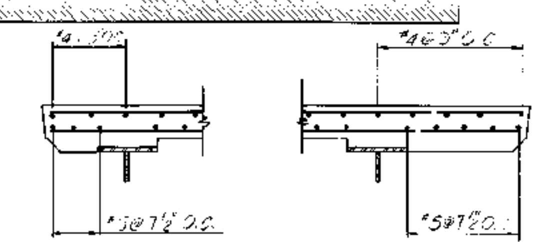
"A" DIMENSIONS — UNITS 1 THRU 18			
UNIT 1		UNIT 7	
S5 & S6	10 3/8"	~~S1A~~	~~10 3/8"~~
S1-S4 & S7-S10	9 3/4"	S2-S4 & S7-S9	10 1/4"
UNIT 2 & 3		S5 & S6	10 1/8"
S5 & S6	10 1/4"	S1 & S10	10 1/2"
S1-S4 & S7-S10	9 3/4"	UNIT 8 THRU 12	
UNIT 4		S2-S4 & S7-S9	10 1/4"
~~S1 (AT PIER 3)~~	~~10"~~	S5 & S6	10 1/8"
~~S1 (AT PIER 4)~~	~~10 1/4"~~	S1 & S10	10 1/2"
~~S2~~	~~11"~~	UNIT 13 & 14	
~~S3~~	~~10"~~	S1	10 3/4"
~~S4~~	~~10 1/2"~~	S2, S3, S4 & S7	9 3/4"
~~S5~~	~~9 3/4"~~	S5 & S6	10 1/4"
~~S6~~	~~10"~~	S8 & S9	10"
S1 - S10	10 1/8"	S10	10 1/2"
UNIT 5		UNIT 15	
~~S1~~	~~10 1/2"~~	S2-S4 & S7-S9	9 3/4"
~~S2~~	~~9 3/4"~~	S5 & S6	10 1/4"
~~S3-S6~~	~~9 3/4"~~	S1 & S10	10 1/2"
S5 & S6	10 1/8"	UNIT 16 & 17	
S2-S4 & S7-S9	10 1/4"	S1	10 1/2"
S1 & S10	10 1/2"	S2 & S3	10"
		S4, S7, S8 & S9	9 3/4"
UNIT 6		S5 & S6	10 1/4"
S5 & S6	10 1/8"	S10	10 3/4"
S2 - S4 & S7-S9	10 1/4"	UNIT 18	
S1 & S10	10 1/2"	S2-S4 & S7-S9	9 3/4"
		S5 & S6	10 3/8"
		S1 & S10	10 3/4"

"A" DIMENSIONS — UNITS 1A THRU 4A			
UNIT 1A		UNIT 4A	
S1, S2 & S3	9 1/2"	S1 (AT PIER 3A)	9 1/2"
S4	10"	S1 (AT PIER 3)	10 1/4"
UNITS 2A & 3A		S2 & S3	9 1/2"
S1, S2 & S3	9 1/2"	S4	10"
S4	9 3/4"		

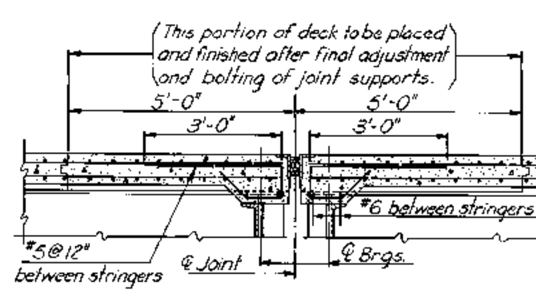
Note "A"

"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'-9" 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.

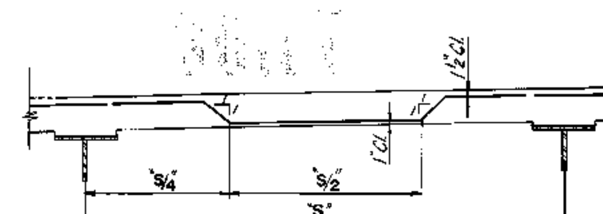
DEFLECTION SCHEDULE											
UNIT	STRINGER	A	B	UNIT	STRINGER	A	B	UNIT	STRINGER	A	B
1	S1-S10	5/8"	7/8"	7-12	S1-S10	1 5/8"	2 1/4"	16 & 17	S1	1 3/8"	2"
2	~~S1-S6~~	~~1"~~	~~1 3/8"~~	13 & 14	S1	3/4"	1"		S2	1 3/8"	1 7/8"
	S1-S10	1 1/8"	1 1/2"		S2	7/8"	1 1/8"		S3	1 1/4"	1 3/4"
3	~~S1-S6~~	~~1"~~	~~1 5/8"~~		S3	7/8"	1 1/4"		S4	1 1/4"	1 5/8"
	S1-S10	1 1/8"	1 1/2"		S4	1"	1 3/8"		S5	1 1/8"	1 5/8"
4	~~S1~~	~~1 5/8"~~	~~2 1/4"~~		S5	1"	1 1/2"		S6	1"	1 1/2"
	~~S2 & S4~~	~~1 3/8"~~	~~2 1/8"~~		S6	1 1/8"	1 5/8"		S7	1"	1 5/8"
	~~S3 & S5~~	~~1/2"~~	~~3/4"~~		S7	1 1/4"	1 5/8"		S8	7/8"	1 1/4"
	~~S6~~	~~1 1/2"~~	~~2 1/4"~~		S8	1 1/4"	1 3/4"		S9	7/8"	1 1/8"
	S1-S10	1 1/2"	2 1/8"		S9	1 3/8"	1 7/8"		S10	3/4"	1"
5	S1-S10	1 5/8"	2 1/4"		S10	1 3/8"	2"	18	S1-S10	5/8"	7/8"
6	S1-S10	1 5/8"	2 1/4"	15	S1-S10	1 1/8"	1 1/2"				



LONGITUDINAL REINFORCEMENT AT FASCIA



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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

JAMES RIVER BRIDGE
DECK DETAILS

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

SCALE: 1/2" = 1'-0" UNLESS NOTED
CONTRACT NO.: C-3
SHEET NO. 41 OF 53

Bridge 8

Northbound and Southbound Powhite Parkway (VA-76) Parallel Bridges
Over
The James River, Kanawha Canal and CSXT Railroad Tracks

<u>Widening</u> Construction Plans for Bridge 8N and 8S

Record Set Plans

LIMITED ACCESS HIGHWAY

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

REVISED BY

DESIGNED BY

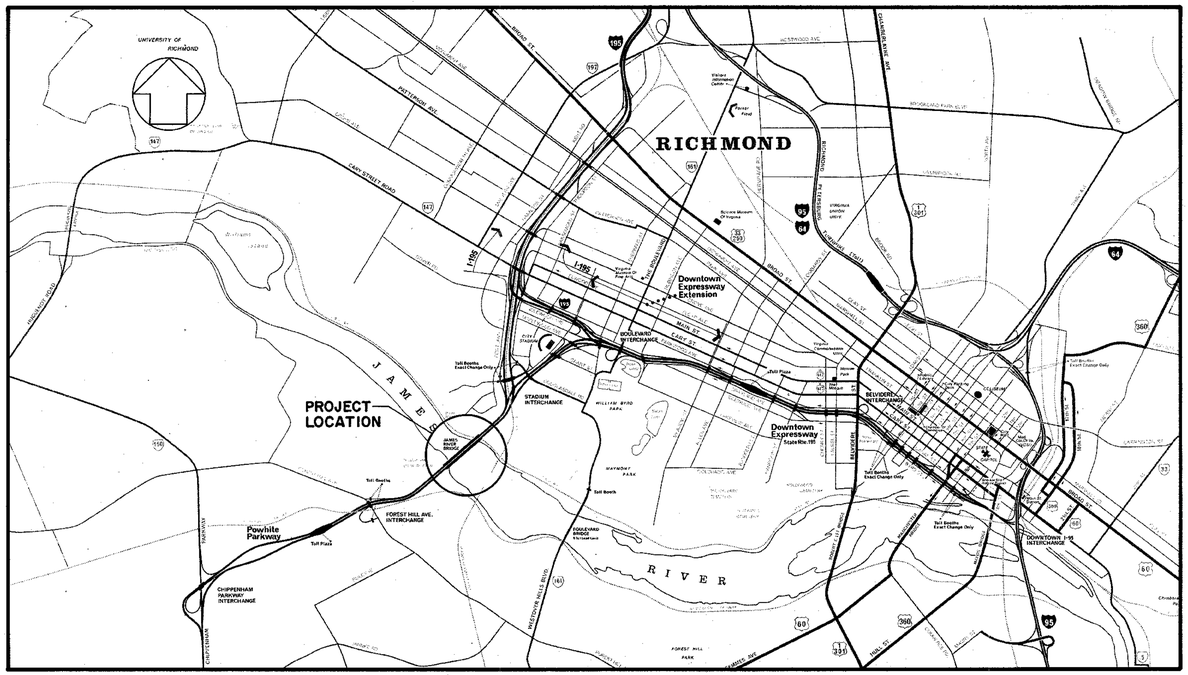
RICHMOND METROPOLITAN AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

PROPOSED WIDENING

JAMES RIVER BRIDGE

INDEX OF SHEETS



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

CONTRACT C-13

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

SUBMITTED BY	
Date	
3-16-81	
Date	HOWARD, NEEDLES, TAMMEN & BERGENDOFF general consultant

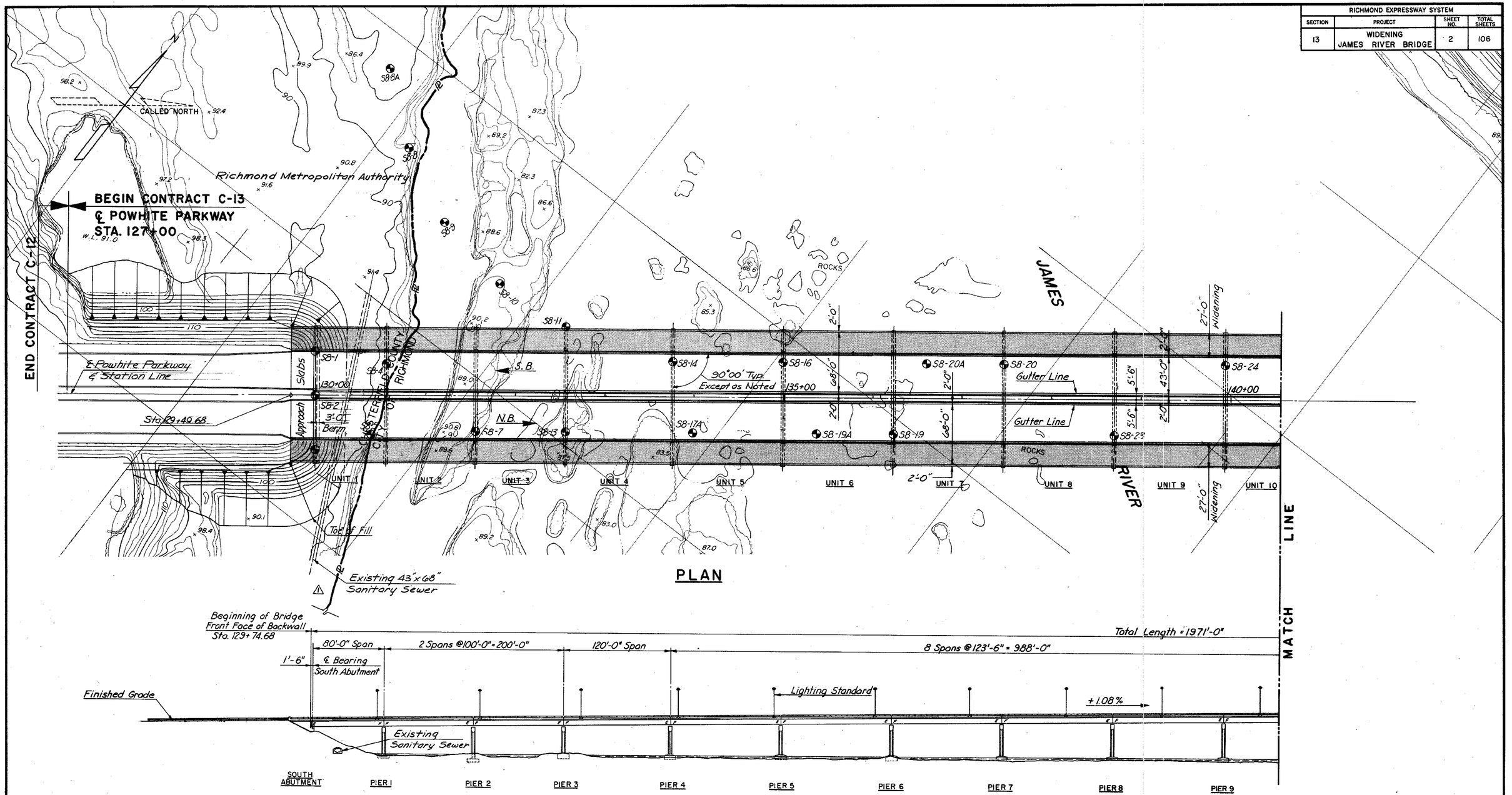
RECOMMENDED BY	
Date	
3-29-82	
Date	GENERAL MANAGER, RICHMOND METROPOLITAN AUTHORITY

APPROVED BY	
3-29-82	
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				
MADE	A.L.C.	3-87		As Built	TEM	3-89
CHECKED	T.F.P.	3-87	⚠	Property Line	A.L.C.	4-87
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

AS BUILT

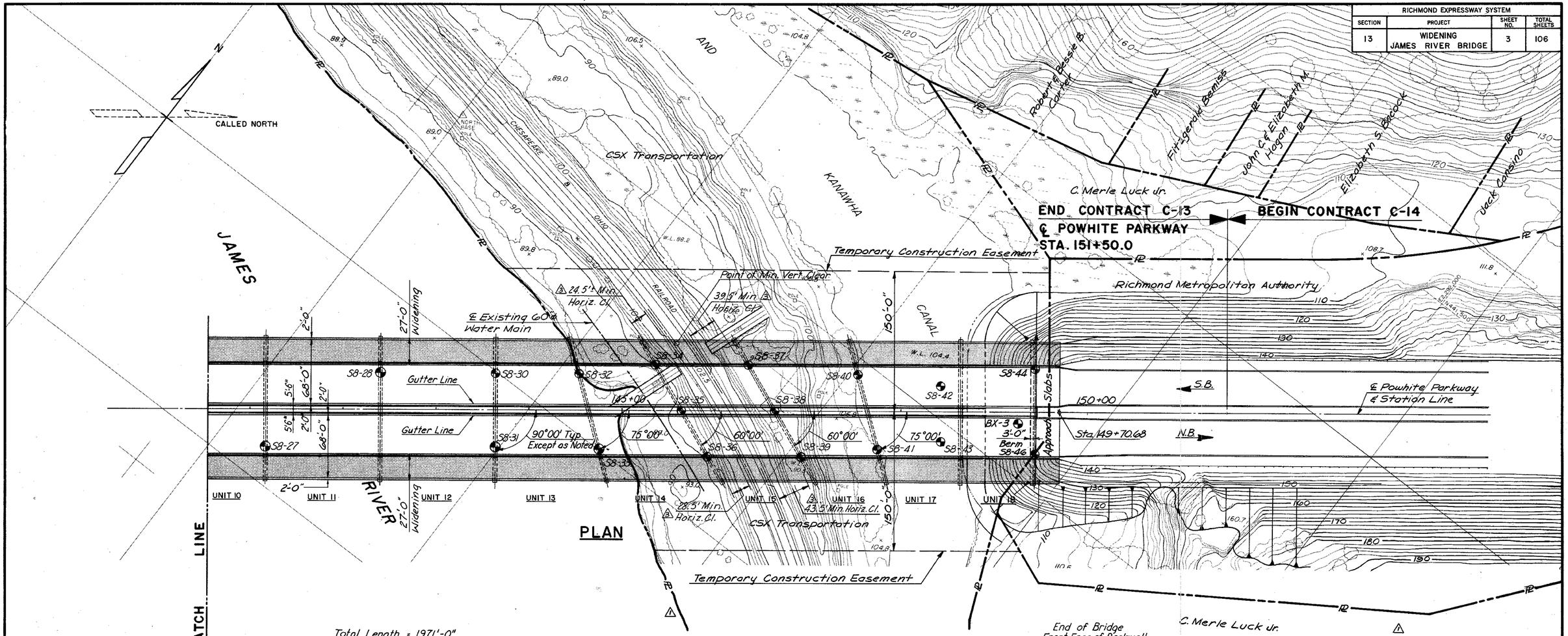
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

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



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

As Built TEM 3-89

NO.	REVISION	BY	DATE
3	Added Horiz. Cl.	EJM	7-87
2	Vert. Clear	ALC	5-87
1	Property Line	ALC	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

△1 ESTIMATE OF QUANTITIES *

	CONSTRUCTION SURVEY △1	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													3091.6		4038		604,840	/															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	△1																
PIER 17					417			1627	1080		180.8					19580	△1																
APPROACH SLAB												99.2				15100																	
TOTALS	/	4670	1735	23	2540	728	57	4454	4715	48	2946.6	99.2	3091.6		4038	356,060	606,020	/	2341	336		180	190		/	17			/	/	/		2750
				△2	△2	△3		△3	△2		△3			△3	△3	△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.

△ ELEVATIONS TAKEN FROM CITY OF RICHMOND DATUM.

△4 As Built TEM 3-89

	BY	DATE	NO.	REVISION	BY	DATE
MADE	ALC	3-87	△3	Quantities	ALC	4-87
CHECKED	TFP	3-87	△2	Quantities	ALC	4-87
IN CHARGE	S.R.		△1	Quantities & Added Note	ALC	4-87

AS BUILT

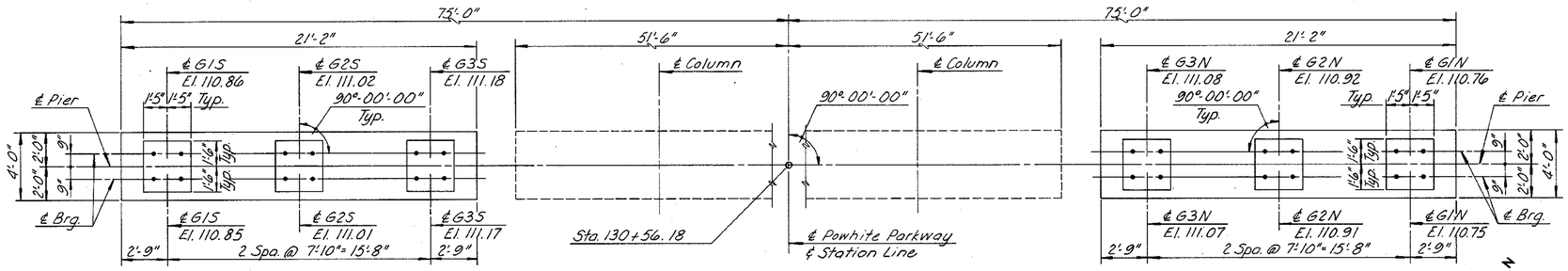
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

GENERAL NOTES AND ESTIMATED QUANTITES

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

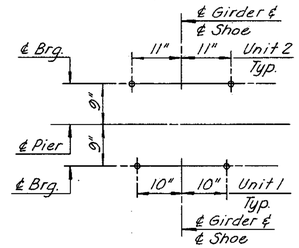
SCALE: AS SHOWN
CONTRACT NO. C-13
SHEET NO. 4 OF 106

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

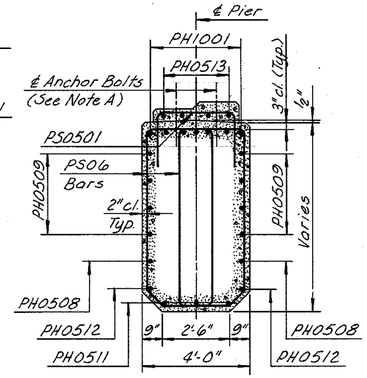


PLAN - SOUTHBOUND
Scale: 1/4" = 1'-0"

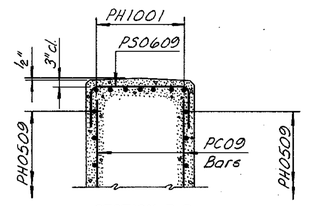
PLAN - NORTHBOUND
Scale: 1/4" = 1'-0"



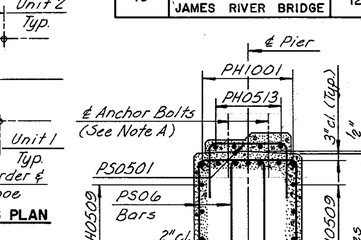
ANCHOR BOLT SETTING PLAN
No Scale



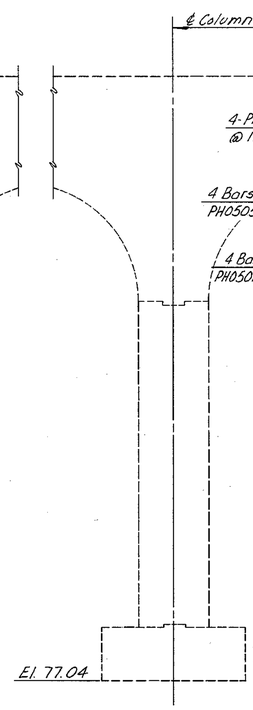
SECTION A-A
Scale: 3/8" = 1'-0"



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

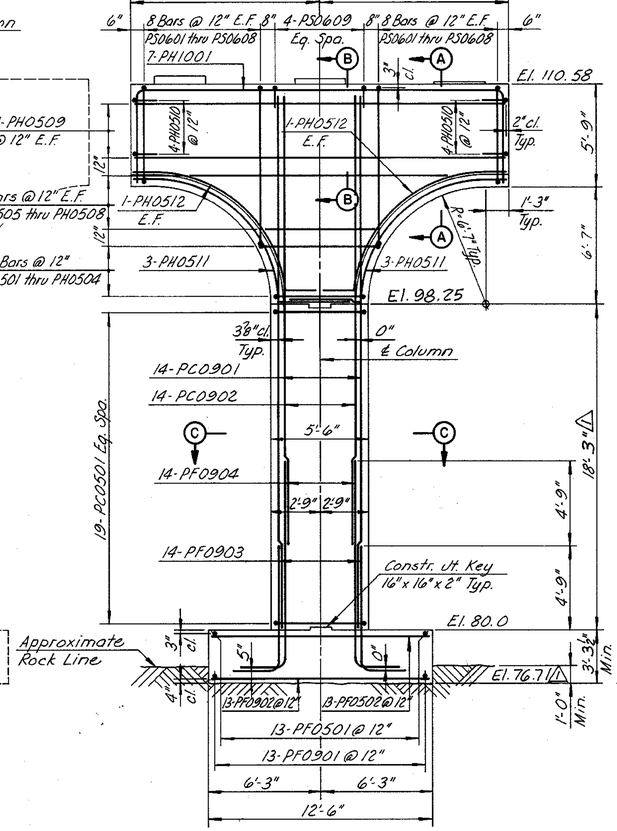


ELEVATION - SOUTHBOUND
Scale: 1/4" = 1'-0"

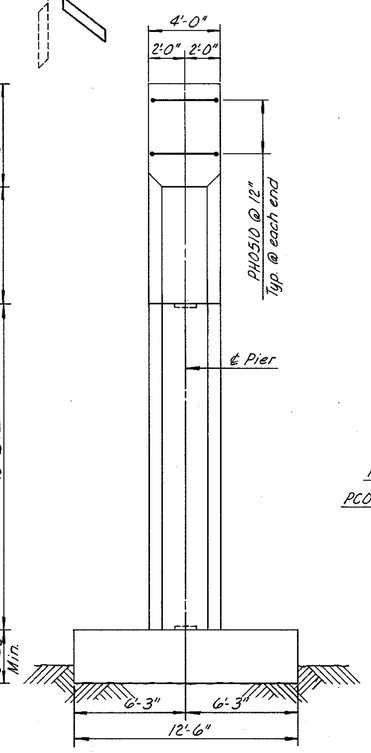


NOTES:

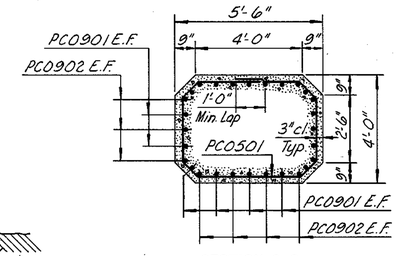
Allowable Bearing Pressure - 7 tons/s.f.
Actual Design Bearing Pressure - 4.7 tons/s.f.



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



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



SECTION C-C
Scale: 3/8" = 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

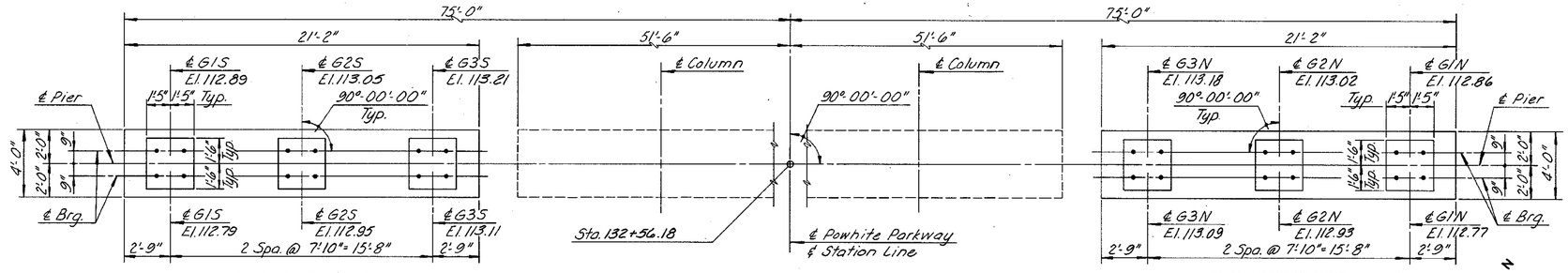
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER I DETAILS

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

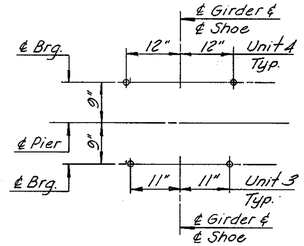
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 12 OF 106

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

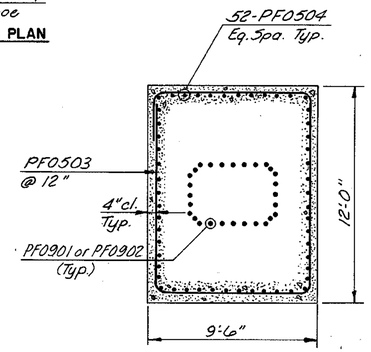


PLAN - SOUTHBOUND
Scale: 4" = 1'-0"

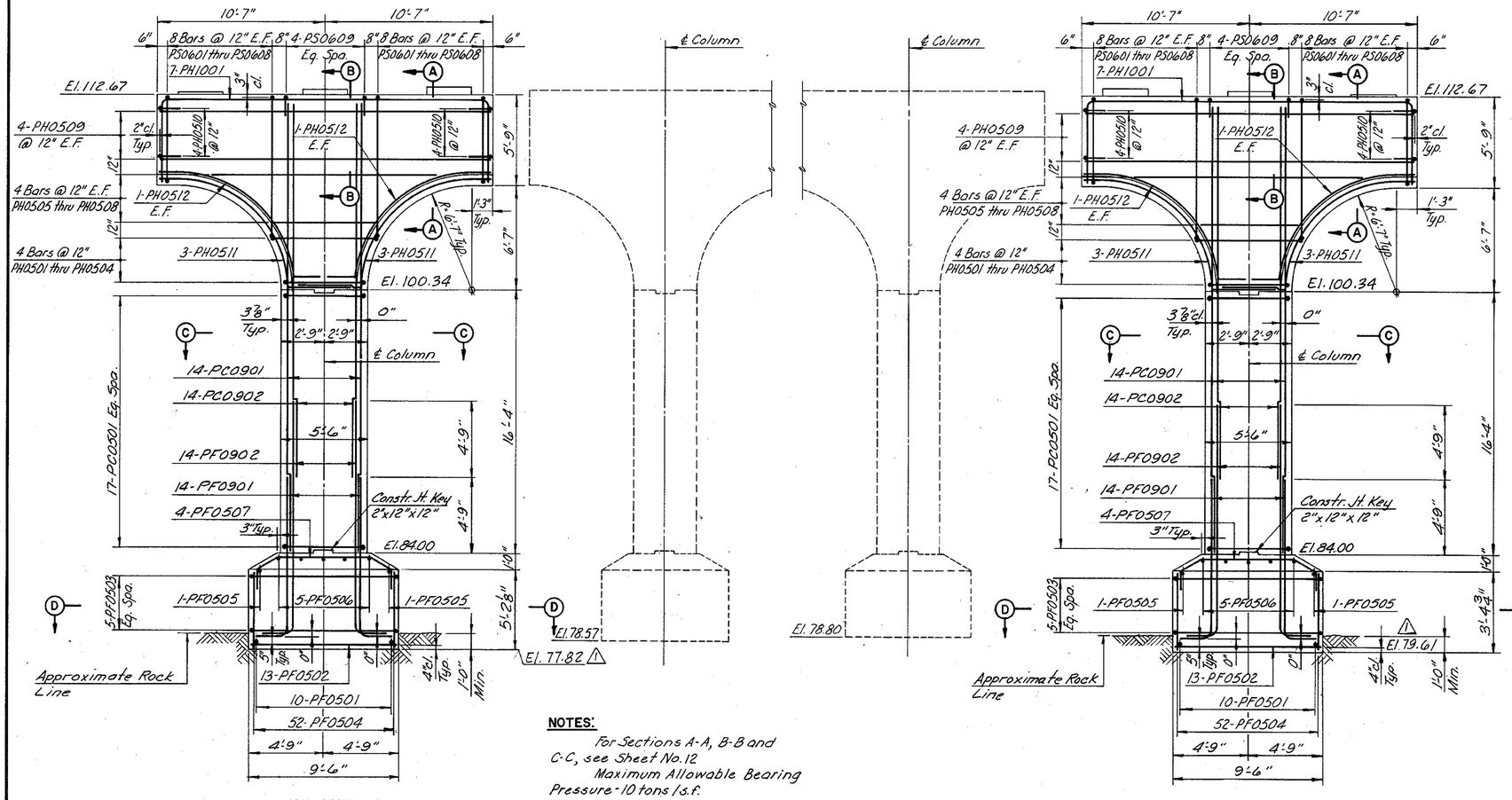
PLAN - NORTHBOUND
Scale: 4" = 1'-0"



ANCHOR BOLT SETTING PLAN
No Scale



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



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

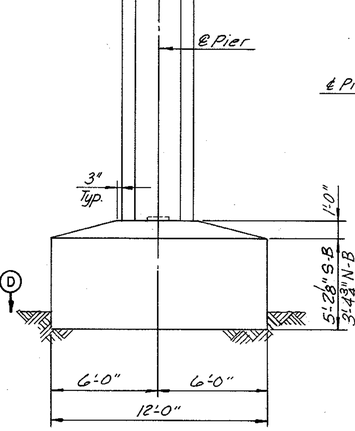
ELEVATION - NORTHBOUND
Scale: 4" = 1'-0"

NOTES:

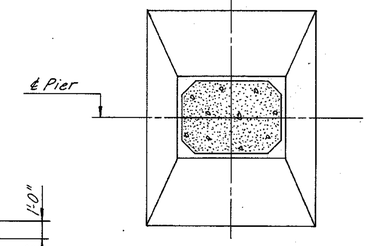
For Sections A-A, B-B and C-C, see Sheet No. 12

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

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



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



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

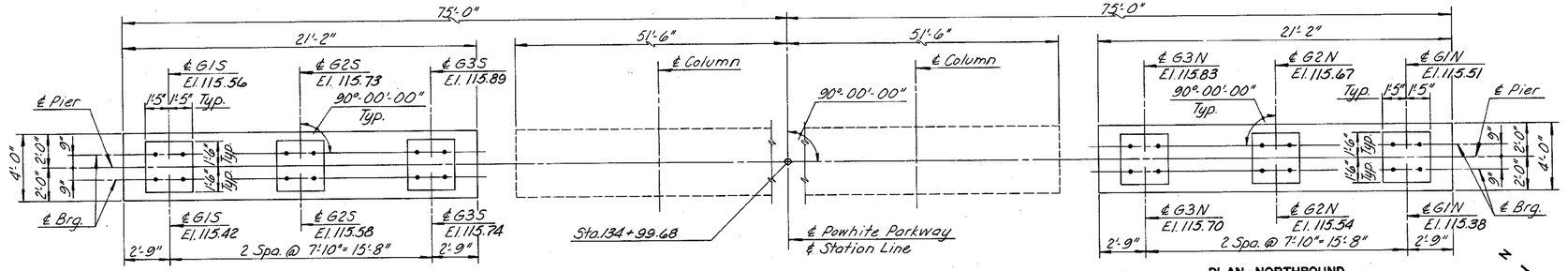
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 3 DETAILS

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

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

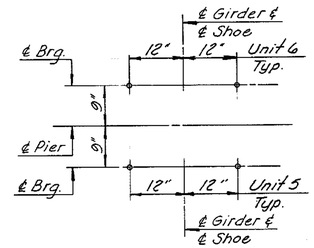
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	16	106



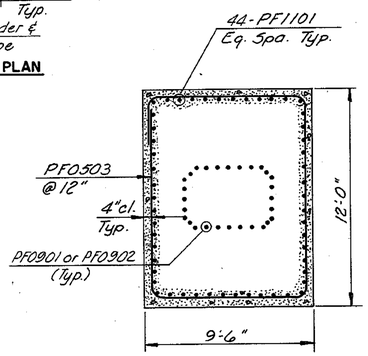
PLAN - SOUTHBOUND
Scale: 4" = 1'-0"

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

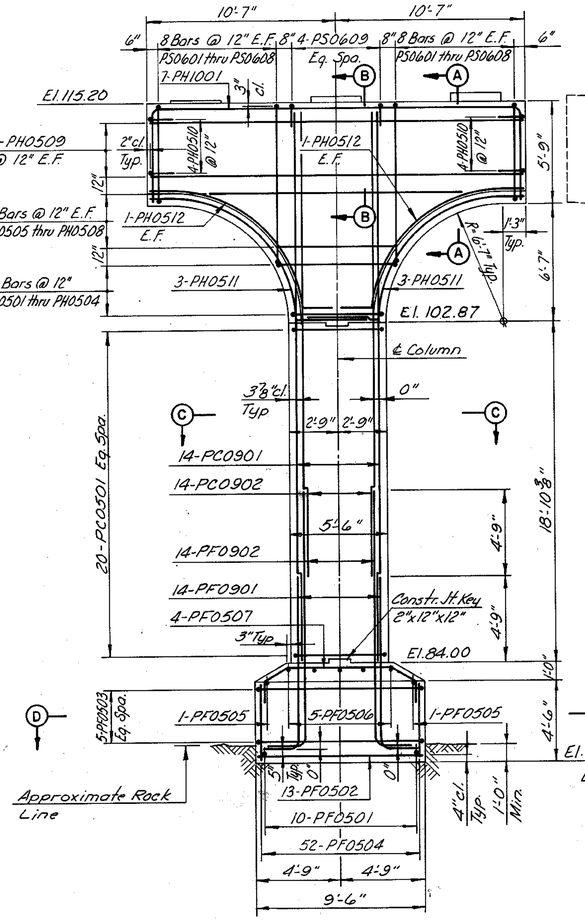
CALLED NORTH



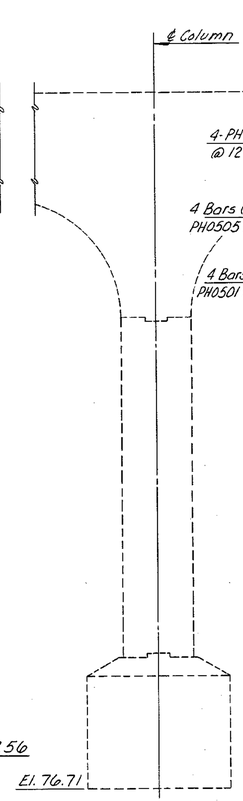
ANCHOR BOLT SETTING PLAN
No Scale



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



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



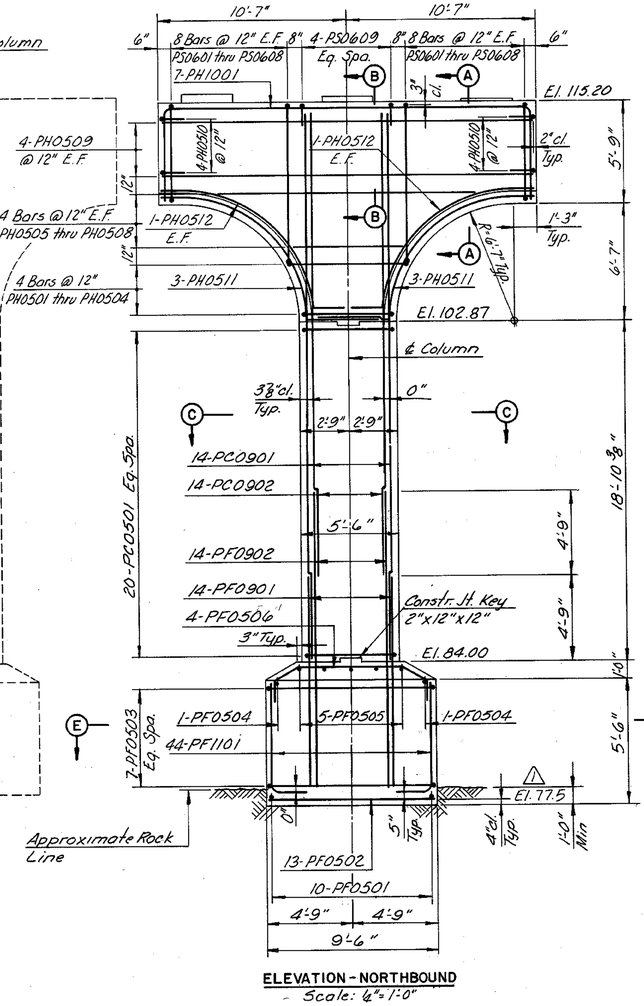
NOTES:

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

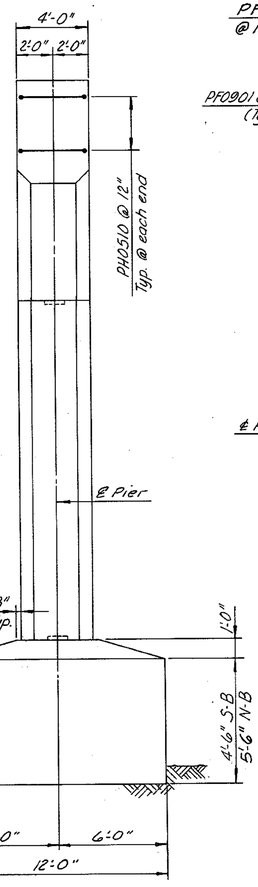
For Section D-D, see Sheet No. 14

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

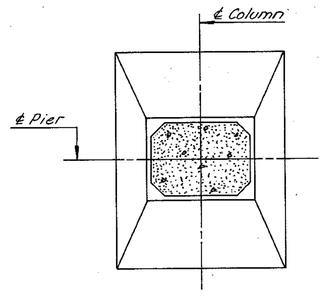
Actual Design Bearing Pressure - 8.4 tons/s.f.



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



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



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

AS BUILT

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

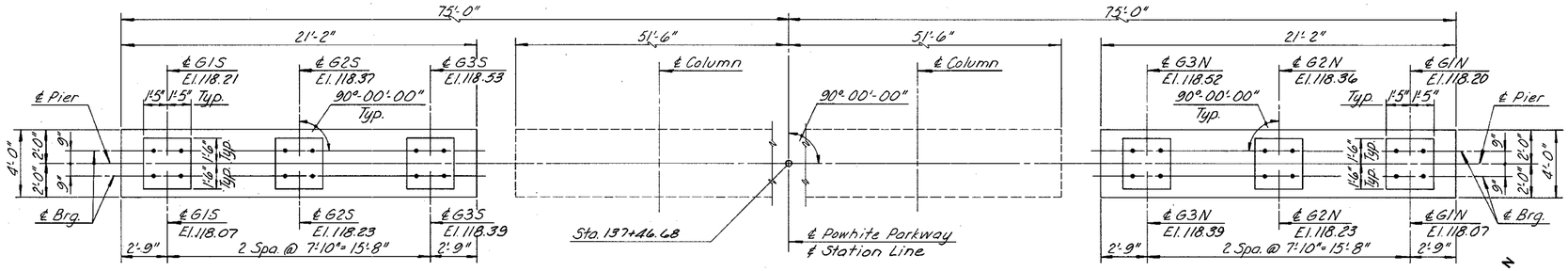
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 5 DETAILS

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

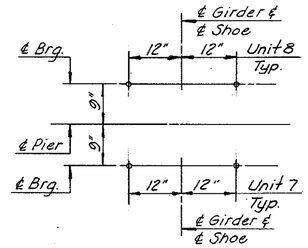
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 16 OF 106

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



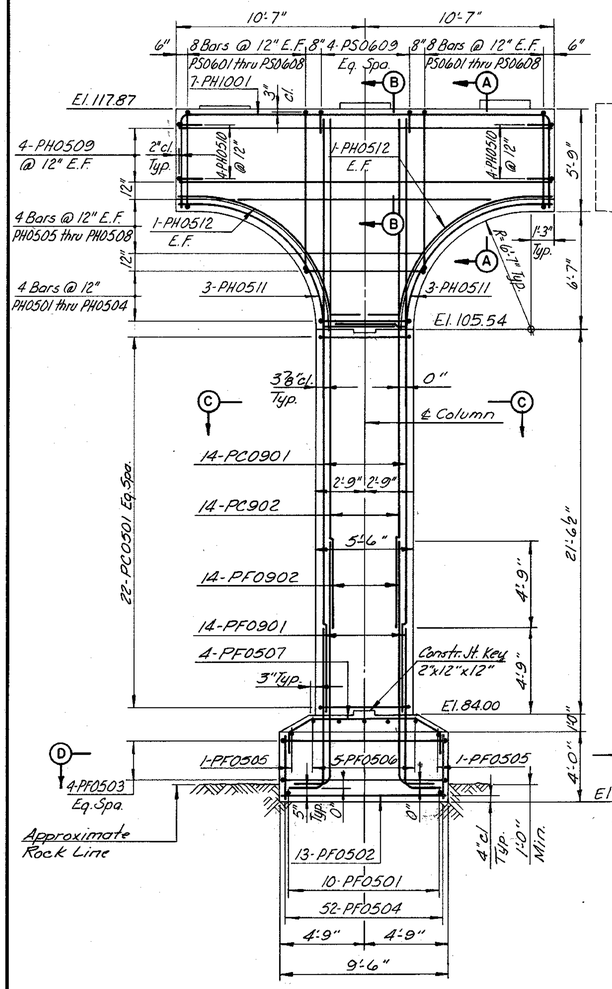
PLAN - SOUTHBOUND
Scale: 1/4"=1'-0"

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

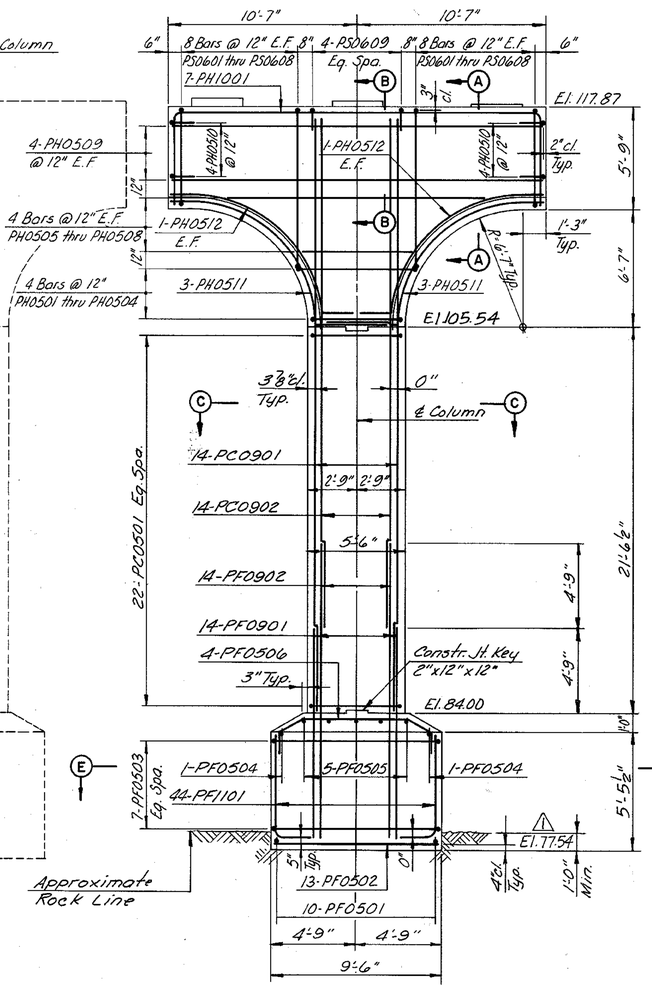


ANCHOR BOLT SETTING PLAN
No Scale

N CALLED NORTH



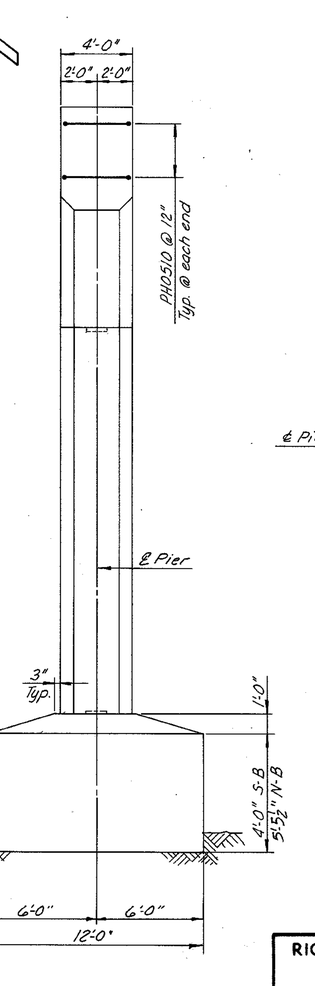
ELEVATION - SOUTHBOUND
Scale: 1/4"=1'-0"



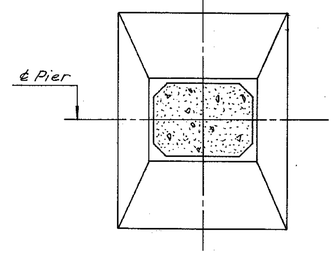
ELEVATION - NORTHBOUND
Scale: 1/4"=1'-0"

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.



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



FOOTING PLAN
Scale: 1/4"=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.					

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

NOTES:

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

For Section E-E, see Sheet No. 16

Maximum Allowable Bearing Pressure - 3.5 tons/s.f.

Actual Design Bearing Pressure - 3.3 tons/s.f.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 11 DETAILS

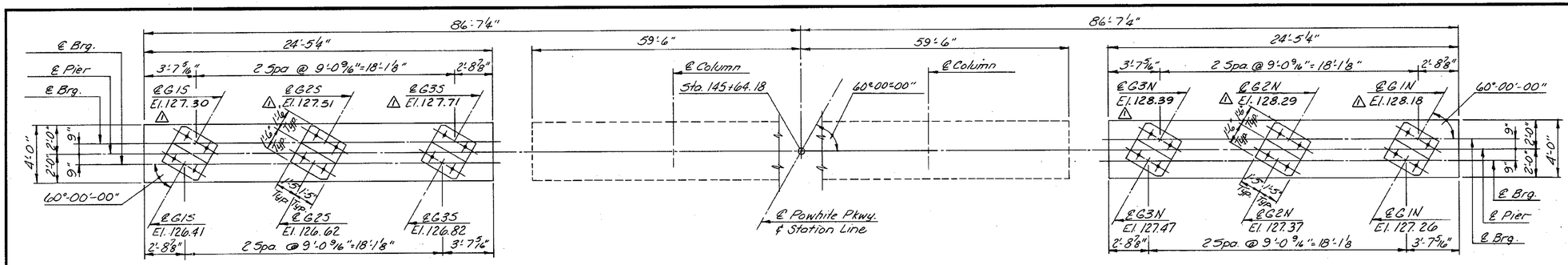
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

AS BUILT

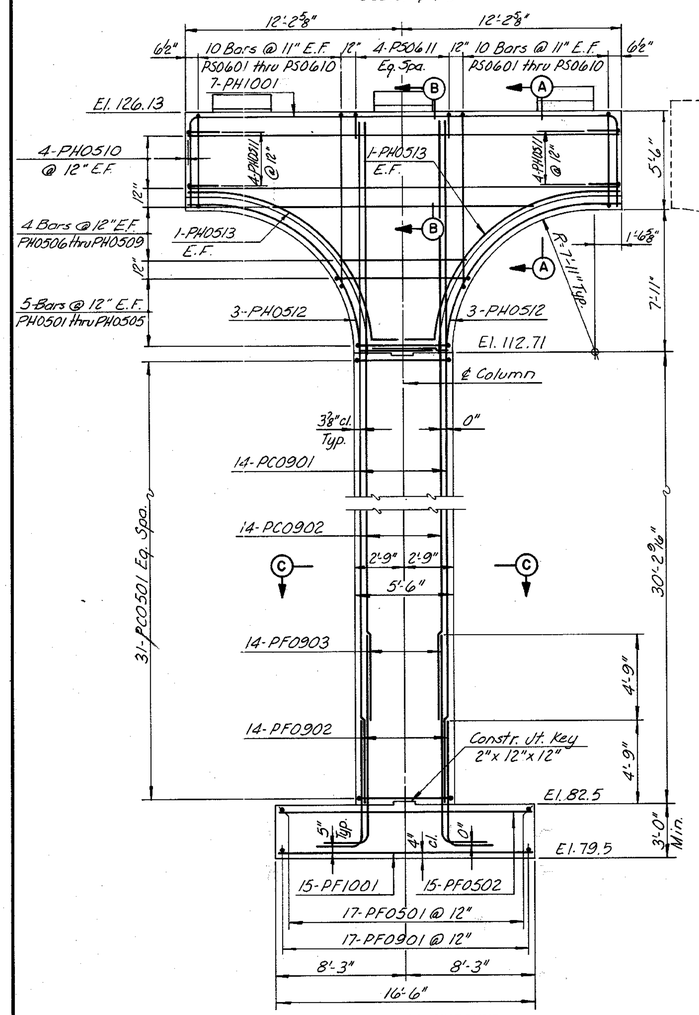
	BY	DATE	NO.	REVISION	BY	DATE
MADE	EJM	3-87				
CHECKED	T.F.P.	3-87	1	As Built	TEM	3-89
IN CHARGE	S.R.					

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

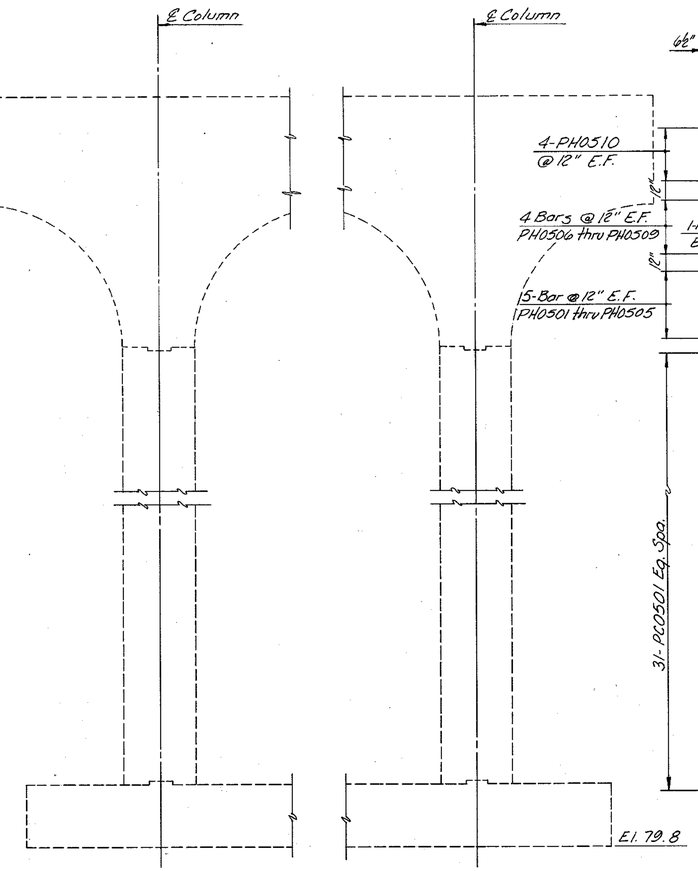


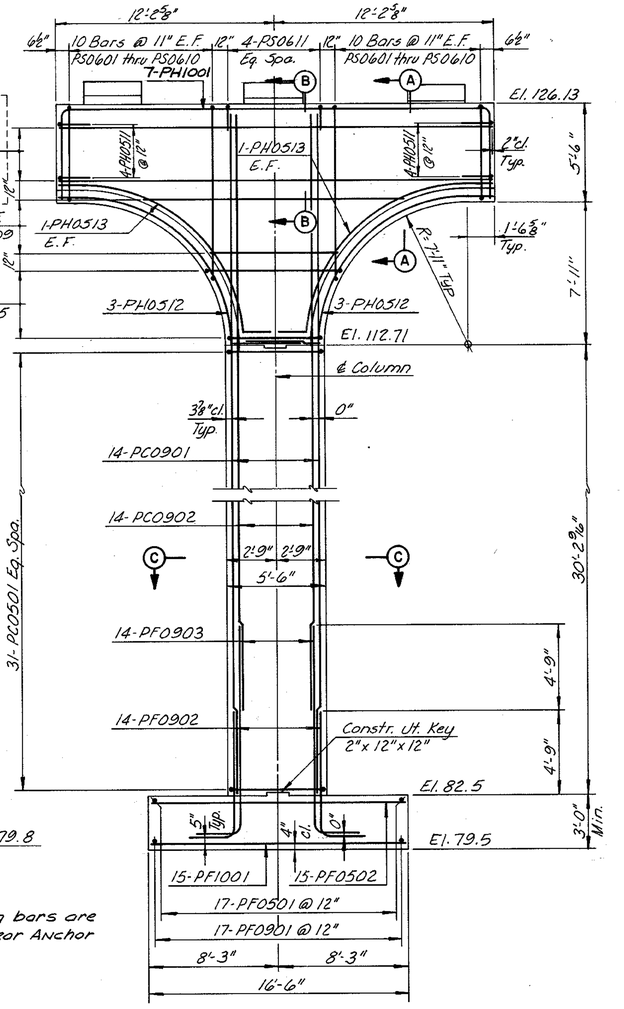
PLAN - SOUTHBOUND
Scale: 4"=1'-0"

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

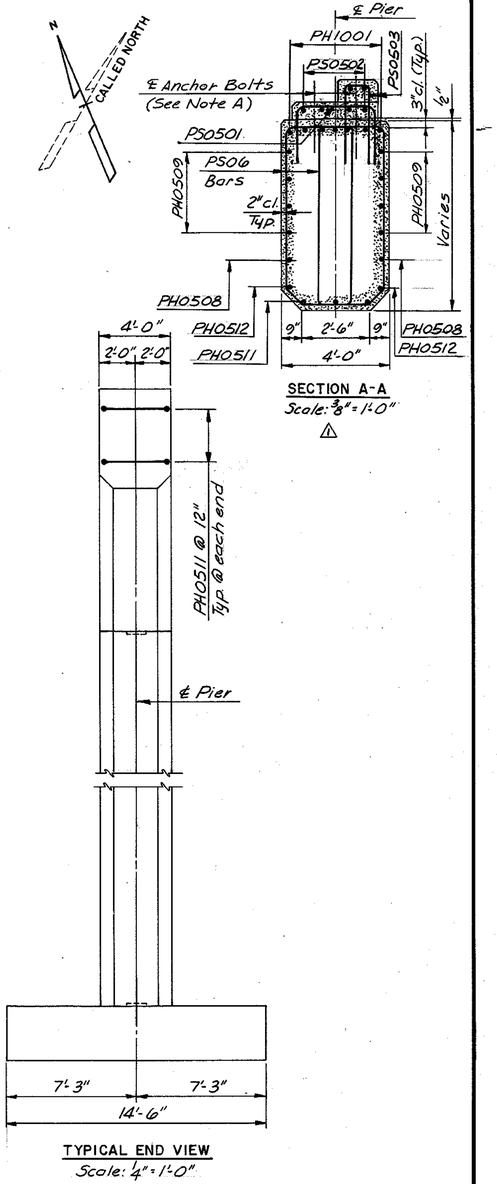


ELEVATION - SOUTHBOUND
Scale: 4"=1'-0"





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



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	EJM	2-87
CHECKED	T.F.P.	3-87
IN CHARGE	S.R.	

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

AS BUILT

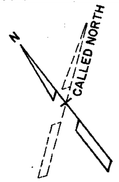
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

PIER 14 DETAILS

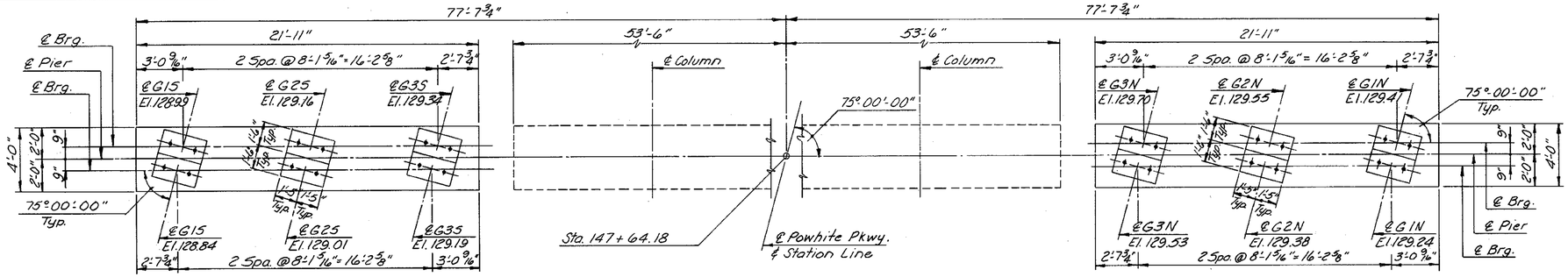
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

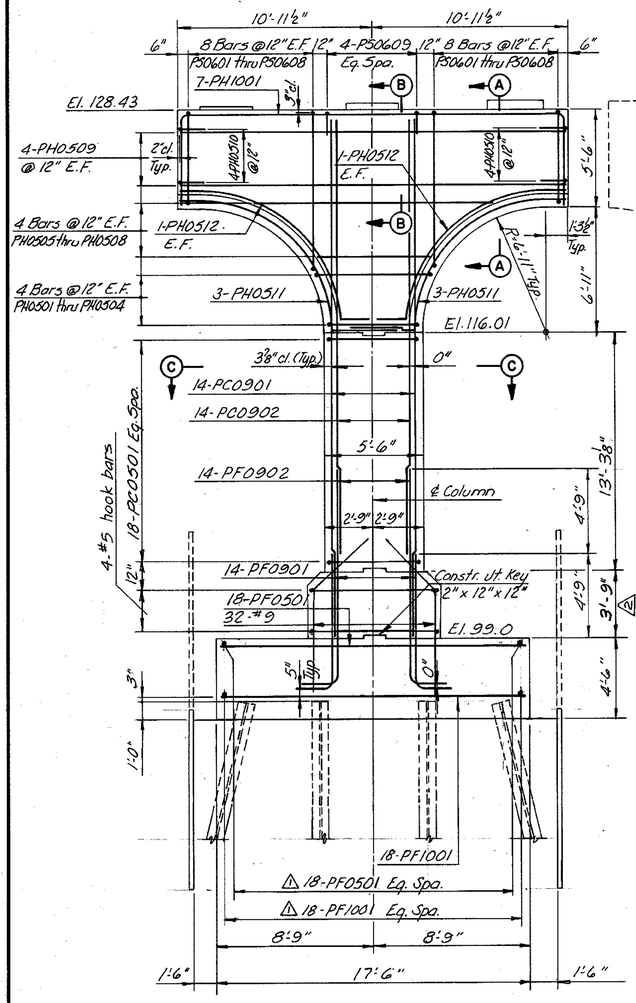


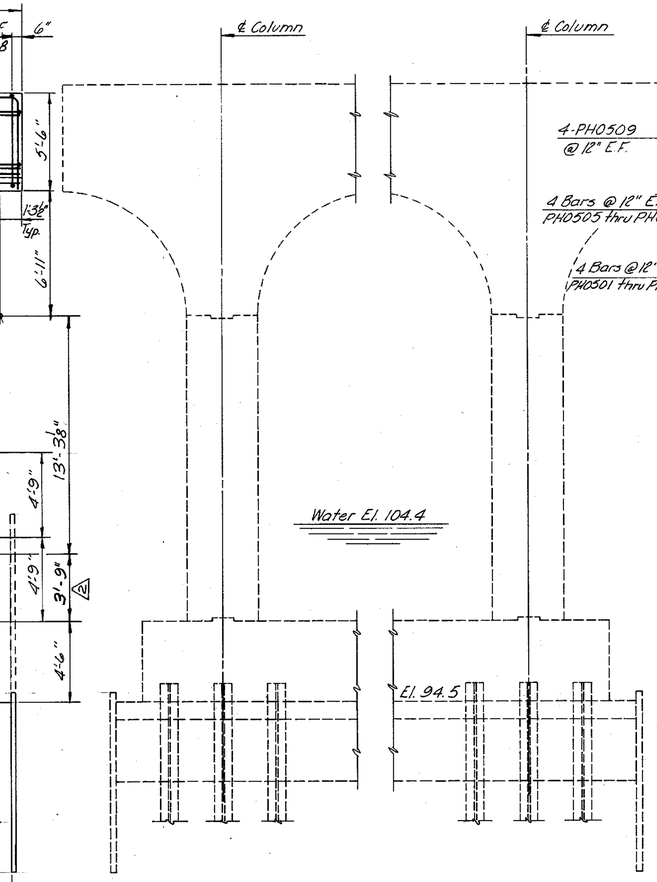
NOTE:
For Sections A-A, B-B and C-C, see Sheet No. 12.
For Anchor Bolt Setting Plan, see Sheet No. 29.

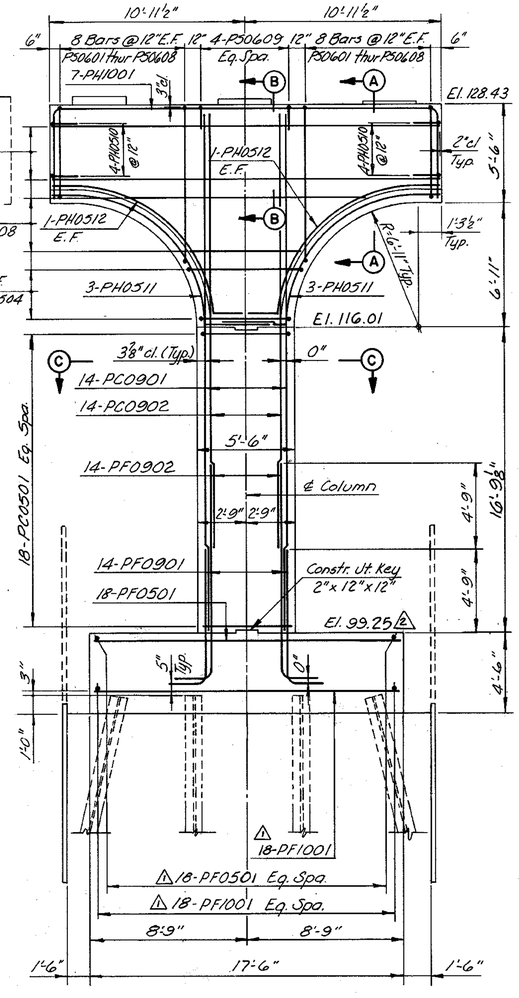


PLAN - SOUTHBOUND
Scale: 4"=1'-0"

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

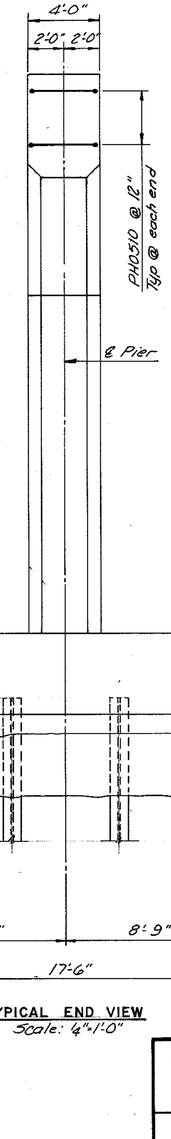


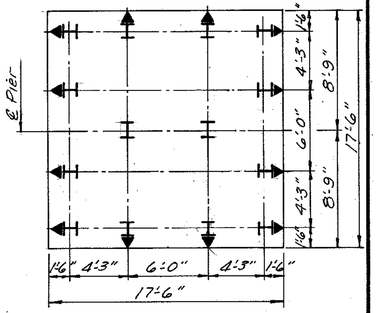




ELEVATION - SOUTHBOUND
Scale: 4"=1'-0"

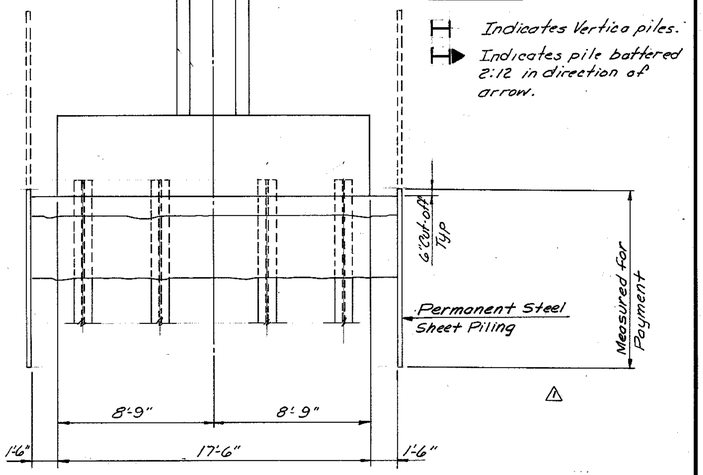
ELEVATION - NORTHBOUND
Scale: 4"=1'-0"





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

PILE NOTES:
- Indicates Vertical 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
1	Both Elevation & END View	ALC	4-87

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

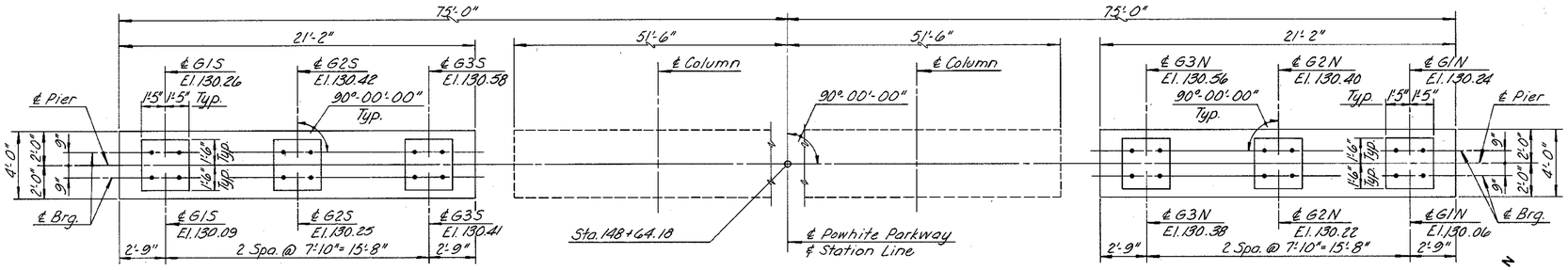
PIER 16 DETAILS

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

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

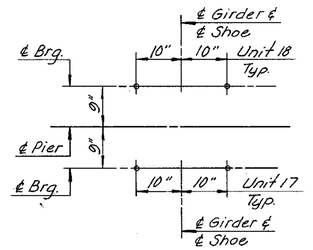
AS BUILT

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

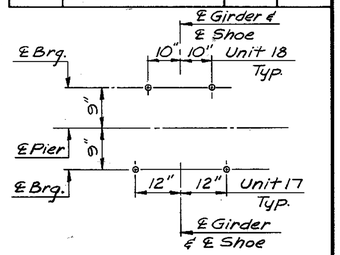


PLAN - SOUTHBOUND
Scale: 1/4"=1'-0"

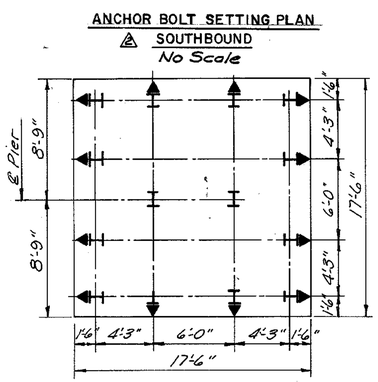
PLAN - NORTHBOUND
Scale: 1/4"=1'-0"



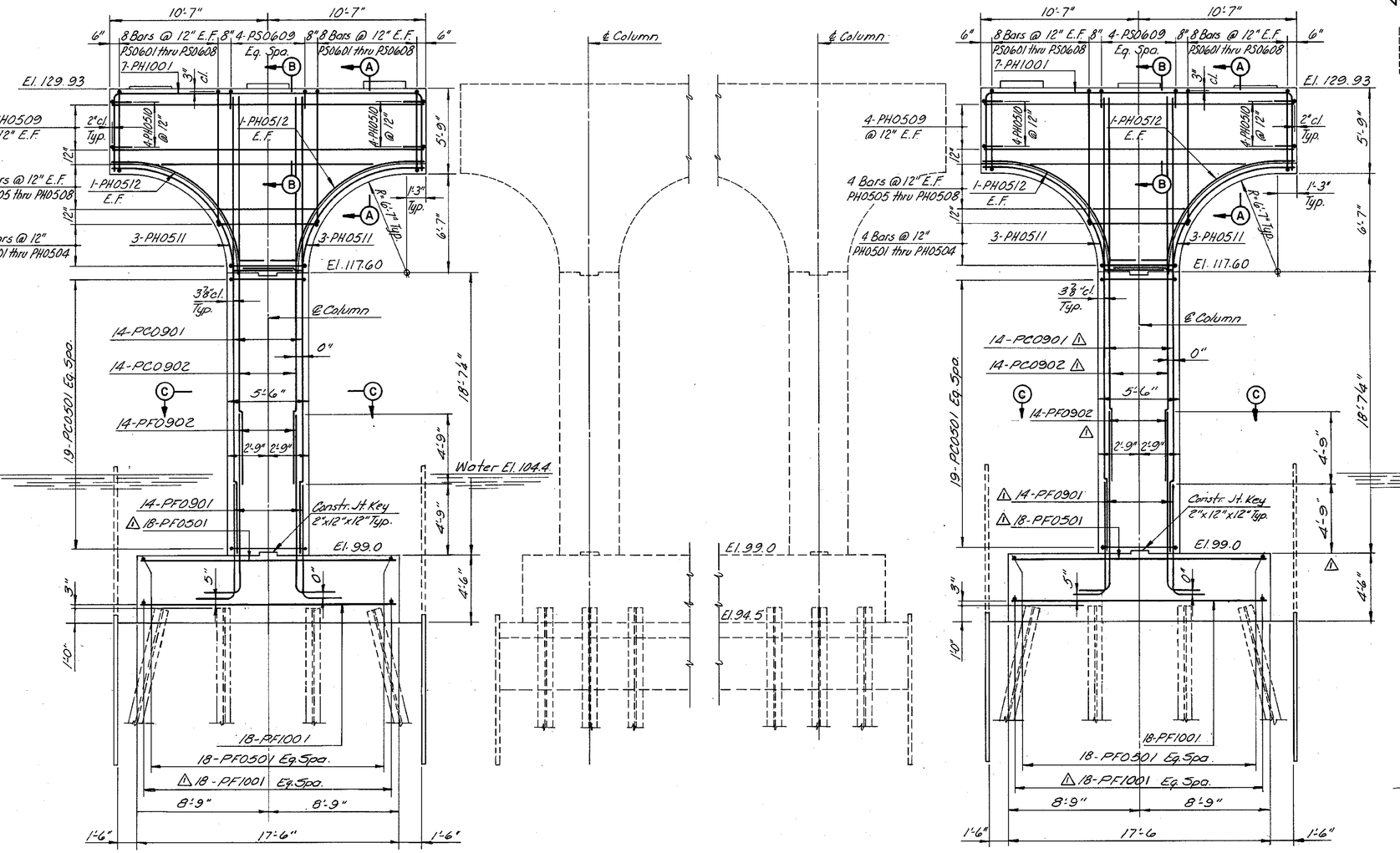
ANCHOR BOLT SETTING PLAN
△ NORTHBOUND (No Scale)



ANCHOR BOLT SETTING PLAN
△ SOUTHBOUND
No Scale



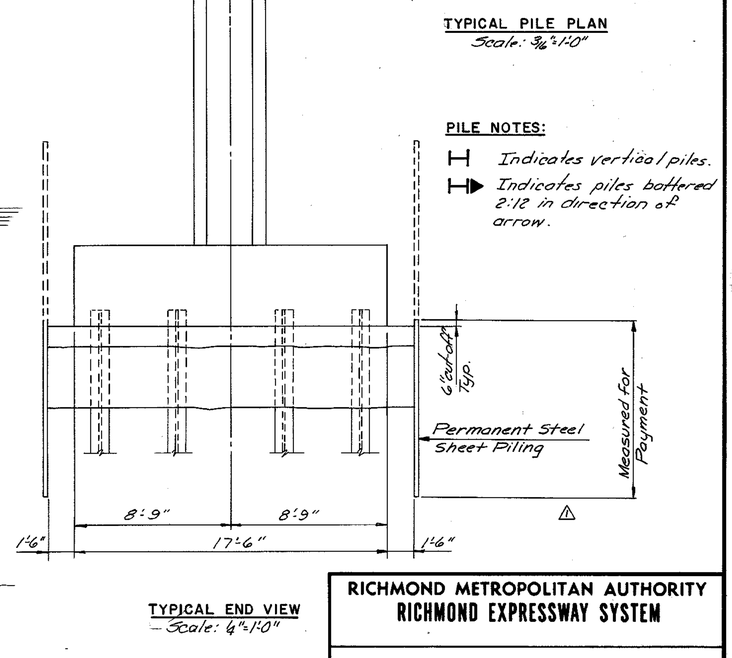
TYPICAL PILE PLAN
Scale: 3/16"=1'-0"



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

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

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



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

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

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

NO.	REVISION	BY	DATE
	As Built	TEM	3-89
△	Rev. Anchor Bolt	ALC	6-87
△	Both Elevation & End View	ALC	4-87

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

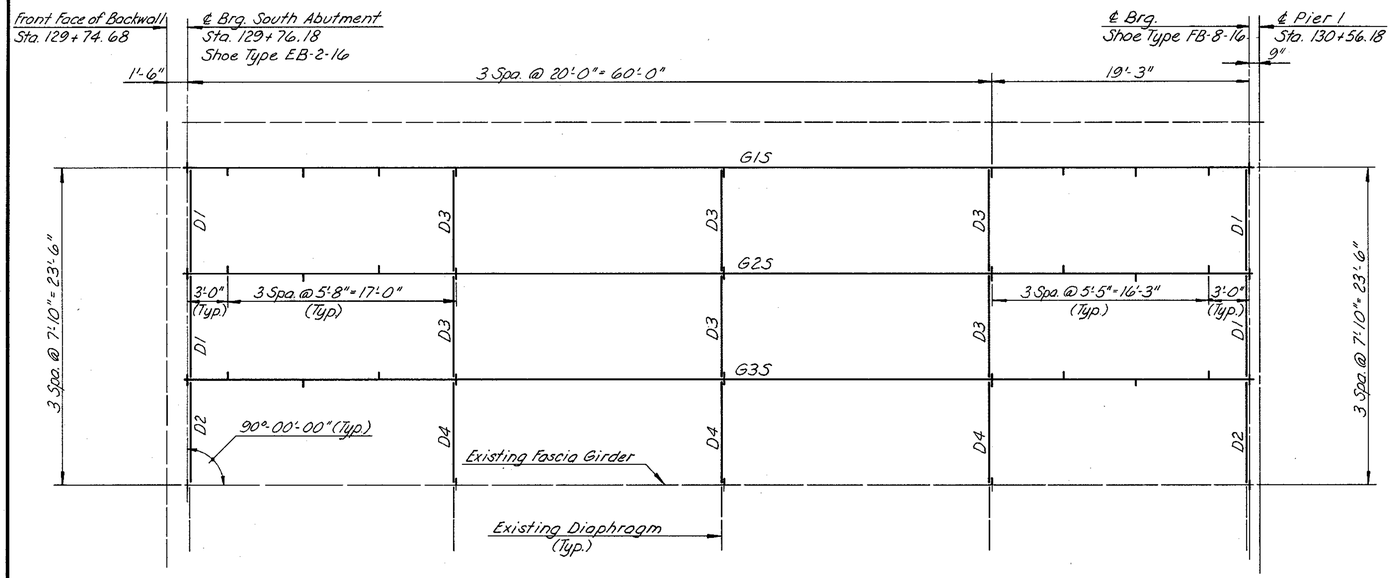
PIER 17 DETAILS

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

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

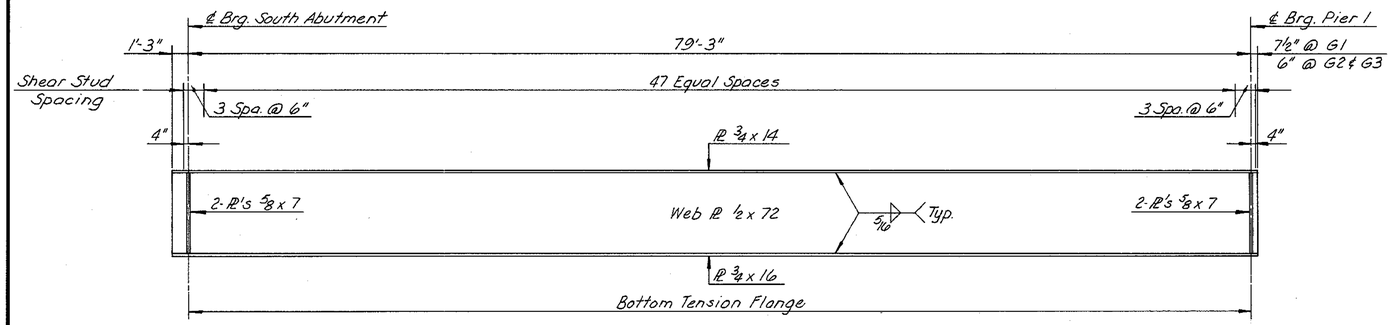
AS BUILT

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	EJM	1-87				
CHECKED	TFP	3-87		As Built	TEM	3-89
IN CHARGE	SR					

AS BUILT

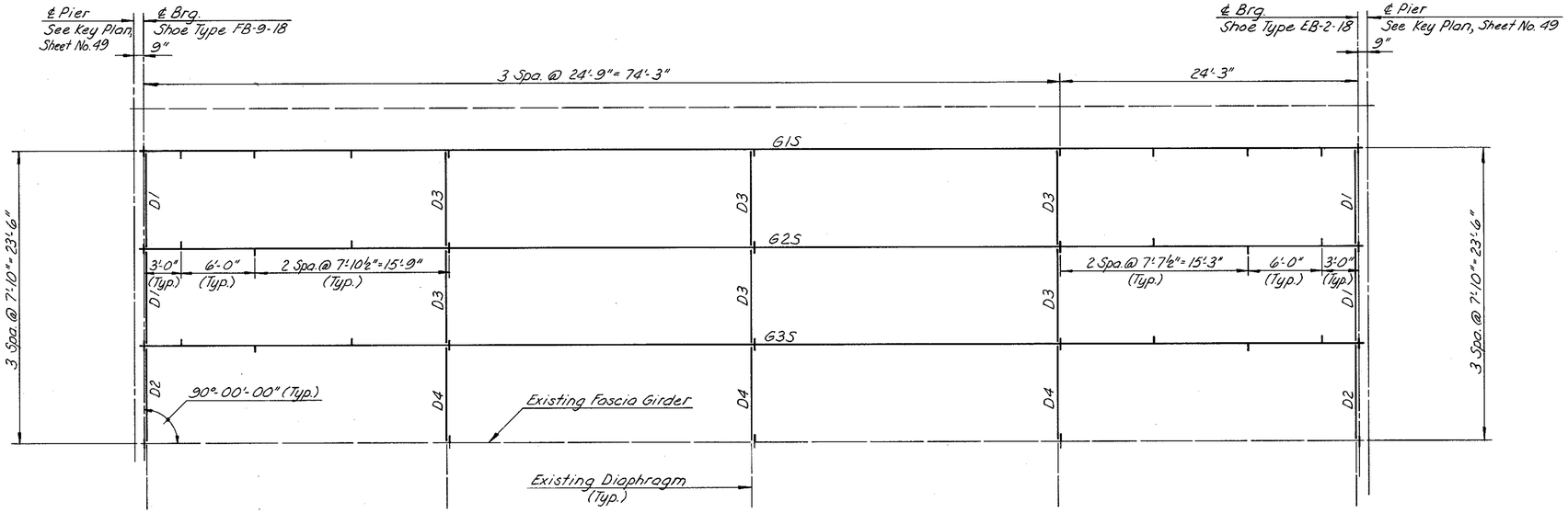
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT I SOUTHBOUND & NORTHBOUND

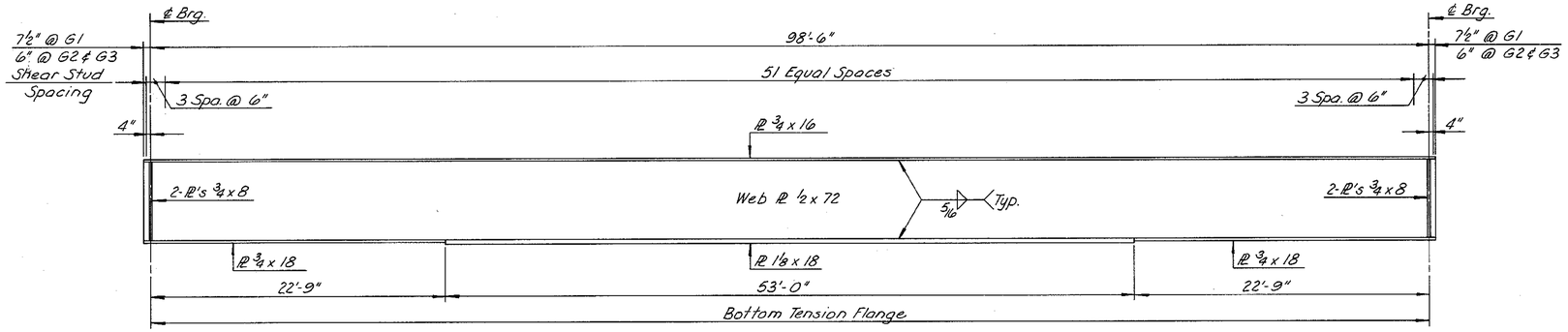
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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					

AS BUILT

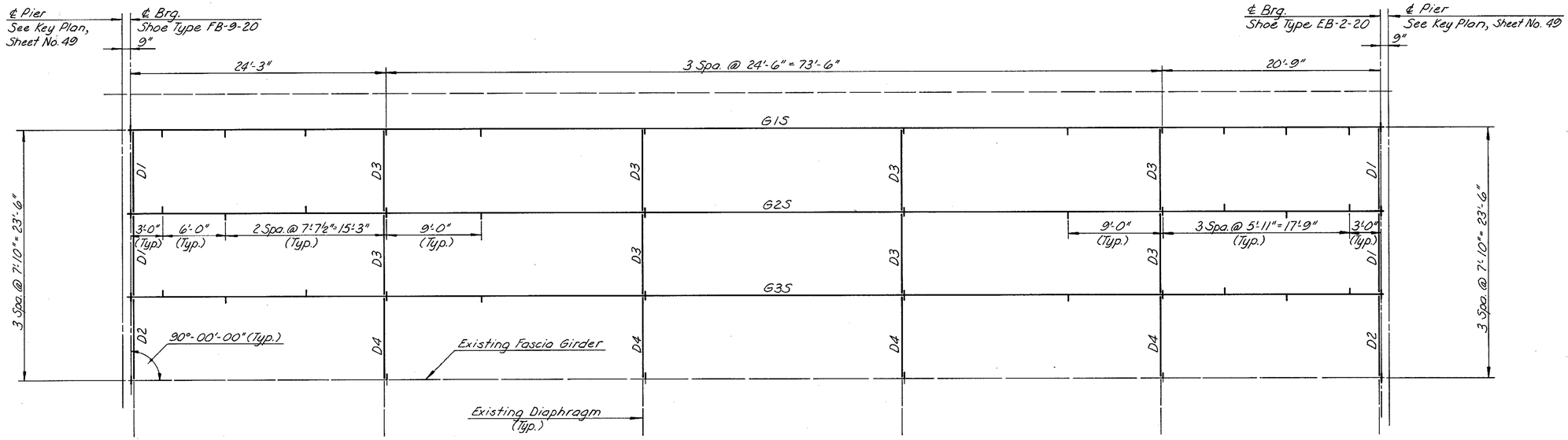
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

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

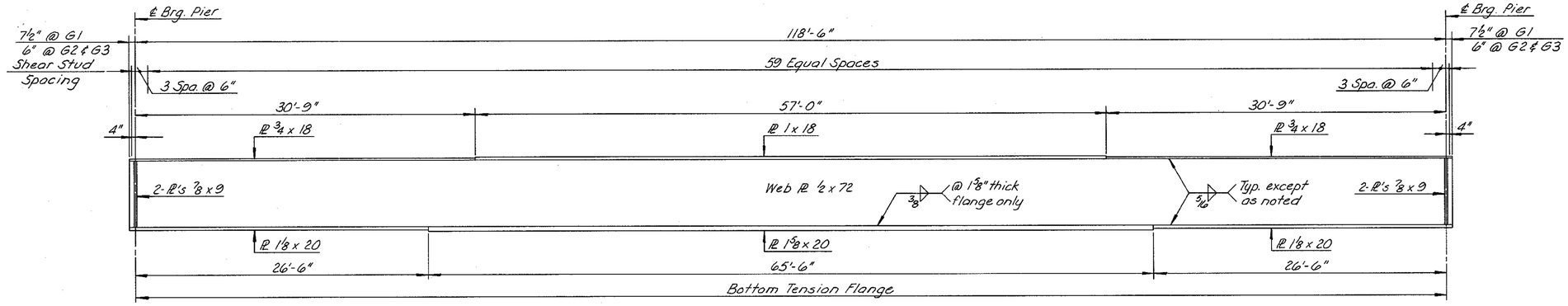
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

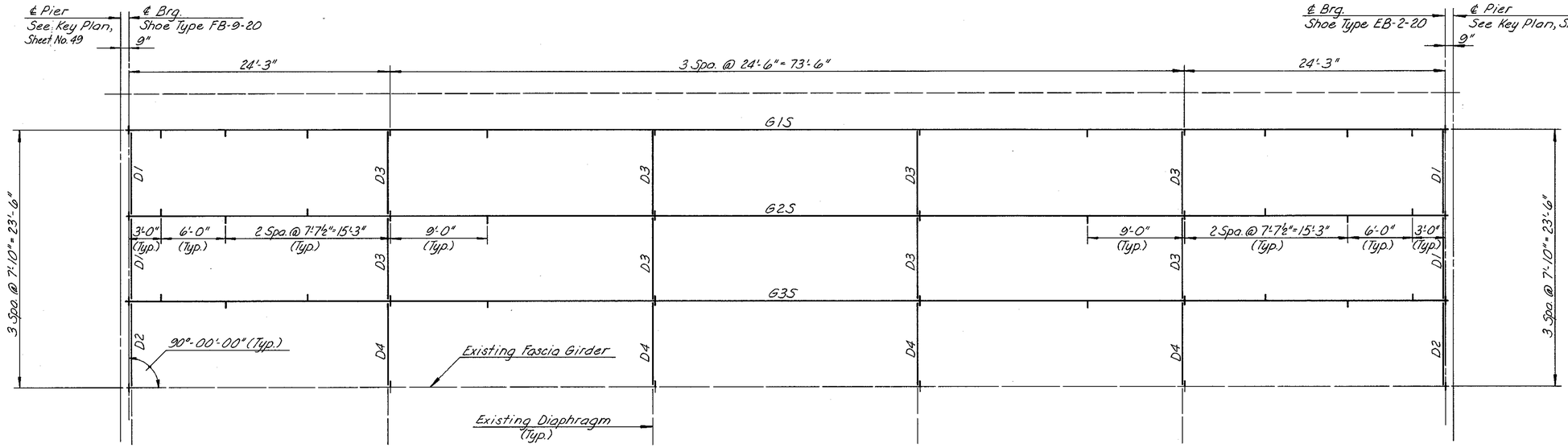
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 4 SOUTHBOUND & NORTHBOUND

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

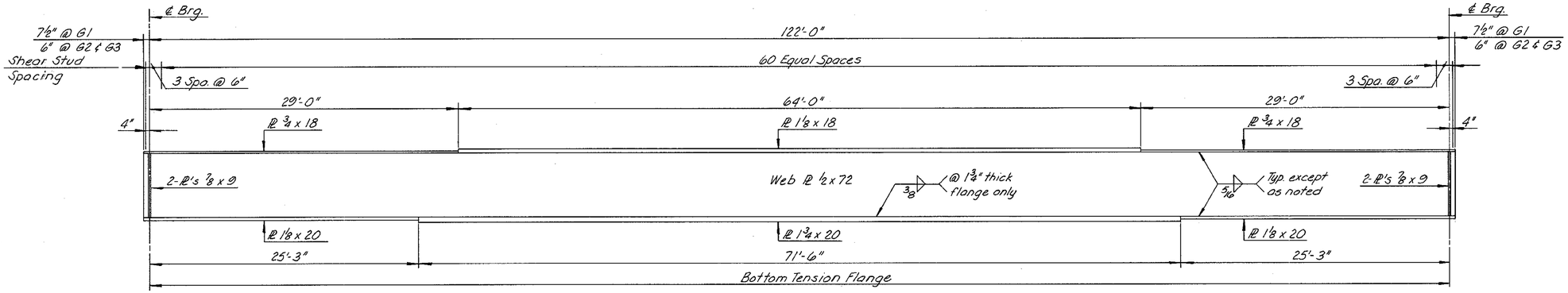
SCALE: AS SHOWS
CONTRACT NO.: C-13
SHEET NO. 32 OF 106

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

N3339

AS BUILT

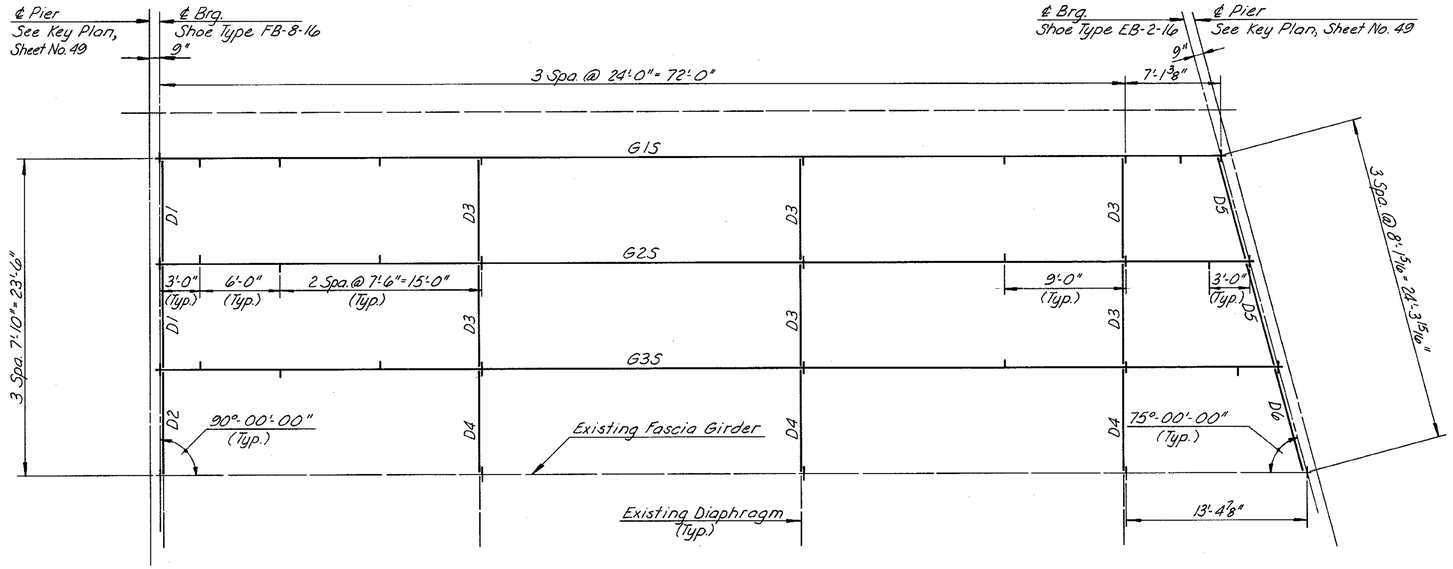
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

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

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

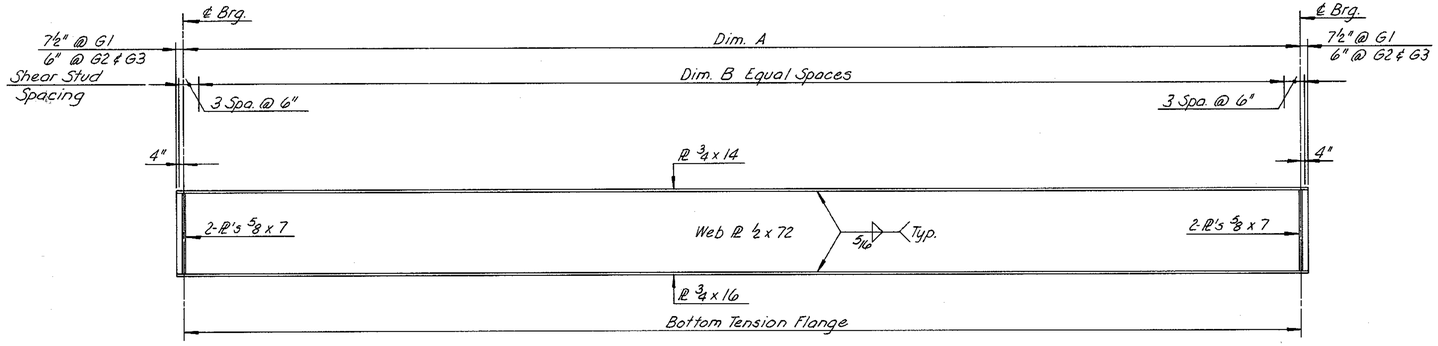
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 33 OF 106

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'-1⅞"	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

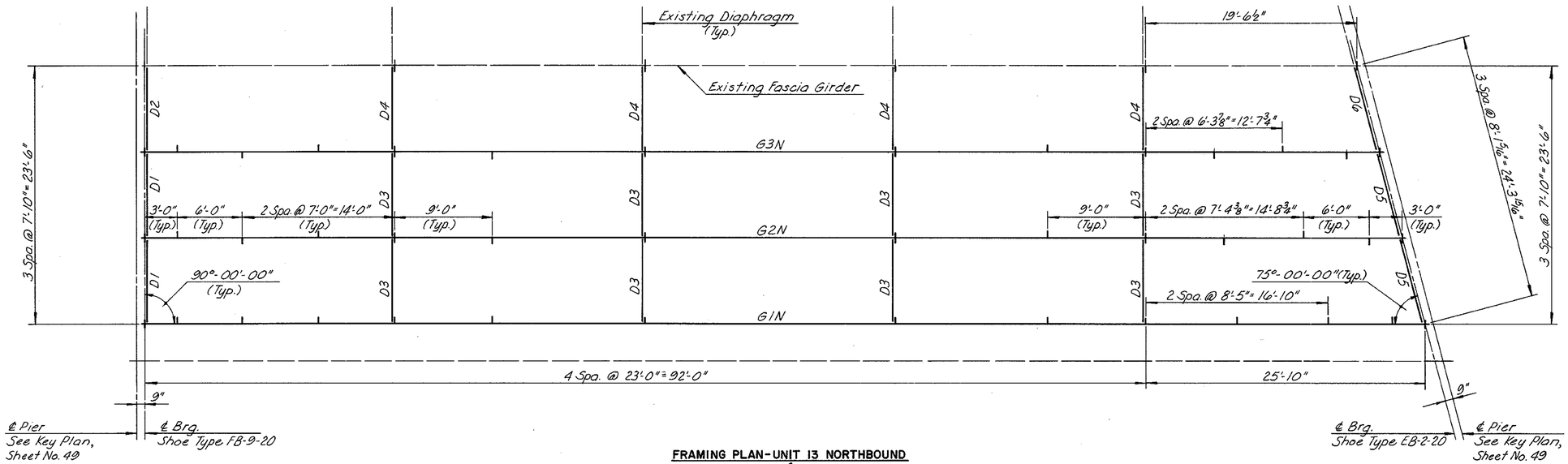
FRAMING PLAN & GIRDER ELEVATION
UNIT 13 SOUTHBOUND

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

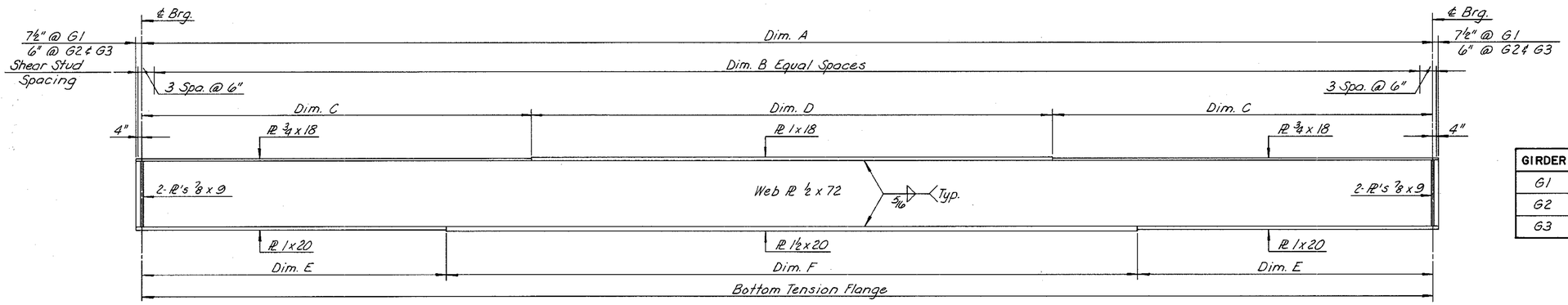
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 34 OF 106

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 13/16"	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

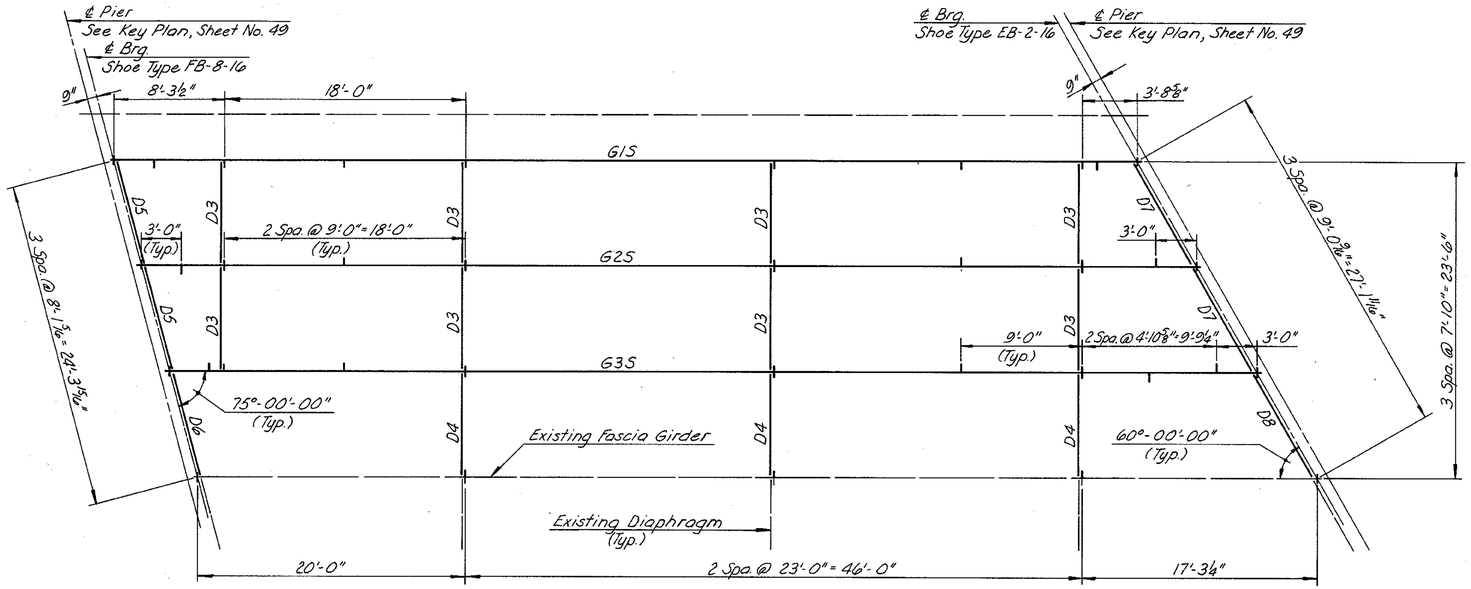
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 13 NORTHBOUND

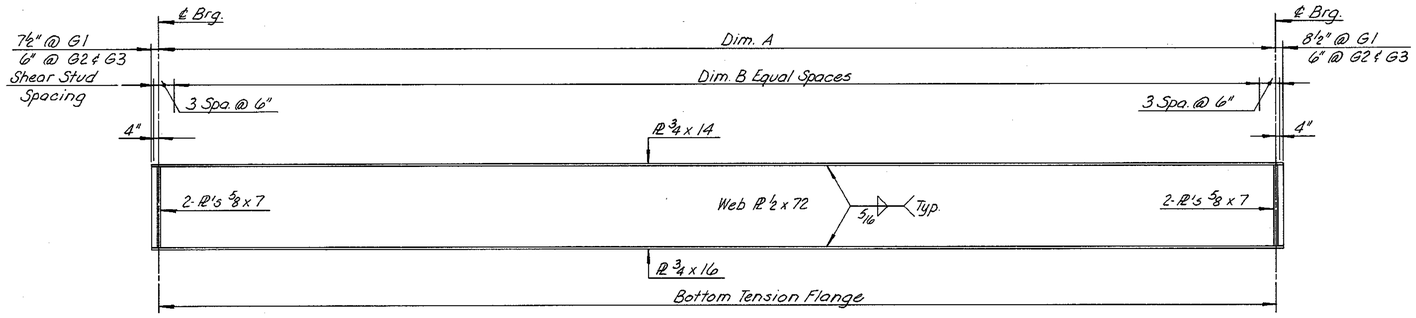
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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: 3/32" = 1'-0"



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

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

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					

N2519

AS BUILT

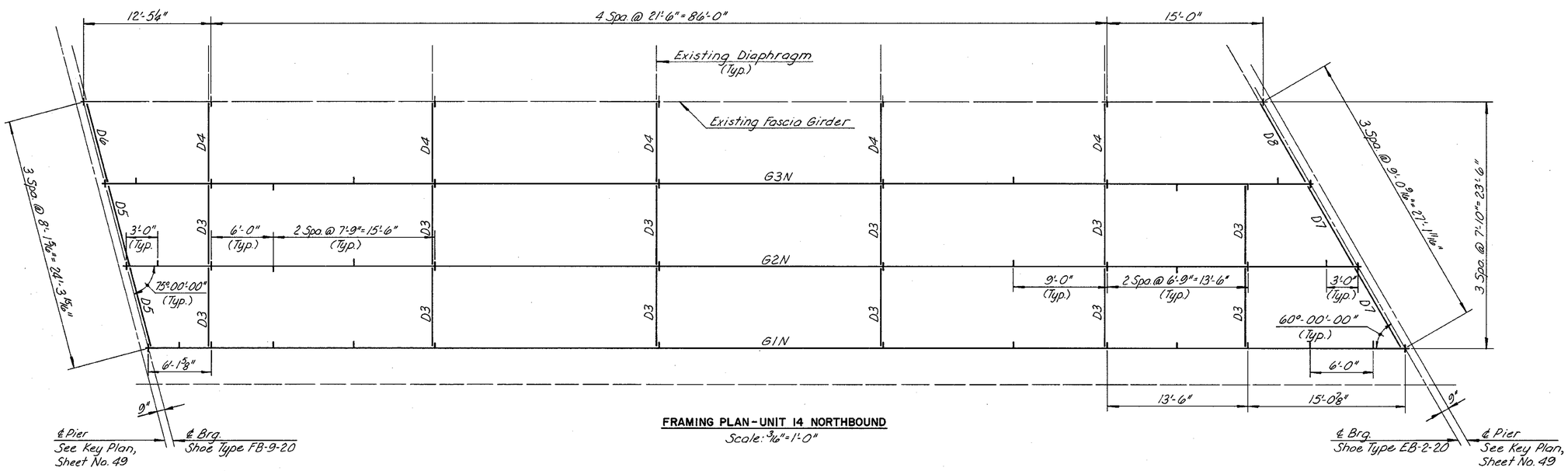
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 14 SOUTHBOUND

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

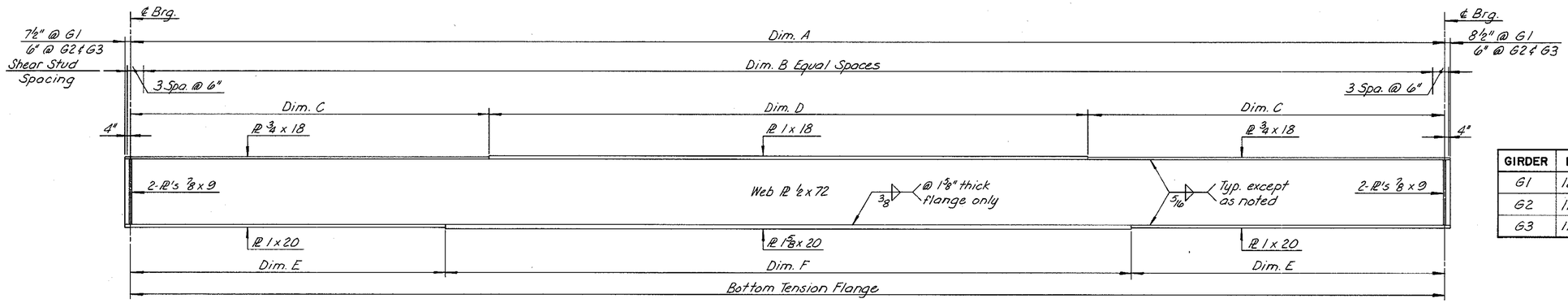
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 36 OF 106

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	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"

GIRDER ELEVATION - UNIT 14 NORTHBOUND
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					

AS BUILT

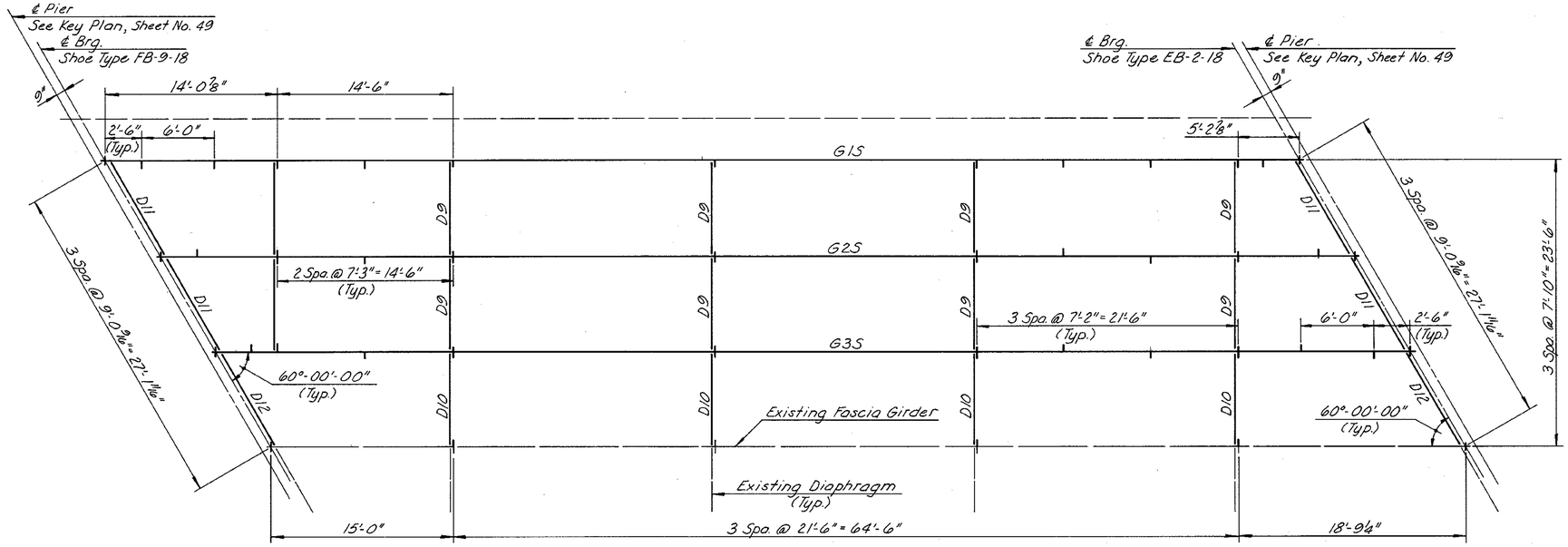
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 14 NORTHBOUND

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

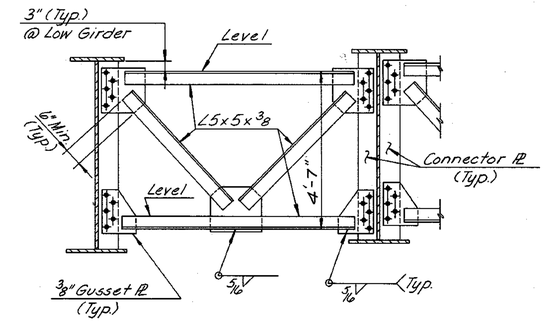
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 37 OF 106

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

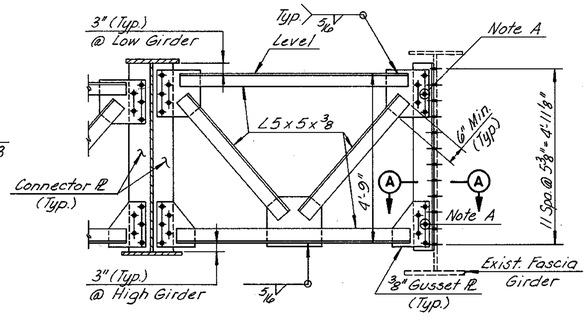


⚠ **FRAMING PLAN-UNIT 15 SOUTHBOUND**
Scale: 3/16" = 1'-0"

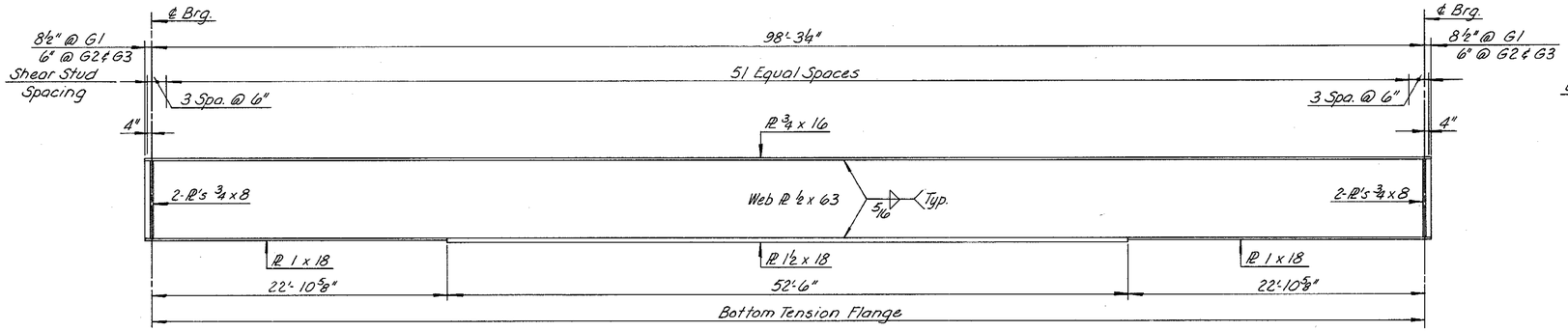
NOTE:
For Section A-A, see Sheet No. 45.
For Diaphragms 11 & 12, see Sheet No. 39.
For Additional Steel Details, see Sheet No. 45.



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



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



⚠ **GIRDER ELEVATION-UNIT 15 SOUTHBOUND**
Scale: 3/16" = 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

AS BUILT

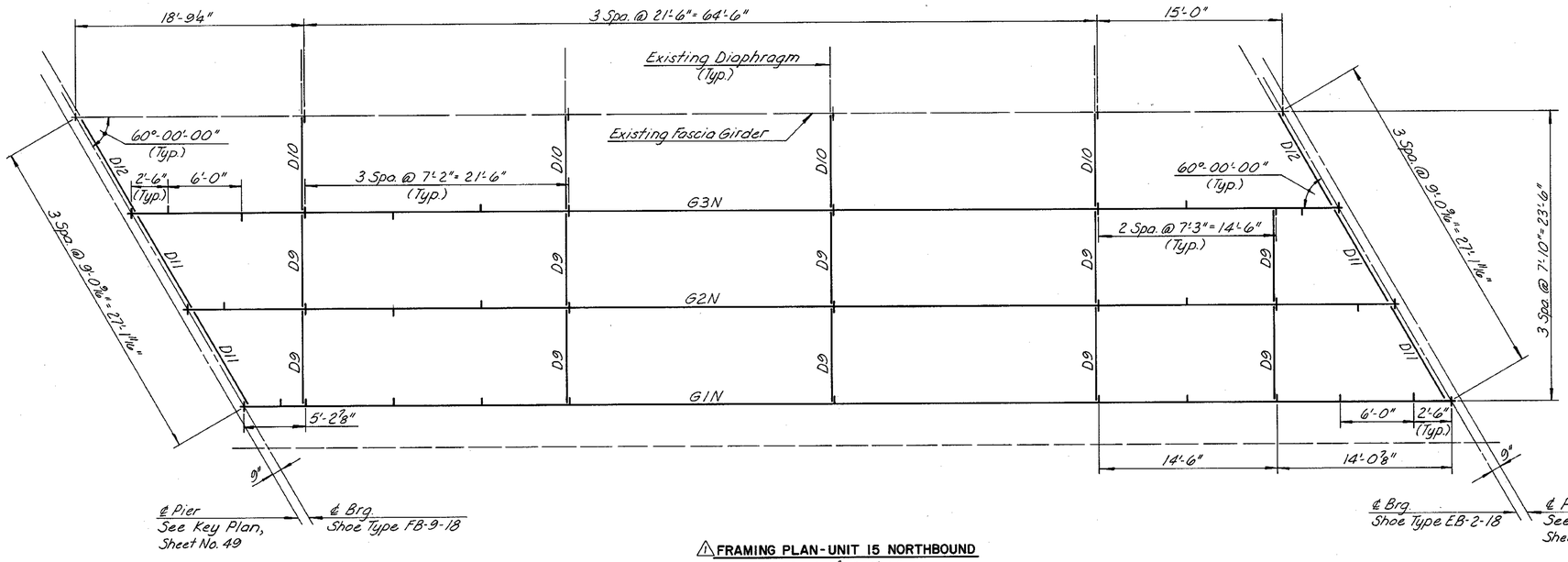
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 15 SOUTHBOUND

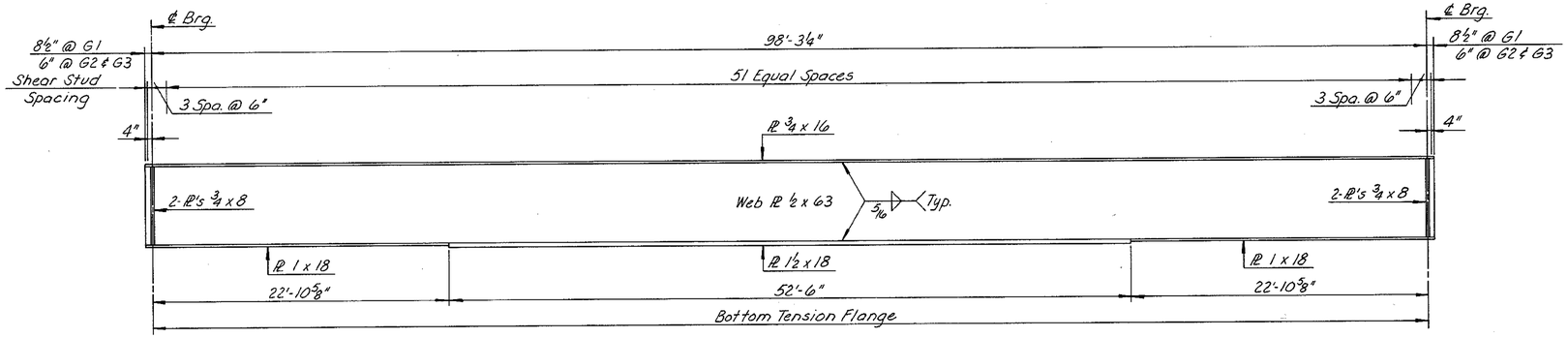
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

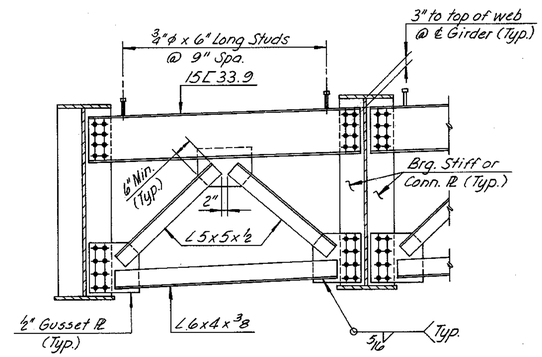


⚠ FRAMING PLAN - UNIT 15 NORTHBOUND
Scale: 3/16" = 1'-0"

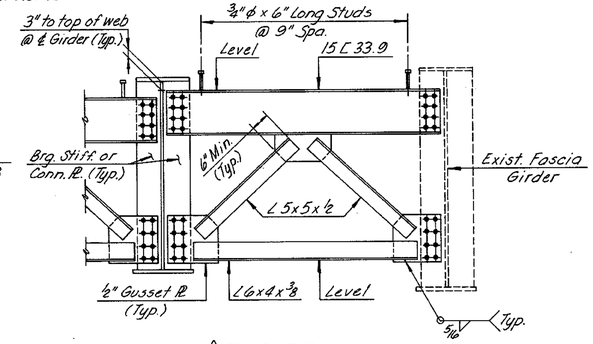


⚠ GIRDER ELEVATION - UNIT 15 NORTHBOUND
Scale: 3/16" = 1'-0"

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

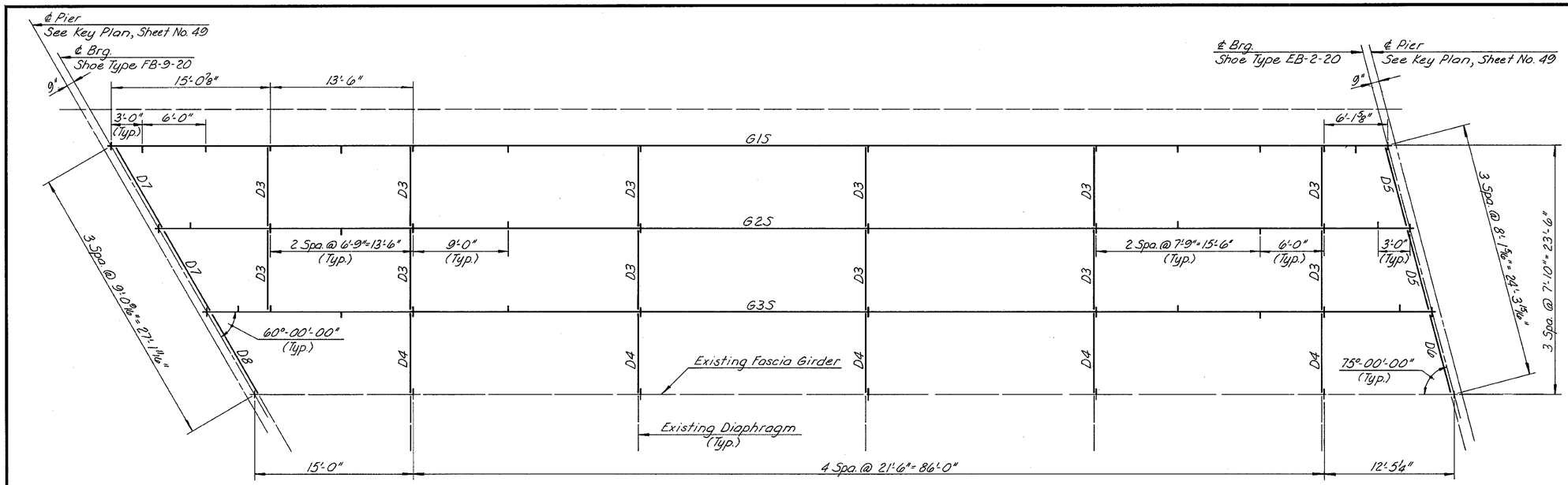
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 15 NORTHBOUND

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

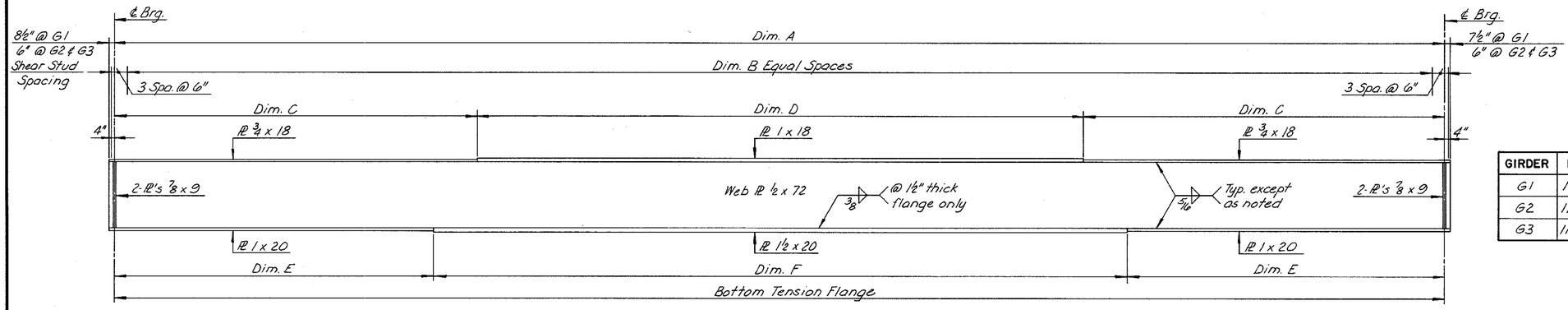
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 39 OF 106

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

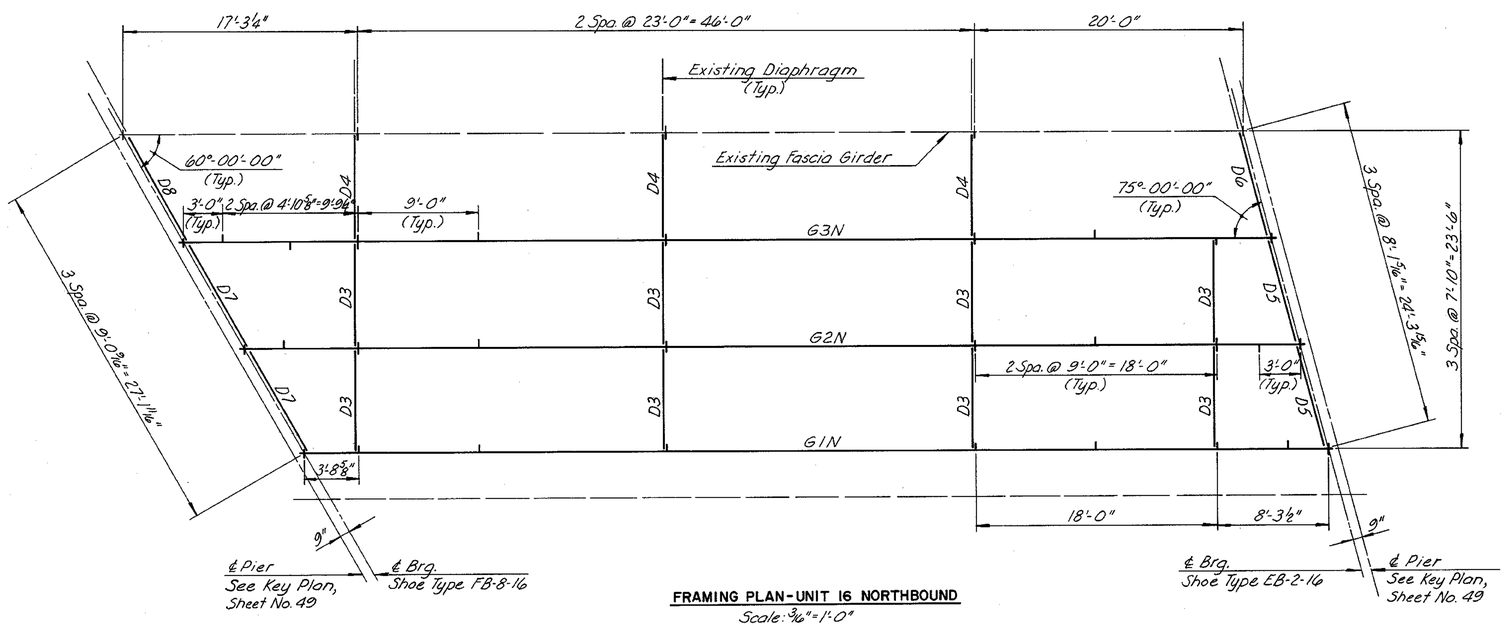
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 16 SOUTHBOUND

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

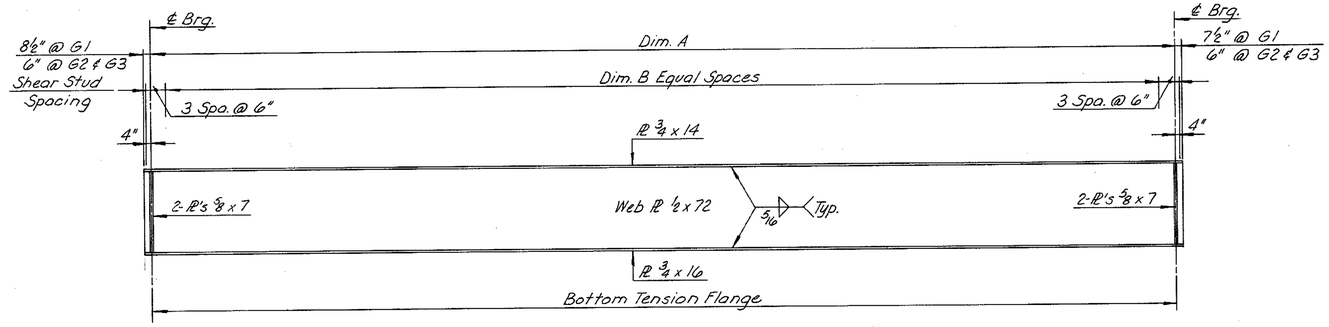
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 40 OF 106

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					

N1289

AS BUILT

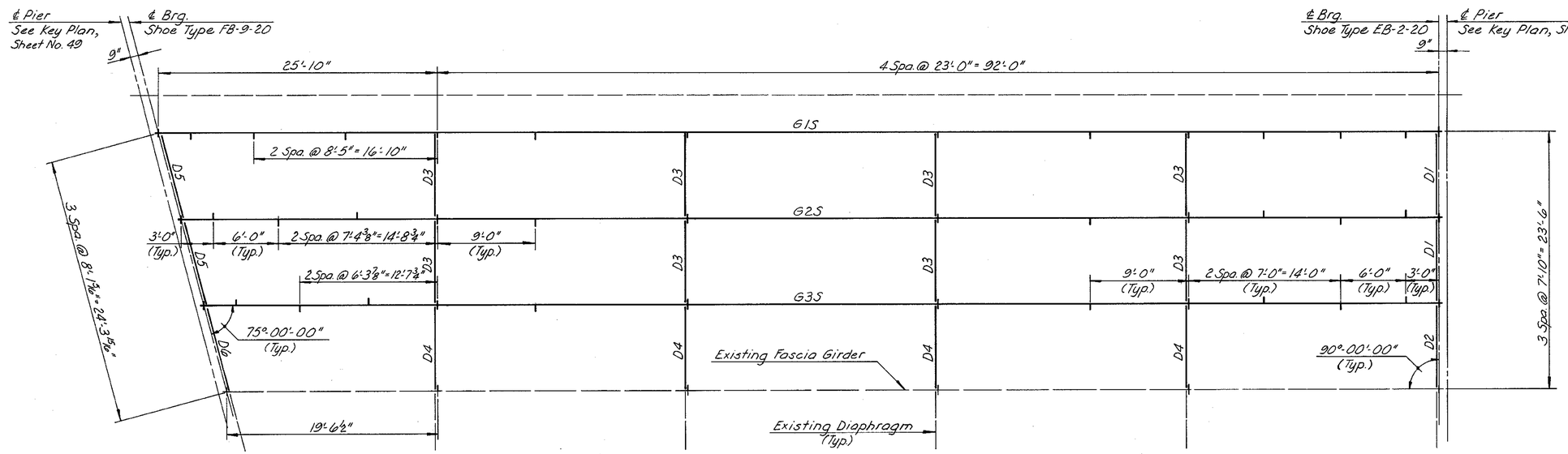
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 16 NORTHBOUND

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

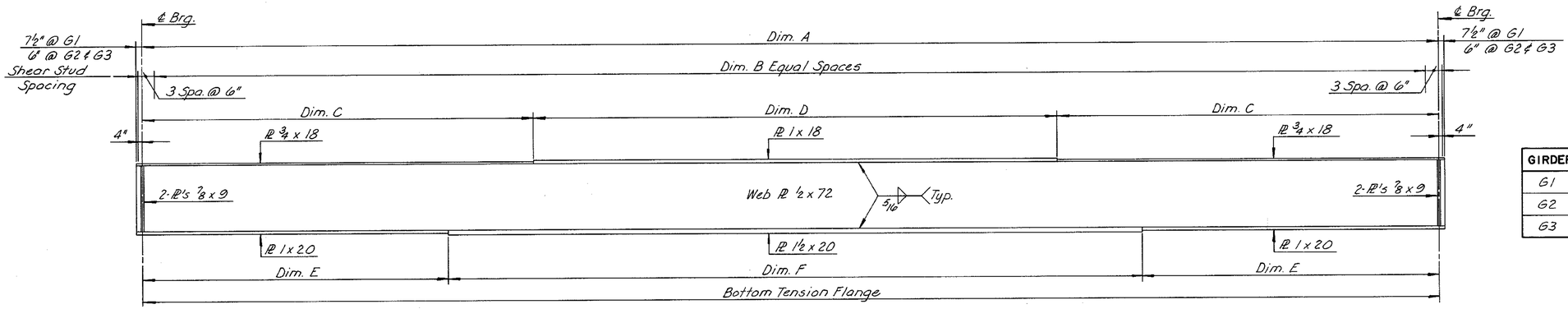
SCALE: AS SHOWN
CONTRACT NO: C-13
SHEET NO. 41 OF 106

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'-8¾"	57	32'-1⅜"	51'-6"	24'-7⅜"	66'-6"
G3	113'-7⅝"	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
MADE	EJM	1-87
CHECKED	TFP	3-87
IN CHARGE	SR	

NO.	REVISION	BY	DATE
	As Built	TEM	3-89

AS BUILT

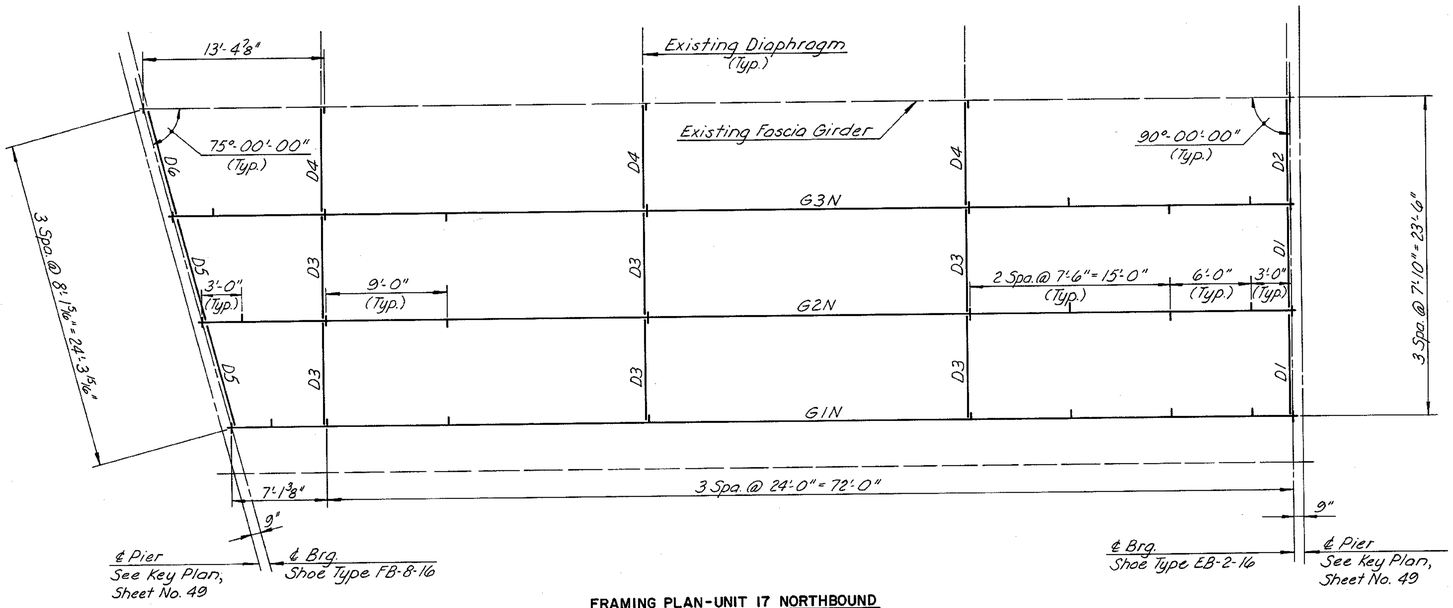
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 17 SOUTHBOUND

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

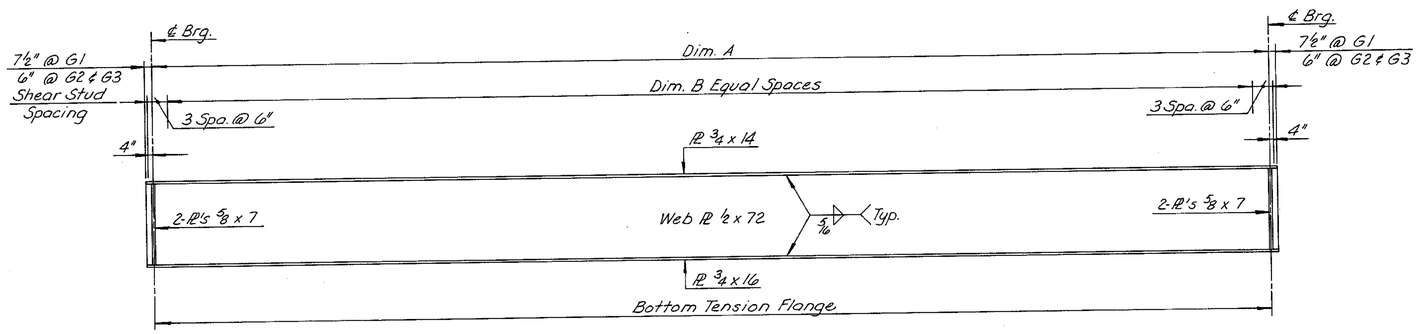
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 42 OF 106

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'-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					

HSW8

AS BUILT

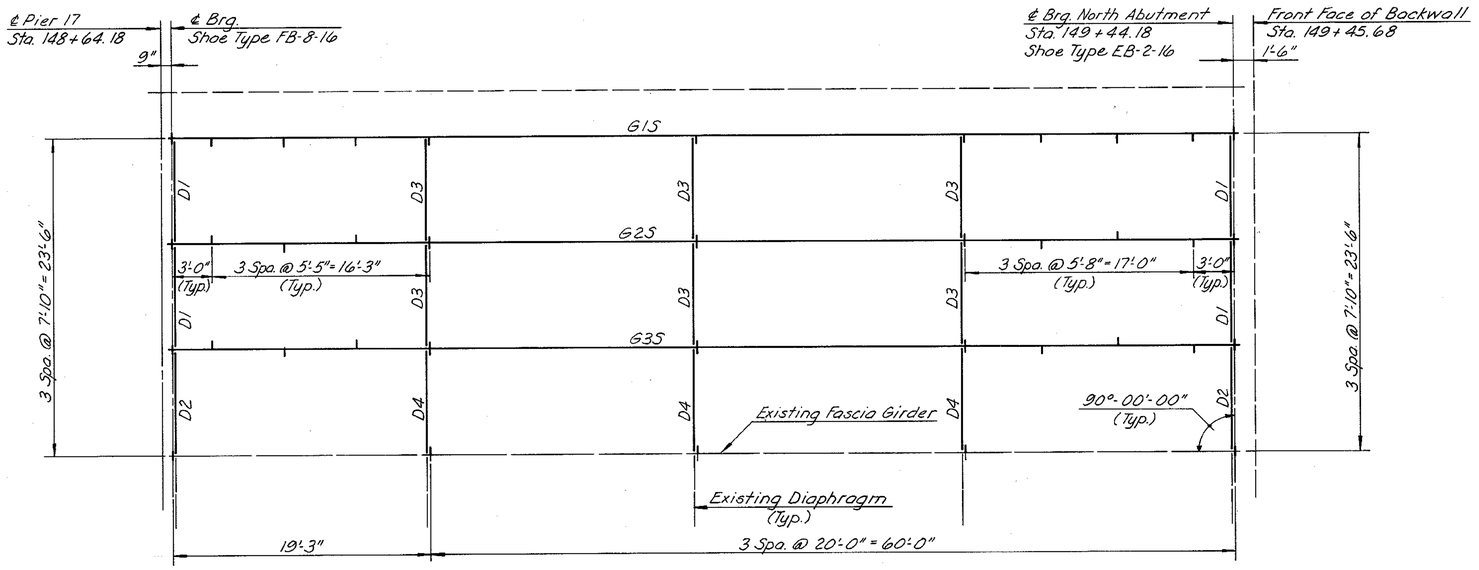
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 17 NORTHBOUND

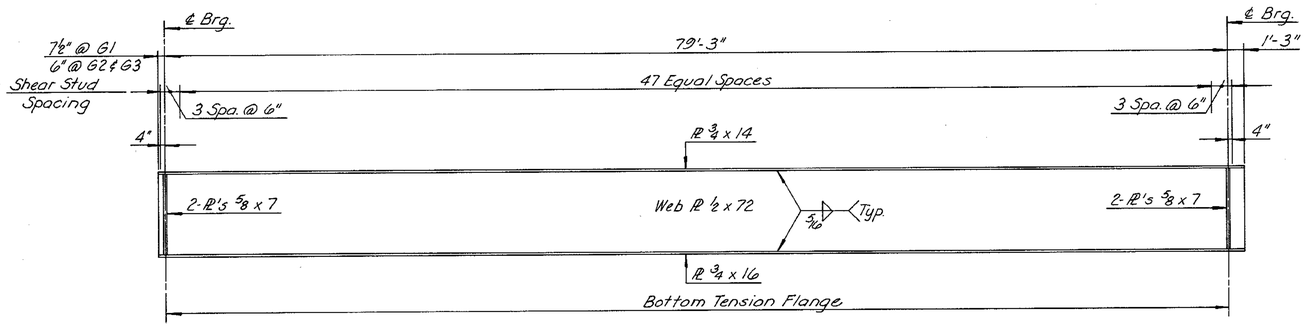
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

AS BUILT

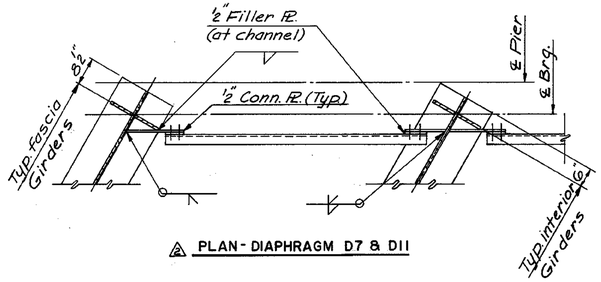
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

FRAMING PLAN & GIRDER ELEVATION
UNIT 18 SOUTHBOUND & NORTHBOUND

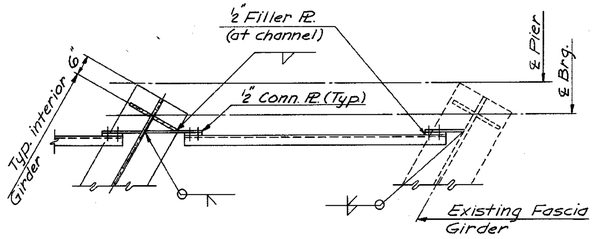
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

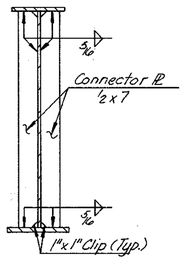
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	45	106



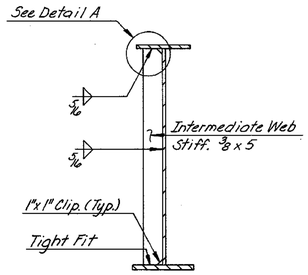
△2 PLAN - DIAPHRAGM D7 & D11



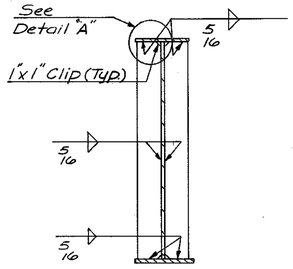
△2 PLAN - DIAPHRAGM D8 & D12



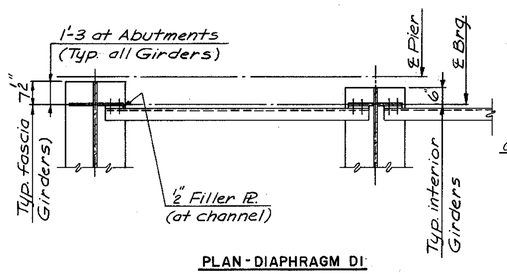
INTERMEDIATE DIAPHRAGM CONNECTOR PLATE DETAIL
No Scale



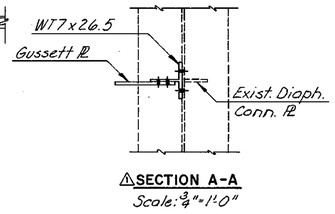
INTERMEDIATE WEB STIFFENER DETAIL
No Scale



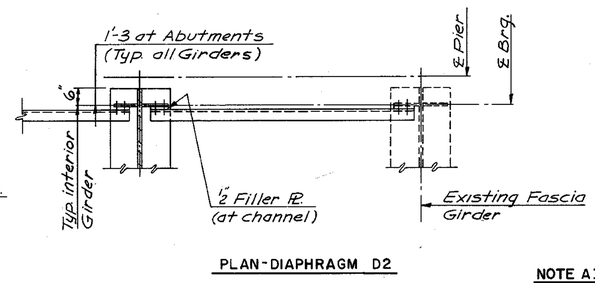
BEARING STIFFENER DETAIL
No Scale



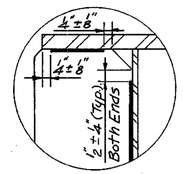
PLAN - DIAPHRAGM D1



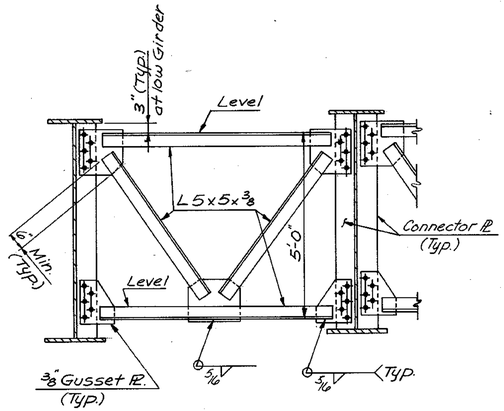
△SECTION A-A
Scale: ¾"=1'-0"



PLAN - DIAPHRAGM D2

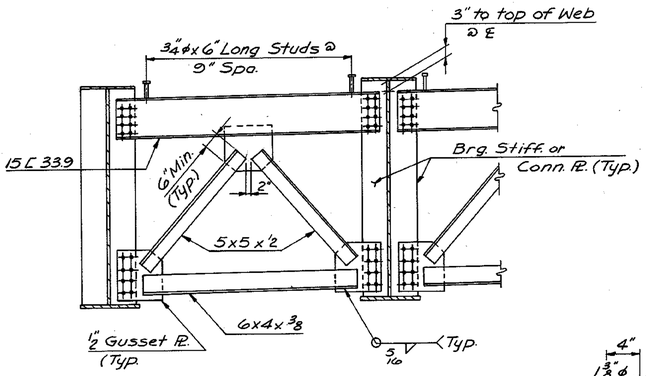


DETAIL "A"
No Scale

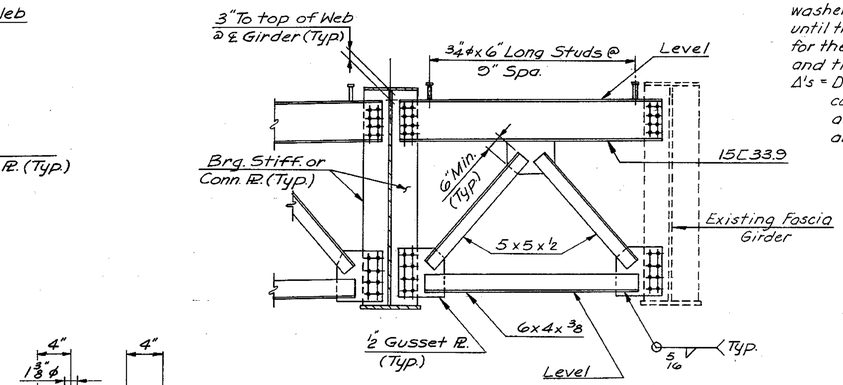


INTERMEDIATE DIAPHRAGM D3,
Scale: ½"=1'-0"

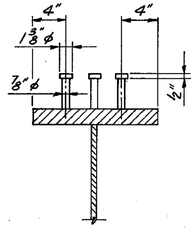
NOTE A:
Provide slotted hole in Conn. Pl. for Δ's deflection and 1"ϕ erection bolt with 3"ϕ washers. The bolt shall remain snug tight until the deck slab is placed, then the holes for the remaining bolts shall be field drilled and tightened.
Δ's = Deflection of girder from dead load of concrete deck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



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

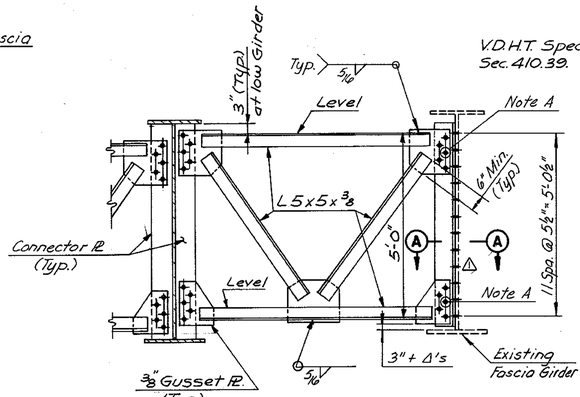


ELEVATION
END DIAPHRAGM DETAILS - D2, D6, D8
Scale: ½"=1'-0"

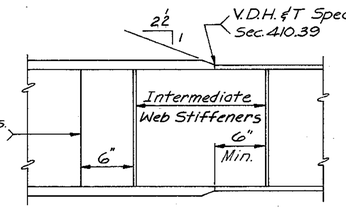


SHEAR STUD DETAIL
No Scale

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

AS BUILT

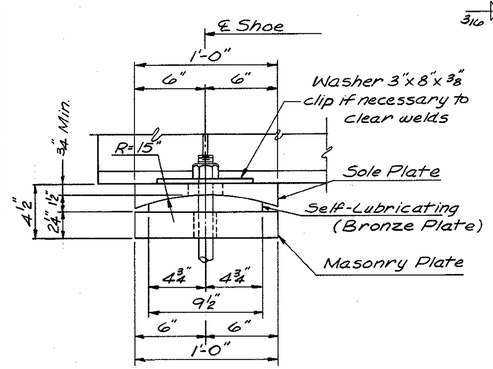
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

STEEL DETAILS

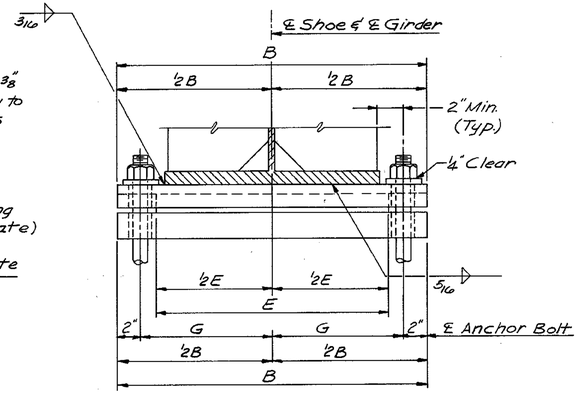
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

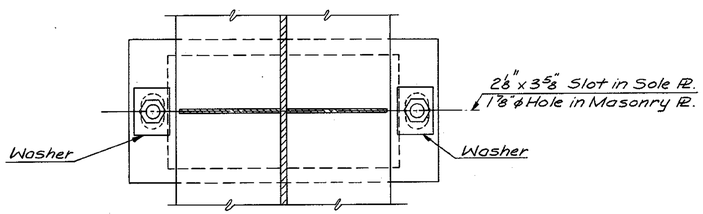
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	46	106



SIDE ELEVATION



END ELEVATION

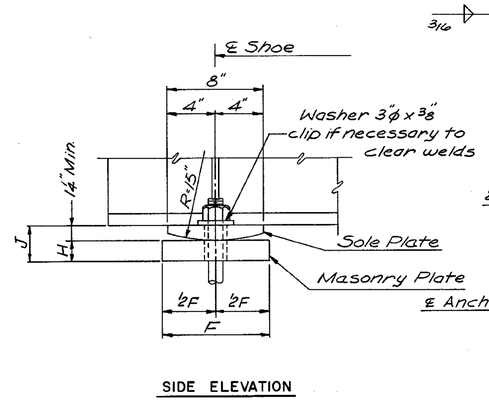


PLAN

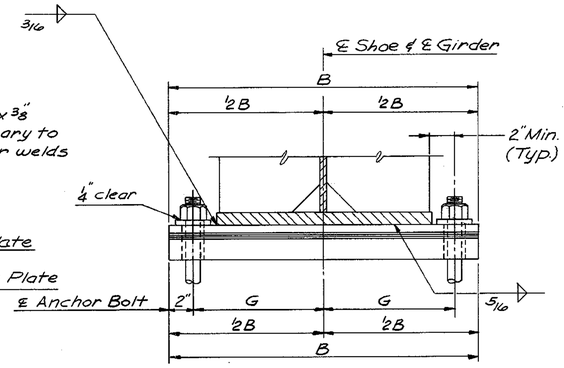
EXPANSION SHOE EB-2
No Scale

EXPANSION SHOES													
SHOE TYPE	NO. REQ'D	A	B	C	D	E	F	G	H	J	L		
EB-2-16	24		2'-0"			1'-5½"		10"			1'-7"		
EB-2-18	18		2'-2"			1'-7½"		11"			1'-7"		
EB-2-20	66		2'-4"			1'-9½"		1'-0"			1'-7"		

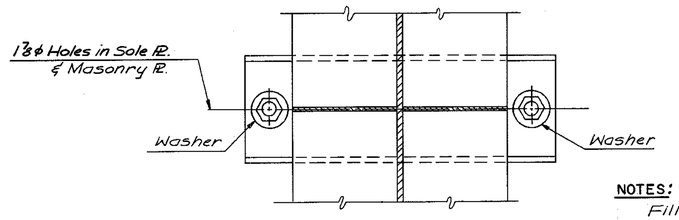
FIXED SHOES													
SHOE TYPE	NO. REQ'D	A	B	C	D	E	F	G	H	J	L		
FB-8-16	24		2'-0"				8"	10"	1½"	2¾"	1'-2"		
FB-9-18	18		2'-2"				9"	11"	1¾"	4½"	1'-2¼"		
FB-9-20	66		2'-4"				9"	1'-0"	1¾"	4½"	1'-2¼"		



SIDE ELEVATION

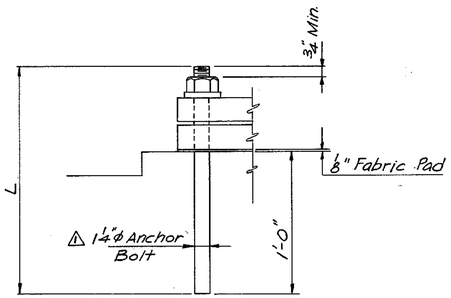


END ELEVATION



PLAN

FIXED SHOE
No Scale



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	⚠	1¼"ϕ Anchor Bolt	ALC	4-87
IN CHARGE	S.R.		NO.	REVISION	BY	DATE

AS BUILT

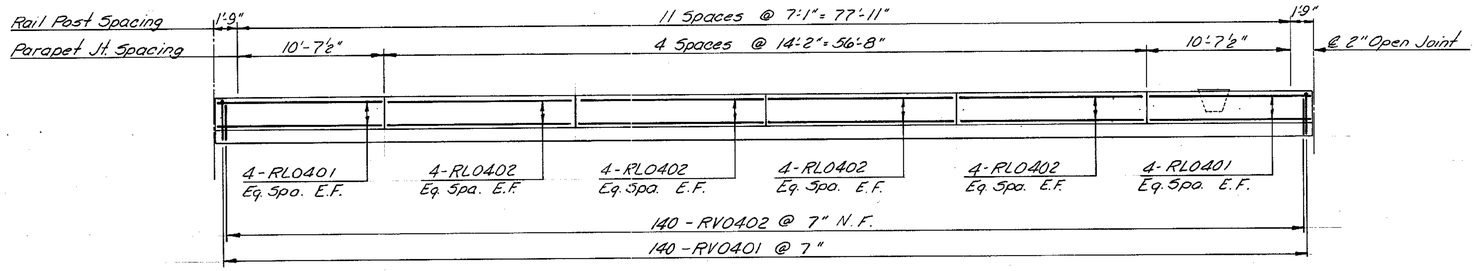
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

SHOE DETAILS

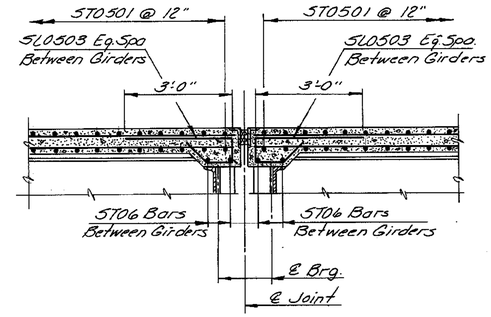
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

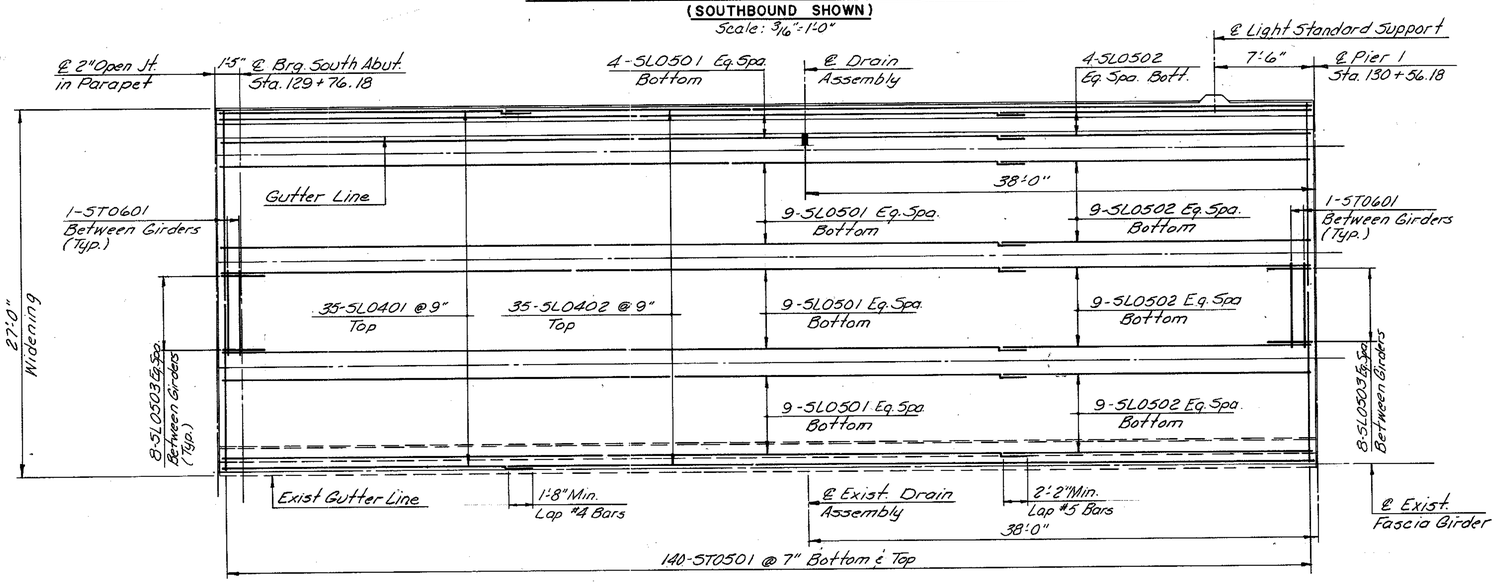
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	51	106



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

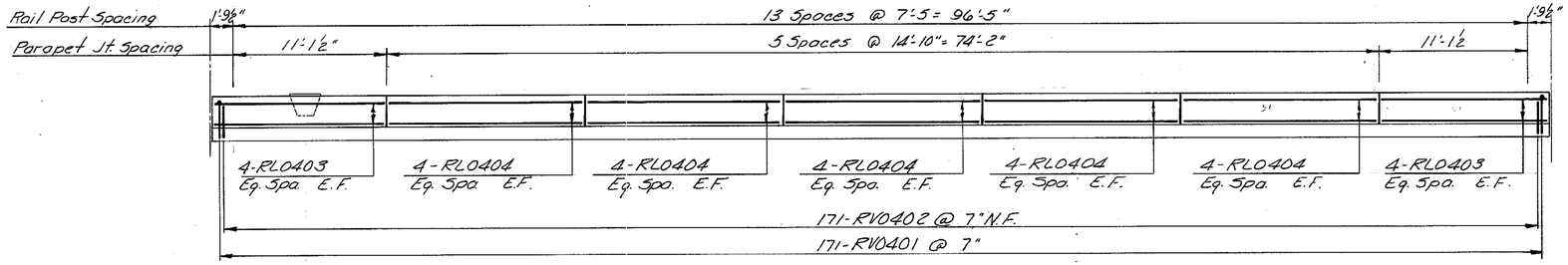
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNIT I SOUTHBOUND & NORTHBOUND

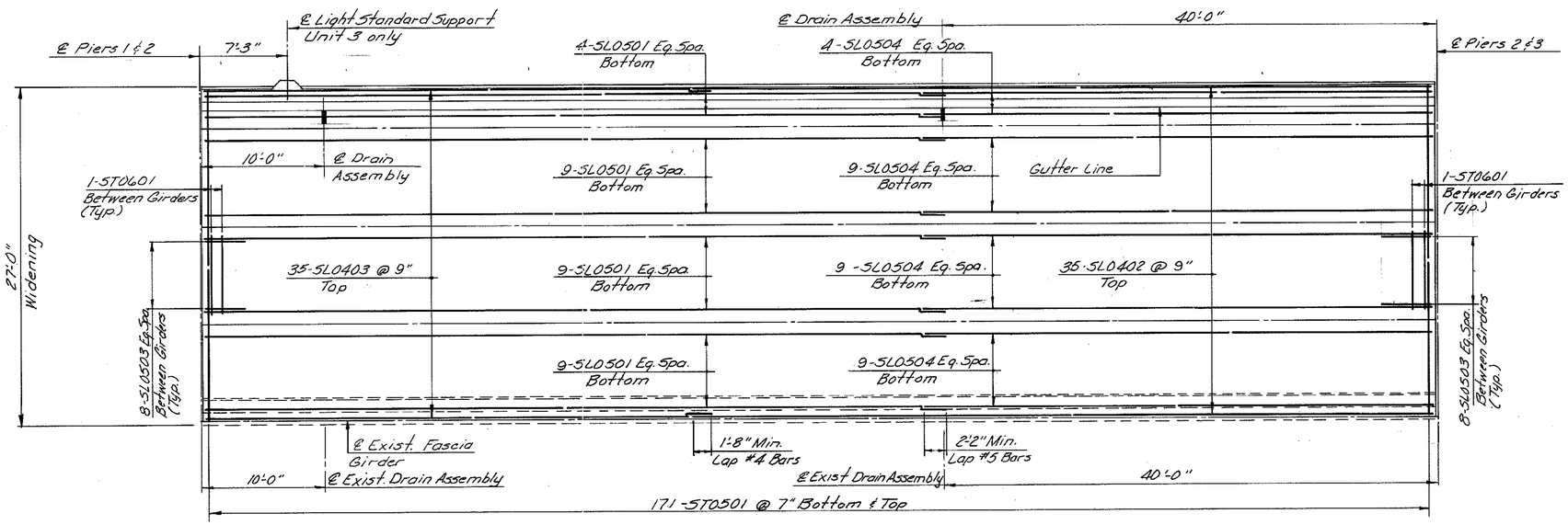
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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.					

N2599

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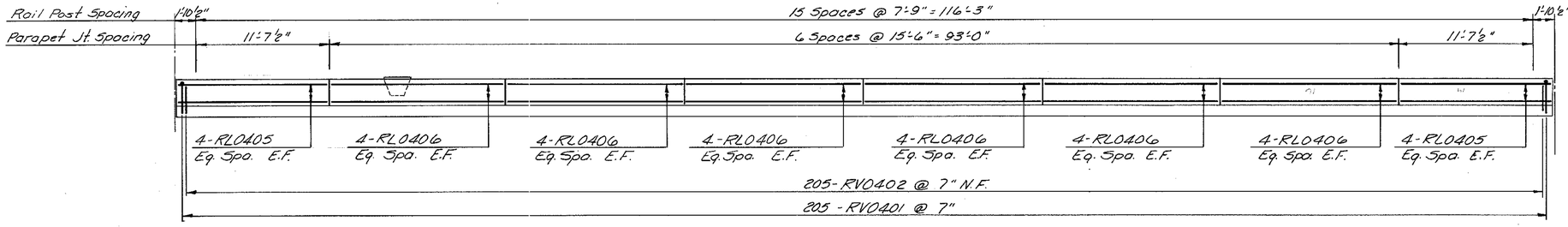
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNITS 2 & 3 SOUTHBOUND & NORTHBOUND

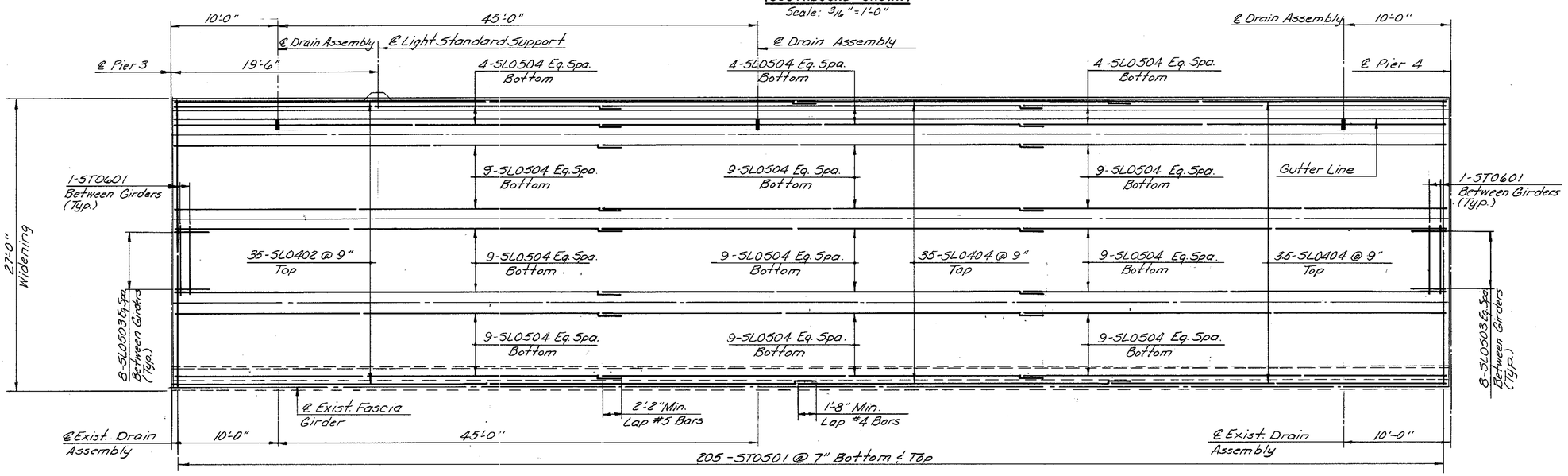
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

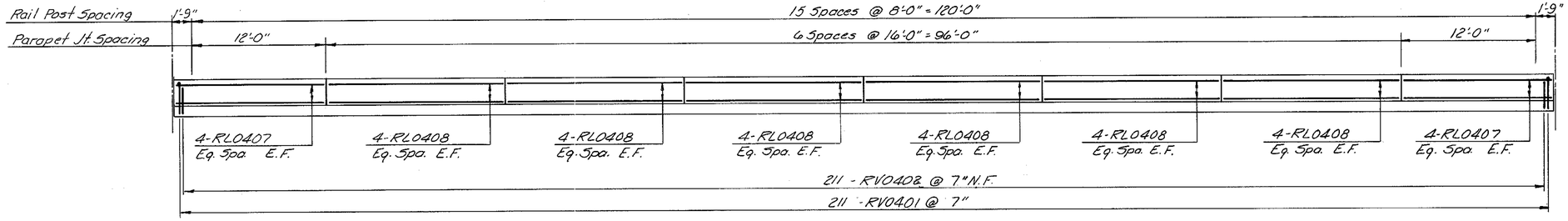
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNIT 4 SOUTHBOUND & NORTHBOUND

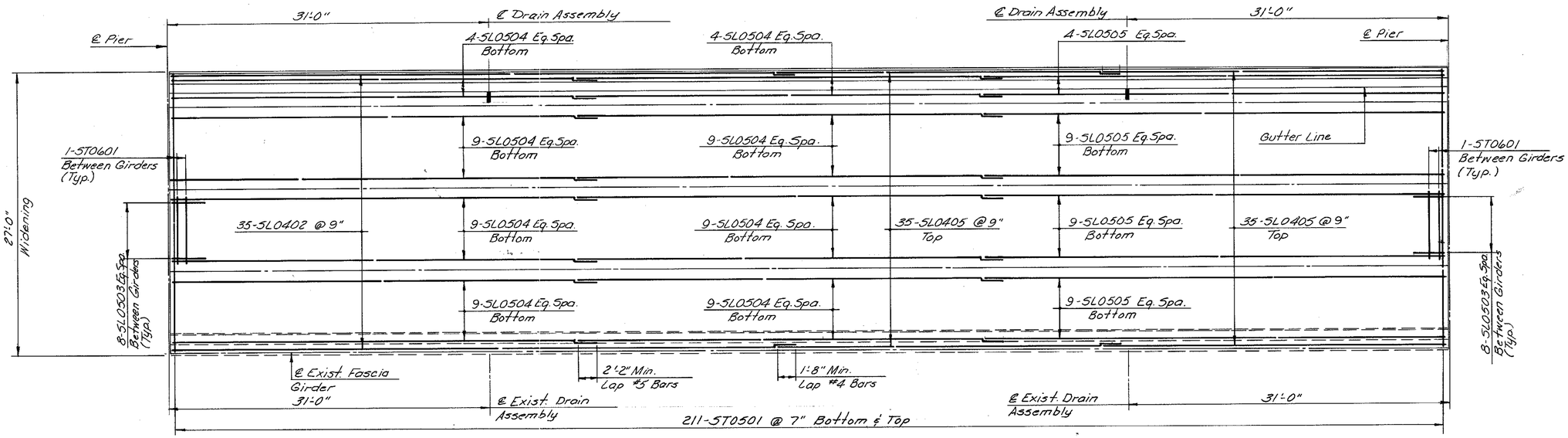
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

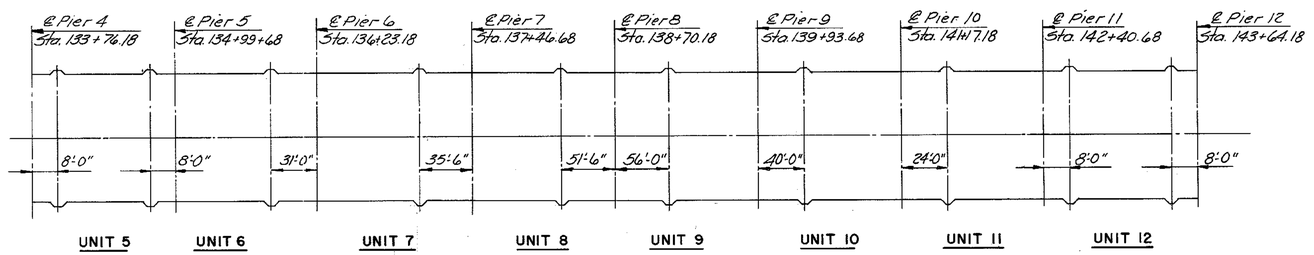
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
13	WIDENING JAMES RIVER BRIDGE	54	106



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.					

N1599

AS BUILT

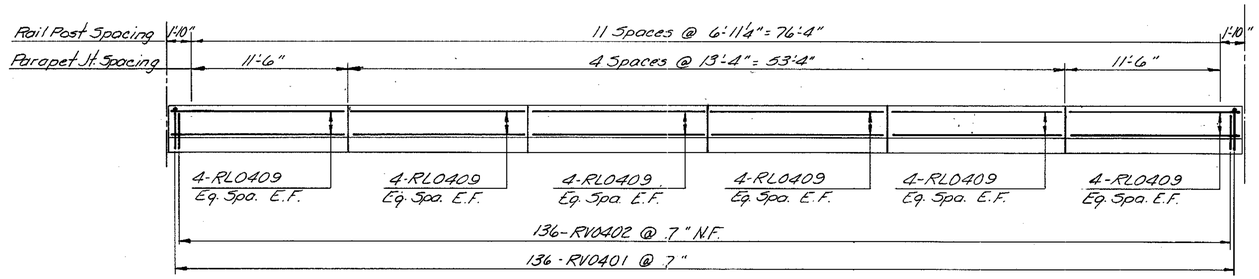
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN
UNITS 5 THRU 12 SOUTHBOUND & NORTHBOUND

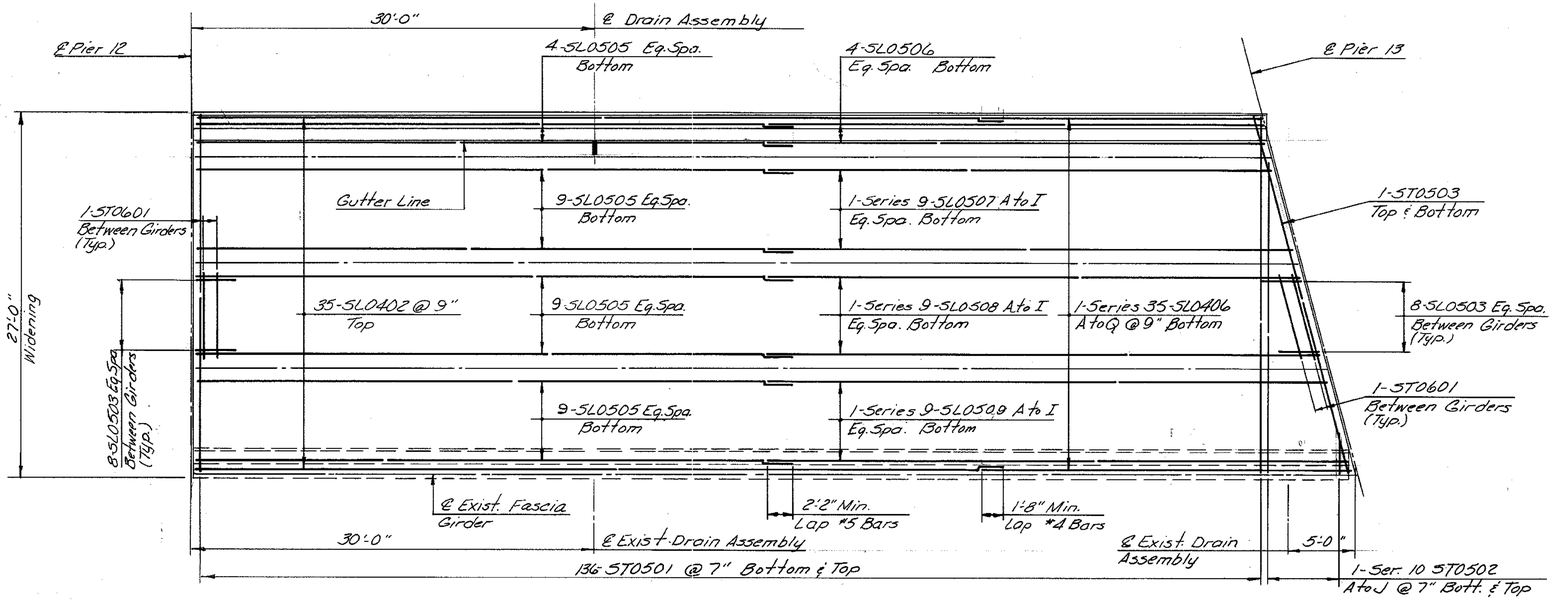
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

AS BUILT

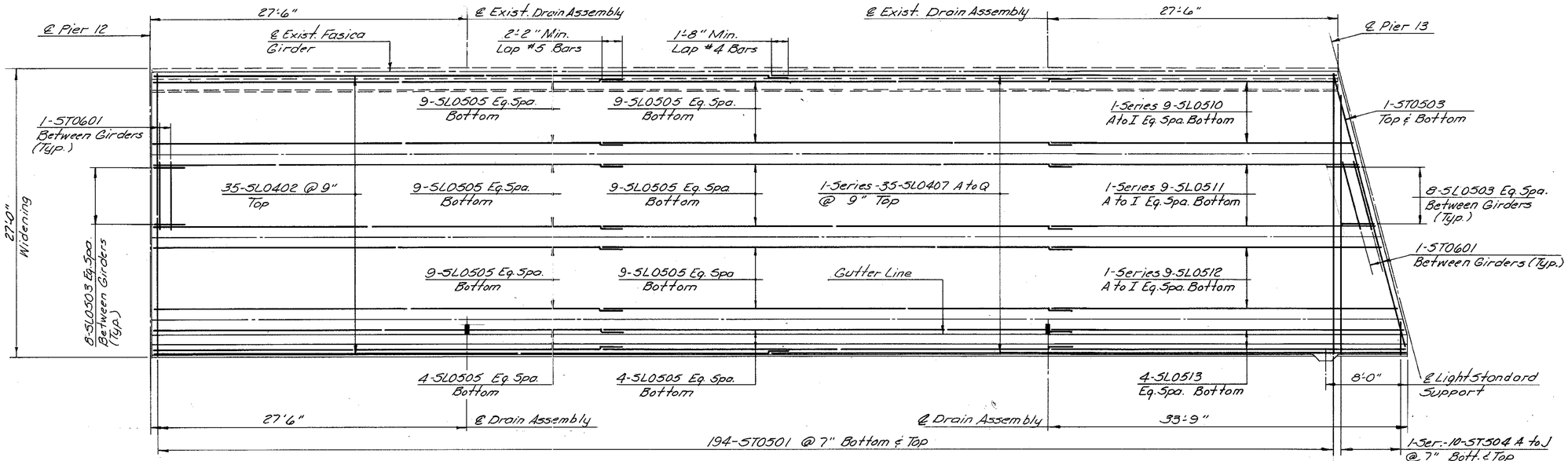
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 13 SOUTHBOUND

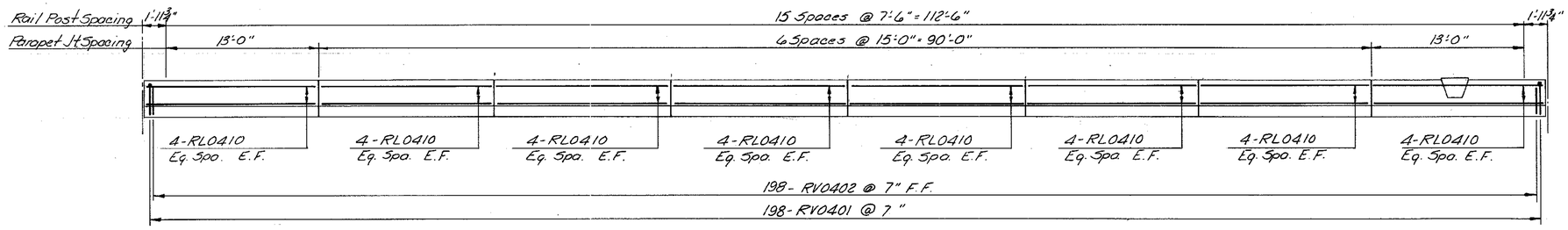
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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	TRP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

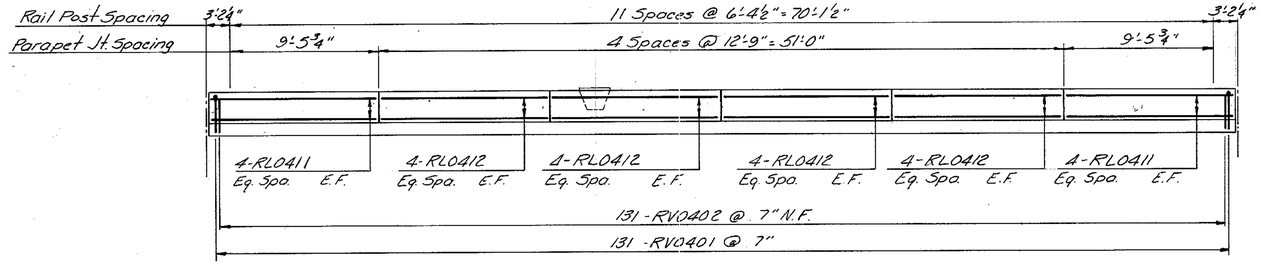
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 13 NORTHBOUND

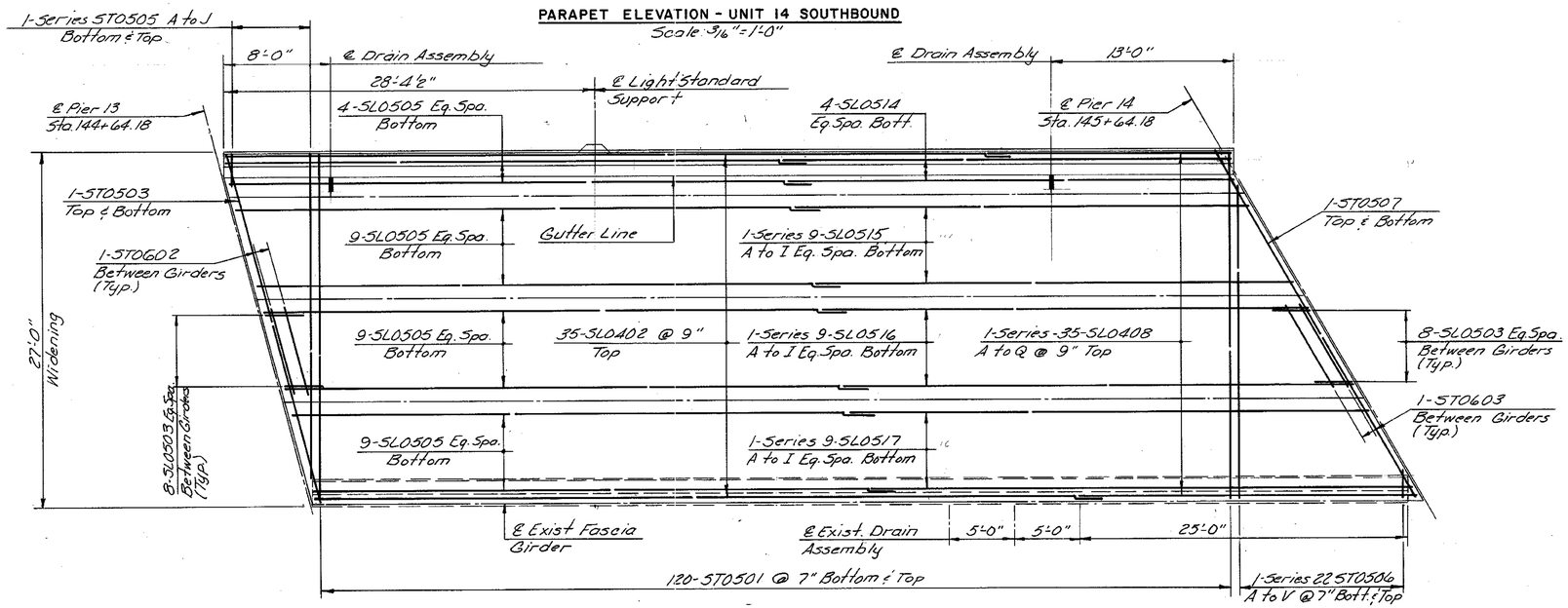
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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	TAP	3-87		As Built	TEM	3-89
IN CHARGE	S.R.					

AS BUILT

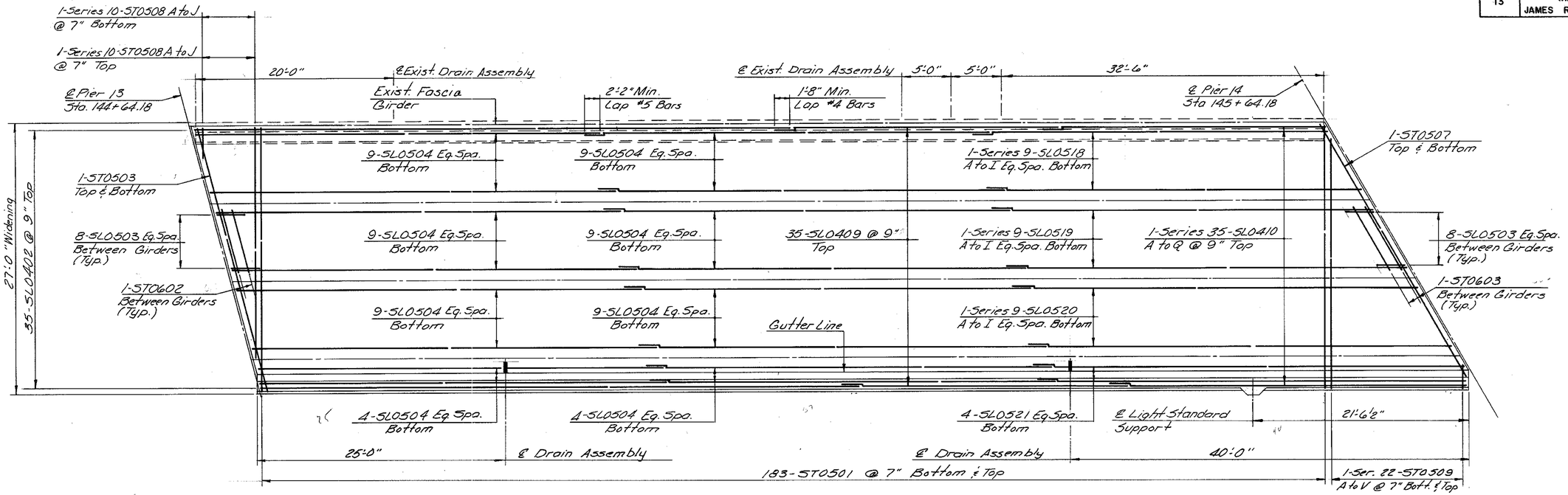
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 14 SOUTHBOUND

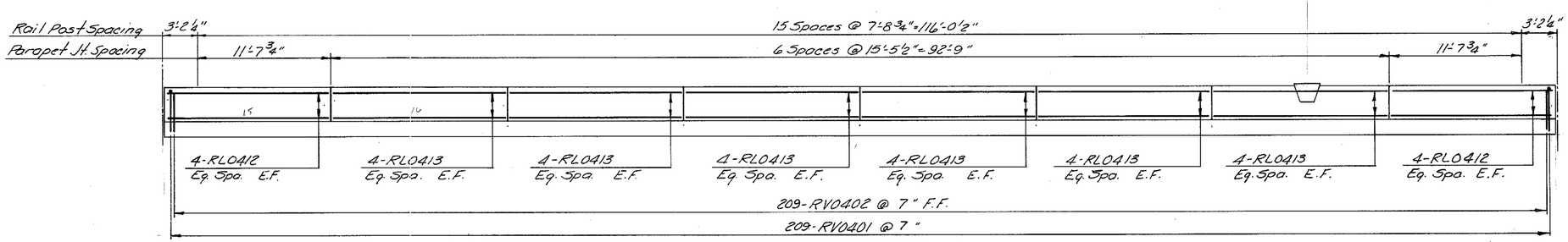
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

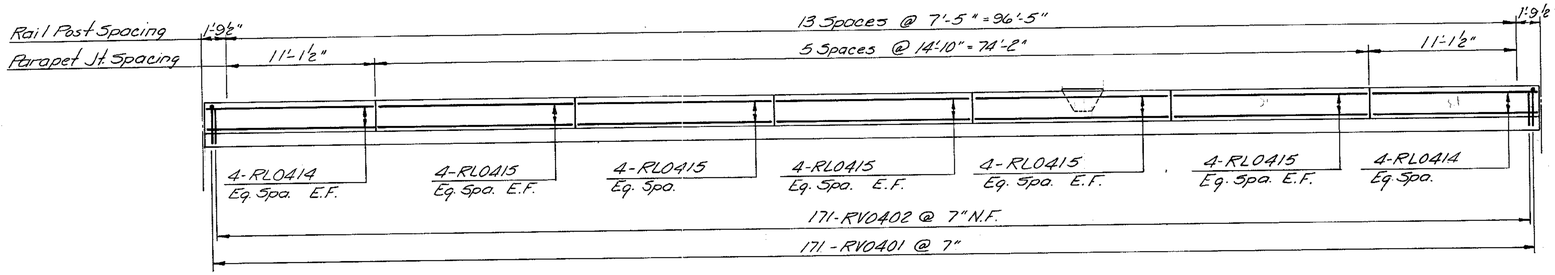
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 14 NORTHBOUND

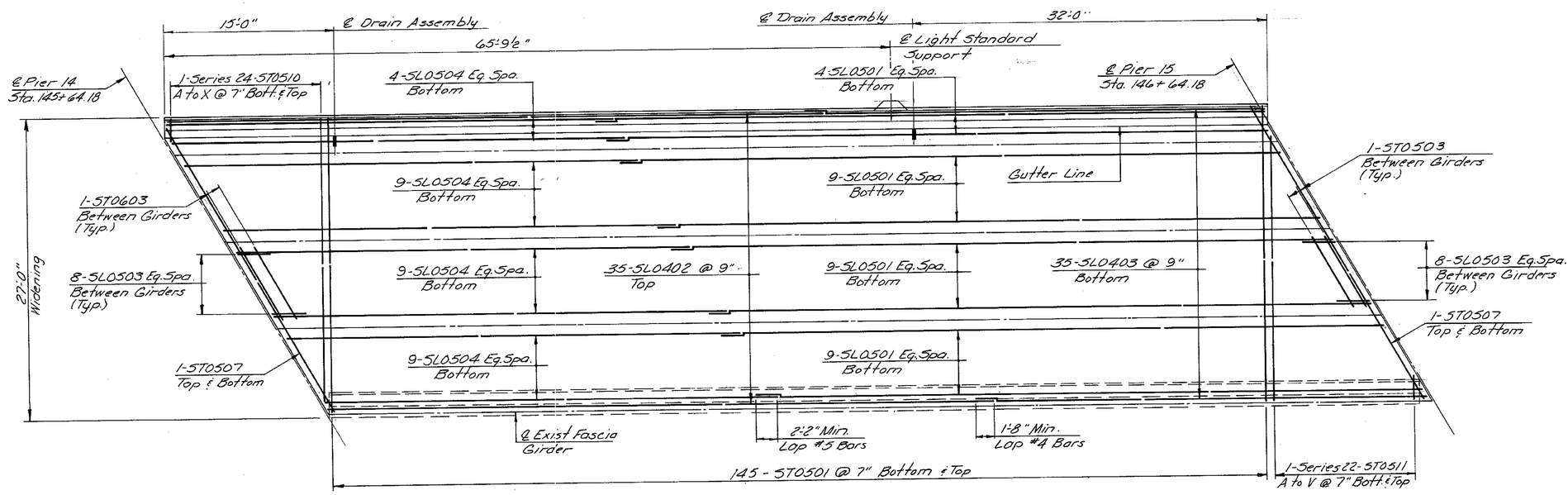
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

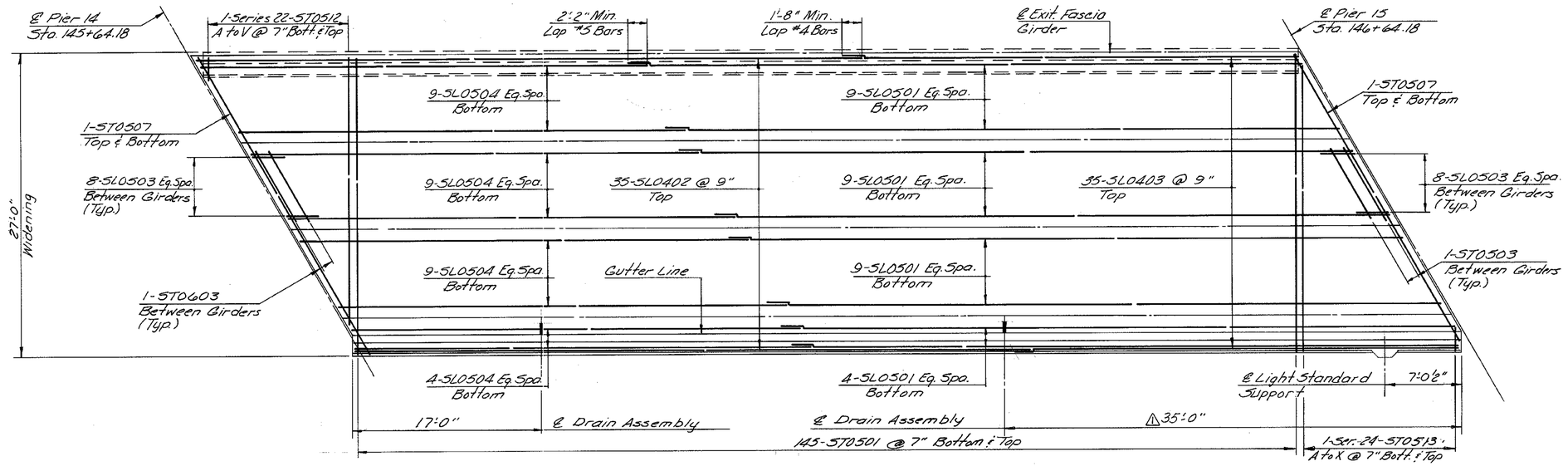
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 15 SOUTHBOUND

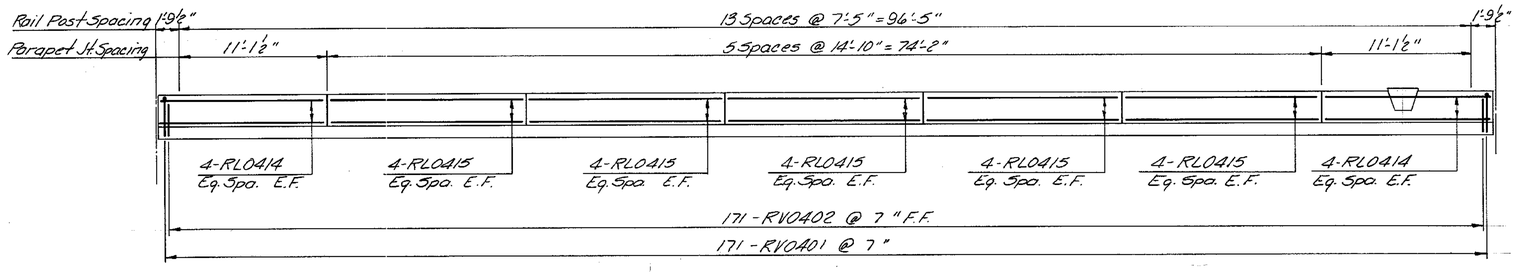
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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.					

P187A99

AS BUILT

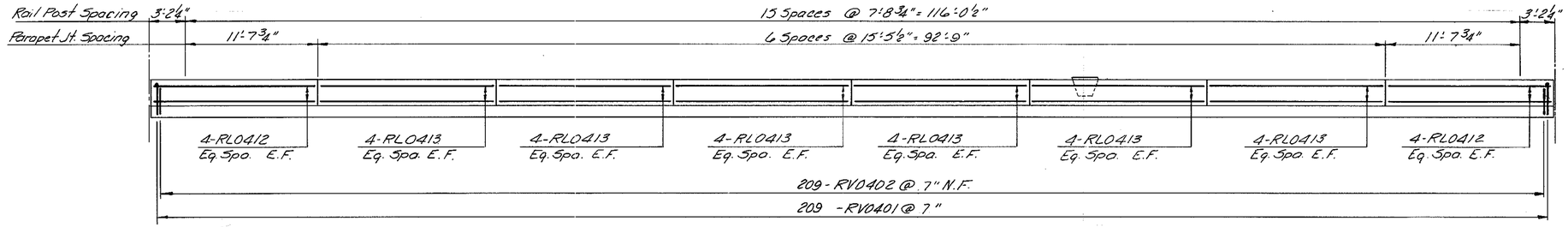
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 15 NORTHBOUND

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

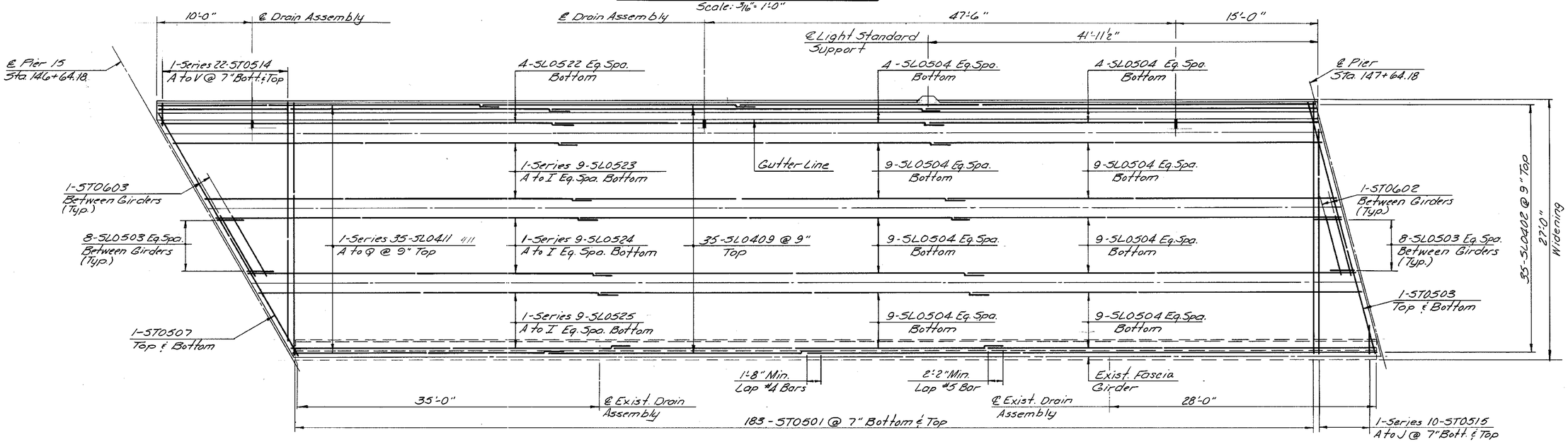
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 60 OF 106

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	TFP	3-87		As Built	TEM	3-89
IN CHARGE S.R.						

AS BUILT

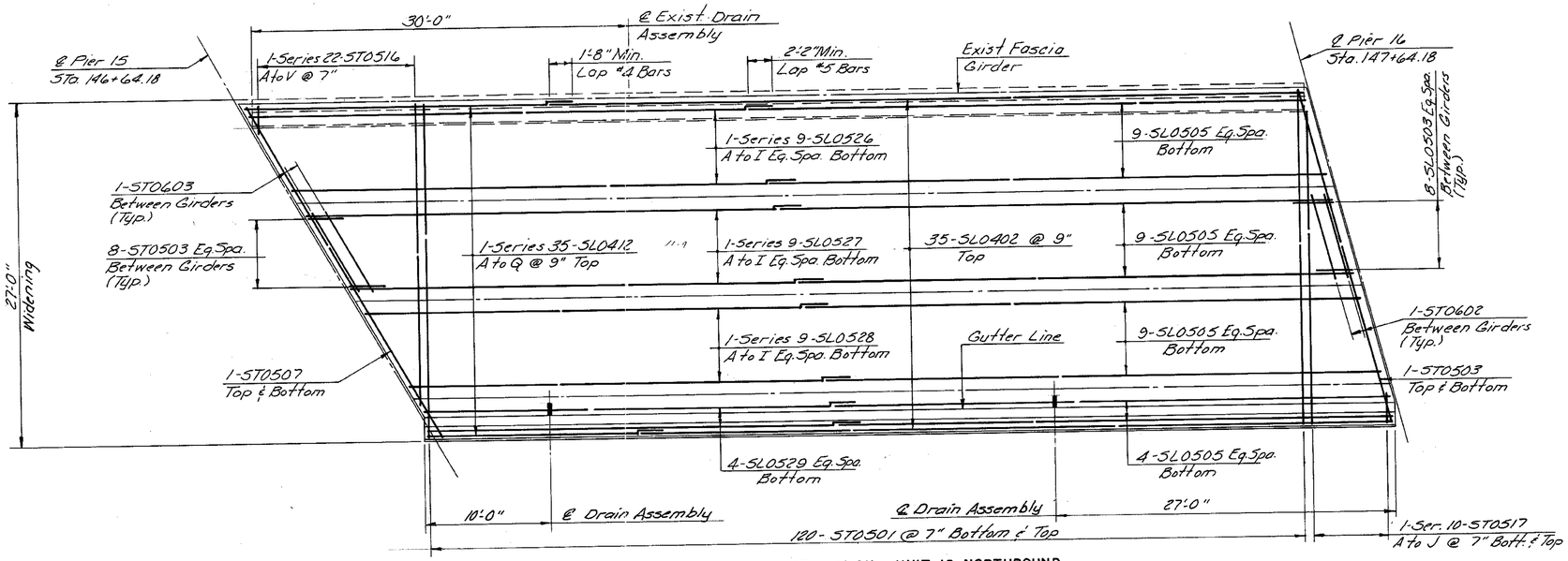
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 16 SOUTHBOUND

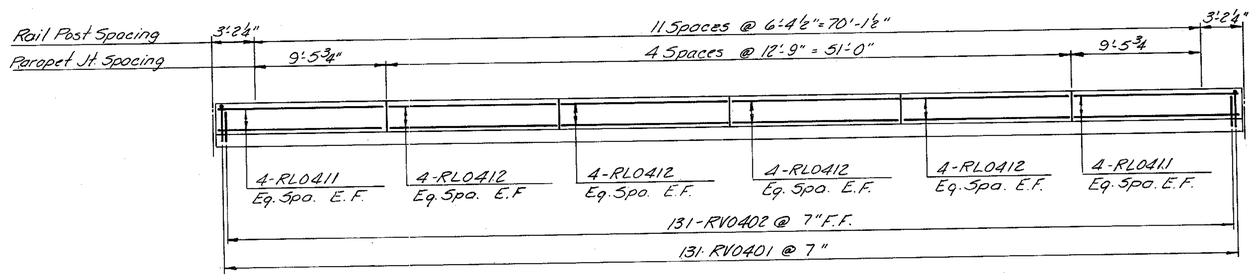
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

NO.	REVISION	BY	DATE
	As Built	TEM	3-89

AS BUILT

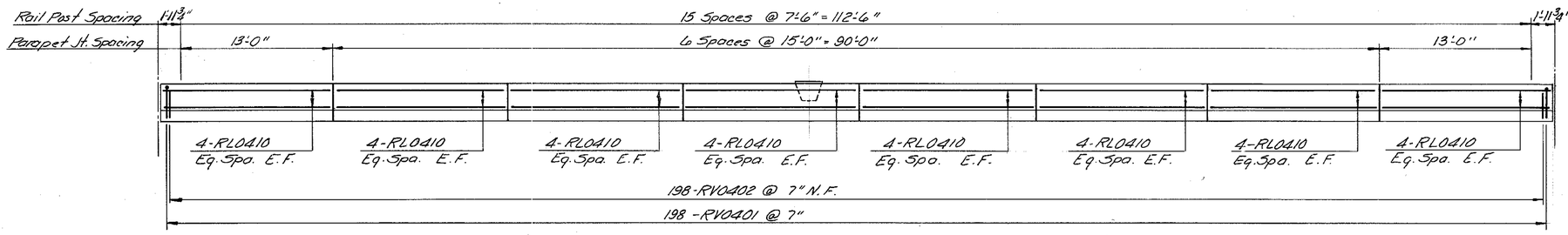
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 16 NORTHBOUND

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

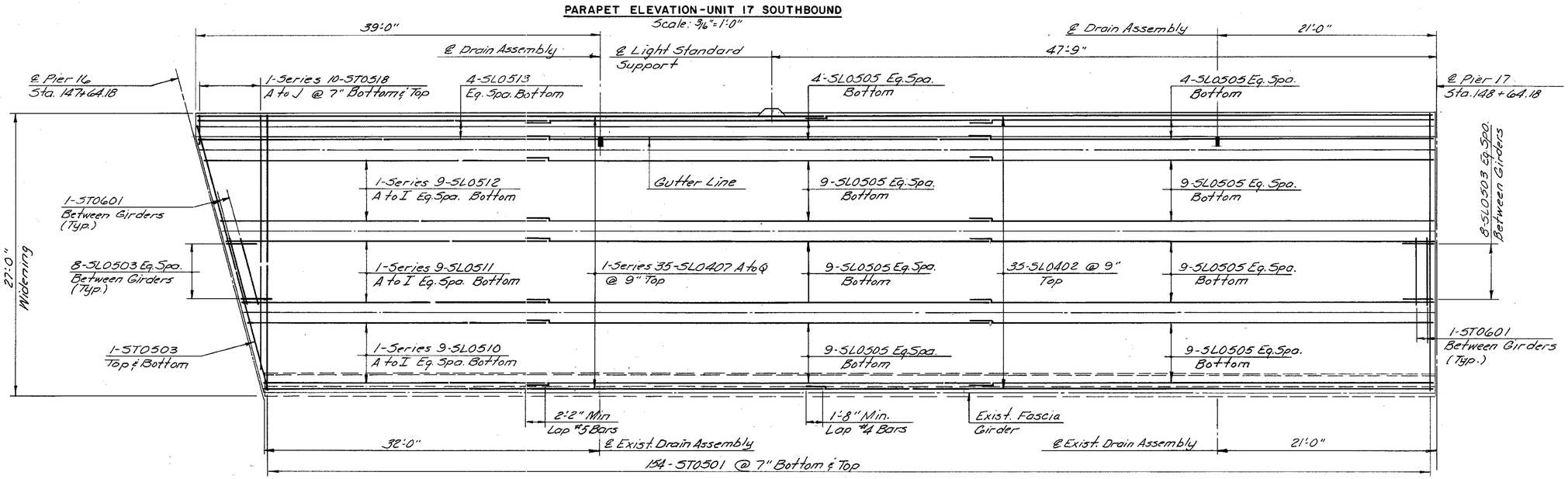
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 62 OF 106

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

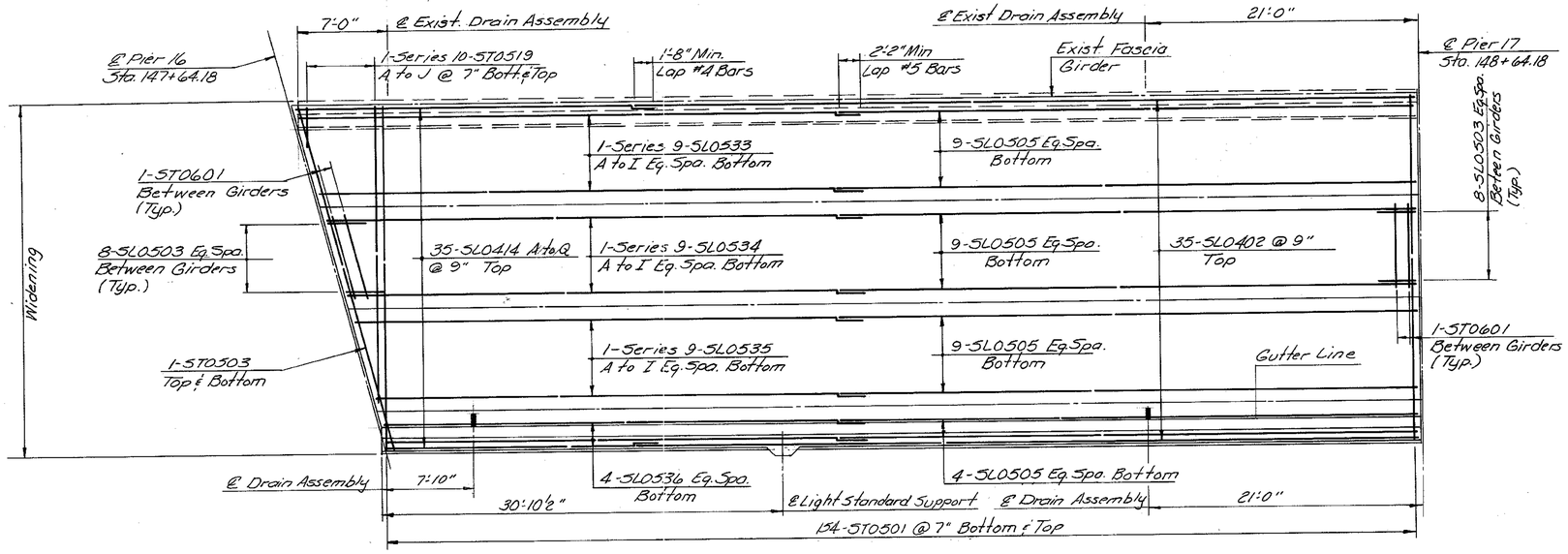
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 17 SOUTHBOUND

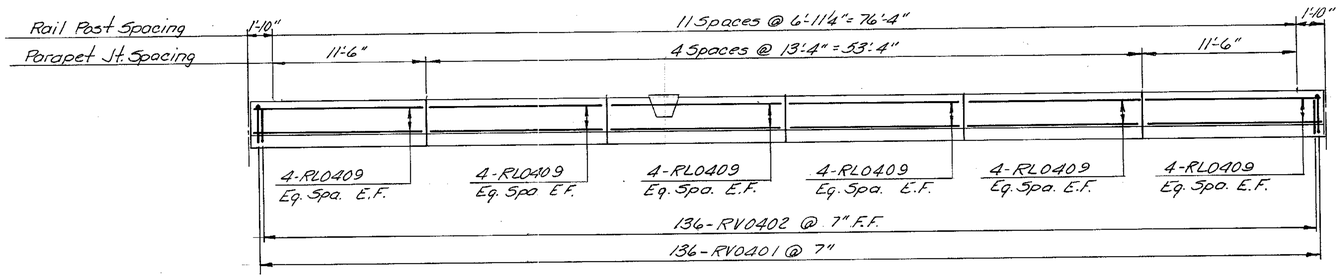
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

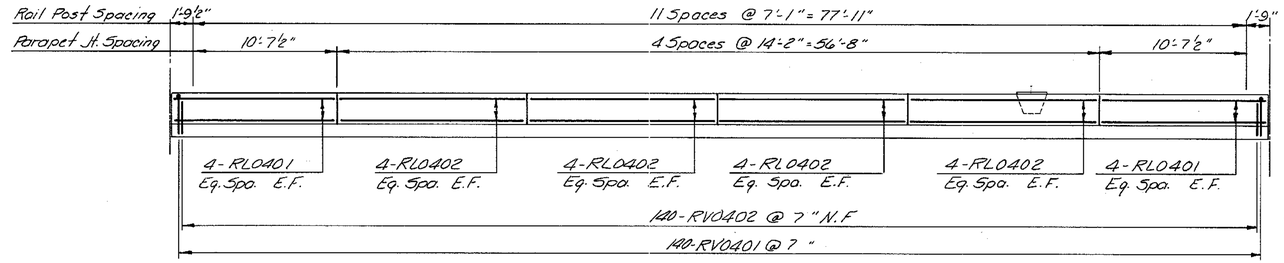
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

DECK PLAN - UNIT 17 NORTHBOUND

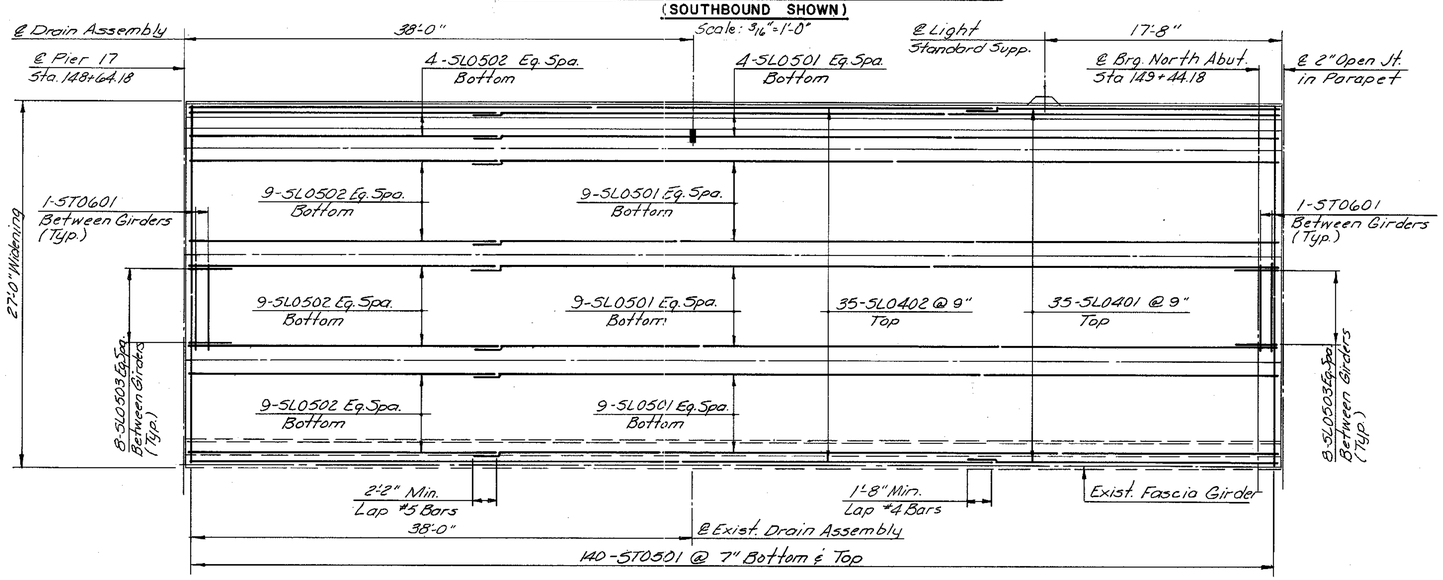
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
Alexandria, Virginia

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

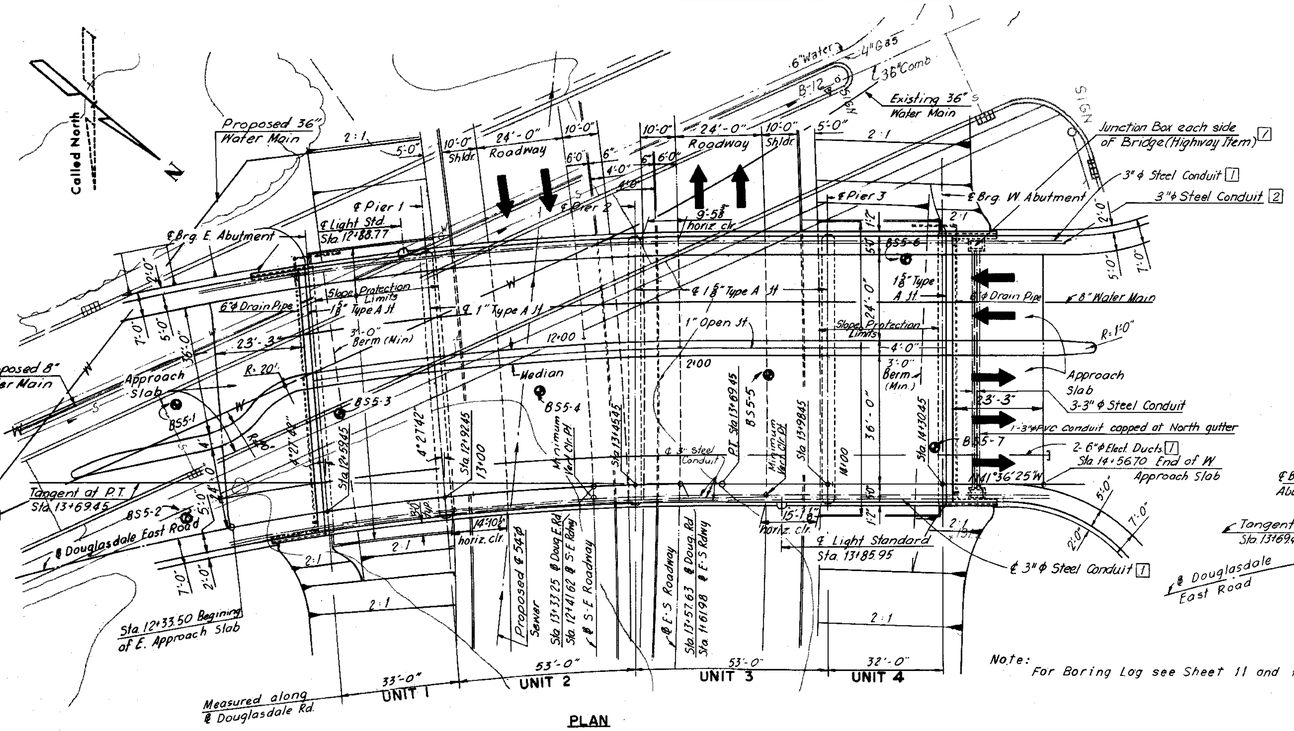
SCALE: AS SHOWN
CONTRACT NO.: C-13
SHEET NO. 65 OF 106

Bridge 12

Douglasdale Road
Over
Downtown Expressway Connector (VA-146)

Record Set Plans

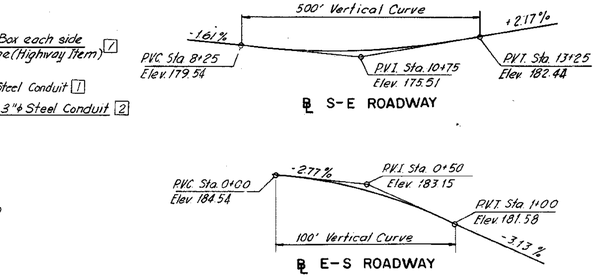
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	84	



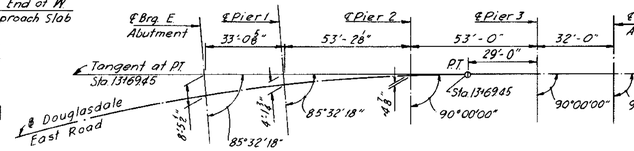
PLAN

Note: For Boring Log see Sheet 11 and 12

Boring, denotes 2½"ϕ Cased hole

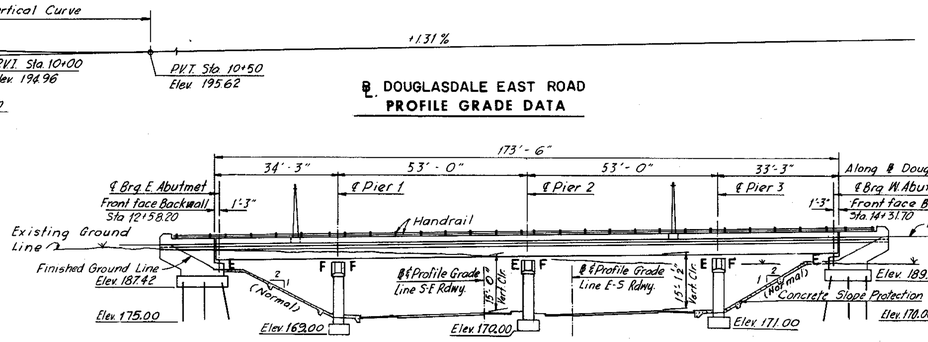


PROFILE GRADE DATA



LAYOUT SKETCH

no scale



ELEVATION

Note: Pile Tip elevations shown are estimated elevations.

CURVE DATA

Douglasdale East Road

P.I. = Sta. 12+21.35
Δ = 24°03'23"
D = 8°00'00"
T = 152.60'
L = 300.70'
R = 716.20'

S-E Roadway

P.I. = Sta. 10+68.11
Δ = 34°20'58"
D = 5°00'00"
T = 354.17'
L = 686.99'
R = 1145.92'

E-S Roadway

P.I. = Sta. 6+43.88
Δ = 37°15'41"
D = 3°00'00"
T = 643.88'
L = 1242.04'
R = 1909.86'

ESTIMATED QUANTITIES

	Struc. Excav. Cu. yds.	CONCRETE: Class A4 Cu. yds.	CONCRETE: Class A3 Cu. yds.	CONCRETE: CLA3 Appr. Sl. Cu. yds.	Reinf Steel Lbs.	Str. Stl Mild Car. Lbs.	Porous Backfill Cu. yds.	Underdrain 6"dia. pipe Lin. ft.	10BP42 Stl. Pile Lin. ft.	Con. Slab Sl. Prot. Sq. yds	Asphalt Damp prf. Sq. yds.	Metal Conduit Lin. ft.	Conduit 6"dia. VEP-CO Lin. Ft.	Water Main 8"dia. Lin. Ft.	Aluminum Railing (2-rails) Lin. ft.	PVC Conduit Lin. Ft.
Superstructure		440.0			95,614	326,332						1,539 7	448 7	211	403	66 7
East Abutment	230.8		145.6		7,846		9	92	391.8	357.7	57					
Pier 1	356.6		142.9		16,397											
Pier 2	239.1		132.9		15,882											
Pier 3	313.3		138.4		16,012											
West Abutment	288.5		148.0		7,852		9	96	503.2	358.2	57					
Approach Slabs				147.6	38,885											
TOTAL	1,428.3	440.0	707.8	147.6	198,488	326,332	18	188	895.0	715.9	114	1,539 7	448 7	211	403	66 7

ESTIMATED QUANTITIES NOTES

(a) Class A3, unless noted
(b) Class A4
* Frame and Cover only

Notes:
The cost of furnishing and installing 2"ϕ and 3"ϕ galvonized steel conduit shall be included in the bid price for the item "Metal Conduit".

	BY	DATE
MADE	S.S.W	10-25-67
CHECKED	G.C.C.	2-14-68
IN CHARGE	F.K.D.	

NO.	REVISION	BY	DATE
7	PVC Conduit added to Plan & Qty. 8-5"ϕ VEPCO Conduit changed to 2-6"ϕ & Qty. revised. 3"ϕ Metal Conduit deleted in Plan & Qty revised.	L.B.P.	1-74
3	As Built	TEM	9-75
2	Move 3"ϕ Cond. from N. Parapet to S. Parapet	TEM	1-74

INDEX

GENERAL NOTES

ROADWAY: Two roadways 24'-0" and 36'-0" clear. Two 5'-0" side walks and 4'-0" median with a 1" joint.

CAPACITY: Dead Load Includes 15 lbs. per sq. ft. for future wearing surface.
Live Loads - HS20-44 loading.

SPECIFICATIONS:

GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1969 and 1970-72 Interim Specification, 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 on the plan 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 A4. All other concrete shall be Class A3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted.
Finishing concrete surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall be intermediate grade 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. Specification A36 except as noted.
All field connections shall be made with high strength bolts. High strength bolts shall be ¾" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

BENCH MARK: 7 B-12 Copperweld rod in west end of median on Douglasdale Road. Elev. 192.01

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 12
DOUGLASDALE EAST ROAD OVER S-E&E-S ROADWAYS

GENERAL PLAN AND ELEVATION

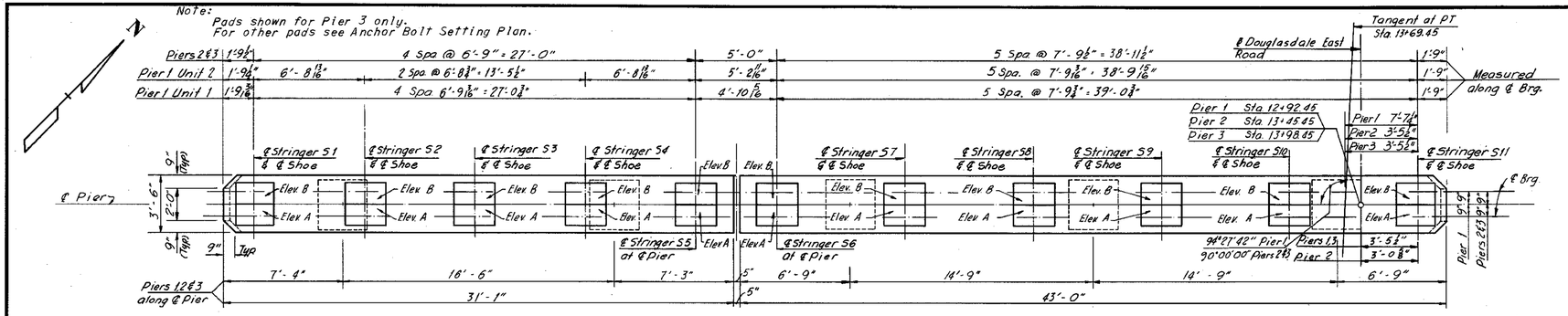
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

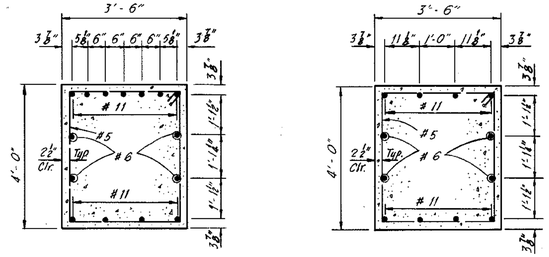
SCALE: 1"=20'
CONTRACT NO.: 7
SHEET NO. 1 OF 12

84

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	88	

Note:
Pads shown for Pier 3 only.
For other pads see Anchor Bolt Setting Plan.

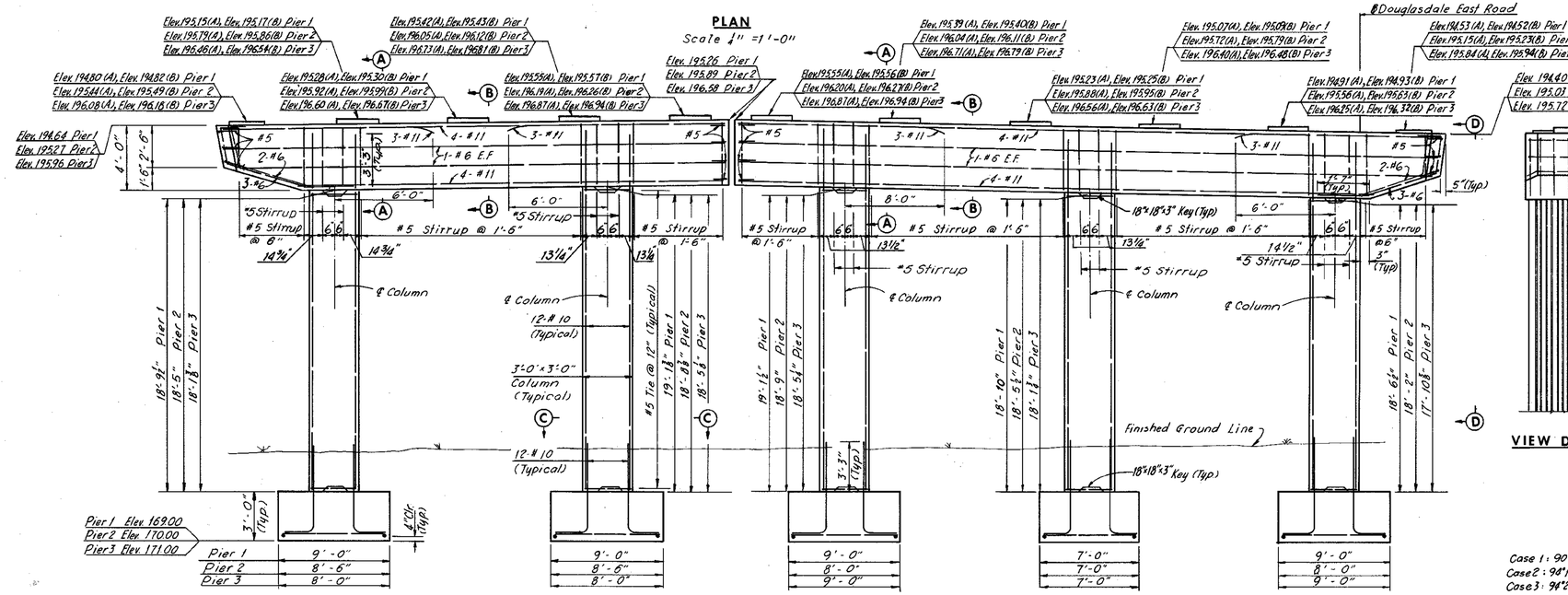




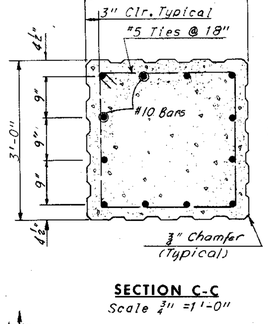
SECTION A-A
Scale 1/2"=1'-0"

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

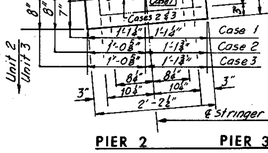
PLAN
Scale 1/4" =1'-0"



VIEW D-D



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



Legend:
F = Fixed
E = Expansion

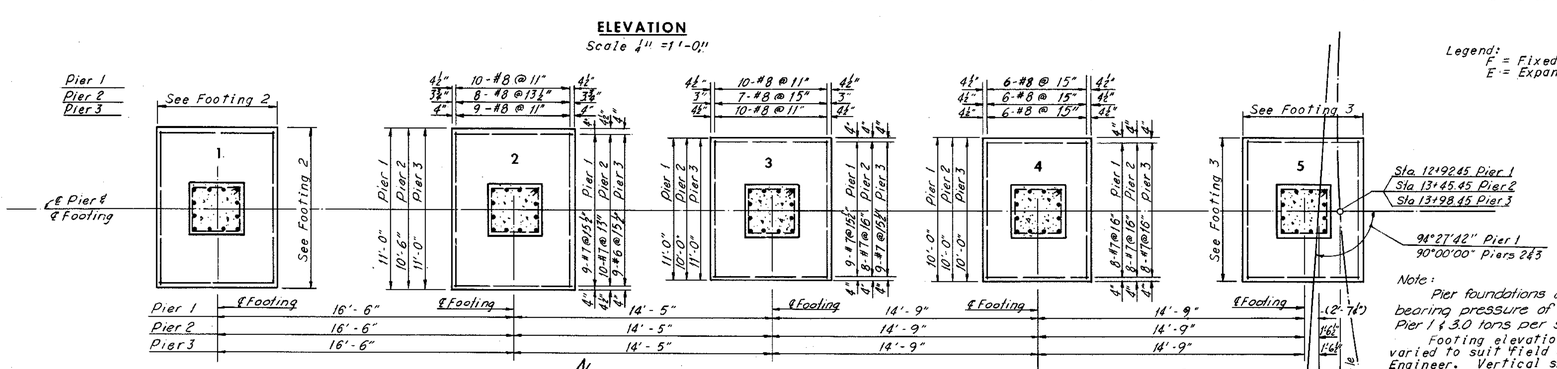
PIER 2 **PIER 3**

ANCHOR BOLT SETTING PLAN

PIER 1	
Stringer	"A"
S1	0"
S2	3/16"
S3	1/8"
S4	1 1/4"
S5	1 5/16"
S6	- 2 1/16"
S7	- 2 1/4"
S8	- 1 11/16"
S9	-1 6 1/4"
S10	- 1/8"
S11	0"

Case 1 is for Pier 3 all stringers
Case 2 is for Pier 2 stringers S1 thru S5
Case 3 is for Pier 2 stringers S6 thru S11

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



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

Called North

Note:
Pier foundations are designed for an allowable bearing pressure of 5.0 tons per square foot at Pier 1 & 3.0 tons per square foot at Piers 2 and 3.

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

Note:
For Standard Shoe Details see Sheet 51.
For Framing Plan see Sheet 6.

	BY	DATE				
MADE	S.S.W.	12-22-67				
CHECKED	G.C.C.	2-12-68	1	As Built	T.E.M.	9-75
IN CHARGE F.K.D.			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 12
DOUGLASDALE EAST ROAD OVER
S-E&E-S ROADWAYS

PIERS

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

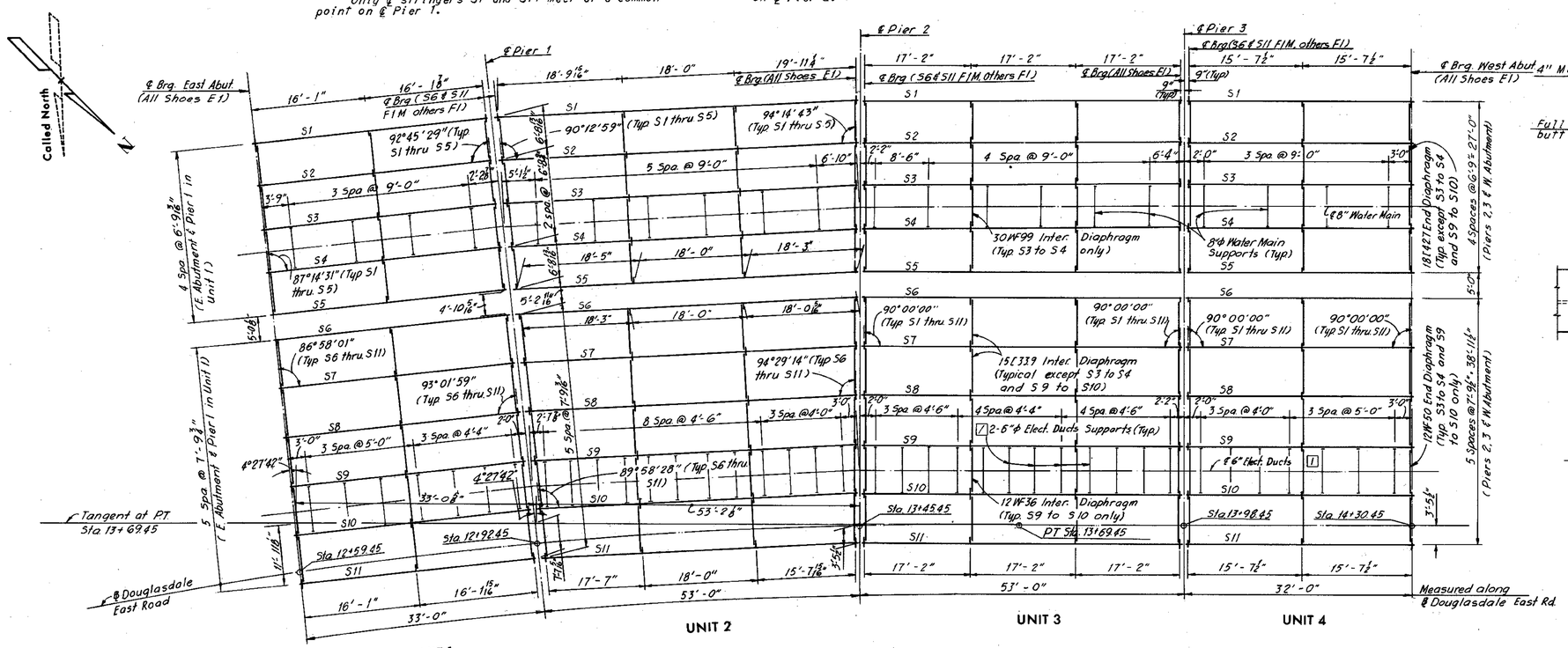
SCALE: As noted
CONTRACT NO.: 7.
SHEET NO. 5 OF 12

88

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	89	

Note: Only ℄ stringers S1 and S11 meet at a common point on ℄ Pier 1.

Note: ℄ of all stringers meet at a common point on ℄ Pier 2.



FRAMING PLAN

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

Note:
For Structural Steel Quantities see Sheet 1.
For Standard Shoe details see Sheet S1.
For Framing details see Sheet 7.

*Denotes spacing which begins at termination of 5 spaces @ 6".

STRINGER SCHEDULE

UNIT	STRINGER	LENGTH "L"	STRINGER "A"	℞ "B"	DIM "B"	C	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
1	S1	32'-2 1/4"	36 WF 135	—	—	—	—	10 1/2"	11"	1'-1"	1'-2"	1'-2"
	S2ThruS5	32'-2 5/8"	33 WF 118	—	—	—	—	8 1/2"	9"	10"	1'-1"	1'-4"
	S6ThruS10	32'-2 5/8"	33 WF 118	—	—	—	—	8 1/2"	9"	10"	1'-1"	1'-4"
	S11	32'-2 5/8"	36 WF 135	—	—	—	—	10 1/2"	11"	1'-1"	1'-2"	1'-2"
2	S1	56'-9 3/8"	36 WF 135	10 1/2" x 8 7/8"	40'-0"	2'-0"	36'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S2	56'-2 7/8"	33 WF 118	10" x 8 3/8"	43'-0"	2'-0"	39'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S3	55'-8 3/8"	33 WF 118	10" x 8 3/8"	43'-0"	2'-0"	39'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S4	55'-2 3/8"	33 WF 118	10" x 8 3/8"	43'-0"	2'-0"	39'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S5	54'-8"	33 WF 118	10" x 7 1/2"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S6	54'-3 5/8"	33 WF 118	10" x 8 3/8"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S7	53'-8 1/8"	33 WF 118	10" x 8 3/8"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S8	53'-0 3/8"	33 WF 118	10" x 8 3/8"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S9	52'-5 1/8"	33 WF 118	10" x 8 3/8"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S10	51'-10 1/4"	33 WF 118	10" x 8 3/8"	41'-0"	2'-0"	37'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S11	51'-2 5/8"	36 WF 150	—	—	—	—	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
3	S1 and S11	51'-6"	36 WF 150	—	—	—	—	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
	S2ThruS10	51'-6"	33 WF 118	10" x 8 3/8"	39'-0"	2'-0"	35'-0"	7 1/2"	8 1/2"	10"	1'-0"	1'-4"
4	S1 and S11	31'-3"	36 WF 135	—	—	—	—	10 1/2"	11"	1'-1"	1'-2"	1'-2"
	S2ThruS10	31'-3"	33 WF 118	—	—	—	—	8 1/2"	9"	10"	1'-1"	1'-4"

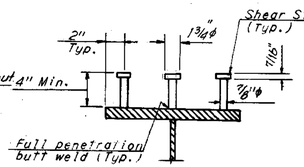
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber diagram.
If stringers are not cambered distance top of stringers to top of slab will vary 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 7.

D.L. DEFLECTION CAMBER SCHEDULE

UNIT	STRINGER	D.L. DEFLECTION ¼L, ¾L	D.L. DEFLECTION ½L	CAMBER ¼L, ¾L	CAMBER ½L
1	S1	1/16	1/16	1/4	1/4
	S2 S3 S4	1/16	1/8	1/4	1/4
	S5	1/16	1/8	1/4	1/4
	S6	1/16	1/8	1/4	1/4
	S7 S8 S9 S10	1/16	1/8	1/4	1/4
	S11	1/16	1/16	1/4	1/4
2	S1	1/8	3/16	5/16	15/16
	S2	1/8	1/4	3/8	1 3/16
	S3	1/8	1/4	3/8	1 3/16
	S4	1/8	3/16	3/8	1 1/16
	S5	1/8	11/16	5/16	15/16
	S6	1/8	11/16	1/2	3/4
	S7	1/8	3/16	1/8	13/16
	S8	1/8	3/16	1/2	3/4
	S9	1/8	11/16	1/2	3/4
	S10	1/8	11/16	1/2	11/16
	S11	1/8	1/4	1/8	3/8
3	S1	1/8	1/4	1/8	1/2
	S2 S3 S4	1/8	1/8	1/16	1/16
	S5	1/8	1/8	1/16	1/4
	S6	1/8	1/8	1/16	3/8
	S7 S8 S9 S10	1/8	1/16	1/16	3/8
	S11	1/8	1/8	1/8	1/2
4	S1	1/16	1/16	1/16	1/8
	S2 S3 S4	1/16	1/8	1/16	1/8
	S5	1/16	1/16	1/16	1/8
	S6	1/16	1/16	1/16	1/8
	S7 S8 S9 S10	1/16	1/8	1/16	1/8
	S11	1/16	1/16	1/16	1/8

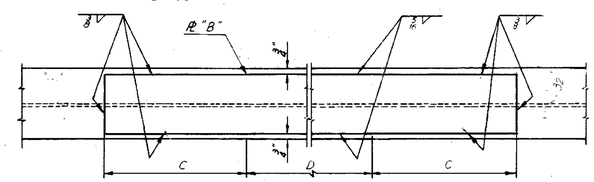
SHOE SCHEDULE

EXPANSION SHOES TYPE	EXPANSION SHOES NO. REQD.	FIXED SHOES TYPE	FIXED SHOES NO. REQD.
E1	44	F1	36
		F1M	8

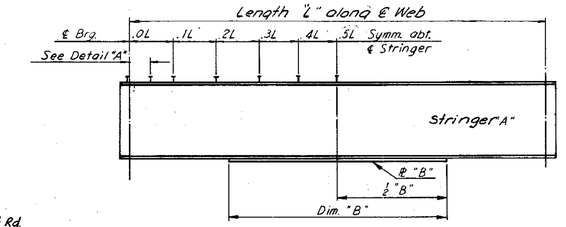


SHEAR STUD DETAIL

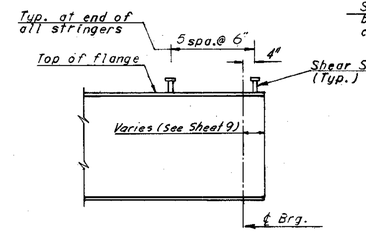
No Scale



COVER PLATE DETAIL

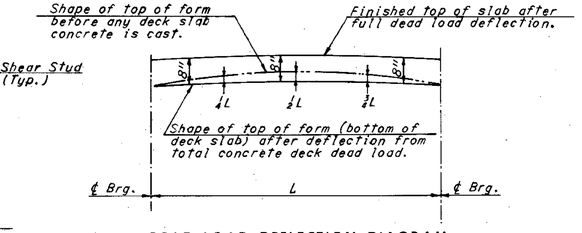


STRINGER ELEVATION



DETAIL A

No Scale



DEAD LOAD DEFLECTION DIAGRAM

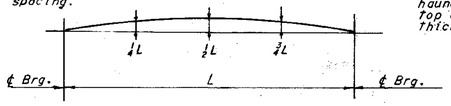
No Scale

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.

SHEAR STUD NOTE

Stud rows shall be placed parallel to the main deck reinforcing.
Shear stud spacing shown is maximum spacing.



CAMBER DIAGRAM

No Scale

NOTE TO FABRICATOR

Stringers shall be fabricated with an upward camber amounting to the tabulated values. This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	S.S.W.	1-4-68		As Built		
CHECKED	G.C.C.	2-12-68	1	5"ϕ VEPCO Conduit changed to 6"ϕ	L.B.P.	1-74
IN CHARGE	F.K.D.					

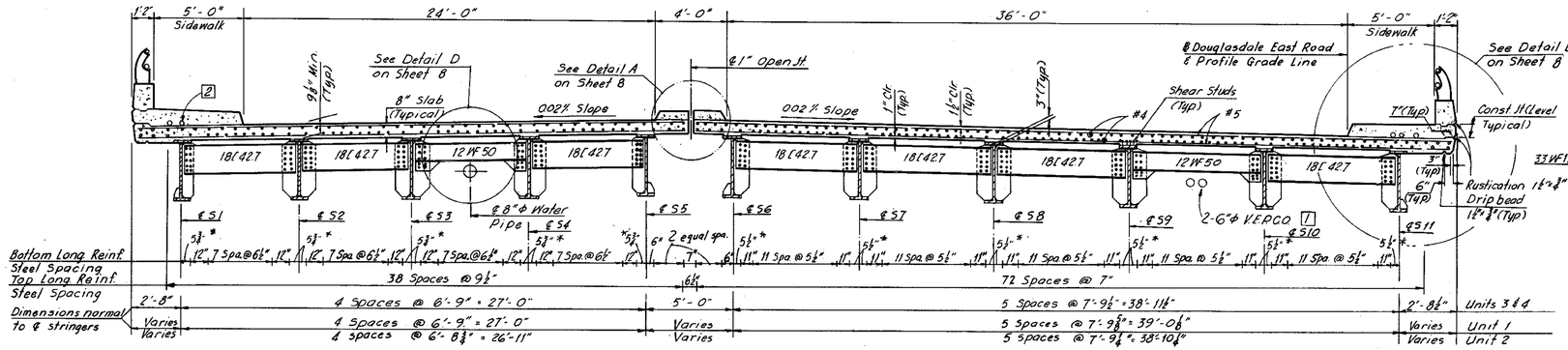
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 12
DOUGLASDALE EAST ROAD OVER S-E&E-S ROADWAYS
FRAMING PLAN

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

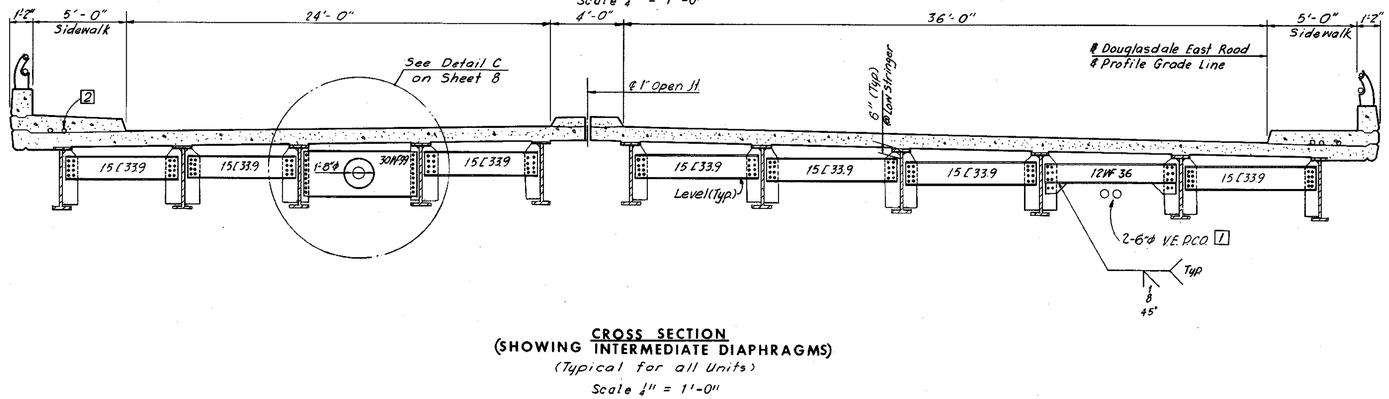
SCALE: As noted
CONTRACT NO.: 7
SHEET NO. 6 OF 12

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	90	

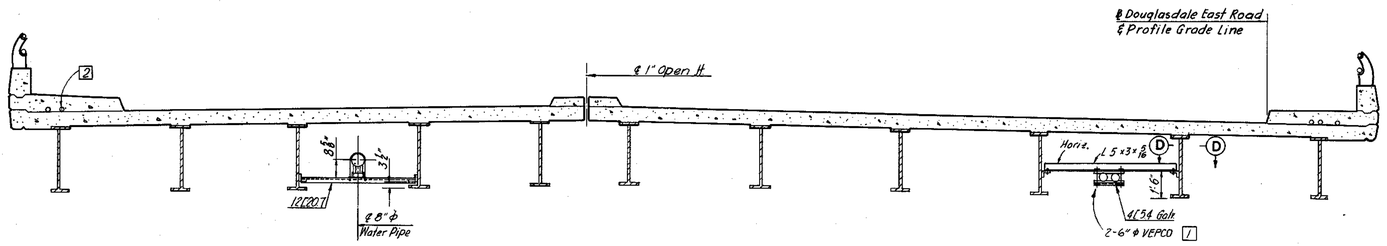


* — Dimensions shown is for Units 3 and 4. Ajust as required for Units 1 and 2.

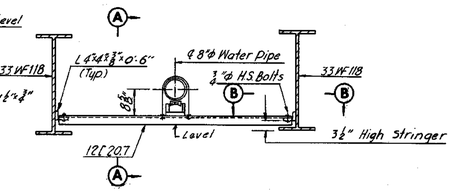
CROSS SECTION
(SHOWING END DIAPHRAGMS)
(Typical for Units 2 & 3)
Scale ¼" = 1'-0"



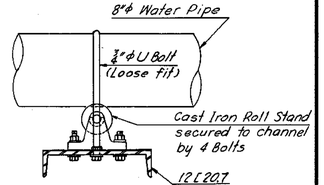
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
(Typical for all Units)
Scale ¼" = 1'-0"



CROSS SECTION
(SHOWING UTILITY SUPPORTS)
Scale ¼" = 1'-0"

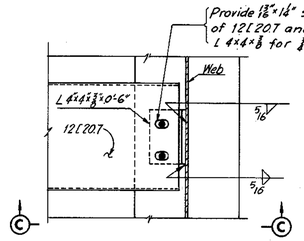


WATER PIPE SUPPORT

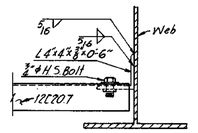


SECTION A-A

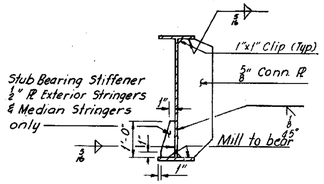
Note: Provide ⅛" clear between 8" ϕ pipe and ¾" ϕ U Bolt.



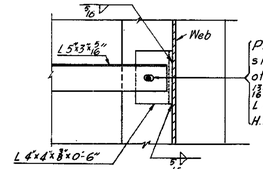
SECTION B-B



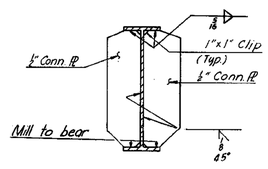
SECTION C-C



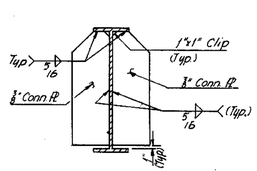
TYPICAL END DIAPHRAGM CONNECTOR PLATE EXTERIOR STRINGER



SECTION D-D



TYPICAL END DIAPHRAGM CONNECTOR PLATE INTERIOR STRINGER



TYPICAL INTERMEDIATE DIAPHRAGM CONNECTOR PLATE

No Scale

Notes:
For Deck Plan see Sheet 8.
For Framing Plan see Sheet 6.
For details of sidewalk and median see Sheet 8.

	BY	DATE
MADE	S.SW	1-10-68
CHECKED	G.C.C.	2-9-68
IN CHARGE	F.K.D.	

NO.	REVISION	BY	DATE
7	1'-3" ϕ Cond. added & 8"-5" ϕ V.E.P.C.O. Cond. chgd. to 2"-6" ϕ	LBP	1-74

NO.	As Built REVISION	BY	DATE
2	Move 3" ϕ Conduit from N. Parapet to S. Parapet	TEM	1-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

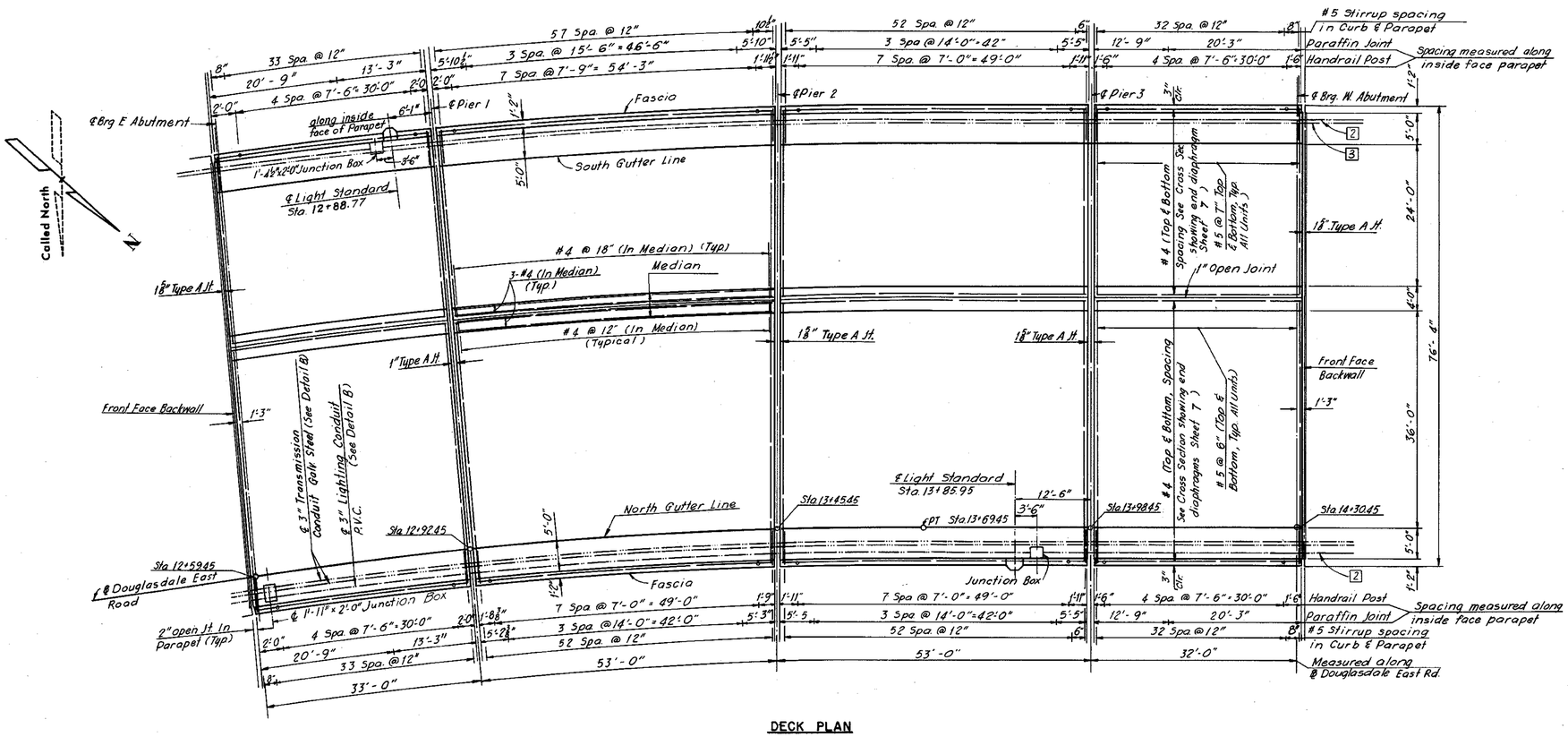
BRIDGE NO. 12
DOUGLASDALE EAST ROAD OVER S-E&E-S ROADWAYS
FRAMING DETAILS

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

SCALE: As noted
CONTRACT NO.: 7
SHEET NO. 7 OF 12

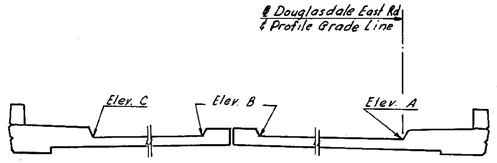
90

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	9/-	



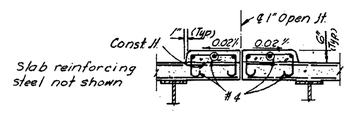
DECK PLAN

Scale $\frac{3}{32}$" = 1'-0"



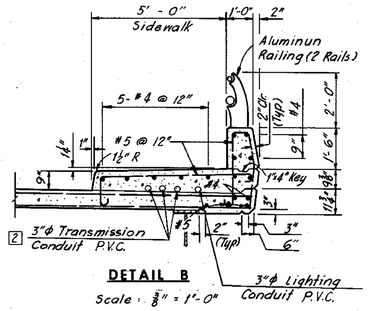
GUTTERLINE ELEVATIONS			
STATION	ELEV A	ELEV B	ELEV C
12+50.00	198.24	198.96	198.48
12+58.20	198.34	—	—
12+59.45	198.36	—	—
12+60.00	198.37	199.09	198.61
12+60.86	—	199.10	—
12+61.14	—	199.10	—
12+62.76	—	—	198.64
12+70.00	198.50	199.22	198.74
12+80.00	198.63	199.35	198.87
12+90.00	198.76	199.48	199.00
12+92.45	198.79	—	—
12+93.47	—	199.52	—
12+93.57	—	199.53	—
12+94.19	—	—	199.05
13+00.00	198.89	199.61	199.13
13+10.00	199.02	199.74	199.26
13+20.00	199.15	199.87	199.39
13+30.00	199.28	200.00	199.52
13+40.00	199.41	200.13	199.65
13+45.45	199.49	—	—
13+46.60	—	200.22	—
13+46.72	—	200.22	—
13+47.42	—	—	199.75
13+50.00	199.55	200.27	199.79
13+60.00	199.68	200.40	199.92
13+70.00	199.81	200.53	200.05
13+80.00	199.94	200.66	200.18
13+90.00	200.07	200.79	200.31
13+98.45	200.18	200.90	200.42
14+00.00	200.20	200.92	200.44
14+10.00	200.33	201.05	200.57
14+20.00	200.46	201.18	200.70
14+30.00	200.59	201.31	200.83
14+30.45	200.60	201.32	200.84
14+31.70	200.62	201.34	200.86
14+40.00	200.72	201.44	200.96

Note:
For Superstructure concrete quantities see Sheet 1.
For Framing Plan see Sheet 6.
For Framing details see Sheet 7.
For Joint details see Sheet 9.
For Standard Lighting details see Sheet S4
For Standard handrail (2 rails) details see Sheet S3.



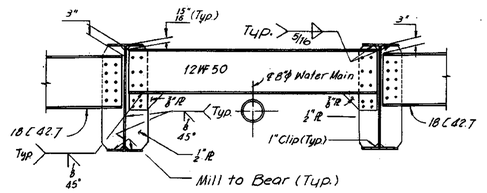
DETAIL A

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



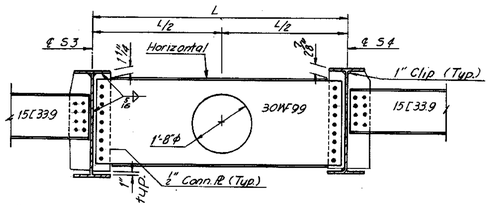
DETAIL B

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



END DIAPHRAGM AT UTILITY BAY

DETAIL D



INTERMEDIATE DIAPHRAGM AT UTILITY BAY

DETAIL C

No Scale

3 Junction Boxes 1 each:
2'-0" x 1'-4½"
2'-0" x 1'-1½"
2'-0" x 1'-11"

	BY	DATE	NO.	REVISION	BY	DATE
			4	As Built	TEM	9-75
			3	Move 3"ϕ Cond. from N. to S. Parapet	TEM	1-74
MADE	S.S.W	11-8-68	2	2-3"ϕ Cond. extended & 1-3"ϕ Cond. added	L.B.P.	1-74
CHECKED	G.C.C.	2-10-68	1	General Revisions	S.S.W.	5-14-68
IN CHARGE	F.K.D.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 12
DOUGLASDALE EAST ROAD OVER S-E&E-S ROADWAYS
DECK PLAN

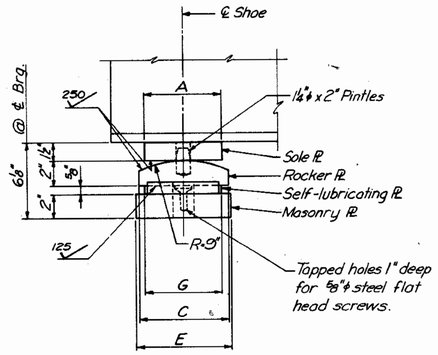
AS BUILT

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

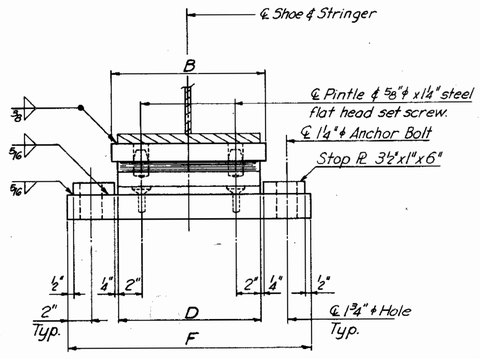
SCALE: As noted
CONTRACT NO.: 7
SHEET NO. 8 OF 12

91

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	119	11

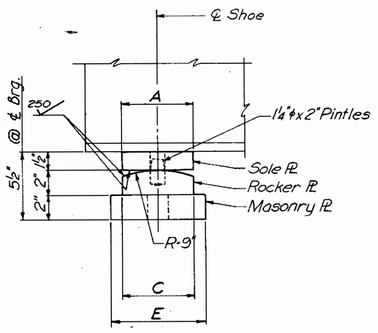


SIDE ELEVATION



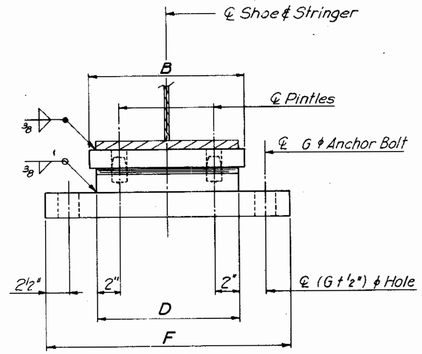
END ELEVATION

EXPANSION SHOE
No Scale



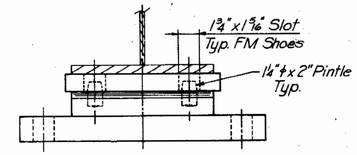
SIDE ELEVATION

Note:
Sole plate is to be beveled to compensate for grade.



END ELEVATION

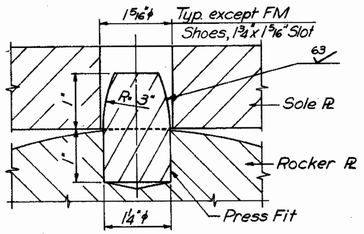
FIXED SHOE
No Scale



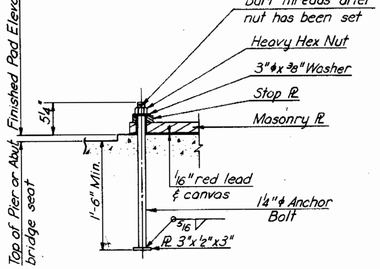
Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

END ELEVATION

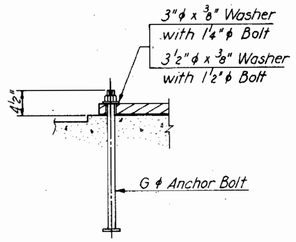
FIXED MODIFIED SHOE
No Scale



PINTLE DETAIL
Scale: ¾" = 1"



EXPANSION SHOE



FIXED SHOE

ANCHOR BOLT DETAIL
No Scale

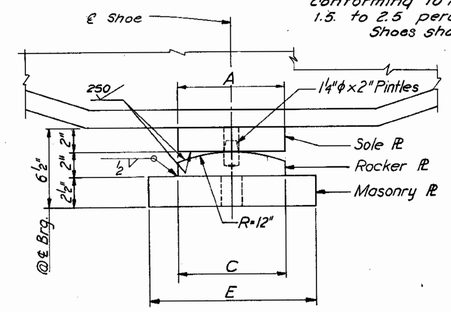
Note:
Anchor Bolt for Fixed Shoes same as Anchor Bolt for Exp. Shoes except as shown.

Shoe Notes:

Materials for shoes (exclusive of self-lubricating plates) shall be high strength low alloy structural steel conforming to A.S.T.M. Specifications A588.
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 plane 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 A.S.A. 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 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.
Materials for self-lubricating plates shall be lead Tin Bronze conforming to A.S.T.M. Specifications 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									FIXED SHOES								
TYPE	NO. REQD.	A	B	C	D	E	F	G	TYPE	NO. REQD.	A	B	C	D	E	F	G
E1	63	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	F1	53	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"ϕ
E3	12	6"	1'-1"	9"	1'-1"	9½"	1'-9½"	7"	F1M	16	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"ϕ
E6	7	6"	1'-7"	8"	1'-6"	8½"	2'-2½"	6"	F4	10	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"ϕ
E7	7	6"	1'-7"	9½"	1'-6"	10½"	2'-2½"	7½"	F4M	4	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"ϕ
E2	6	6"	1'-1"	8½"	1'-0"	9"	1'-8½"	6½"	F12	8	6"	1'-1"	6"	1'-1"	7½"	1'-10"	1¼"ϕ
									F12M	4	6"	1'-1"	6"	1'-1"	7½"	1'-10"	1¼"ϕ



SIDE ELEVATION

FIXED SHOE TYPE F13
No Scale

Note: For details and dimensions not shown see Fixed Shoe details above.

	BY	DATE				
MADE	C.B.P.	3-68				
CHECKED	A.J.S.	3-68		As Built		
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD SHOE DETAILS
Bridges 12, 36, 37

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

SCALE: AS SHOWN
CONTRACT NO: 7
SHEET NO. S1

119

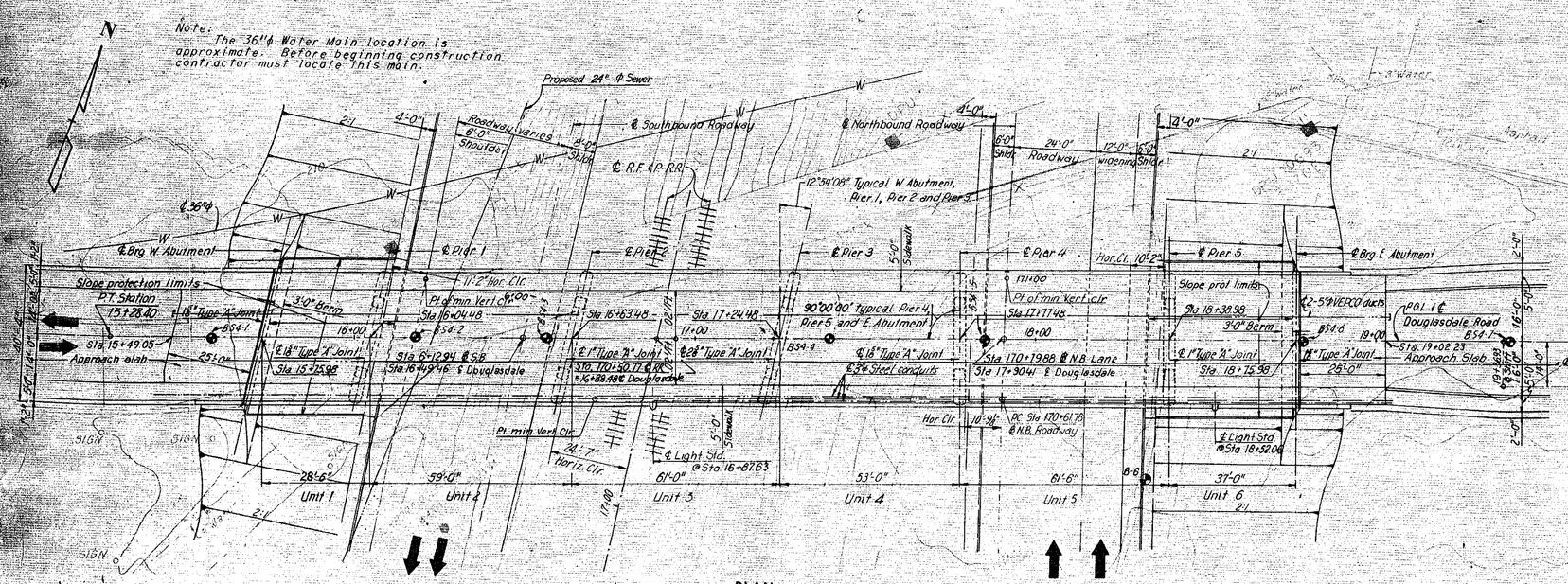
Bridge 13

Douglasdale Road
Over
Northbound and Southbound Powhite Parkway (VA-76) connector to I-195 and CSX Railroad

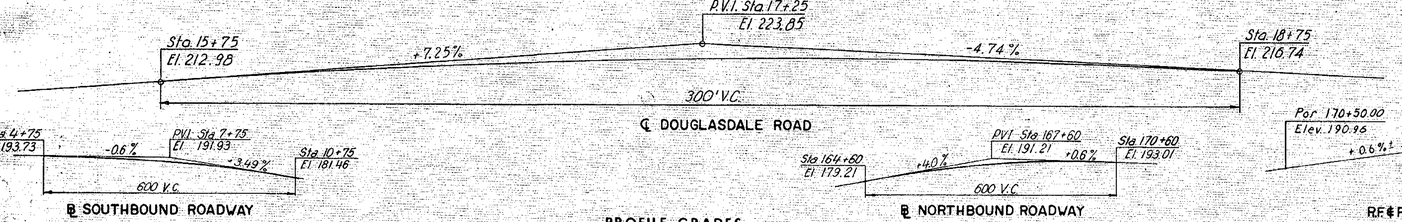
Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	118	153

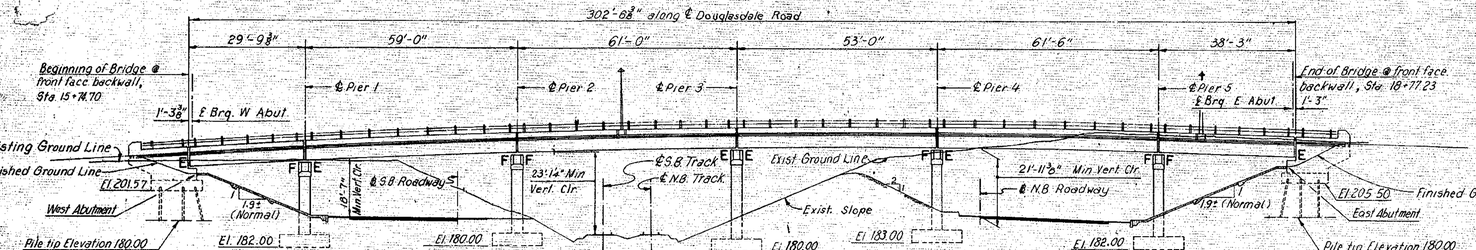
Note:
The 36"ϕ Water Main location is approximate. Before beginning construction contractor must locate this main.

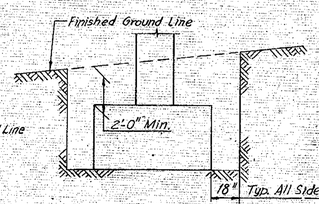


PLAN



PROFILE GRADES





LIMITS OF EXCAVATION

CURVE DATA

℄ Northbound Roadway
P.I. = Sta. 173+60.82
Δ = 17°47'52"
D = 3°00'00"
T.A. = 299.04'
L = 593.26'
R = 1,909.86'

Note: Pile Tip Elevations shown estimated.

(a) Class A3, unless noted
(b) Class A4
* Frame and Cover only.

ELEVATION

ESTIMATED QUANTITIES

	Struct. Excav. Cu. Yds.	Concrete (a) Cu. Yds.	Reinf. Steel lbs.	Str. Stl. Mild Carbon lbs.	Aluminum Railing (2-rails) Lin. Ft.	Porous Backfill Cu. Yds.	Under-drain 6" Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin. Ft.	Con. Slab Sl. Prot. Sq. Yds.	Asphalt damp-proofing Sq. Yds.	Approach Slab Conc. (a) Cu. Yds.	Metal Conduit Lin. Ft. 2"Dia	Metal Conduit Lin. Ft. 3"Dia	Conduit 5"Dia VEPCO Lin. Ft.	Water Main 8"Dia Lin. Ft.	*Junction Box Lbs.
Superstructure	——	464.8(b)	87,170	335,000	650	——	——	——	——	——	——	7	914	704	358	360
West Abutment	130	80.0	13,500	——	——	5.2	50	307	193.3	27	40.4	——	——	——	——	——
Pier 1	185	65.1	10,220	——	——	——	——	——	——	——	——	——	——	——	——	——
Pier 2	119	67.5	11,120	——	——	——	——	——	——	——	——	——	——	——	——	——
Pier 3	204	67.9	11,400	——	——	——	——	——	——	——	——	——	——	——	——	——
Pier 4	171	66.4	10,740	——	——	——	——	——	——	——	——	——	——	——	——	——
Pier 5	156	66.6	10,690	——	——	——	——	——	——	——	——	——	——	——	——	——
East Abutment	126	77.5	13,100	——	——	4.8	49	358	239.7	25	39.4	——	——	——	——	——
TOTAL	1091	464.8(b) 491.0	167,940	335,000	650	10	99	665	433	52	79.8	7	914	704	358	360

LIMITS OF EXCAVATION

GENERAL NOTES

ROADWAY: One 28'-0" clear roadway. Two 5'-0" sidewalks

CAPACITY: Dead Load includes 15 lbs. per sq. ft. for future wearing surface.
Live Loads - HS20-44 loading.

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.

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 plan 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.

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 A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 1" chamfer or fillet unless otherwise noted. Care in the method of fabrication, the use of low-slump concrete, and other means shall be employed to prevent downgrade movement of newly placed slab concrete.
Finishing Concrete Surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform to A.S.T.M. 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. Specification A36 except as noted.
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.

BENCH MARK: A-16 Copperweld rod N.W. of R.R. Bridge on Douglasdale. Elev. 213.60

⊕ Boring, denotes 2½"ϕ Cased hole

INDEX

	BY	DATE	NO.	REVISION	BY	DATE
MADE	JV	3-4-68	3	Profile Grade	P.S.	4-8-71
CHECKED	MAA	3-6-68	2	General	J.G.V.	10-70
IN CHARGE	FKD		1	General Revisions	R.L.M.	5-1768

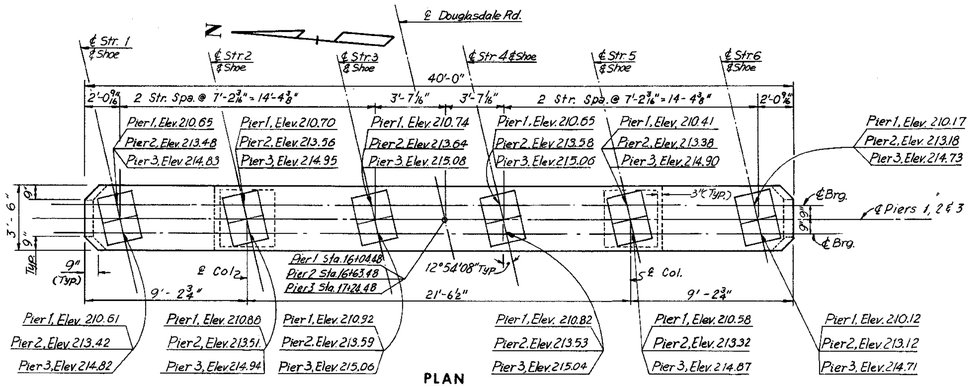
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO 13
DOUGLASDALE ROAD OVER
BELTLINE EXPRESSWAY AND R.F.&P.R.R.
GENERAL PLAN AND ELEVATION

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

SCALE: 1"=20'
CONTRACT NO. 4
SHEET NO. 1 OF 12

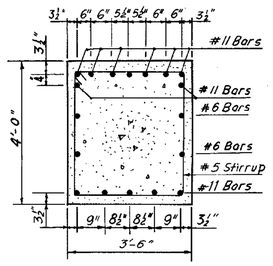
118 A2

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	121	155



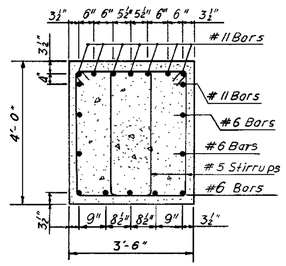
PLAN

Scale: 1" = 1'-0"



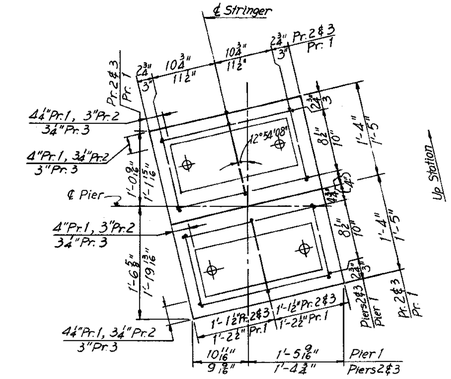
SECTION B-B

Scale: ½" = 1'-0"



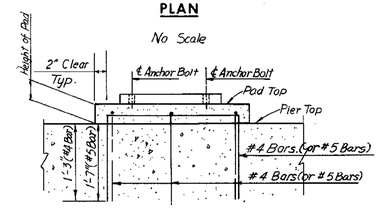
SECTION D-D

Scale: ½" = 1'-0"



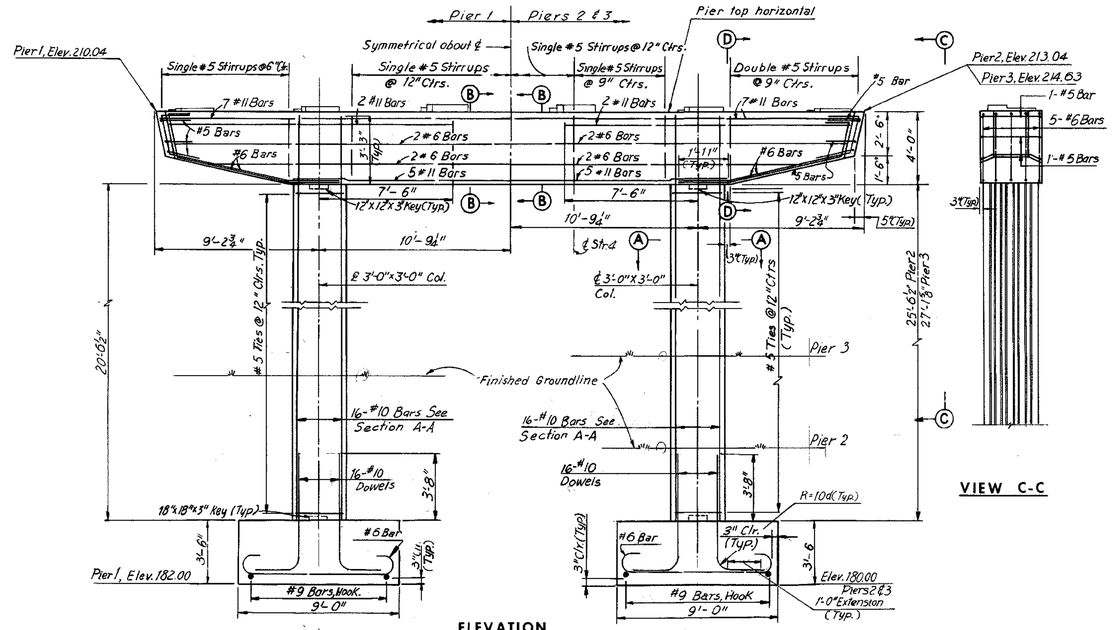
PLAN

No Scale



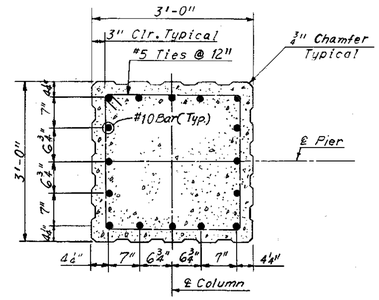
REINFORCED PAD DETAIL

No Scale



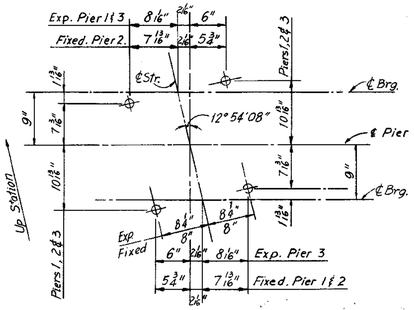
ELEVATION

Scale: 1" = 1'-0"



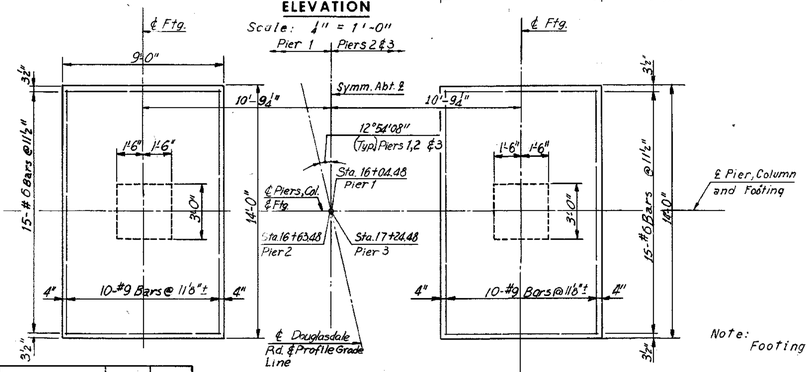
SECTION A-A

Scale: ¾" = 1'-0"



ANCHOR BOLT SETTING PLAN

No Scale



FOOTING PLAN

Scale: ¼" = 1'-0"

Note: Footing elevations are exact.

Note:
Pads with heights of 4" or less shall not be reinforced.
Pads with heights between 4" and 6" use #4 bar.
Pads with heights between 8' and 12" use #5 bar.

Notes:
For shoe details see Sheet 51.
For Framing Plan see Sheet 6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	M.A.A	9-29-67	2	As Builts	R.H.	2-2-73
CHECKED	J.J.W	3-6-68	1	Profile Grade	P.S.	4-7-71
IN CHARGE	F.K.D					

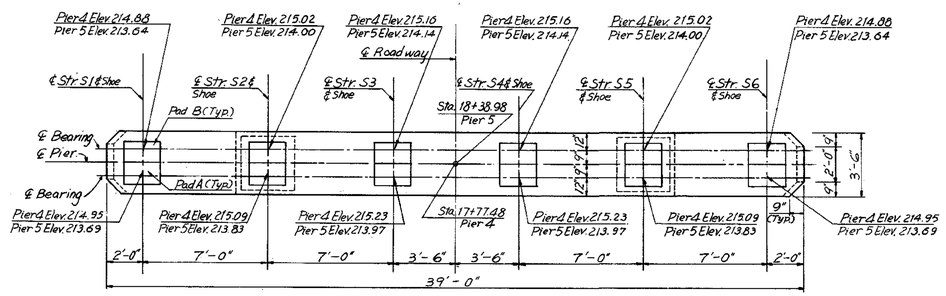
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO 13
DOUGLASDALE ROAD OVER BELTLINE EXPRESSWAY AND R.F.&P.R.R.
PIERS 1, 2 AND 3

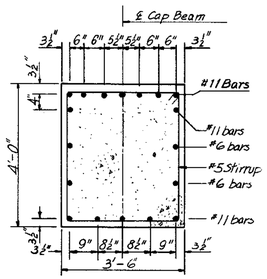
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 4
SHEET NO. 4 OF 12

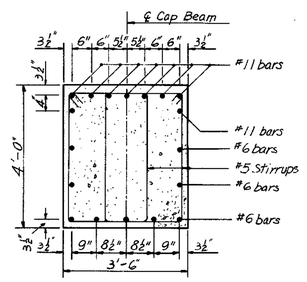
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	122	155



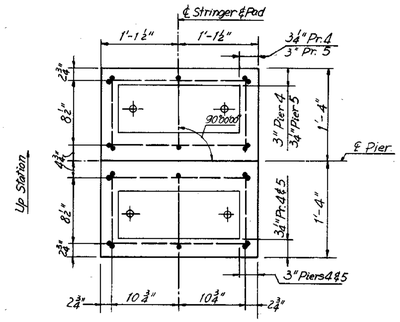
PLAN
Scale: 1/4" = 1'-0"



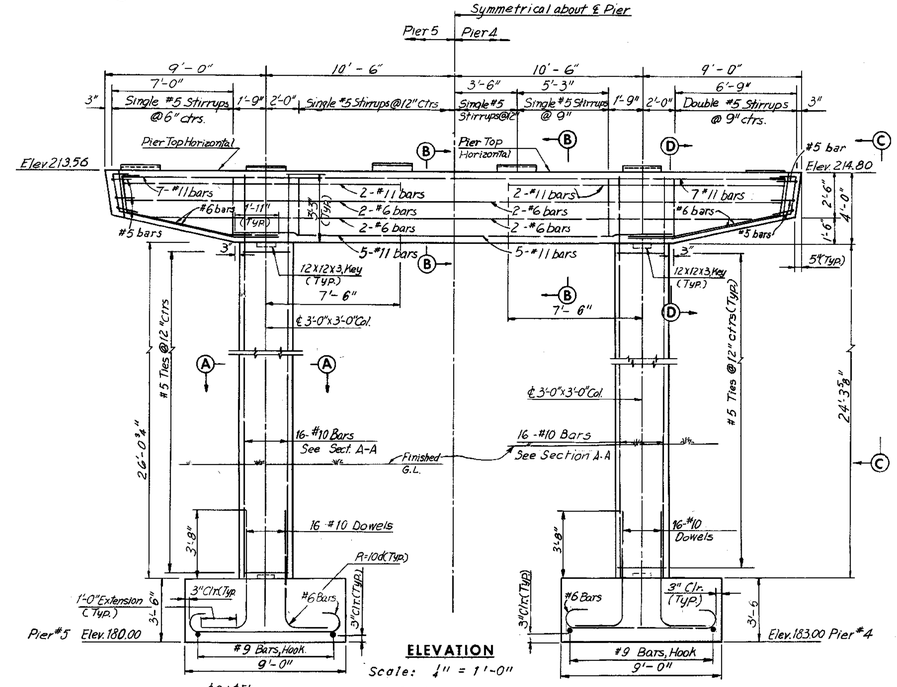
SECTION B-B
Scale: 1/2" = 1'-0"



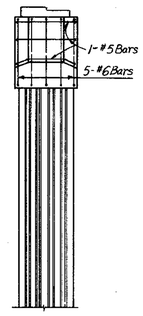
SECTION D-D
Scale: 1/2" = 1'-0"



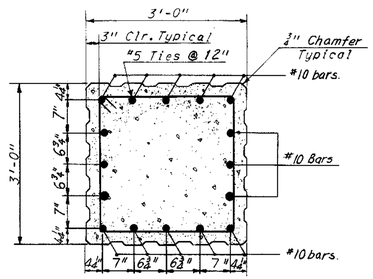
PLAN
No Scale



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

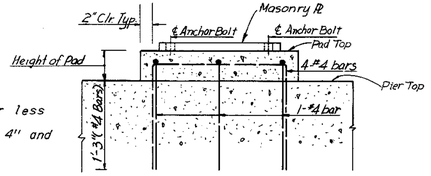


VIEW C-C

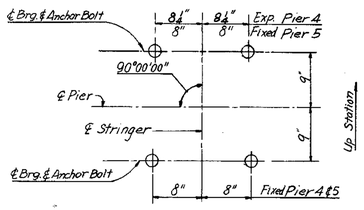


SECTION A-A
Scale: 1/2" = 1'-0"

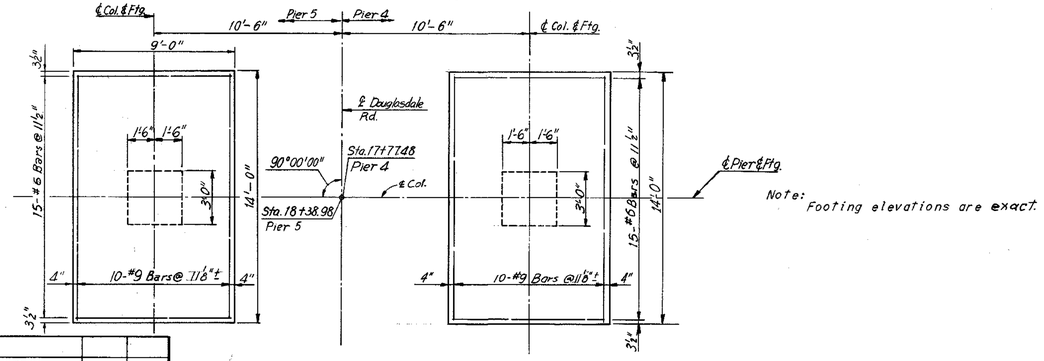
Note:
Pads with heights of 4" or less shall not be reinforced.
Pads with heights between 4" and 8" use #4 bar.



REINFORCED PAD DETAILS
No Scale



ANCHOR BOLT SETTING PLAN
No Scale



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

Note:
Footing elevations are exact.

AS BUILT

Notes:
For shoe details see Sheet S1.
For Framing Plan see Sheet 6.

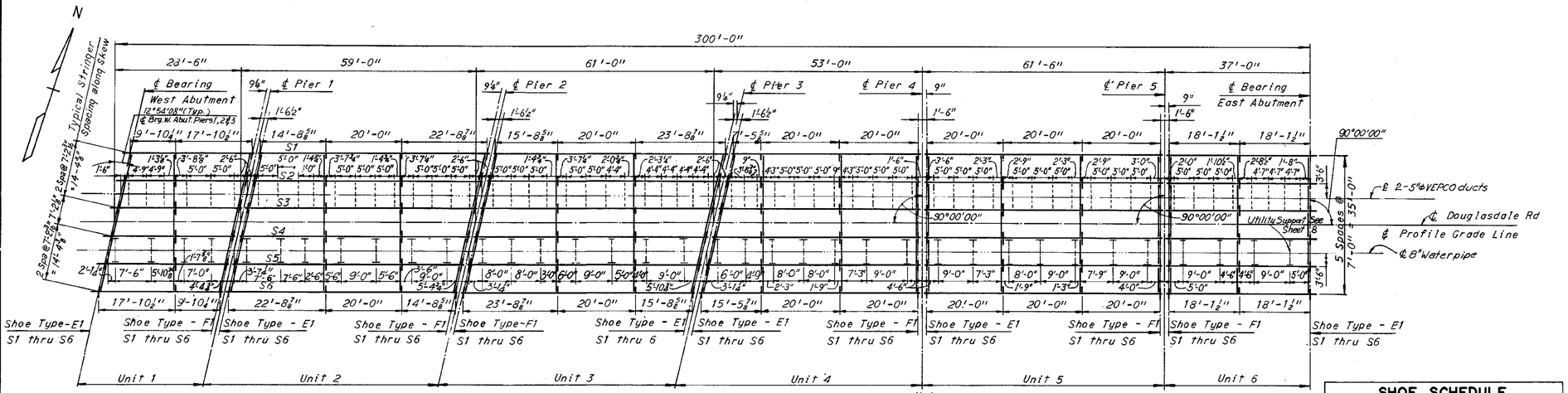
	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.C.C.	9-30-69	2	As Builts	R.H.	2-2-73
CHECKED	S.S.W.	2-1568	1	Profile Grade	P.S.	4-7-71
IN CHARGE	F.K.D.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO 13
DOUGLASDALE ROAD OVER
BELTLINE EXPRESSWAY AND R.F.&P.R.R.
PIERS 4 AND 5

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

SCALE: As Noted
CONTRACT NO.: 4
SHEET NO. 5 OF 12

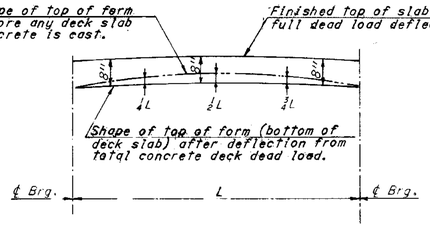
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	123	155



FRAMING PLAN

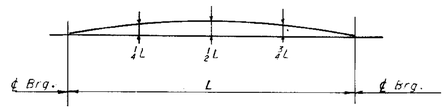
Scale: 1" = 15'-0"

Notes:
For Superstructure Quantities see Sheet 1.
For Framing details see Sheets 7 and 8.
For details of utility supports see Sheet 8.
For Joint Details see Sheet 9.
For standard details of 54"ø VEPCO ducts see Sheet S11.
For dimensions, and location of pipe sleeve for 8"ø Water pipe thru backwall, see Abutmen, Plans Sheets 2 and 3.
For additional details of 8"ø Water Pipe see Sheet S10



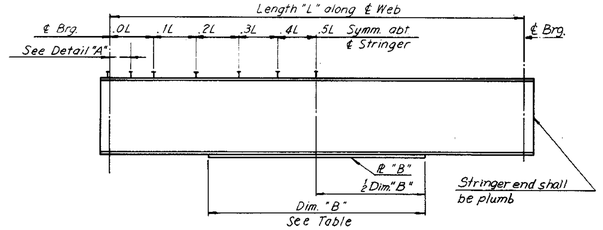
DEAD LOAD DEFLECTION DIAGRAM

No Scale

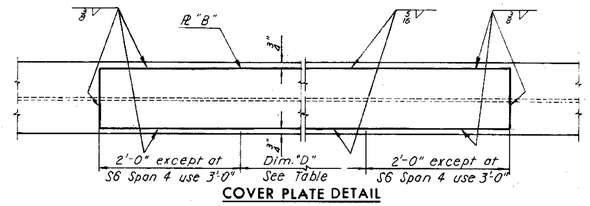


CAMBER DIAGRAM

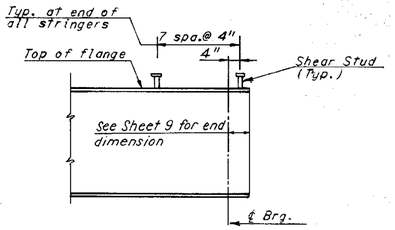
No Scale



STRINGER ELEVATION



COVER PLATE DETAIL



DETAIL A

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.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	36	F1	36

DEAD LOAD DEFLECTION SCHEDULE

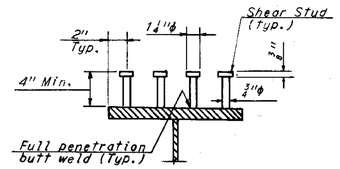
STRINGER	UNIT 1 ¼L	UNIT 1 ¾L	UNIT 1 ½L	UNIT 2 ¼L ¾L	UNIT 2 ½L	UNIT 3 ¼L ¾L	UNIT 3 ½L	UNIT 4 ¼L ¾L	UNIT 4 ½L	UNIT 5 ¼L ¾L	UNIT 5 ½L	UNIT 6 ¼L ¾L	UNIT 6 ½L
S1	1/16"		1/8"	5/16"	13/16"	11/16"	1"	4/16"	7/8"	11/16"	1 1/16"	1/8"	15/16"
S2	1/16"		1/8"	9/16"	13/16"	11/16"	15/16"	5/16"	1"	11/16"	1"	1/8"	1/8"
S3	1/16"		1/8"	9/16"	13/16"	11/16"	15/16"	5/16"	1"	11/16"	1"	1/8"	1/8"
S4	1/16"		1/8"	9/16"	13/16"	11/16"	15/16"	5/16"	1"	11/16"	1"	1/8"	1/8"
S5	1/16"		1/8"	9/16"	13/16"	11/16"	15/16"	7/16"	11/16"	11/16"	1"	1/8"	1/8"
S6	1/16"		1/8"	5/16"	13/16"	11/16"	1"	1/2"	3/4"	11/16"	1 1/16"	1/8"	15/16"

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 7.

* ... Spacing begins at the termination of 7 spaces at 4" ctrs.

STRINGER SCHEDULE

UNIT	STRINGER	LENGTH "L"	STRINGER SIZE	℄ "B"	DIM. "B"	DIM. "D"	SHEAR STUD SPACING .0L-.1L *	.1L-.2L	.2L-.3L	.3L-.4L	.4L-.5L	CAMBER SCHEDULE ¼L	½L	¾L
1	S1 & S6	27'-8 3/8"	36WF135	—	—	—	9½"	11"	13½"	16½"	22"	7/16"	5/8"	7/16"
	S2 & S5	27'-8 3/8"	33 WF 118	—	—	—	9½"	11"	13½"	16½"	22"	7/16"	5/8"	7/16"
	S3 & S4	27'-8 3/8"	33 WF 118	—	—	—	9½"	11"	13½"	16½"	22"	7/16"	5/8"	7/16"
2	S1 & S6	57'-5½"	36 WF 135	10½x⅜	43'-2"	39'-2"	8"	9½"	11½"	14"	18½"	2 3/8"	3 1/16"	2 3/8"
	S2 & S5	57'-5½"	36 WF 135	10½x⅜	43'-2"	39'-2"	8"	9½"	11½"	14"	18½"	2 3/8"	2 7/16"	2 3/8"
	S3 & S4	57'-5½"	36 WF 135	10½x⅜	43'-2"	39'-2"	8"	9½"	11½"	14"	18½"	2 3/8"	2 7/16"	2 3/8"
3	S1 & S6	59'-5½"	36 WF 135	10½x⅜	44'-8"	40'-8"	8"	9½"	11½"	14"	18½"	2 3/16"	3 1/16"	2 3/16"
	S2 & S5	59'-5½"	36 WF 135	10½x⅜	44'-8"	40'-8"	8"	9½"	11½"	14"	18½"	2 5/16"	3 3/16"	2 5/16"
	S3 & S4	59'-5½"	36 WF 135	10½x⅜	44'-8"	40'-8"	8"	9½"	11½"	14"	18½"	2 5/16"	3 3/16"	2 5/16"
4	S1	47'-5 3/8"	36 WF 135	10½x½	35'-8"	31'-8"	8"	9"	11"	14"	18½"	1 7/16"	1 13/16"	1 7/16"
	S2	49'-0 3/8"	36 WF 135	10½x½	36'-10"	32'-10"	8"	9"	11"	14"	18½"	1 7/16"	2"	1 3/8"
	S3	50'-8 3/8"	36 WF 135	10½x⅝	38'-1"	34'-1"	8"	9"	11"	14"	18½"	1 9/16"	2 3/16"	1 9/16"
	S4	52'-3 3/8"	36 WF 135	10½x¾	39'-3"	35'-3"	8"	9"	11"	14"	18½"	1 5/8"	2 5/16"	1 5/8"
	S5	53'-10 5/16"	36 WF 135	10½x⅞	40'-5"	36'-5"	8"	9"	11"	14"	18½"	1 3/4"	2 7/16"	1 3/4"
	S6	55'-5⅜"	36 WF 135	10½x1	41'-8"	35'-8"	8"	9"	11"	14"	18½"	1 15/16"	2 11/16"	1 15/16"
5	S1 & S6	60'-0"	36 WF 135	10½x¾	45'-0"	41'-0"	8"	9½"	11½"	14"	18½"	2 3/8"	3 5/16"	2 3/8"
	S2 & S5	60'-0"	36 WF 135	10½x¾	45'-0"	41'-0"	8"	9½"	11½"	14"	18½"	2 3/8"	3 1/4"	2 3/8"
	S3 & S4	60'-0"	36 WF 135	10½x¾	45'-0"	41'-0"	8"	9½"	11½"	14"	18½"	2 3/8"	3 1/4"	2 3/8"
6	S1 & S6	36'-3"	36 WF 135	—	—	—	9½"	11"	13½"	16½"	22"	4"	16"	4"
	S2 & S5	36'-3"	33 WF 118	—	—	—	9½"	11"	13½"	16½"	22"	3/8"	1/2"	3/8"
	S3 & S4	36'-3"	33 WF 118	—	—	—	9½"	11"	13½"	16½"	22"	3/8"	1/2"	3/8"



SHEAR STUD DETAIL

No Scale

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
			4	As Builts	RH.	2-2-73
MADE	A.H.H	11-20-67	3	Profile Grade	P.S.	4-7-71
CHECKED	S.S.W.	2-8-68	2	General		10-70
IN CHARGE	FKD		1	General Revisions	MHH	3-12-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

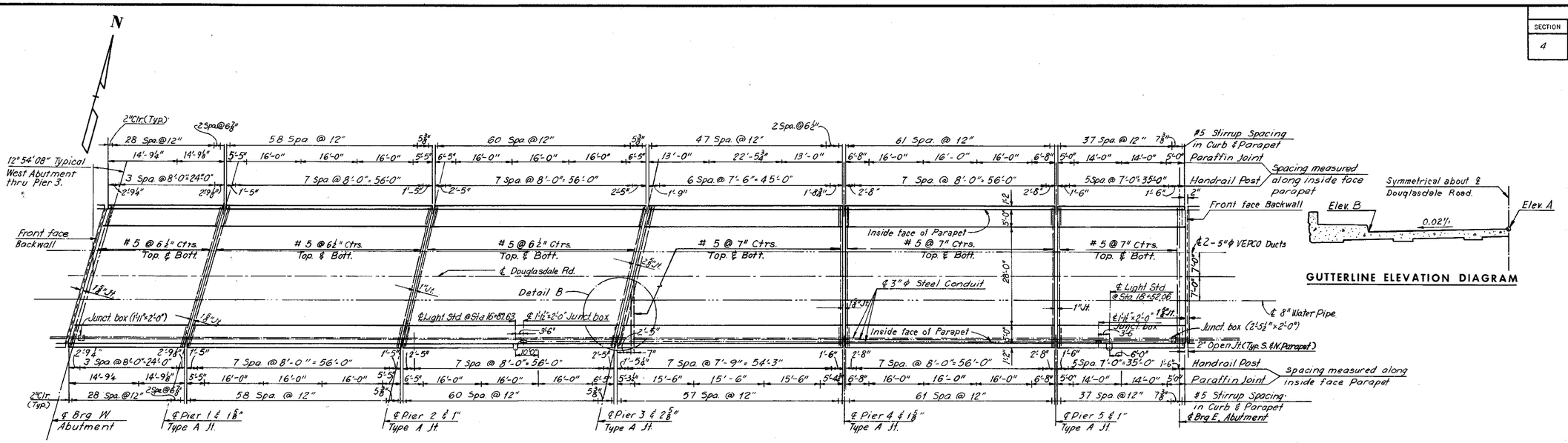
BRIDGE NO 13
DOUGLASDALE ROAD OVER
BELTLINE EXPRESSWAY AND R.F.&P.R.R.

FRAMING PLAN

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

SCALE: As Noted
CONTRACT NO.: 4
SHEET NO. 6 OF 12

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	124	155



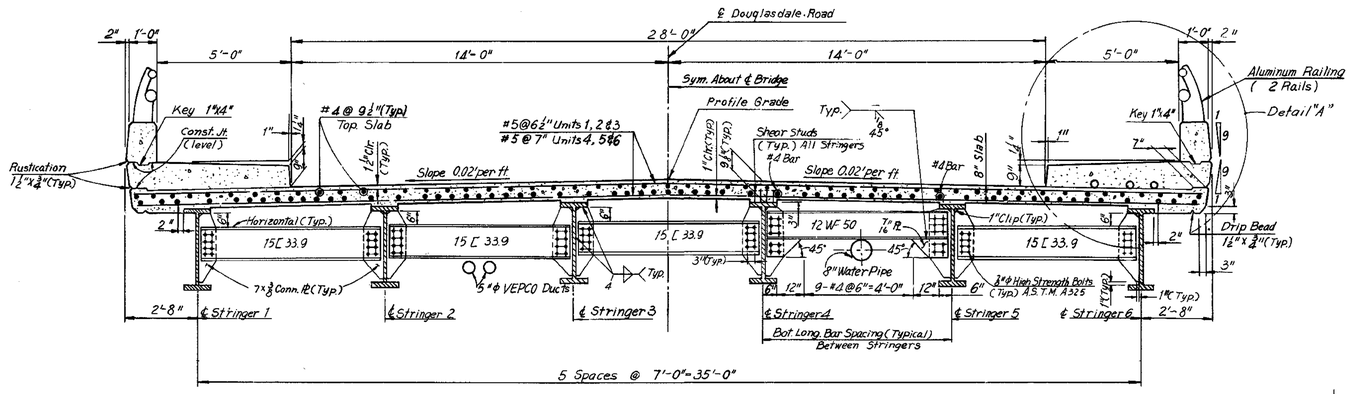
DECK PLAN

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

Note:
For reinforcing steel at joints see Sheet 9 joint details.

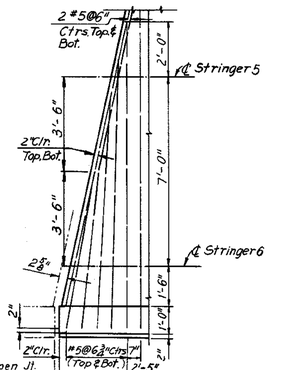
GUTTERLINE ELEVATION DIAGRAM

TABLE OF ELEVATIONS		
STATION	ELEV. A	ELEV. B
15+50.00	211.17	210.89
60.00	211.89	211.61
70.00	212.62	212.34
71.49	——	212.45
74.70	212.96	——
77.91	——	212.92
80.00	213.34	213.06
90.00	214.03	213.75
16+00.00	214.67	214.39
01.28	——	214.47
04.48	214.95	——
07.69	——	214.86
10.00	215.28	215.00
20.00	215.84	215.56
30.00	216.37	216.09
40.00	216.85	216.57
50.00	217.30	217.02
60.00	217.70	217.42
60.28	——	217.43
63.48	217.83	——
66.69	——	217.67
70.00	218.07	217.79
80.00	218.40	218.12
90.00	218.68	218.40
17+00.00	218.93	218.65
10.00	219.13	218.85
20.00	219.30	219.02
21.28	——	219.03
24.48	219.36	——
27.69	——	219.12
30.00	219.42	219.14
40.00	219.51	219.23
50.00	219.55	219.27
60.00	219.56	219.28
70.00	219.52	219.24
77.48	219.47	219.19
80.00	219.45	219.17
90.00	219.33	219.05
18+00.00	219.18	218.90
10.00	218.99	218.71
20.00	218.75	218.47
30.00	218.48	218.20
38.98	218.20	217.92
40.00	218.16	217.88
50.00	217.81	217.53
60.00	217.42	217.14
70.00	216.97	216.69
77.23	216.63	216.35
80.00	216.50	216.22
90.00	216.03	215.75
19+00.00	215.55	215.27



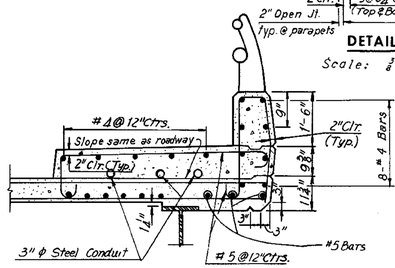
TYPICAL CROSS SECTION
INTERMEDIATE DIAPHRAGM

Scale: ⅜" = 1'-0"



DETAIL "B"

Scale: ⅜" = 1'-0"



DETAIL "A"

Scale: ½" = 1'-0"

Notes:
For Superstructure Quantities see Sheet 1.
For framing and Utility support details see Sheet 8.
For Joint details see Sheet 9.
For Lighting details see Sheet S4.
For details of transmission ducts see Sheet S4.

	BY	DATE				
			3	As Builts	R.H.	2-5-73
MADE	AHH	10-7-67	2	Profile Grade	L.B.P.	4-6-71
CHECKED	S.S.W.	2-8-68	1	General Revisions	MHH	3-12-68
IN CHARGE	FKD		NO.	REVISION	BY	DATE

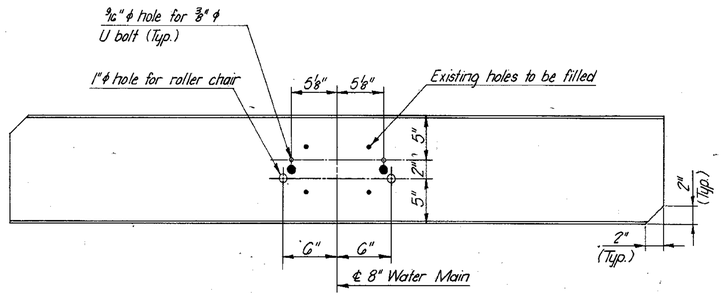
ASSBUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO 13
DOUGLASDALE ROAD OVER
BELTLINE EXPRESSWAY AND R.F.&P.R.R.
DECK PLAN

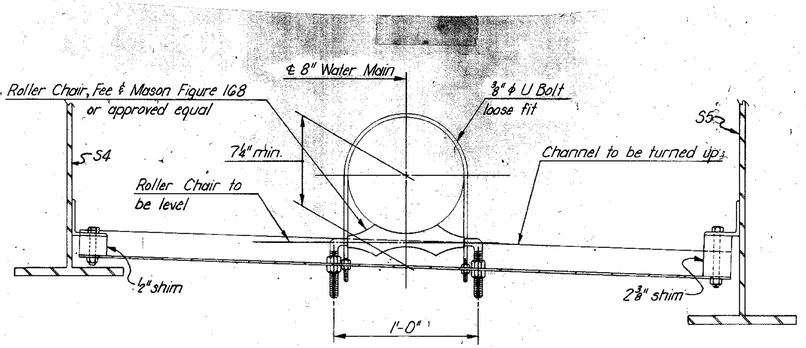
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 4
SHEET NO. 7 OF 12

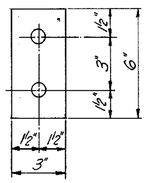
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	11.5A	1



PLAN
Scale: 1½"=1'-0"



ELEVATION
Scale: 1½"=1'-0"



SHIM DETAIL
Scale: 3"=1'-0"

	BY	DATE				
MADE						
CHECKED			1	AS BUILTS	RH	2-5-73
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

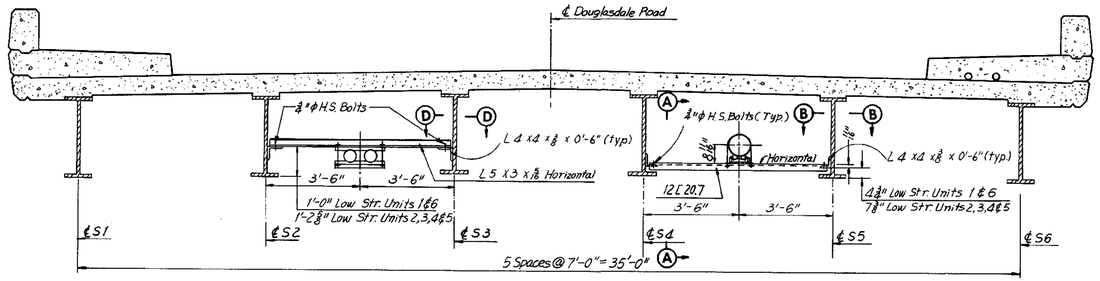
BRIDGE NO. 13
DOUGLASDALE ROAD OVER
BELTLINE EXPRESSWAY AND R.F. & P. R.R.
WATER MAIN SUPPORT DIAPHRAGMS
UNITS 1 & 6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS SHOWN
CONTRACT NO.: 4
SHEET NO. 8A OF 12

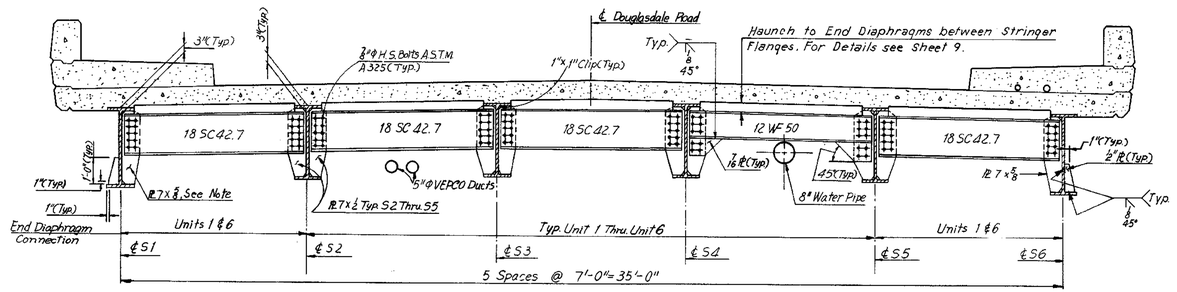
AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	125	155



UTILITY SUPPORTS
TYPICAL SECTION BETWEEN DIAPHRAGMS

Scale : ⅜" = 1'-0"

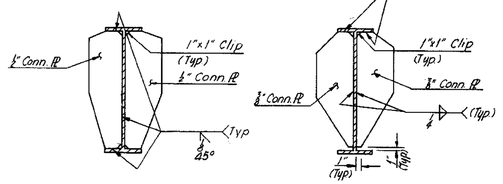


CROSS SECTION
END DIAPHRAGMS

Scale : ⅜" = 1'-0"

Note: For Intermediate diaphragms see Sheet 7.

Note: End diaphragms and connection shown above are typical for all units with the following exceptions: 7"x⅝" Bearing and connection plates on exterior stringers with 2 rows of 5 bolts as shown for Units 1 and 6, to be replaced by 10"x⅝" plate with 3 rows of 5 bolts for Units 2 through 5, see Detail A below.

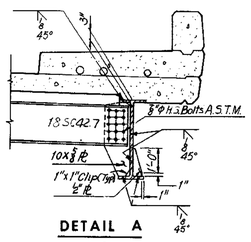


TYPICAL END DIAPHRAGM CONNECTOR PLATE INTERIOR STRINGER

No Scale

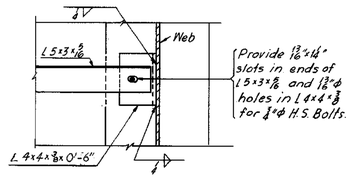
TYPICAL INTERMEDIATE DIAPHRAGM CONNECTOR PLATE

No Scale



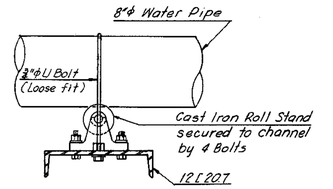
DETAIL A

Scale : ⅜" = 1'-0"
(Units 2 thru 5)



SECTION D-D

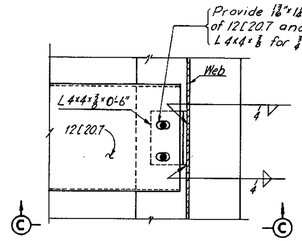
No Scale



SECTION A-A

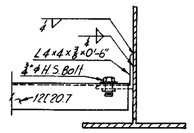
No Scale

Note: Provide ⅛" Clr. between ¾" U Bolt and 8" ϕ Pipe.



SECTION B-B

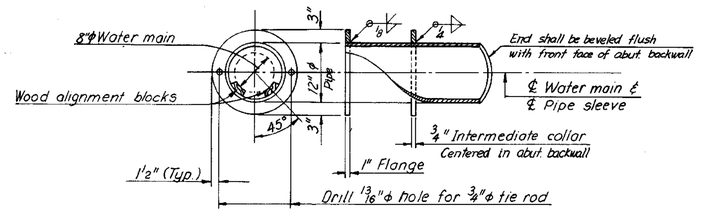
No Scale



SECTION C-C

No Scale

Note: For spacing of Utility supports see Framing Plan Sheet 6.



Note: Steel pipe sleeve to be hot-dip galvanized after fabrication in accordance with ASTM A123

PIPE SLEEVE DETAIL FOR WATER MAIN

No Scale

Note: For location and additional sleeve dimensions of 8"ϕ Water pipe see Abutment Plans Sheets 2 and 3.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	11-27-67	2	As Builts	RH	2-5-73
CHECKED	S.S.W.	2-14-68	1	General Revisions	MHH	3-12-68
IN CHARGE	FKD					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

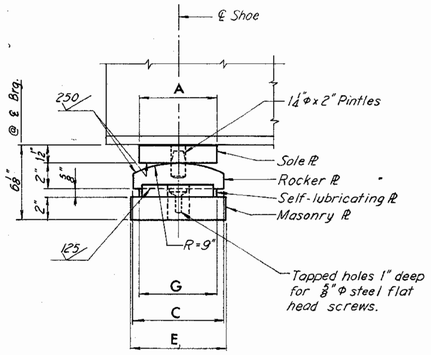
BRIDGE NO 13
DOUGLASDALE ROAD OVER BELTLINE EXPRESSWAY AND R.F.&P.R.R.

FRAMING DETAILS

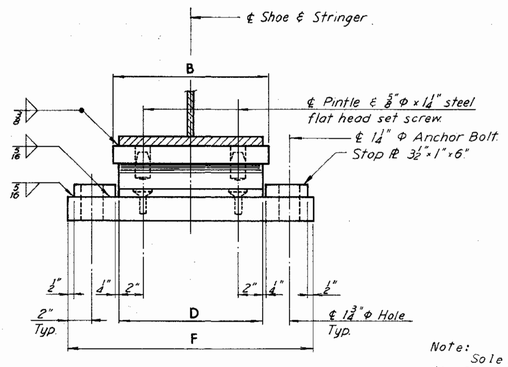
AS BUILT

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

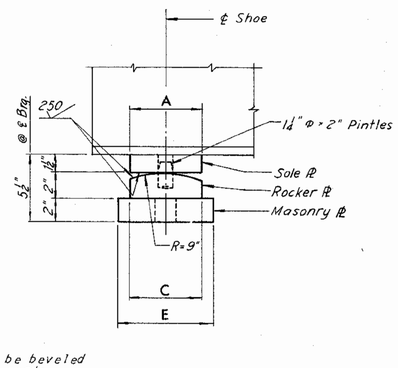
SCALE: As Noted
CONTRACT NO.: 4
SHEET NO. 8 OF 12



SIDE ELEVATION

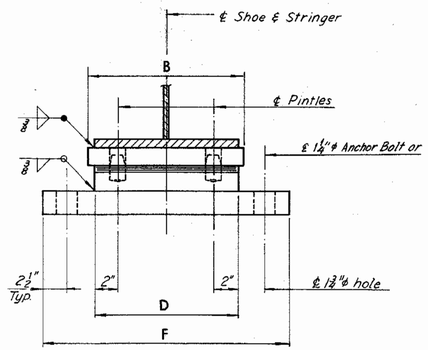


END ELEVATION

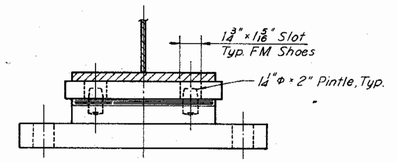


SIDE ELEVATION

Note: Sole PL is to be beveled to compensate for grade.



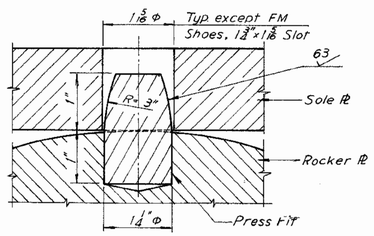
END ELEVATION



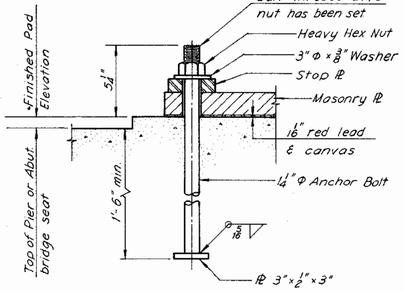
Note: Fixed Modified Shoes same as Fixed Shoes except as shown.

END ELEVATION

EXPANSION SHOE



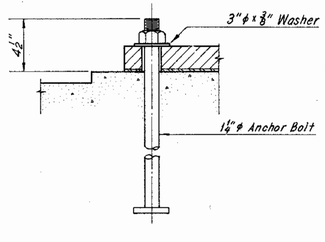
PINTLE DETAIL



EXPANSION SHOE

ANCHOR BOLT DETAIL

FIXED SHOE



FIXED SHOE

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

FIXED MODIFIED SHOE

Shoe Notes:

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 plane 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 B45.1, 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 temperature of 68°F.

Concrete pads shall be formed integral with abutment or pier and not less than 1" or more than 4" 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 and shall be hot dipped 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	NUMBER REQUIRED
E1	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	61
E2	6"	1'-1"	8½"	1'-0"	9"	1'-8½"	6½"	4

FIXED SHOES	A	B	C	D	E	F	NUMBER REQUIRED
F1	6"	1'-1"	6"	1'-0"	7½"	1'-9"	50
F1M	6"	1'-1"	6"	1'-0"	7½"	1'-9"	15

AS BUILT

	BY	DATE				
MADE	MHH	2-1-68		AS BUILT	WE	9-73
CHECKED	J.V.	2-6-68	1	General	J.G.V.	10-70
IN CHARGE	F.K.D.			REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

STANDARD SHOE DETAILS
Bridges 13, 17

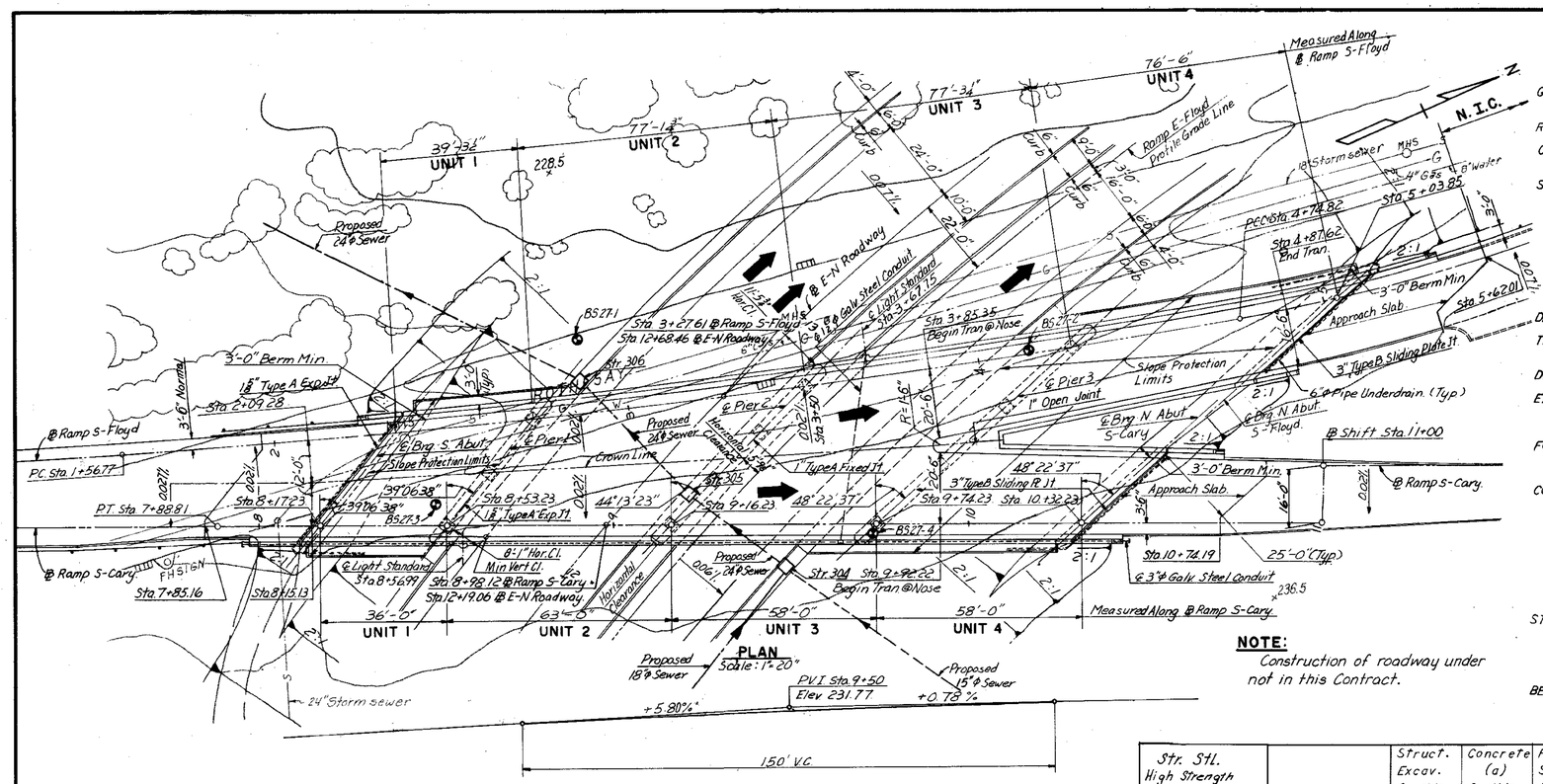
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: No Scale
CONTRACT NO.: —/
SHEET NO. 51

Bridge 17

Northbound Powhite Parkway (VA-76) Ramp to Floyd Ave. and Cary Street Over Northbound I-195 and the Ramp from Northbound I-195 to Floyd Avenue

Record Set Plans



RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	130	155

PLAN

Scale: 1"=20"

NOTE:
Construction of roadway under not in this Contract.

GENERAL NOTES

ROADWAY Variable width of roadway.

CAPACITY: Dead Load includes 15 lbs. per sq. ft. for future wearing surface.

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.

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 plan 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.

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: Piles shall be driven to a minimum length corresponding to the approximate tip elevations shown on the Plans but in no case to less than a penetration affording the required safe bearing capacity noted on the Plans.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other 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.

All reinforcing steel shall conform to A.S.T.M. A-615, 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. Specification A36 except as noted. 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.

BENCH MARK: A-25 Copperweld rod S. side of Thompson St. and Cary Road. Elev. 236.59.

PROFILE GRADE ℄ RAMP S-CARY

● Boring, denotes 2½"φ Cased Hole

ESTIMATED QUANTITIES

Str. Stl. High Strength lbs. A588		Struct. Excav. Cu. Yds.	Concrete (a) Cu. Yds.	Reinf. Steel Lbs.	Str. Stl. Mild Carbon Lbs.	Aluminum railing (1-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Under-drain 6" Dia. Pipe Lin. Ft.	Con. Slab Sl. Prot. Sq. Yds.	Asphalt damp-proofing Sq. Yds.	Approach Slab Conc. (a) Cu. Yds.	Steel Piles 10BP42 Lin. Ft.	Parapet Junct. Box Complete Each	Metal Conduit 3" Dia. Lin. Ft.	Metal Conduit 1½" Dia. Lin. Ft.
11,561.2	Superstructure	–	335.98(b)	94,764	342,021.5	687	–	–	–	–	–	–	2	290	56
	South Abutment	179	87.81	26,326	–	–	7	68	–	31	62.91	654.3	–	–	–
	Pier 1	67	67.39	7,653	–	–	–	–	–	–	–	413.4	–	–	–
	Pier 2	90	99.35	12,167	–	–	–	–	–	–	–	432.1	–	–	–
	Pier 3	156	112.88	15,056	–	–	–	–	–	–	–	493.8	–	–	–
	N-Abut. S-Cary	143	79.26	21,016	–	–	5	56	–	25	52.85	621.7	–	–	–
	N-Abut. S-Floyd	180	88.22	29,400	–	–	6	80		28	73.48	802.1	–	–	–
	Total	815	335.98(b) 534.91	206,382	342,021.5	687	18	204	–	84	189.24	3,417.4	2	290	56

Estimated Quantities Notes:
(a) Class A3, unless noted
(b) Class A4

ELEVATION

Scale: 1"=20"

LIMITS OF STRUCTURE EXCAVATION

CURVE DATA

℄ RAMP S-CARY
P.I. = Sta. 3+96.91
Δ = 15°46'34"
D = 2°00'00"
T = 396.91'
L = 788.81'
R = 2864.79'

℄ RAMP S-FLOYD
P.I. = Sta. 3+15.96
Δ = 6°21'39"
D = 2°00'00"
T = 159.19'
L = 318.05'
R = 2864.79'

℄ RAMP S-FLOYD
P.I. = Sta. 5+60.34
Δ = 20°18'32"
D = 12°00'00"
T = 85.52'
L = 169.24'
R = 477.46'

℄ E-N ROADWAY
P.I. = Sta. 12+48.94
Δ = 59°15'01"
D = 7°30'00"
T = 434.42'
L = 790.00'
R = 763.94'

PROFILE GRADE ℄ RAMP S-FLOYD

PROFILE GRADE ℄ E-N ROADWAY

LAYOUT SKETCH

No Scale

AS BUILT

INDEX

			NO.	REVISION	BY	DATE
5 As Builts	R.H.	2-5-73	4	Profile Grade - ℄ E-N Rdwy	L.B.P.	4-70
	BY	DATE	3	Parapet	E.V.R.	12-70
MADE	G.C.C.	1-2-68	2	General	J.G.V.	10-70
CHECKED	L.J.R.	3-7-68	1	General Revision	AMH	5-13-68
IN CHARGE	FKD		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

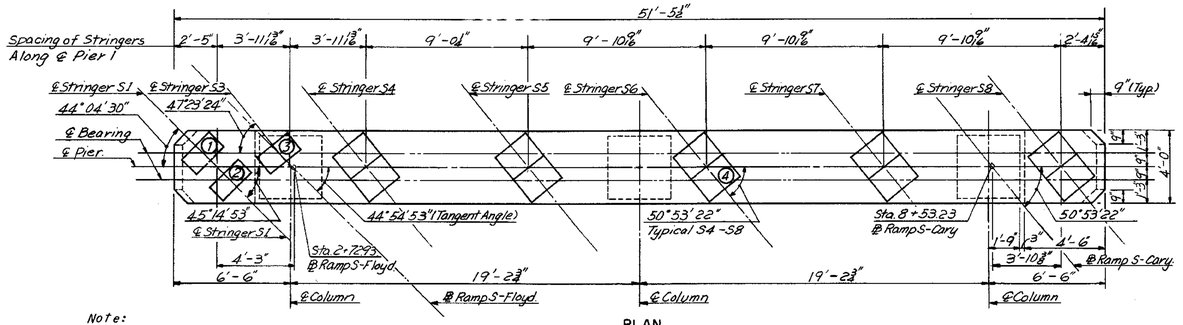
BRIDGE NO. 17
RAMP S-CARY OVER
EAST-NORTH ROADWAY

GENERAL PLAN AND ELEVATION

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

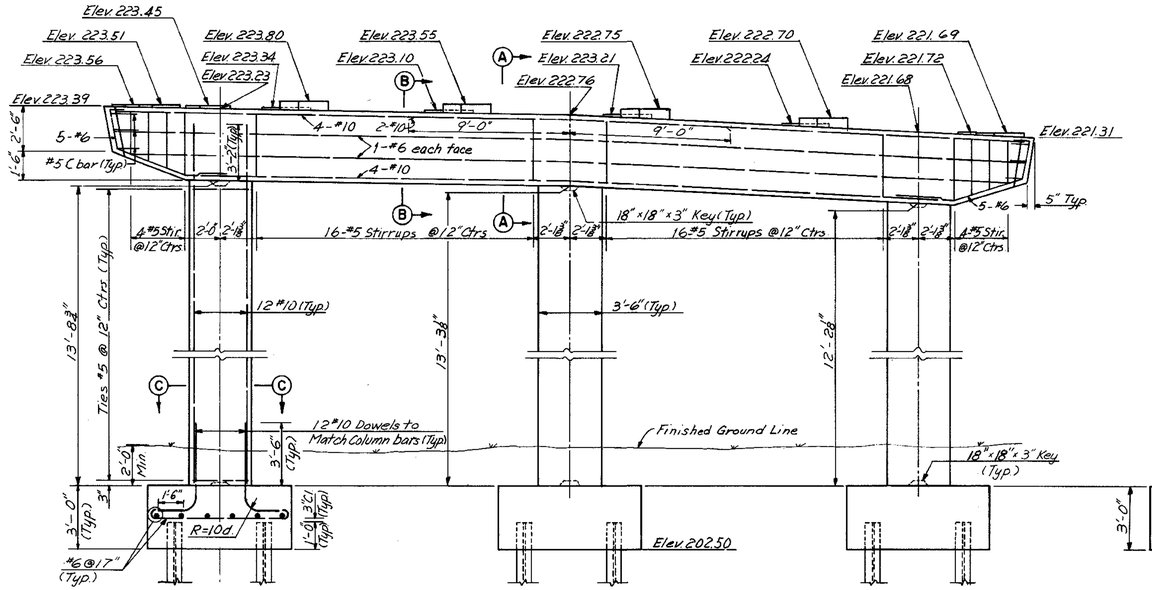
SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 1 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	135	155

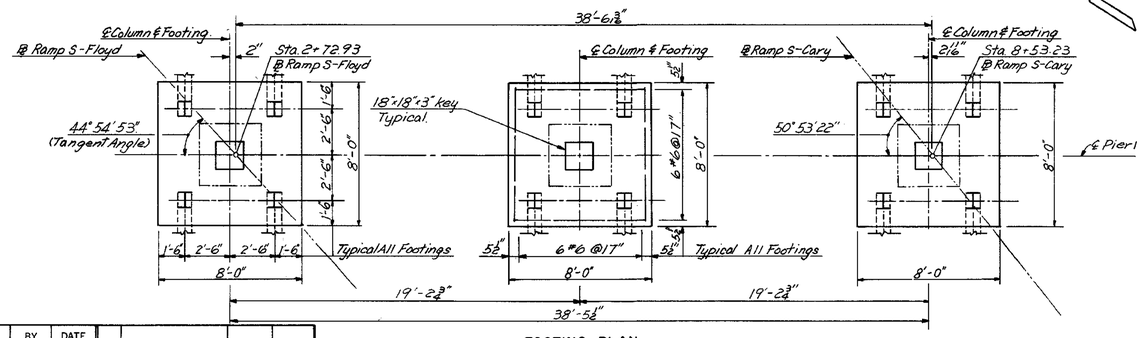


Note:
③ Indicates case of Anchor bolt setting plan, see table.

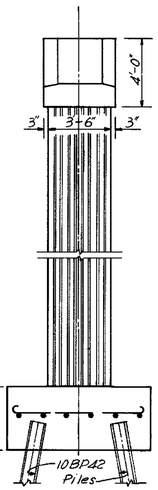
PLAN
Scale 1/4" = 1'-0"

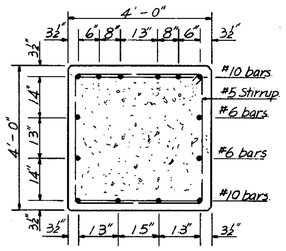


ELEVATION
Scale 1/4" = 1'-0"



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





SECTION A–A
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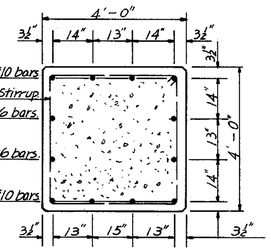
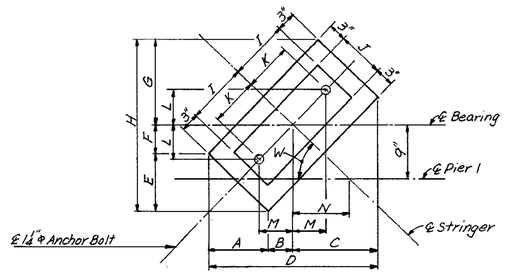
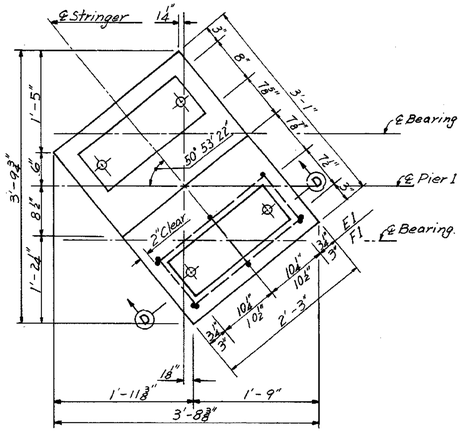


SECTION B–B
Scale 1/2" = 1'-0"

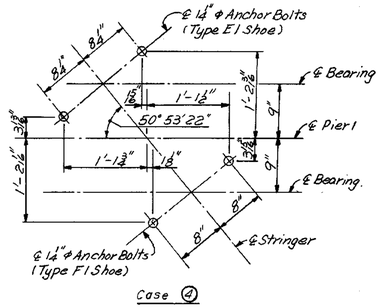




ANCHOR BOLT SETTING PLAN DIMENSIONS															
Case	Angle W	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	44°04'30"	10	4¼	14¼	28½	9⅜	4⅝	14⅜	28¾	10¼	8	8¼	5/16	5¾	9 5/16
2	45°14'53"	9½	2⅞	14⅜	28¾	9⅜	4⅝	14¼	28½	10½	7½	8	5⅜	5 11/16	8 5/16
3	47°23'24"	9½	5	14½	29	10¼	3⅞	14⅝	28¼	10¼	8	8¼	5/16	6¼	8¼

(Dimensions are in inches)

Case ①, ② & ③

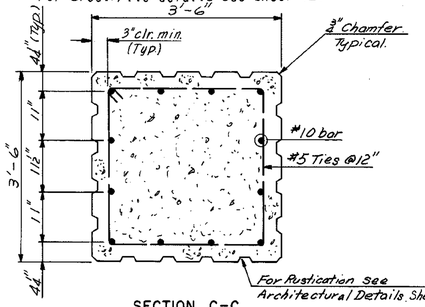


Case ④

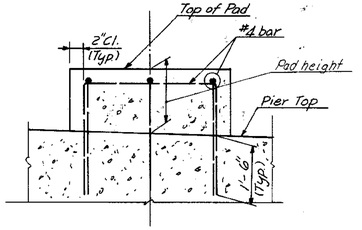
ANCHOR BOLT SETTING PLAN
No Scale

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.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 2" per foot where shown.
For Standard Shoe details see Sheet S1.
For Framing Plan see Sheet 8.
For Steel Pile details see Sheet 12.



SECTION C–C
Scale 3/4" = 1'-0"



SECTION D–D
No Scale

Note:
No reinforcing steel required for pad height less than 4".

	BY	DATE				
MADE	GCC	11-3-67	2	As Builts	R.H.	2-5-73
CHECKED	AMH	3-7-68	1	General Revision	RLM	5-15-68
IN CHARGE	FKD		NO.	REVISION	BY	DATE

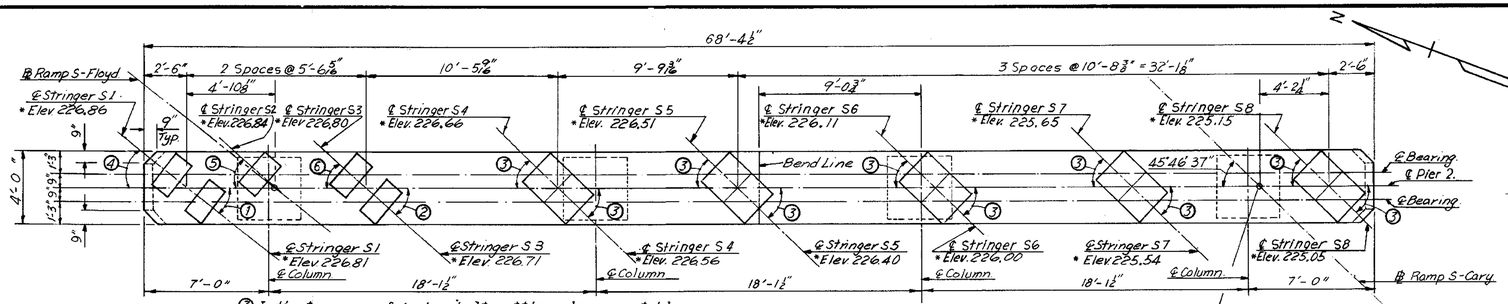
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO. 17
RAMP S-CARY OVER
EAST-NORTH ROADWAY
PIER 1

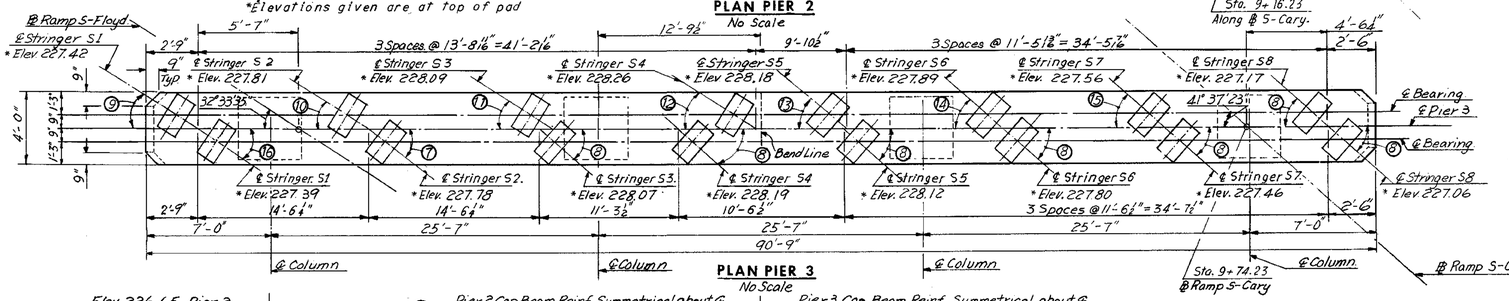
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 6 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	136	155



PLAN PIER 2
No Scale



PLAN PIER 3
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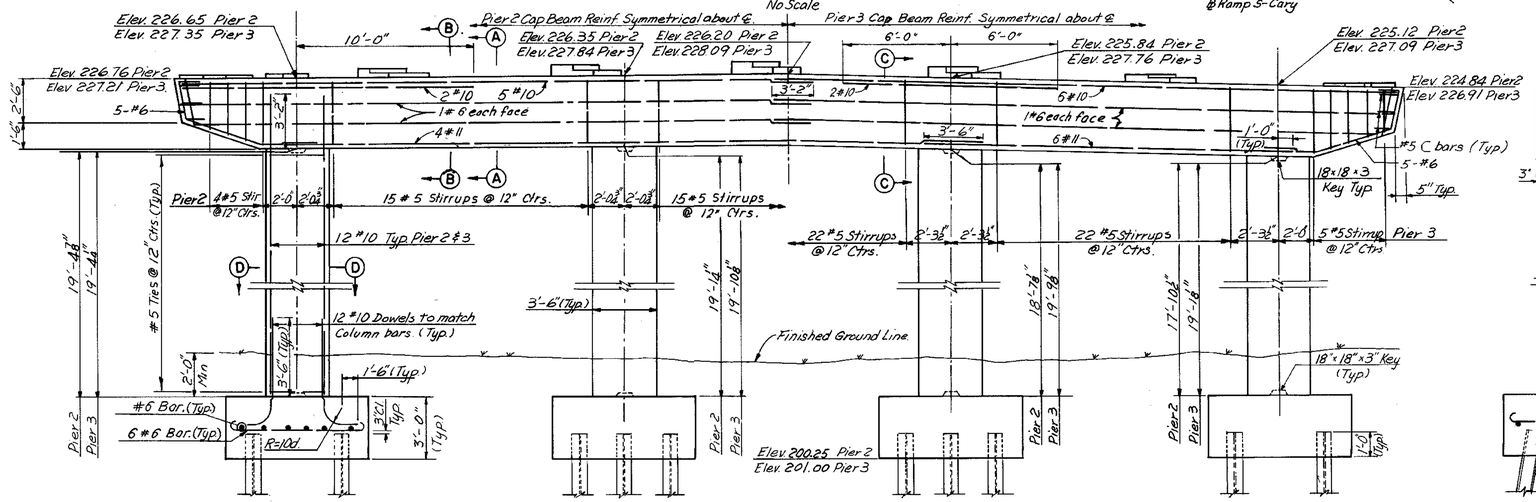
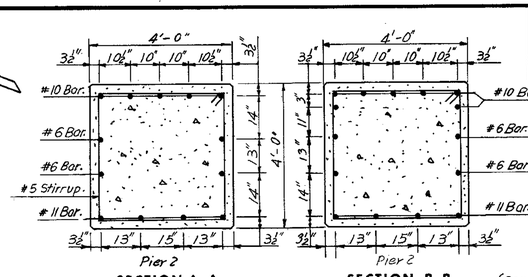
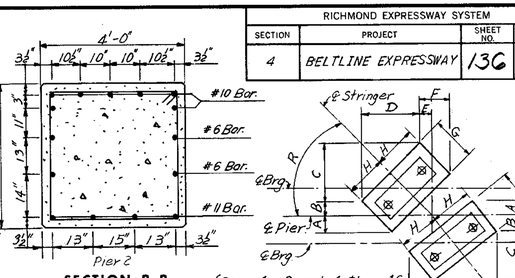
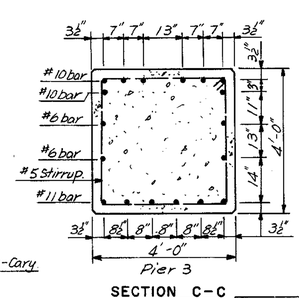




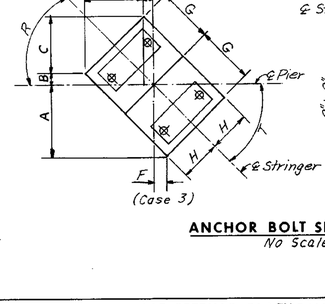
SECTION A-A
Scale ½"=1'-0"

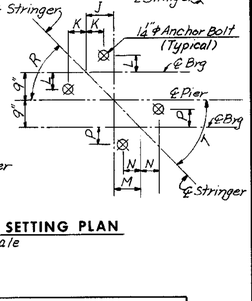


SECTION B-B
Scale ½"=1'-0"



SECTION C-C
Scale ½"=1'-0"





ANCHOR BOLT SETTING PLAN
No Scale

ANCHOR BOLT SETTING PLAN DIMENSIONS

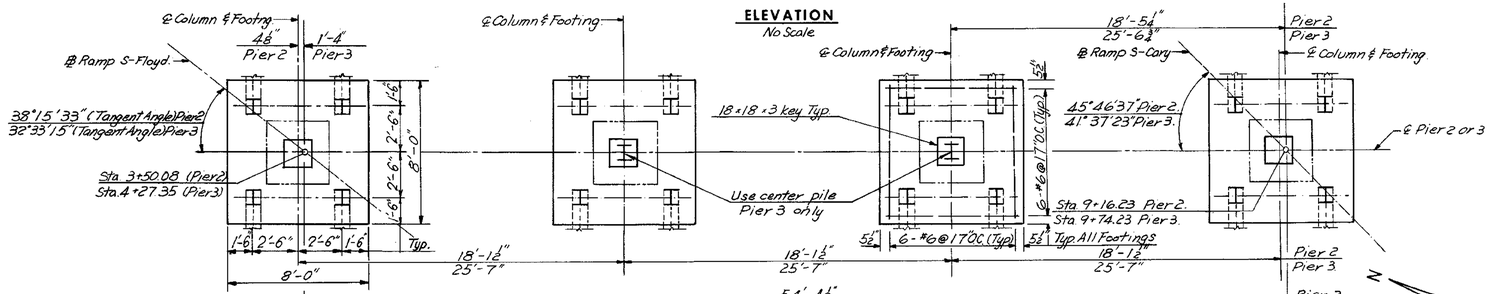
Case	Angle R	Angle T	A	B	C	D	E	F	G	H	J	K	L	M	N	P
1	-	38°57'45"	5⅜	2⅜	21	17	7¼	10⅛	13⅛	13⅛	-	-	-	11⅛	5	6¼
2	-	42°16'39"	5½	3⅜	20	18⅛	5⅜	10	13⅛	13⅛	-	-	-	9⅛	5⅜	5⅝
3	45°46'37"	45°46'37"	23½	4⅜	18⅛	19⅜	3⅜	3¼	19½	13⅜	8⅜	5⅜	5⅝	23⅛	5⅜	5⅝
4	37°24'05"	-	5⅝	2⅜	21½	16⅜	8⅛	10⅜	13½	13½	11⅜	4⅜	6⅜	-	-	-
5	41°08'52"	-	5⅜	3½	20⅜	17⅛	6½	10⅛	13½	13½	10⅜	5¼	6	-	-	-
6	45°46'37"	-	5½	4⅜	18⅛	19⅜	3⅜	9⅜	13½	13½	8⅛	5⅜	5⅝	-	-	-
7	-	36°59'38"	5¾	2⅜	21⅛	16	9⅜	11⅛	14	13¼	-	-	-	11⅛	4⅝	6⅜
8	41°37'23"	41°37'23"	5⅜	3⅜	20⅛	17⅜	6¼	10½	14	13½	10⅛	5⅜	6	10⅛	5½	5⅝
9	30°54'54"	-	6	0⅞	23⅛	13⅞	13⅞	11⅜	13½	13½	15	4⅜	6⅜	-	-	-
10	30°37'47"	-	6	0⅜	23¼	13¾	14⅛	11⅜	13½	13½	15	4⅛	6⅜	-	-	-
11	30°20'58"	-	6	0⅛	23½	13⅜	14⅜	11⅜	13½	13½	15⅛	4⅛	6⅜	-	-	-
12	30°04'26"	-	6⅛	0⅛	23⅜	13½	14⅝	11⅜	13½	13½	15⅜	4	6⅜	-	-	-
13	42°09'02"	-	5½	3½	20	18⅛	5⅜	10	13½	13½	9⅛	5⅜	5⅝	-	-	-
14	42°37'53"	-	5½	3⅜	19⅜	18⅛	5⅜	9⅞	13½	13½	9⅜	5⅛	5⅜	-	-	-
15	42°07'21"	-	5½	3½	20	18⅛	5⅜	10	13½	13½	9⅛	5⅜	5⅝	-	-	-
16	-	33°14'51"	5⅞	1⅜	22⅜	14½	12⅜	11⅜	14	13¼	-	-	-	13¾	4½	6⅞

(Dimensions are in inches)

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.

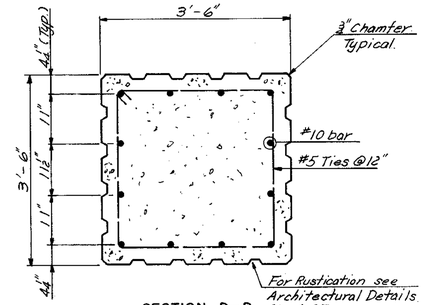
AS BUILT

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 2" per foot where shown.
For Standard Shoe details see Sheet S1.
For Framing Plan see Sheet 8.



ELEVATION
No Scale

FOOTING PLAN
No Scale



SECTION D-D
Scale ½" = 1'-0"

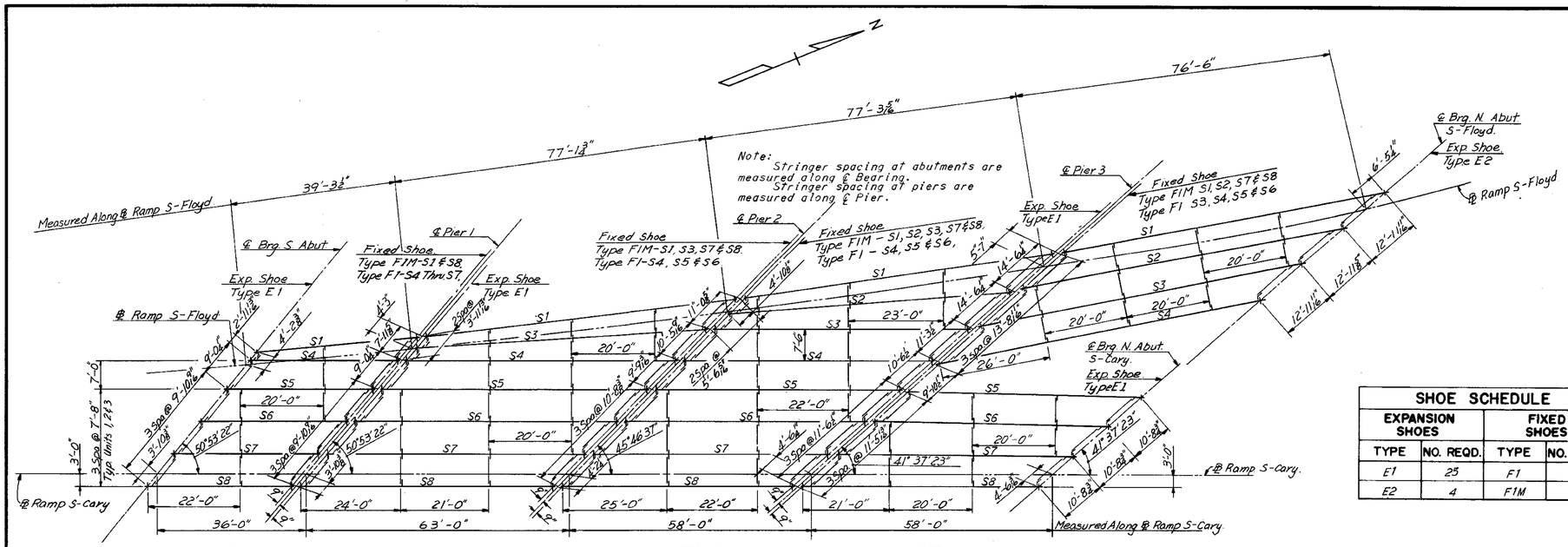
	BY	DATE				
MADE	M.A.A. G.C.C.	11-1-67				
CHECKED	AMH	3-7-68	1	As Builts	RH.	2-5-73
IN CHARGE	FKD		NO.	REVISION	BY	DATE

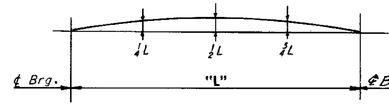
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO. 17
RAMP S-CARY OVER EAST-NORTH ROADWAY
PIERS 2 AND 3

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

SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 7 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	137	155





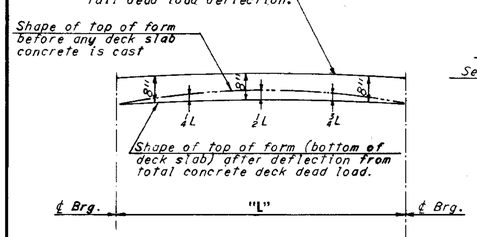
CAMBER DIAGRAM
No Scale

NOTE TO FABRICATOR

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. 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 9.

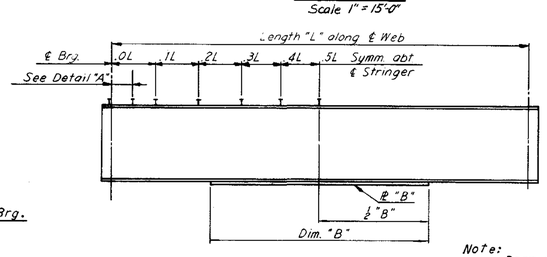
SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	25	F1	14
E2	4	F1M	15

AS BUILT

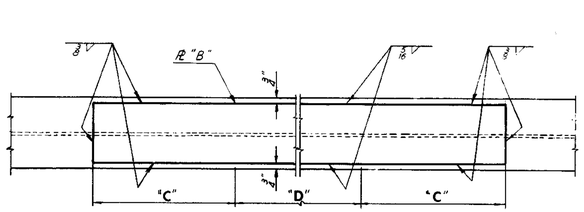


DEAD LOAD DEFLECTION DIAGRAM
No Scale

FRAMING PLAN
Scale 1" = 15'-0"

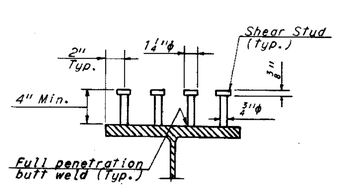


STRINGER ELEVATION

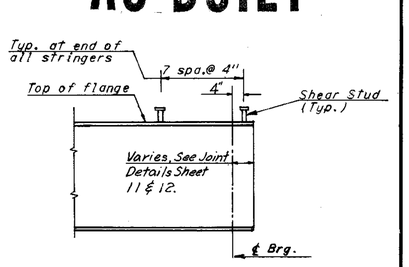


COVER PLATE DETAIL

Note: Beam Ends, Bearing Stiffeners and Diaphragm Connections shall be plumb.



SHEAR STUD DETAIL
No Scale



DETAIL A
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.

** Spacing begins at termination of 7 spaces @ 4" as shown in Detail A.*

Note: For Superstructure Structural steel quantities see Sheet 1. For Standard Shoe details see Sheet 51. For Framing details see Sheet 9. For Joint details see Sheets 11 and 12. This sheet must be worked with sheets 2, 3, 4, 6, & 7.

DEAD LOAD DEFLECTION SCHEDULE

	UNIT 1			UNIT 2			UNIT 3			UNIT 4		
STRINGER	¼L	½L	¾L	¼L	½L	¾L	¼L	½L	¾L	¼L	½L	¾L
S1	1/8"		1/8"	1 1/8"	2 1/8"	1 1/8"	1 1/8"	1 1/16"	1 1/8"	1 1/4"	2"	1 1/4"
S2	—	—	—	—	—	—	7/8"	1 7/8"	7/8"	1 1/4"	2"	1 1/4"
S3	—	—	—	15/16"	1 1/4"	15/16"	3/4"	1 1/8"	3/4"	1 5/16"	2 1/16"	1 5/16"
S4	3/16"	1/4"	3/16"	13/16"	1 1/4"	13/16"	11/16"	1 1/16"	11/16"	1 1/8"	2 1/16"	1 1/8"
S5	3/16"	1/4"	3/16"	3/4"	1 1/16"	3/4"	5/8"	15/16"	5/8"	1/2"	11/16"	1/2"
S6	3/16"	1/4"	3/16"	11/16"	1 1/16"	11/16"	3/8"	7/8"	3/8"	1/2"	3/4"	1/2"
S7	3/16"	1/4"	3/16"	5/8"	1 1/16"	5/8"	1/2"	13/16"	1/2"	1/2"	13/16"	1/2"
S8	1/16"	1/8"	1/16"	1 3/16"	1 7/16"	1 3/16"	1/2"	3/4"	1/2"	1/2"	3/4"	1/2"

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.

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER LENGTH "L"	STRINGER SIZE	R B	DIM "B"	DIM "C"	DIM "D"	MAX SHEAR STUD SPACING .0L-.1L *	.1L-.2L	.2L-.3L	.3L-.4L	.4L-.5L	CAMBER SCHEDULE ¼L	½L	¾L
1	S1	38'-3 5/16"	36 WF 135	—	—	—	—	15 1/2"	17"	20"	23"	24"	1/8"	1/4"	5/16"
	S4-S7	35'-0 3/16"	30 WF 99	—	—	—	—	7 1/2"	8 1/2"	9 1/2"	11 1/2"	13 1/2"	3/16"	5/16"	5/16"
	S8	35'-0 3/16"	36 WF 135	—	—	—	—	10 1/2"	11 1/2"	13"	15 1/2"	18 1/2"	1/8"	1/8"	1/8"
2	S1	75'-7 1/16"	36 WF 150	10 1/2 x 3/4	.57'-0"	21'-6"	52'-0"	11 1/2"	13"	16"	19"	23 1/2"	3/32"	5/16"	3/16"
	S3	70'-1 3/16"	36 WF 150	10 1/2 x 5/8	42'-0"	21'-0"	38'-0"	8"	9"	11"	13"	15 1/2"	2 5/16"	4"	2 5/16"
	S4	65'-3 5/16"	36 WF 150	10 1/2 x 5/8	48'-0"	21'-0"	44'-0"	8"	9"	11"	13"	15 1/2"	2 5/16"	3 3/16"	2 5/16"
	S5	64'-2 5/16"	36 WF 150	10 1/2 x 5/8	48'-0"	21'-0"	44'-0"	8"	9"	11"	13"	15 1/2"	2 7/16"	3 5/16"	2 1/16"
	S6	62'-11 3/16"	36 WF 150	10 1/2 x 3/8	48'-0"	21'-0"	44'-0"	8"	9"	11"	13"	15 1/2"	2 3/16"	3 1/16"	2 5/16"
	S7	61'-8 15/16"	36 WF 150	10 1/2 x 5/8	48'-0"	21'-0"	44'-0"	8"	9"	11"	13"	15 1/2"	1 15/16"	2 3/16"	2 1/16"
	S8	60'-6 11/16"	36 WF 150	10 1/2 x 3/8	44'-0"	21'-0"	40'-0"	9"	10"	12"	14"	17"	1 15/16"	2 5/16"	1 15/16"
3	S1	75'-5 15/16"	36 WF 150	10 1/2 x 1	62'-0"	21'-6"	57'-0"	10"	11 1/2"	14"	16 1/2"	20"	3 1/16"	4 5/16"	3 1/16"
	S2	68'-1 3/16"	36 WF 150	10 1/2 x 5/8	54'-0"	21'-6"	49'-0"	8 1/2"	10"	12 1/2"	14 1/2"	17 1/2"	2 5/16"	2 5/16"	2 5/16"
	S3	61'-0 5/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	2"	2 5/16"	1 1/16"
	S4	59'-11 13/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	2 1/16"	2 5/16"	1 13/16"
	S5	58'-10 7/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	2 3/16"	3 1/16"	2 1/16"
	S6	57'-8 7/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	1 15/16"	2 5/16"	1 15/16"
	S7	56'-6 11/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	1 13/16"	2 1/16"	1 13/16"
	S8	55'-4 7/16"	36 WF 150	—	—	—	—	9"	10 1/2"	12"	14"	17"	1 3/16"	2 3/16"	1 1/16"
4	S1	75'-9 1/16"	36 WF 160	10 1/2 x 1 1/8	65'-0"	31'-0"	59'-0"	8 3/4"	9 1/2"	1 2"	14 1/2"	18"	3 3/16"	4 1/16"	3 1/16"
	S2	76'-4 11/16"	36 WF 160	10 1/2 x 1 1/4	65'-0"	31'-0"	59'-0"	7 1/2"	8 1/2"	10 1/2"	13"	16"	3 1/16"	4 5/16"	3 1/16"
	S3	77'-0 3/16"	36 WF 160	10 1/2 x 1 1/4	65'-0"	31'-0"	59'-0"	7 1/2"	8 1/2"	10 1/2"	13"	16"	3 5/16"	5 1/16"	4 1/16"
	S4	77'-8"	36 WF 160	10 1/2 x 1 1/8	63'-0"	31'-0"	57'-0"	8 1/2"	9 1/2"	12"	14 1/2"	18"	4"	5 1/16"	4"
	S5	55'-2 13/16"	36 WF 150	—	—	—	—	9"	10 1/2"	12"	14"	17"	1 3/16"	1 1/2"	1 5/16"
	S6	55'-9 3/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	1 9/16"	2"	1 1/16"
	S7	56'-3 7/16"	36 WF 135	10 1/2 x 1/2	44'-0"	21'-0"	40'-0"	7"	8"	10"	12"	14 1/2"	1 3/16"	2 3/16"	1 5/16"
	S8	56'-10 7/16"	36 WF 150	—	—	—	—	9"	10 1/2"	12"	14"	17"	1 5/16"	2 1/16"	1 5/16"

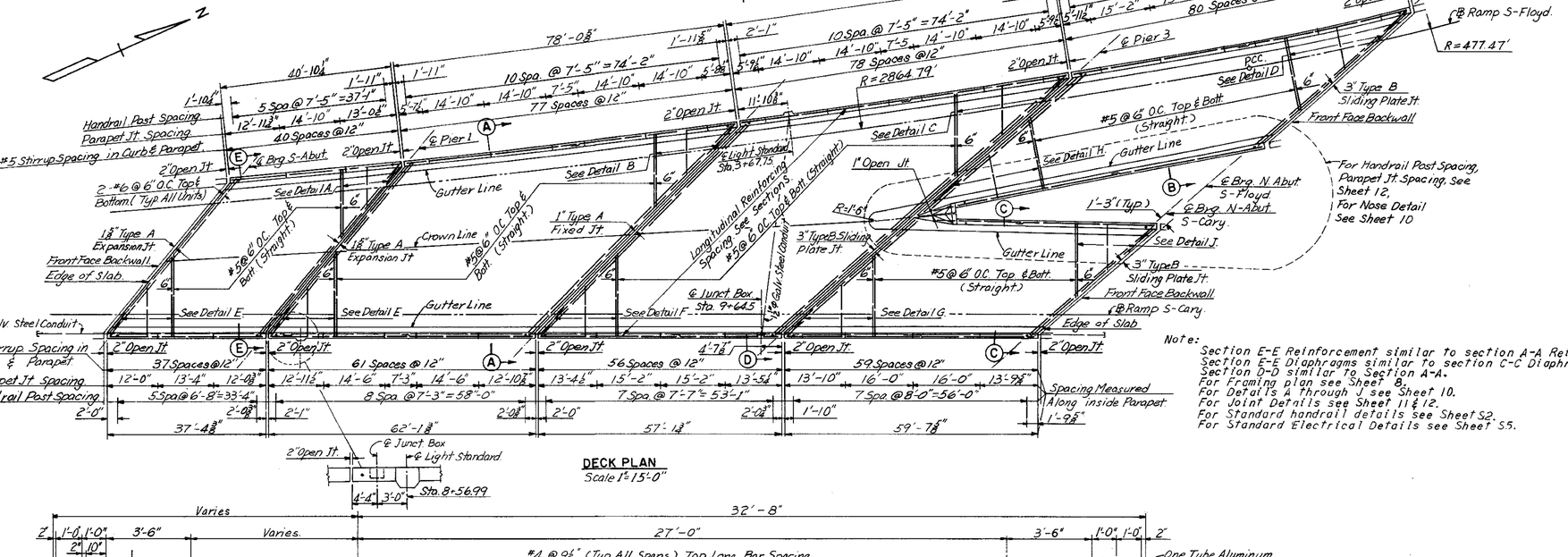
	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.C.C.	11-3-67	3	As Builts	R.H.	2-5-75
CHECKED	AMH	2-26-68	2	General	P.S.	10-70
IN CHARGE	FKD		1	General Revision	AMH	5-15-68

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY
BRIDGE NO. 17
RAMP S-CARY OVER EAST-NORTH ROADWAY
FRAMING PLAN

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

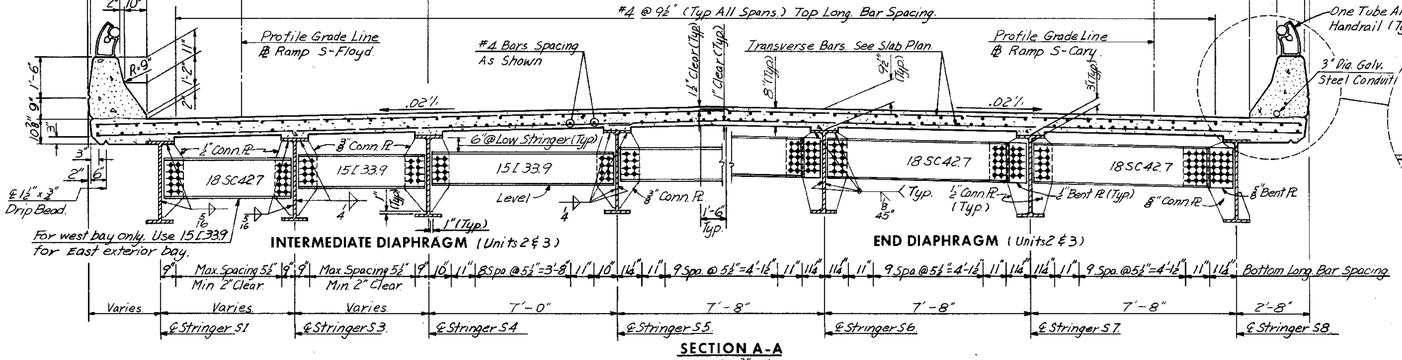
SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 8 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	138	155



DECK PLAN
Scale 1" = 15'-0"

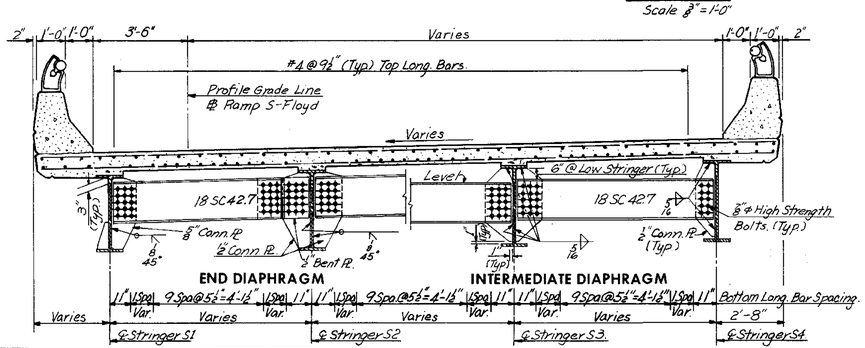
Note:
Section E-E Reinforcement similar to section A-A Reinforcement.
Section F-F Diaphragms similar to section C-C Diaphragms.
Section D-D similar to Section A-A.
For Framing plan see Sheet 8.
For Details A Through J see Sheet 10.
For Joint Details see Sheet 11 & 12.
For Standard handrail details see Sheet S2.
For Standard Electrical Details see Sheet S5.



INTERMEDIATE DIAPHRAGM (Units 2 & 3)

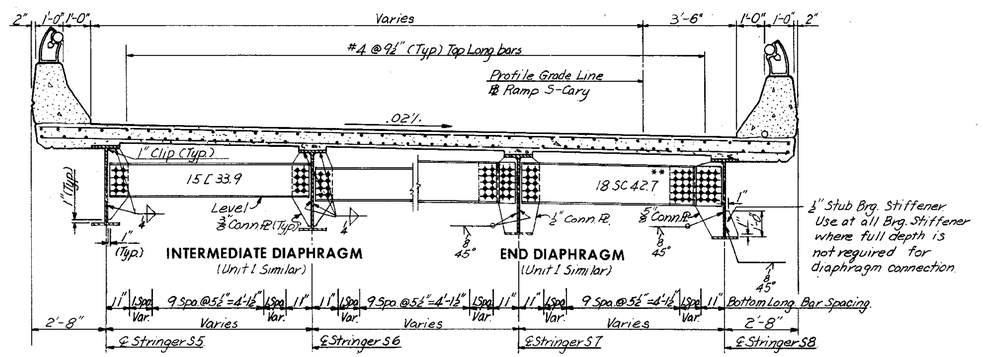
END DIAPHRAGM (Units 2 & 3)

SECTION A-A
Scale ⅜" = 1'-0"



END DIAPHRAGM **INTERMEDIATE DIAPHRAGM**

SECTION B-B
Scale ⅜" = 1'-0"



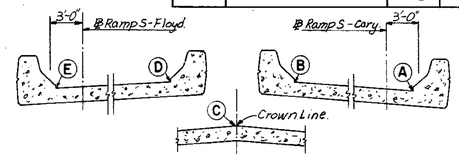
INTERMEDIATE DIAPHRAGM (Unit 1 Similar)

END DIAPHRAGM (Unit 1 Similar)

½" Stub Brg. Stiffener. Use at all Brg. Stiffener where full depth is not required for diaphragm connection.

SECTION C-C
Scale ⅜" = 1'-0"

**For Unit 1 use two rows of bolts



GUTTERLINE ELEVATION DIAGRAM
No Scale

GUTTERLINE ELEVATIONS

STATION ℄ S-Cary	ELEV. A	ELEV. B	ELEV. C	ELEV. D	ELEV. E	STATION ℄ S-Floyd
8+00	223.00	-	223.31	-	223.02	1+94.25
8+10	223.58	-	223.89	-	223.59	2+04.18
8+12.77	223.73	-	-	-	-	-
8+20	224.16	-	224.48	-	224.16	2+14.13
8+30	224.74	-	225.07	-	224.75	2+24.10
8+40	225.32	-	225.66	-	225.33	2+34.07
-	-	-	-	-	225.41	2+35.31
8+50	225.90	-	226.25	-	225.92	2+44.03
8+50.38	225.93	-	-	-	-	-
8+60	226.48	-	226.84	-	226.50	2+53.99
8+70	227.06	-	227.43	-	227.08	2+63.95
8+80	227.64	-	228.02	-	227.66	2+73.91
-	-	-	-	-	227.80	2+76.45
8+90	228.18	-	228.58	-	228.21	2+83.86
9+00	228.70	-	229.10	-	228.72	2+93.81
9+10	229.18	-	229.59	-	229.20	3+03.76
9+12.83	229.31	-	-	-	-	-
9+20	229.62	-	230.05	-	229.65	3+13.70
9+30	230.03	-	230.47	-	230.06	3+23.63
9+40	230.41	-	230.86	-	230.44	3+33.57
9+50	230.76	-	231.22	-	230.78	3+43.49
9+60	231.07	-	231.55	-	231.06	3+53.42
-	-	-	-	-	231.08	3+54.53
9+70	231.35	-	231.84	-	231.24	3+63.33
9+70.29	231.36	-	-	-	-	-
9+80	231.60	-	232.09	-	231.37	3+73.25
9+90	231.81	-	232.32	-	231.47	3+83.15
9+92.22	-	232.33	-	232.31	-	3+85.35
9+97.17	-	232.42		232.39	231.53	3+90
-	-	-		232.51	-	3+96.70
10+00	231.99	232.46		232.54	231.61	4+00
10+10	232.13	232.60		232.66	231.66	4+10
10+20	232.24	232.71		232.74	231.68	4+20
10+30	232.32	323.78		232.79	231.65	4+30
10+30.18	232.33	-		-	231.65	4+32.86
10+40	232.40	232.86		232.80	231.60	4+40
10+50	232.48	232.93		232.78	231.52	4+50
10+55.27	-	232.96		232.72	231.41	4+60
10+60	232.56	233.00		232.64	231.27	4+70
10+70	232.64	233.08		232.53	-	4+77.68
10+80	232.71	233.14		232.48	231.10	4+80
				232.29	230.90	4+90
				232.07	230.67	5+00
				231.80	230.41	5+10
				-	230.31	5+13.34
				231.51	230.12	5+20
				231.19	229.80	5+30

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.C.C.	11-23-67	3	As Builts	R.H.	2-5-73
CHECKED	AMH	2-28-68	2	Parapet	J.G.V.	12-70
IN CHARGE	FKO		1	General Revision	AMH	5-13-68

AS BUILT

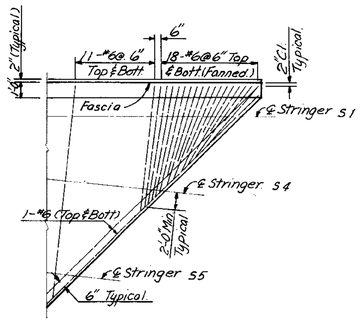
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

BRIDGE NO. 17
RAMP S-CARY OVER EAST-NORTH ROADWAY
DECK PLAN

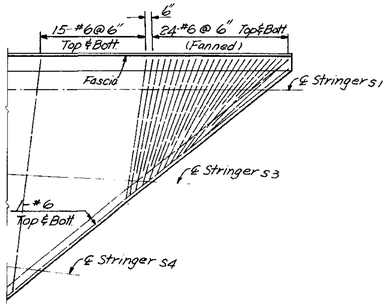
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 9 OF 14

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
4	BELTLINE EXPRESSWAY	139	155



DETAIL A
No Scale



DETAIL B
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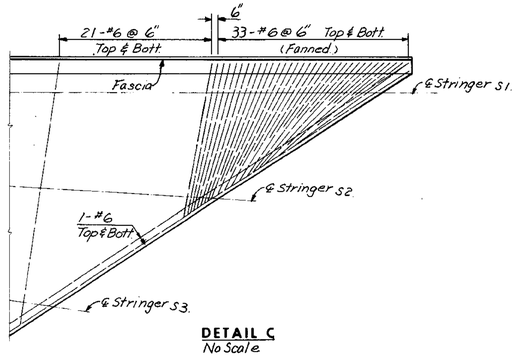

DETAIL C
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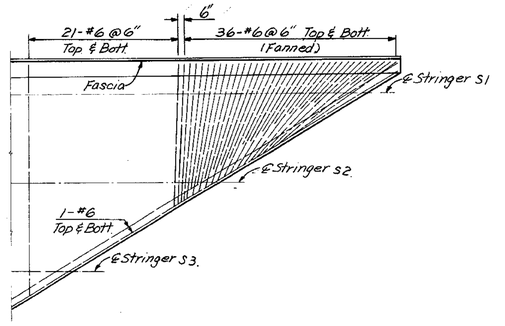
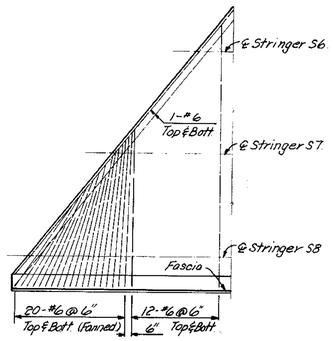


DETAIL D
No Scale



DETAIL E
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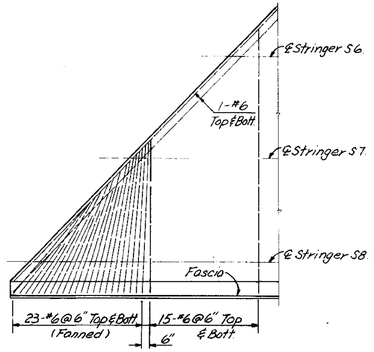
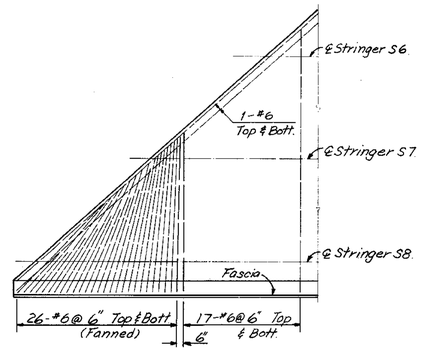


DETAIL F
No Scale



DETAIL G
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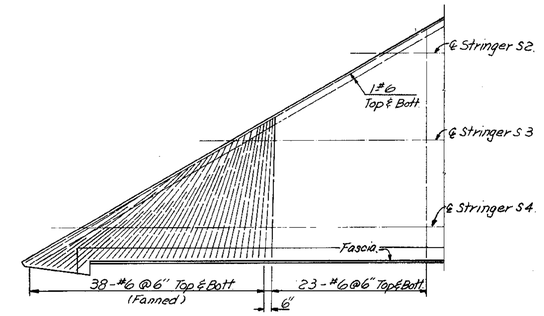
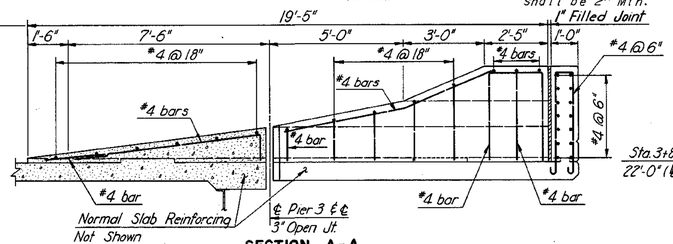
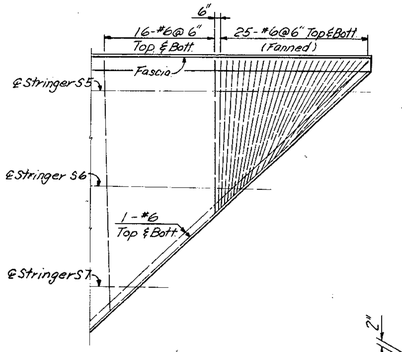


DETAIL H
No Scale

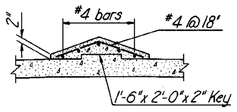
Note:
Clearance between Fanned Reinforcing Steel shall be 2" Min.



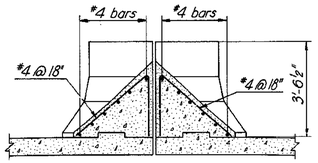
SECTION A-A
Scale: 3/8"=1'-0"



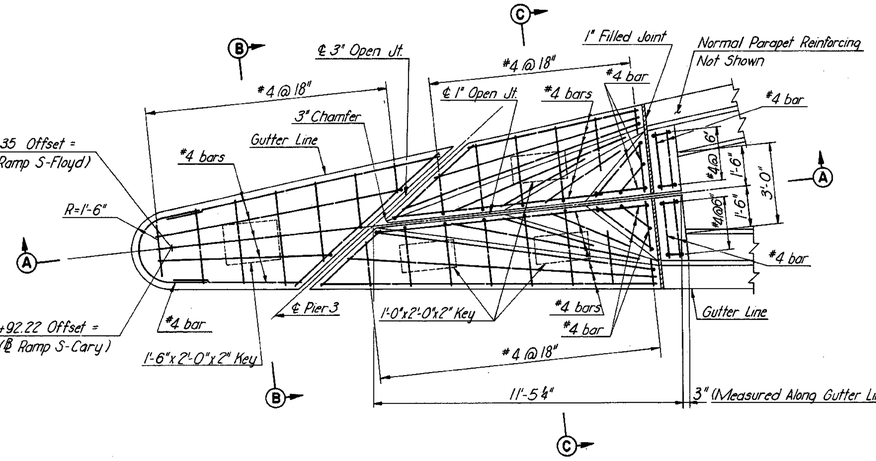
DETAIL J
No Scale



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



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



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

AS BUILT

Note:
For Joint details see Sheets 11 and 12
For Deck Plan see Sheet 9.
For Framing Plan see Sheet 8.
For location of Details see Sheet 9.

	BY	DATE				
MADE	G.C.C.	12-15-67				
CHECKED	S.S.W.	3-19-68	1	As Builts	R.H.	2-5-73
IN CHARGE	FKD		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
BELTLINE EXPRESSWAY

BRIDGE NO. 17
RAMP S-CARY OVER
EAST-NORTH ROADWAY

DECK DETAILS

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

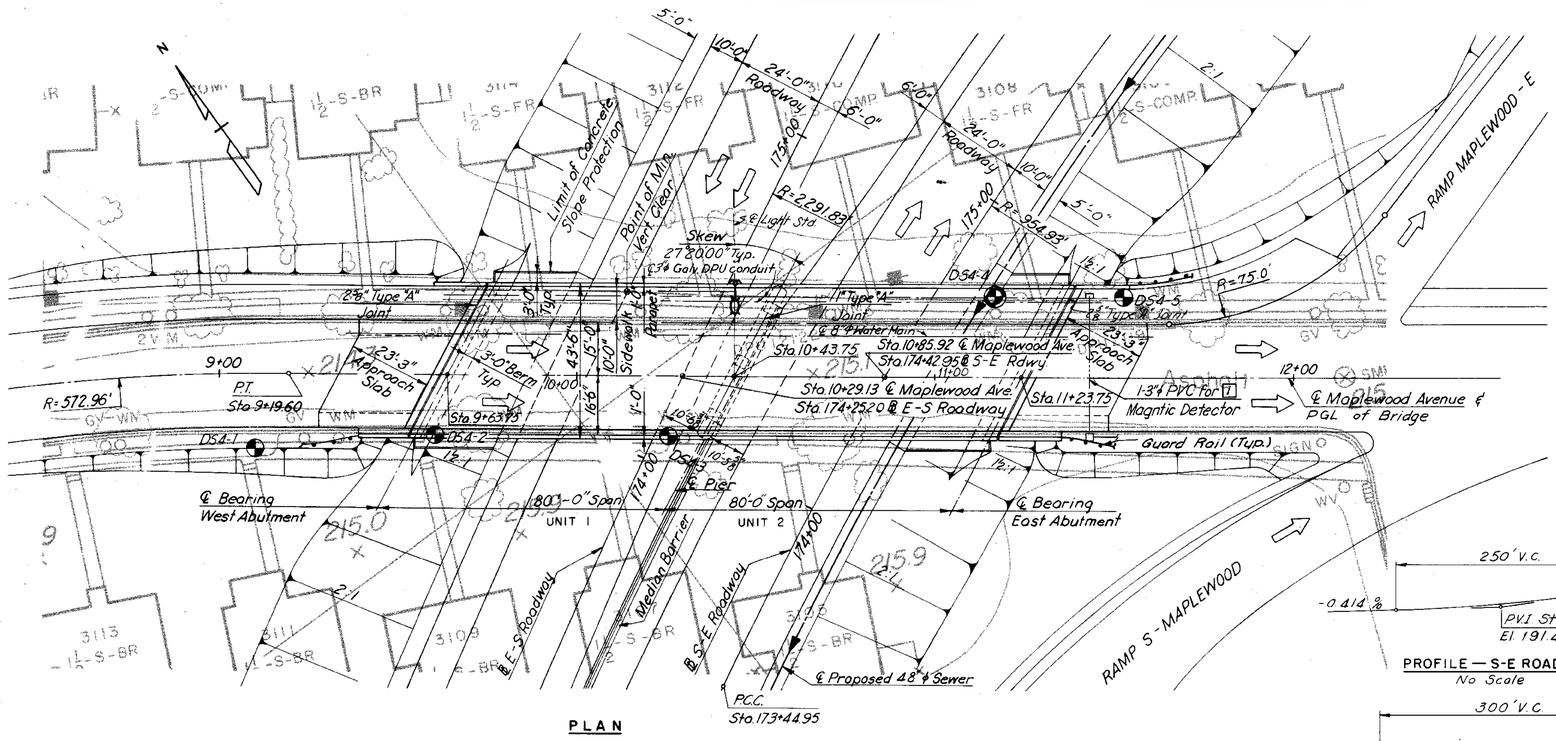
SCALE: As noted
CONTRACT NO.: 4
SHEET NO. 10 OF 14

Bridge 36

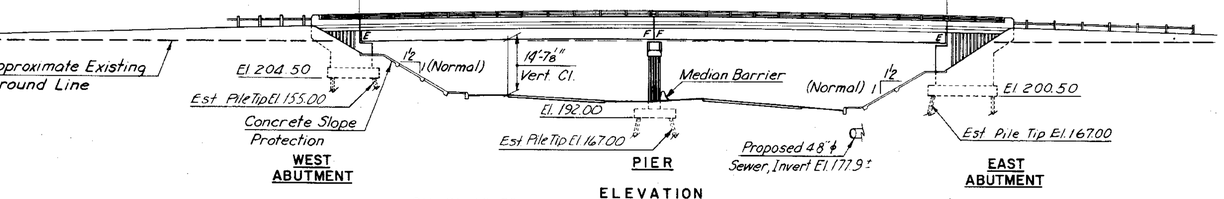
Maplewood Avenue
Over
The Connector to Downtown Expressway (VA 146)

Record Set Plans

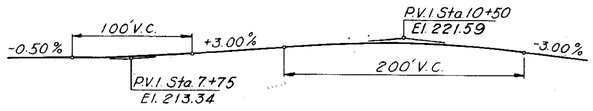
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	96	



PLAN

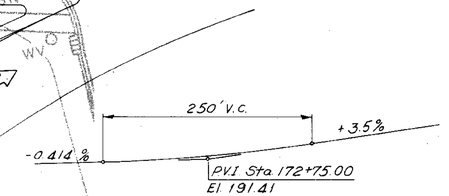


ELEVATION

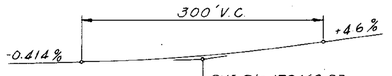


PROFILE - MAPLEWOOD AVENUE
No Scale

Note:
The cost of furnishing and installing 2" ϕ and 3" ϕ galvanized steel conduit shall be included in the bid price for the item "Metal Conduit."



PROFILE — S-E ROADWAY
No Scale



PROFILE — E-S ROADWAY
No Scale

GENERAL NOTES

ROADWAY: 36'-4" Face of rail to edge of sidewalk.

CAPACITY: Dead Load-Includes 15 lbs. per sq. ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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, 1969 and 1970-72 Interim Specifications, 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 on the plan 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. Found. mat'l. shall be kept dry & special attn. is called to Sec. 401.05 of the Gen. Specs. & to the Contract Special Prov. concerning preparation of found. for ftgs.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other 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 gradient is over 2%).

Finishing concrete surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall be intermediate grade. 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. Specification A36 except as noted.

All Field connections shall be made with high strength bolts. High strength bolts shall be ¾" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

BENCH MARK: C-11. Copper Weld Rod, South side of Maplewood Ave. at Belmont Ave. Elev. 215.37.

INDEX	
NO.	DESCRIPTION
1	GENERAL PLAN AND ELEVATION
2	WEST ABUTMENT
3	EAST ABUTMENT
4	ABUTMENT DETAILS
5	PIER
6	FRAMING PLAN
7	DECK PLAN AND CROSS SECTION
8	JOINT DETAILS
9	APPROACH SLAB & SLOPE PROTECTION DETAILS
10	BORING LOGS
S1	STANDARD SHOE DETAILS
S3	STANDARD ALUMINUM RAILING DETAILS (2 RAILS)
S4	STANDARD ELECTRICAL DETAILS
S7 TO S9	STANDARD ARCHITECTURAL DETAILS
S11	STANDARD GAS AND WATER MAIN SUPPORT DETAILS
S13	LIMITS OF EXCAVATION AND BACKFILL

Indicates 2½" ϕ cased hole boring.
Indicates 4" ϕ cased hole boring.

ESTIMATE OF QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A4 C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 APPR. SLABS C.Y.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAIL) L.F.	POROUS BACKFILL C.Y.	REINFORCING STEEL LBS	STEEL PILES 10 BP 42 L.F.	CONC. SLAB SLOPE PROT. S.Y.	ASPHALT DAMPPROOFING S.Y.	UNDERDRAIN 6"ϕ PIPE L.F.	WATER MAIN 8"ϕ L.F.	METAL CONDUIT L.F.	3" ϕ [1] PVC CONDUIT L.F.
SUPERSTRUCTURE		276.2			270,749	327		53,067					213	1,176	34
WEST ABUTMENT	218.6		143.0			23	12.3	7,081	864.2	150.2	57	57			
EAST ABUTMENT	454.0		215.0			31.4	43	13,320	1,291.4	133.1	107	60			
PIER	131.4		82.7					12,264	480.2						
APPROACH SLABS				86				22,420							
TOTAL	804.0	276.2	440.7	86	270,749	381.4	55.3	108,152	2035.8	283.3	164	117	213	1,176	34

	BY	DATE	NO.	REVISION	BY	DATE
MADE	LCC	1-3-68	2	As Built	T.E.M.	9-75
CHECKED	TCY	9-12-68	1	Add PVC Cond.	TEM	1-31-74
IN CHARGE	AGC					

AS BUILT

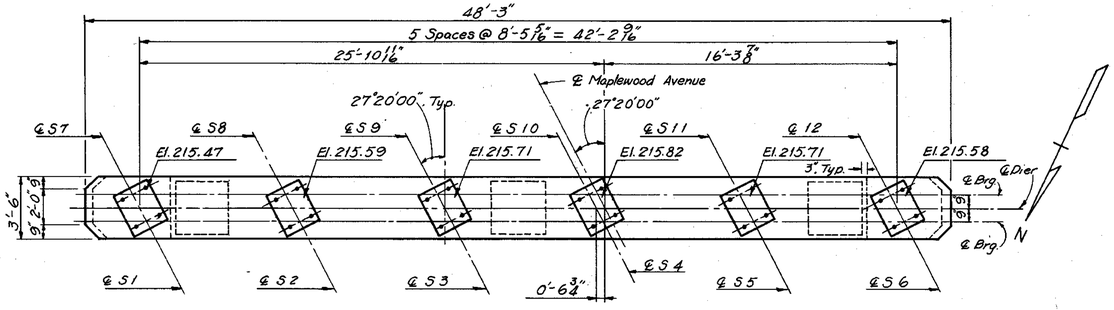
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 36
MAPLEWOOD AVENUE OVER
DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

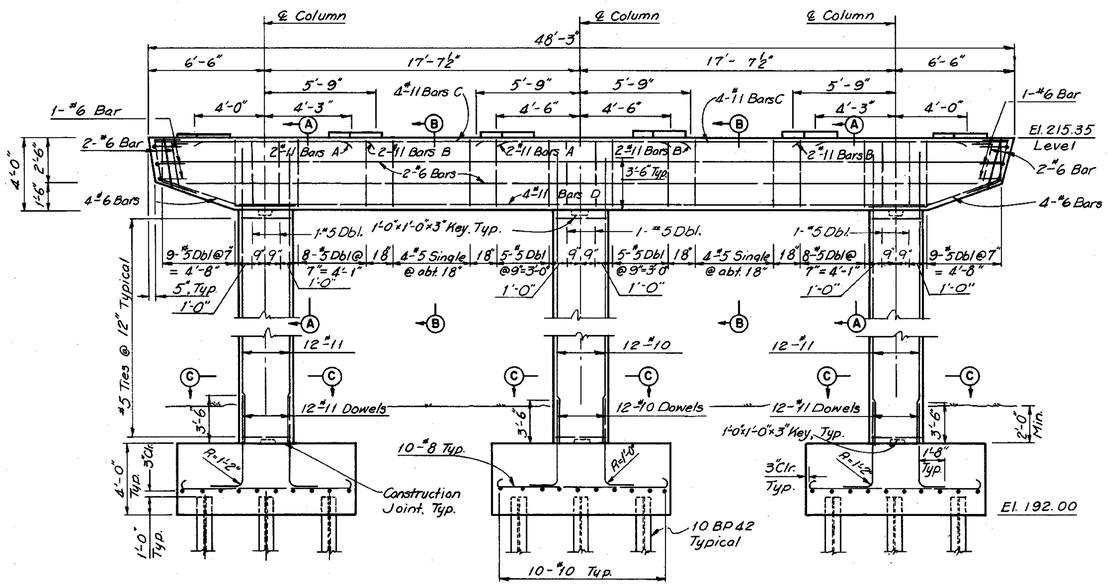
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"= 20' UNLESS NOTED
CONTRACT NO.: 7
SHEET NO. 1 OF 10

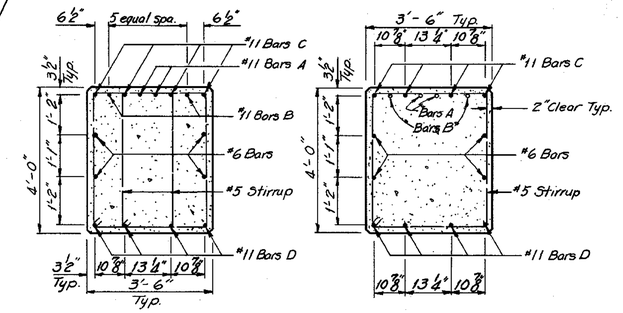
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
.7	DOWNTOWN EXPRESSWAY	100	



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

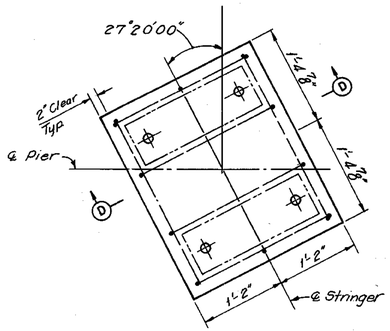


FRONT ELEVATION
Scale: 1/4"=1'-0"

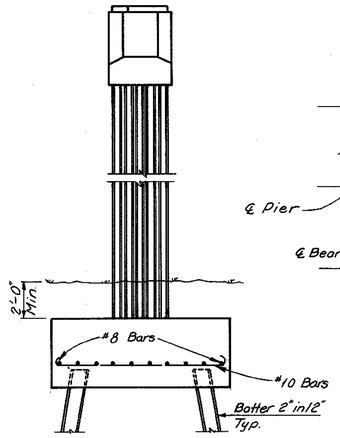


SECTION A-A
Scale: 1/2"=1'-0"

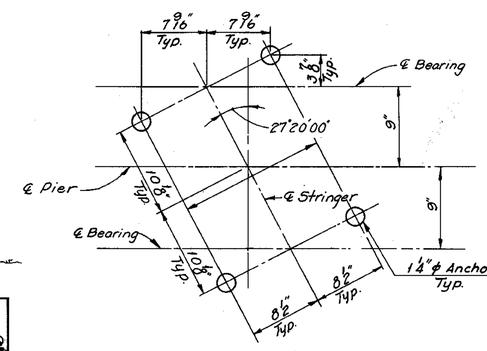
SECTION B-B
Scale: 1/2"=1'-0"



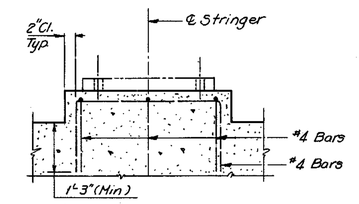
PAD REINFORCING DETAIL
Scale 1"=1'-0"



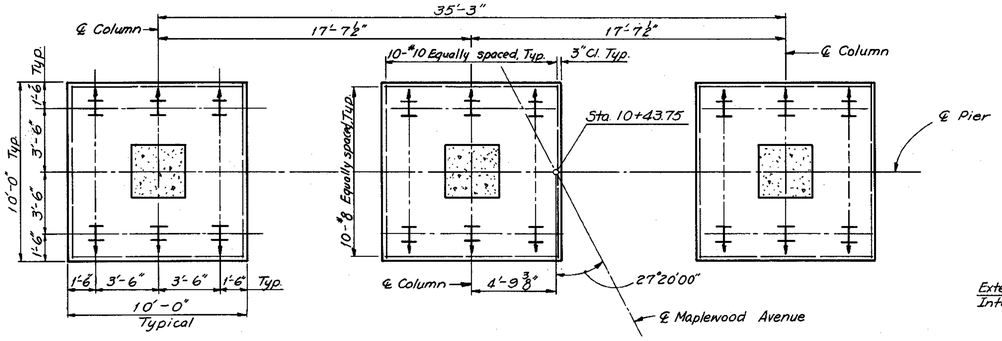
END ELEVATION
Scale: 1/4"=1'-0"



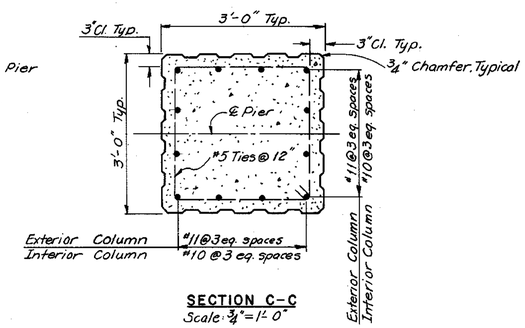
ANCHOR BOLT SETTING PLAN
Scale: 1 1/2"=1'-0"



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



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



SECTION C-C
Scale: 3/4"=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.
All piles shall be 10 BP 42. (Des. cap = 45 T.)
Pad reinforcing is required in S3 through S5 and S9 through S11 only.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	LCC	1-2-68				
CHECKED	A.M.	2-8-68		As Built		
IN CHARGE	R. G. C.					

AS BUILT

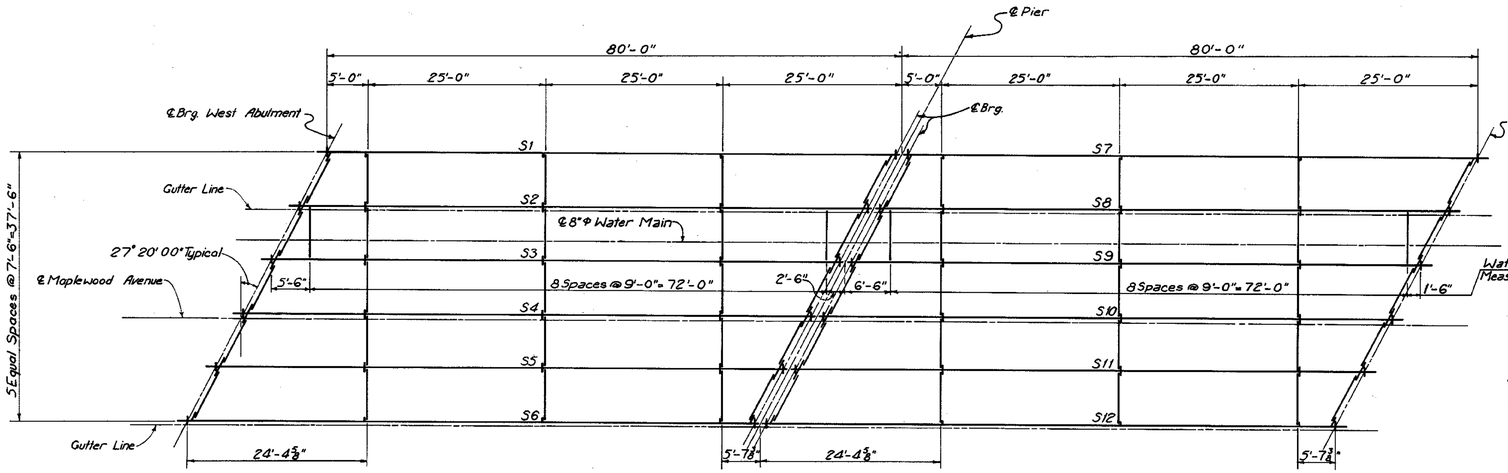
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 36
MAPLEWOOD AVENUE OVER
DOWNTOWN EXPRESSWAY
PIER

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

SCALE: As Noted
CONTRACT NO.: 7
SHEET NO. 5 OF 10

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

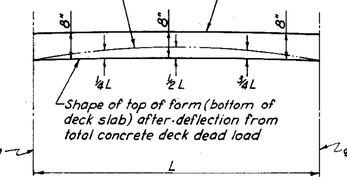


FRAMING PLAN
1" = 10'-0"

N

Shape of top of form before any deck slab concrete is cast

Finished top of slab after full dead load deflection



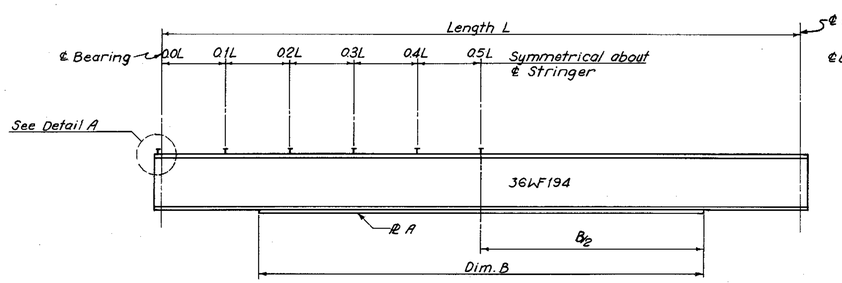
DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

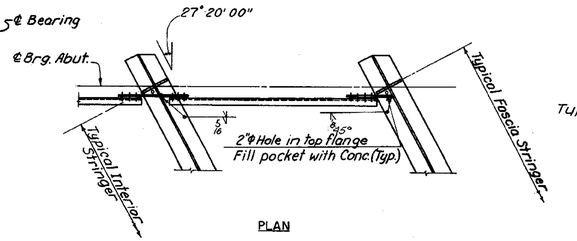
The given deflections are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.

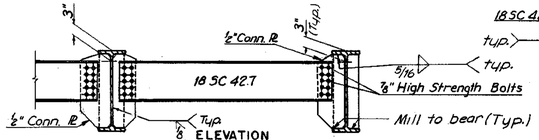
DEFLECTION SCHEDULE		
STRINGER	¼L & ¾L	½L
S1	1 9/16"	2 1/8"
S2	1 9/16"	1 9/16"
S3, S4 & S5	1 1/4"	1 3/4"
S6	1 3/8"	1 5/16"
S7	1 9/16"	2 1/2"
S8	1 5/16"	1 13/16"
S9, S10 & S11	1 1/4"	1 3/4"
S12	1 3/8"	1 5/16"



STRINGER ELEVATION

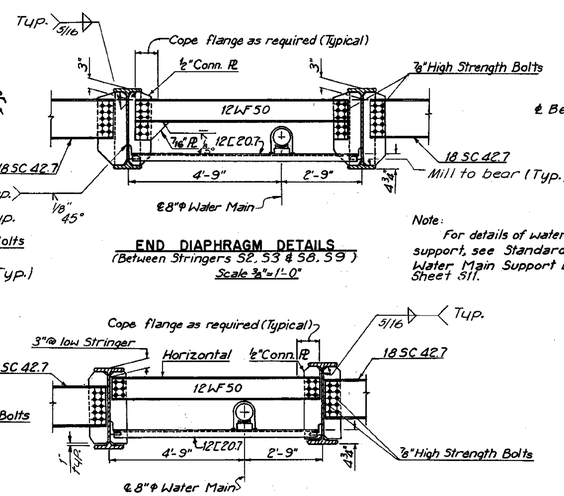


PLAN



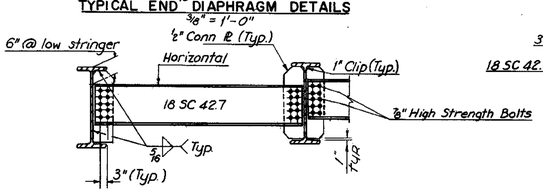
ELEVATION

TYPICAL END DIAPHRAGM DETAILS
⅜" = 1'-0"



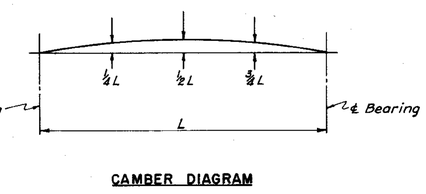
END DIAPHRAGM DETAILS
(Between Stringers S2, S3 & S8, S9)
Scale ⅜"=1'-0"

Note:
For details of water main support, see Standard Gas and Water Main Support Details Sheet S11.



TYPICAL INTERMEDIATE DIAPHRAGM
⅜" = 1'-0"

INTERMEDIATE DIAPHRAGM DETAILS
(Between Stringers S2, S3 & S8, S9)
Scale: ⅜"=1'-0"



CAMBER DIAGRAM

STRINGER SCHEDULE										
STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	℄ A	DIM. B	SHEAR STUD SPACING .0L-.1L*	.1L-.2L	.2L-.3L	.3L-.4L	.4L-.5L	BEARING STIFFENER	SHOE TYPE LT. END	SHOE TYPE RT. END
S1	79'-1⅞"	10½"x1⅝"	60'	12"	15"	20"	24"	24"	5"x⅝"	E3	F12M
S2	79'-1⅞"	10½"x2"	68'	8"	9"	11"	14"	18"	5"x⅝"	E3	F12
S3 & S4 & S5	79'-1⅞"	10½"x1⅝"	64'	9"	11"	13"	15"	20"	5"x⅝"	E3	F12
S6	79'-1⅞"	10½"x1⅜"	64'	9"	11"	13"	15"	20"	5"x⅝"	E3	F12M
S7	79'-1⅞"	10½"x1⅝"	60'	12"	15"	20"	24"	24"	5"x⅝"	F12M	E3
S8	79'-1⅞"	10½"x2"	68'	8"	9"	11"	14"	18"	5"x⅝"	F12	E3
S9, S10 & S11	79'-1⅞"	10½"x1⅝"	64'	9"	11"	13"	15"	20"	5"x⅝"	F12	E3
S12	79'-1⅞"	10½"x1⅜"	64'	9"	11"	13"	15"	20"	5"x⅝"	F12M	E3

CAMBER SCHEDULE		
STRINGER	¼L & ¾L	½L
S1	2 1/16"	2 7/8"
S2	1 7/8"	2 9/16"
S3, S4 & S5	1 5/16"	2 11/16"
S6	1 5/16"	2 11/16"
S7	2 1/16"	2 7/8"
S8	1 7/8"	2 9/16"
S9, S10 & S11	1 5/16"	2 11/16"
S12	1 5/16"	2 11/16"

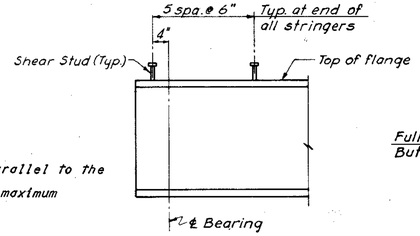
NOTE TO FABRICATOR

The above stringers shall be fabricated with an upward camber amounting to the tabulated value.

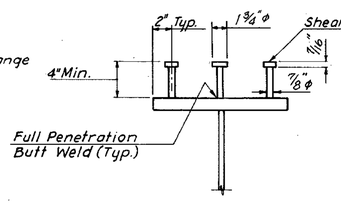
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.

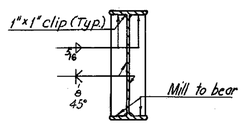
* Denotes spacing which begins at termination of 5 spaces at 6".



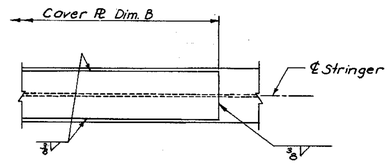
DETAIL "A"



SHEAR STUD DETAIL



BEARING STIFFENER
½" = 1'-0"



COVER PLATE DETAIL
No Scale

SHEAR STUD NOTES

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

Shear stud spacing shown is maximum spacing.

	BY	DATE				
MADE	O.T.M.	11-20-67				
CHECKED	LCC	1-22-68		As Built		
IN CHARGE	R. G. C.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

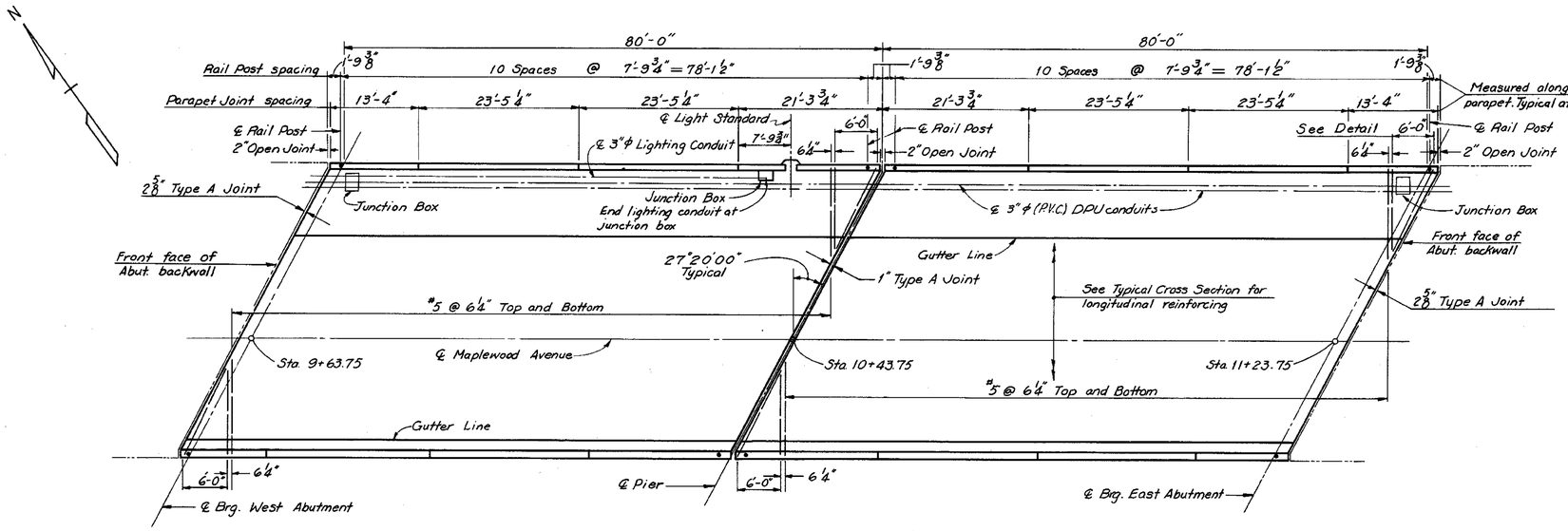
BRIDGE NO. 36
MAPLEWOOD AVENUE OVER
DOWNTOWN EXPRESSWAY
FRAMING PLAN

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

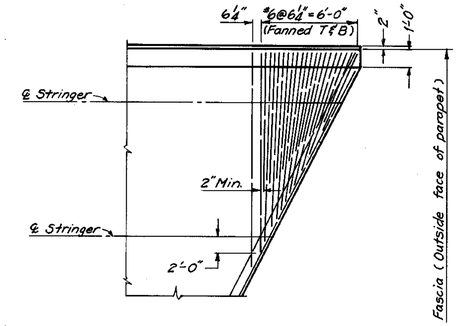
SCALE: As Shown
CONTRACT NO.: 7
SHEET NO. 6 OF 10

101

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

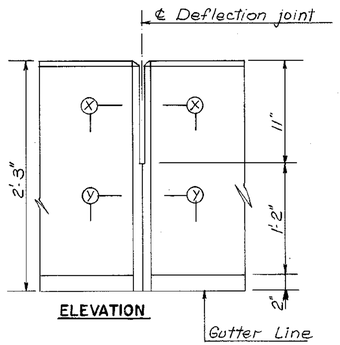


DECK PLAN
1" = 10'



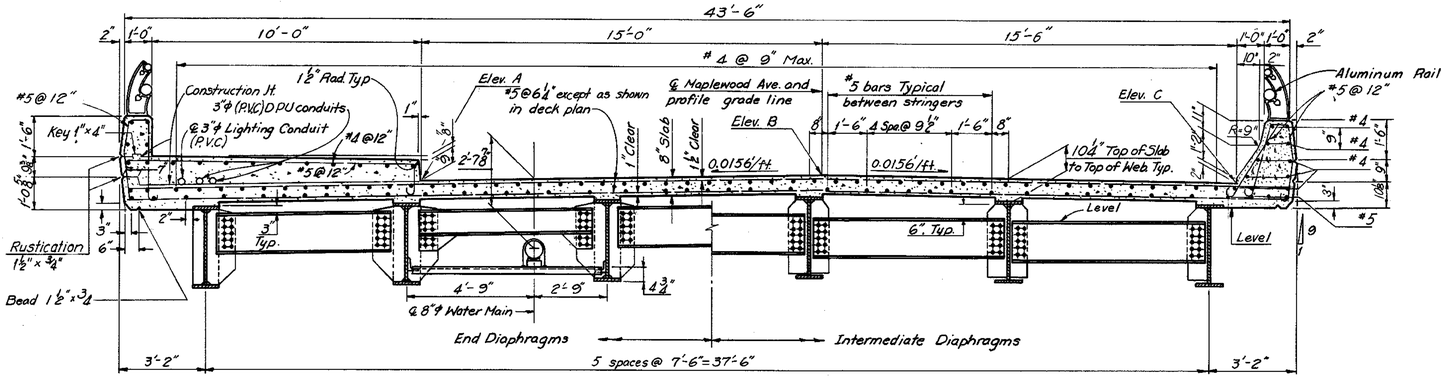
TYPICAL ACUTE CORNER REINFORCING DETAIL
No Scale

3 Junction Boxes
2 each 2'-0" x 1'-11"
1 each 2'-0" x 1'-1½"

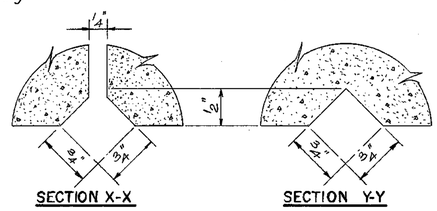


ELEVATION

ROADWAY ELEVATIONS			
LOCATION	ELEV. A	ELEV. B	ELEV. C
Front Face W. Abut. Bkwall	218.89	218.93	218.47
¼ Point	219.32	219.41	219.00
½ Point	219.62	219.76	219.40
¾ Point	219.80	219.98	219.67
Center Line Pier	219.86	220.08	219.82
¼ Point	219.78	220.06	219.84
½ Point	219.59	219.91	219.74
¾ Point	219.27	219.64	219.51
Front Face E. Abut. Bkwall	218.82	219.24	219.16



TYPICAL CROSS SECTION
⅜" = 1'-0"



⚠ PARAPET DEFLECTION JOINT DETAILS

Notes:
Minimum splice length for #4 bar is 1'-3" and #5 bar is 1'-7".
For details of water main support, see Standard Gas and Water Main Support Details Sheet S11.
For Lighting details and DPU conduit details, see Standard Electrical Details (Bridge Carrying City Street) Sheet S4.

	BY	DATE				
MADE	LCC	11-14-67	2	As Built	TEM	9-75
CHECKED	O.M.	12-9-68	1	PARAPET JOINT ADDED.	T.E.M.	7.74
IN CHARGE	R.G.C.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 36
MAPLEWOOD AVENUE OVER
DOWNTOWN EXPRESSWAY

DECK PLAN AND CROSS SECTION

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

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

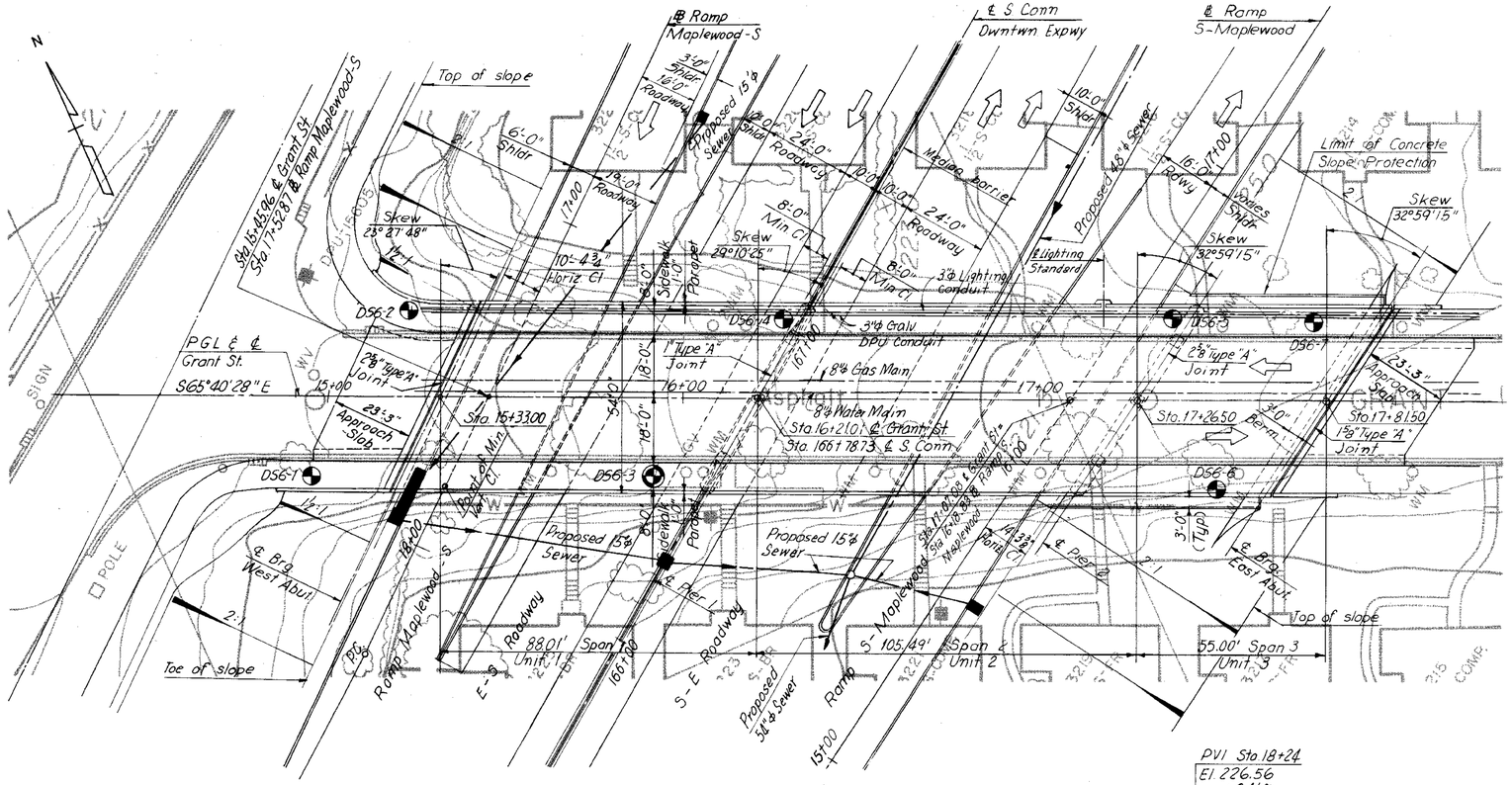
102

Bridge 37

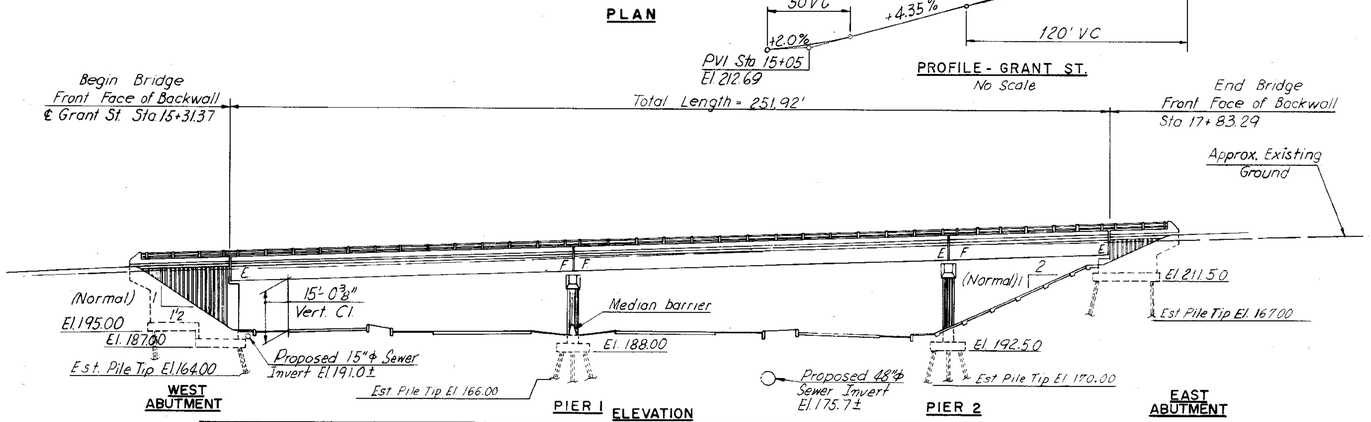
Grant Street
Over
The Connector to Downtown Expressway (VA 146)

Record Set Plans

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



PLAN



ELEVATION

GENERAL NOTES

ROADWAY: One 36'-0" Clear roadway. Two 8'-0" sidewalks.

CAPACITY: Dead Load-Includes 15 lbs. per sq. ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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. 1969 and 1970-72 Interim Specifications, modified by Special Provision.
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 on the plan 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. Found. mat'l. shall be kept dry & special attn. is called to Sec. 401.05 of the Gen. Specs. & to the Contract Special Prov. concerning preparation of found. for ftgs.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other 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 gradient is over 2%).

Finishing concrete surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall be intermediate grade. 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. Specification A36 except as noted.

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. All shop welded web splices, flange splices and web to flange welds shall be made by the submerged arc process.

BENCH MARK: B-13. Copper Weld Rod, N.E. corner of McCloy and Grant St. Elev. 204.98'

◔ Indicates 2½" ø cased hole boring.

◓ Indicates 4" ø cased hole boring.

INDEX	
NO	DESCRIPTION
1	GENERAL PLAN AND ELEVATION
2 & 3	WEST ABUTMENT
4	EAST ABUTMENT
5	ABUTMENT DETAILS
6	PIER 1
7	PIER 2
8	FRAMING PLAN
9	DECK PLAN AND CROSS SECTION
10	JOINT DETAILS
11	APPROACH SLAB & SLOPE PROTECTION DETAILS
12 & 13	BORING LOGS
S1	STANDARD SHOE DETAILS
S3	STANDARD ALUMINUM RAILING DETAILS (2 RAIL)
S4	STANDARD ELECTRICAL DETAILS
S7-S9	STANDARD ARCHITECTURAL DETAILS
S11	STANDARD GAS & WATER MAIN SUPPORT DETAILS
S13	LIMITS OF EXCAVATION & BACKFILL

ESTIMATE OF QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A4 C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 APPR. SLAB C.Y.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAIL) L.F.	POROUS BACKFILL C.Y.	REINFORCING STEEL LBS.	STEEL PILES 10 BP 42 L.F.	CONC. SLAB SLOPE PROT. S.Y.	ASPHALT DAMP PROOFING S.Y.	UNDER DRAIN 6" Ø PIPE L.F.	GAS MAIN 8" Ø L.F.	WATER MAIN 8" Ø L.F.	METAL CONDUIT L.F.
SUPERSTRUCTURE		538.6			490,258	504		102,177					312	316	837
WEST ABUTMENT	777.4		395.0			60	130	82,554	1390.7	10.2	226	127			
EAST ABUTMENT	319.7		152.0			25	19	8,107	894.8	439.3	75	90			
PIER 1	131.7		123.2					24,147	561.6						
PIER 2	51.4		92.5					20,668	633.4						
APPROACH SLABS				97				28,426							
TOTAL	1280.2	538.6	762.7	97	490,258	589	149	216,079	3480.5	449.5	301	217	312	316	837

Notes;
The cost of furnishing and installing 2" ø and 3" ø galvanized steel conduit shall be included in the bid price for the item, "Metal Conduit".

	BY	DATE
MADE	TCY	2-16-68
CHECKED	ICH	2-29-68
IN CHARGE	RGC	

NO.	REVISION	BY	DATE
1	As Built	TEM	9-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

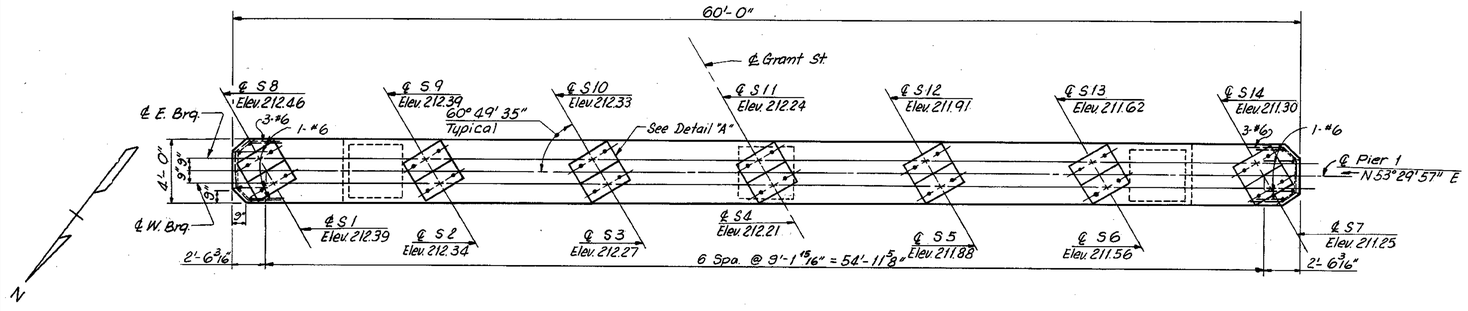
BRIDGE NO. 37
GRANT STREET OVER SOUTH CONNECTION DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

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

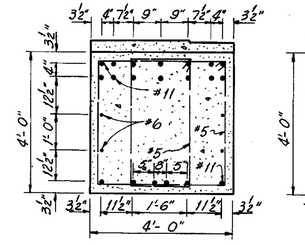
SCALE: 1"=20'
CONTRACT NO.: 7
SHEET NO. 1 OF 13

106

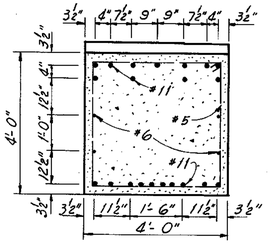
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	///	



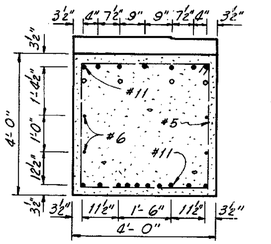
PLAN
Scale 1/8"=1'



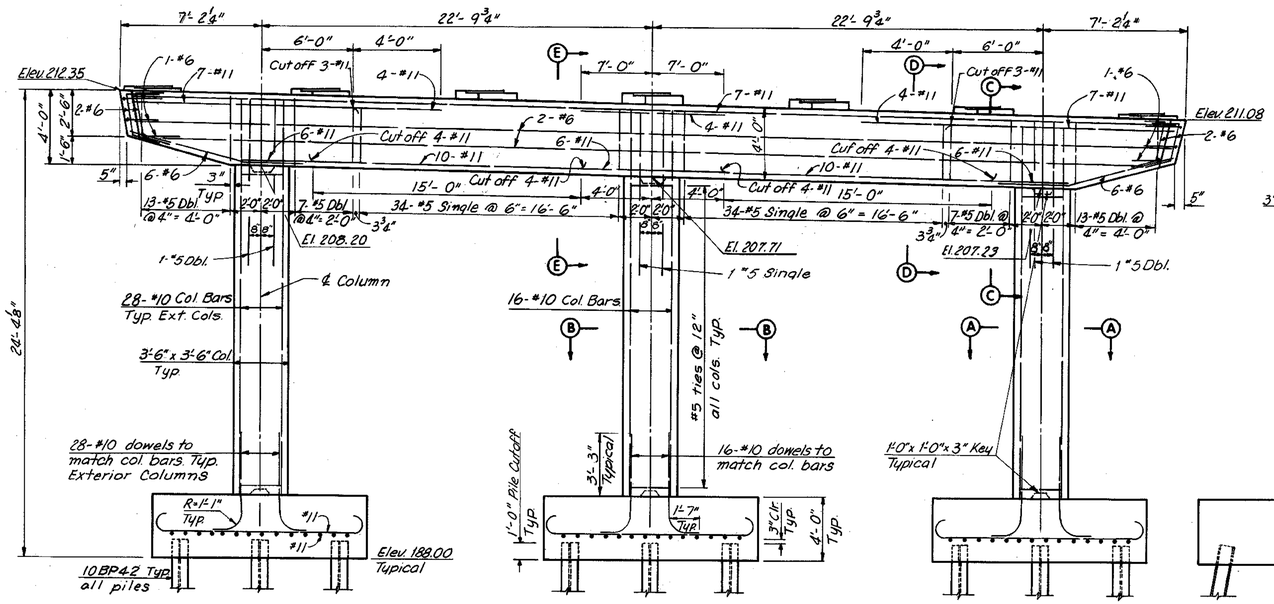
SECTION C-C
Scale 1/2"=1'



SECTION D-D
Scale 1/2"=1'



SECTION E-E
Scale 1/2"=1'

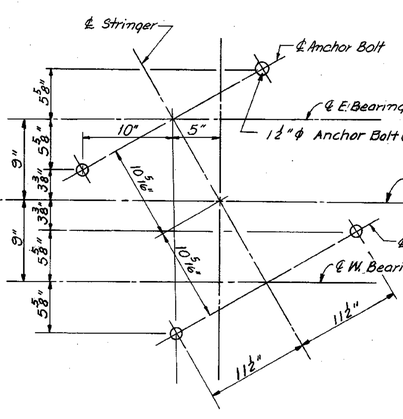


ELEVATION
Scale 1/4"=1'

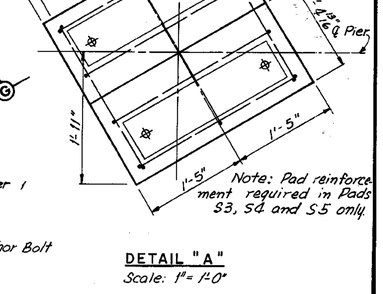
END VIEW
Scale: 1/4"= 1'-0"

Note:
For architectural treatment of columns see Standard Architectural Details sheet 37

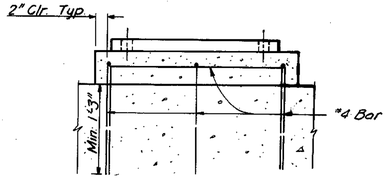
FOOTING PLAN
Scale 1/4"=1'



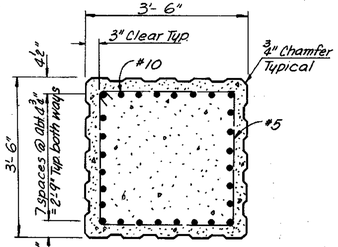
LOCATION OF ANCHOR BOLTS
Scale: 1½"= 1'-0"



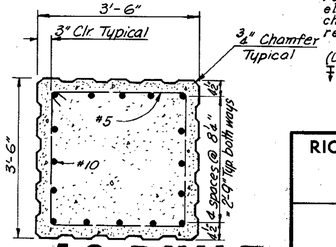
DETAIL "A"
Scale: 1"= 1'-0"



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



SECTION A-A
Scale: ¾"= 1'-0"



AS BUILT

SECTION B-B
Scale: ¾"= 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 from more than 2 ft., redesign will be required.
All piles shall be 10 BP 42 Steel Piles (Design Capacity = 45 tons).
‡ Denotes pile battered 2 in 12 in direction shown

	BY	DATE				
MADE	TCY	1-31-68				
CHECKED	ICH	2-20-68	1	As Built	TEM	9-75
IN CHARGE	R.G.C.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

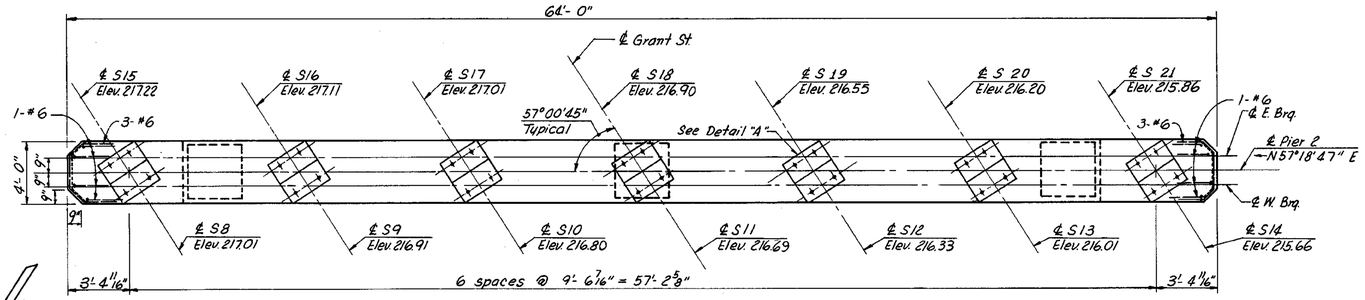
BRIDGE NO. 37
GRANT STREET OVER SOUTH CONNECTION DOWNTOWN EXPRESSWAY
PIER I

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

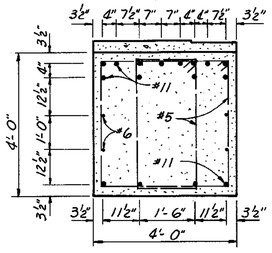
SCALE: As Shown
CONTRACT NO.: 7
SHEET NO. 6 OF 13

///

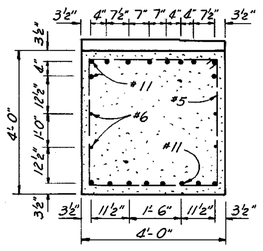
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	112	



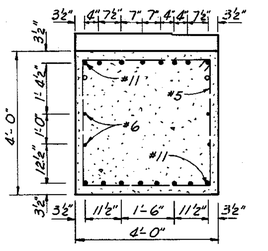
PLAN
Scale: 1/4"=1'0"



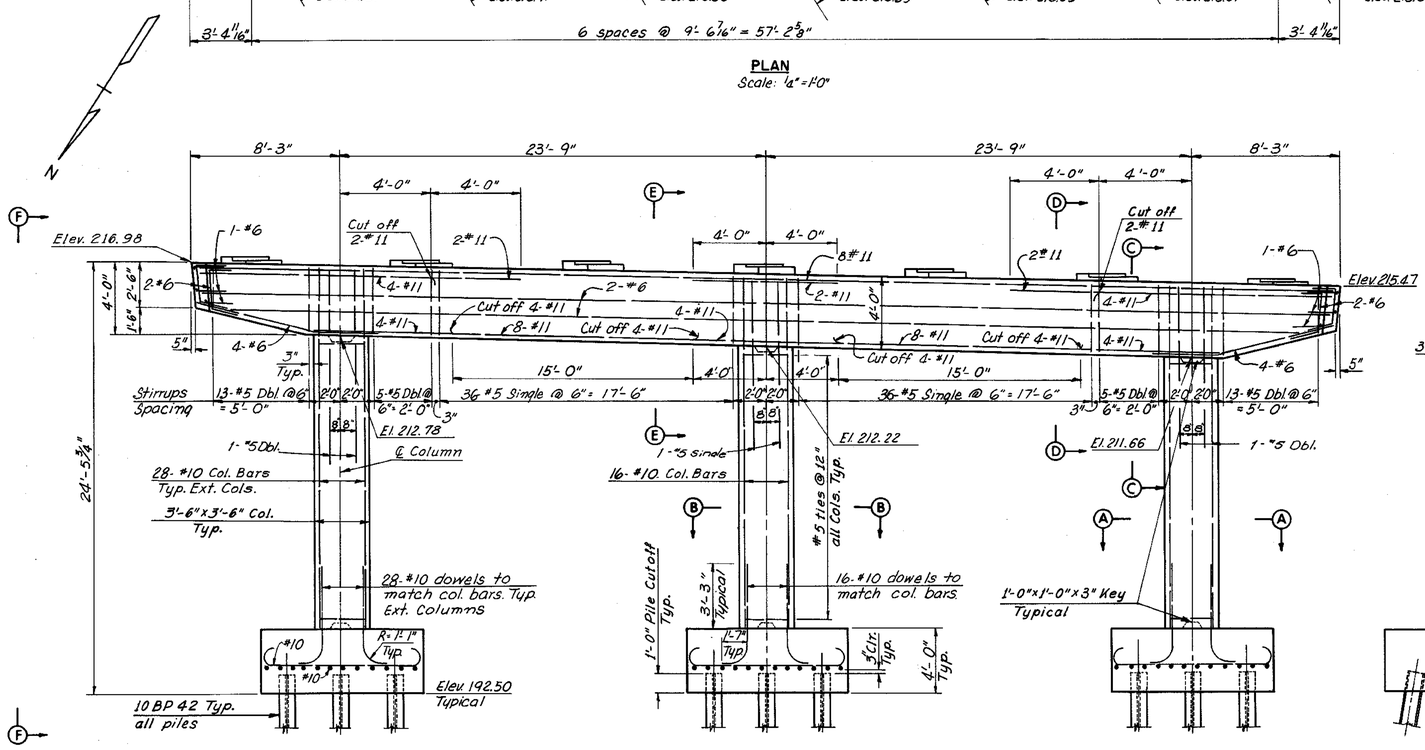
SECTION C-C
Scale: 1/2"= 1'-0"



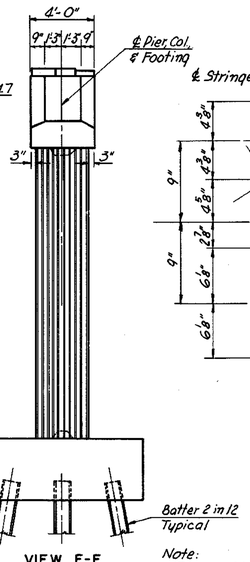
SECTION D-D
Scale: 1/2"= 1'-0"



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

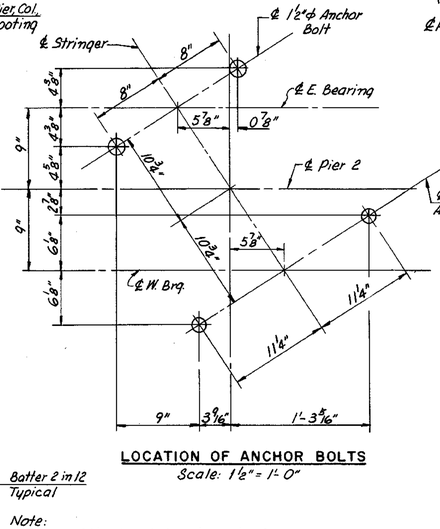


ELEVATION
Scale: 1/4"= 1'-0"

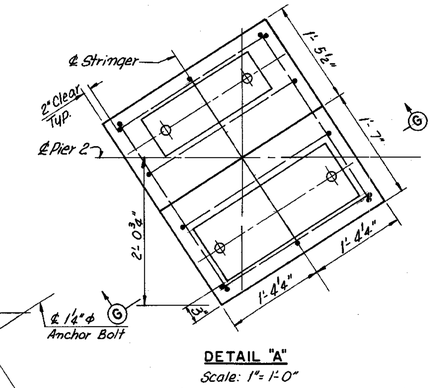


VIEW F-F
Scale: 1/4"= 1'-0"

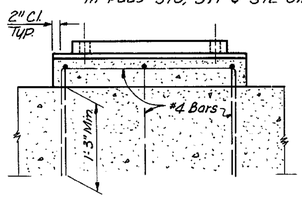
Note:
For architectural treatment of columns see Standard Architectural Details Sheet S7.



LOCATION OF ANCHOR BOLTS
Scale: 1½"= 1'-0"

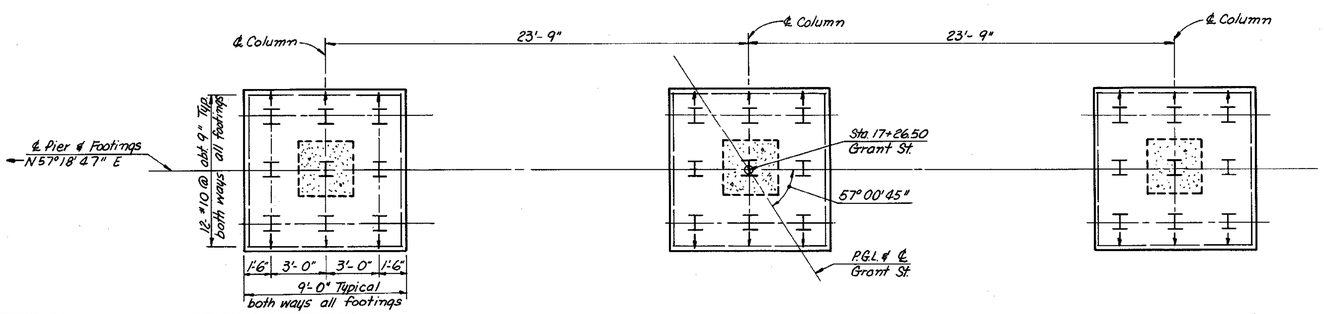


DETAIL "A"
Scale: 1"= 1'-0"
Note: Pad reinforcement required in Pads S10, S11 & S12 only.

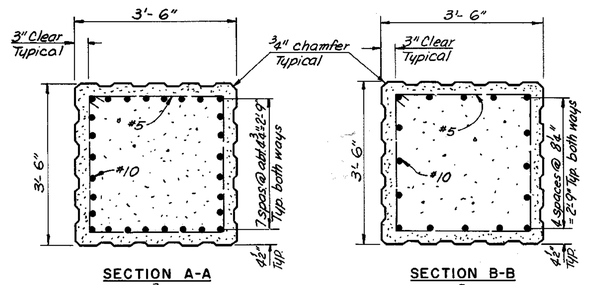


SECTION G-G
Scale: 1"= 1'-0"

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.
All piles shall be 10 BP 42 Steel Piles (Design Capacity = 45 tons).
‡ Denotes pile battered 2 in 12 in direction of arrow



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



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

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

	BY	DATE				
MADE	TCY	1-31-68				
CHECKED	ICH	2-20-68	1	As Built	TEM	9-75
IN CHARGE	R. G. C.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 37
GRANT STREET OVER SOUTH CONNECTION DOWNTOWN EXPRESSWAY
PIER 2

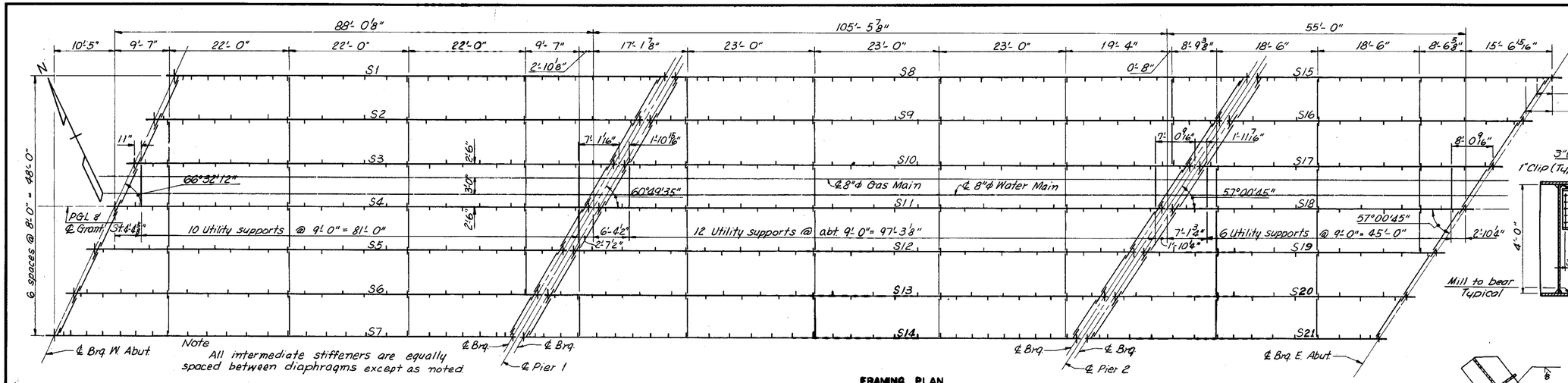
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO.: 7
SHEET NO. 7 OF 13

AS BUILT

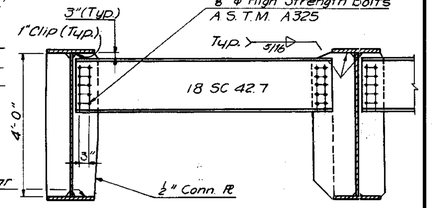
112

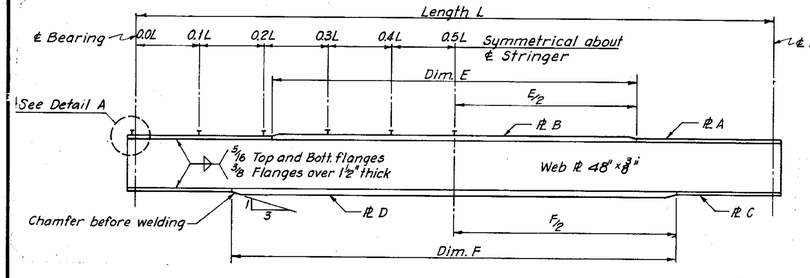
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	113	



Note
All intermediate stiffeners are equally spaced between diaphragms except as noted.

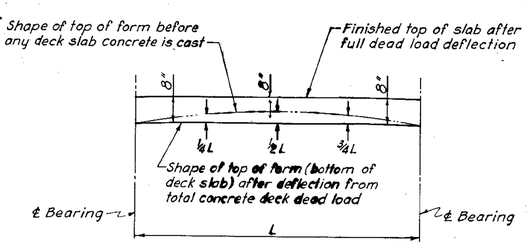
½ Intermediate Stiffener Space
Intermediate Stiffener Space
Typical all stringer ends



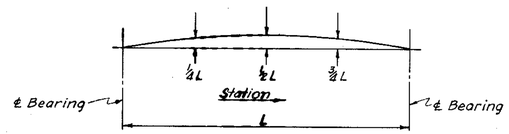


STRINGER ELEVATION

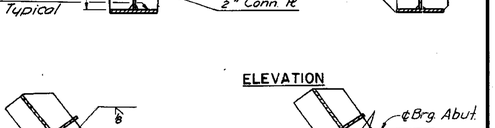
FRAMING PLAN
1" = 10'



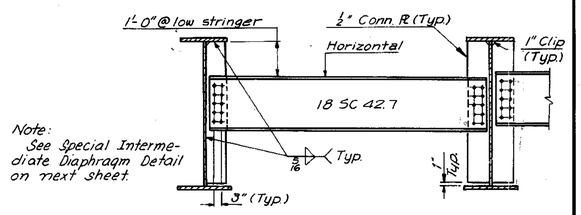
DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM



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



Note:
See Special Intermediate Diaphragm Detail on next sheet.

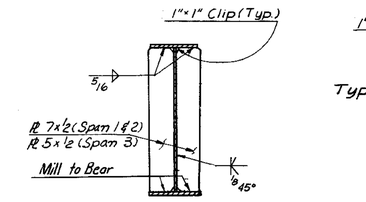
TYPICAL INTERMEDIATE DIAPHRAGM
½" = 1'-0"

STRINGER SCHEDULE														
STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	PL A	PL B	PL C	PL D	DIM. E	DIM. F	SHEAR STUD SPACING .0L-.1L*	.1L-.2L	.2L-.3L	.3L-.4L	.4L-.5L	BEARING STIFFENER	SHOE TYPE LT. END	SHOE TYPE RT. END
S1	90'-1⅝"	16x1¼	16x1¼	18x1¼	18x1¾	——	56'-6"	12"	15"	20"	24"	24"	2-7x½	E6	F4M
S2	89'-1 11/16"	16x1½	16x1¼	18x1¼	18x1¾	——	55'-3"	11½"	13½"	16"	19½"	24"	2-7x½	E6	F4
S3	88'-⅜"	16x1¼	16x1¼	18x1¼	18x1¾	——	54'-8"	11½"	13½"	16"	19½"	24"	2-7x½	E6	F4
S4	87'-1 13/16"	16x1¼	16x1¼	18x1¼	18x1¾	——	54'-0"	11½"	13½"	16"	19½"	24"	2-7x½	E6	F4
S5	86'-1 15/16"	16x1¼	16x1¼	18x1¼	18x1¾	——	53'-5"	11½"	13½"	16"	19½"	24"	2-7x½	E6	F4
S6	85'-2"	16x1¼	16x1¼	18x1¼	18x1¾	——	52'-9"	11½"	13½"	16"	19½"	24"	2-7x½	E6	F4
S7	84'-2 1/16"	16x1¼	16x1¼	18x1¼	18x1¾	——	52'-9"	12"	15"	20"	24"	24"	2-7x½	E6	F4M
S8	105'-10 15/16"	16x1¼	16x2	18x1⅜	18x2½	53'-0"	64'-9"	14½"	18"	23½"	24"	24"	2-7x½	F4M	E7
S9	105'-2⅛"	16x1¼	16x1⅜	18x1⅜	18x2½	52'-8"	65'-4"	12"	18"	16½"	20½"	24"	2-7x½	F4	E7
S10	104'-5 9/16"	16x1¼	16x1⅜	18x1⅜	18x2½	52'-3"	64'-10"	12"	14"	16½"	20½"	24"	2-7x½	F4	E7
S11	103'-8 13/16"	16x1¼	16x1⅜	18x1⅜	18x2½	51'-11"	64'-5"	12"	14"	16½"	20½"	24"	2-7x½	F4	E7
S12	103'-0⅝"	16x1¼	16x1⅜	18x1⅜	18x2½	51'-7"	63'-11"	12"	14"	16½"	20½"	24"	2-7x½	F4	E7
S13	102'-3 3/8"	16x1¼	16x1⅜	18x1⅜	18x2½	51'-2"	63'-6"	12"	14"	16½"	20½"	24"	2-7x½	F4	E7
S14	101'-6 11/16"	16x1¼	16x2	18x1⅜	18x2½	50'-10"	62'-1"	14½"	18"	23½"	24"	24"	2-7x½	F4M	E7
S15,521	54'-1'4"	12x⅞	12x⅞	12x⅞	12x⅞	——	——	16½"	20½"	24"	24"	24"	2-5x½	F1M	E1
S16 to S20	54'-1'4"	12x⅞	12x⅞	12x⅞	12x⅞	——	——	11½"	13"	15½"	19"	24"	2-5x½	F1	E1

* Denotes spacing which begins at termination of 5 spaces at 6"

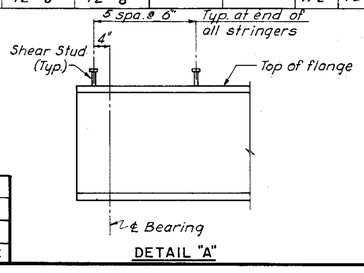
DEFLECTION SCHEDULE		
STR.	¼L & ¾L	½L
S1	1¾"	2 7/16"
S2	1 1/16"	2 7/16"
S3	1 7/16"	2"
S4	1¼"	1¾"
S5	1 5/16"	1 13/16"
S6	1 5/16"	1 13/16"
S7	1 3/16"	1⅞"
S8	2 5/16"	3¼"
S9	2 3/16"	3 1/16"
S10	2 1/16"	2⅞"
S11	1⅞"	2 5/8"
S12	2"	2 3/4"
S13	2"	2 3/4"
S14	2"	2 3/4"
S15,521	7/16"	5/8"
S16,520	3/8"	9/16"
S17,519	3/8"	9/16"
S18	3/8"	½"

CAMBER SCHEDULE			
STR.	¼ L	½ L	¾ L
S1	1¾"	2 7/16"	1¾"
S2	1 9/16"	2 3/16"	1 9/16"
S3	1 1/16"	2"	1 1/16"
S4	1¼"	1¾"	1¼"
S5	1⅜"	1⅞"	1⅜"
S6	1¼"	1 13/16"	1 5/16"
S7	1 3/16"	1 13/16"	1¼"
S8	2 5/16"	3¼"	2 5/16"
S9	2 3/16"	3 1/16"	2 3/16"
S10	2 1/16"	2⅞"	2 1/16"
S11	1⅞"	2 5/8"	1⅞"
S12	2"	2 3/4"	2"
S13	2"	2 3/4"	2"
S14	2"	2 3/4"	2"
S15	1"	1 5/8"	1 5/16"
S16	¾"	1 1/16"	1⅛"
S17	5/8"	1 1/16"	15/16"
S18	½"	13/16"	13/16"
S19	7/16"	11/16"	9/16"
S20	⅜"	9/16"	7/16"
S21	7/16"	5/8"	7/16"

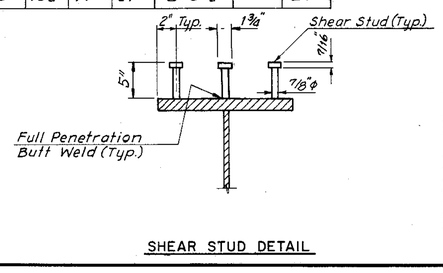


BEARING STIFFENER
½" = 1'-0"

INTERMEDIATE STIFFENER
½" = 1'-0"



DETAIL "A"



SHEAR STUD DETAIL

SHEAR STUD NOTE

Stud rows shall be placed parallel to the main deck reinforcing.
Shear stud spacing shown in maximum spacing.

	BY	DATE				
MADE	TCY	1-9-68				
CHECKED	ICH	2-21-68		As Built		
IN CHARGE	R.G.C.		NO.	REVISION	BY	DATE

NOTE TO CONTRACTOR

The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.

NOTE TO FABRICATOR

The above 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 Gas and Water support details see Standard Sheet S11.

AS BUILT

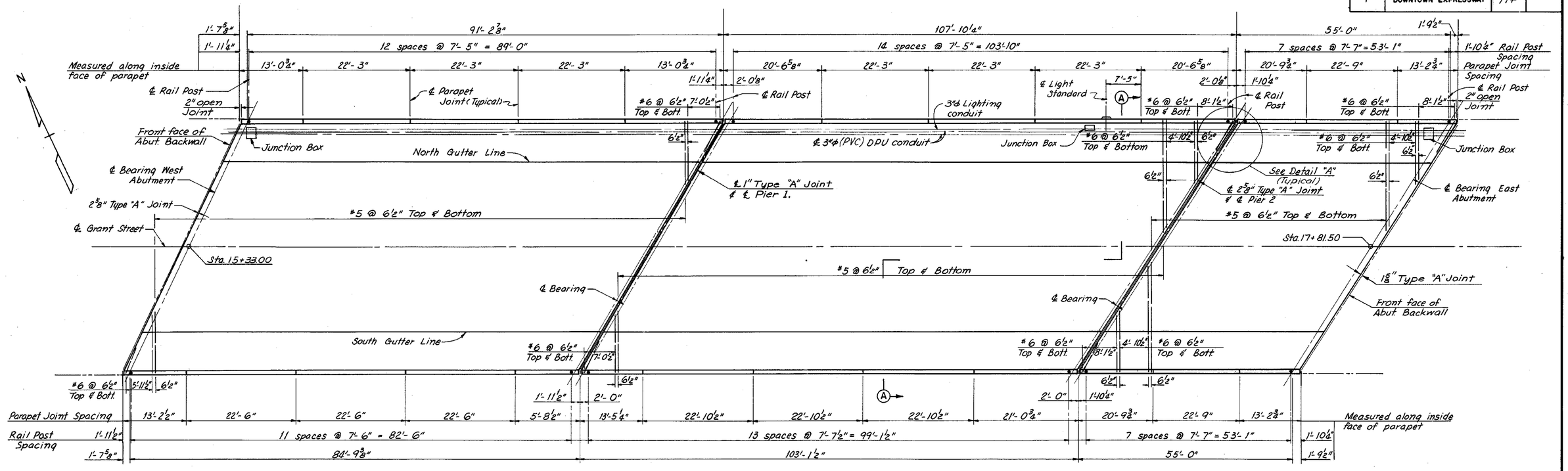
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 37
GRANT STREET OVER SOUTH CONNECTION DOWNTOWN EXPRESSWAY
FRAMING PLAN

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

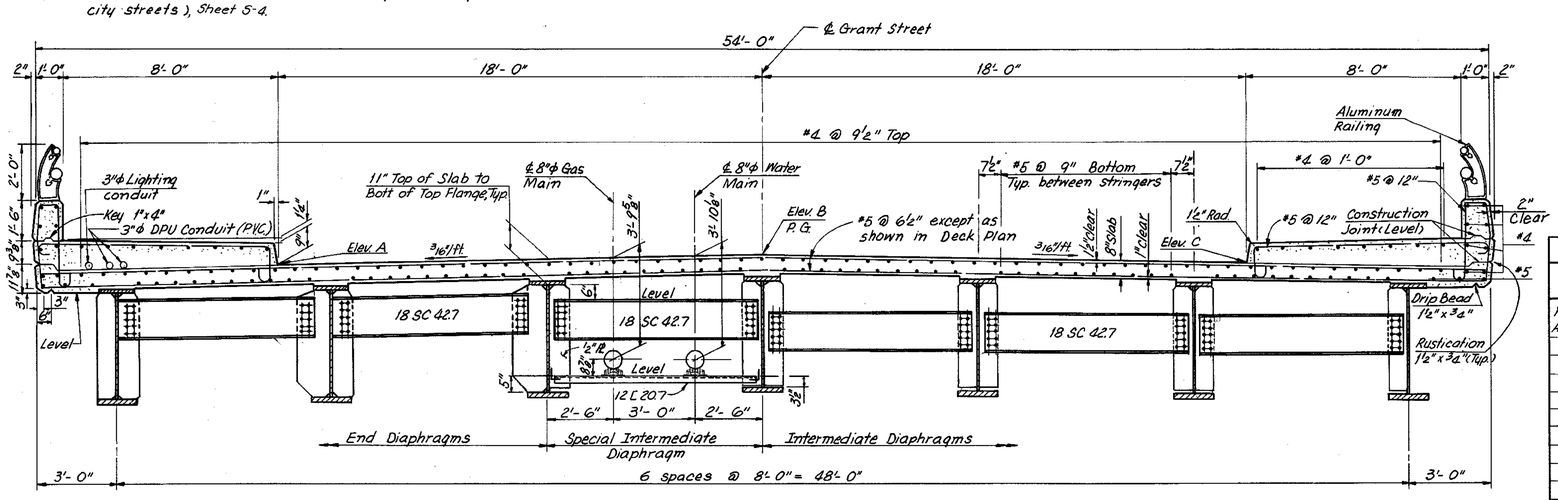
SCALE: As Shown
CONTRACT NO.: 7
SHEET NO. 8 OF 13

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
7	DOWNTOWN EXPRESSWAY	114	



DECK PLAN
No Scale

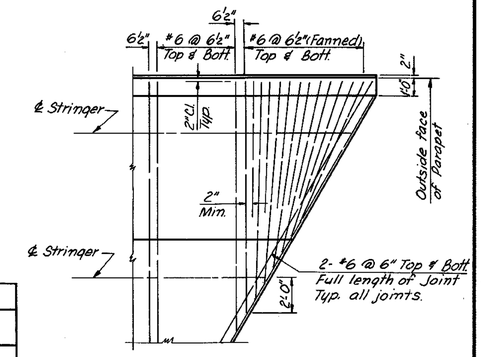
Note:
For Lighting details and D.P.U. conduit details see Standard Electrical Details (Bridge carrying city streets), Sheet 5-4.



CROSS SECTION A-A
Scale: ⅜" = 1'-0"

3 Junction Boxes
2 each 2'-0" x 1'-11"
1 each 2'-0" x 1'-½"

ROADWAY ELEVATIONS			
LOCATION	ELEV. A	ELEV. B	ELEV. C
Front Face W. Abut. Backwall	213.90	213.84	213.23
.25 Point	214.89	214.81	214.17
.50 Point	215.89	215.79	215.12
.75 Point	216.89	216.76	216.07
℄ Pier 1	217.89	217.73	217.02
.25 Point	219.06	218.88	218.15
.50 Point	220.22	220.03	219.27
.75 Point	221.38	221.17	220.40
℄ Pier 2	222.55	222.32	221.53
.25 Point	223.17	222.94	222.15
.50 Point	223.78	223.56	222.77
.75 Point	224.35	224.17	223.38
Front Face E. Abut. Backwall	224.86	224.73	223.99



DETAIL "A"
Scale: ½" = 1'-0"

	BY	DATE				
MADE	TCY	11-21-67				
CHECKED	ICH	2-9-68	1	As Built	TEM	9-75
IN CHARGE	R.G.C.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 37
GRANT STREET OVER SOUTH CONNECTION DOWNTOWN EXPRESSWAY
DECK PLAN AND CROSS SECTION

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

SCALE: AS SHOWN
CONTRACT NO.: 7
SHEET NO. 9 OF 13

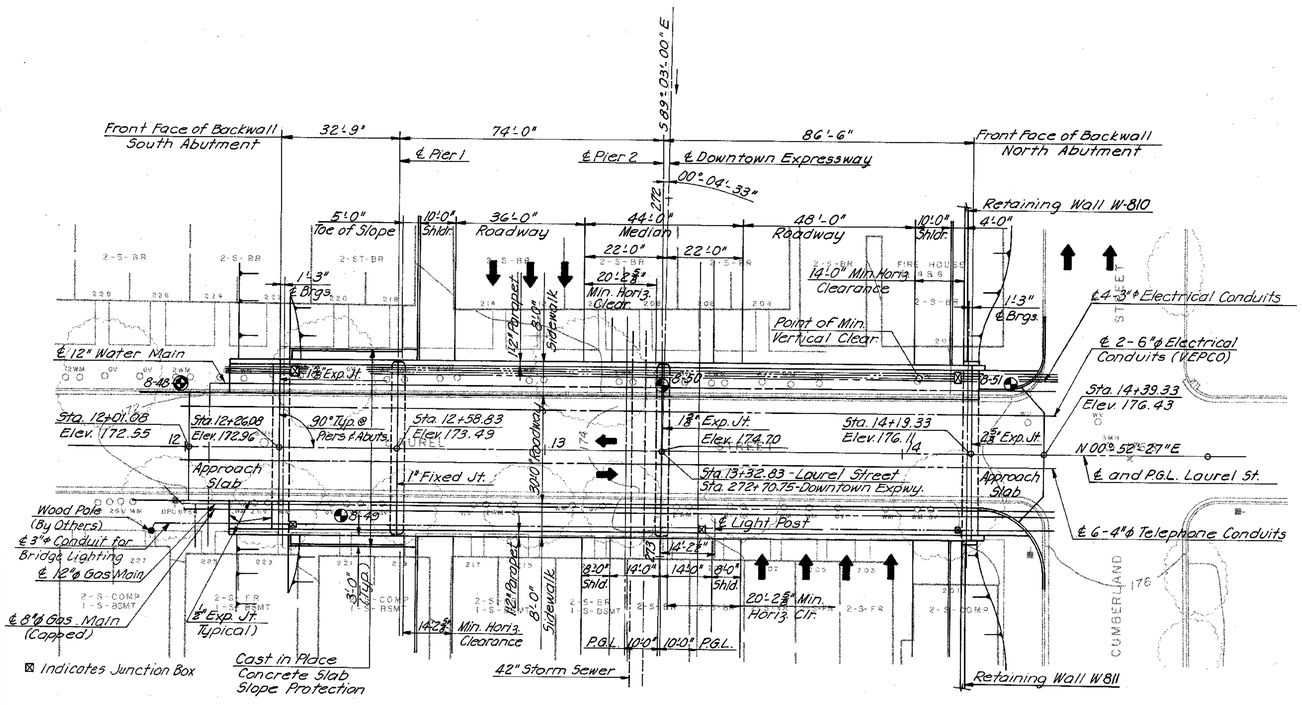
114

Bridge 50

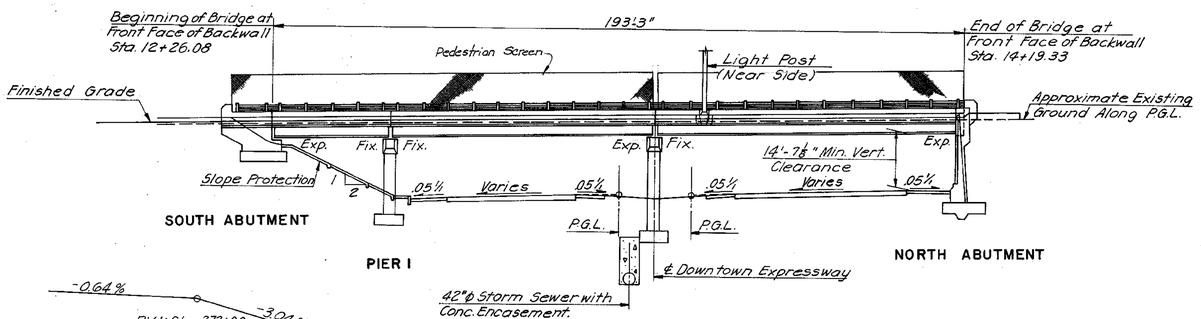
South Laurel Street
Over
Downtown Expressway (VA 195)

Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	222	



PLAN



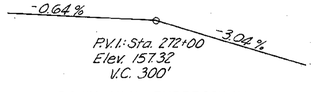
SOUTH ABUTMENT

PIER 1

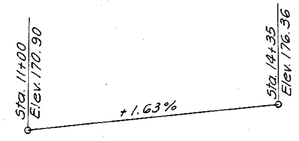
PIER 2

NORTH ABUTMENT

ELEVATION



DOWNTOWN EXPRESSWAY



LAUREL STREET

PROFILE DATA

	BY	DATE				
MADE	W.D.U.	8-67				
CHECKED	W.E.O.	10-67		AS BUILT	H.M.W.	4-74
IN CHARGE	W.E.O.		NO.	REVISION	BY	DATE

GENERAL NOTES:

ROADWAY: One 30'-0" Clear roadway. Two 8'-0" sidewalks.

CAPACITY: Dead Load - Includes 15 lbs. per sq. ft. for future wearing surface.
Live Loads - HS 20-44 loading and B.P.R. modified for military vehicles.

SPECIFICATIONS:

GENERAL - Virginia Department of Highway Road and Bridge Specifications 1970
DESIGN - AASHO 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.

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 plan 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 kept dry and special attention is called to Section 401.05 of the General Specifications, and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES:

Concrete in superstructure shall be Class A4. All other 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 gradient is over 2%.)
Finishing concrete surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted.
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.

BENCH MARK: C-38. Monument located in walk N.E. Corner Cumberland and South Laurel. Elev. 176.83.

INDEX

NOTES:
Top of Pavement Elevations at ends of Deck along P.G.L. are given on Plan, Remaining Pavement Elevations are given on Sheet 7.
⊕ Indicates 2½"ϕ Cased Hole Boring.
⊕ Indicates 4"ϕ Cased Hole Boring.

ESTIMATED QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A4 C.Y.	CONCRETE CLASS A3 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL-A36 LBS.	ALUMINUM BRIDGE RAILING L.F.	ASPHALT DAMP-PROOFING S.Y.	6 INCH PIPE UNDERDRAIN L.F.	POROUS BACKFILL C.Y.	CONC. SLAB SLOPE PROTECTION S.Y.	GAS MAIN 12"ϕ L.F.	GAS MAIN 8"ϕ L.F.	WATER MAIN 12"ϕ L.F.	CONDUITS 6"ϕ VEPCO L.F.	CONDUITS 4"ϕ TEL. L.F.	3"ϕ PVC CONDUIT L.F.	2"ϕ METAL CONDUIT L.F.	Pedestrian Screen L.F.	
Superstructure		364.21		68,195	382,078.4	408													
South Abutment	134		88.24	4,873			43	57	14	232.6									
Pier 1	241		92.65	16,300															
Pier 2	272		97.54	19,411															
North Abutment	268.12		242.29	12,341			119	55	72										
Approach Slabs			76.60	17,263															
Total	915.12	364.21	597.32	138,383	382,078.4	408	162	112	86	232.6	226	217.3	208	481	1442	960.5	4	420	

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B 50
LAUREL STREET OVER
DOWNTOWN EXPRESSWAY

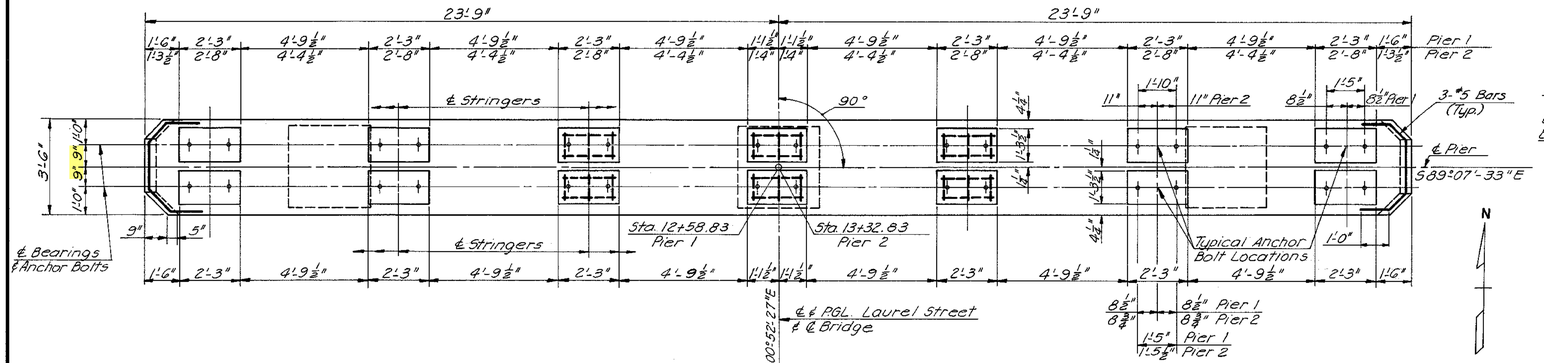
GENERAL PLAN AND ELEVATION

AMERICAN ENGINEERS
Richmond, Virginia

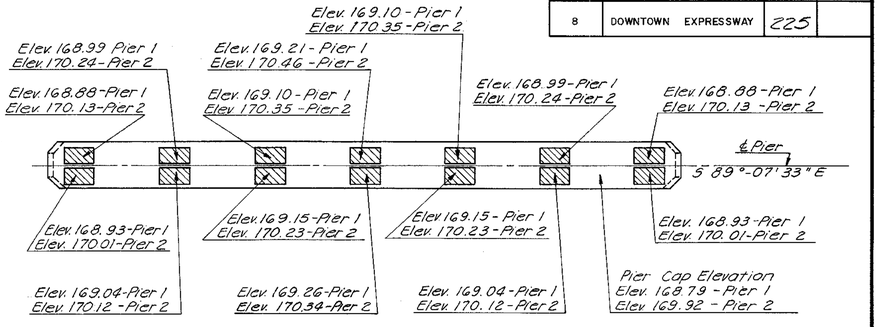
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: 1" = 20'
CONTRACT NO.: 8
SHEET NO. 1 OF 9

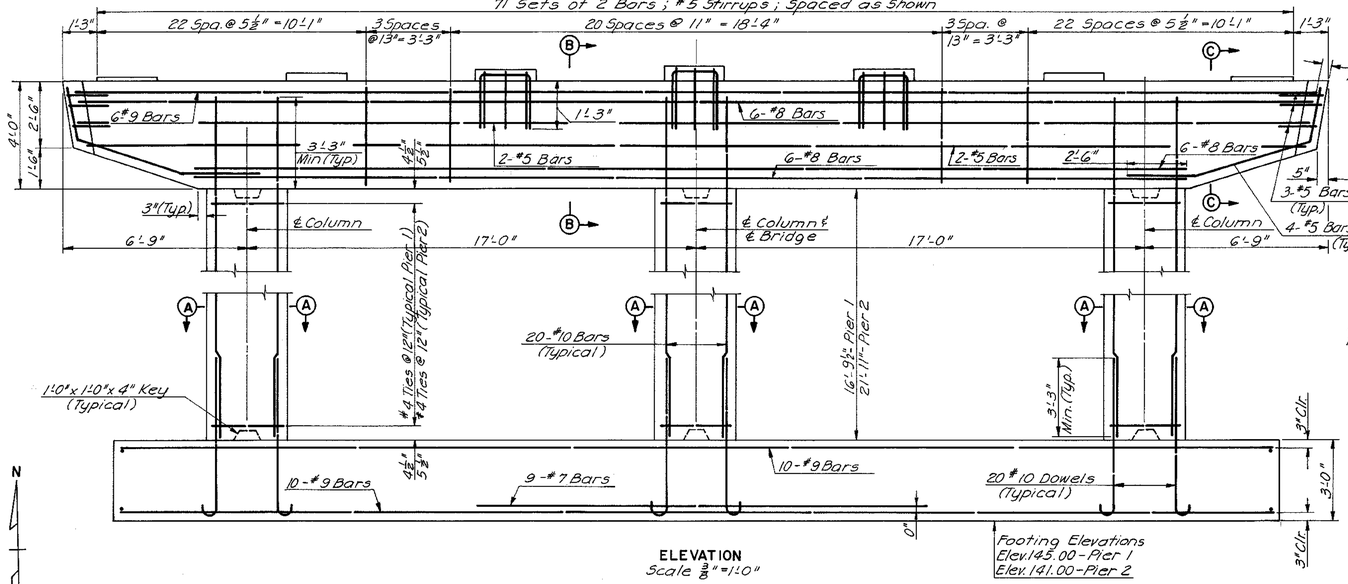
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	225	



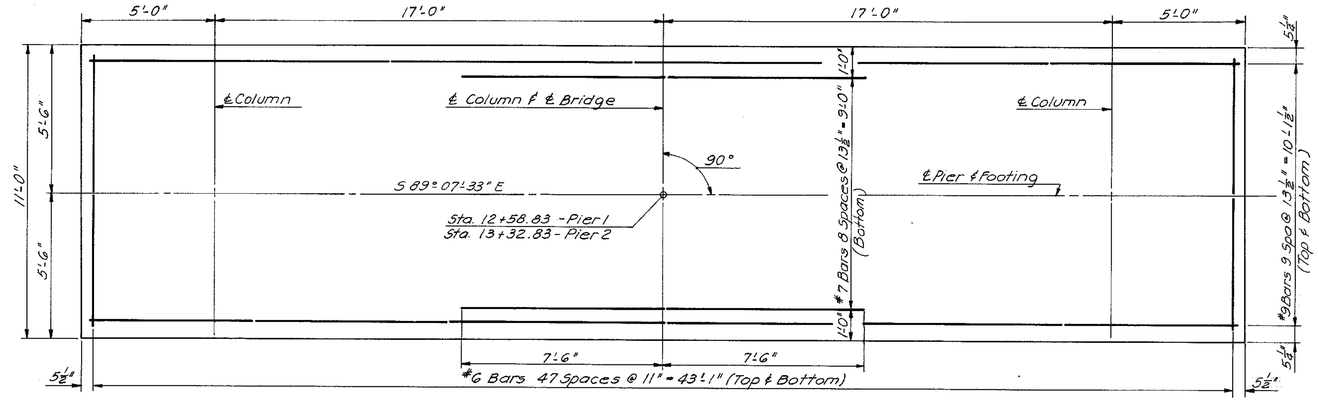
PLAN
Scale: 3/32" = 1'-0"



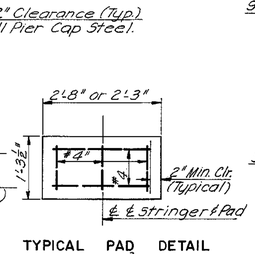
PAD ELEVATIONS
Scale: 3/16" = 1'-0"



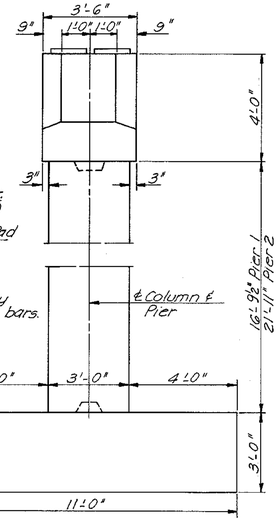
ELEVATION
Scale 3/8" = 1'-0"

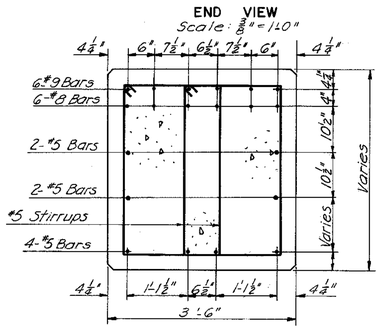


FOOTING PLAN
Scale 3/8" = 1'-0"

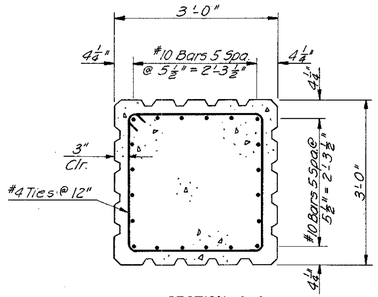


TYPICAL PAD DETAIL
Scale: 3/8" = 1'-0"
Reinforcement required only in pads showing reinforcing bars.

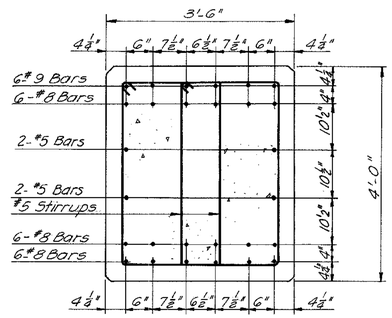




SECTION C-C
Scale: 3/4" = 1'-0"



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



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

AS BUILT

NOTES:
For Framing Plan see Sheet 5.
For Bearing Details see Sheet 51.
For General Notes see Sheet 1.
For Architectural Treatment see Sheet 51 to 50

Foundation Note:
Foundation Elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical Column reinforcing shall not be cut until these elevations are established.
Where elevations change by more than 2 feet, redesign will be required.
Pier Foundation is designed for an allowable Bearing Pressure of 2 tons per sq. foot.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.D.J.	9-67				
CHECKED	W.E.O.	9-67				
IN CHARGE	W.E.O.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

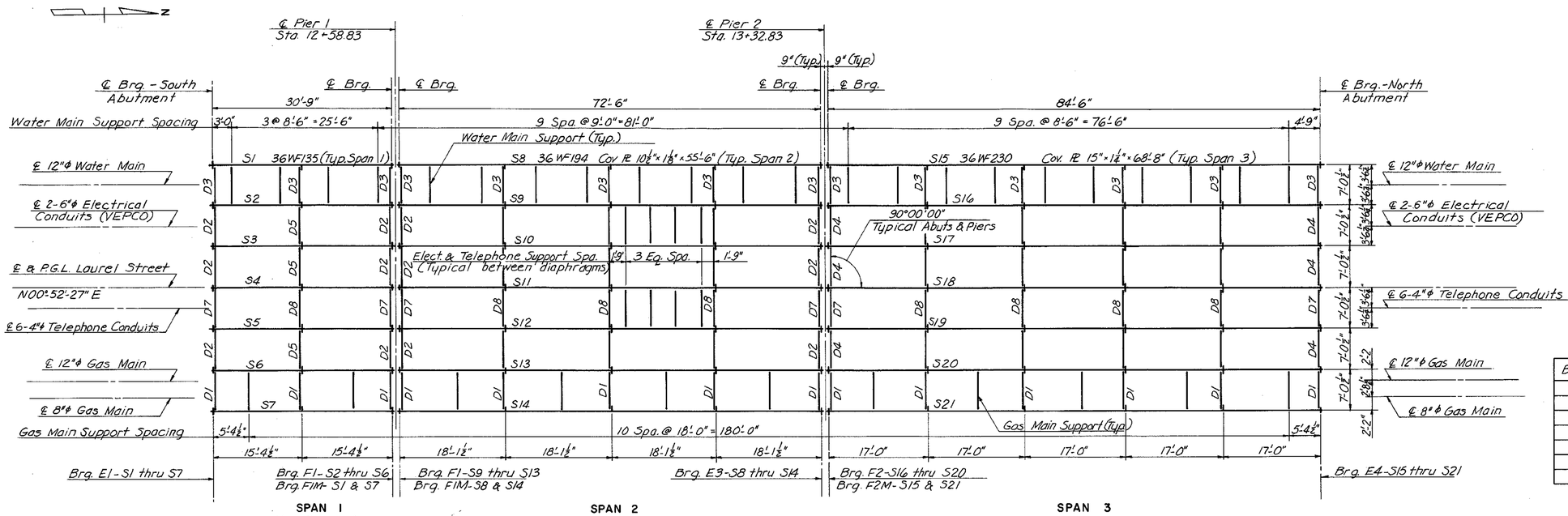
STRUCTURE B 50
LAUREL STREET OVER
DOWNTOWN EXPRESSWAY
PIER DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

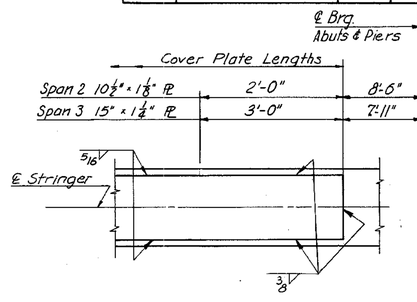
SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 4 OF 9

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	226	



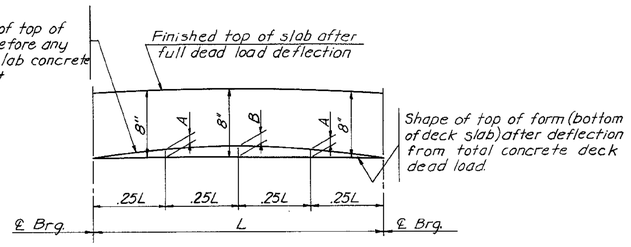
FRAMING PLAN
Scale: 1" = 10'-0"

Note: All intermediate diaphragms are D6 unless otherwise noted.



COVER PLATE DETAIL
No Scale

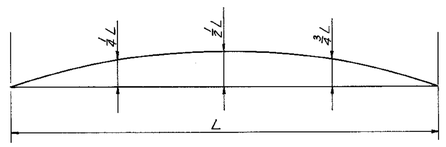
Bearing Type	No. Required
E1	7
F1	10
FIM	4
E3	7
F2	5
F2M	2
E4	7



DEAD LOAD DEFLECTION DIAGRAM

Stringers	A	B
S1 thru S7	7/16"	3/8"
S8, S14	1"	1 7/16"
S9 thru S13	7/8"	1 7/16"
S15, S21	1 3/4"	2 1/16"
S16 thru S20	1 1/4"	1 3/4"

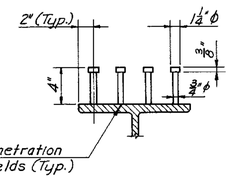
NOTE TO CONTRACTOR:
The above deflections are those anticipated to occur in the stringer upon placement of the total concrete deck dead load. In practice the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall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



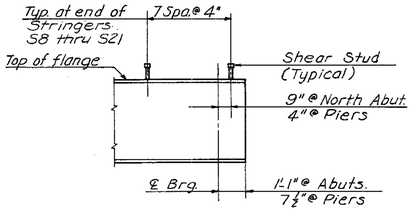
CAMBER DIAGRAM

Stringers	¼L, ¾L	½L
S8, S14	1 1/16"	1 3/8"
S9 thru S13	1 3/16"	1 1/16"
S15, S21	2"	2 1/16"
S16 thru S20	1 13/16"	2 1/16"

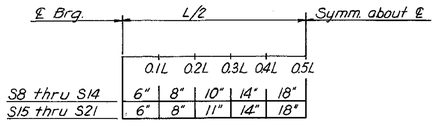
NOTE TO FABRICATOR:
The above stringers shall be fabricated with an upward camber amounting to (see table). This will provide approximate compensation for deflection under full dead load and for conformity with finished grade. Stringers which are not required to be shop cambered shall be turned so that any mill tolerance deviation from straightness will be in the direction shown by the camber diagram above.



SHEAR STUD DETAIL
Scale: 1½" = 1'-0"



DETAIL "A"
No Scale



SHEAR STUD SPACING
No Scale
Shear Stud spacing shown is maximum

Shear Stud Notes:
Capacity = 3400 lbs. per stud.
Three ⅞" diameter studs may be substituted at the same longitudinal spacing as shown for four ¾" diameter studs.
Stud rows to be placed perpendicular to ℄ stringer.
For end condition see Detail "A".

Notes:
Structural steel shall conform to ASTM Specifications A36 (latest revision).
For General Notes see Sheet 1.
For Superstructure Cross Section see Sheet 6.
For Diaphragm Details see Sheet 6.
For Utility Support Details see Sheet 6.
For Bearing Shoe Dimensions see Standard Sheet S1.

AS BUILT

	BY	DATE
MADE	F.B.C.	7-67
CHECKED	W.E.O.	9-67
IN CHARGE W.E.O.		

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B 50
LAUREL STREET OVER
DOWNTOWN EXPRESSWAY

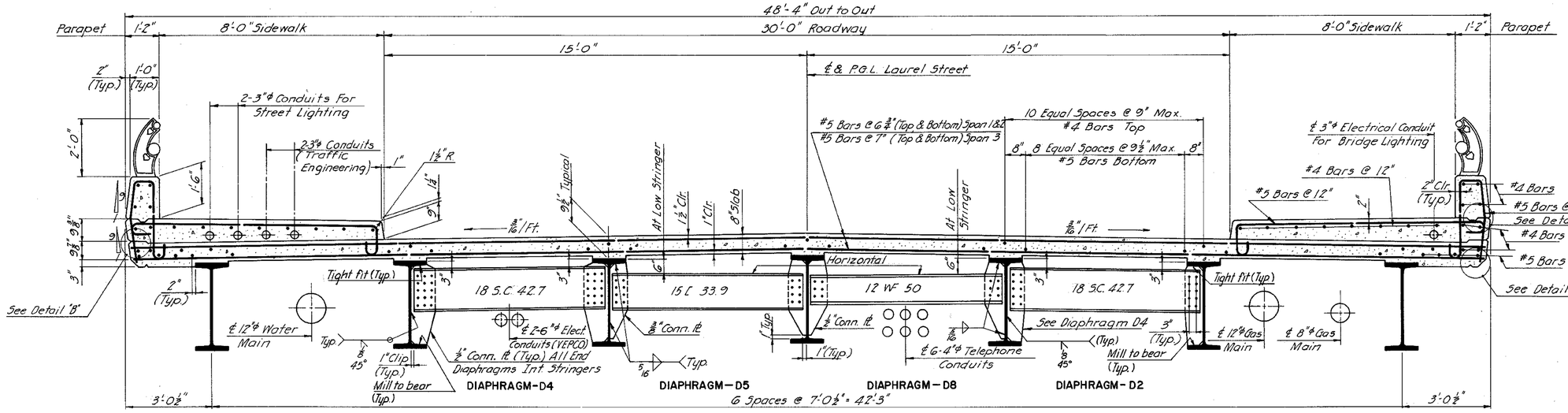
FRAMING PLAN

AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

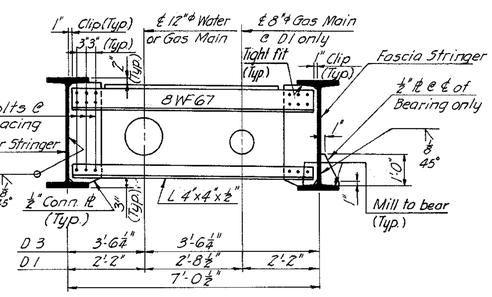
SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 5 OF 9

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	227	

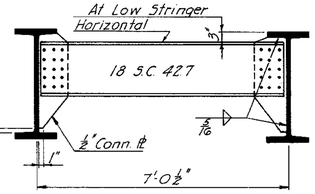


DIAPHRAGM-D4 DIAPHRAGM-D5 DIAPHRAGM-D8 DIAPHRAGM-D2

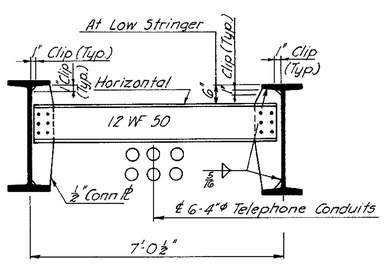
TYPICAL CROSS SECTION
Scale: ½" = 1'-0"



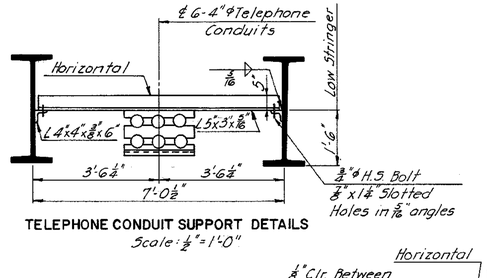
DIAPHRAGM-D1



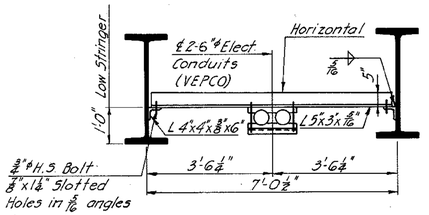
DIAPHRAGM-D6
Scale: ½" = 1'-0"



DIAPHRAGM-D7
Scale: ½" = 1'-0"



TELEPHONE CONDUIT SUPPORT DETAILS
Scale: ½" = 1'-0"

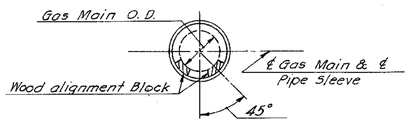


ELECTRICAL CONDUIT SUPPORT DETAILS
Scale: ½" = 1'-0"

NOTE:
Steel pipe sleeve to be hot-dip galvanized after fabrication in accordance with ASTM A123

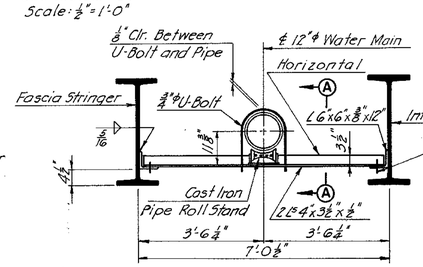
PIPE SLEEVE DETAIL FOR WATER MAIN

DIAPHRAGM-D3
Scale: ½" = 1'-0"

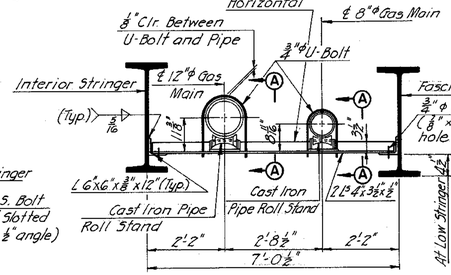


NOTE:
Steel pipe sleeve to be hot-dip galvanized after fabrication in accordance with ASTM A123

PIPE SLEEVE DETAIL FOR GAS MAIN



WATER MAIN SUPPORT DETAILS
Scale: ½" = 1'-0"



GAS MAIN SUPPORT DETAILS
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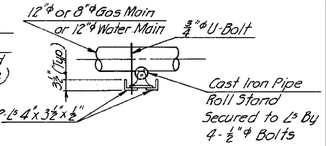
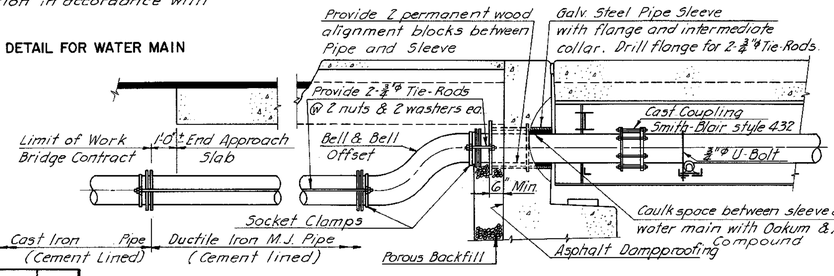


SECTION A-A
No Scale

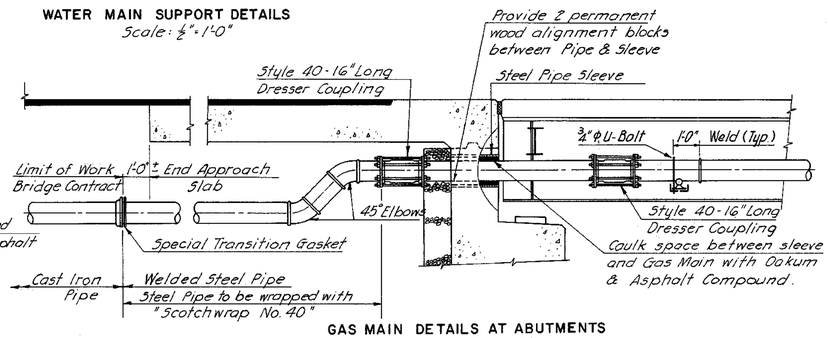
DETAIL "A"
Scale: 1" = 1'-0"

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

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



WATER MAIN DETAILS AT ABUTMENTS
Scale: ⅜" = 1'-0"



GAS MAIN DETAILS AT ABUTMENTS
Scale: ⅜" = 1'-0"

NOTES:
For General Notes, see Sheet 1.
For Framing Plan, see Sheet 5.
For Slab Plan, see Sheet 7.
For Electrical Conduit Hanger Details, see Sheet S10

AS BUILT

	BY	DATE
MADE	C.F.S.	8-67
CHECKED	W.E.O.	10-67
IN CHARGE	W.E.O.	

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B50
LAUREL STREET OVER
DOWNTOWN EXPRESSWAY

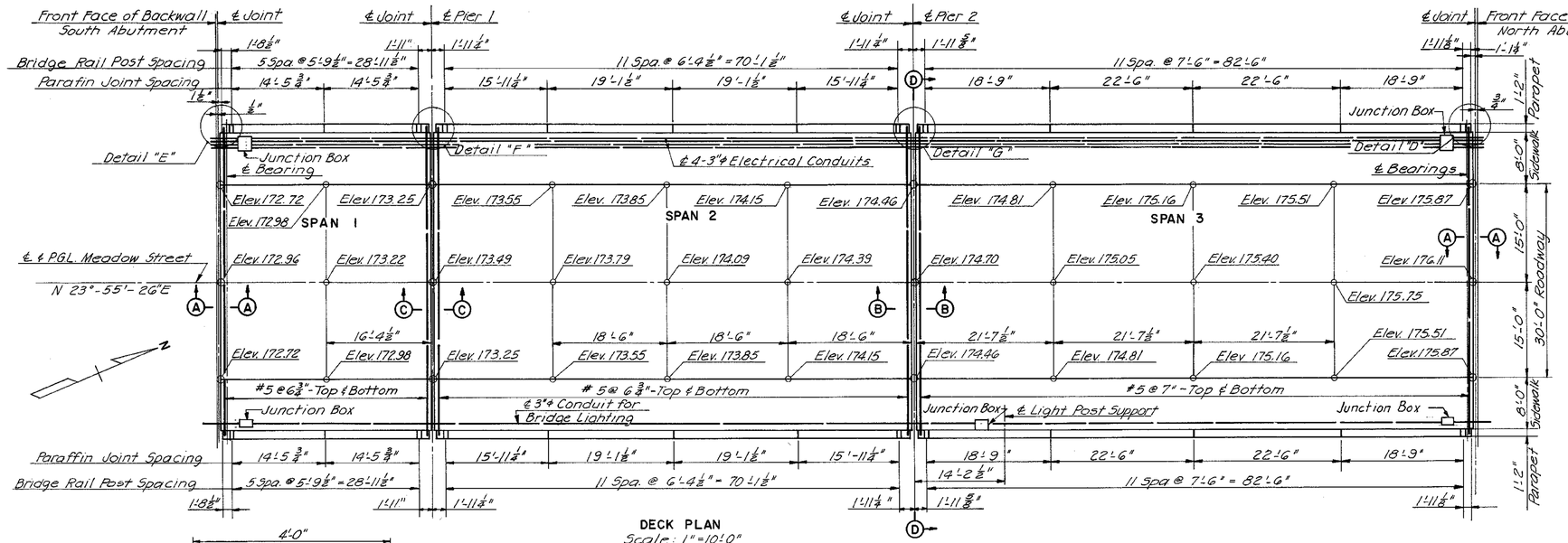
CROSS SECTION & UTILITY DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

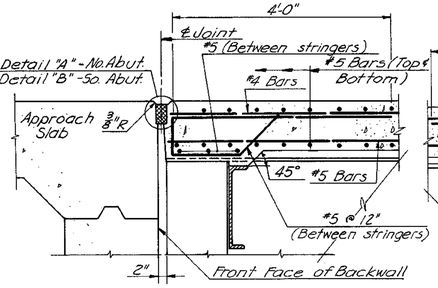
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 6 OF 9

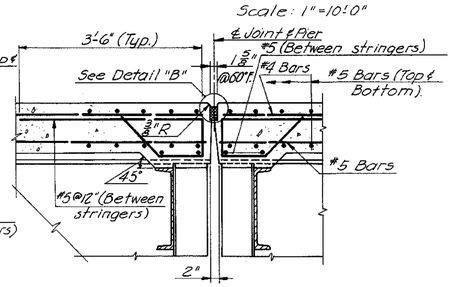
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	228	



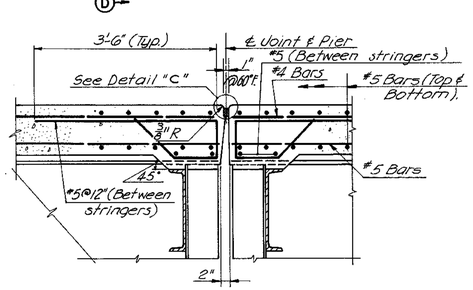
DECK PLAN
Scale: 1" = 10'-0"



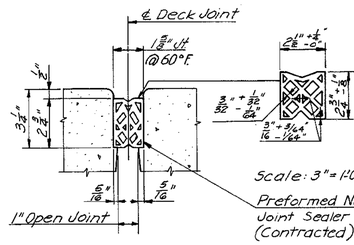
SECTION A-A
Scale: 3/4" = 1'-0"



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

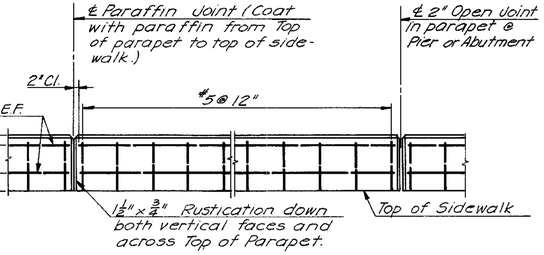


SECTION C-C
Scale: 3/4" = 1'-0"

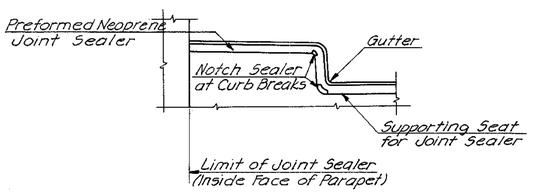


Scale: 3" = 1'-0"

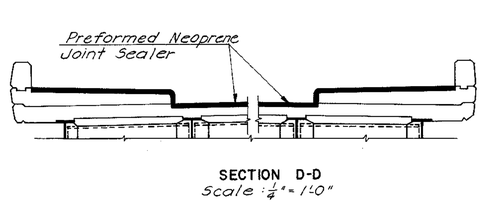
DETAIL "B"
Scale: 3" = 1'-0"



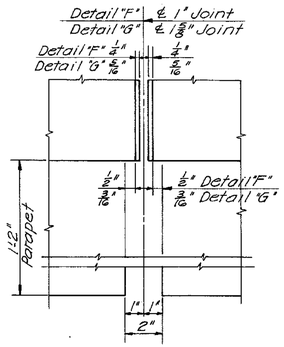
TYPICAL PARAPET ELEVATION
Scale: 1/2" = 1'-0"



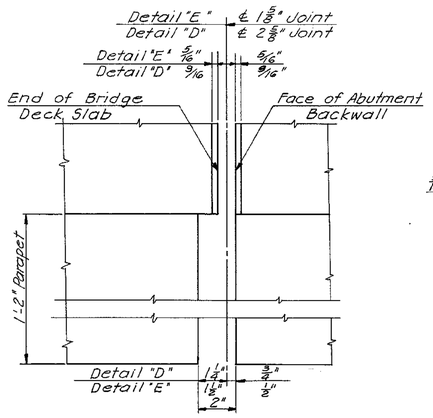
TREATMENT OF JOINT AT CURB
No Scale



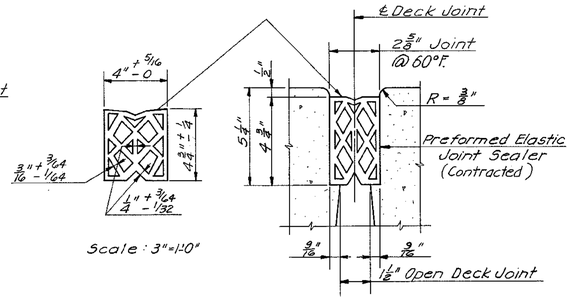
SECTION D-D
Scale: 1/4" = 1'-0"



DETAIL "F" & "G"
Scale: 3" = 1'-0"

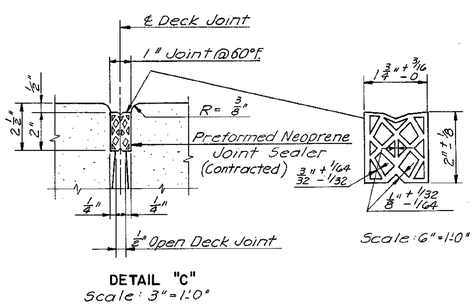


DETAIL "D" & "E"
Scale: 3" = 1'-0"



Scale: 3" = 1'-0"

DETAIL "A"
Scale: 3" = 1'-0"



Scale: 6" = 1'-0"

DETAIL "C"
Scale: 3" = 1'-0"

NOTES:
For Typical Deck Cross Section, see Sheet 6.
For General Notes, see Sheet 1.
For Framing Plan, see Sheet 5.
For Railing Details see Sheet 53.
For Light Post Support Details see Sheet 54.

Note to Contractor:
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 the 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	R.P.R.	8-67
CHECKED	W.E.O.	9-67
IN CHARGE	W.E.O.	

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B50
LAUREL STREET OVER
DOWNTOWN EXPRESSWAY

DECK PLAN AND JOINT DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

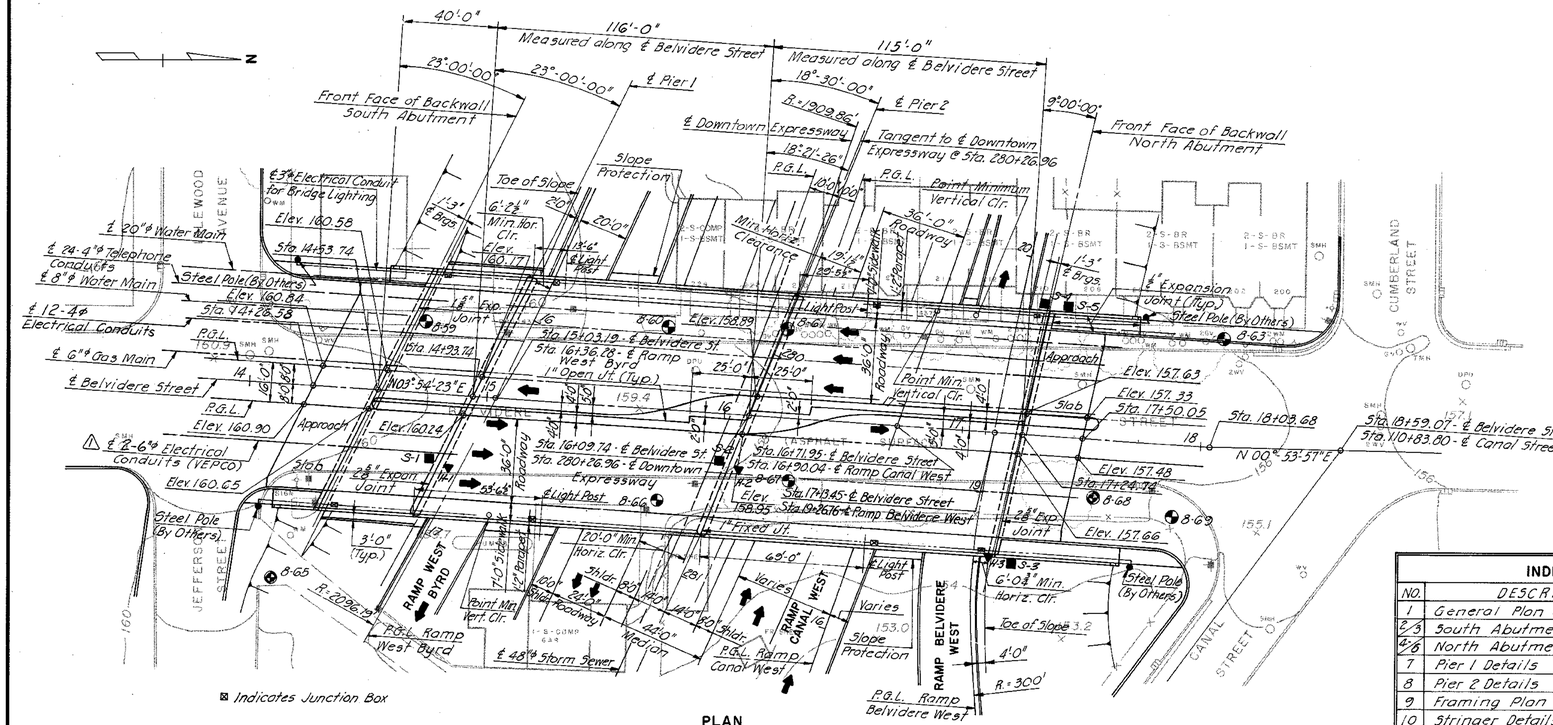
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 7 OF 9

Bridge 51

Belvidere Street (US 1 and US 301)
Over
Downtown Expressway (VA 195)

Record Set Plans



RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	231	

PLAN

ELEVATION

PROFILE DATA

GENERAL NOTES:

ROADWAY:	Two 36'-0" Clear roadways. Two 7'-0" Sidewalks. One variable median.
CAPACITY:	Dead Load - includes 15 lbs. per sq. ft. for future wearing surface. Live Loads - HS20-44 loading and B.P.R. modified 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. 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 plan 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 kept dry and special attention is called to Section 401.05 of the General Specifications, and to the Contract Special Provisions, concerning preparation of foundations for footings.

CONCRETE NOTES:

Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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. (When gradient is over 2%).

Finishing concrete surfaces: See the Standard Architectural Detail Sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted.
All field connections shall be made with high strength bolts. High Strength bolts shall be 7/8"φ unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

BENCH MARK: C-40 Monument located at S.E. corner Idlewood Avenue and Belvidere Street. Elev. 160.76.

INDEX

ESTIMATED QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A4 C.Y.	CONCRETE CLASS A3 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL A36 LBS	ALUMINUM BRIDGE RAILING L.F.	CONCRETE SLAB SLOPE PROTECTION S.Y.	ASPHALT DAMP-PROOFING S.Y.	6" INCH PIPE UNDERDRAIN L.F.	POROUS BACKFILL C.Y.	GAS MAIN 6"φ L.F.	WATER MAIN 20"φ L.F.	WATER MAIN 8"φ L.F.	CONDUIT 6"φ VEPCO L.F.	CONDUIT 4"φ TELE. L.F.	Pedestrian Screen L.F.	CONDUIT 4"φ CITY L.F.	3"φ PVC. CONDUIT L.F.	2"φ METAL CONDUIT L.F.
Superstructure		962.16		224,141	1,324,511.8	658					323	247	313	664 △1	6,504	665	3,252	570	16
South Abutment	475		234.47	11,589			564.9	228	126	76									
Pier 1	598		258.89	50,865			295.1												
Pier 2	318		258.71	48,366															
North Abutment	1,194		891.55	75,607			131.2	468	170	289									
Approach Slabs			258.08	58,162															
Total	2,585	962.16	1,901.70	468,730	1,324,511.8	658	991.2	696	296	365	323	247	313	664 △1	6,504	665	3,252	570	16

	BY	DATE	NO.	REVISION	BY	DATE
MADE	WDU	10-67		AS BUILT	HMW	4-76
CHECKED	WEO	12-67	△1	Rev. VEPCO Quantity	DGT	11-12-74
IN CHARGE	WEO					

NOTES: Top of Pavement Elevations at ends of Deck along P.G.L.'s are given on Plan; Remaining Pavement Elevations are given on Sheet 14.
⊕ - Indicates 2 1/2"φ Cased Hole Boring
⊕ - Indicates 4"φ Cased Hole Boring
▼ - Indicates Geonor Heave Points
■ - Indicates Settlement Points

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B 51
BELVIDERE STREET OVER
DOWNTOWN EXPRESSWAY

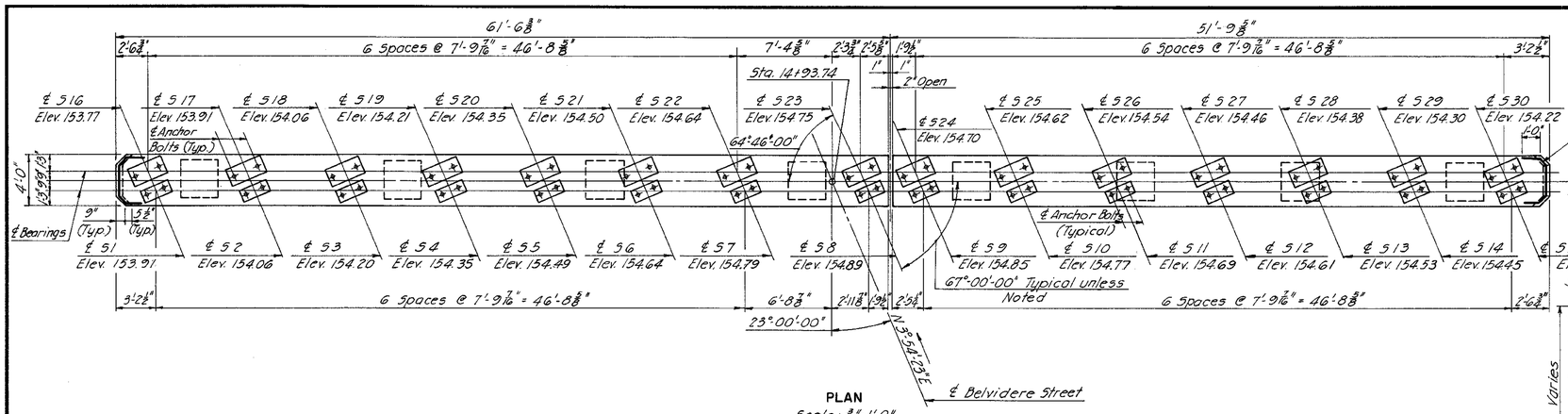
GENERAL PLAN AND ELEVATION

AMERICAN ENGINEERS
Richmond, Virginia

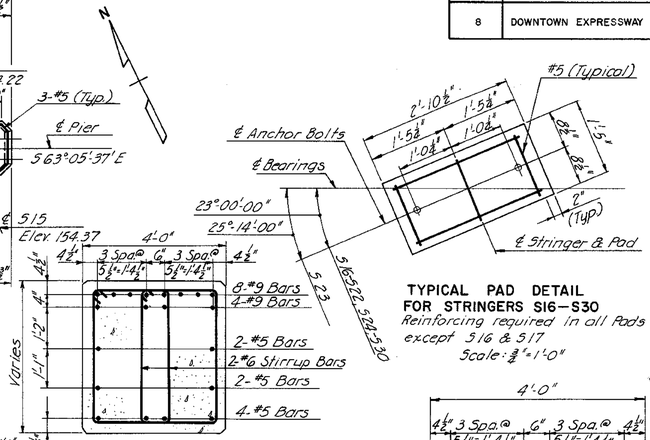
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: 1"=30'-0"
CONTRACT NO.: 8
SHEET NO. 1 OF 21

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	237	

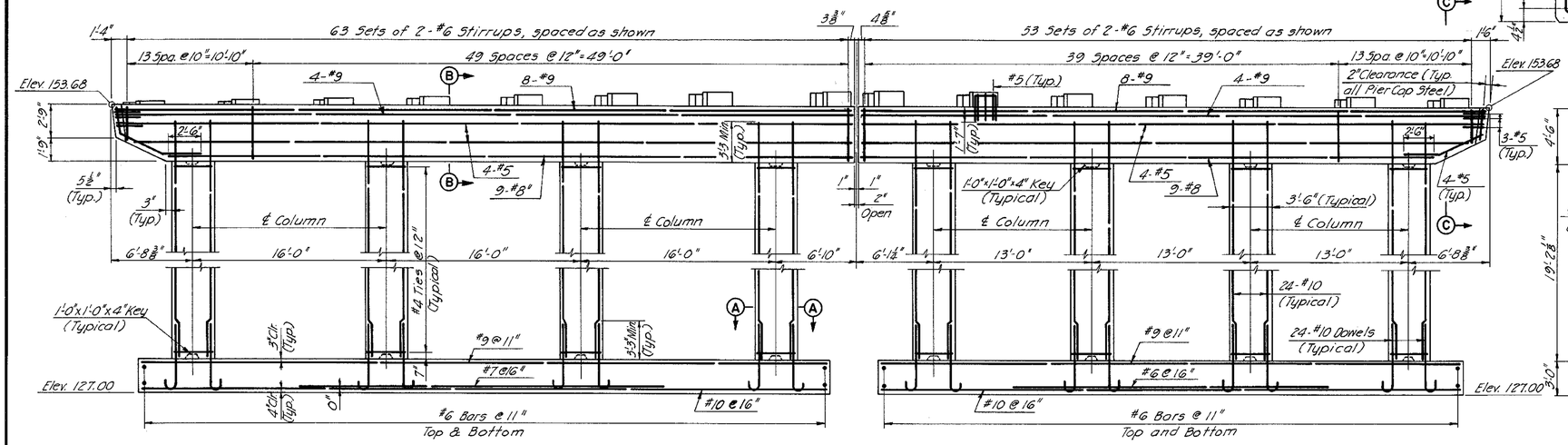


PLAN
Scale: ⅜"=1'-0"

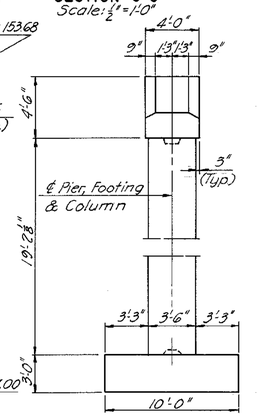


TYPICAL PAD DETAIL FOR STRINGERS S16–S30
Reinforcing required in all Pads except S16 & S17
Scale: ¾"=1'-0"

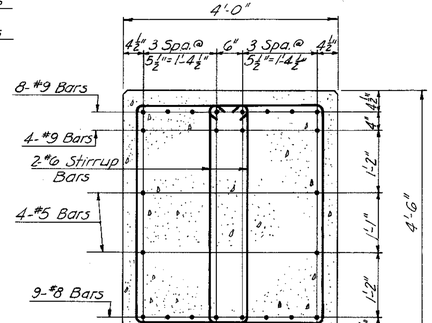
SECTION C-C
Scale: ½"=1'-0"



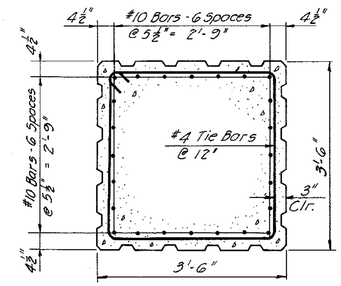
ELEVATION
Scale: ⅜"=1'-0"



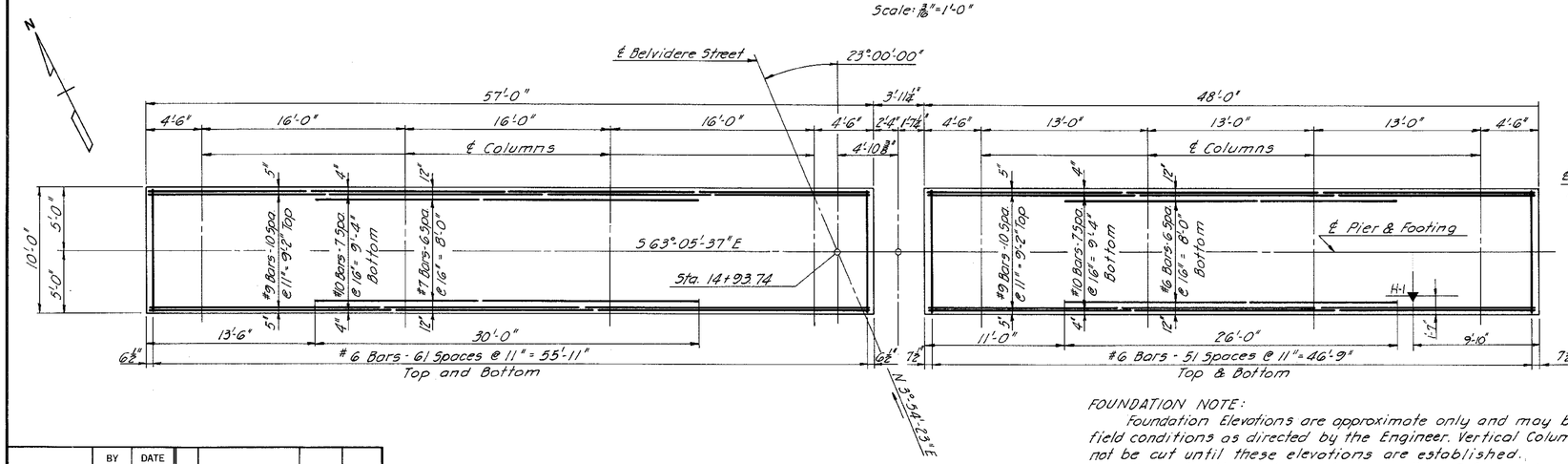
END VIEW
Scale: ⅜"=1'-0"



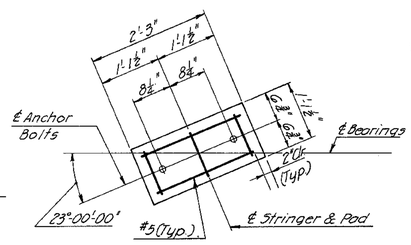
SECTION B-B
Scale: ¾"=1'-0"



SECTION A-A (TYP.)
Scale: ¾"=1'-0"



FOOTING PLAN
Scale: ⅜"=1'-0"



TYPICAL PAD DETAIL FOR STRINGERS S1–S15
Reinforcing Required in all Pads except S1
Scale: ¾"=1'-0"

NOTES:
For Framing Plan, see Sheet 9.
For Bearing Shoe Dimensions, see Standard Sheet S1.
For General Notes, see Sheet 1.
For Architectural Treatment Details, see Sheet S7 to S9.

FOUNDATION NOTE:
Foundation Elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical Column reinforcing shall not be cut until these elevations are established.
Where elevations change by more than 2 feet, redesign will be required.
Pier Foundation is designed for an allowable Bearing Pressure of 2½ tons per square foot.

	BY	DATE				
MADE	CFS	11-67				
CHECKED	WEO	12-67		AS BUILT	HMN	4-76
IN CHARGE	WEO		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

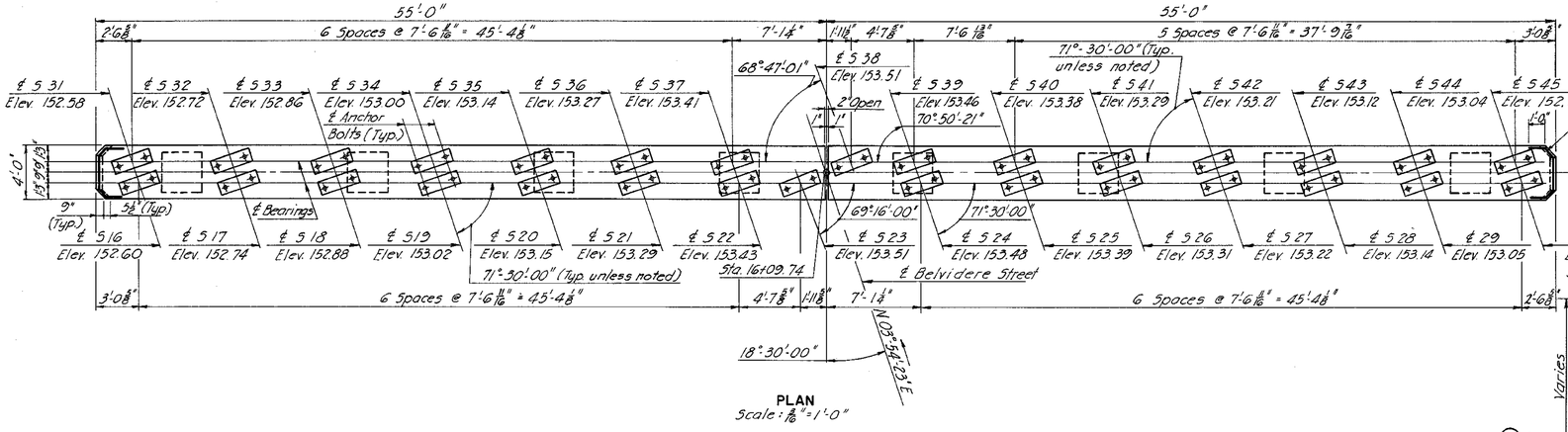
STRUCTURE B51
BELVIDERE STREET OVER DOWNTOWN EXPRESSWAY
PIER I DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

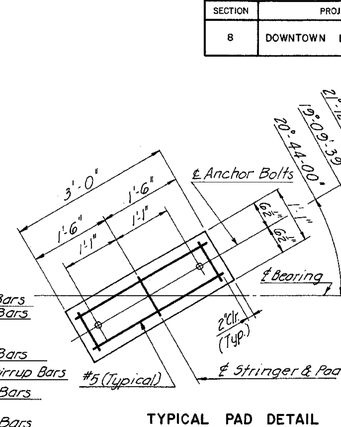
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 7 OF 21

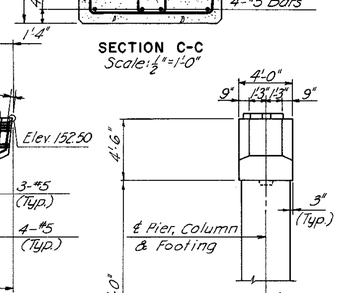
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	238	



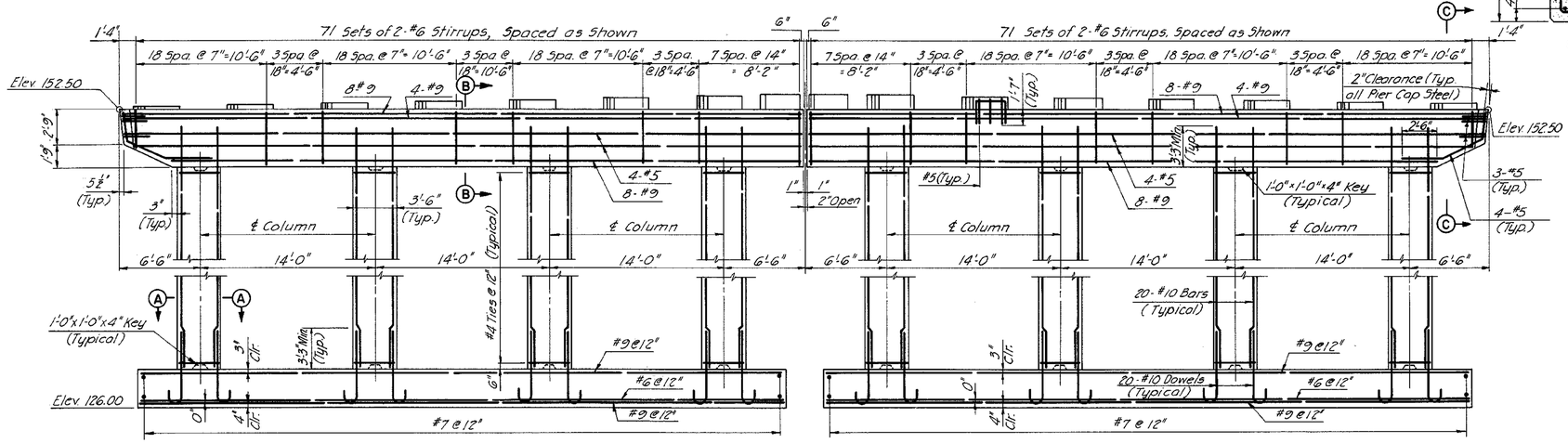
PLAN
Scale: 1/16" = 1'-0"



TYPICAL PAD DETAIL
Scale: 3/4" = 1'-0"
(Reinforcing Required in all Pads except 516, 517, 531 & 532)

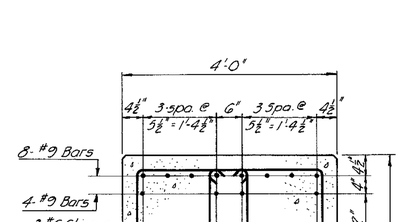


SECTION C-C
Scale: 1/2" = 1'-0"

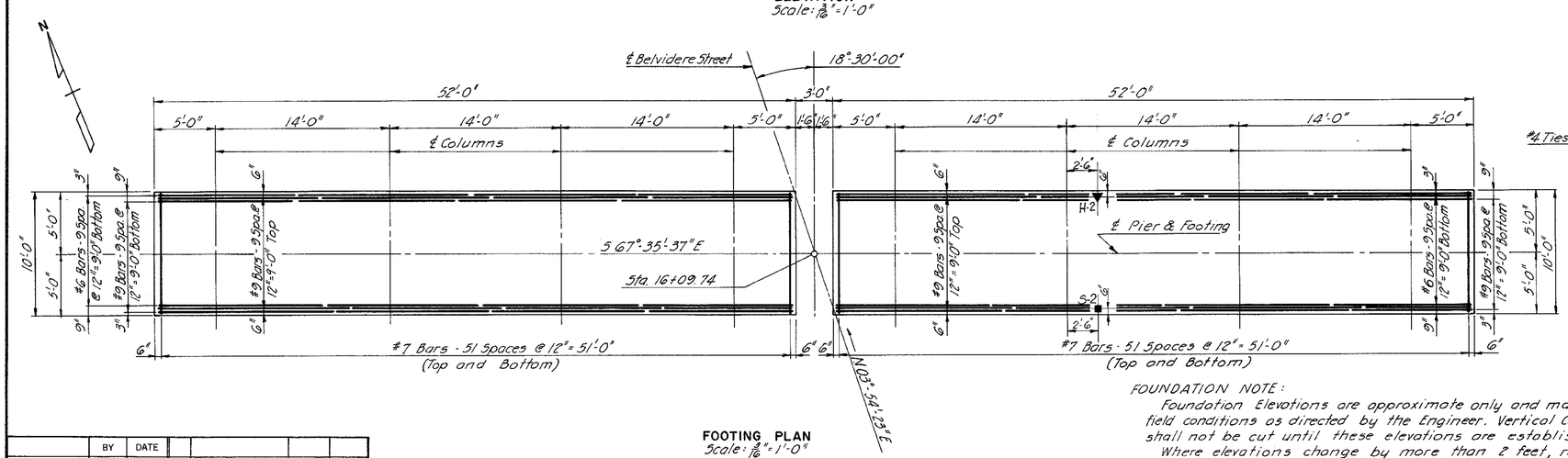


ELEVATION
Scale: 1/16" = 1'-0"

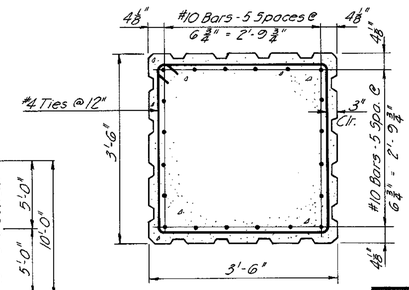
END VIEW
Scale: 1/16" = 1'-0"



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



FOOTING PLAN
Scale: 1/16" = 1'-0"



SECTION A-A (TYP.)
Scale: 3/4" = 1'-0"

AS BUILT

NOTES:
For Framing Plan, see Sheet 9
For Bearing Shoe Dimensions, see Standard Sheet 51.
For General Notes, see Sheet 1.
For Architectural Treatment Details, see Sheet 57 to 59.

FOUNDATION NOTE:
Foundation Elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical Column reinforcing shall not be cut until these elevations are established.
Where elevations change by more than 2 feet, redesign will be required.
Pier Foundation is designed for an allowable Bearing Pressure of 2½ tons per square foot.

	BY	DATE
MADE	CFS	11-67
CHECKED	WEO	12-67
IN CHARGE	WEO	

NO.	REVISION	BY	DATE
	AS BUILT	HMN	4-76

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

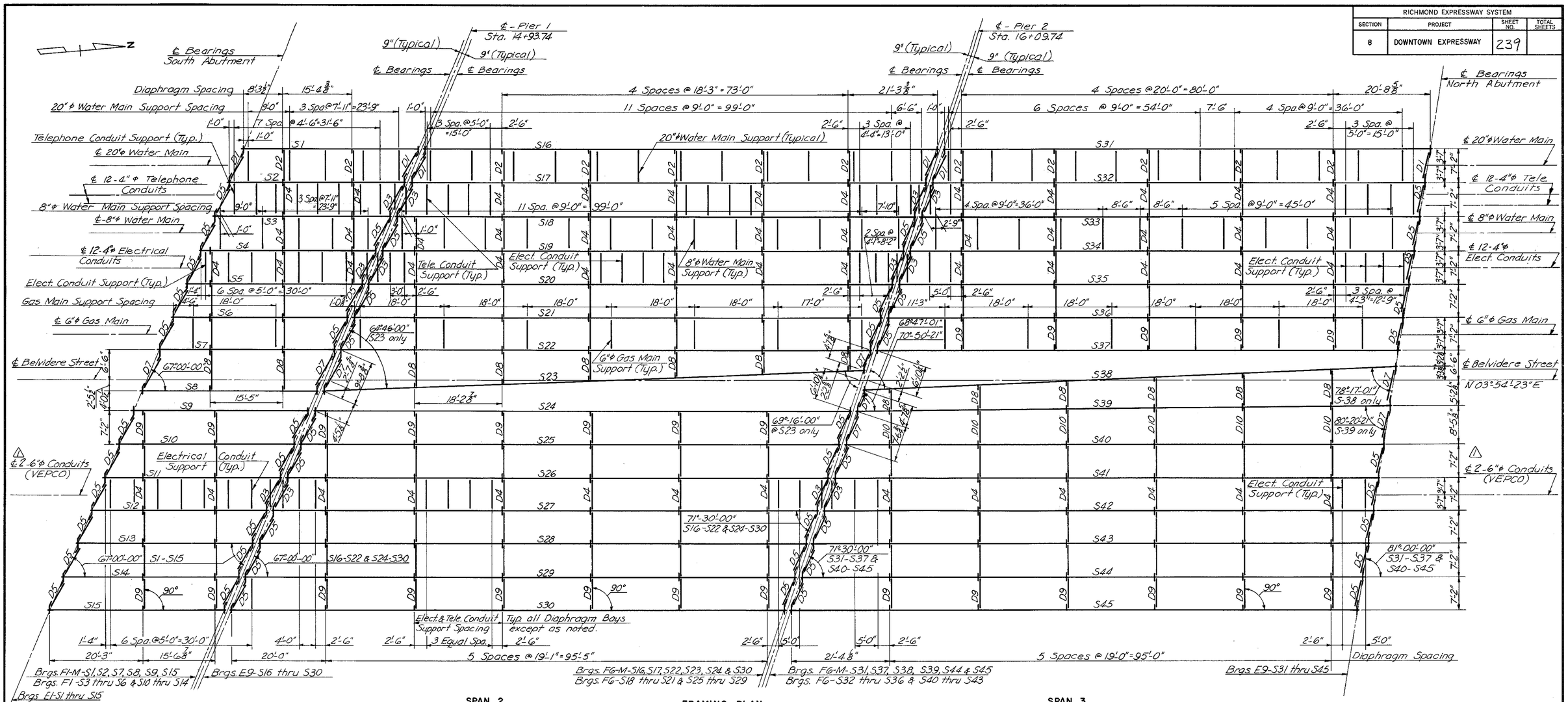
STRUCTURE B 51
BELVIDERE STREET OVER DOWNTOWN EXPRESSWAY
PIER 2 DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 8 OF 21

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	239	



SPAN 1
Non-Composite

SPAN 2

FRAMING PLAN
Scale: 1" = 10'-0"

SPAN 3

Bearing Type	No. Required
F1	9
F1-M	6
F6	18
F6-M	12
E1	15
E9	30

Stringer Lengths ℄ Brg. to ℄ Brg.

S1 thru S15	37'-9 7/8"	S22	113'-9 1/2"	S30	118'-10 1/2"	S38	114'-3 3/8"
		S23	116'-2 3/8"	S31	104'-2 3/8"	S39	114'-3 3/8"
S16	109'-11 3/4"	S24	114'-11 3/4"	S32	105'-5 1/2"	S40	115'-4 1/2"
S17	110'-7 1/8"	S25	115'-7 1/2"	S33	106'-9"	S41	116'-7 5/8"
S18	111'-2 3/4"	S26	116'-3 1/2"	S34	108'-0 1/2"	S42	117'-10 1/2"
S19	111'-10 1/2"	S27	116'-10 7/8"	S35	109'-3 1/2"	S43	119'-1 5/8"
S20	112'-6 1/4"	S28	117'-6 3/8"	S36	110'-6 3/8"	S44	120'-4 1/2"
S21	113'-2"	S29	118'-2 3/8"	S37	111'-9 5/8"	S45	121'-8"

NOTE:
All Intermediate Diaphragms are D6 unless otherwise noted.
Intermediate Stiffeners shall be located on inside face of stringers S1, S15, S16, S30, S31 & S45. They shall be located on alternate sides along the remaining stringers.

INTERMEDIATE STIFFENER SPACING (MAXIMUM)

Stringer	1st 2 Spaces	1L	2L	3L	4L	5L
S1 thru S15	2'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
S16 thru S45	1'-9"	3'-6"	3'-10"	4'-0"	4'-0"	4'-0"

NOTES:
Structural Steel Shall Conform to ASTM Specifications A-36 (Latest Revision).
For General Notes see Sheet 1.
For Superstructure Cross Section see Sheet 11.
For Diaphragm Details see Sheet 12.
For Utility Support Details see Sheet 13.
For Bearing Shoe Dimensions see Sheet 51.
For Stringer Details see Sheet 10.
For Stiffener Details see Sheet 10.

	BY	DATE
MADE	D.L.A.	9-67
CHECKED	W.E.O.	12-67
IN CHARGE	W.E.O.	

NO.	REVISION	BY	DATE
1	Rev. No. VEPCO Conduits	DGT	11-12-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

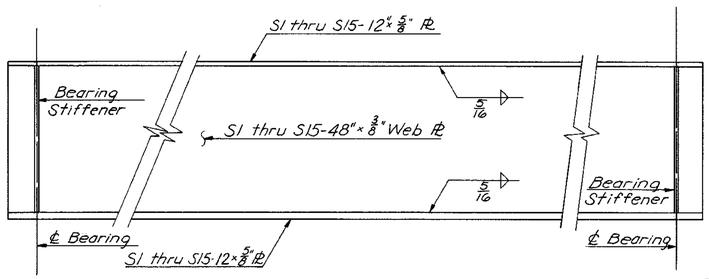
STRUCTURE B51
BELVIDERE STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

AMERICAN ENGINEERS
Richmond, Virginia

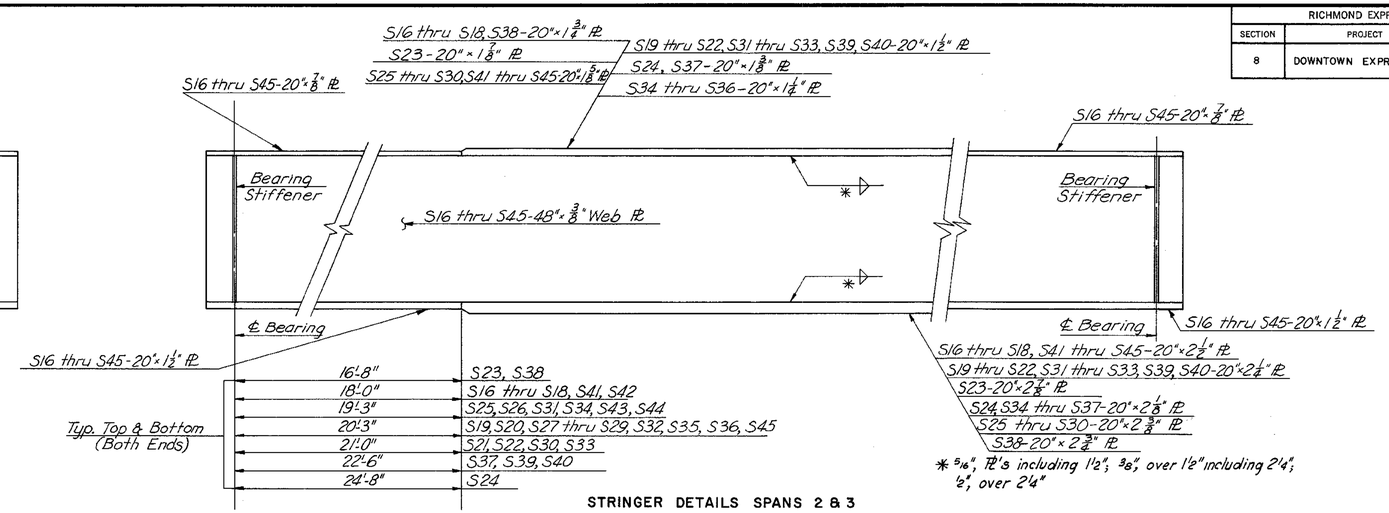
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 9 OF 21

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	240	

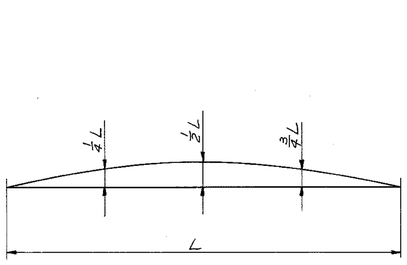


STRINGER DETAILS SPAN 1



* 5/16" Flr's including 1'-2"; 3/8", over 1'-2" including 2'-4"; 1/2", over 2'-4"

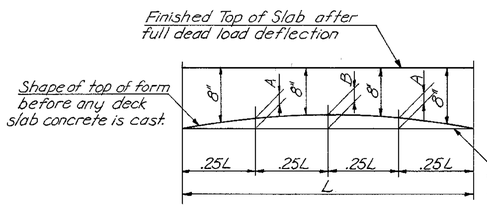
STRINGER DETAILS SPANS 2 & 3



CAMBER DIAGRAM
No Scale

Stringers	1/4 L	1/2 L	3/4 L
S1 thru S15	1/8"	3/16"	1/8"
S16, S18, S24, S34, S37, S38	2 5/16"	3 1/4"	2 3/16"
S17, S19 thru S23, S25, S35, S36	2 1/16"	3 3/8"	2 1/16"
S26 thru S29, S40 thru S43	2 5/8"	3 11/16"	2 3/8"
S30, S44	2 13/16"	4 1/8"	2 13/16"
S31 thru S33	2 1/8"	3"	2 1/8"
S39	2 1/2"	3 1/2"	2 1/4"
S45	3 3/16"	4 1/2"	3 1/16"

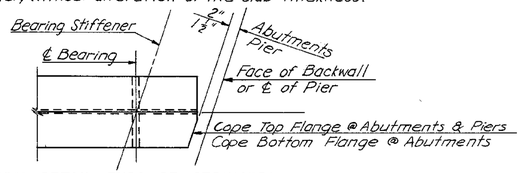
NOTE TO FABRICATOR:
The above stringers shall be fabricated with an upward camber amounting to (see table). This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.



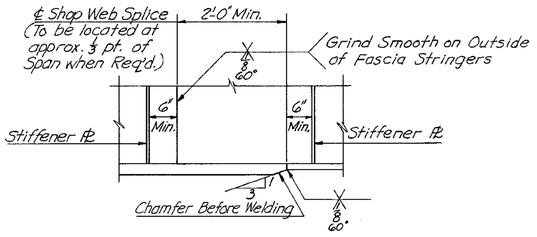
DEAD LOAD DEFLECTION DIAGRAM
No Scale

Stringers	A	B
S1 thru S15	1 7/16"	1/8"
S16 thru S18, S31	1 7/16"	2"
S19, S20, S24, S34, S37, S38	1 3/8"	2 1/16"
S21, S25 thru S29, S36, S39 thru S42	1 1/16"	2 3/16"
S30	2 1/4"	3 1/2"
S32, S33	1 7/16"	1 1/2"
S43, S44	2"	2 13/16"
S45	2 7/16"	3 3/8"
S22, S23, S35	1 1/2"	2 7/16"

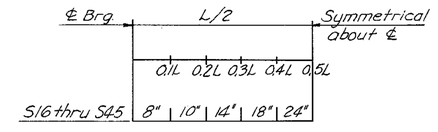
NOTE TO CONTRACTOR:
The above deflections are those anticipated to occur in the stringer upon placement of the total concrete deck load. In practice, the stringers in place, are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be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



TYPICAL DETAIL - ENDS OF STRINGERS
No Scale

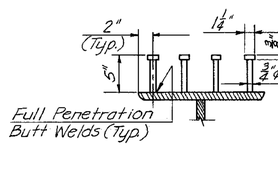


SHOP SPLICE DETAIL
No Scale

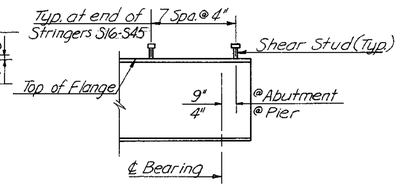


SHEAR STUD SPACING
No Scale

SHEAR STUD NOTES:
Capacity = 3,400 lbs. per stud.
Three 3/4" ϕ Studs may be substituted at the same Longitudinal Spacing as shown for 4-1/2" ϕ Studs.
Stud Rows to be placed Parallel to main deck reinf.
For End Condition see Detail "A"

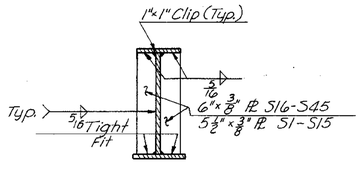


SHEAR STUD DETAIL
No Scale

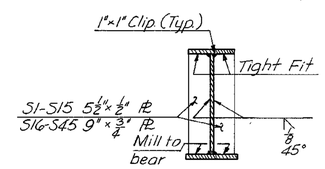


DETAIL "A"
No Scale

NOTES:
Structural Steel Shall Conform to ASTM Specifications A-36 (Latest Revision).
For General Notes see Sheet 1.
For Superstructure Cross Section see Sheet 11
For Diaphragm Details see Sheet 12.
For Utility Support Details see Sheet 13.
For Framing Plan see Sheet 9.
For Stiffener Spacing see Sheet 9.



INTERMEDIATE STIFFENER



BEARING STIFFENER

STIFFENER DETAILS
No Scale

AS BUILT

	BY	DATE
MADE	T.D.J.	11-67
CHECKED	W.E.O.	12-67
IN CHARGE	W.E.O.	

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B51
BELVIDERE STREET OVER
DOWNTOWN EXPRESSWAY

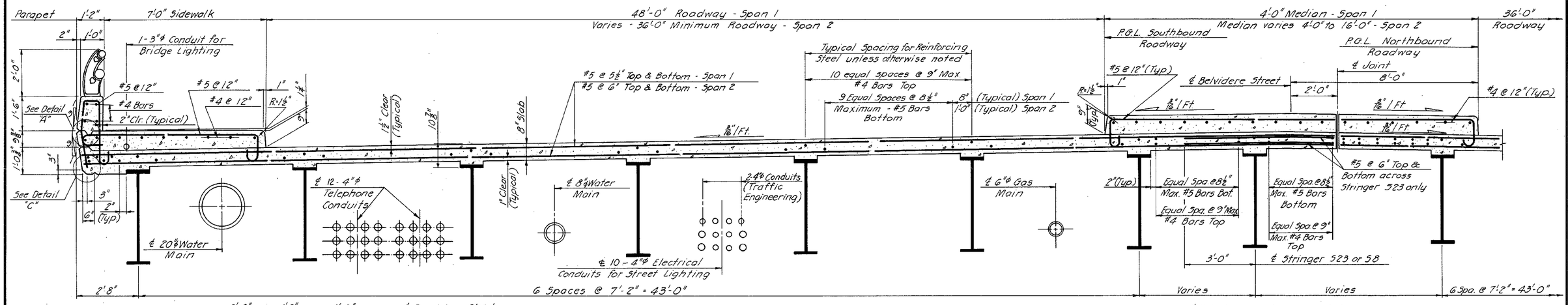
STRINGER DETAILS

AMERICAN ENGINEERS
Richmond, Virginia

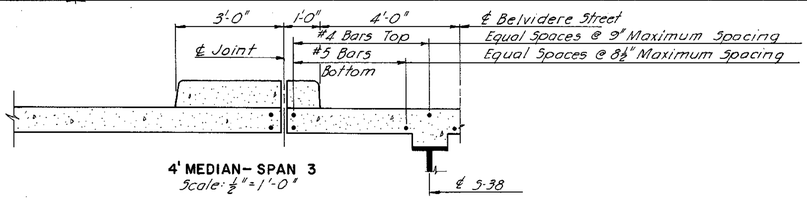
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 10 OF 21

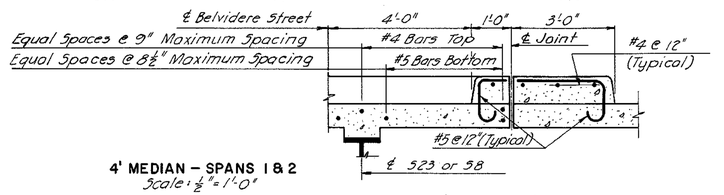
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	241	



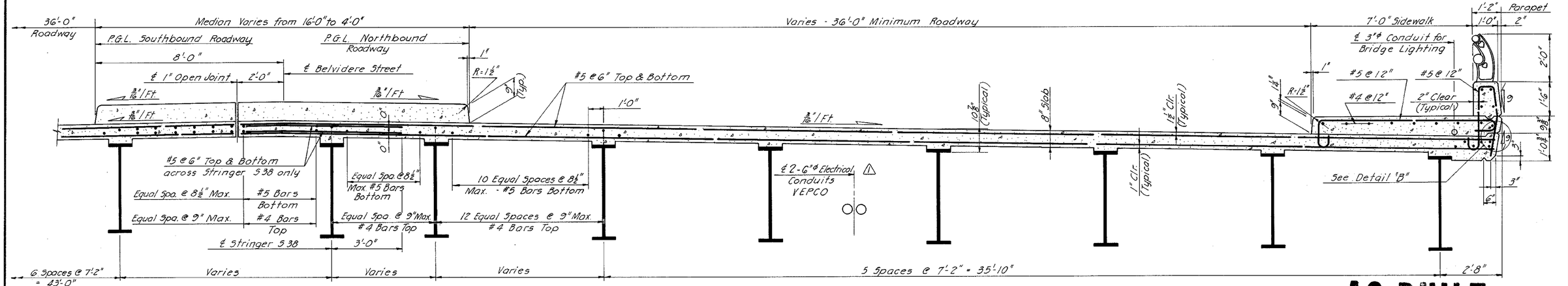
TYPICAL CROSS SECTION
Southbound Roadway (Spans 1 & 2 Shown)
Scale: ½" = 1'-0"



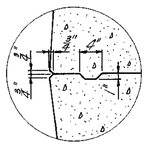
4' MEDIAN– SPAN 3
Scale: ½" = 1'-0"



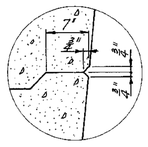
4' MEDIAN – SPANS 1 & 2
Scale: ½" = 1'-0"



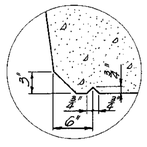
TYPICAL CROSS SECTION
Northbound Roadway (Span 3 Shown)
Scale: ½" = 1'-0"



DETAIL "A"
Scale: 1½" = 1'-0"



DETAIL "B"
Scale: 1½" = 1'-0"



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

NOTES:
For General Notes, see Sheet 1.
For Framing Plan, see Sheet 9.
For Slab Plan, see Sheet 14.
For Diaphragm Details, see Sheet 12.
For Joint Details, see Sheet 15.
For Railing Details, see Sheet 53.

	BY	DATE
MADE	DLA	9-67
CHECKED	WEO	12-67
IN CHARGE	W E O	

NO.	REVISION	BY	DATE
1	Rev. No. VEPCO Conduits	DGT	11-12-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B51
BELVIDERE STREET OVER DOWNTOWN EXPRESSWAY
CROSS SECTION

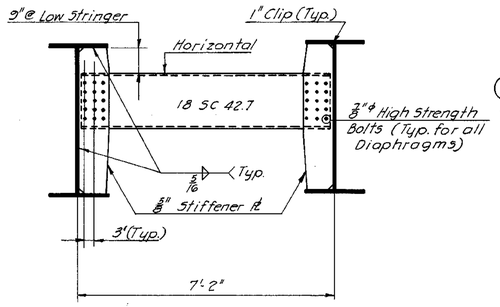
AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

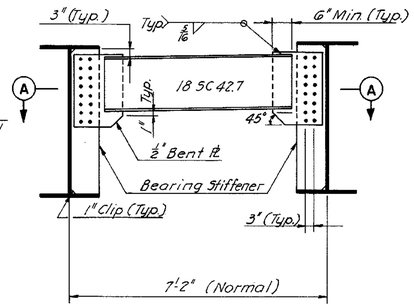
SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 11 OF 21

241

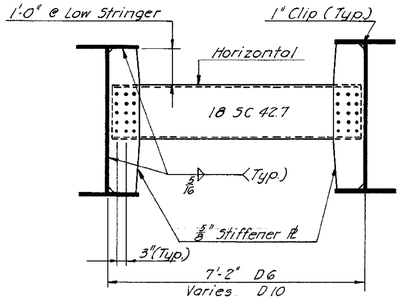
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	242	



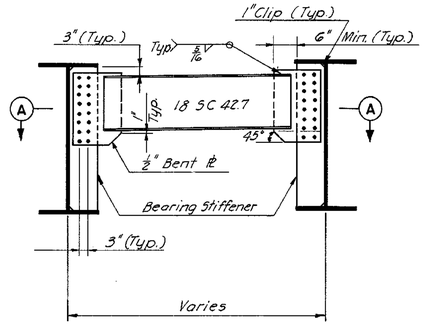
DIAPHRAGM D4



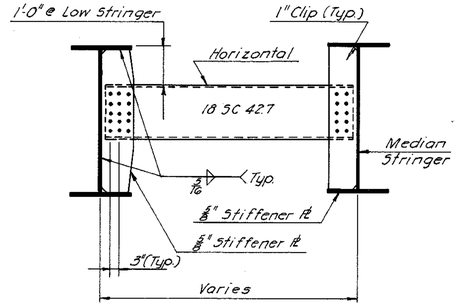
DIAPHRAGM D5



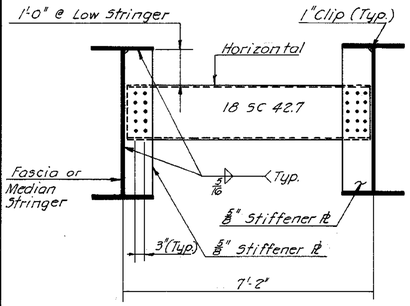
DIAPHRAGM D6 & D10



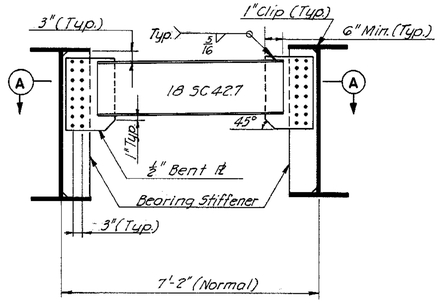
DIAPHRAGM D7



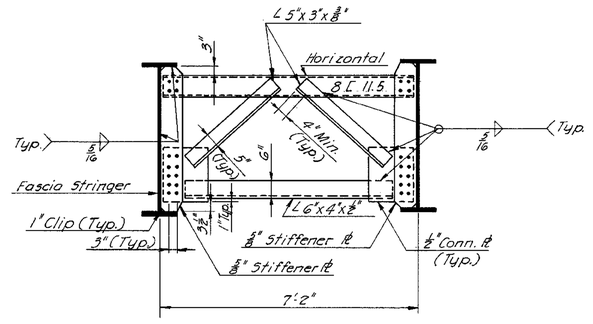
DIAPHRAGM D8



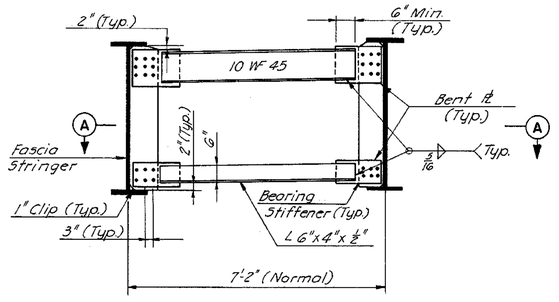
DIAPHRAGM D9



DIAPHRAGM D3



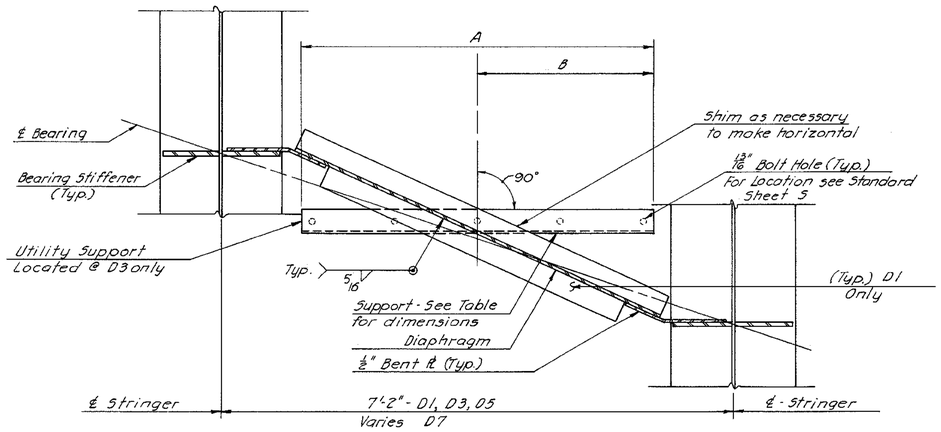
DIAPHRAGM D2



DIAPHRAGM D1

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

UTILITY	SUPPORT	A	B
Telephone	G C 8.2	4'-11"	2'-5 1/2"
Elect. - City	G C 8.2	2'-7"	1'-3 1/2"
Elect. - VEPCO	G C 8.2	1'-7"	0'-9 1/2"



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

NOTES:
For General Notes, see Sheet 1
For Framing Plan, see Sheet 9
For Stiffener Details, see Sheet 10

AS BUILT

	BY	DATE
MADE	QLA	10-67
CHECKED	WEO	12-67
IN CHARGE	WEO	

NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B51
BELVIDERE STREET OVER
DOWNTOWN EXPRESSWAY

DIAPHRAGM DETAILS

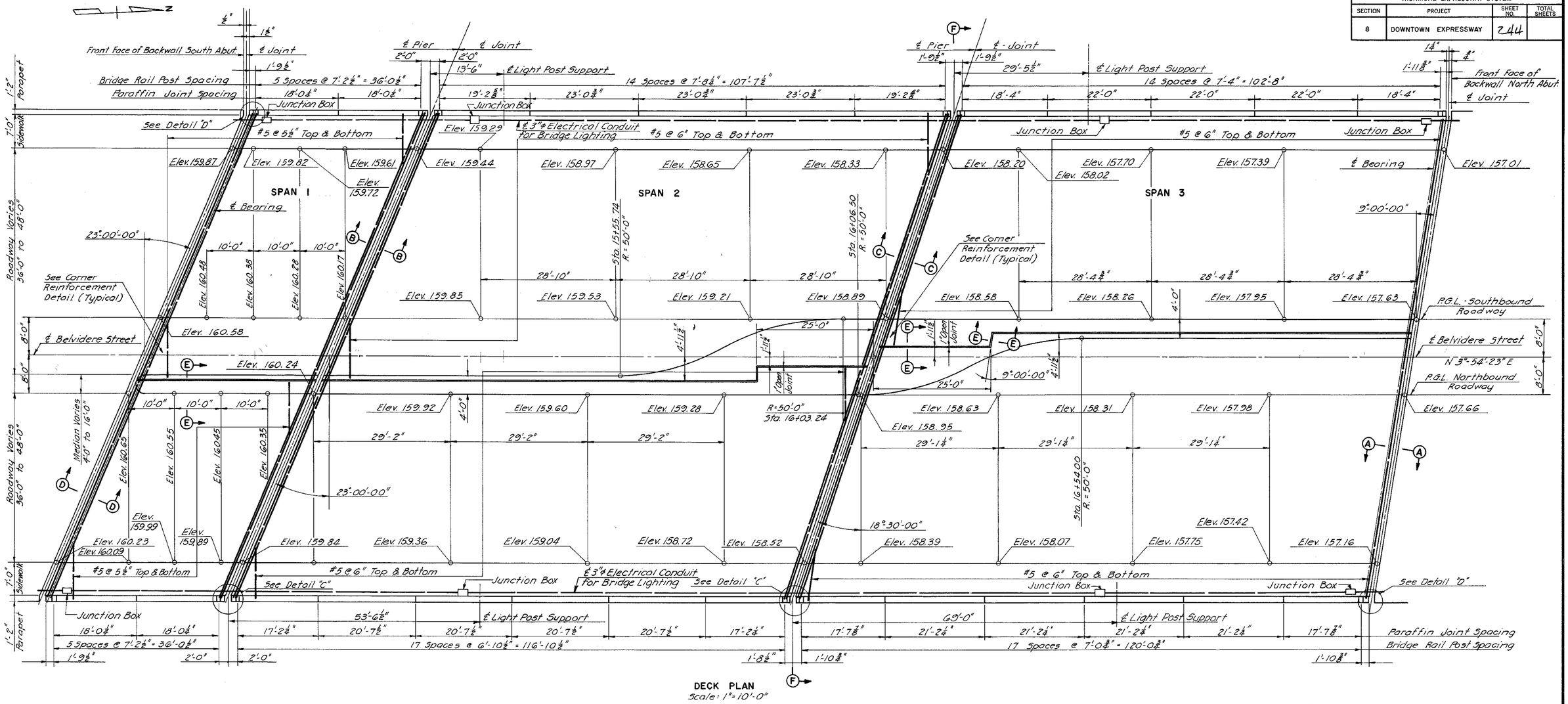
AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

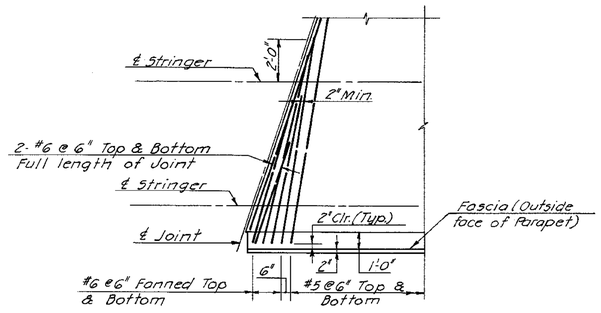
SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 12 OF 21

242

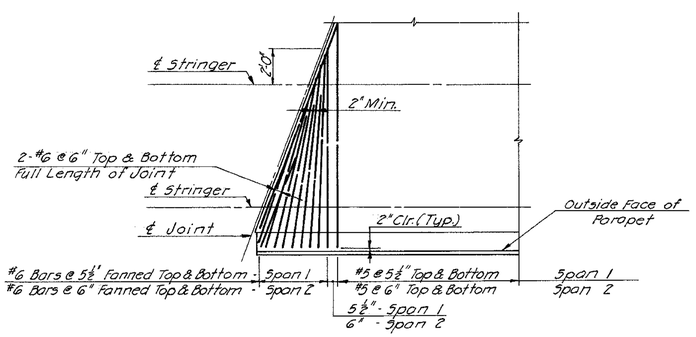
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	244	



DECK PLAN
Scale: 1" = 10'-0"



TYPICAL CORNER REINFORCEMENT DETAIL
(Pier 2 - Span 3)
Outside Face of Parapet Shown (Median Joint Similar)
Scale: ¼" = 1'-0"



TYPICAL CORNER REINFORCEMENT DETAIL
(Spans 1 & 2)
Outside Face of Parapet Shown (Median Joint Similar)
Scale: ¼" = 1'-0"

NOTES:
For General Notes, see Sheet 1
For Typical Deck Cross Section, see Sheet 11.
For Joint Details, see Sheet 15.
For Sections and Details, see Sheet 15.
For Typical Parapet Elevation, see Sheet 15.

AS BUILT

	BY	DATE				
MADE	DLA	9-67				
CHECKED	WEO	12-67				
IN CHARGE	WEO		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STRUCTURE B51
BELVIDERE STREET OVER
DOWNTOWN EXPRESSWAY
DECK PLAN

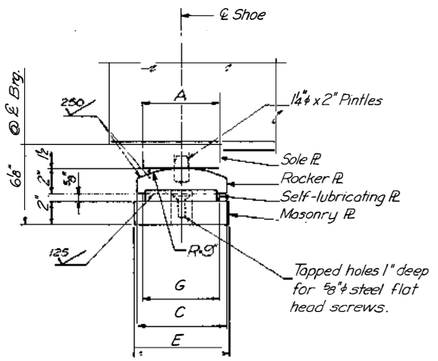
AMERICAN ENGINEERS
Richmond, Virginia

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
General Consultants

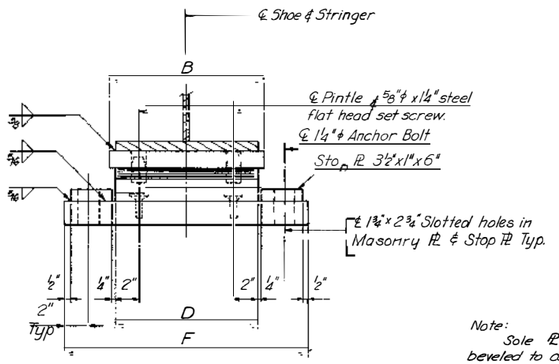
SCALE: AS NOTED
CONTRACT NO.: 8
SHEET NO. 14 OF 21

244

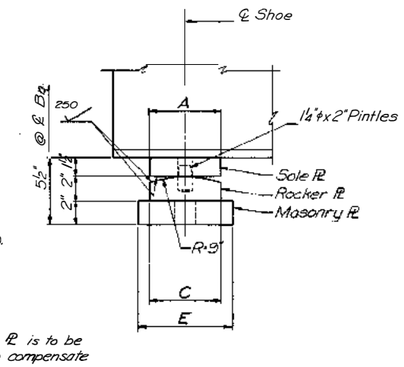
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
8	DOWNTOWN EXPRESSWAY	264	



SIDE ELEVATION

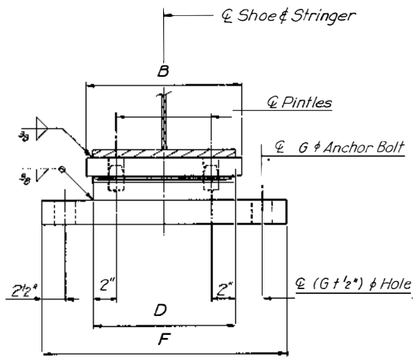


END ELEVATION

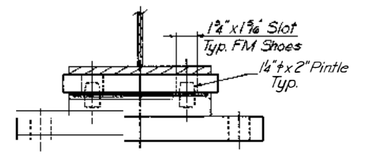


Note:
Sole PL is to be beveled to compensate for grade.

SIDE ELEVATION



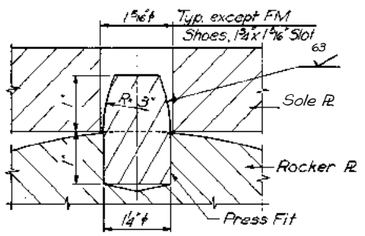
END ELEVATION



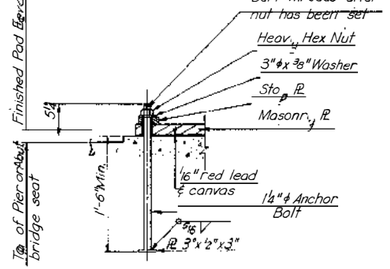
Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

END ELEVATION

EXPANSION SHOE
No Scale



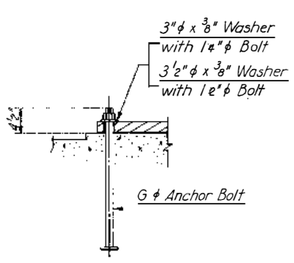
PINTLE DETAIL
Scale: ¾" = 1"



EXPANSION SHOE

ANCHOR BOLT DETAIL
No Scale

FIXED SHOE
No Scale



FIXED SHOE

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

FIXED MODIFIED SHOE
No Scale

Shoe Notes

Material for shoes (exclusive of self-lubricating plates) shall be high strength low alloy structural steel conforming to ASTM specification A-588

Material for self-lubricating plates shall be Leaded Tin Bronze conforming to ASTM 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.

Top of masonry plates, bottom [illegible] plates and top and bottom of sole plates shall be planed, straightened or otherwise treated to secure true plane 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 A.S.A. B.46.1 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 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 and shall be hot-dip galvanized conforming to A.S.T.M. A-153.

Templates shall be used to accurately set the anchor bolts.

SHOE DIMENSIONS

EXPANSION SHOES									FIXED SHOES							
TYPE	NO. REQD.	A	B	C	D	E	F	G	TYPE	NO. REQD.	A	B	C	D	E	F	G
E 1	29	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	F 1	39	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"ϕ
E 2	7	6"	1'-1"	8½"	1'-0"	9"	1'-8½"	6½"	F 1M	18	6"	1'-1"	6"	1'-0"	7½"	1'-9"	1¼"ϕ
E 3	21	6"	1'-1"	9"	1'-1"	9½"	1'-9½"	7"	F 2	9	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"ϕ
E 4	14	6"	1'-5½"	8"	1'-4½"	8½"	2'-1"	6"	F 2M	6	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"ϕ
E 5	1	6"	1'-5½"	9"	1'-4½"	9½"	2'-1"	7"	F 4	11	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"ϕ
E 7	20	6"	1'-7"	9½"	1'-6"	10½"	2'-2½"	7½"	F 4M	7	6"	1'-7"	6"	1'-6"	7"	2'-4"	1½"ϕ
E 9	40	6"	1'-9"	10"	1'-8"	11"	2'-4½"	7½"	F 6	18	6"	1'-9"	6"	1'-8"	7"	2'-6"	1½"ϕ
									F 6M	12	6"	1'-9"	6"	1'-8"	7"	2'-6"	1½"ϕ
									F 7	10	6"	1'-9"	6"	1'-8"	8"	2'-6"	1½"ϕ
									F 5	1	6"	1'-7"	6"	1'-6"	8"	2'-4"	1½"ϕ
									F 5M	1	6"	1'-7"	6"	1'-6"	8"	2'-4"	1½"ϕ

	BY	DATE
MADE	J.M.S.	10-67
CHECKED	W.E.O.	10-67
IN CHARGE	W.E.O.	

NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

STANDARD
SHOE DETAILS
Bridges 50, 51

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

SCALE: AS SHOWN
CONTRACT NO.: 8
SHEET NO. 51 OF

K+E MADE IN U.S.A. 52746

264

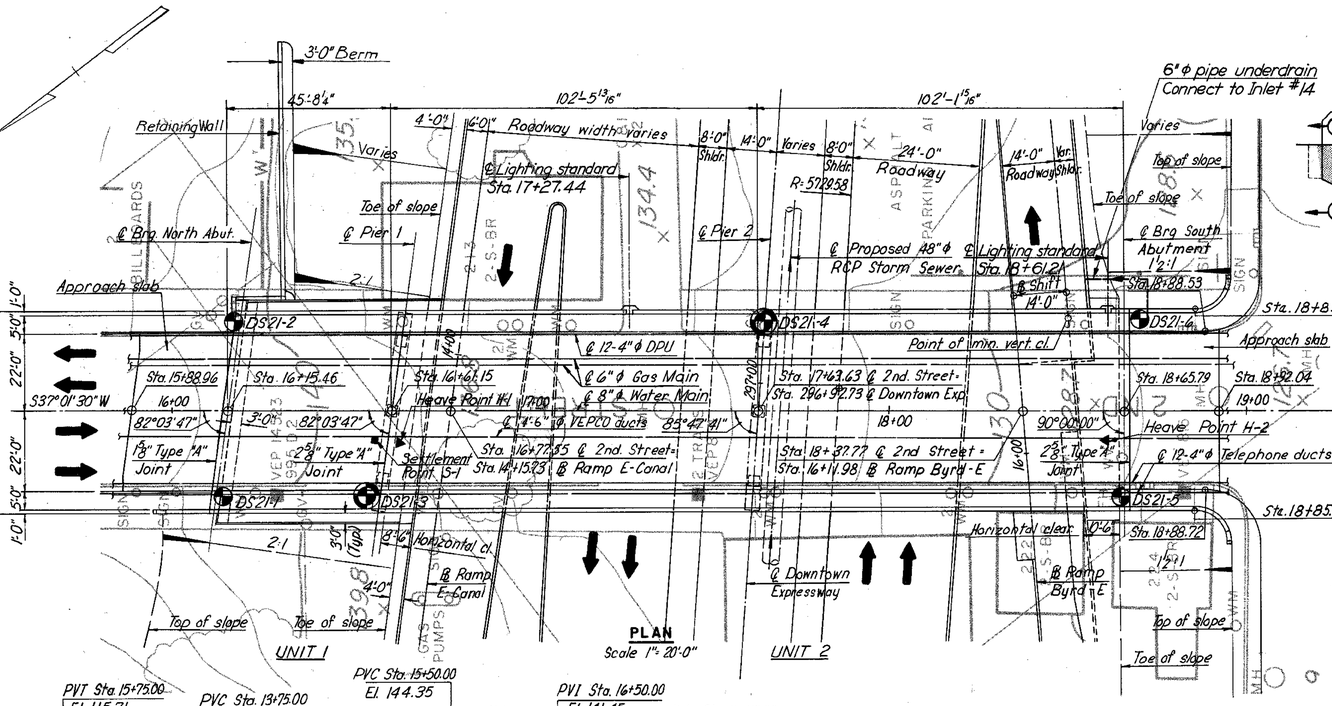
Bridge 54

2nd Street
Over
Downtown Expressway (VA 195)

Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	119	

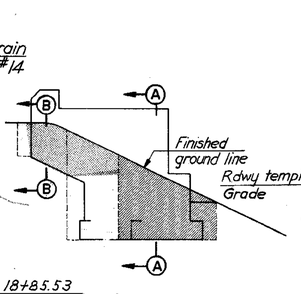
INDEX



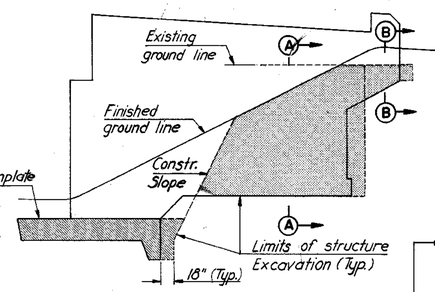
PROFILE GRADE
RAMP E-CANAL
Not to Scale

PROFILE GRADE
SOUTH SECOND STREET BRIDGE
Not to Scale

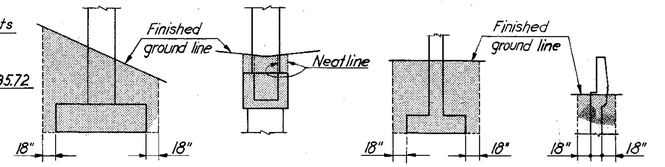
PROFILE GRADE
RAMP BYRD-E
Not to Scale



NORTH ABUT.

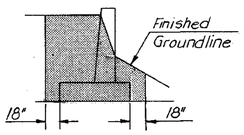


SOUTH ABUT.



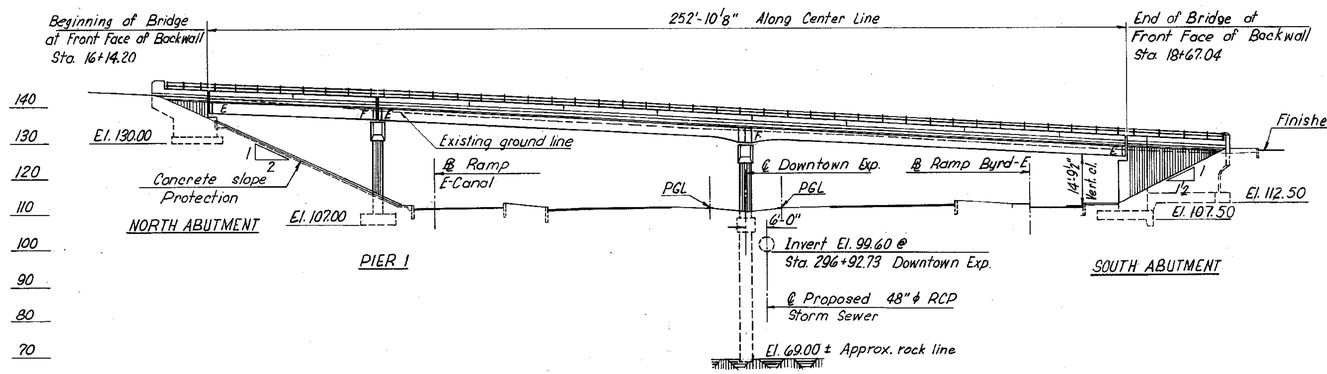
PIER 1 | PIER 2 | SECTION A-A | SECTION B-B

PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

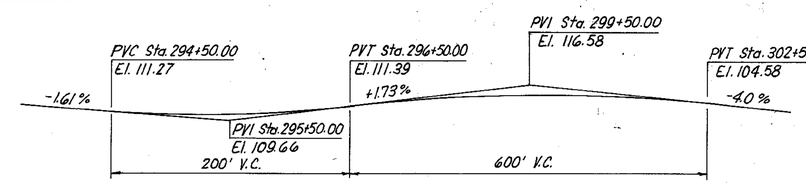


⚠ RETAINING WALL AT NORTH ABUTMENT

INSTRUMENTATION:
▼ Indicates location of Heave Point.
■ Indicates location of Settlement Point.
BORINGS: Indicates location of 2½"ϕ cased hole boring.
Indicates location of 4"ϕ cased hole boring.
For boring data, see Boring Logs sheet.
NOTE: For General Notes and Quantities, see next sheet.



ELEVATION
Scale 1"=20'-0"



PROFILE GRADE
DOWNTOWN EXPRESSWAY
Not to Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	E.F.	6.67	2	As Built	TEM	6-77
CHECKED	DSB	5-68	⚠	Retaining Wall Added		
IN CHARGE P.R.V.						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 1 OF 20

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
S	DOWNTOWN EXPRESSWAY	120	

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'0" sidewalks. Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Sections 401.05 and 401.06 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted. All field connections shall be made with high strength bolts. High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-44 Plug, corner E. Canal St. and S. 2nd St., Elev. 143.46
C-45 Plug, corner Byrd St. and S. 2nd St., Elev. 126.18

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	DRILLED HOLES FOR CAISSONS 4'-0" L.F.	POROUS BACKFILL C.Y.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6"ϕ L.F.	GAS MAIN 6"ϕ L.F.	WATER MAIN 8"ϕ L.F.	CONDUIT 6"ϕ VEPCO L.F.	CONDUIT 4"ϕ TELEPHONE L.F.**	CONDUIT 4"ϕ D.P.U. L.F.	METAL CONDUIT 3"ϕ L.F.	STEEL PLES 10BP42 L.F.		MAINT. & SUPT. EXISTING TEL. CABLES L.S.
SUPERSTRUCTURE				503.23	101,330	565,498	506						612	308	1224	4621	3625	717			
NORTH ABUTMENT	652	234.45			13,647		12		60	360.83	159	174							1432.9		
PIER 1	151	109.19			26,845																
PIER 2	38	113.26			22,500			80.3													
SOUTH ABUTMENT	329.43	321.55			28,511		63		95		194	132									
APPROACH SLABS			121.95		26,710																
TOTAL	1170.43	778.45	121.95	503.23	219,543	565,498	581	80.3	155	360.83	353	306	612	308	1224	4621	3625	717	1432.9		L.S.

** Does not include existing 9-duct bank to be maintained in service

	BY	DATE	NO.	REVISION	BY	DATE
MADE	E.V.R.		2	As Built	TEH	6-77
CHECKED	JBP PRV	5-68	1	Quant N. Abut	RBH	6-74
IN CHARGE P.R.V.						

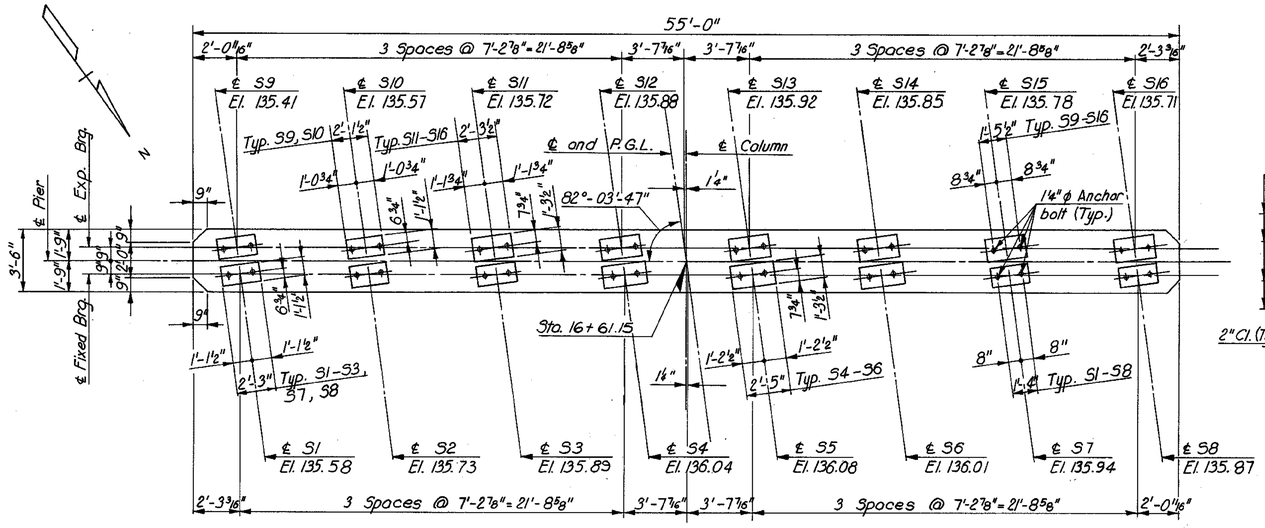
AS BUILT.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-54
- 2ND STREET OVER DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

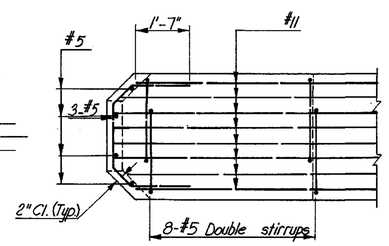
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 2 OF 20

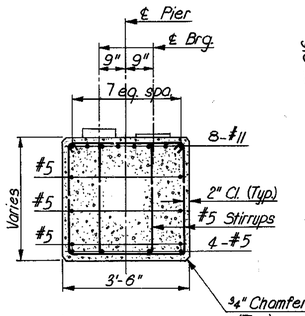
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	DOWNTOWN EXPRESSWAY	127	



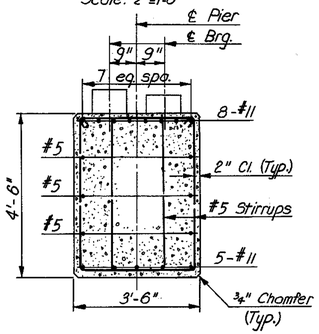
PLAN
Scale: 1/4"=1'-0"



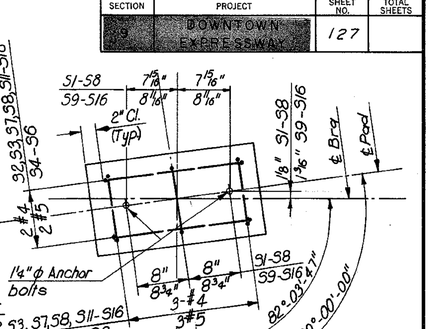
PLAN OF PIER CAP
SHOWING REINFORCING DETAILS
Scale: 1/2"=1'-0"

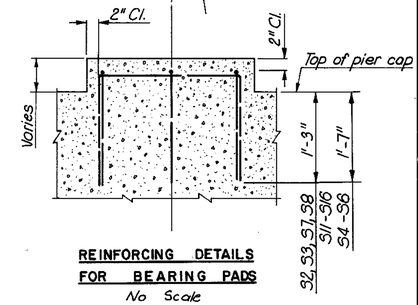


SECTION A-A
Scale: 1/2"=1'-0"

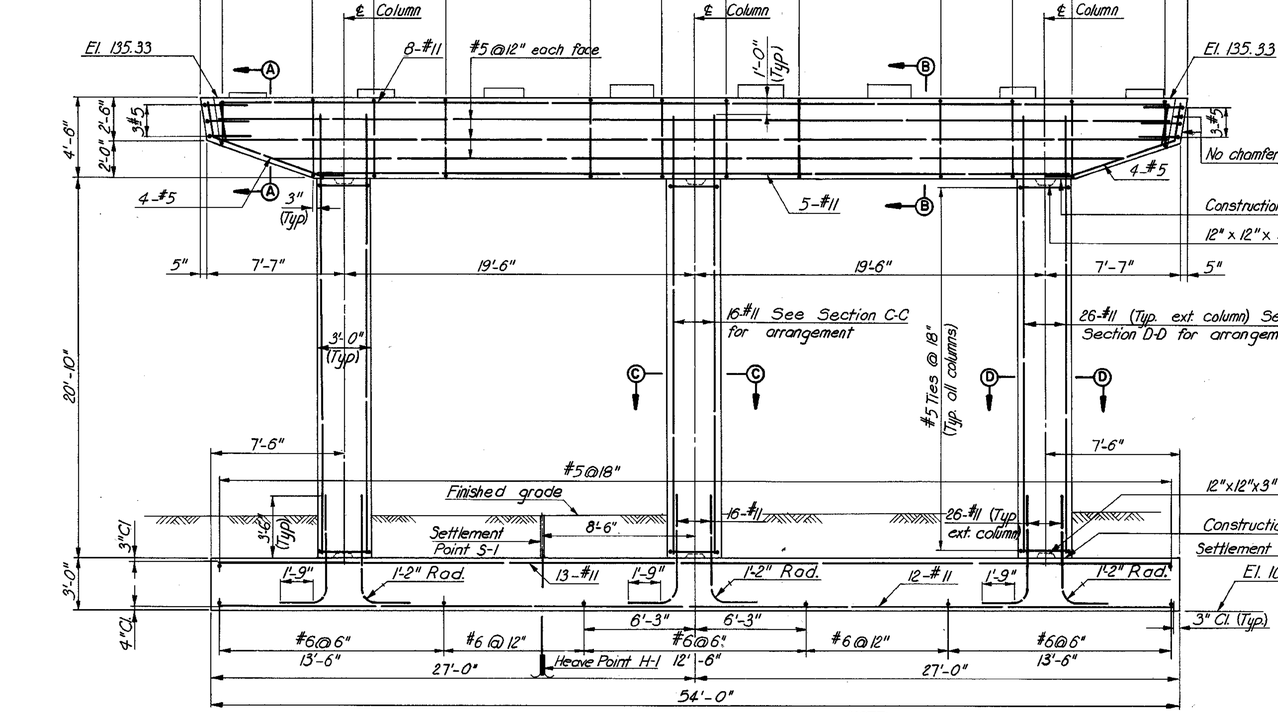


SECTION B-B
Scale: 1/2"=1'-0"



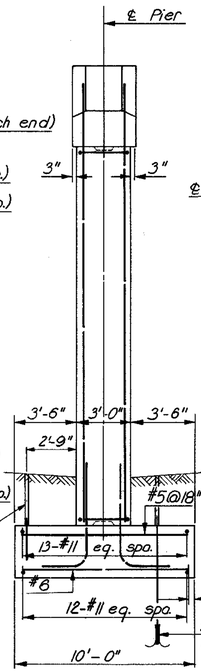


REINFORCING DETAILS
FOR BEARING PADS
No Scale



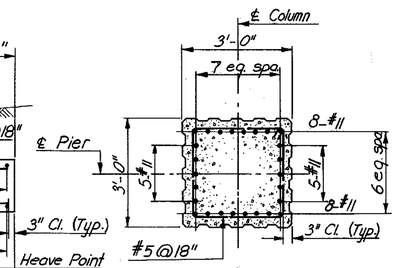
ELEVATION
Scale: 1/4"=1'-0"

NOTE:
Installation procedures for Settlement Points and Heave Points are described in the Special Provisions of the Specifications. Typical Installation Details and other pertinent data are shown on Sheets C-11 and 16 Misc. Detail of Highway Plans



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

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



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

FOUNDATION NOTES:

Foundation elevation is approximate and may be varied to suit field conditions as directed by the Engineer. Vertical column reinforcing shall not be cut until this elevation is established.

Where elevation changes by more than two feet, redesign will be required.

Pier foundation is designed for an allowable bearing pressure of 2½ tons per square foot.

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

	BY	DATE				
MADE	elm	1-68				
CHECKED	C.B.P.	3-68	1	As Built	TEM	4-77
IN CHARGE	P.R.V.		NO.	REVISION	BY	DATE

AS BUILT

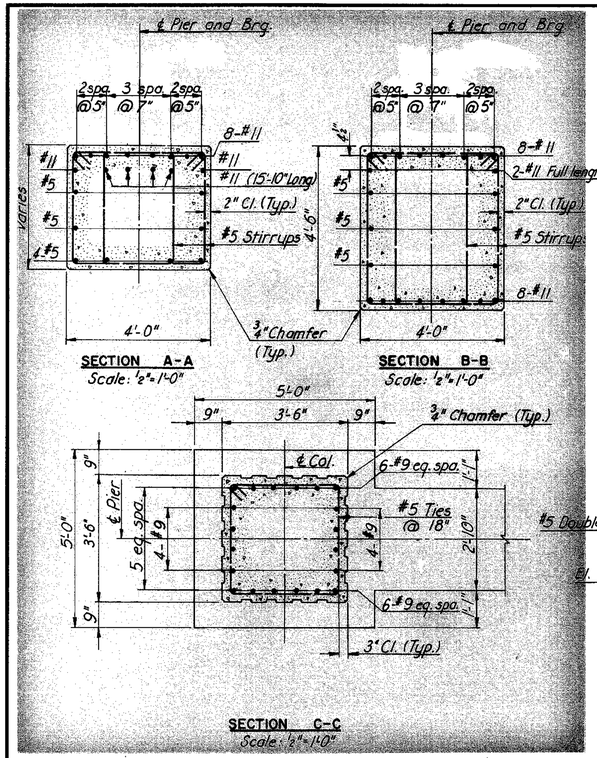
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

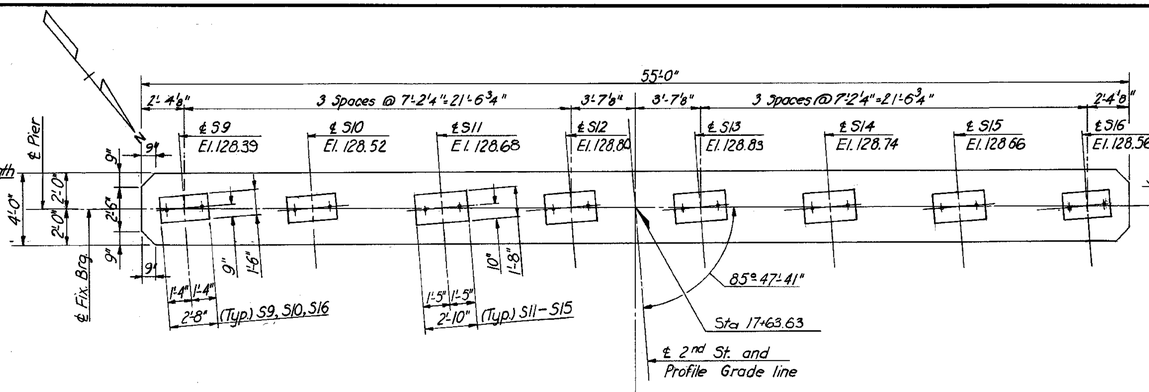
BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY
PIER I

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

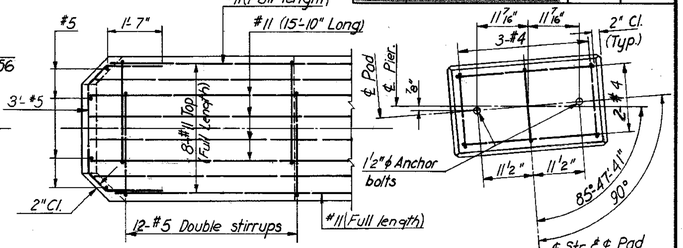
SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 9 OF 20

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	128	

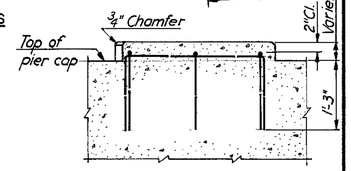




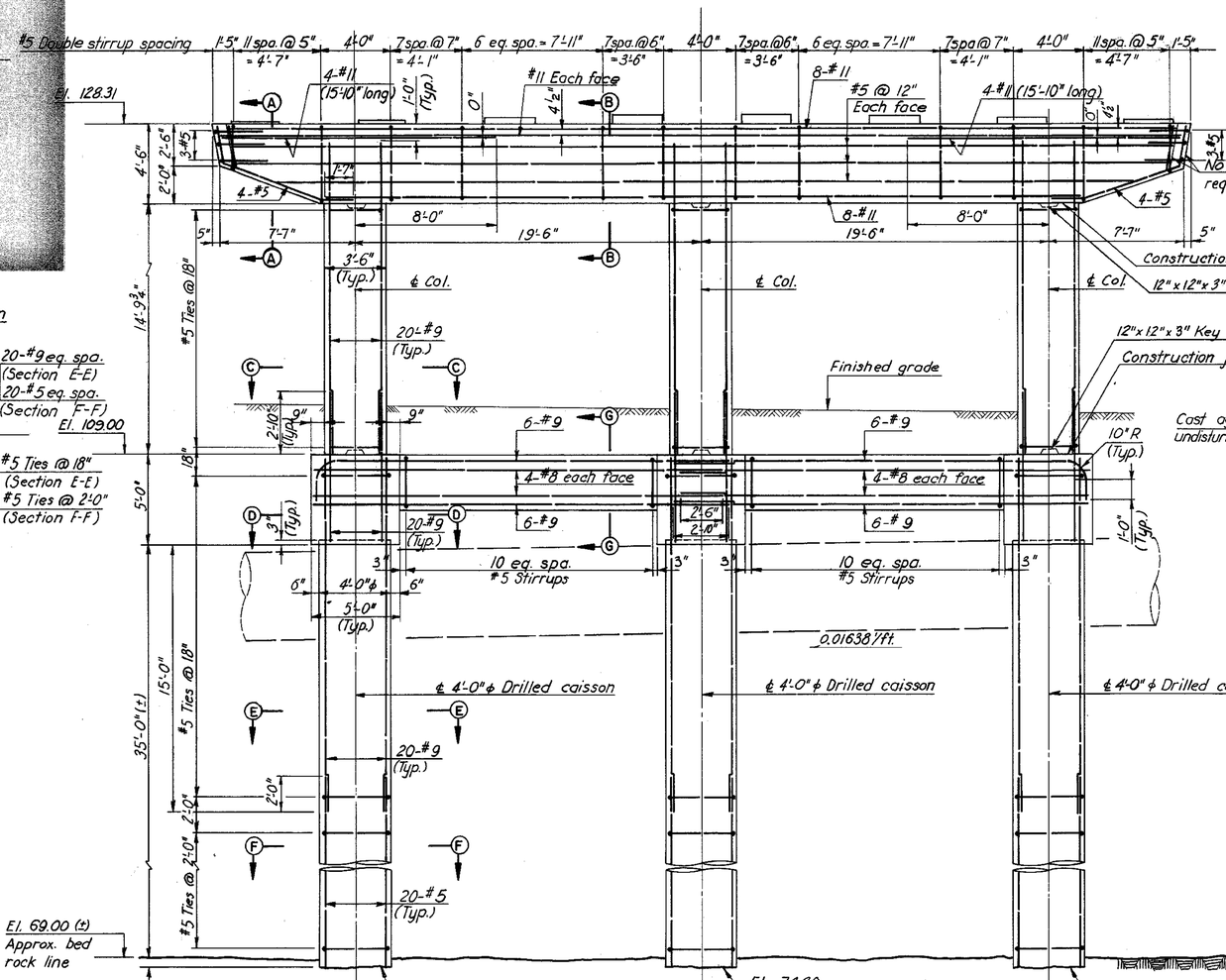
PLAN
Scale: 1/4"=1'-0"



PLAN OF PIER CAP
SHOWING REINFORCING DETAILS
Scale: 1/2"=1'-0"



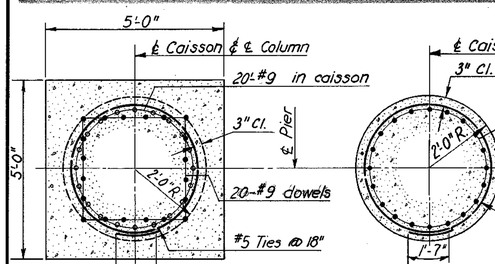
REINFORCING DETAILS
FOR BEARING PADS AT
S11 - S15
Scale: 3/4"=1'-0"



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

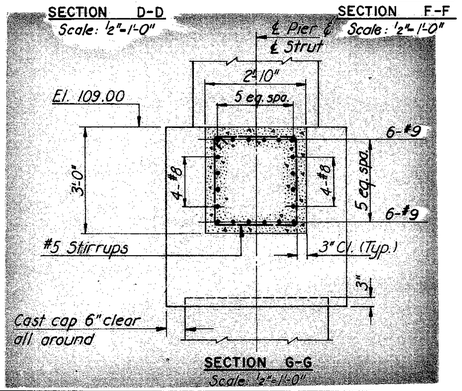
AS BUILT

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



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

SECTION E-E
SECTION F-F
Scale: 1/2"=1'-0"



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

	BY	DATE				
MADE	D.L.A.	1-68				
CHECKED	D.S.B.	5-68	1	As Built	TEM	6-77
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

NOTES:
For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.
For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTES:
Maximum misalignment of caissons:
3" at top in any direction.
6" at bottom in any direction.
The 3" of concrete caisson embedded in the cap shall be free of earth film and surface laitance.
Bed rock elevation is approximate and may vary. Vertical caisson reinforcing shall not be cut until this elevation is established for each caisson.
Caissons are designed for an allowable rock bearing pressure of 30 tons per square foot.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

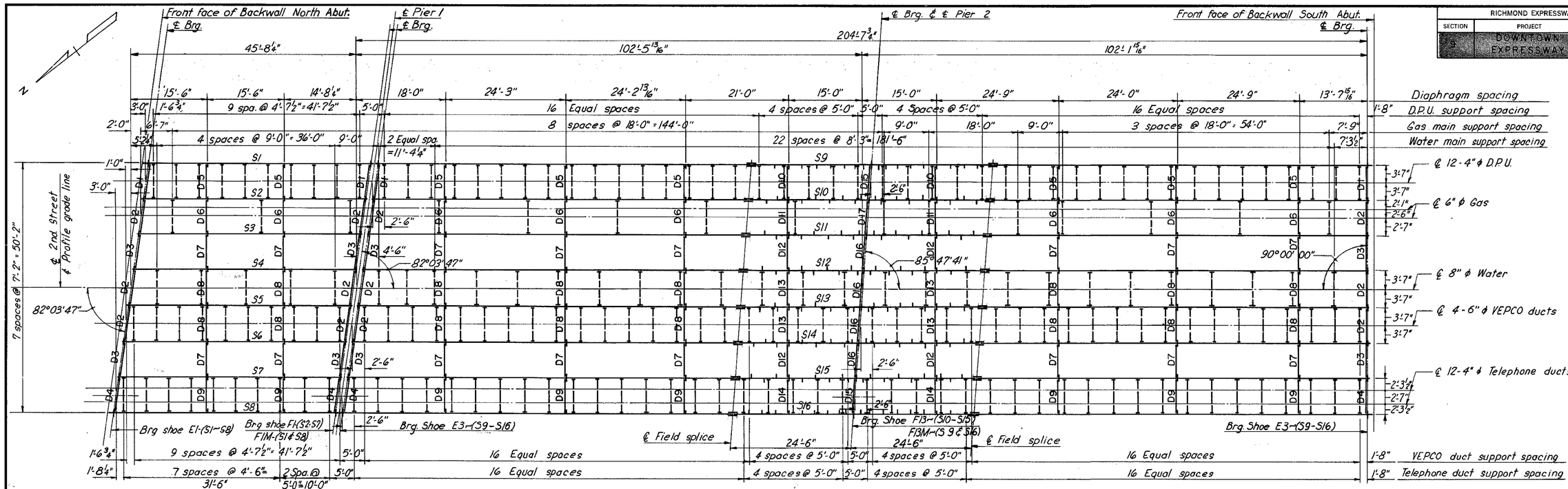
BRIDGE B-54
2 ND STREET OVER
DOWNTOWN EXPRESSWAY
PIER 2

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

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 10 OF 20

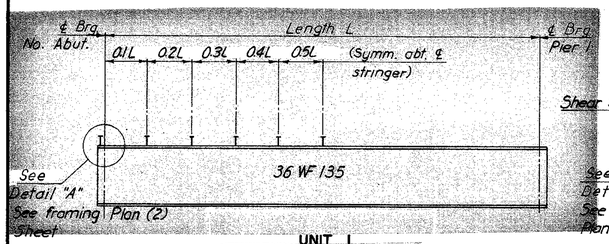
128

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	DOWNTOWN EXPRESSWAY	129	



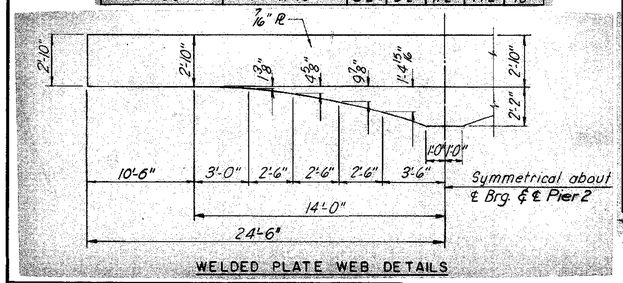
FRAMING PLAN

Scale: 1" = 10'

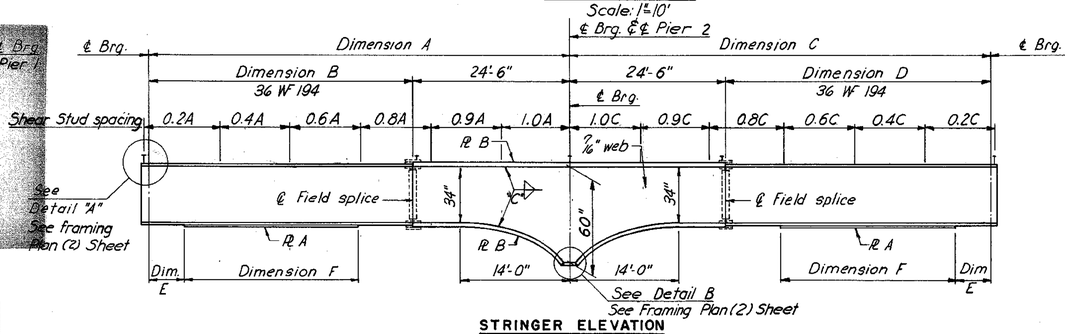


UNIT 1
STRINGER ELEVATION

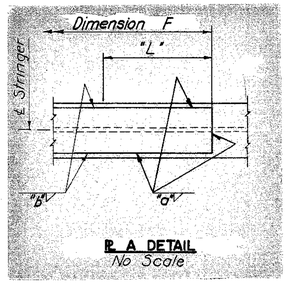
UNIT 1 STRINGER SCHEDULE						
STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	SHEAR STUD SPACING** 0.1L	0.2L	0.3L	0.4L	0.5L
S1-S8	44'-11 13/16"	8½	9½	11½	14½	16



WELDED PLATE WEB DETAILS



STRINGER ELEVATION
No Scale



R A DETAIL
No Scale

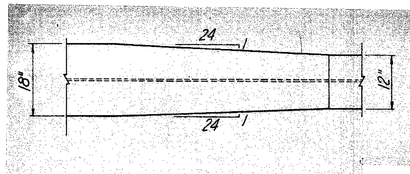
SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	8	F1	6
E3	16	F1M	2
		F13	6
		F13M	2

UNIT 2 STRINGER SCHEDULE

STRINGER	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E	R A DIM. F	R A SIZE	R A "L"	R A "a"	R A "b"	R B SIZE	R B "C"	SHEAR STUD SPACING** 0.2*	0.4*	0.6*	0.8*	0.9*	1.0*
S9	100'-0 15/16"	75'-6 5/16"	100'-3 3/4"	75'-9 3/4"	9'-3"	61'-0"	10½ x 1⅝	2'-3"	5/8"	3/8"	18 x 1⅜	5/16	7"	10"	11"	7"	18"	24"
S10	100'-6 9/16"	76'-0 9/16"	100'-10 1/16"	76'-4 1/16"	10'-3"	59'-6"	10½ x 1⅝				18 x 1½		8"	11"	12"	8"		
S11	101'-0¼"	76'-6¼"	101'-4 1/16"	76'-10 1/16"	11'-6"	57'-6"	10½ x 1¼				18 x 1¼							
S12	101'-5 15/16"	76'-11 15/16"	101'-10 3/4"	77'-4 3/4"	10'-3"	60'-6"	10½ x 1⅝				18 x 1½							
S13	101'-11 9/16"	77'-5 9/16"	102'-5 1/16"	77'-11 1/16"		61'-0"	10½ x 1⅝				18 x 1½							
S14	102'-5¼"	77'-11¼"	102'-11 3/8"	78'-5 3/8"		61'-6"	10½ x 1⅝				18 x 1½							
S15	102'-10⅝"	78'-4⅜"	103'-5 1/16"	78'-11 1/16"	10'-3"	62'-0"	10½ x 1⅝				18 x 1½	5/16	8"	11"	12"	8"		
S16	103'-4 1/16"	78'-10 1/16"	104'-0"	79'-6"	9'-0"	64'-0"	10½ x 1⅜	2'-3"	5/8"	3/8"	18 x 1⅝	3/8	7"	10"	11"	7"	18	24

* To be applied to either A or C dimension.

** Shear stud spacing shown is maximum spacing.



HORIZONTAL FLANGE TRANSITION
Scale 3/4" = 1'-0"

Note:
For additional details see Framing Plan (2) Sheet.

	BY	DATE				
MADE	EVR	3-68				
CHECKED	DSB	5-68	1	As Built	TEM	6-77
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

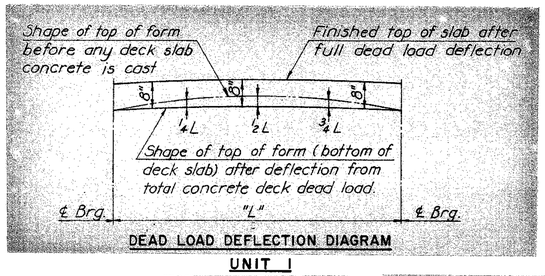
BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY

FRAMING PLAN (1)

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 11 OF 20

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	130	



DEAD LOAD DEFLECTION DIAGRAM

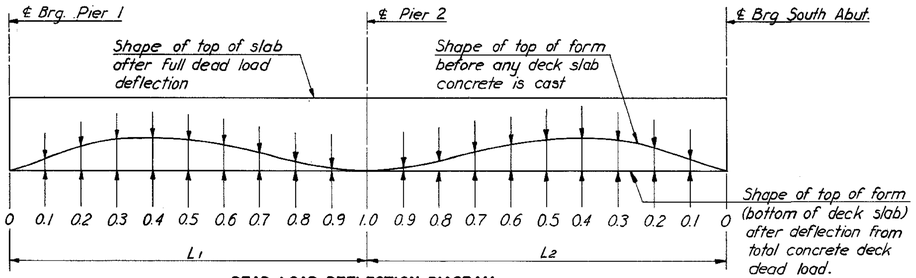
UNIT 1

DEFLECTION SCHEDULE		
STR.	1/4 L & 3/4 L	1/2 L
S1-S8	1/4"	3/8"

NOTE TO CONTRACTOR:

The above deflections are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

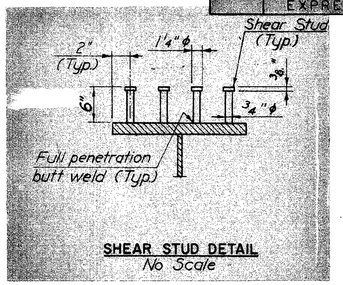
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.



DEAD LOAD DEFLECTION DIAGRAM

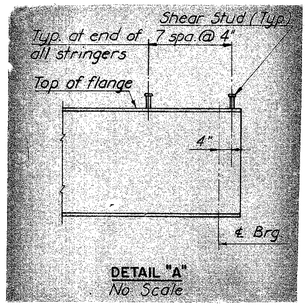
UNIT 2

DEFLECTION SCHEDULE										
STR.	0.1L_1 0.1L_2	0.2L_1 0.2L_2	0.3L_1 0.3L_2	0.4L_1 0.4L_2	0.5L_1 0.5L_2	0.6L_1 0.6L_2	0.7L_1 0.7L_2	0.8L_1 0.8L	0.9L_1 0.9L_2	1.0
S9	1/16"	1/4"	1 5/8"	1 13/16"	1 11/16"	1 7/16"	1"	1/2"	1/8"	0"
S10-S12	5/8"	1/8"	1 1/2"	1 5/8"	1/2"	1/4"	7/8"	7/16"	1/8"	0"
S13-S15	3/4"	1/4"	1 11/16"	1 13/16"	1 1/16"	1 7/16"	1"	1/2"	1/8"	0"
S16	3/4"	1 3/8"	1 13/16"	2"	1 7/8"	1 9/16"	1 1/16"	9/16"	3/16"	0"



SHEAR STUD DETAIL

No Scale



DETAIL "A"

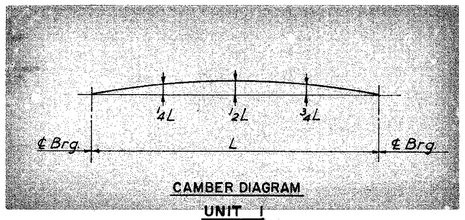
No Scale

SHEAR STUD NOTE:

Capacity = 3,400 lbs. per stud.

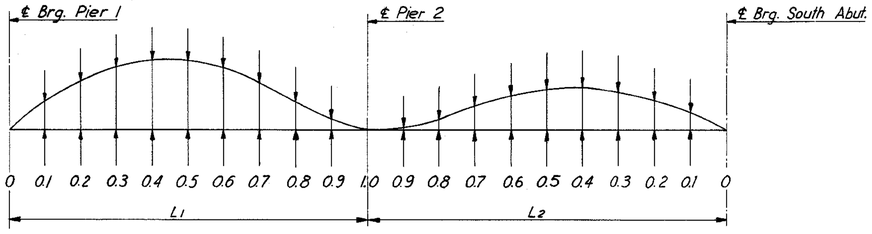
The contractor may, if he elects, use three 2" diameter studs at the same longitudinal spacing in lieu of the four 3" diameter studs shown.

Stud rows shall be placed parallel to the deck reinforcing.



CAMBER DIAGRAM

UNIT 1



CAMBER DIAGRAM

UNIT 2

CAMBER SCHEDULE			
STR.	1/4 L	1/2 L	3/4 L
S8	5/8"	1"	5/8"

NOTE TO FABRICATOR:

The above 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.

Stringers which are not required to be shop cambered shall be turned so that any mill tolerance deviation from straightness will be in the direction shown by the camber diagram above.

Dimensions are in inches.

CAMBER SCHEDULE																			
STR.	0.1L_1	0.2L_1	0.3L_1	0.4L_1	0.5L_1	0.6L_1	0.7L_1	0.8L_1	0.9L_1	1.0	0.9L_2	0.8L_2	0.7L_2	0.6L_2	0.5L_2	0.4L_2	0.3L_2	0.2L_2	0.1L_2
S9	1/2"	2 1/16"	3 1/2"	3 7/8"	3 13/16"	3 3/8"	2 9/16"	1 5/8"	1/16"	0"	3/16"	5/8"	1/4"	1 13/16"	2 3/16"	2 1/4"	2 1/16"	1 3/8	15/16"
S10-S12	1/2"	2 5/8"	3 3/8"	3 3/4	3 1/16"	3 1/4"	2 1/2"	1 9/16"	1/16"	0"	3/16"	9/16"	1/8"	1 5/8"	2"	2 1/8"	2"	1 1/2"	7/8"
S13-S15	1 9/16"	2 15/16"	3 1/16"	4 1/16"	4"	3 1/2"	2 3/4"	1 1/16"	3/4"	0"	3/16"	5/8"	1/4"	1 1/16"	2 3/16"	2 5/16"	2 3/16"	1 1/16"	15/16"
S16	1 1/16"	3"	3 9/16"	4 1/4"	4 3/16"	3 1/16"	2 7/8"	1 13/16"	3/4"	0"	3/16"	13/16"	1 3/8"	2"	2 3/8"	2 1/2"	2 5/16"	1 3/16"	1

FILL PLATE THICKNESS

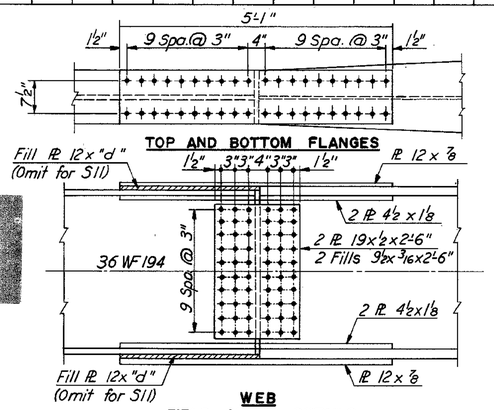
STR.	"d"
S9	1/8"
S10	1/4"
S12-S15	
S16	3/8"

STRINGER SPLICE NOTE

Web splice plates shall have horizontal rolled or mill sheared edges. Vertical edges may be shop sheared or flame cut.

For S9 and S16 place heads of H.S. bolts on outside face of web splices.

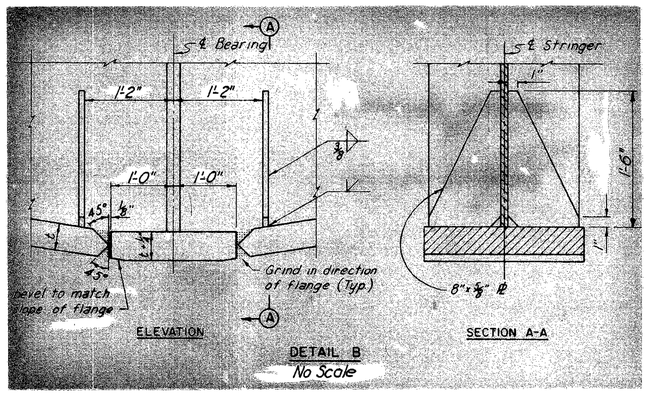
For all stringers place heads down for flange splices.



WEB

FIELD SPLICE DETAILS

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



	BY	DATE				
MADE	EVR	3-68				
CHECKED	A.J.S.	3-68	1	As Built	T.E.M.	6-77
IN CHARGE P.R.V.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

DOWNTOWN EXPRESSWAY

BRIDGE B-54

2ND STREET OVER DOWNTOWN EXPRESSWAY

FRAMING PLAN (2)

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

SCALE: AS SHOWN

CONTRACT NO.: 9

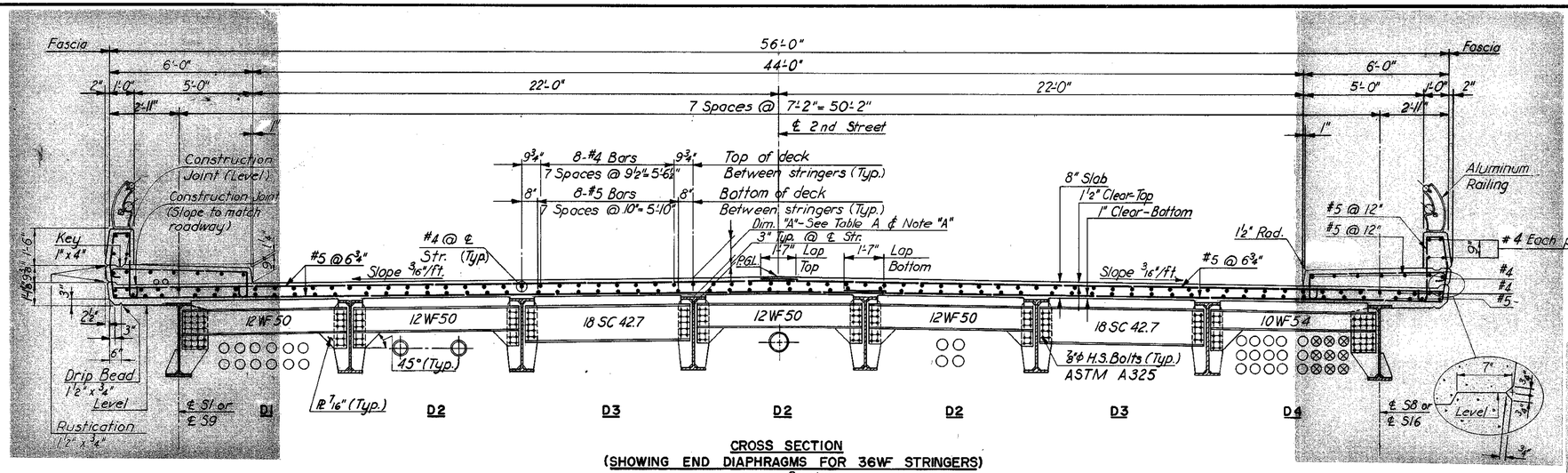
SHEET NO. 12 OF 20

130

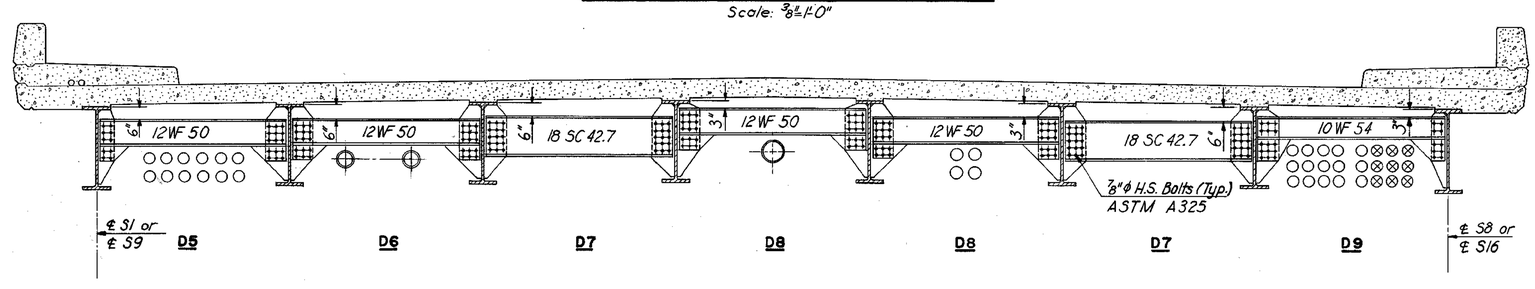
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	131	

TABLE A	
STRINGER	DIM "A"
S1-S8	10⅜"
S9-S16	10½"

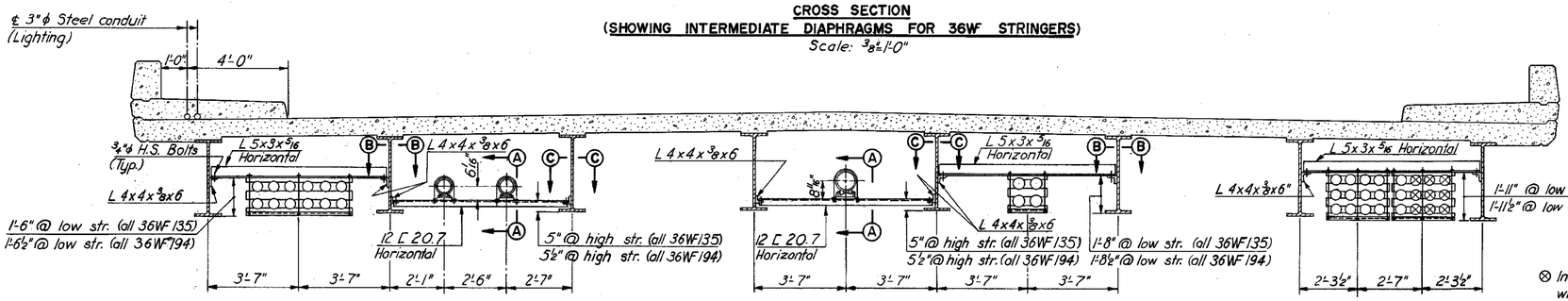
NOTE "A":
Dimension shown is measured from top of stringer to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.



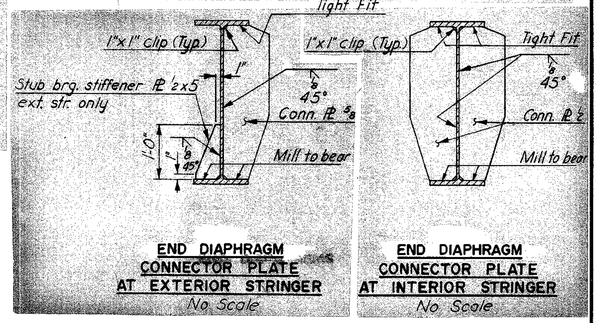
CROSS SECTION
(SHOWING END DIAPHRAGMS FOR 36WF STRINGERS)
Scale: 3/8"=1'-0"

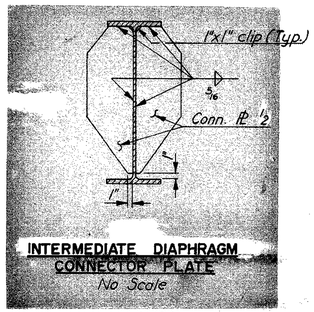


CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS FOR 36WF STRINGERS)
Scale: 3/8"=1'-0"



⊗ Indicates existing telephone ducts which are to be maintained in service. See Sheet 3.



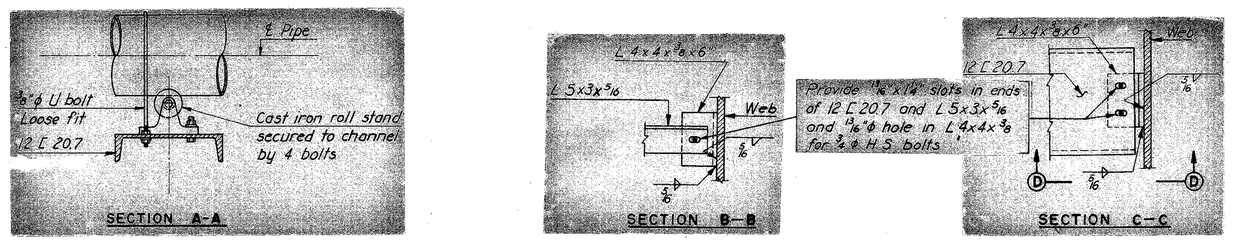


NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan (1) sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.

CROSS SECTION
(SHOWING UTILITY SUPPORTS FOR 36WF STRINGERS)
Scale: 3/8"=1'-0"



	BY	DATE				
MADE	EVR	10-67				
CHECKED	DSB	5-68	1	As Built	TEM	6-77
IN CHARGE	P.R.V.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY

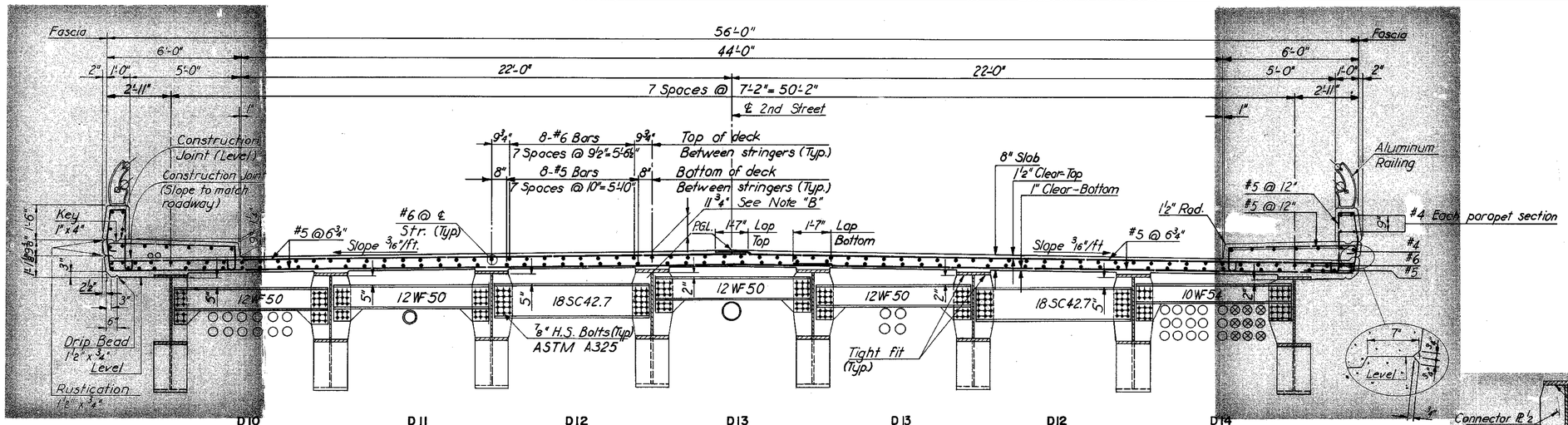
CROSS SECTION (1)

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

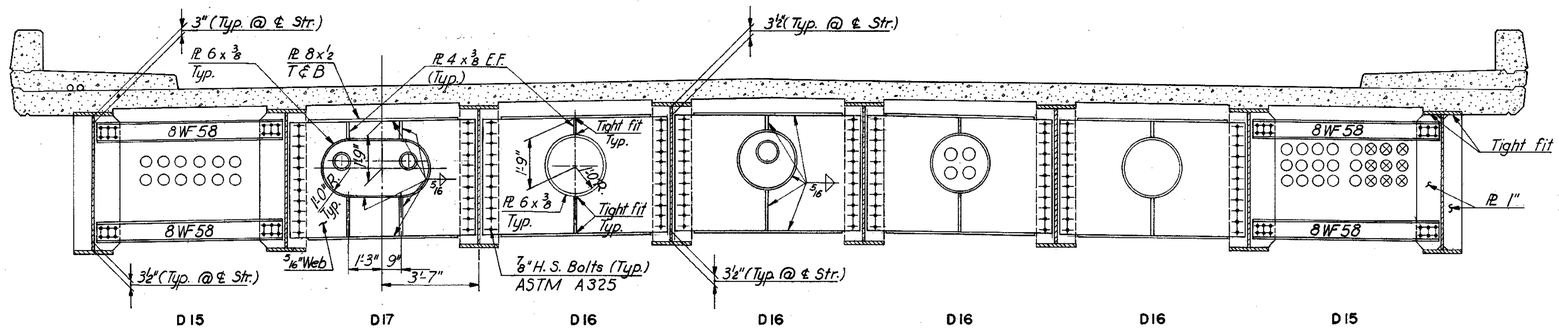
SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 13 OF 20

131

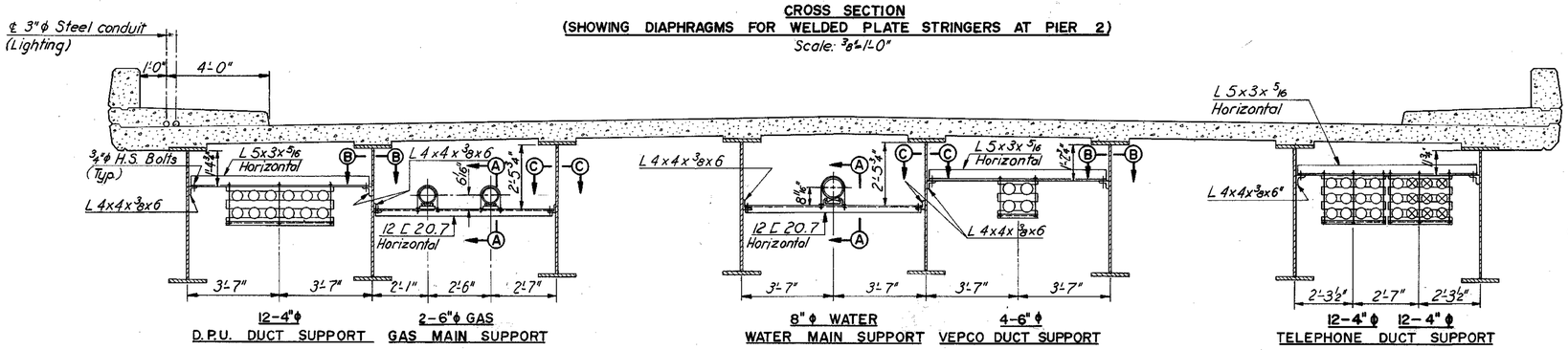
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	132	



CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS FOR WELDED PLATE STRINGERS)
Scale: 3/8"=1'-0"



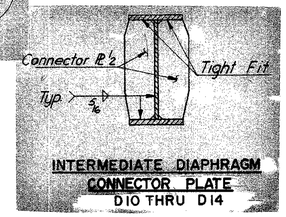
CROSS SECTION
(SHOWING DIAPHRAGMS FOR WELDED PLATE STRINGERS AT PIER 2)
Scale: 3/8"=1'-0"



12-4"ϕ D.P.U. DUCT SUPPORT | 2-6"ϕ GAS GAS MAIN SUPPORT | 8"ϕ WATER WATER MAIN SUPPORT | 4-6"ϕ VEPCO DUCT SUPPORT | 12-4"ϕ 12-4"ϕ TELEPHONE DUCT SUPPORT

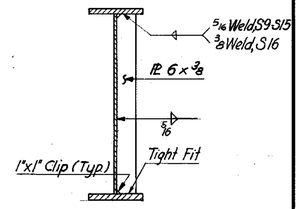
CROSS SECTION
(SHOWING UTILITY SUPPORTS FOR WELDED PLATE STRINGERS)
Scale: 3/8"=1'-0"

⊗ Indicates existing telephone ducts which are to be maintained in service. See Sheet 3.

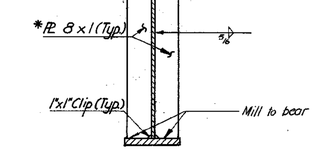


INTERMEDIATE DIAPHRAGM CONNECTOR PLATE
D10 THRU D14

NOTE "B"
Dimension shown is measured from top of web to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.



INTERMEDIATE STIFFENER AT DIAPHRAGM D5 THRU D9



BEARING STIFFENER AT PIER 2
D15 & D16
* Bearing stiffener width is minimum and may be increased to accommodate diaphragm.

FOR WELDED PLATE STRINGERS
No Scale

NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan (1) sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.

For Sections A-A, B-B, C-C, see Cross Section (1) Sheet.

	BY	DATE				
MADE	EVR	1-68				
CHECKED	DSB	5-68	1	As Built	TEM	6-77
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

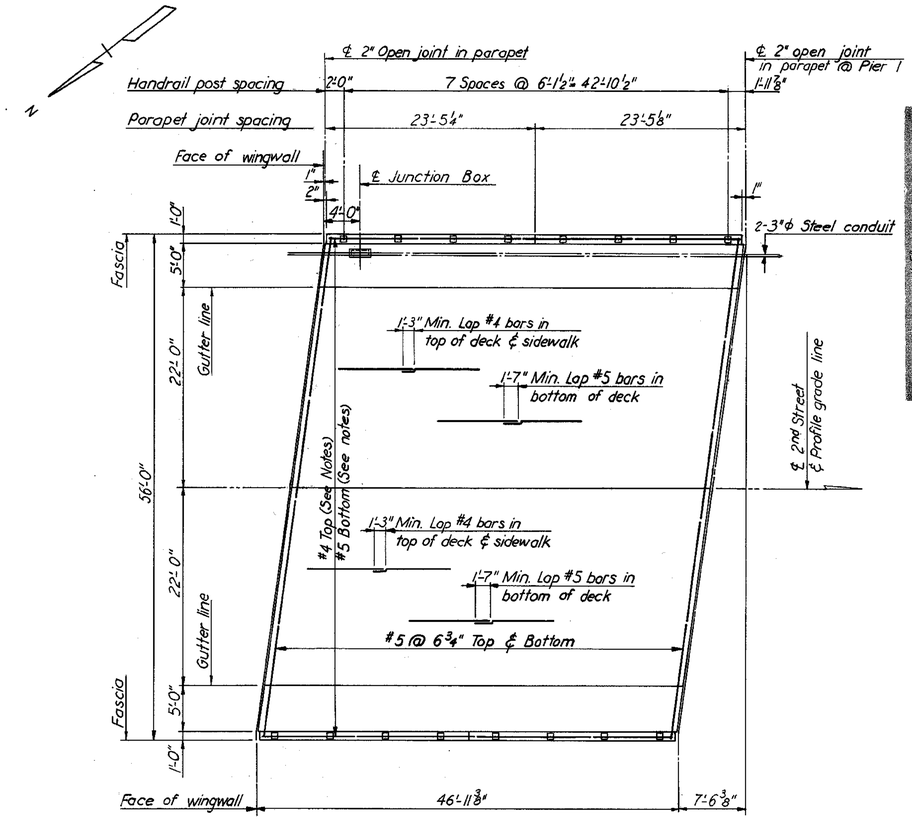
BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY

CROSS SECTION (2)

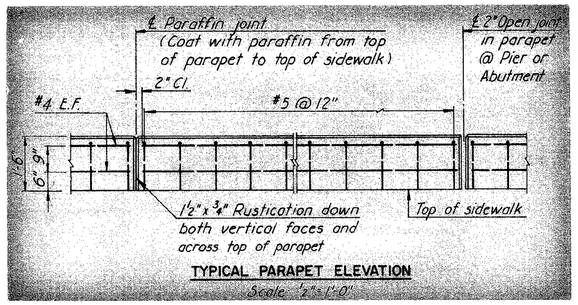
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 14 OF 20

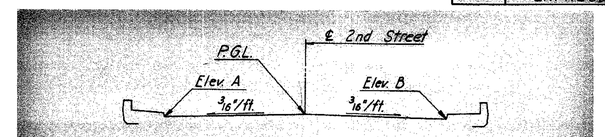
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	133	



PLAN - UNIT I
Scale: 1/8"=1'-0"



TYPICAL PARAPET ELEVATION
Scale: ½"=1'-0"



(LOOKING IN DIRECTION OF STATIONING)

PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
13+90.00	*142.76	*143.10	*142.76	+40.00	136.42	136.76	136.42
16+00.00	*142.42	*142.76	*142.42	17+50.00	135.91	136.25	135.91
+10.00	*142.06	*142.40	142.06	+60.00	135.39	135.73	135.39
+11.13	———	———	142.02	+62.01	———	———	135.28
+14.20	———	142.25	———	+63.63	———	135.54	———
+17.26	141.80	———	———	+65.25	135.11	———	———
+20.00	141.70	142.04	141.70	+70.00	134.87	135.21	134.87
+30.00	141.32	141.66	141.32	+80.00	134.35	134.69	134.35
+40.00	140.93	141.27	140.93	+90.00	133.83	134.17	133.83
16+50.00	140.53	140.87	140.53	18+00.00	133.31	133.65	133.31
+58.08	———	———	140.20	+10.00	132.79	133.13	132.79
+60.00	140.12	140.46	140.12	+20.00	132.27	132.61	132.27
+61.15	———	140.42	———	+30.00	131.75	132.09	131.75
+64.21	139.94	———	———	+40.00	131.23	131.57	131.23
+70.00	139.70	140.04	139.70	18+50.00	130.71	131.05	130.71
+80.00	139.27	139.61	139.27	+60.00	130.19	130.53	130.19
+90.00	138.82	139.16	138.82	+67.04	129.82	130.16	129.82
17+00.00	138.37	138.71	138.37	+70.00	129.67	130.01	129.67
+10.00	137.90	138.24	137.90	+80.00	*129.15	*129.49	*129.15
+20.00	137.42	137.76	137.42	+90.00	———	*128.97	———
+30.00	136.93	137.27	136.93	19+00.00	———	*128.45	———

* Elevations shown are given to top of bituminous surfacing.

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section (1) sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE				
MADE	EVR	3-68				
CHECKED	OSB	5-68	1	As Built	TEM	6-77
IN CHARGE P.R.V.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

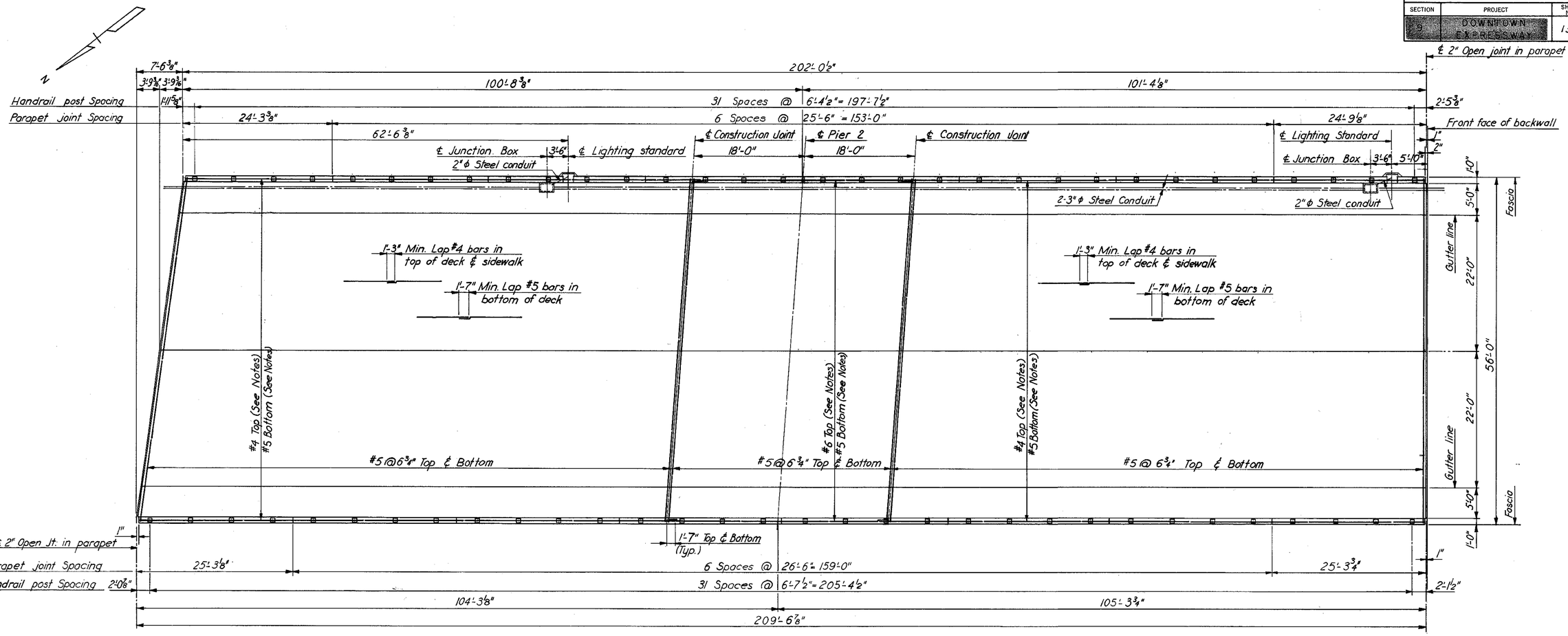
BRIDGE B-54
2ND STREET OVER
DOWNTOWN EXPRESSWAY

DECK PLAN I

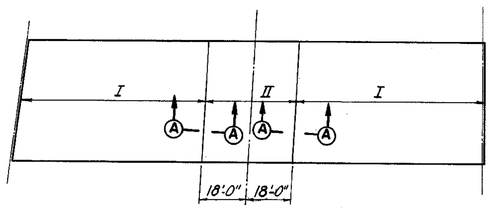
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 15 OF 20

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
B	DOWNTOWN EXPRESSWAY	134	



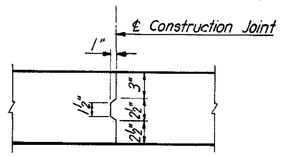
PLAN — UNIT 2
Scale: 1/4"=1'0"



OPTIONAL DECK POURING SEQUENCE
No Scale

Area marked I indicates first pour.
Area marked II indicates second pour.

Note:
Unit 2 was poured in one pour.



SECTION A-A
No Scale

NOTES:

For location and spacing of deck parapet and sidewalk reinforcement see Cross Section (1) Sheet for end portion and Cross Section (2) Sheet for Pier 2.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE				
MADE	EVR	3-68				
CHECKED	DSB	5-68	1	As Built	TEM	6-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-54
2ND STREET OVER DOWNTOWN EXPRESSWAY

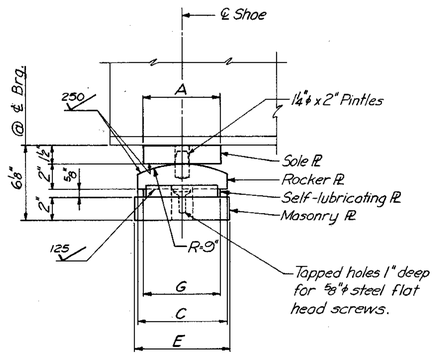
DECK PLAN 2

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

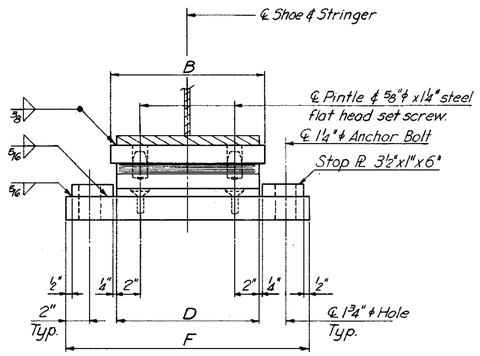
SCALE: AS SHOWN
CONTRACT NO. 0
SHEET NO. 16 OF 20

134

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	242	

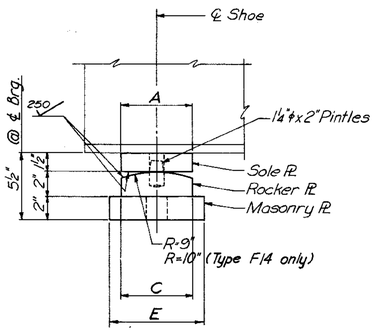


SIDE ELEVATION

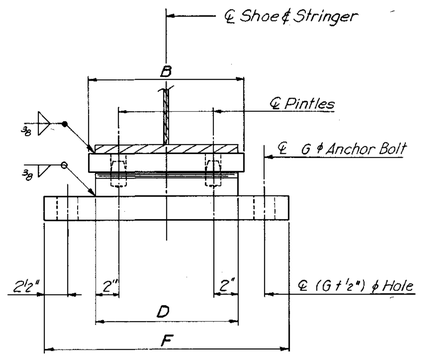


END ELEVATION

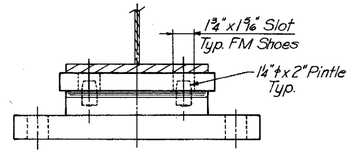
Note:
Sole plate is to be beveled to compensate for grade.



SIDE ELEVATION



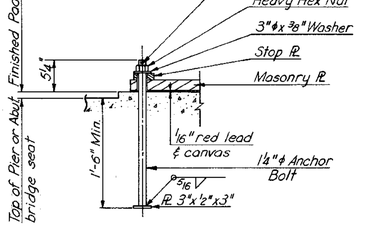
END ELEVATION



Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

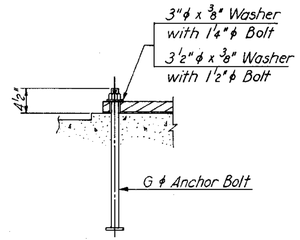
END ELEVATION

EXPANSION SHOE
No Scale



EXPANSION SHOE

FIXED SHOE
No Scale



FIXED SHOE

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

FIXED MODIFIED SHOE
No Scale

Shoe Notes:

Material for shoes (exclusive of self-lubricating plates) shall be structural carbon steel conforming to requirements of A.S.T.M. Specifications A242-66T and shall have a corrosion resistance equal to a minimum of four times that of A.S.T.M.-A7 steel as determined by a salt spray test conforming to A.S.T.M. Method B287-62.

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 plane surfaces.

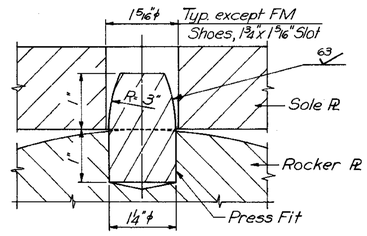
Contact surfaces noted on the plans with finish symbols shall be finished in accordance with the American Standards Association surface roughness requirement as defined in A.S.A. B46.1-55, Surface Roughness, Waviness and Lay, Part I.

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 1/8" or more than 1/4" 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.

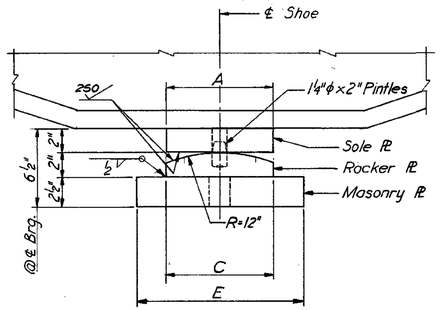


PINTLE DETAIL
Scale: 3/4" = 1"

ANCHOR BOLT DETAIL
No Scale

SHOE DIMENSIONS

EXPANSION SHOES									FIXED SHOES								
TYPE	NO. REQD.	A	B	C	D	E	F	G	TYPE	NO. REQD.	A	B	C	D	E	F	G
E1	30	6"	1'-1"	7 1/2"	1'-0"	8"	1'-8 1/2"	6"	F1	53	6"	1'-1"	6"	1'-0"	7 1/2"	1'-9"	1/4"ϕ
E2	29	6"	1'-1"	8 1/2"	1'-0"	9"	1'-8 1/2"	6 1/2"	F1M	16	6"	1'-1"	6"	1'-0"	7 1/2"	1'-9"	1/4"ϕ
E3	51	6"	1'-1"	9"	1'-1"	9 1/2"	1'-9 1/2"	7"	F3	3	6"	1'-5 1/2"	6"	1'-4 1/2"	8"	2'-3"	1/2"ϕ
E5	12	6"	1'-5 1/2"	9"	1'-4 1/2"	9 1/2"	2'-1"	7"	F6	20	6"	1'-9"	6"	1'-8"	7"	2'-6"	1/2"ϕ
E8	28	6"	1'-9"	9"	1'-8"	9 1/2"	2'-4 1/2"	6 1/2"	F6M	8	6"	1'-9"	6"	1'-8"	7"	2'-6"	1/2"ϕ
E4	6	6"	1'-5 1/2"	8"	1'-4 1/2"	8 1/2"	2'-1"	6"	F12	15	6"	1'-1"	6"	1'-1"	7 1/2"	1'-10"	1/4"ϕ
									F12M	6	6"	1'-1"	6"	1'-1"	7 1/2"	1'-10"	1/4"ϕ
									F13	6	9"	1'-7"	9"	1'-6"	1'-2"	2'-4"	1/2"ϕ
									F13M	2	9"	1'-7"	9"	1'-6"	1'-2"	2'-4"	1/2"ϕ
									F14	1	6"	1'-5 1/2"	6"	1'-4 1/2"	1'1"	2'-3"	1/2"ϕ
									F2	1	6"	1'-5 1/2"	6"	1'-4 1/2"	7"	2'-2"	1/4"ϕ
									F2M	9	6"	1'-5 1/2"	6"	1'-4 1/2"	7"	2'-2"	1/4"ϕ
									F12M	4	6"	1'-1"	6"	1'-1"	7 1/2"	1'-10"	1/4"ϕ



SIDE ELEVATION

FIXED SHOE TYPE F13
No Scale

Note: For details and dimensions not shown see Fixed Shoe details above.

	BY	DATE				
MADE	G.B.P.	3-68				
CHECKED	A.J.S.	3-68	1	As Built	TEM	7-77
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD SHOE DETAILS
Bridges 54, 55, 56, 57, 58, 60

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

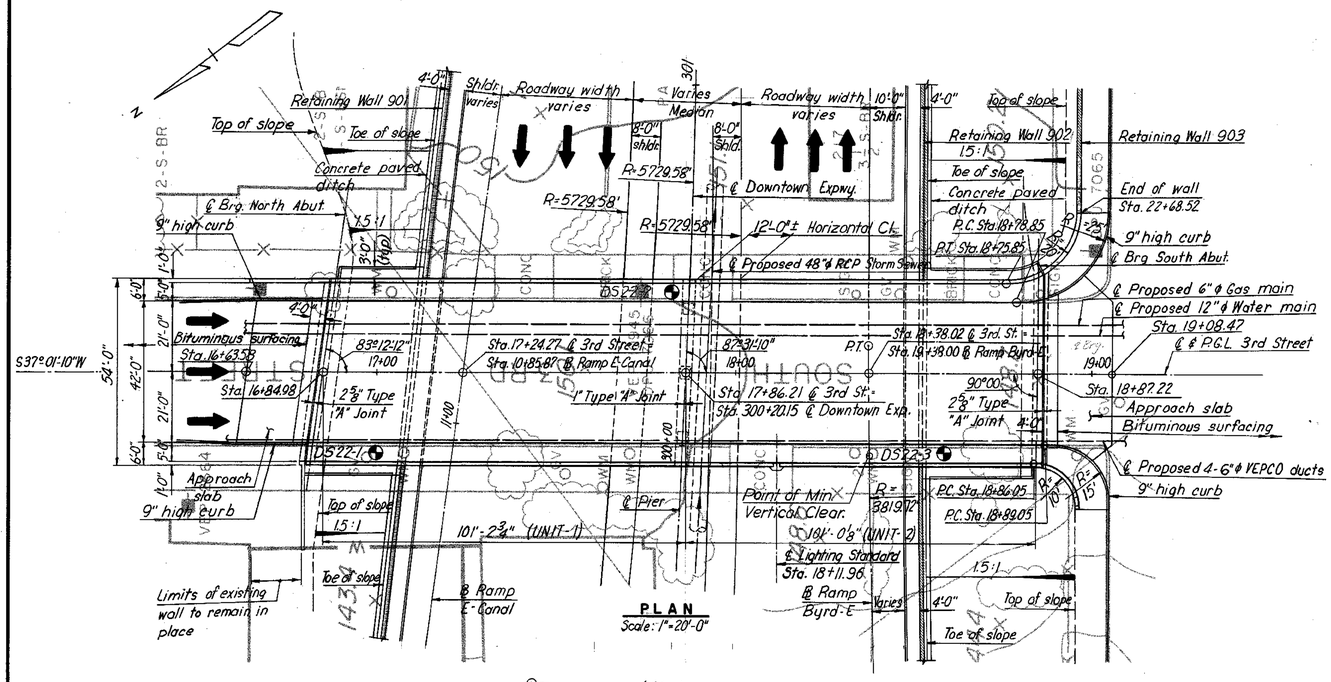
SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. S1 OF ___

242

Bridge 55

3rd Street
Over
Downtown Expressway (VA 195)

Record Set Plans



RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	139	

PLAN
Scale: 1"=20'-0"

PROFILE GRADE 3RD STREET
Not to Scale

PROFILE GRADE DOWNTOWN EXPRESSWAY
Not to Scale

SECTION A-A

PIER 1

SECTION B-B

SECTION C-C

PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

NO.	DESCRIPTION
1	General Plan and Elevation
2	General Notes and Quantities
3	North Abutment
4	North Abutment Details (1)
5	North Abutment Details (2)
6	North Abutment Details (3)
7	South Abutment
8	South Abutment Details (1)
9	South Abutment Details (2)
10	Pier
11	Framing Plan
12	Cross Section and Utility Details
13	Deck Plans
14	Joint Details
15	Approach Slabs and Slope Protection
16	Boring Logs
S1	Standard Shoe Details
S3	Standard Aluminum Railing Details (2 Rails)
S4	Standard Electrical Details (Bridges Carrying City Streets)
S7	Standard Architectural Details
S8	Standard Architectural Details
S9	Standard Architectural Details
S10	Standard Conduit Installation Details
S11	Standard Utility Support Details at Bridge Abutments

ELEVATION
Scale 1"=20'-0"

BORINGS: ● Indicates location of 2½"φ cased hole boring. For boring data, see Boring Logs sheet.

NOTE: For General Notes and Quantities, see next sheet.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	T.E.M.	1-68	2	As Built	TEM	6-77
CHECKED	A.B.P.	3-68	1	Ret. Wall Deleted	H.M.W.	4-15-76
IN CHARGE	P.R.Y.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-55
3RD STREET OVER
DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 1 OF 16

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	140	

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'0" sidewalks. Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Sections 401.05 and 401.06 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted.
All field connections shall be made with high strength bolts.
High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-46 Plug, corner Byrd St. and S. 3rd St., Elev. 149.69
C-47 Plug, corner E. Canal St. and S. 3rd St., Elev. 152.70

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	DRILLED HOLES FOR CAISSONS 4'-0" ϕ L.F.	POROUS BACKFILL C.Y.	STEEL PILES 10BP42 L.F.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6" ϕ L.F.	GAS MAIN 6" ϕ L.F.	WATER MAIN 12" ϕ L.F.	CONDUIT 6" ϕ VEPCO L.F.	METAL CONDUIT 3" ϕ L.F.	
SUPERSTRUCTURE				384.39	84,396	418,496	409.9							251	249	997	1278	
NORTH ABUTMENT	299	175.67			12,201		22.7		29	2134	178.68	111	129					
PIER I	38	140.94			39,985			95.3										
SOUTH ABUTMENT	623	209.43			16,751		28.9		41		246.75	118	90					
APPROACH SLABS			100.37		22,618													
TOTAL	960	526.04	100.37	384.39	175,951	418,496	461.5	95.3	70	2134	425.43	229	219	251	249	997	1278	

	BY	DATE				
MADE	EVR	3-68				
CHECKED	G.B.P.	12-68	1	As Built	TEM	6-77
IN CHARGE PRY			NO.	REVISION	BY	DATE

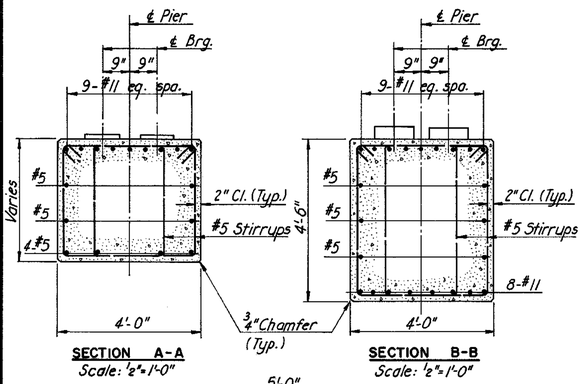
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-55
3RD STREET OVER DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

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

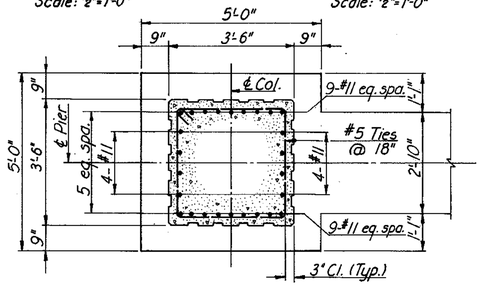
SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 2 OF 16

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	148	

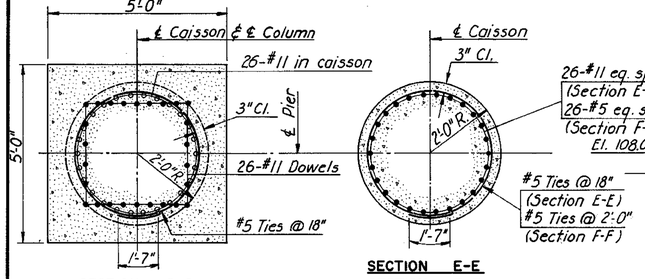


SECTION A-A
Scale: 1/2"=1'-0"

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

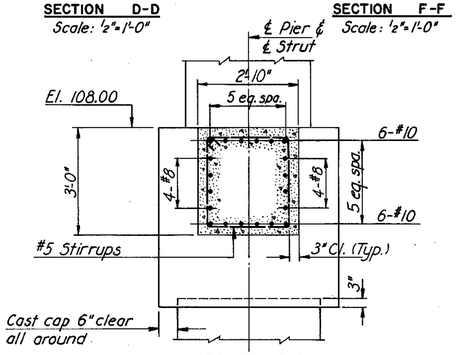


SECTION C-C
Scale: 1/2"=1'-0"

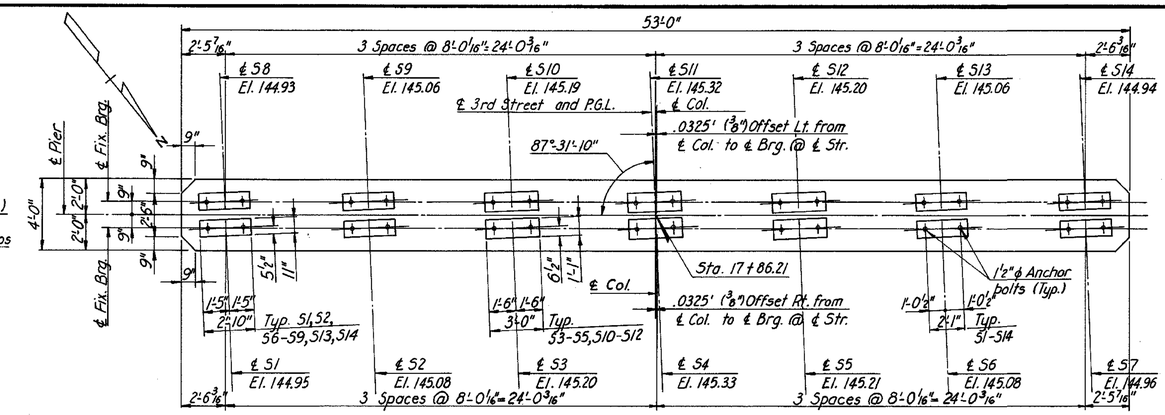


SECTION D-D
Scale: 1/2"=1'-0"

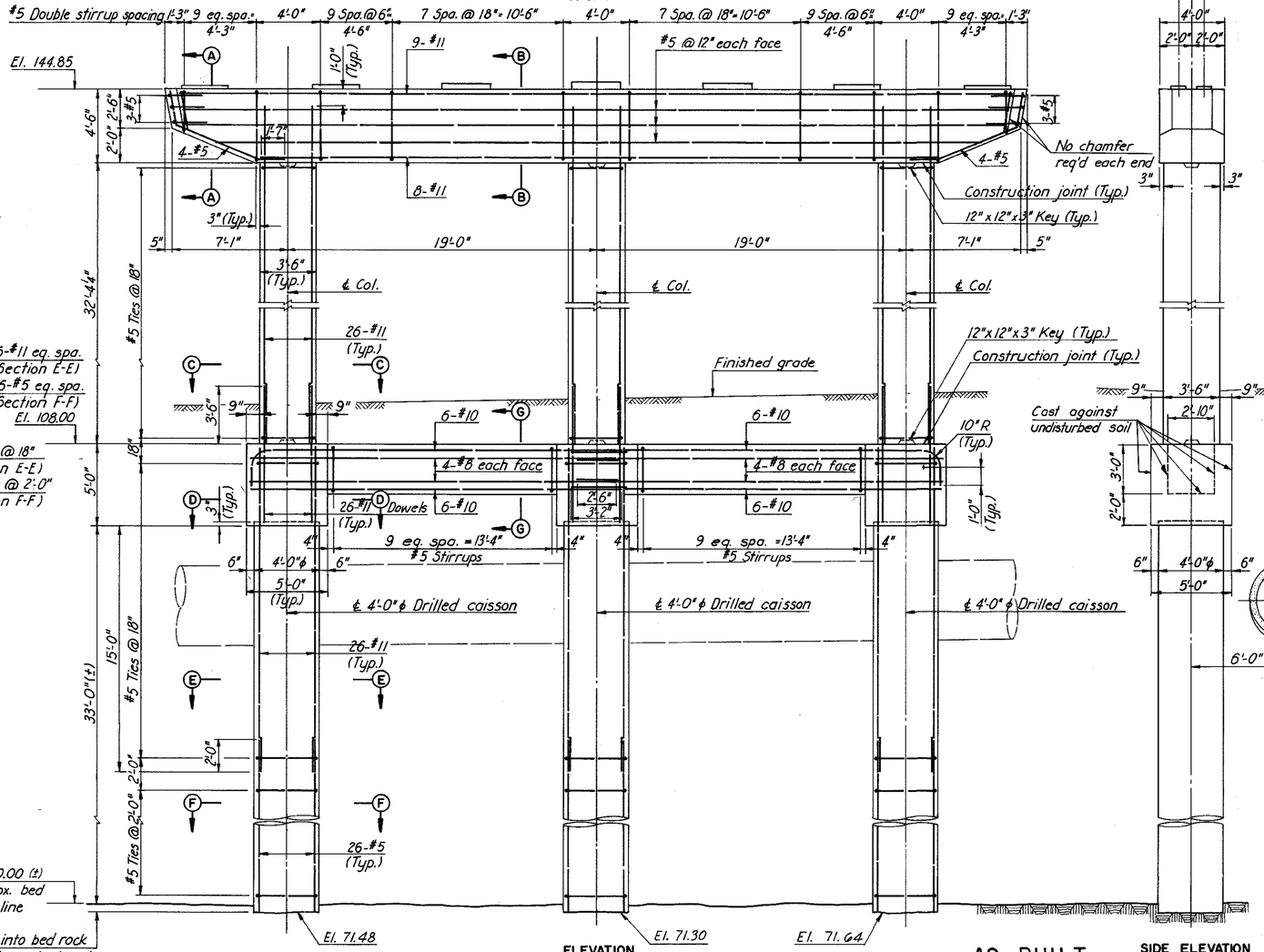
SECTION E-E
SECTION F-F
Scale: 1/2"=1'-0"



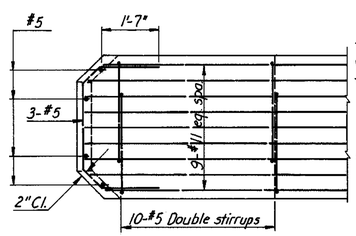
SECTION G-G
Scale: 1/2"=1'-0"



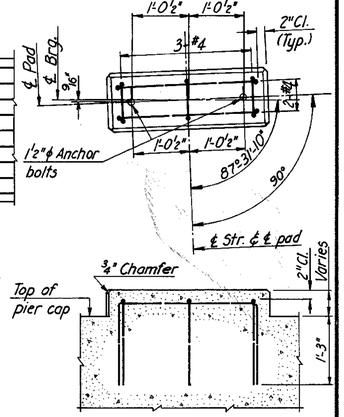
PLAN
Scale: 1/4"=1'-0"



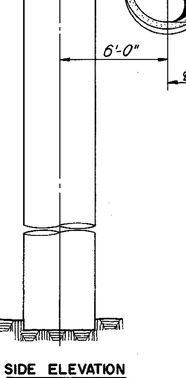
ELEVATION
Scale: 1/4"=1'-0"

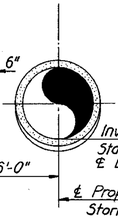


PLAN OF PIER CAP SHOWING REINFORCING DETAILS
Scale: 1/2"=1'-0"



REINFORCING DETAILS FOR BEARING PADS AT S3 — S5 AND S10—S12
Scale: 3/4"=1'-0"





NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTES:

Maximum misalignment of caissons:
3" at top in any direction.
6" at bottom in any direction.

The 3" of concrete caisson embedded in the cap shall be free of earth film and surface laitance.

Bed rock elevation is approximate and may vary. Vertical caisson reinforcing shall not be cut until this elevation is established for each caisson.

Caissons are designed for an allowable rock bearing pressure of 30 tons per square foot.

	BY	DATE				
MADE	A.B.P.	1-68				
CHECKED	T.E.M.	2-68	1	As Built	TEM	6-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

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

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-55

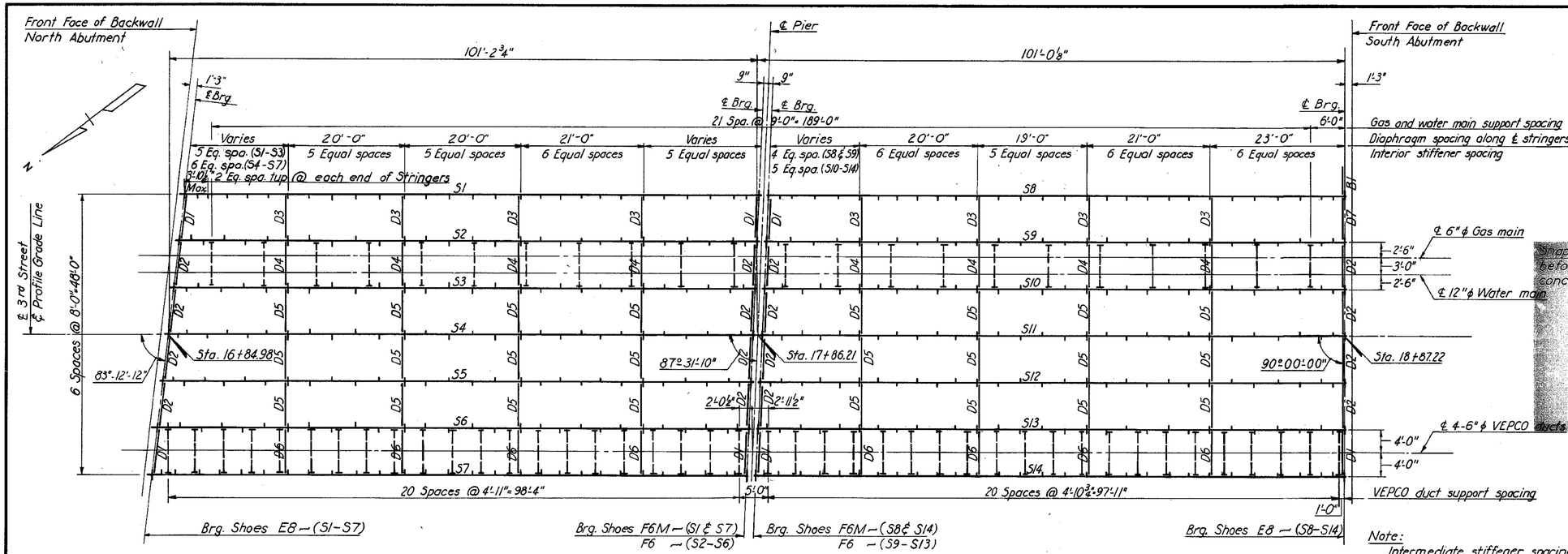
3RD STREET OVER DOWNTOWN EXPRESSWAY

PIER

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

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 10 OF 16

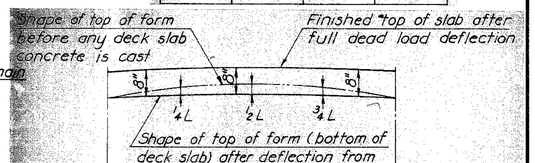
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	149	



FRAMING PLAN

Scale: 1"=10'

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E8	14	F6M	4
		F6	10



DEAD LOAD DEFLECTION DIAGRAM

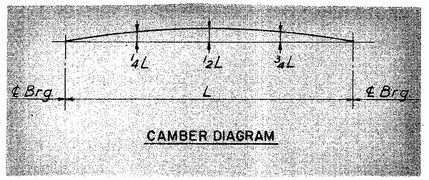
Note:
Intermediate stiffener spacing along stringers may be varied to clear utility supports.

DEFLECTION SCHEDULE					
STR.	¼L & ¾L	½L	STR.	¼L & ¾L	½L
S1, S6, S8	1½"	2⅛"	S2, S3, S9	1½"	2"
S11, S12			S10, S13		
S14			S4, S5, S7	1⅝"	2⅛"

NOTE TO CONTRACTOR:

The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.



CAMBER DIAGRAM

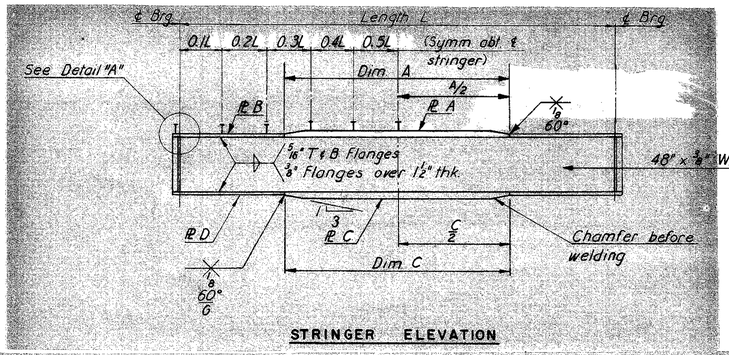
CAMBER SCHEDULE							
STR.	¼L	½L	¾L	STR.	¼L	½L	¾L
S1-S3	2"	2 3/4"	2"	S4, S5	2"	2 7/8"	2"
S6				S7			
S8-S14							

NOTE TO FABRICATOR:

The above stringers shall be fabricated with an upward camber amounting to the tabulated value.

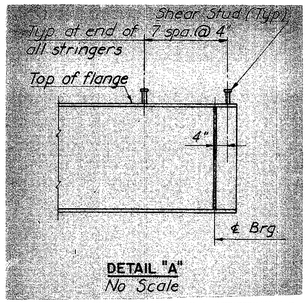
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.

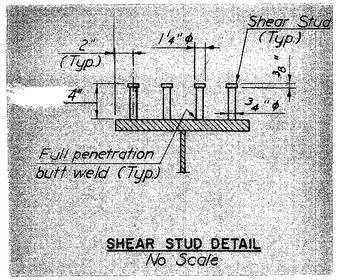


STRINGER ELEVATION

STRINGER SCHEDULE												
STR.	LENGTH ℄ BRG. TO ℄ BRG.	℄ A	DIM A	℄ B	℄ C	DIM C	℄ D	SHEAR STUD SPACING 0.1L	0.2L	0.3L	0.4L	0.5L
S1	98'-7 7/8"	16 x 1/4	53'-0"	16 x 7/8	20 x 1 3/8	63'-0"	20 x 1/4	9"	10½"	13½"	18"	21"
S2	99'-3 3/16"	16 x 1 3/8	57'-0"			64'-0"		10"	11½"	14"	18"	20"
S3	99'-10½"	16 x 1 3/8	57'-0"								18"	20"
S4	100'-5¾"	16 x 1/4	53'-0"								17½"	19½"
S5	101'-1/16"	16 x 1/4	53'-0"		20 x 1 3/8	64'-0"	20 x 1/4				17½"	19½"
S6	101'-8 5/16"	16 x 1 3/8	59'-0"	16 x 7/8	20 x 2	62'-0"	20 x 1 3/8	10"	11½"	14"	17½"	20"
S7	102'-3 5/8"	16 x 1½	57'-0"	16 x 1	20 x 2⅛	66'-0"	20 x 1 3/8	9"	10½"	13½"	18½"	22"
S8	99'-2 5/8"	16 x 1/4	53'-0"	16 x 7/8	20 x 1 3/8	63'-0"	20 x 1/4	9"	10½"	13½"	18"	21"
S9	99'-6 13/16"	16 x 1 3/8	57'-0"			64'-0"		10"	11½"	14"	18"	20"
S10	99'-10 15/16"	16 x 1 3/8	57'-0"			64'-0"					18"	20"
S11	100'-3 3/8"	16 x 1/4	52'-0"			63'-0"					17½"	19½"
S12	100'-7¼"	16 x 1/4	52'-0"		20 x 1 3/8	63'-0"	20 x 1/4			14"	17½"	19½"
S13	100'-11 7/16"	16 x 1 3/8	58'-0"	16 x 7/8	20 x 2	61'-0"	20 x 1 3/8	10"	11½"	13½"	18"	20"
S14	101'-3 5/8"	16 x 1½	55'-0"	16 x 1	20 x 2⅛	65'-0"	20 x 1 3/8	9"	11"	13½"	18½"	22"



DETAIL "A"
No Scale



SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE:

Capacity = 3,400 lbs. per stud.

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

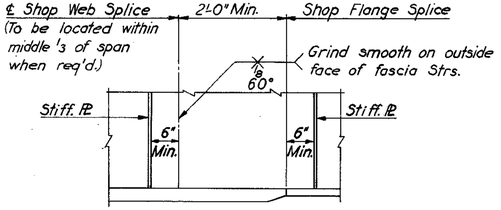
Stud rows shall be placed parallel to the main deck reinforcing.

Shear stud spacing shown is maximum spacing.

NOTE TO CONTRACTOR:

The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.



SHOP SPLICE DETAILS
Scale: 3/4"=1'-0"

	BY	DATE				
MADE	EVR	12-14				
CHECKED	T.E.M.	2-68	1	As Built	TEM	6-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

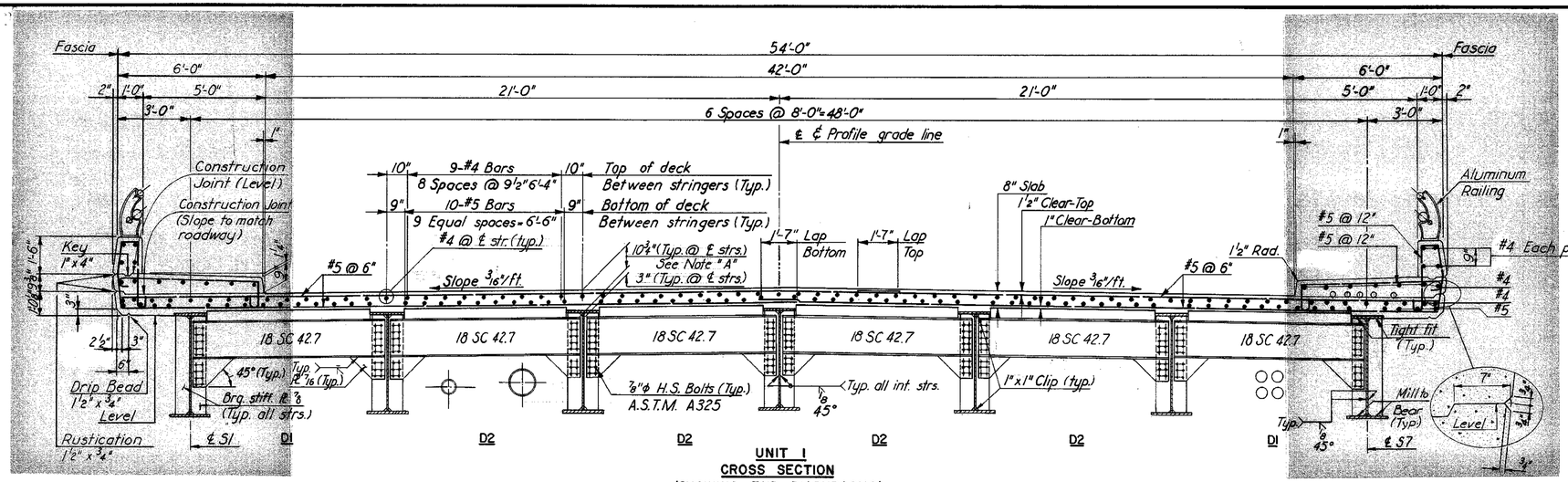
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-55
3RD STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

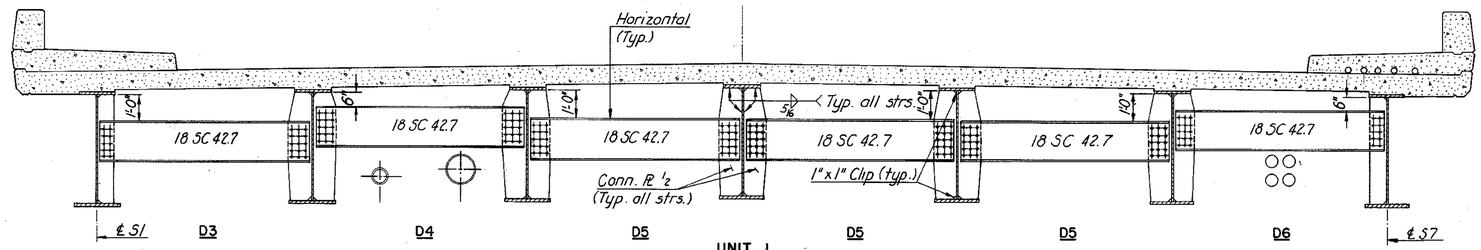
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 11 OF 16

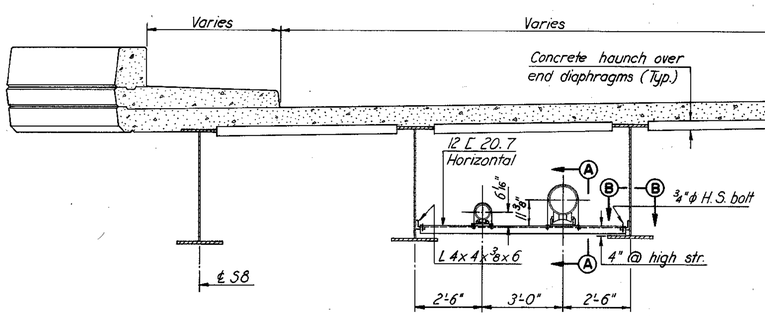
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	150	



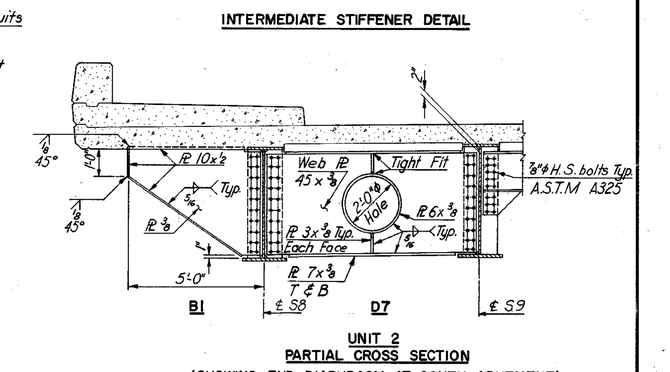
UNIT 1
CROSS SECTION
(SHOWING END DIAPHRAGMS)
Scale: 3/8"=1'0"



UNIT 1
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
Scale: 3/8"=1'0"



6"ϕ GAS 12"ϕ WATER
GAS & WATER MAIN SUPPORT



Note: End and intermediate diaphragms same as shown in Unit 1 Cross Sections above. See Framing Plan sheet and Partial Cross Section this sheet.

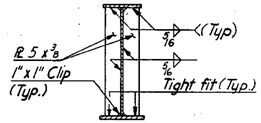
4-6"ϕ
VEPCO DUCT SUPPORT

NOTE "A"
Dimension shown is measured from top of web to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 3" slab.

NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

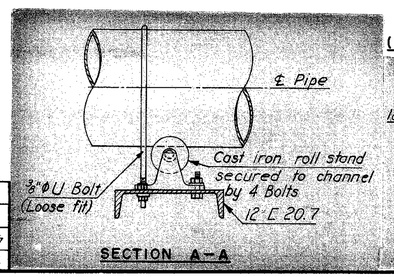
For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.



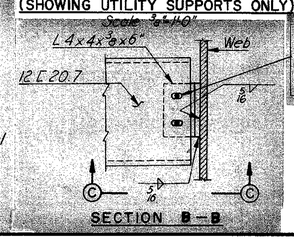
Note: Stiffener shall be welded to compression flange and have a tight fit to the tension flange.

INTERMEDIATE STIFFENER DETAIL

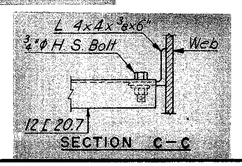
UNIT 2
PARTIAL CROSS SECTION
(SHOWING END DIAPHRAGM AT SOUTH ABUTMENT)
Scale: 3/8"=1'0"

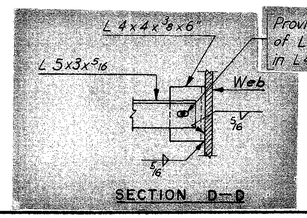


UNIT 2
CROSS SECTION
(SHOWING UTILITY SUPPORTS ONLY)
Scale: 3/8"=1'0"



Provide 9/16"x1¼" slots in ends of 12 L 20.7 and 13/16"ϕ hole in L 4x4x⅜x6 for ¾"ϕ H.S. bolt





Provide 13/16"x1¼" slots in ends of L 5x3x5/16 and 13/16"ϕ hole in L 4x4x⅜x6 for ¾"ϕ H.S. bolt

AS BUILT

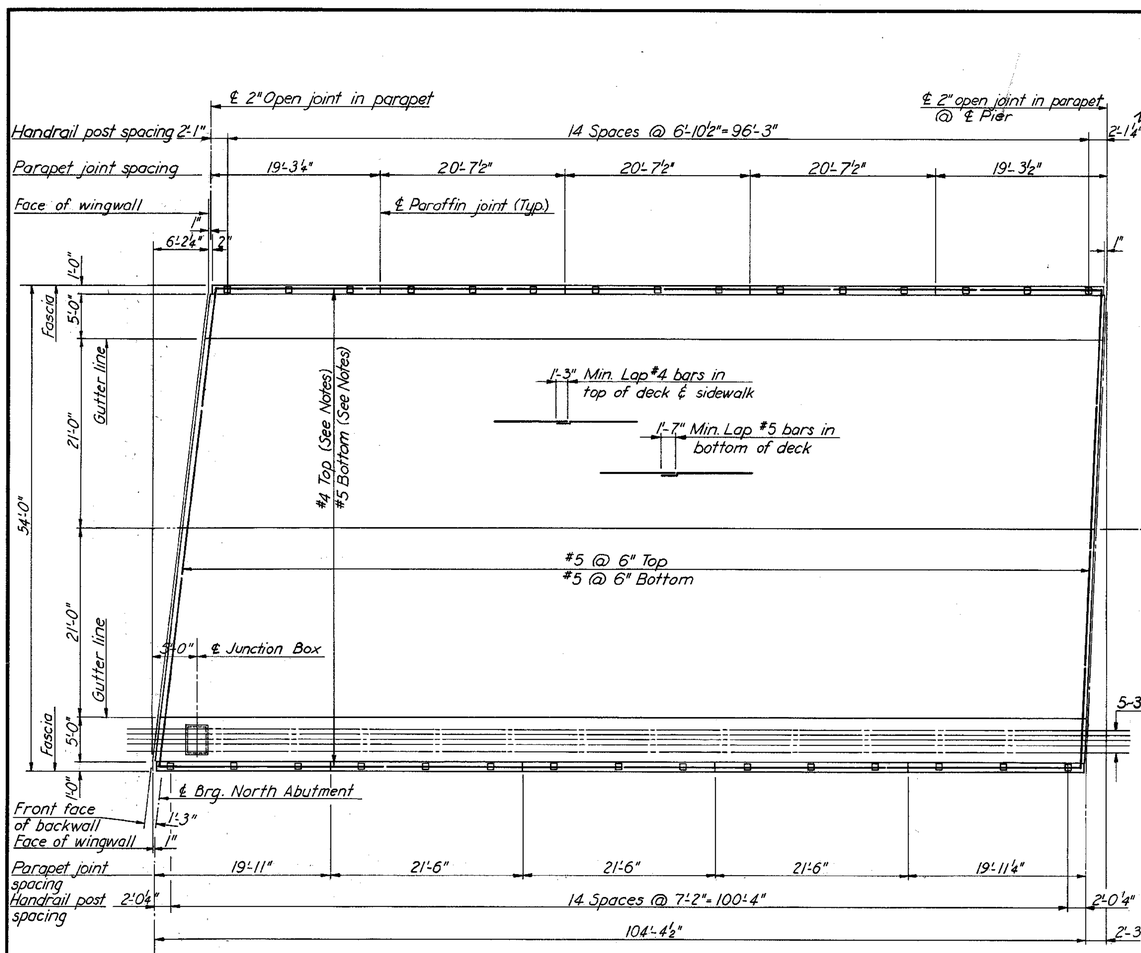
	BY	DATE	NO.	REVISION	BY	DATE
MADE	A.B.P.	10-67				
CHECKED	T.E.M.	2-68	1	As Built	T.E.M.	6-77
IN CHARGE	P.R.Y.					

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-55
3RD STREET OVER DOWNTOWN EXPRESSWAY
CROSS SECTION AND UTILITY DETAILS

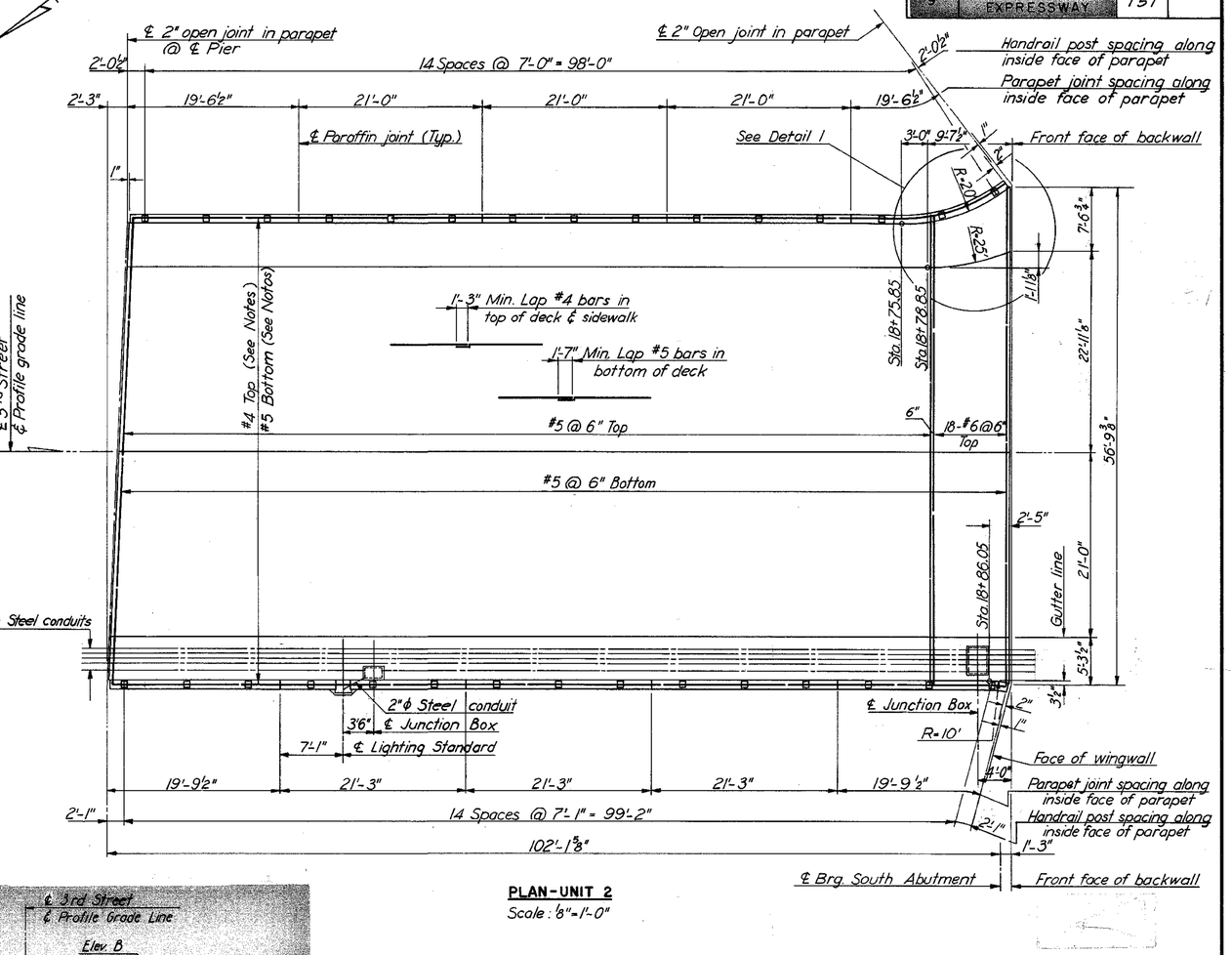
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 12 OF 16

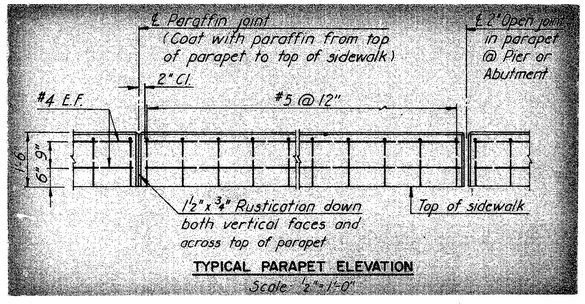
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	151	



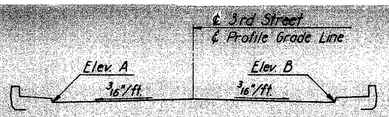
PLAN - UNIT 1
Scale: 1/8"= 1'-0"



PLAN - UNIT 2
Scale: 1/8"= 1'-0"



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

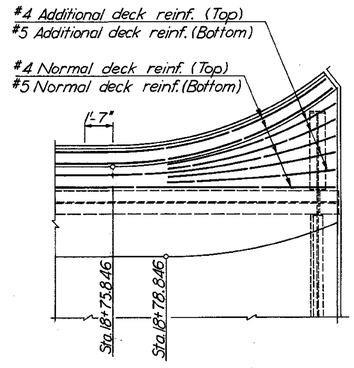


(LOOKING IN DIRECTION OF STATIONING)

PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
16+60	—	152.05*	151.72*	+85.30	—	—	150.47
+70	151.62*	151.95*	151.62*	+86.21	—	150.79	—
+80	151.52*	151.85	151.52	+87.12	150.45	—	—
+81.23	—	—	151.51	+90	150.42	150.75	150.42
+83.72	—	151.81	—	18+00	150.32	150.65	150.32
+86.23	151.46	—	—	+10	150.22	150.55	150.22
+90	151.42	151.75	151.42	+20	150.12	150.45	150.12
17+00	151.32	151.65	151.32	+30	150.02	150.35	149.02
+10	151.22	151.55	151.22	+40	149.92	150.25	149.92
+20	151.12	151.45	151.12	+50	149.82	150.15	149.82
+30	151.02	151.35	151.02	+60	149.72	150.05	149.72
+40	150.92	151.25	150.92	+70	149.62	149.95	149.62
+50	150.82	151.15	150.82	+80	149.51	149.85	149.52
+60	150.72	151.05	150.72	+88.47	149.42	149.77	149.44
+70	150.62	150.95	150.62	+90	149.40	149.75	149.43
+80	150.52	150.85	150.52	19+00	149.27*	149.65*	148.67*
				+08.47	—	149.57*	—

* Elevations shown are given at top of bituminous surfacing.



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

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section and Utility Details sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE				
MADE	J.B.M.	9-67				
CHECKED	T.E.M.	2-68	1	As Built	TEM	6-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-55
3RD STREET OVER DOWNTOWN EXPRESSWAY
DECK PLANS

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

SCALE: AS SHOWN
CONTRACT NO: 9
SHEET NO. 13 OF 16

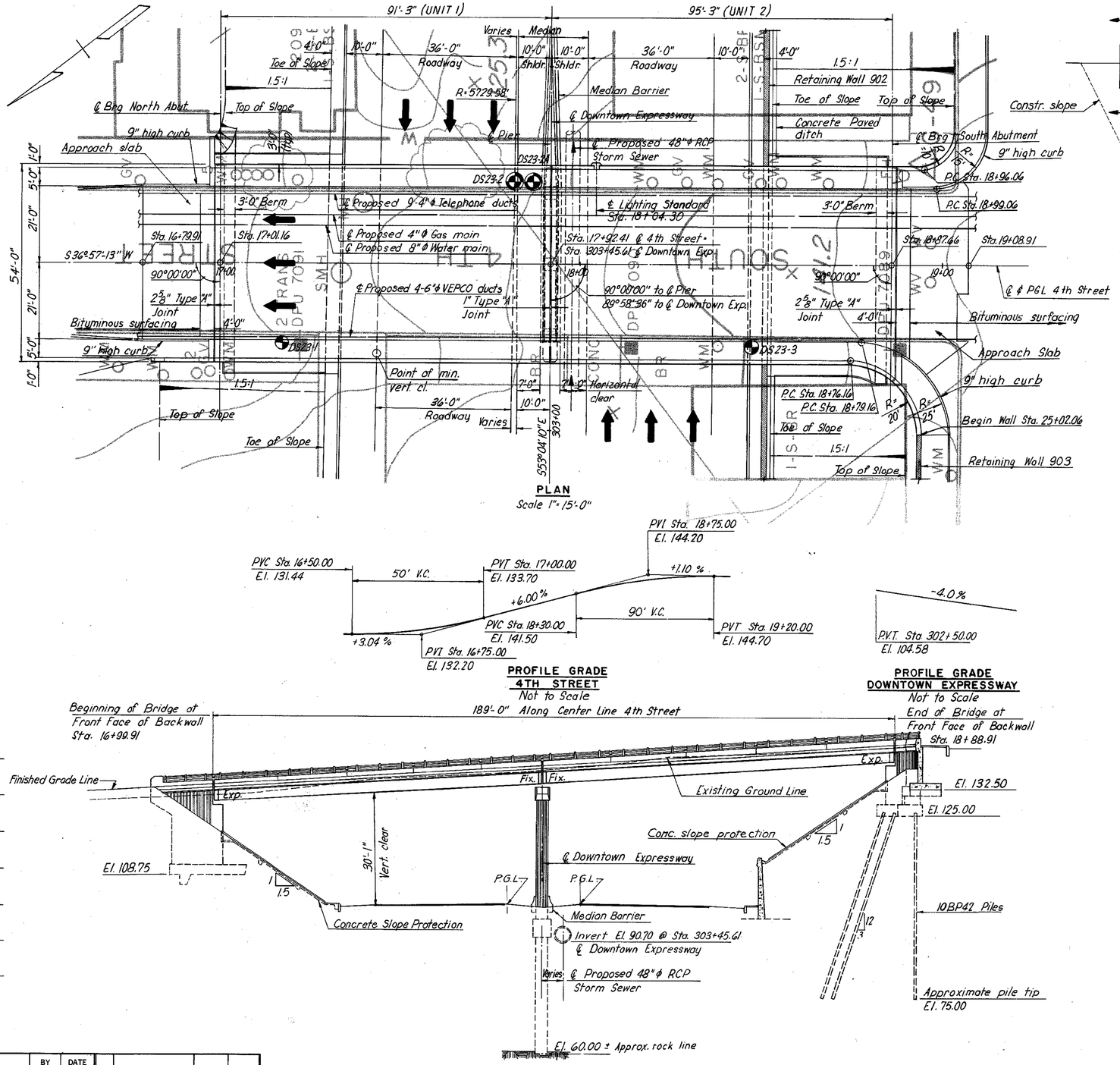
Bridge 56

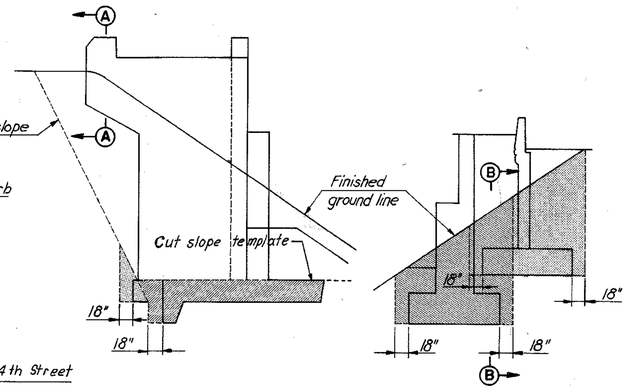
4th Street
Over
Downtown Expressway (VA 195)

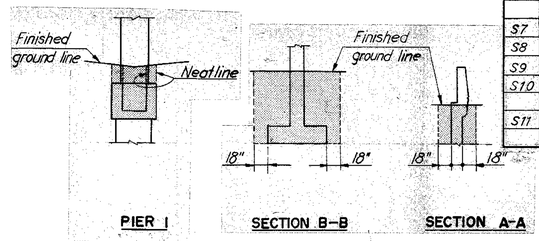
Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	155	

INDEX







PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

PROFILE GRADE 4TH STREET
Not to Scale

PROFILE GRADE DOWNTOWN EXPRESSWAY
Not to Scale

ELEVATION
Scale 1" = 15'-0"

BORINGS: Indicates location of 2½"ϕ cased hole boring.
Indicates location of 4"ϕ cased hole boring.
For boring data, see Boring Logs sheet.

NOTE: For General Notes and Quantities, see next sheet.

	BY	DATE
MADE	T.E.M.	2-68
CHECKED	A.B.P.	3-68
IN CHARGE	P.R.Y.	

NO.	REVISION	BY	DATE
1	As Built	TEM	7-77

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-56
4TH STREET OVER DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 1 OF 15

155

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	156	

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'10" sidewalks. Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Sections 401.05 and 401.06 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted. All field connections shall be made with high strength bolts. High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-48 Copper weld rod, corner E. Canal St. and S. 4th St., Elev. 129.23
C-49 Copper weld rod, corner Byrd St. and S. 4th St., Elev. 143.97

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	DRILLED HOLES FOR CAISSONS 4' ϕ L.F.	POROUS BACKFILL C.Y.	STEEL PILES 10BP42 L.F.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6" ϕ L.F.	GAS MAIN 4" ϕ L.F.	WATER MAIN 8" ϕ L.F.	CONDUIT 6" ϕ VEPCO L.F.	CONDUIT 4" ϕ TELEPHONE L.F.	METAL CONDUIT 3" ϕ L.F.	
SUPERSTRUCTURE				352.49	78,469	346,311	380.1							237	234	924	2079	1185	
NORTH ABUTMENT	152	203.40			26,390		14.7		83		250.99	151	71						
PIER 1	41	132.70			36,710			76.88											
SOUTH ABUTMENT	526	247.23			17,593		37.6		34	2,666.1	250.92	156	101						
APPROACH SLABS			96.85		22,208														
TOTAL	719	643.33	96.85	352.49	181,370	346,311	432.4	76.88	117	2,666.1	501.91	307	172	237	234	924	2079	1185	

	BY	DATE
MADE	EVR	3-68
CHECKED	C.B.P.	12-68
IN CHARGE	P.R.V.	

NO.	REVISION	BY	DATE
1	As Built	TEM	7-77

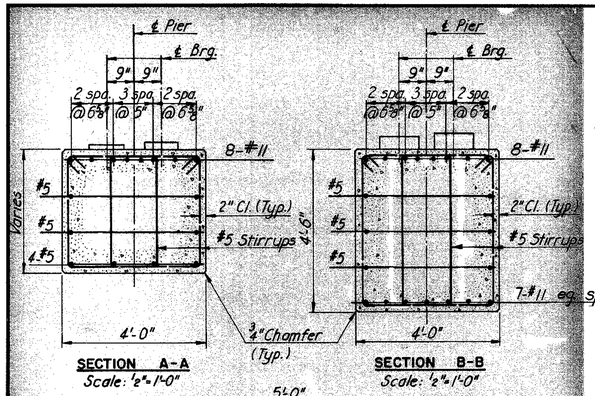
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-56
4TH STREET OVER DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

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

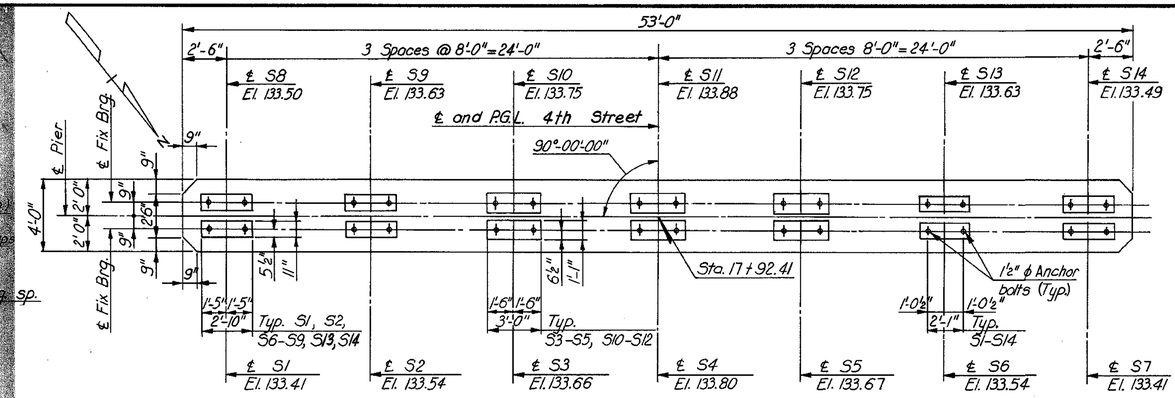
SCALE: AS SHOWN
CONTRACT NO: 9
SHEET NO. 2 OF 15

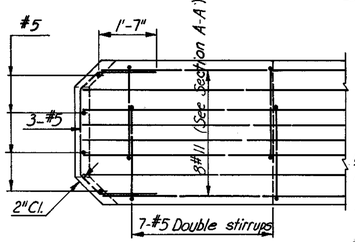
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	163	

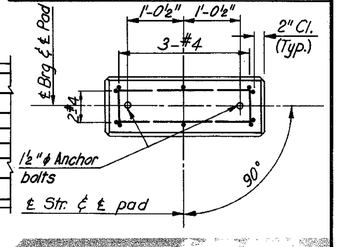


SECTION A-A
Scale: ½"=1'-0"

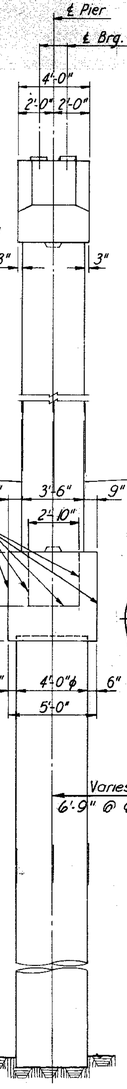
SECTION B-B
Scale: ½"=1'-0"

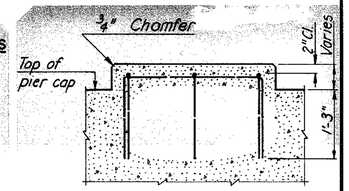




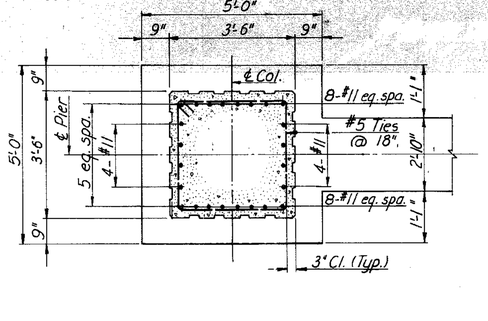


PLAN OF PIER CAP SHOWING REINFORCING DETAILS
Scale: ½"=1'-0"

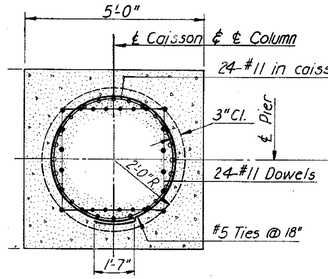




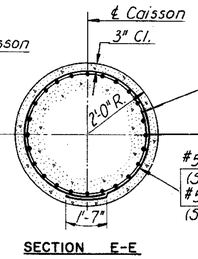
REINFORCING DETAILS FOR BEARING PADS AT S3 — S5 AND S10—S12
Scale: ¾"=1'-0"



SECTION C-C
Scale: ½"=1'-0"

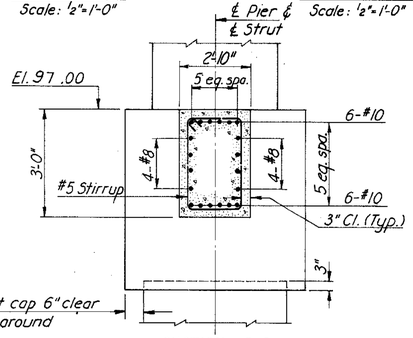


SECTION D-D
Scale: ½"=1'-0"



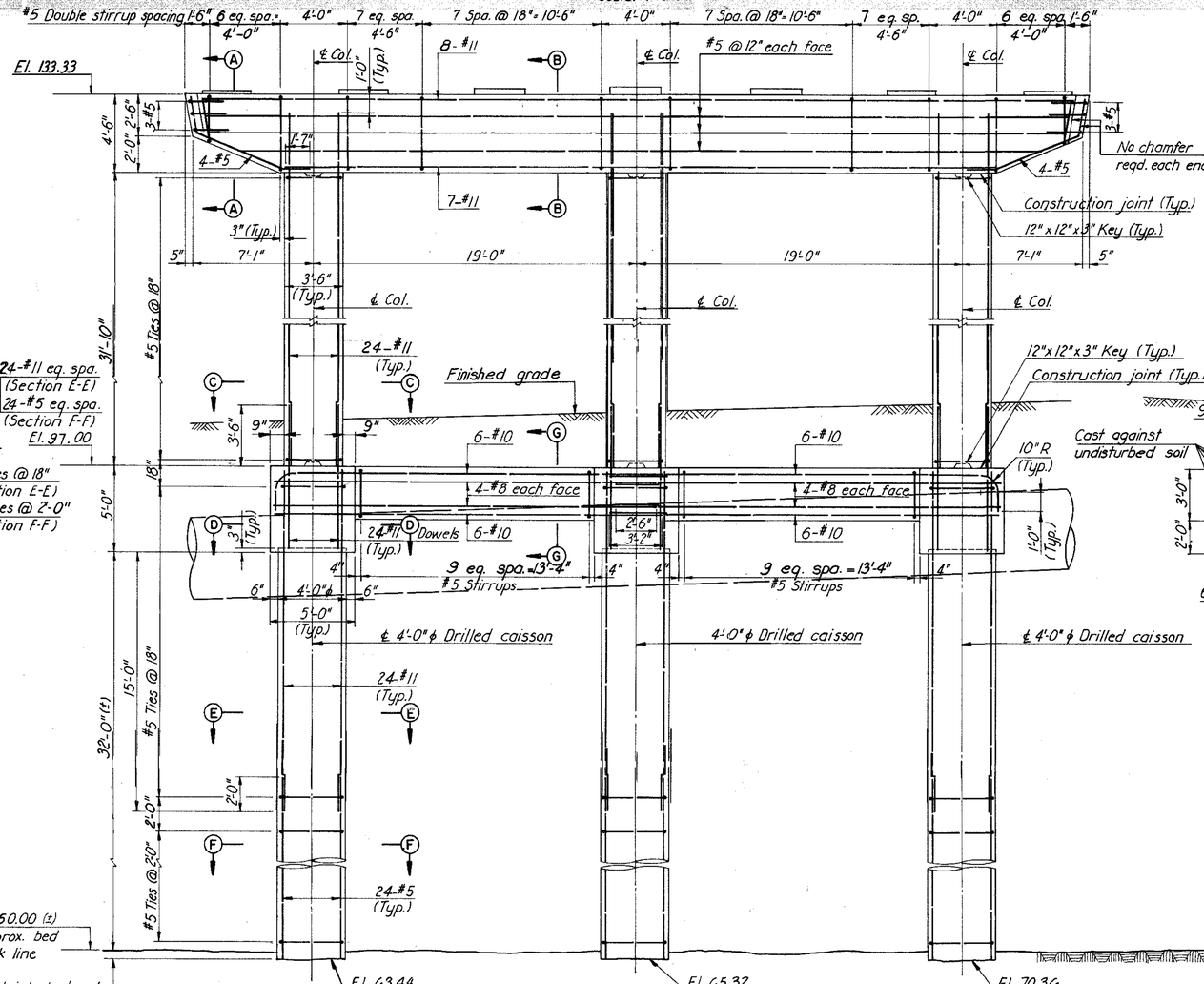
SECTION E-E
SECTION F-F
Scale: ½"=1'-0"

24-#11 eq. spa. (Section E-E)
24-#5 eq. spa. (Section F-F)
El. 97.00
#5 Ties @ 18" (Section E-E)
#5 Ties @ 2'-0" (Section F-F)



SECTION G-G
Scale: ½"=1'-0"

PLAN
Scale: ¼"=1'-0"



ELEVATION
Scale: ¼"=1'-0"

SIDE ELEVATION
Scale: ¼"=1'-0"

AS BUILT

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

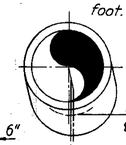
FOUNDATION NOTES:

Maximum misalignment of caissons:
3" at top in any direction.
6" at bottom in any direction.

The 3" of concrete caisson embedded in the cap shall be free of earth film and surface laitance.

Bed rock elevation is approximate and may vary. Vertical caisson reinforcing shall not be cut until this elevation is established for each caisson.

Caissons are designed for an allowable rock bearing pressure of 30 tons per square foot.



Inv. El. 90.70 @ Sta. 303+45.61 ℄ Downtown Expressway

℄ Proposed 48" ϕ R.C.P. Storm sewer

	BY	DATE				
MADE	elm	1-68				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

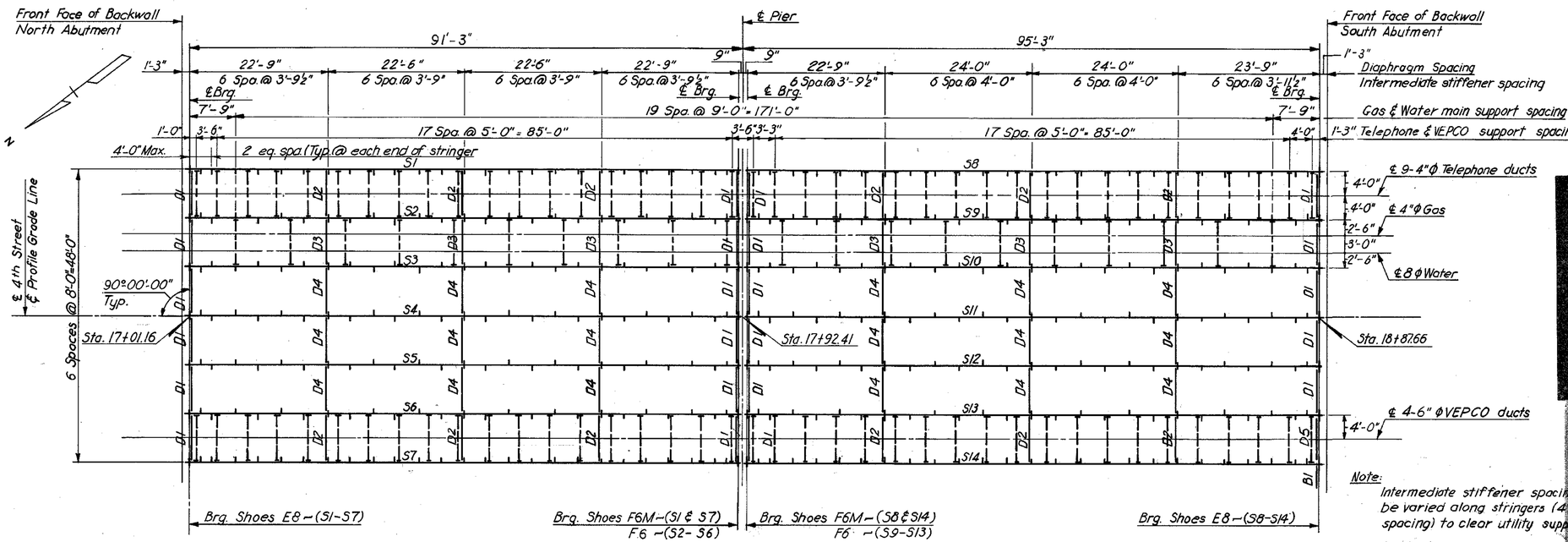
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-56
4TH STREET OVER DOWNTOWN EXPRESSWAY
PIER

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

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 9 OF 15

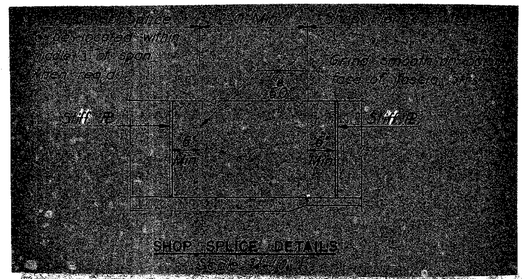
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	164	

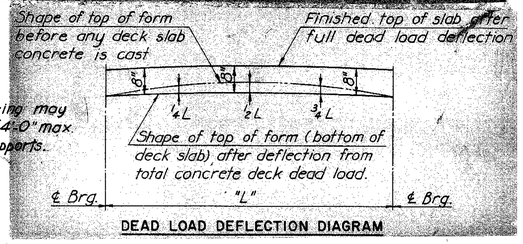


FRAMING PLAN
Scale: 1"=10'

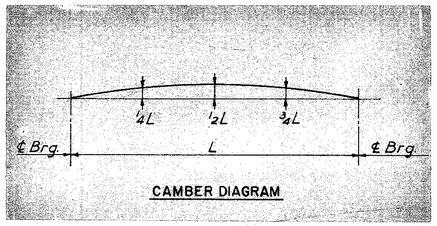
Note:
Intermediate stiffener spacing may be varied along stringers (4'-0" max. spacing) to clear utility supports.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E8	14	F6	10
		F6M	4





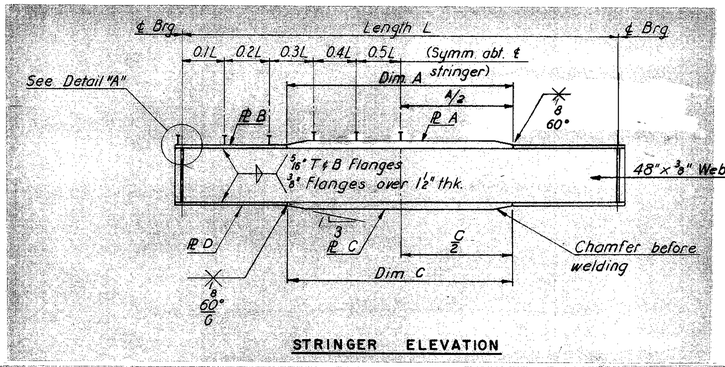
DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM

CAMBER SCHEDULE							
STR.	¼L	½L	¾L	STR.	¼L	½L	¾L
S1, S2	1 5/8"	2'4"	1 5/8"	S8	4½"	7 5/8"	6'8"
S4-S7				S11, S12			
S3	1 5/8"	2 3/8"	1 5/8"	S9, S10	4½"	7½"	6'8"
				S13, S14			

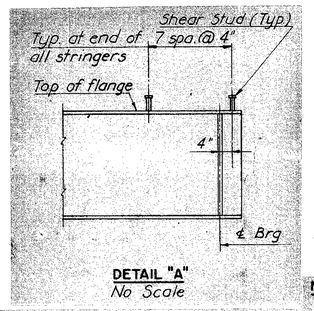
NOTE TO FABRICATOR:
The above stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.



STRINGER ELEVATION

STRINGER SCHEDULE												
STR.	LENGTH ℄ BRG. TO ℄ BRG.	℄ A	DIM A	℄ B	℄ C	DIM C	℄ D	SHEAR STUD SPACING 0.1L	0.2L	0.3L	0.4L	0.5L
S1	90'-6"	16 x 1	42'-0"	16 x ¾	20 x 1 5/8	55'-0"	20 x 1/8	9"	10½"	13½"	17½"	20½"
S2		16 x 1	40'-0"		20 x 1 5/8	53'-0"	20 x 1/8	10"	11½"	13½"	17"	19"
S3		16 x ⅞	34'-0"		20 x 1⅜	53'-0"	20 x 1/8	10"		13½"	16½"	18½"
S4			29'-0"		20 x 1½	57'-0"	20 x 1	9½"		14"		
S5			29'-0"		20 x 1½	57'-0"	20 x 1	9½"	11½"	14"		
S6		16 x ⅞	34'-0"		20 x 1⅜	53'-0"	20 x 1/8	9½"	11"	13½"	16½"	18½"
S7	90'-6"	16 x 1	42'-0"		20 x 1⅜	55'-0"		9"	10½"	13½"	17½"	20½"
S8	94'-6"	16 x 1/8	53'-0"		20 x 1¾	62'-0"		9"	10½"	13½"		21"
S9		16 x 1/8	52'-0"		20 x 1¾	61'-0"		9½"	11"	14"		19½"
S10		16 x 1/8	50'-0"		20 x 1¾	60'-0"		10"	11½"		17½"	19½"
S11		16 x 1	44'-0"		20 x 1⅝	58'-0"		10"	11½"		17"	19"
S12		16 x 1	44'-0"		20 x 1⅝	58'-0"		10"	11½"		17"	19"
S13		16 x 1 1/8	50'-0"		20 x 1¾	61'-0"	20 x 1/8	9½"	11"	14"	17"	19½"
S14	94'-6"	16 x 1/8	53'-0"	16 x ¾	20 x 1⅞	58'-0"	20 x 1/4	9"	10½"	13½"	17½"	21"

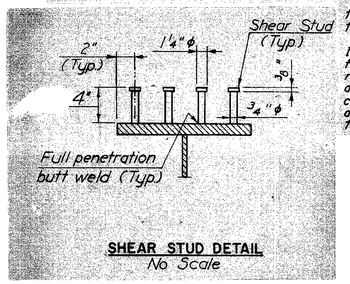
Note: Lengths shown are horizontal distances measured along centerlines of stringers.



DETAIL "A"
No Scale

DEFLECTION SCHEDULE		
STR.	¼L & ¾L	½L
S1 – S7	1/4"	1 3/4"
S8, S11, S12	1⅜"	2"
S9, S10, S13, S14	1⅜"	1⅛"

NOTE TO CONTRACTOR:
The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.



SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE:
Capacity = 3,400 lbs. per stud.
The 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 reinforcing.
Shear stud spacing shown is maximum spacing.

	BY	DATE				
MADE	EVR	10-20				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

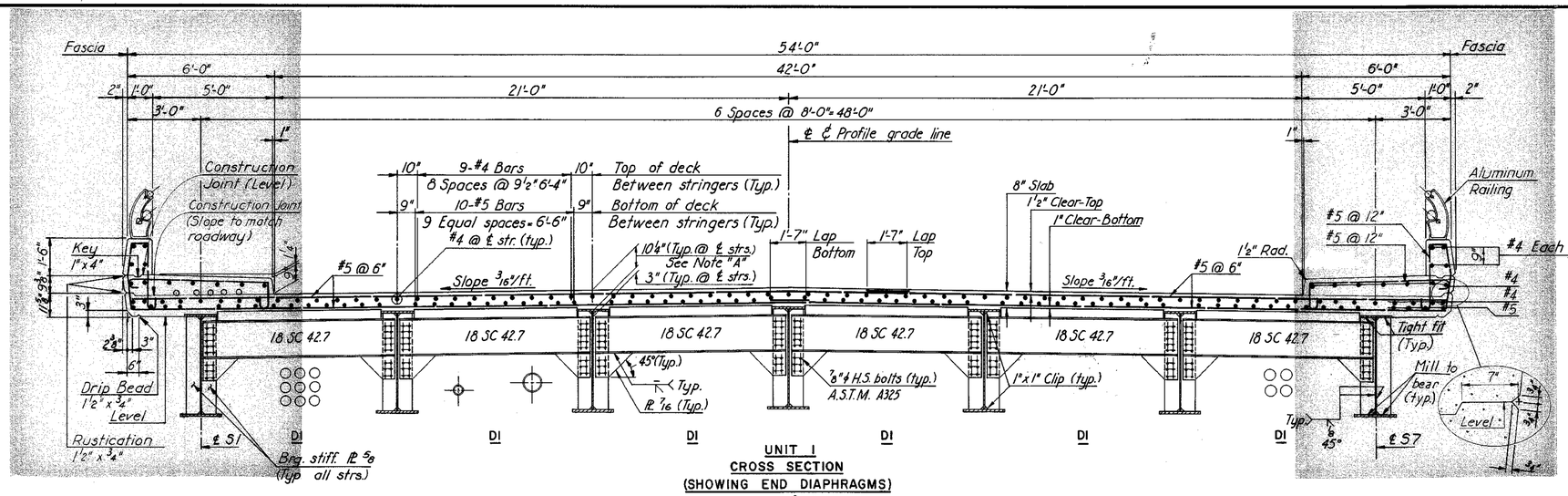
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-56
4TH STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 10 OF 15

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	165	



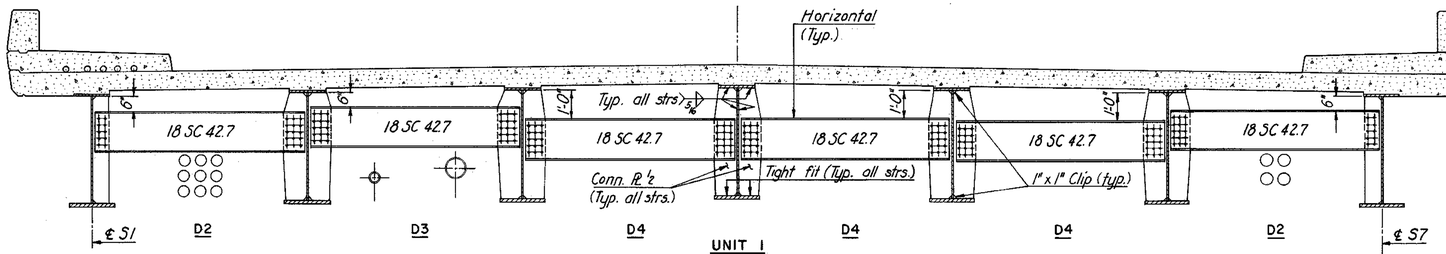
UNIT 1
CROSS SECTION
(SHOWING END DIAPHRAGMS)
Scale: 3/8" = 1'-0"

NOTE "A"
Dimension shown is measured from top of web to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.

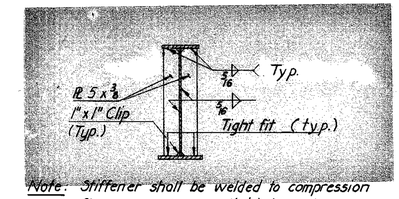
NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.

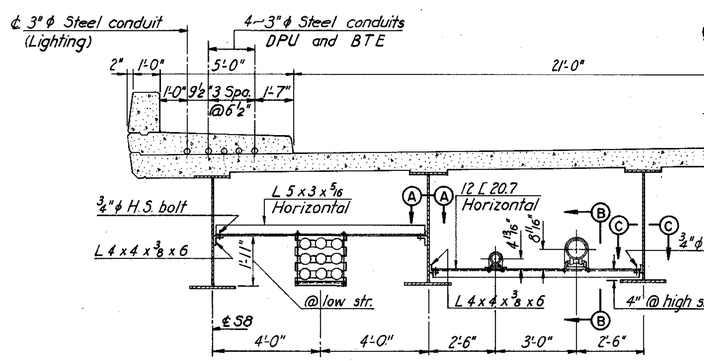


UNIT 1
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
Scale: 3/8" = 1'-0"



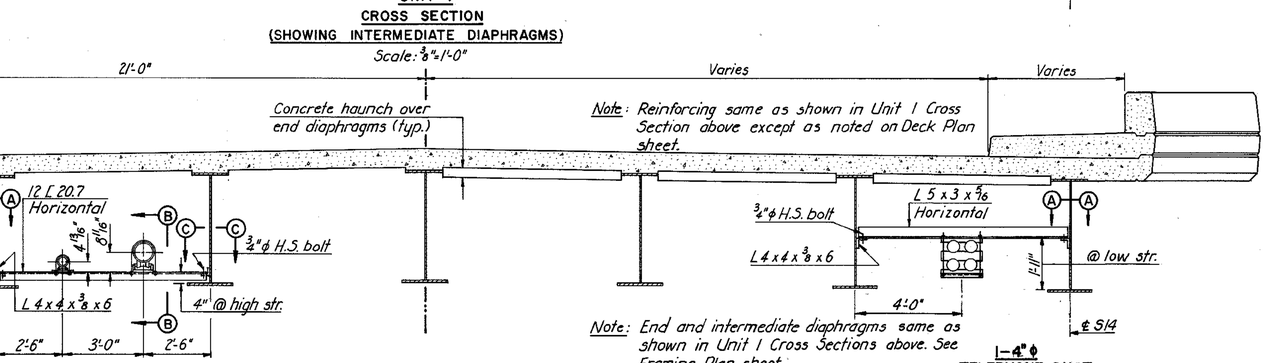
Note: Stiffener shall be welded to compression flange and have a tight fit to the tension flange.

INTERMEDIATE STIFFENER DETAIL

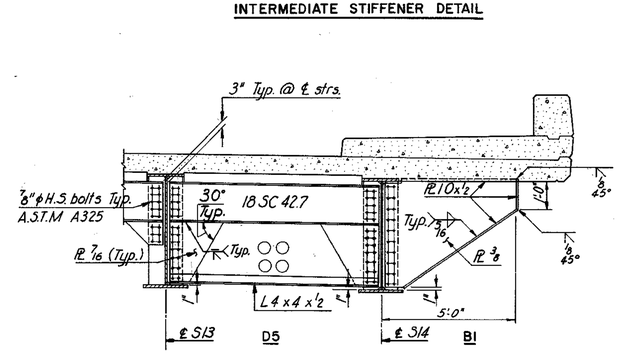


9 - 4" ϕ
TELEPHONE DUCT SUPPORT

4" ϕ GAS 8" ϕ WATER
GAS & WATER MAIN SUPPORT

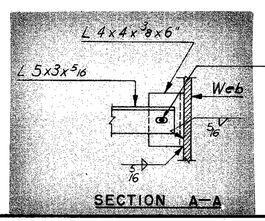


1 - 4" ϕ
TELEPHONE DUCT
4-6" ϕ
VEPCO DUCT SUPPORT

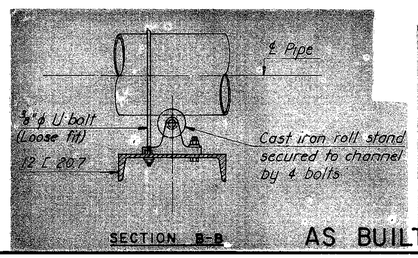


UNIT 2
PARTIAL CROSS SECTION
(SHOWING END DIAPHRAGM AT SOUTH ABUTMENT)
Scale: 3/8" = 1'-0"

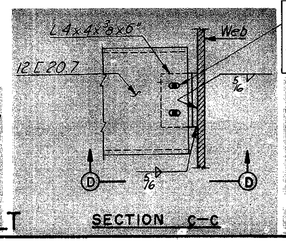
UNIT 2
CROSS SECTION
(SHOWING UTILITY SUPPORTS ONLY)
Scale: 3/8" = 1'-0"



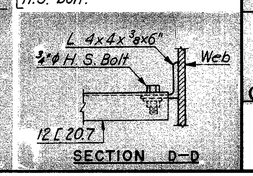
Provide 13/16" x 1¼" slots in ends of L 5 x 3 x 5/16 and 13/16" ϕ hole in L 4 x 4 x 3/8 x 6 for ¾" ϕ H.S. bolt.



AS BUILT



Provide 13/16" x 1¼" slots in ends of 12 [20.7 and 13/16" ϕ hole in L 4 x 4 x 3/8 x 6 for ¾" ϕ H.S. bolt.



	BY	DATE				
MADE	S.B.P.	11-67				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-56
4TH STREET OVER
DOWNTOWN EXPRESSWAY

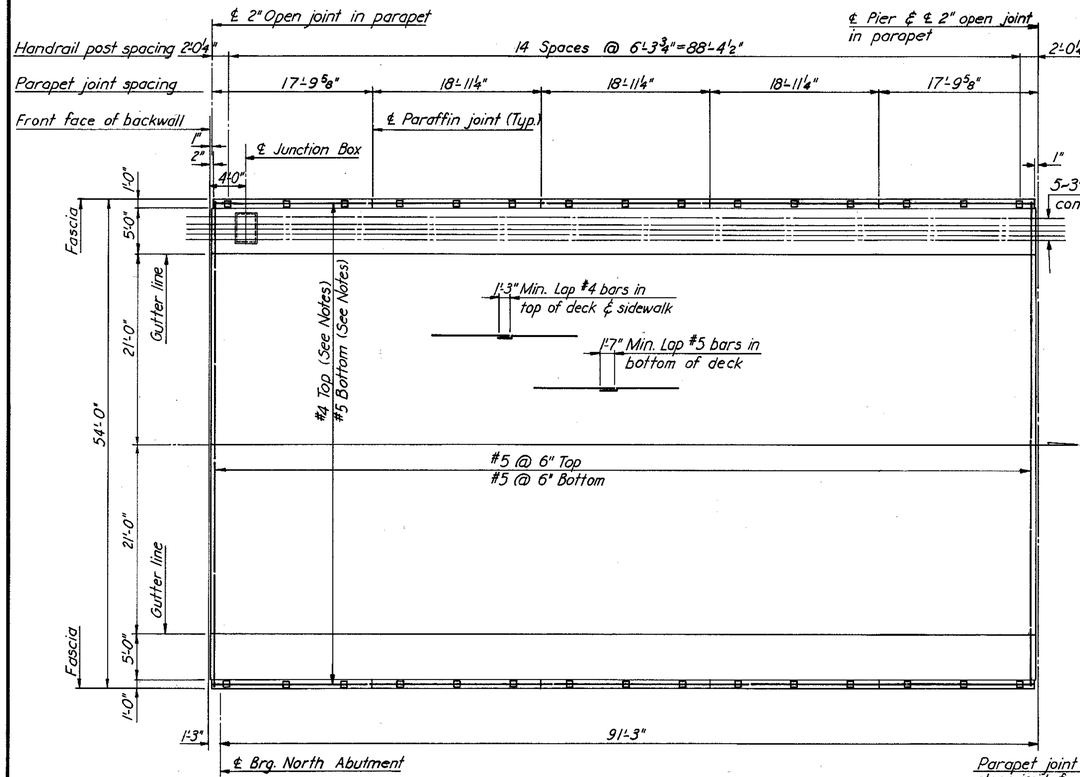
CROSS SECTION AND UTILITY DETAILS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 11 OF 15

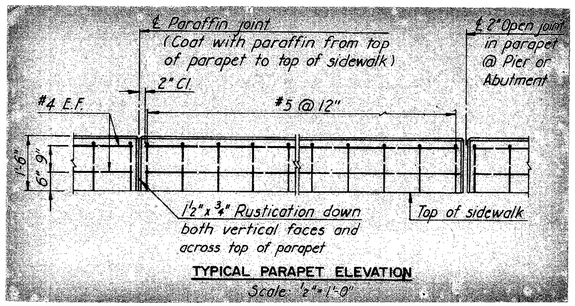
165

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	166	

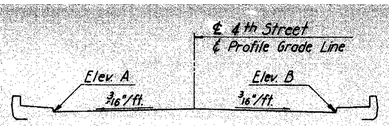


PLAN - UNIT 1
Scale: ⅛"=1'-0"

PLAN - UNIT 2
Scale: ⅛"=1'-0"



TYPICAL PARAPET ELEVATION
Scale: ½"=1'-0"

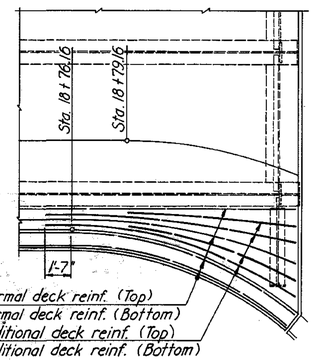


(LOOKING IN DIRECTION OF STATIONING)

PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
16+80	*132.29	*132.62	*132.29	18+00	139.37	139.70	139.37
16+90	*132.80	*133.13	*132.80	+10	139.97	140.30	139.97
+99.91	133.37	133.70	133.37	+20	140.57	140.90	140.57
17+10	133.97	134.30	133.97	+30	141.17	141.50	141.17
+20	134.57	134.90	134.57	+40	141.75	142.07	141.75
+30	135.17	135.50	135.17	+50	142.26	142.59	142.26
+40	135.77	136.10	135.77	+60	142.73	143.06	142.73
+50	136.37	136.70	136.37	+70	143.14	143.47	143.14
+60	136.97	137.30	136.97	+80	143.49	143.82	143.49
+70	137.57	137.90	137.57	+86.91	143.76	144.09	143.72
+80	138.17	138.50	138.17	+90	143.79	144.12	143.75
+90	138.77	139.10	138.77	19+00	*143.90	*144.37	*144.12
+92.41	138.92	139.25	138.92				

* Elevations shown are given to top of bituminous surfacing.



DETAIL 1
Scale: ¼"=1'-0"

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section and Utility Details sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE				
MADE	d.B.P.	9-67				
CHECKED	T.E.M.	2-68	1	As Built	T.E.M.	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-56
4TH STREET OVER DOWNTOWN EXPRESSWAY

DECK PLANS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 12 OF 15

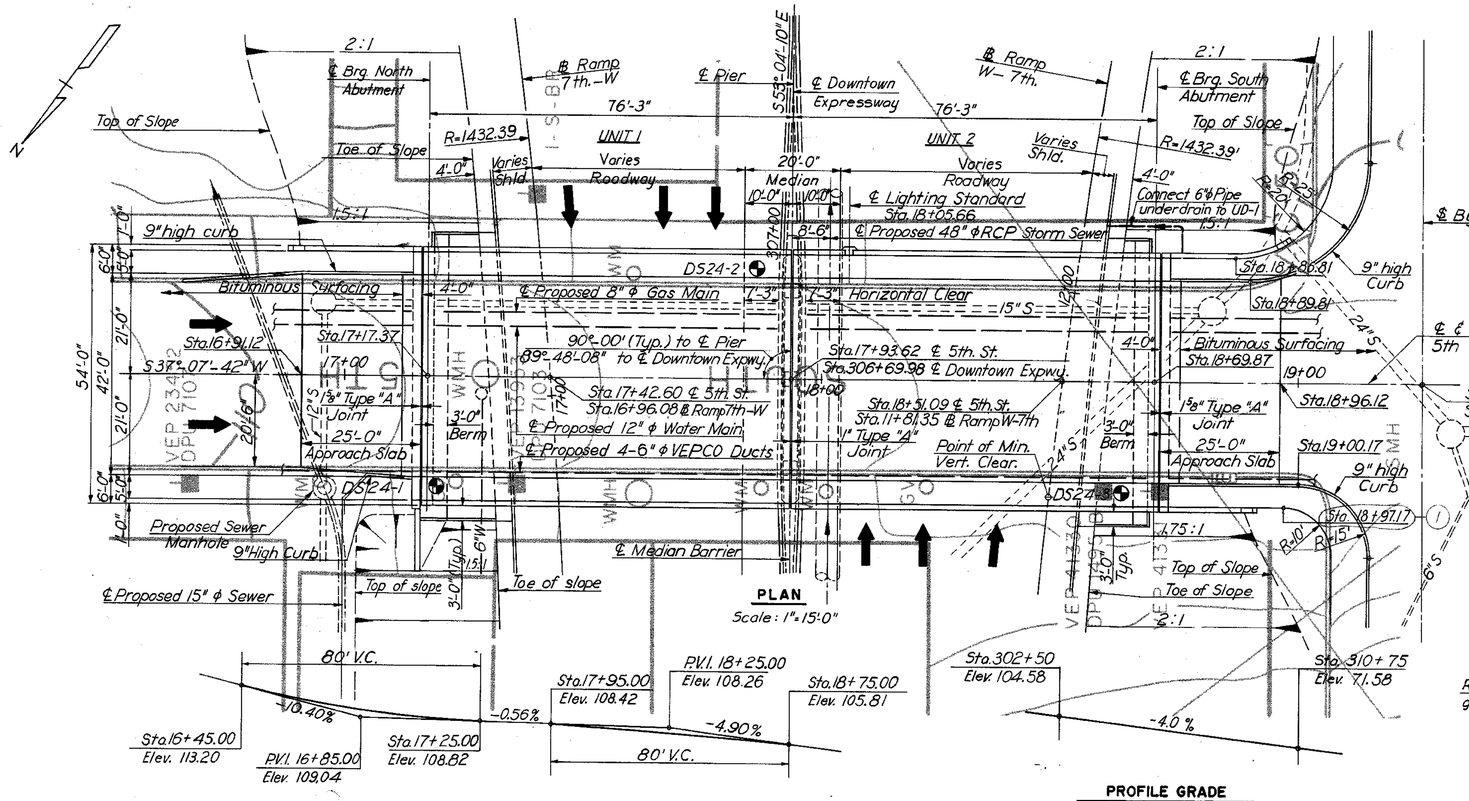
Bridge 57

5th Street
Over
Downtown Expressway (VA 195)

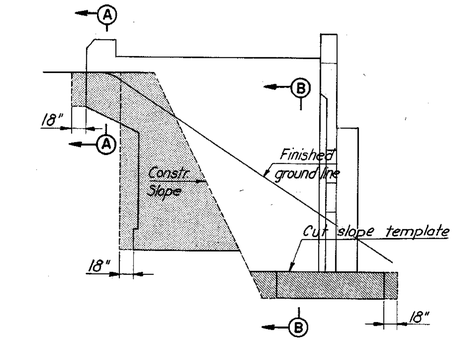
Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	170	

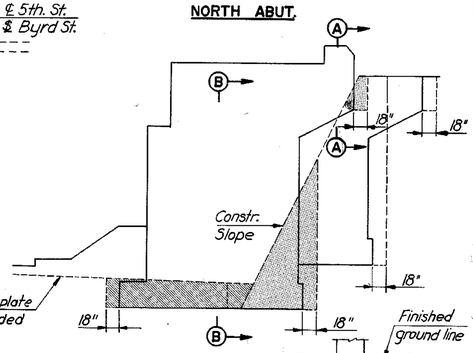
INDEX



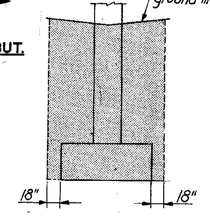
PLAN
Scale: 1"=15'-0"



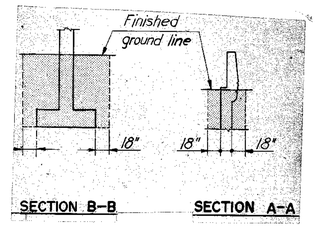
NORTH ABUT.



SOUTH ABUT.

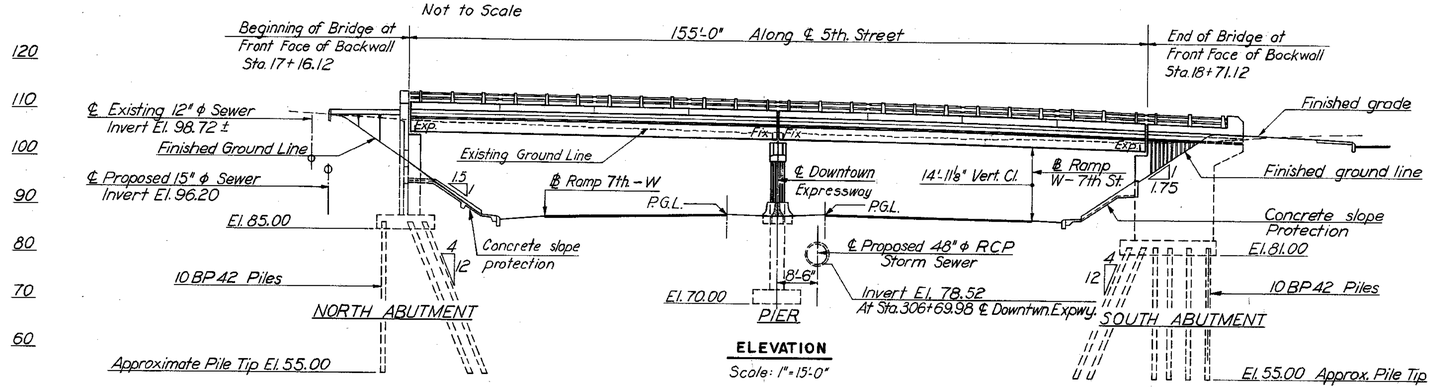


PIER 1



SECTION B–B **SECTION A–A**

PROFILE GRADE
5th STREET
Not to Scale



ELEVATION
Scale: 1"=15'-0"

PROFILE GRADE
DOWNTOWN EXPRESSWAY
Not to Scale

PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

BORINGS: ⊕ Indicates location of 2½"ϕ cased hole boring. For boring data, see Boring Logs sheet.

NOTE: For General Notes and Quantities, see next sheet.

	BY	DATE				
MADE	J.B.M.	1-68				
CHECKED	T.E.M.	2-68	1	As Built	T.E.M.	7-77
IN CHARGE P.R.V.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-57
5TH STREET OVER DOWNTOWN EXPRESSWAY

GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 1 OF 15

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	17	

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'0" sidewalks. Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Section 401.05 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted. All field connections shall be made with high strength bolts. High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-50 Plug, corner Byrd St. and S. 5th St., Elev. 102.41

C-51 Copper weld rod, corner E. Canal St. and S. 5th St., Elev. 124.46

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	POROUS BACKFILL C.Y.	STEEL PILES 10BP42 L.F.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6"Φ L.F.	GAS MAIN 8"Φ L.F.	WATER MAIN 12"Φ L.F.	CONDUIT 6"Φ VEPCO L.F.	METAL CONDUIT 3"Φ L.F.	
SUPERSTRUCTURE				286.22	63,335	300,021	309.4						213	210	828	1065	
NORTH ABUTMENT	201	251.08			25,224		24.6	76	1,254.2	110.73	148	106					
PIER 1	440	123.74			24,376												
SOUTH ABUTMENT	152	280.89			29,631		42.3	92	975.8	87.19	171	113					
APPROACH SLABS			115.3		25,732												
TOTAL	793	655.37	115.3	286.22	168,298	300,021	376.3	168	2,230.0	197.92	319	219	213	210	828	1065	

	BY	DATE				
MADE	EVR	3-68				
CHECKED	G.B.P.	5-68	1	As Built	TEM	7-77
IN CHARGE	PRK		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

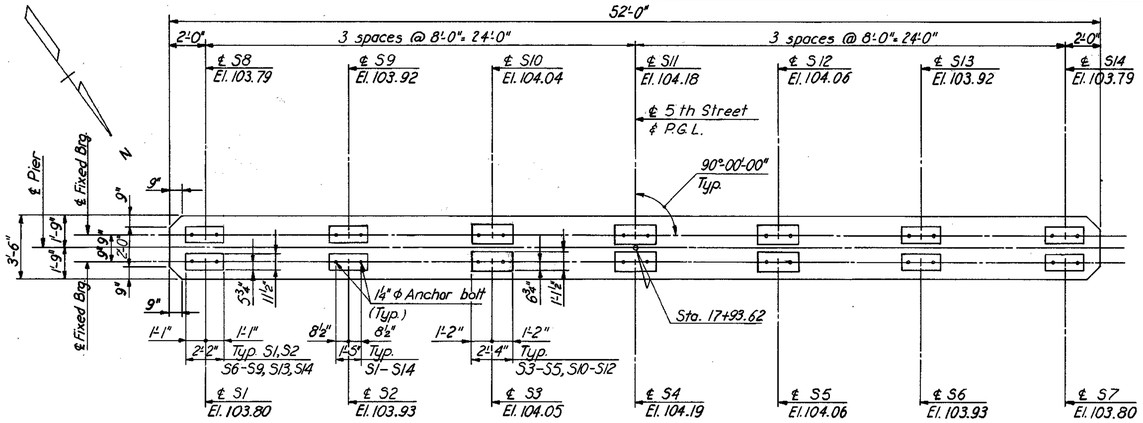
BRIDGE B-57
5TH STREET OVER
DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

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

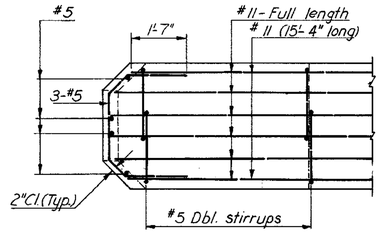
SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 2 OF 15

17

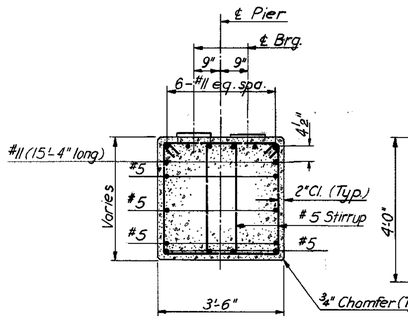
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
5	DOWNTOWN EXPRESSWAY	178	



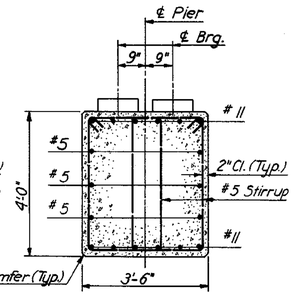
PLAN
Scale: ¼"=1'-0"



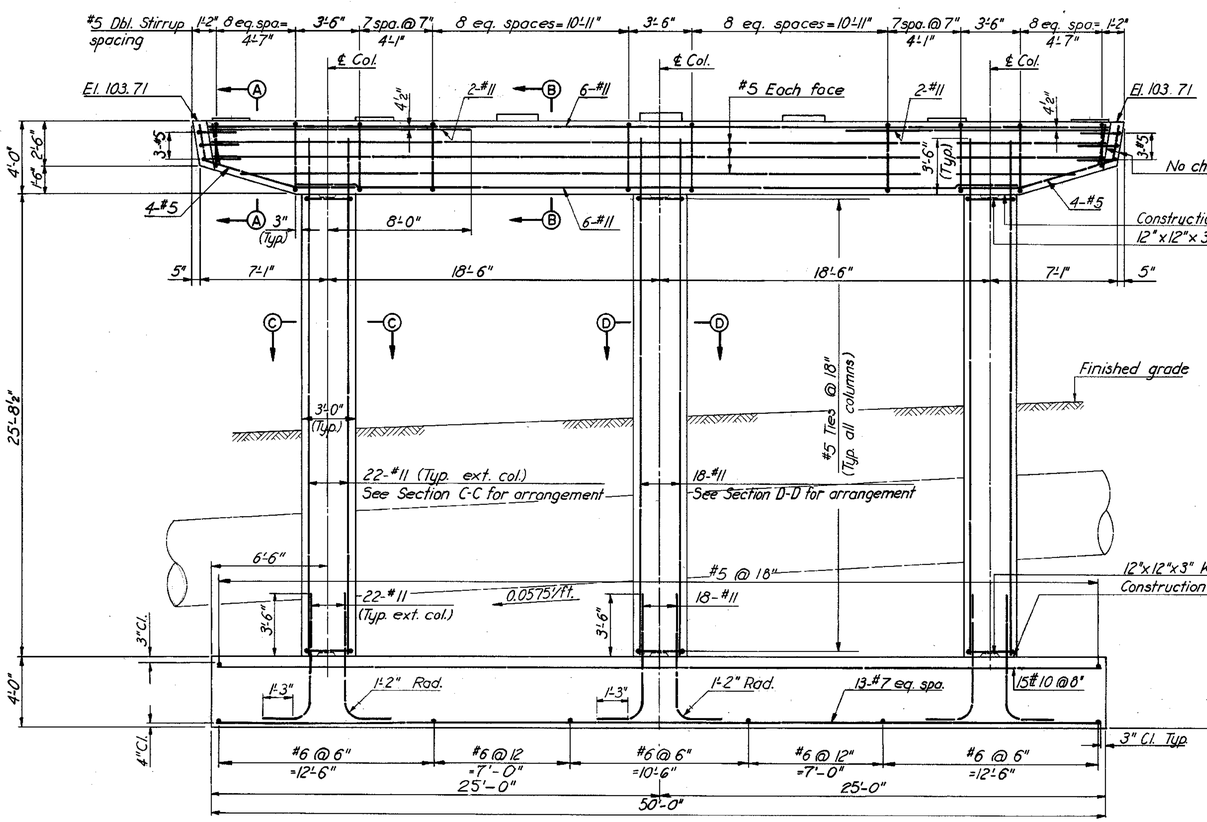
PLAN OF PIER CAP SHOWING REINFORCING DETAILS
Scale: ½"=1'-0"



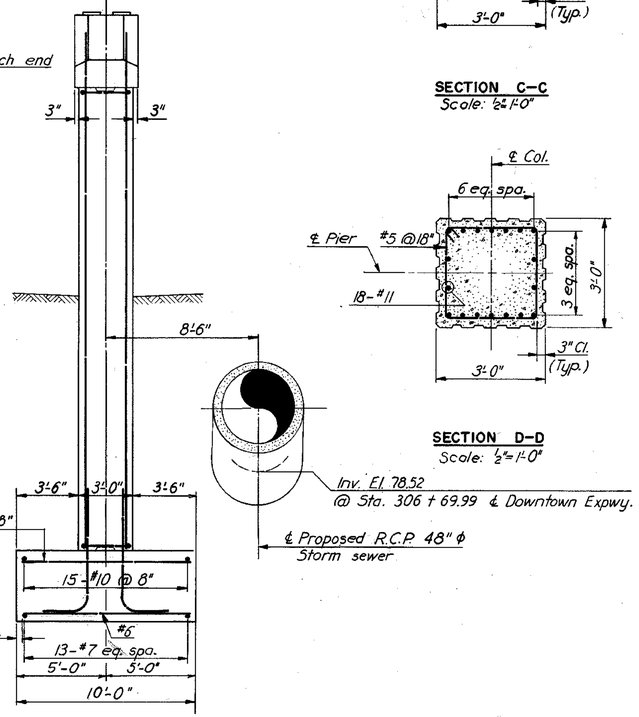
SECTION A-A
Scale: ½"=1'-0"



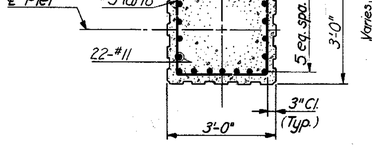
SECTION B-B
Scale: ½"=1'-0"



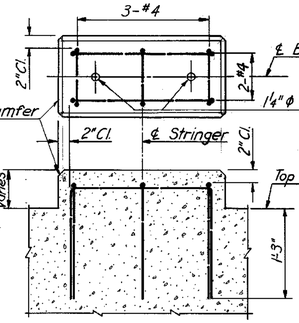
ELEVATION
Scale: ¼"=1'-0"



SIDE ELEVATION
Scale: ¼"=1'-0"



SECTION C-C
Scale: ½"=1'-0"



REINFORCING DETAILS FOR BEARING PADS AT S3 - S5 AND S10 - S12
Scale: 1"=1'-0"

SECTION D-D
Scale: ½"=1'-0"

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTE:

Foundation elevation is approximate and may be varied to suit field conditions as directed by the Engineer. Vertical column reinforcing shall not be cut until this elevation is established.

Where elevation changes by more than two feet, redesign will be required.

Pier foundation is designed for an allowable bearing pressure of 3 tons per square foot.

	BY	DATE				
MADE	EVR	12-67				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	PRV.		NO.	REVISION	BY	DATE

AS BUILT

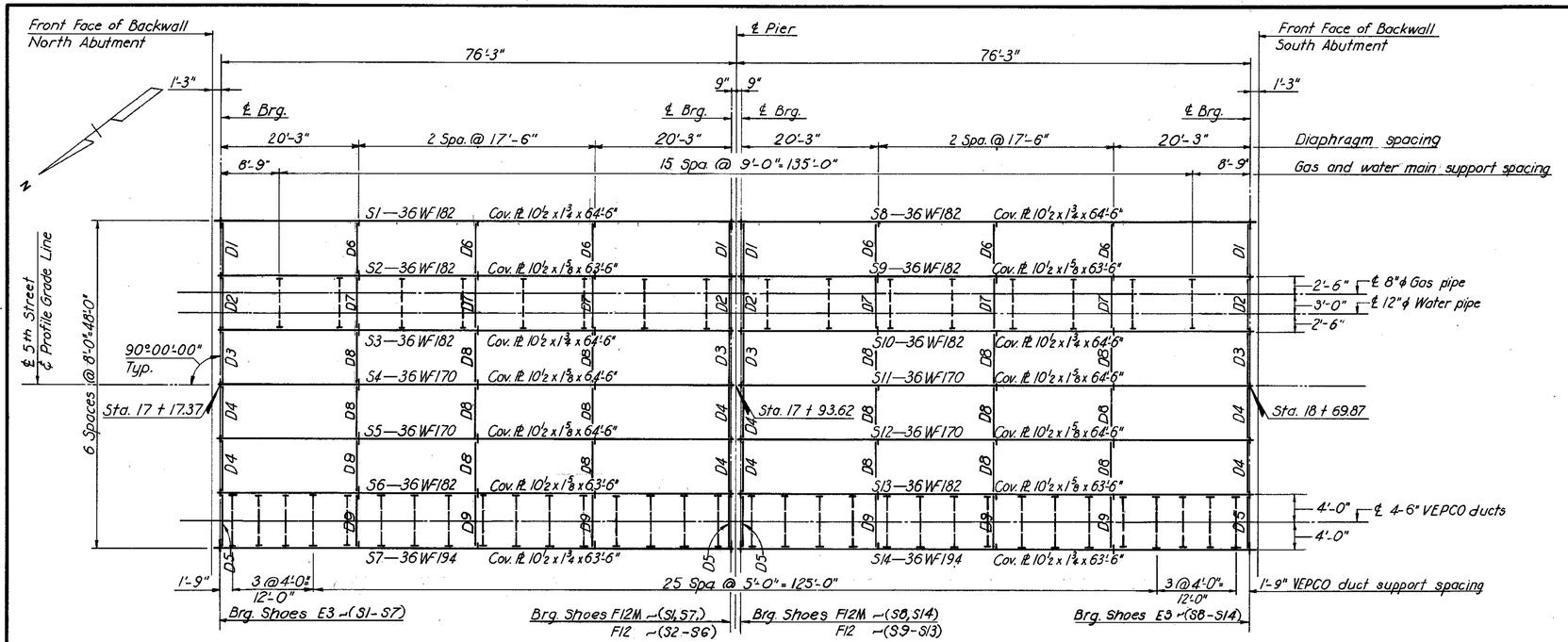
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-57
5TH STREET OVER DOWNTOWN EXPRESSWAY
PIER

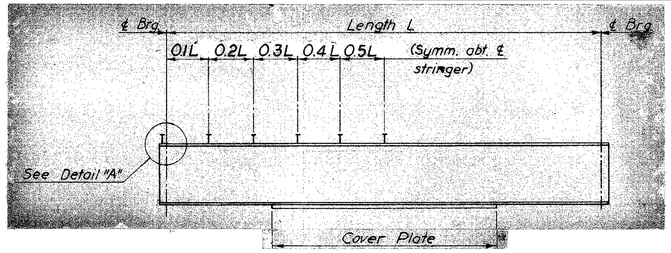
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 9 OF 15

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	179	



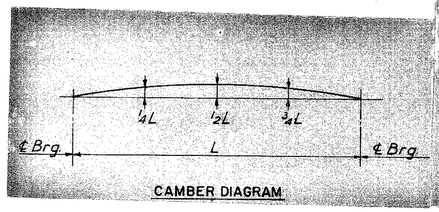
FRAMING PLAN
Scale: 1" = 10'



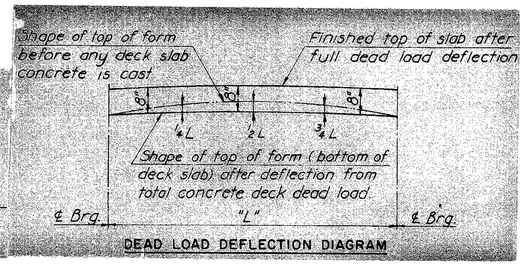
STRINGER ELEVATION

STRINGER SCHEDULE						
STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	SHEAR STUD SPACING: 0.1L	0.2L	0.3L	0.4L	0.5L
S1, S8	75'-6"	7"	8"	11"	13½"	15½"
S2, S9	↕	↕	↕	↕	13"	14½"
S3, S10	↕	↕	↕	↕	13"	14½"
S4, S11	↕	↕	↕	↕	12½"	14"
S5, S12	↕	↕	↕	↕	↕	14"
S6, S13	↕	↕	↕	↕	12½"	14½"
S7, S14	75'-6"	7"	8"	11"	13½"	16"

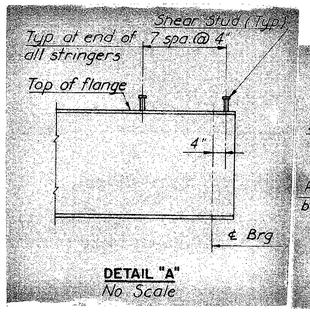
Note:
Lengths shown are horizontal distances measured along centerlines of stringers.



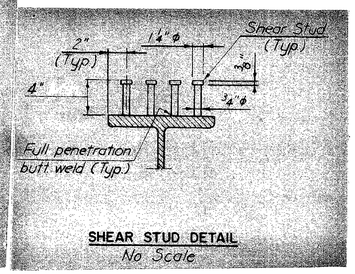
CAMBER DIAGRAM



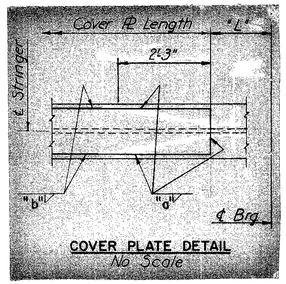
DEAD LOAD DEFLECTION DIAGRAM



DETAIL "A"
No Scale



SHEAR STUD DETAIL
No Scale



COVER PLATE DETAIL
No Scale

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E3	14	F12	10
		F12M	4

CAMBER SCHEDULE			
STR.	¼L	½L	¾L
S7	1"	1 5/8"	
S1, S6	1"	1¾"	1¼"
S2-S5	1⅛"		
S14	5½"	6½"	
S8, S13	5 1/2"	6 5/8"	4⅜"
S9-S12	5 5/8"		

DEFLECTION SCHEDULE		
STR.	¼L & ¾L	½L
S1, S4, S5		
S7, S8, S11	1⅛"	1½"
S12, S14		
S2, S3, S6	1"	1½"
S9, S10, S13		

SHEAR STUD NOTE:
Capacity = 3,400 lbs. per stud.
The 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 reinforcing.
Shear stud spacing shown is maximum spacing.

COVER PLATE SCHEDULE				
STR.	COVER PL	"L"	"a"	"b"
S1, S8	10½ x 1¾	5'-6"	5/8"	3/4"
S3, S10	↕	5'-6"	↕	↕
S7, S14	10½ x 1⅞	6'-0"		
S2, S9	10½ x 1⅜	6'-0"		
S4, S11	↕	5'-6"		
S5, S12	↕	5'-6"	↕	↕
S6, S13	10½ x 1⅛	6'-0"	5/8"	3/4"

NOTE TO FABRICATOR:
The above 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.

NOTE TO CONTRACTOR:
The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.

	BY	DATE				
MADE	D.L.A	12-67				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	P.D.V.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-57
5TH STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

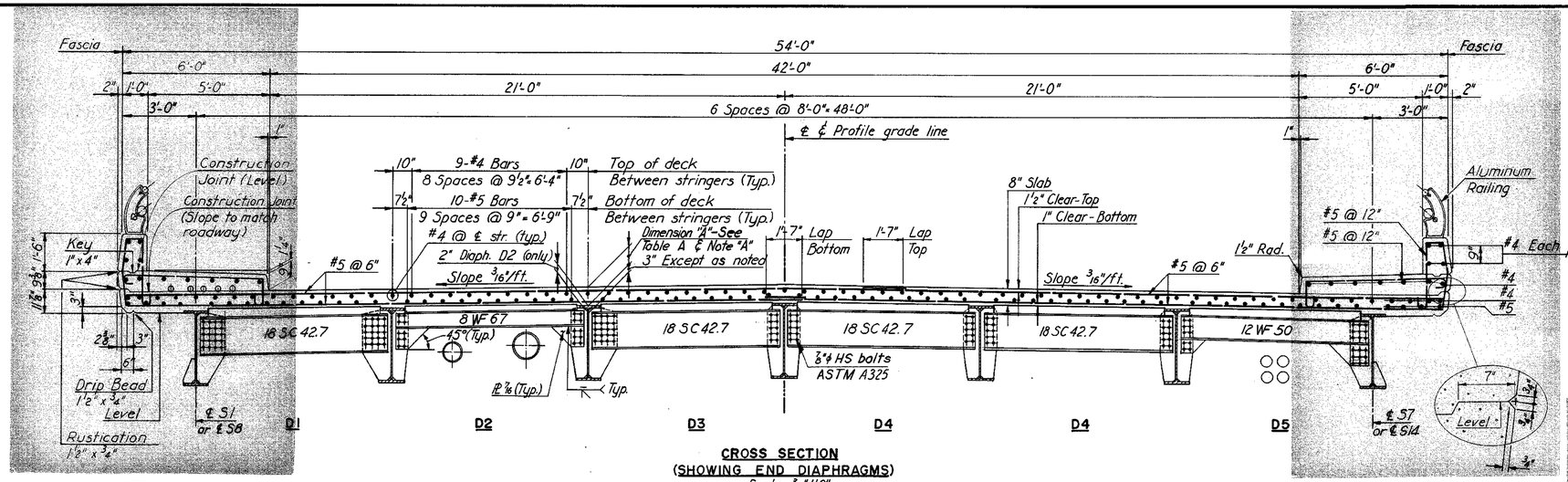
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 10 OF 15

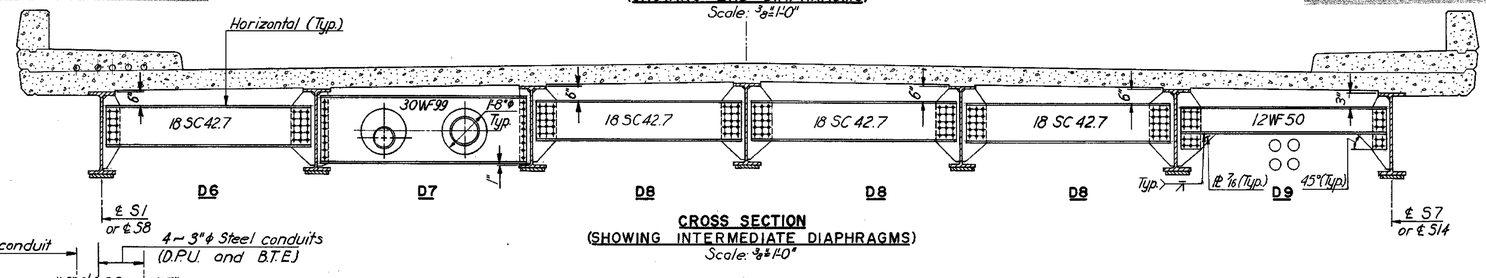
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	180	

TABLE A	
STRINGER	DIM "A"
S1-S6, S8-S13	9¼"
S7, S14	9⅛"

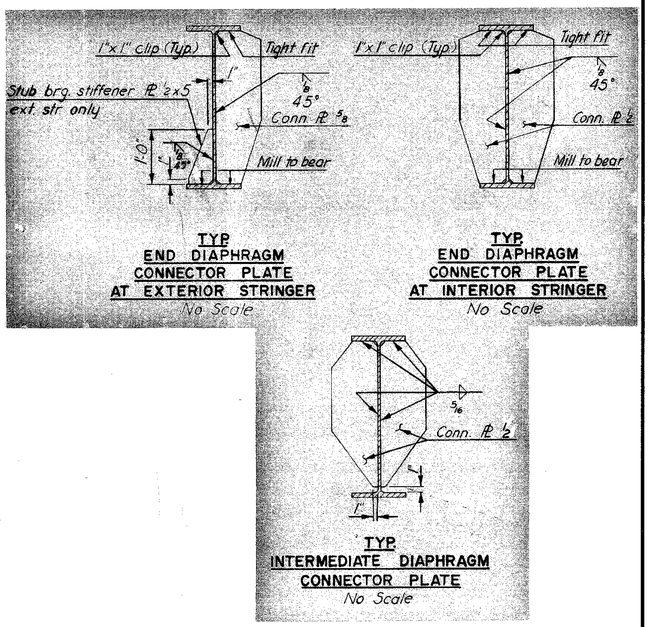
NOTE "A":
Dimension shown is measured from top of stringer to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.

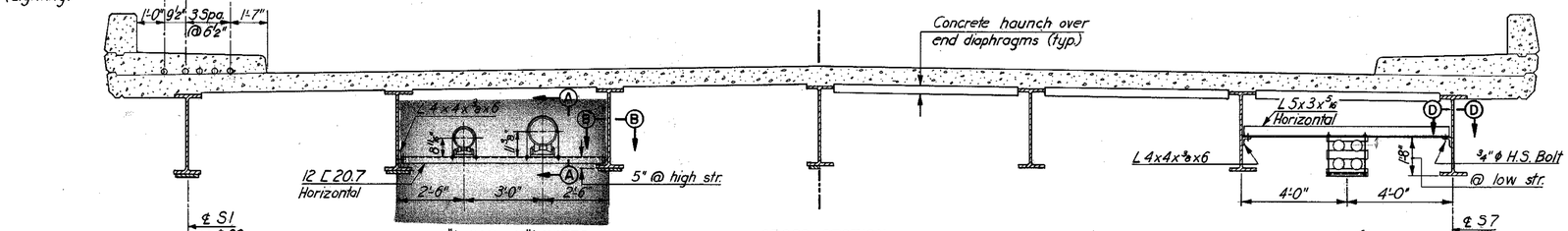


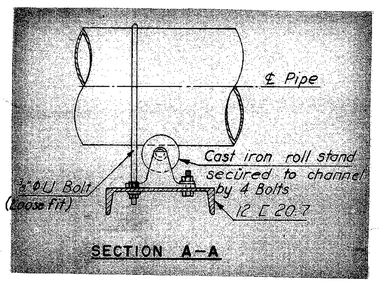
CROSS SECTION
(SHOWING END DIAPHRAGMS)
Scale: ⅜" = 1'-0"

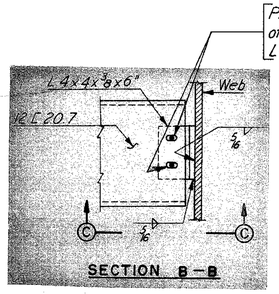


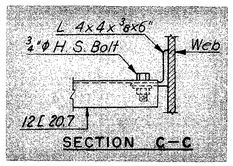
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
Scale: ⅜" = 1'-0"

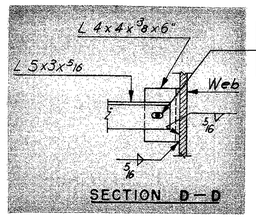












NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details AT Bridge Abutments sheet.

	BY	DATE
MADE	EVR	11-67
CHECKED	T.E.M.	2-68
IN CHARGE	P.R.V.	

NO.	REVISION	BY	DATE
1	As Built	TEM	7-77

AS BUILT

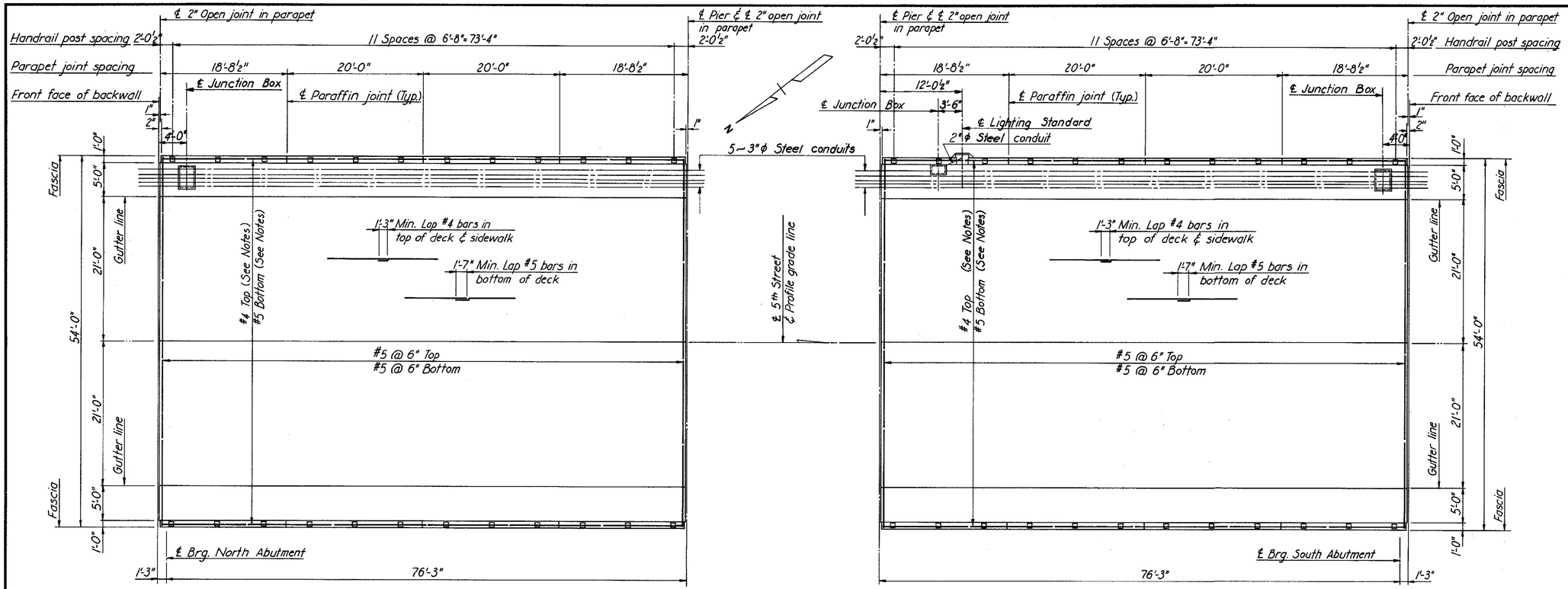
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-57
5TH STREET OVER DOWNTOWN EXPRESSWAY
CROSS SECTION AND UTILITY DETAILS

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

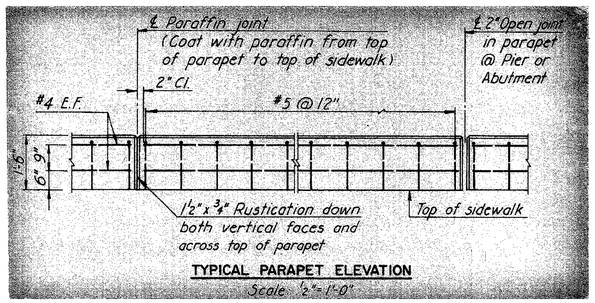
SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 11 OF 15

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	181	

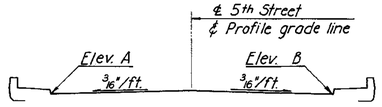


PLAN - UNIT 1
Scale: ⅛"=1'-0"

PLAN - UNIT 2
Scale: ⅛"=1'-0"



TYPICAL PARAPET ELEVATION
Scale: ½"=1'-0"



(LOOKING IN DIRECTION OF STATIONING)

PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
16+90	——	*109.77	——	18+00	108.06	108.39	108.06
17+00	*109.01	*109.34	*108.63	+10	107.92	108.25	107.92
+10	*108.71	*109.04	*108.53	+20	107.69	108.02	107.69
+16.12	108.59	108.92	108.52	+30	107.38	107.71	107.38
+20	108.53	108.86	108.50	+40	107.01	107.34	107.01
+30	108.46	108.79	108.46	+50	106.61	106.94	106.61
+40	108.40	108.73	108.40	+60	106.18	106.51	106.18
+50	108.35	108.68	108.35	+70	105.72	106.05	105.72
+60	108.29	108.62	108.29	+71.12	105.67	105.99	105.67
+70	108.23	108.56	108.23	+80	*105.23	*105.56	*105.25
+80	108.18	108.51	108.18	+90	*104.64	*105.07	*104.72
+90	108.12	108.45	108.12	19+00	——	*104.58	——
+93.62	108.10	108.43	108.10				

* Elevations shown are given to top of bituminous surfacing.

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section and Utility Details sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	A.B.P.	9-67				
CHECKED	T.E.M	2-68	1	As Built	T.E.M	1-77
IN CHARGE	P.R.V.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-57
5TH STREET OVER DOWNTOWN EXPRESSWAY
DECK PLANS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 12 OF 15

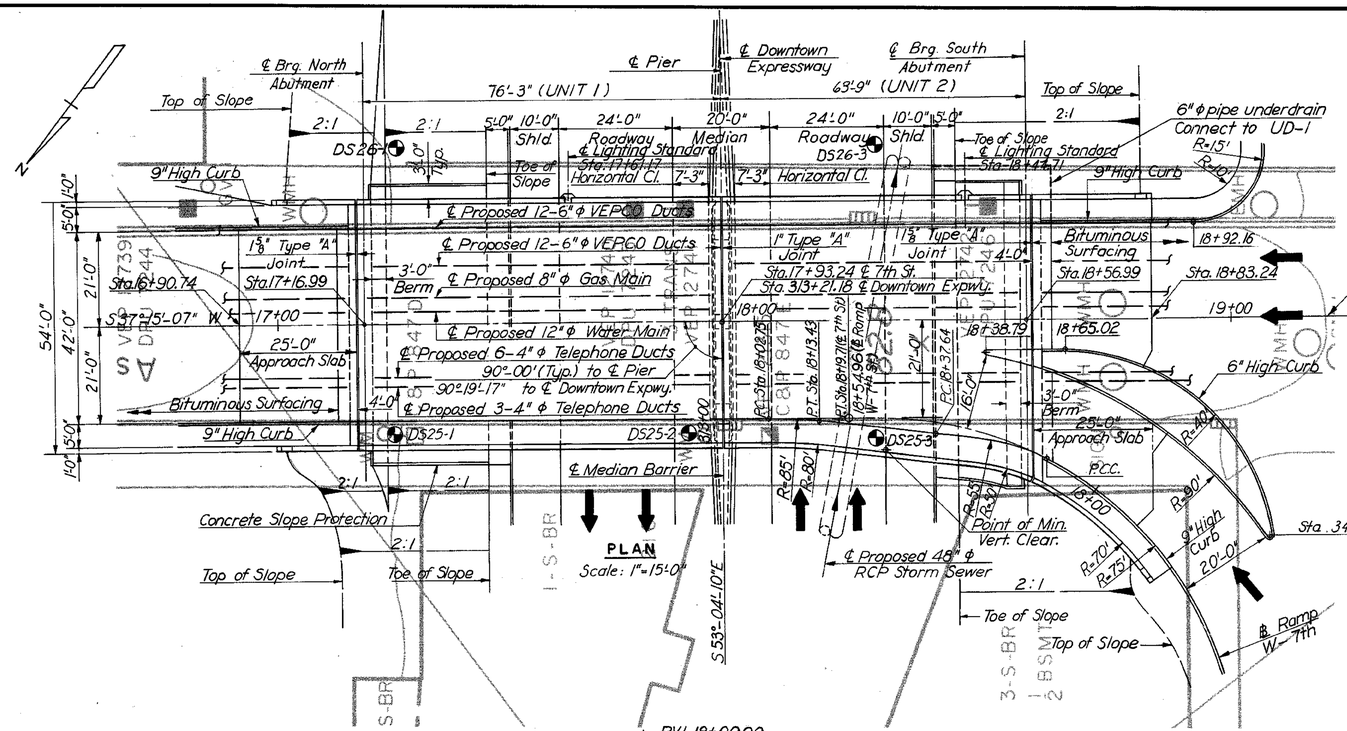
Bridge 58

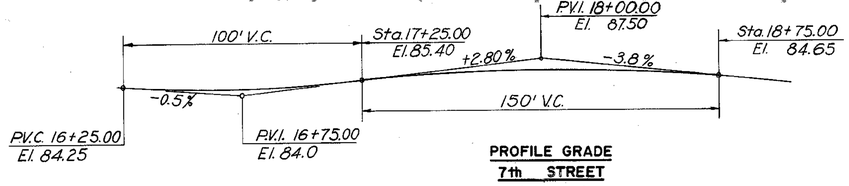
7th Street
Over
Downtown Expressway (VA 195)

Record Set Plans

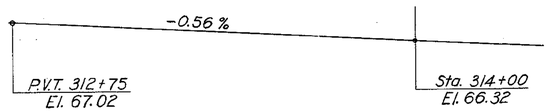
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	185	

INDEX



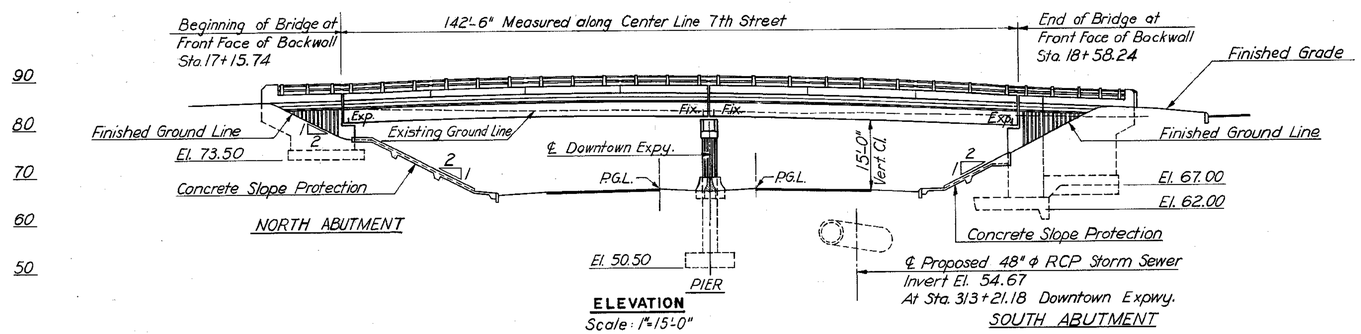


PROFILE GRADE
7th STREET
Not to Scale



PROFILE GRADE
DOWNTOWN EXPRESSWAY
Not to Scale

PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale



ELEVATION
Scale: 1"=15'-0"

BORINGS: ◔ Indicates location of 2½" ϕ cased hole boring. For boring data, see Boring Logs sheet.

NOTE: For General Notes and Quantities, see next sheet.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.B.M.	1-68				
CHECKED	T.E.M.	2-68	1	As Built	T.E.M.	7-77
IN CHARGE	P.R.V.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-58
7TH STREET OVER DOWNTOWN EXPRESSWAY
GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 1 OF 17

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	186	

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'0" sidewalks. Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface. Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Section 401.05 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted. All field connections shall be made with high strength bolts. High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-52 Plug, corner E. Canal St. and S. 7th St., Elev. 84.90
C-53 Plug, S. 7th St., Elev. 83.83

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	POROUS BACKFILL C.Y.	CONC. SLAB SLOPE PROTECTION S.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6"ϕ L.F.	GAS MAIN 8"ϕ L.F.	WATER MAIN 12"ϕ L.F.	CONDUIT 6"ϕ VEPCO L.F.	CONDUIT 4"ϕ TELEPHONE L.F.	METAL CONDUIT 3"ϕ L.F.	STEEL PILES 10BP42 L.F.
SUPERSTRUCTURE				276.41	60,408	270,998	288.5					200.5	197.5	4,668	1,750.5	1,203	
NORTH ABUTMENT	262	111.4			5,818		27.2	13	213.2	54	78						
PIER I	402	121.19			23,306												
SOUTH ABUTMENT	446	353.77			29,430		51.5	96	131.0	205	136						195.3
APPROACH SLABS			112.44		30,322												
TOTAL	1,110	586.36	112.44	276.41	149,284	270,998	367.2	109	344.2	259	214						
												200.5	197.5	4,668	1,750.5	1,203	195.3

	BY	DATE				
MADE	EVR	3-68				
CHECKED	A.B.P.	12-68	1	As Built	TEM	7-77
IN CHARGE	P.R.V.		NO.	REVISION	BY	DATE

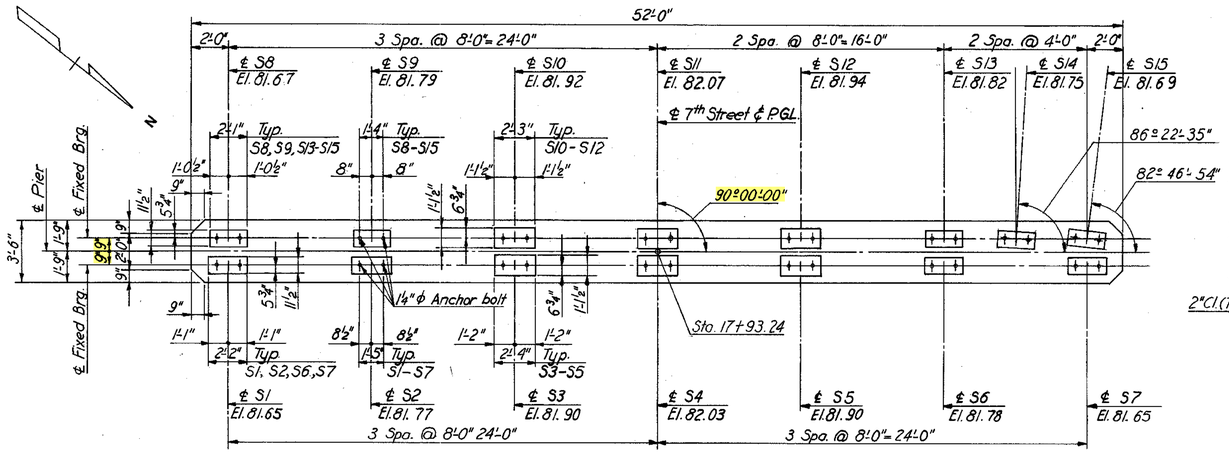
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-58
7TH STREET OVER DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

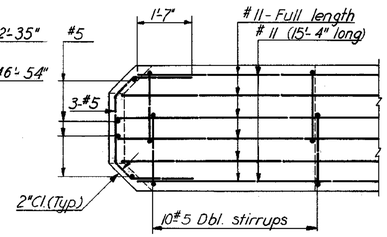
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 2 OF 17

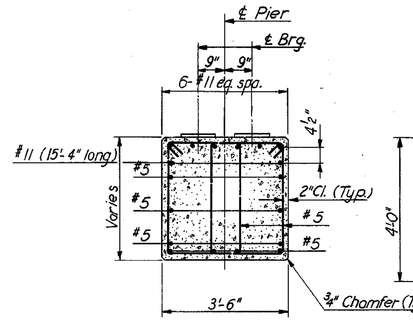
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
5	DOWNTOWN EXPRESSWAY	193	



PLAN
Scale: ¼"=1'-0"

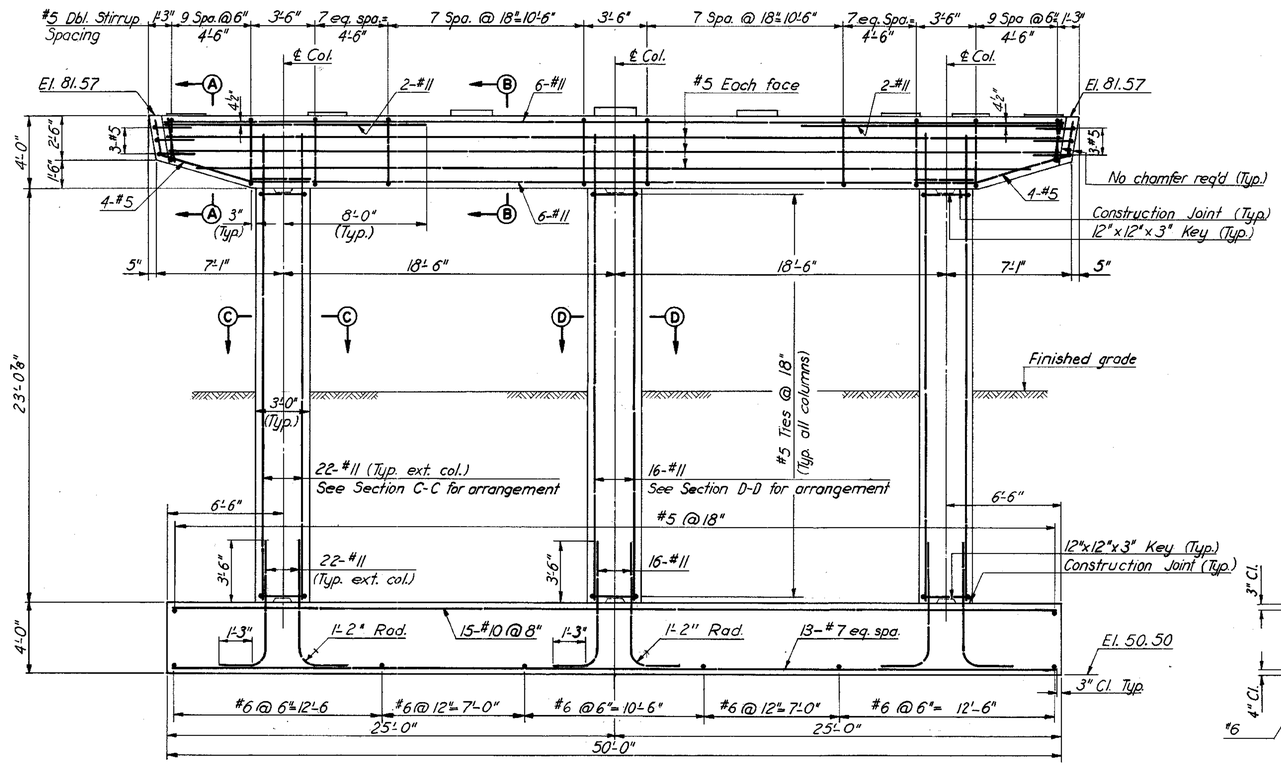


PLAN OF PIER CAP SHOWING REINFORCING DETAILS
Scale: ½"=1'-0"

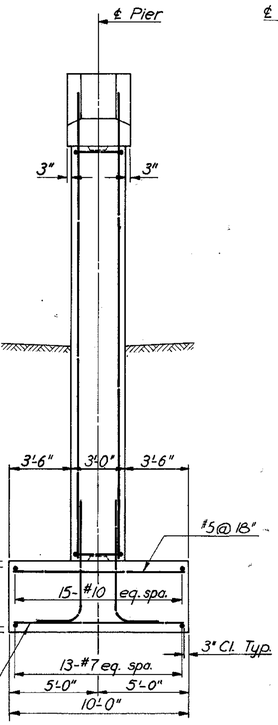


SECTION A–A
Scale: ½"=1'-0"

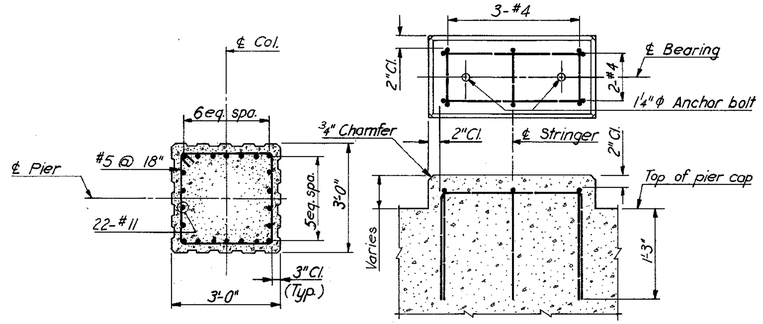
SECTION B–B
Scale: ½"=1'-0"



ELEVATION
Scale: ¼"=1'-0"

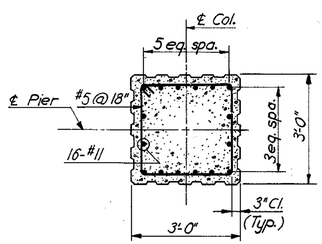


SIDE ELEVATION
Scale: ¼"=1'-0"

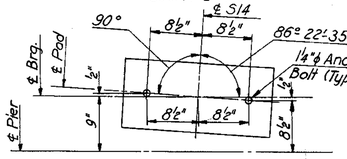


SECTION C–C
Scale: 1½"=1'-0"

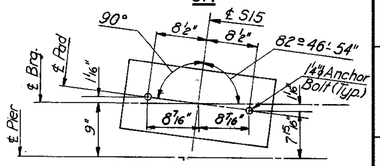
REINFORCING DETAILS FOR BEARING PADS AT S3 – S5 AND S10 – S12
Scale: 1"=1'-0"



SECTION D–D
Scale: ½"=1'-0"



ANCHOR BOLT SETTING PLAN S14



ANCHOR BOLT SETTING PLAN S15

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTE:

Foundation elevation is approximate and may be varied to suit field conditions as directed by the Engineer. Vertical column reinforcing shall not be cut until this elevation is established.

Where elevation changes by more than two feet, redesign will be required.

Pier foundation is designed for an allowable bearing pressure of 3 tons per square foot.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EVR	1-68				
CHECKED	TEM	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.					

AS BUILT

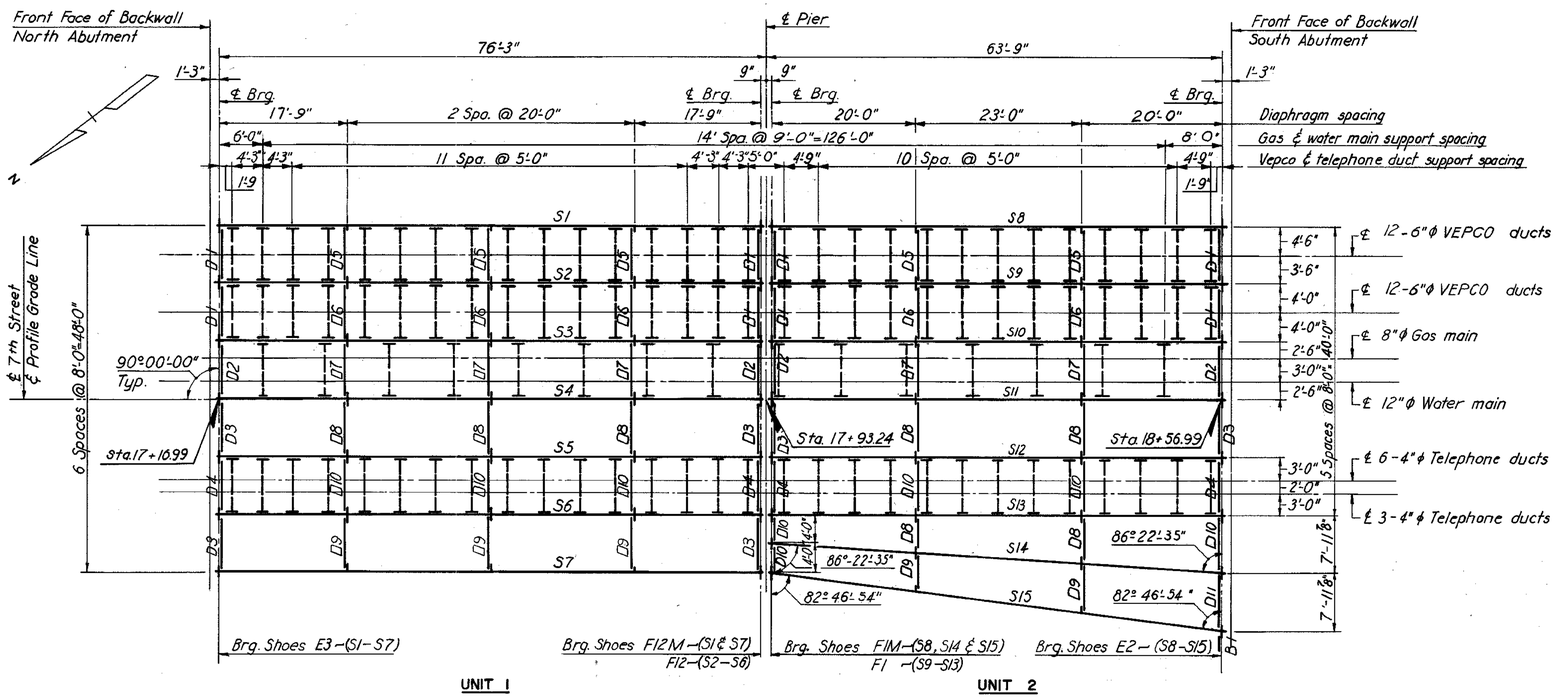
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-58
7 TH STREET OVER DOWNTOWN EXPRESSWAY
PIER

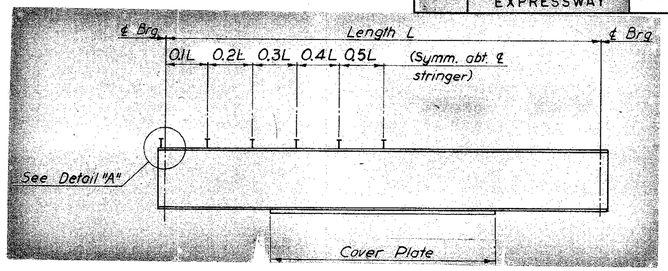
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 9 OF 17

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	194	



FRAMING PLAN
Scale: 1" = 10'

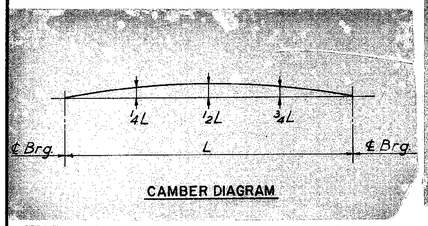


STRINGER ELEVATION

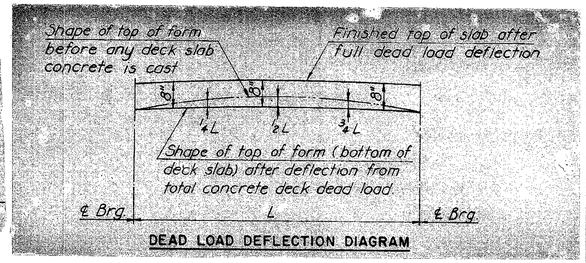
STRINGER SCHEDULE

STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	COVER PLATE	SHEAR STUD SPACING 0.1L	0.2L	0.3L	0.4L	0.5L
S1 – 36 WF 194	75'-6"	10½ x 1¾ x 64'-0"	7"	8"	11"	13½"	15½"
S2 – 36 WF 194	↕	10½ x 1¾ x 64'-0"	↕	↕	10½"	13"	14½"
S3 – 36 WF 182	↕	10½ x 1¾ x 65'-0"	↕	↕	11"	↕	↕
S4 – 36 WF 182	↕	10½ x 1⅞ x 64'-6"	↕	↕	↕	↕	↕
S5 – 36 WF 182	↕	10½ x 1⅞ x 63'-6"	↕	↕	↕	13"	14½"
S6 – 36 WF 182	↕	10½ x 1⅞ x 63'6"	↕	↕	↕	11"	15½"
S7 – 36 WF 182	75'-6"	10½ x 1¾ x 64'-6"	7"	8"	↕	13½"	15½"
S8 – 36 WF 150	63'-0"	10½ x 1 x 51'-0"	7"	8"	10½"	13½"	15"
S9 – 36 WF150	↕	10½ x 1 x 51'-0"	↕	↕	10½"	12½"	14"
S10 – 36 WF150	↕	10½ x 1 x 51'-0"	↕	↕	11"	↕	↕
S11 – 36 WF 135	↕	10½ x 1⅛ x 53'-0"	↕	↕	↕	↕	↕
S12 –	↕	10½ x 1⅛ x 53'-0"	7"	↕	10½"	↕	14"
S13 –	63'-0"	10½ x ⅞ x 51'-6"	7½"	8"	11½"	12½"	15"
S14 –	63'-1 3/16"	10½ x ⅝ x 48'-6"	9"	10"	13"	15½"	17"
S15 – 36 WF 135	63'-6⅛"	10½ x ¾ x 49'-6"	8½"	10"	12½"	16"	18½"

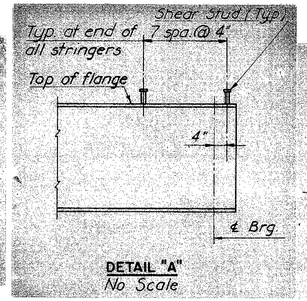
Note:
Lengths shown are horizontal distances measured along centerlines of stringers.



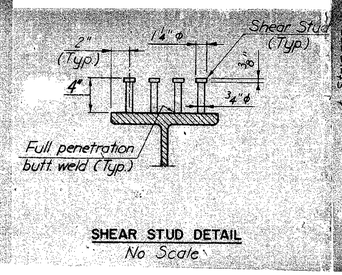
CAMBER DIAGRAM



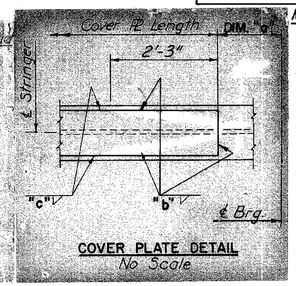
DEAD LOAD DEFLECTION DIAGRAM



DETAIL "A"
No Scale



SHEAR STUD DETAIL
No Scale



COVER PLATE DETAIL
No Scale

CAMBER SCHEDULE

STR.	¼L	½L	¾L	STR.	¼L	½L	¾L
S1, S5-S7	4"	5 5/8"	4⅛"	S8-S10, S12, S13	2⅛"	3⅜"	2⅝"
S2	4"	5½"		S11	2⅝"	4"	2⅝"
S4	4⅛"	5 5/8"		S14	3"	4"	3"
S3	4⅛"	5⅝"	4¼"	S15	3⅜"	4⅛"	3⅛"

DEFLECTION SCHEDULE

STR.	¼L & ¾L	½L	STR.	¼L & ¾L	½L
S1, S3, S7	1⅛"	½"	S8 – S14	¾"	1"
S2, S4 – S6	1"		S15	⅝"	⅞"

SHEAR STUD NOTE:
Capacity = 3,400 lbs. per stud.
The 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 reinforcing.
Shear stud spacing shown is maximum spacing.

COVER PLATE SCHEDULE

STR.	DIM. "a"	Cover Pl.	"b"	"c"
S1 & S2	5'-9"	10½ x 1¾	⅝"	⅜"
S3	5'-3"			
S4 & S7	5'-6"			
S5 & S6	6'-0"	10½ x 1⅞		
S8 – S10	6'-0"	10½ x 1		
S11 & S12	5'-0"	10½ x 1⅛		
S13	5'-9"	10½ x ⅞		
S14	7'-3¾"	10½ x ⅝		
S15	7'-0 1/16"	10½ x ¾		

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	8	F1	5
E3	7	F1M	3
		F12	5
		F12N	2

NOTE TO FABRICATOR:
The above 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.

NOTE TO CONTRACTOR:
The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.

	BY	DATE				
MADE	D.L.A.	10-67				
CHECKED	TEM	2-68	1	As Built	TEM	7-77
IN CHARGE	A.R.V.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-58
7TH STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

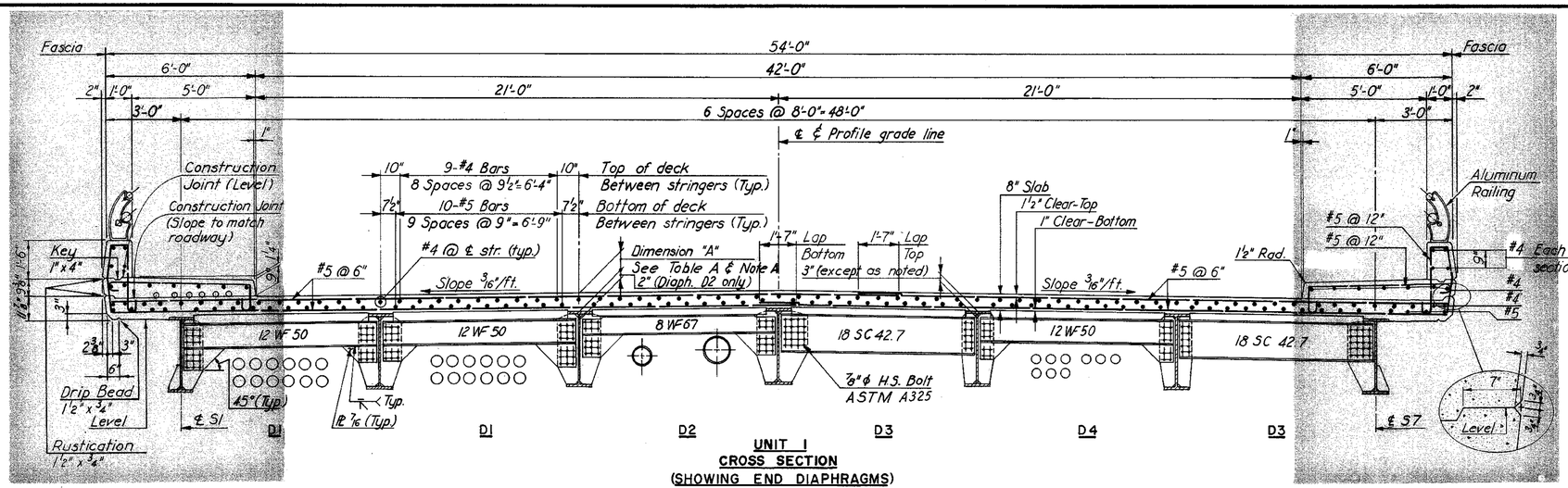
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 10 OF 17

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	195	

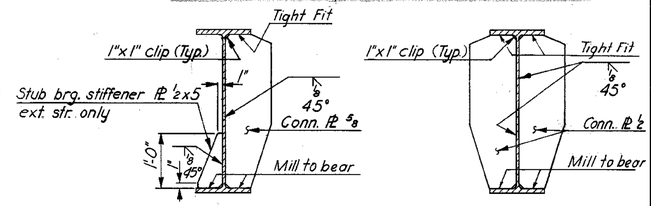
TABLE A	
STRINGER	DIM "A"
S1, S2	9⅛"
S3-S7	9¼"
S8-S15	9½"

NOTE "A":
Dimension shown is measured from top of stringer to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.



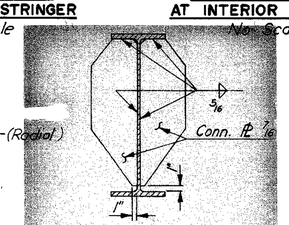
UNIT 1
CROSS SECTION
(SHOWING END DIAPHRAGMS)
Scale: ⅜"=1'-0"

UNIT 1
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
Scale: ⅜"=1'-0"

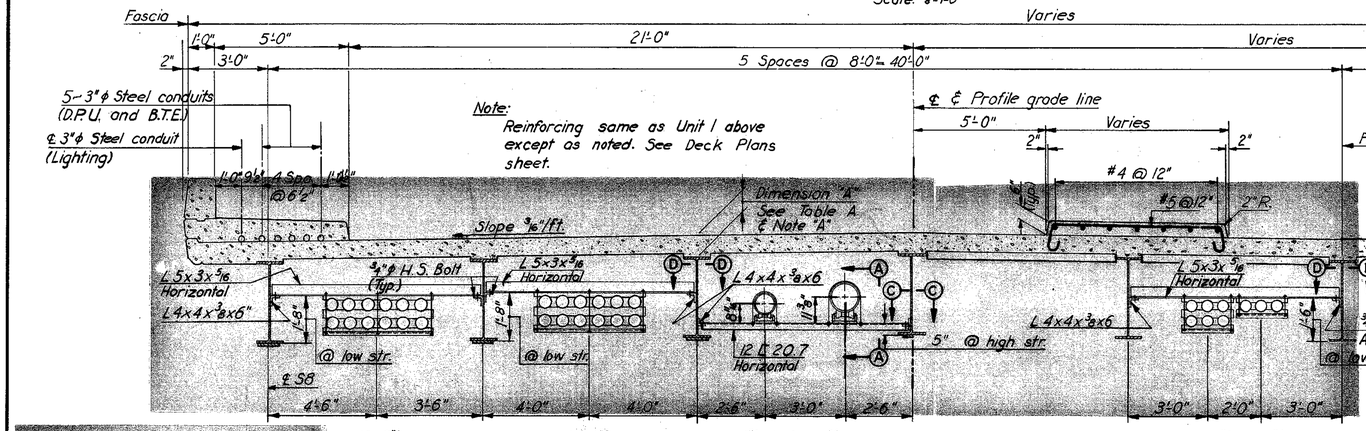


TYP
END DIAPHRAGM
CONNECTOR PLATE
AT EXTERIOR STRINGER
No Scale

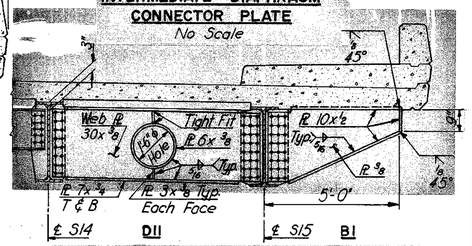
TYP
END DIAPHRAGM
CONNECTOR PLATE
AT INTERIOR STRINGER
No Scale



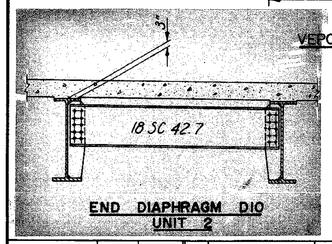
TYP
INTERMEDIATE DIAPHRAGM
CONNECTOR PLATE
No Scale



Note: End ℄ intermediate diaphragms Unit 2 same as Unit 1 except as noted for stringers S14 & S15. See Unit 2 Partial Cross Section and End Diaphragm D10 Unit 2 detail.



UNIT 2
PARTIAL CROSS SECTION
(SHOWING END DIAPHRAGM AT SOUTH ABUTMENT)
Scale: ⅜"=1'-0"



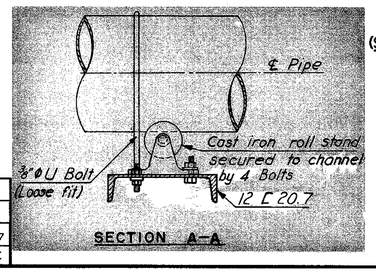
END DIAPHRAGM D10
UNIT 2

12-6"ϕ VEPCO DUCT SUPPORT

12-6"ϕ VEPCO DUCT SUPPORT

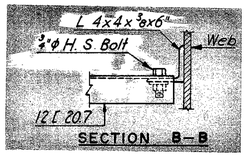
8"ϕ GAS 12"ϕ WATER GAS & WATER MAIN SUPPORT

6-4"ϕ 3-4"ϕ TELEPHONE DUCT SUPPORT



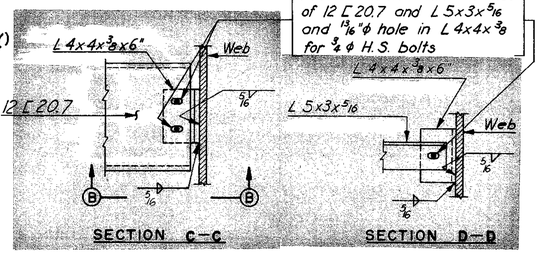
SECTION A-A

UNIT 2
CROSS SECTION
(SHOWING UTILITY SUPPORTS ONLY)
Scale: ⅜"=1'-0"



SECTION B-B

Provide 13/16"x1¼" slots in ends of 12 C 20.7 and L 5x3x5/16 and 13/16"ϕ hole in L 4x4x3/8 for ¾"ϕ H.S. bolts



SECTION C-C

SECTION D-D

NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.

	BY	DATE				
MADE	EVR	10-67				
CHECKED	TEM	2-68	1	As Built	TEM	7-77
IN CHARGE	PRY.		NO.	REVISION	BY	DATE

AS BUILT

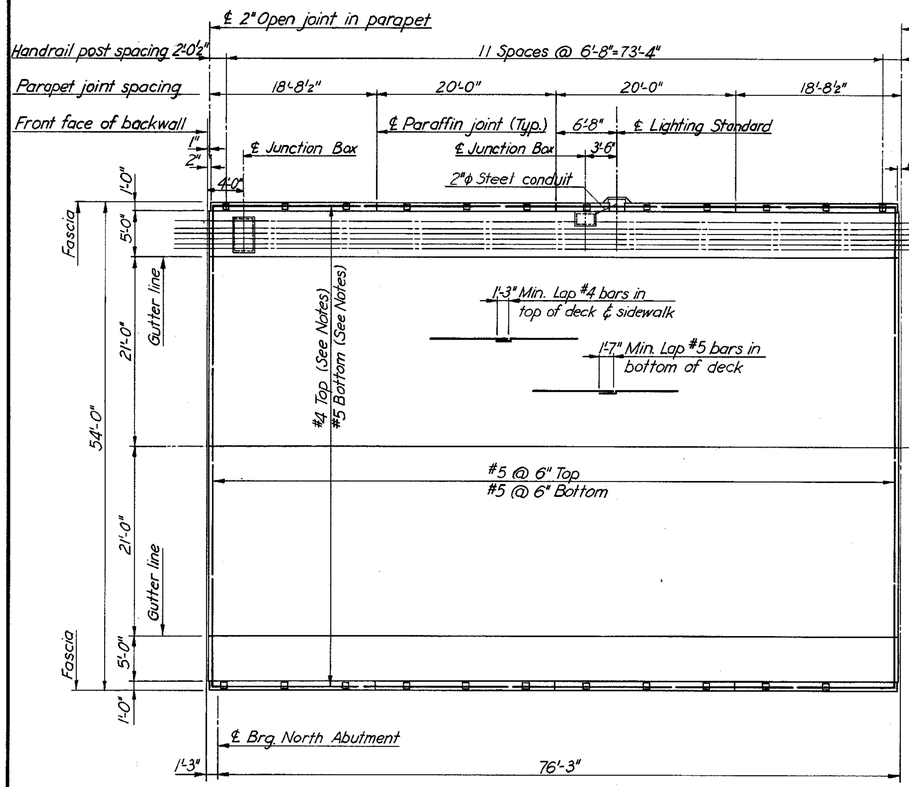
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-58
7TH STREET OVER DOWNTOWN EXPRESSWAY
CROSS SECTION AND UTILITY DETAILS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 11 OF 17

195

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
5	DOWNTOWN EXPRESSWAY	196	



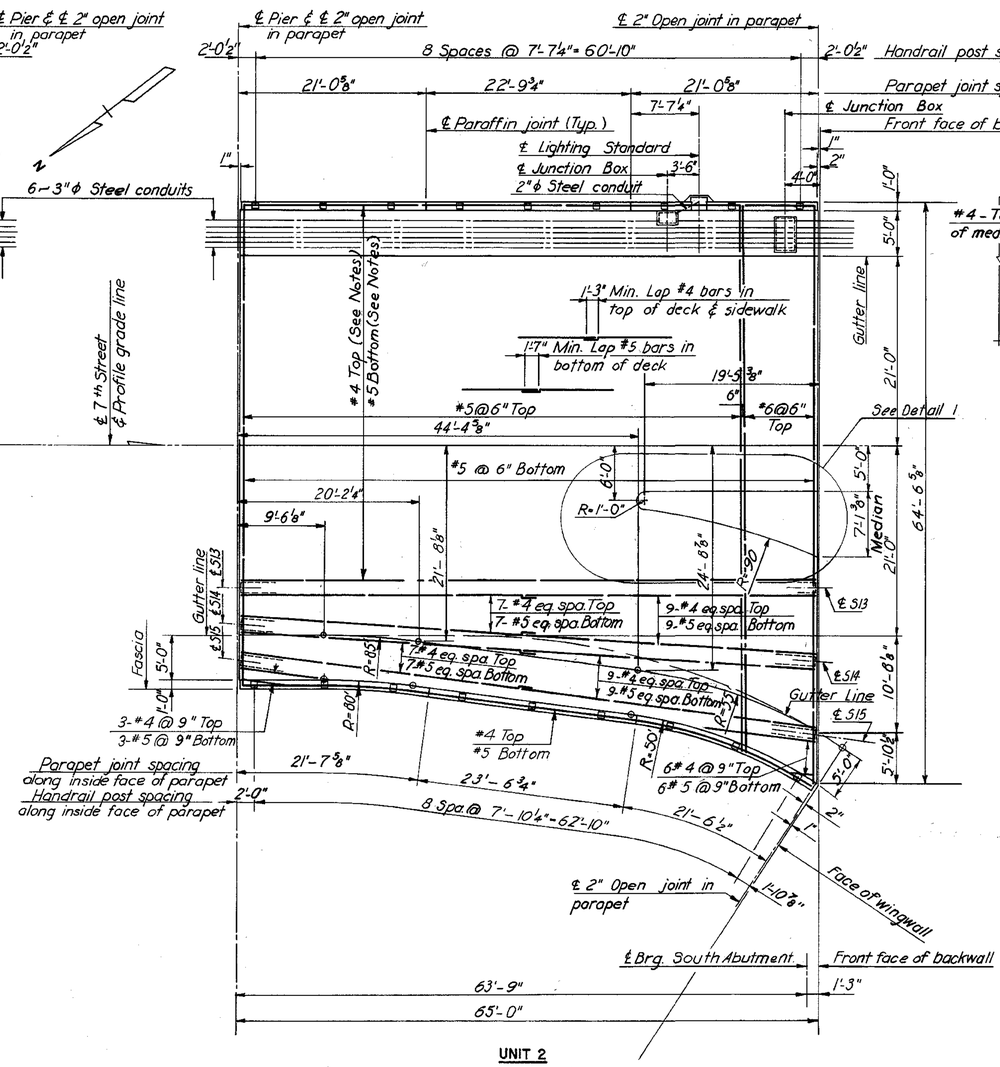
UNIT 1
Scale: ⅛"=1'-0"

(LOOKING IN DIRECTION OF STATIONING)

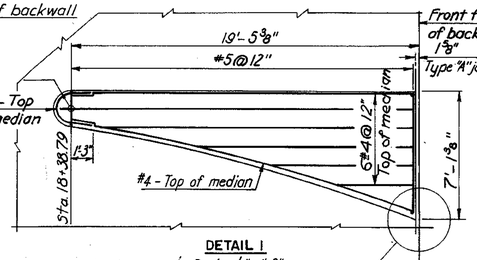
PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
16+90	*84.29	*84.62	*84.29	+93.24	85.96	86.29	85.96
17+00	*84.47	*84.80	*84.47	18+00	85.94	86.26	85.90
+10	*84.69	*85.02	*84.69	+10	85.86	86.19	85.76
+15.74	84.83	85.16	84.83	+20	85.75	86.08	85.55
+20	84.93	85.26	84.93	+30	85.59	85.92	85.29
+30	85.21	85.54	85.21	+40	85.38	85.71	84.98
+40	85.44	85.77	85.44	+50	85.14	85.46	84.56
+50	85.63	85.96	85.63	+58.24	84.89	85.22	84.12
+60	85.78	86.11	85.78	+80	84.84	85.17	84.03
+70	85.89	86.22	85.89	+70	*84.50	*84.83	*83.36
+80	85.93	86.26	85.93	+80	*84.12	*84.46	*83.13
+90	85.96	86.29	85.96	—	—	—	—

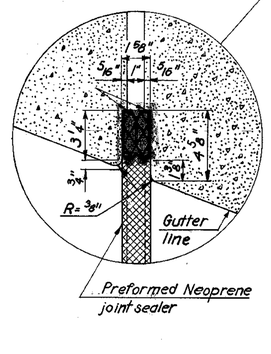
*Elevations shown are given to top of bituminous surfacing.

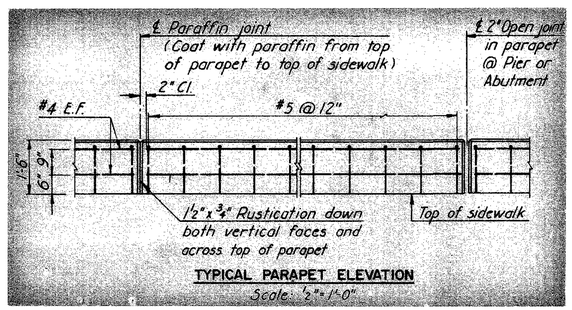


UNIT 2
Scale: ⅛"=1'-0"



DETAIL 1
Scale: 1½"=1'-0"





TYPICAL PARAPET ELEVATION
Scale: ½"=1'-0"

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section and Utility Details sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, function box details and additional reinforcing, see Standard Electrical Details sheet 84.

	BY	DATE				
MADE	J.B.M.	1-68				
CHECKED	TEM	2-68	1	As Built	TEM	7-77
IN CHARGE P.R.V.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-58
7TH STREET OVER DOWNTOWN EXPRESSWAY
DECK PLANS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 12 OF 17

196

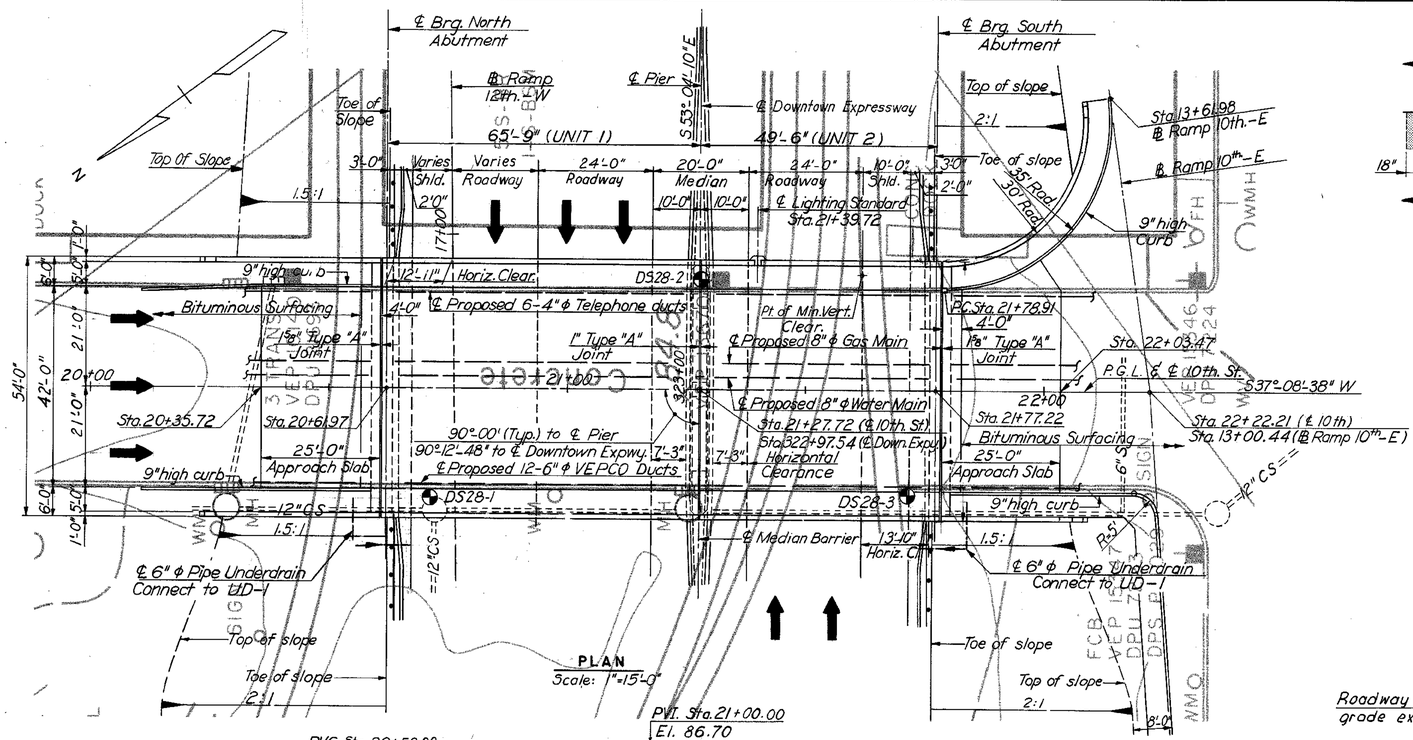
Bridge 60

10th Street
Over
Downtown Expressway (VA 195)

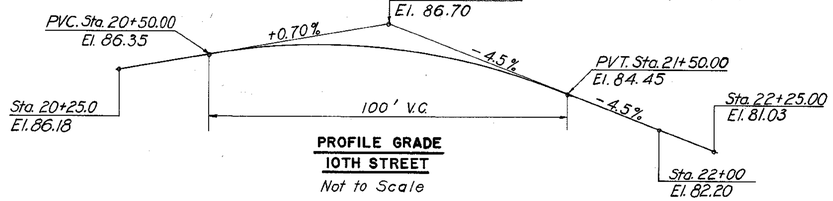
Record Set Plans

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	204	

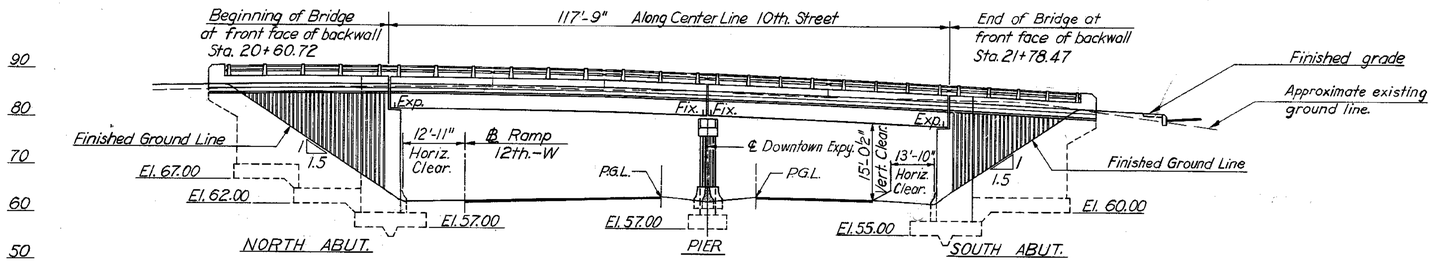
INDEX



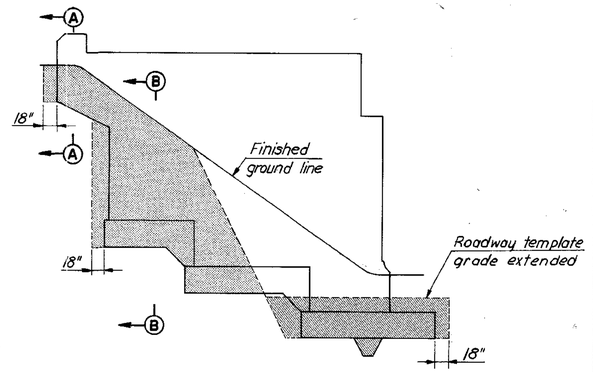
PLAN
Scale: 1"=15'-0"



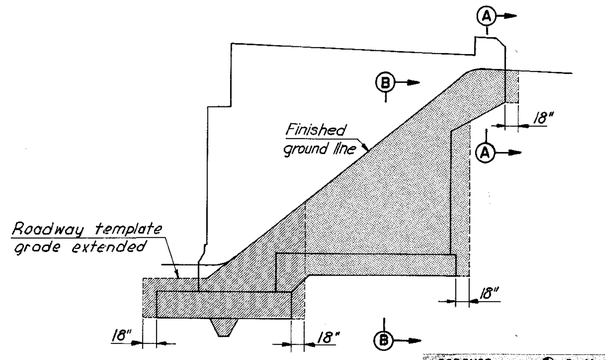
PROFILE GRADE
10TH STREET
Not to Scale



ELEVATION
Scale 1"=15'



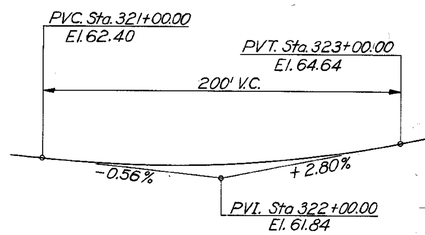
NORTH ABUT.



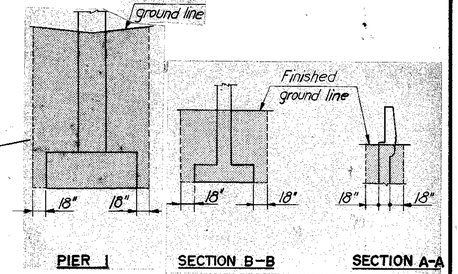
SOUTH ABUT.

BORINGS: Indicates location of 2½"ϕ cased hole boring.
For boring data, see Boring Logs sheet.

NOTE: For General Notes and Quantities, see next sheet.



PROFILE GRADE
DOWNTOWN EXPRESSWAY
Not to Scale



PIER 1 SECTION B-B SECTION A-A

PAYMENT LIMITS FOR STRUCTURE EXCAVATIONS
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.B.M.	12-67	2	As Built	TEM	7-77
CHECKED	A.B.P.	3-68	1	North East WW	TEM	6-74
IN CHARGE	P.R.Y.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-60
10TH STREET OVER
DOWNTOWN EXPRESSWAY

GENERAL PLAN AND ELEVATION

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

SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 1 OF 17

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

GENERAL NOTES

ROADWAY CAPACITY: One 42'-0" clear roadway. Two 5'0" sidewalks.
Dead Load-Includes 15 lbs. per sq.ft. for future wearing surface.
Live Loads-HS20-44 loading and B.P.R. modified 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.

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 plan 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 kept dry and special attention is called to Section 401.05 of the General Specifications and to the Contract Special Provisions concerning preparation of foundations for footings.

CONCRETE NOTES: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3. All exposed edges and corners shall have a 3/4" 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 (when gradient is over 2%).

Finishing Concrete Surfaces: See the Standard Architectural Details sheets and the Contract Special Provisions for types and details.

All reinforcing steel shall conform 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. Specification A36 except as noted.
All field connections shall be made with high strength bolts.
High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specifications A325.

BENCH MARKS: See Reference Ties and Field Control Data sheet in highway plans.

C-56 Plug, corner E. Cary St. and S. 10th St., Elev. 77.32

FINAL QUANTITIES

	STRUCTURE EXCAVATION C.Y.	CONCRETE CLASS A3 C.Y.	CONCRETE CLASS A3 BR. APPR. SLABS C.Y.	CONCRETE CLASS A4 C.Y.	REINFORCING STEEL LBS.	STRUCTURAL STEEL LBS.	ALUMINUM BR. RAILING (2 RAILS) L.F.	POROUS BACKFILL C.Y.	DAMP-PROOFING S.Y.	UNDERDRAIN 6"ϕ L.F.	GAS MAIN 8"ϕ L.F.	WATER MAIN 8"ϕ L.F.	CONDUIT 6"ϕ VEPCO L.F.	CONDUIT 4"ϕ TELEPHONE L.F.	METAL CONDUIT 3"ϕ L.F.	
SUPERSTRUCTURE				229.19	48,894	176,516	235.3				171	173	2037	1018.5	879	
NORTH ABUTMENT	1418	445.53			35,711		69.2	129	272	132						
PIER I	194	85.47			18,598											
SOUTH ABUTMENT	960	441.36			35,887		75.8	133	280	137						
APPROACH SLABS			118.03		26,018											
TOTAL	2572	972.36	118.03	229.19	165,018	176,516	380.3	262	552	269	171	173	2037	1018.5	879	

	BY	DATE				
MADE	EVR	3-68	2	AS BUILT	HMW	5-76
CHECKED	E.B.P.	12-68	1	N. Abut & Total quant.	TEM	6-74
IN CHARGE	PRY		NO.	REVISION	BY	DATE

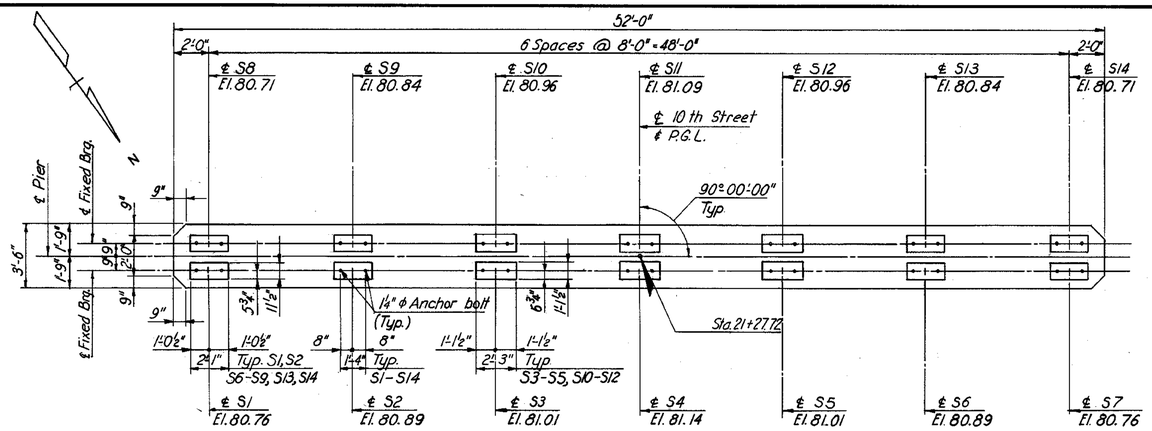
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-60
10TH STREET OVER DOWNTOWN EXPRESSWAY
GENERAL NOTES AND QUANTITIES

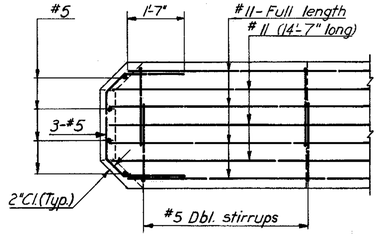
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 2 OF 17

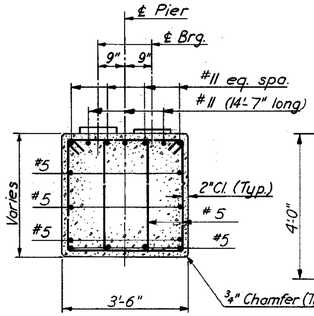
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
2	DOWNTOWN EXPRESSWAY	214	



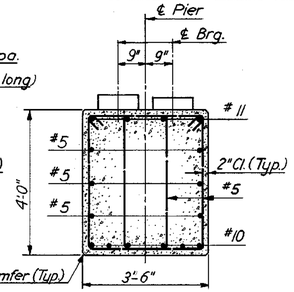
PLAN
Scale: ¼"=1'-0"



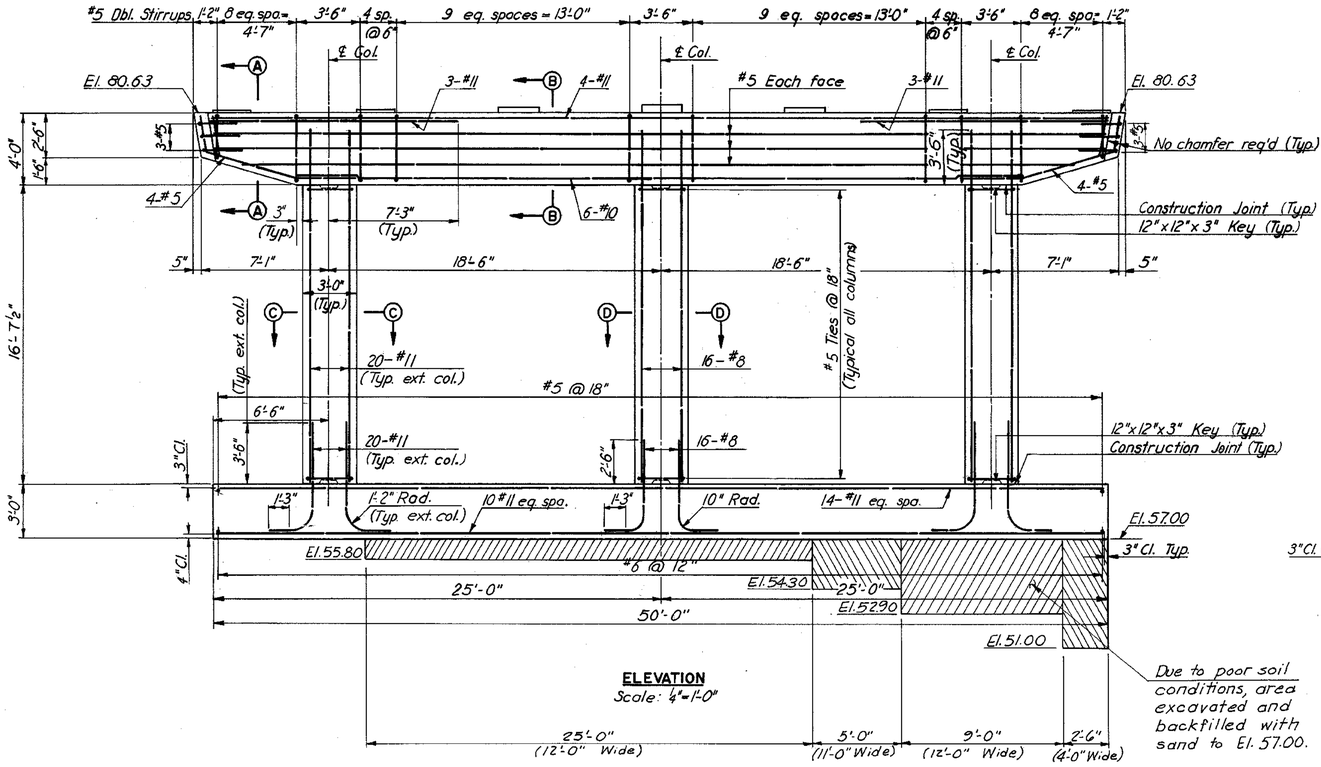
PLAN OF PIER CAP SHOWING REINFORCING DETAILS
Scale: ½"=1'-0"



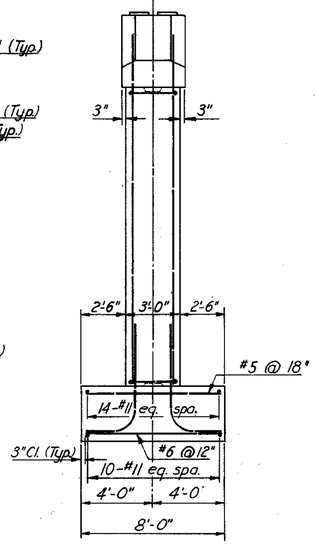
SECTION A-A
Scale: ½"=1'-0"



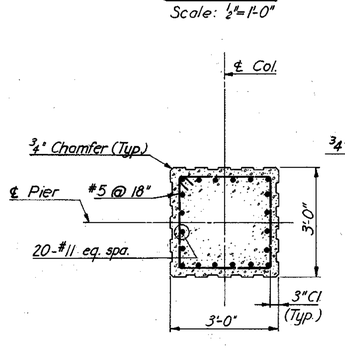
SECTION B-B
Scale: ½"=1'-0"



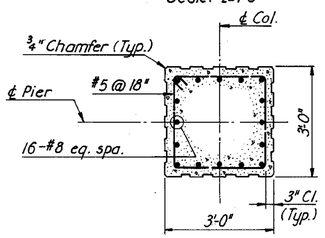
ELEVATION
Scale: ¼"=1'-0"



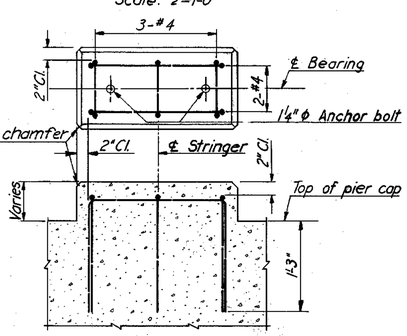
SIDE ELEVATION
Scale: ¼"=1'-0"



SECTION C-C
Scale: ½"=1'-0"



SECTION D-D
Scale: ½"=1'-0"



REINFORCING DETAILS FOR BEARING PADS AT S3 — S5 AND S10 — S12
Scale: 1"=1'-0"

NOTES:

For anchor bolt details and treatment of pads, see Standard Shoe Details sheet.

For details of architectural treatment of piers, see Standard Architectural Details sheet.

FOUNDATION NOTE:

Foundation elevation is approximate and may be varied to suit field conditions as directed by the Engineer. Vertical column reinforcing shall not be cut until this elevation is established.

Where elevation changes by more than two feet, redesign will be required.

Pier foundation is designed for an allowable bearing pressure of 3 tons per square foot.

	BY	DATE				
MADE	EVR	11-67				
CHECKED	TEM	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

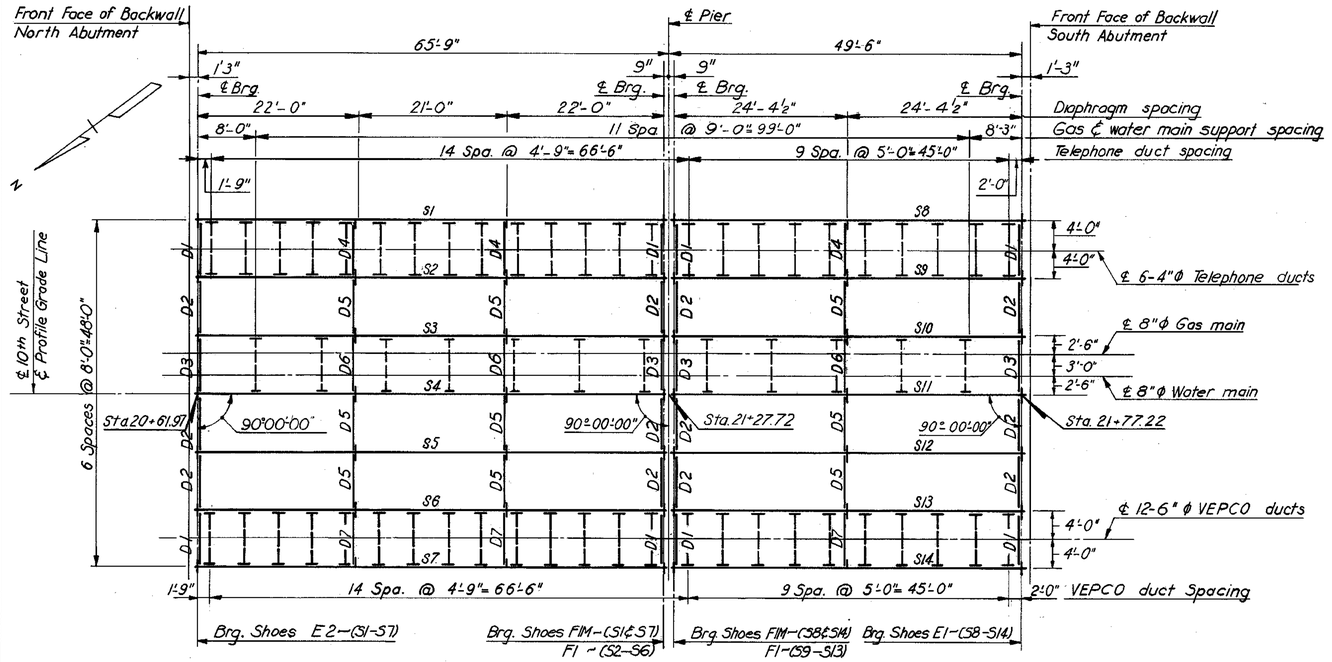
BRIDGE B-60
10TH STREET OVER DOWNTOWN EXPRESSWAY
PIER

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

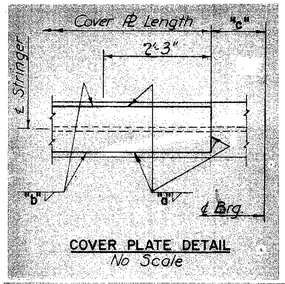
SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 11 OF 17

214

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	215	

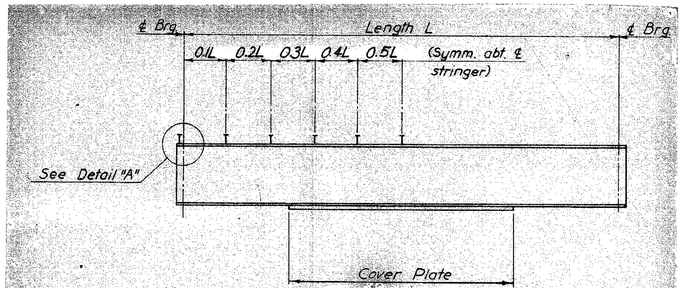


FRAMING PLAN
Scale: 1"=10'



COVER PLATE DETAIL
No Scale

COVER PLATE SCHEDULE				
STR.	COVER PL	"a"	"b"	"c"
S1,S6,S7	10½x1¼	½"	5/16"	5'-3"
S2-S5	10½x1⅛	½"	5/16"	5'-9"

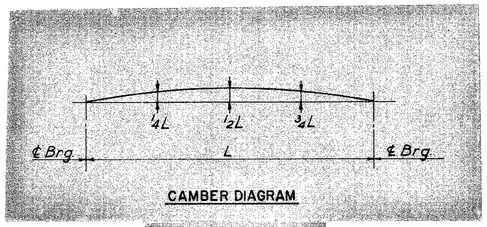


STRINGER ELEVATION

STRINGER SCHEDULE							
STRINGER	LENGTH ℄ BRG. TO ℄ BRG.	COVER PLATE	SHEAR STUD SPACING 0.1L	0.2L	0.3L	0.4L	0.5L
S1 – 36 WF 150	65'-0"	10½ x 1¼ x 54'-6"	6½"	8"	10½"	13"	15"
S2		10½ x 1⅛ x 53'-6"	7"			12½"	14"
S3		10½ x 1⅛ x 53'-6"					
S4		10½ x 1⅛ x 53'-6"					
S5		10½ x 1⅛ x 53'-6"					
S6		10½ x 1¼ x 54'-6"	7"	9"	10½"	12½"	14"
S7	65'-0"	10½ x 1¼ x 54'-6"	6½"	8"	10½"	13"	15"
S8	48'-9"	No Cover Plates	7½"	9"	10½"	13½"	15½"
S9						12½"	14"
S10							
S11							
S12						12½"	14"
S13							
S14 – 36 WF 150	48'-9"	No Cover Plates	7½"	9"	10½"	13½"	15½"

Note: Lengths shown are horizontal distances measured along centerlines of stringers.

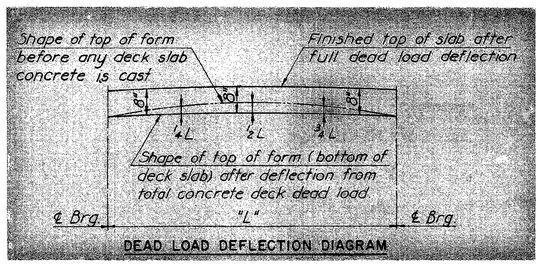
SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	7	FI	10
E2	7	FIM	4



CAMBER DIAGRAM

CAMBER SCHEDULE			
STR.	¼L	½L	¾L
S2 S4-S6	3 3/8"	4 5/8"	3 3/8"
S1, S3 S7	3½"	4 5/8"	3½"
S8-S14	¼"	¼"	¼"

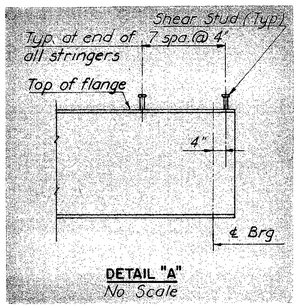
NOTE TO FABRICATOR:
The above stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.



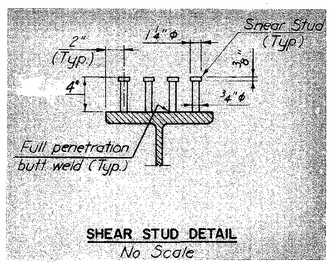
DEAD LOAD DEFLECTION DIAGRAM

DEFLECTION SCHEDULE		
STR.	¼L & ¾L	½L
S1, S3, S5-S7	¾"	1⅛"
S2, S4	¾"	1"
S8-S14	⅜"	½"

NOTE TO CONTRACTOR:
The above deflections 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 for by adjusting forms to vary the thickness of the concrete bolster between the bottom of the slab and the top of stringer, without alteration of the slab thickness.



DETAIL "A"
No Scale



SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE:
Capacity = 3,400 lbs. per stud.
The 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 reinforcing.
Shear stud spacing shown is maximum spacing.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	EVR	11-67				
CHECKED	T.E.M.	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.					

AS BUILT

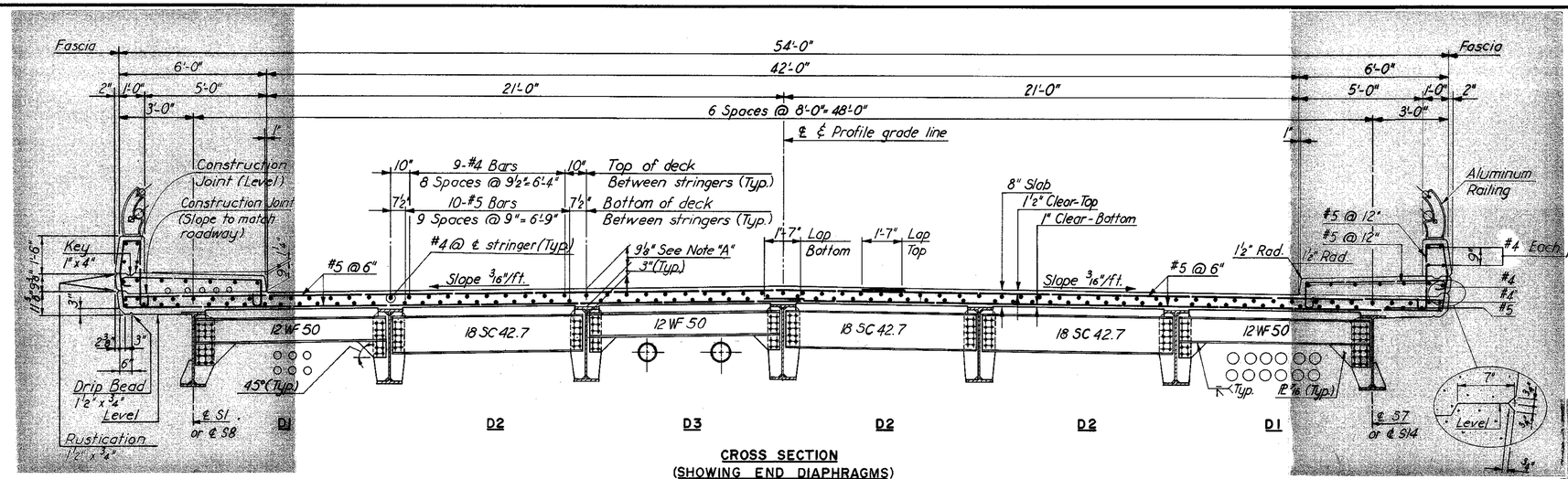
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-60
10TH STREET OVER DOWNTOWN EXPRESSWAY
FRAMING PLAN

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

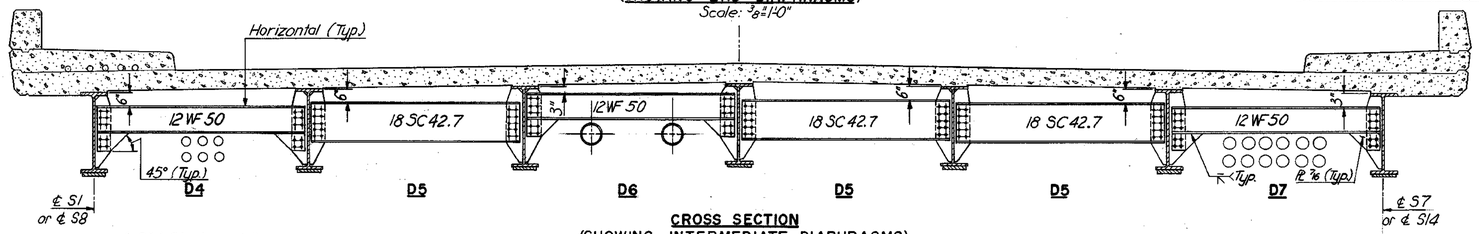
SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 12 OF 17

215

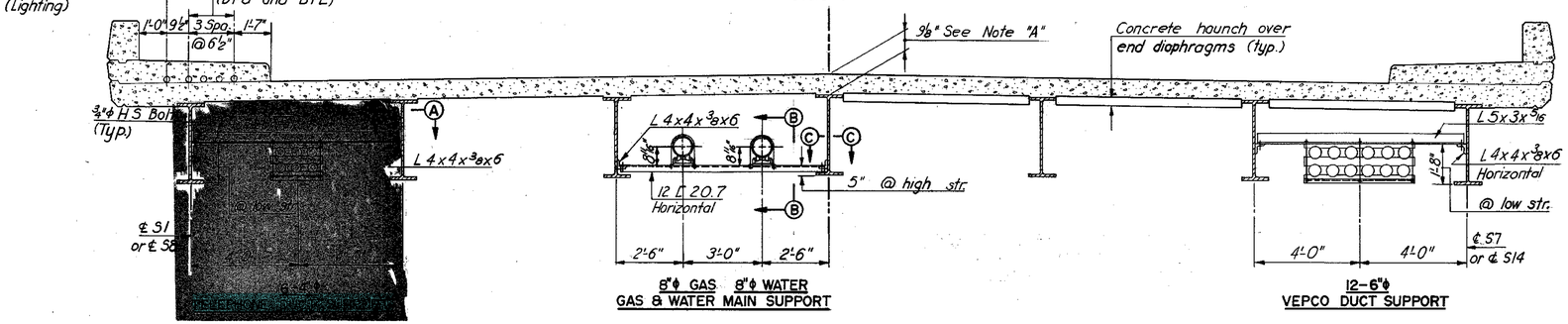
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	216	



CROSS SECTION
(SHOWING END DIAPHRAGMS)
Scale: 3/8" = 1'-0"



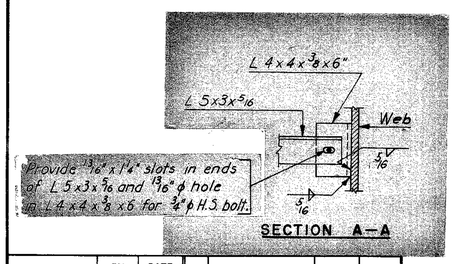
CROSS SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)
Scale: 3/8" = 1'-0"



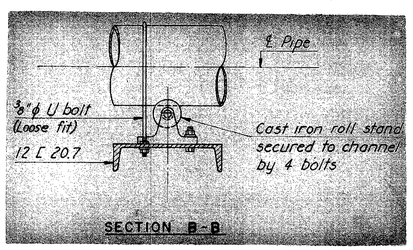
8"ϕ GAS 8"ϕ WATER
GAS & WATER MAIN SUPPORT

12-6"ϕ
VEPCO DUCT SUPPORT

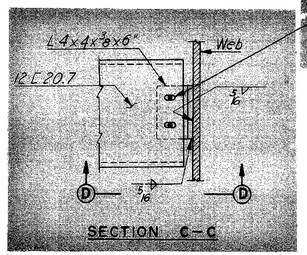
CROSS SECTION
(SHOWING UTILITY SUPPORTS ONLY)
Scale: 3/8" = 1'-0"



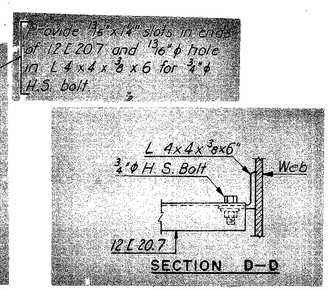
SECTION A—A



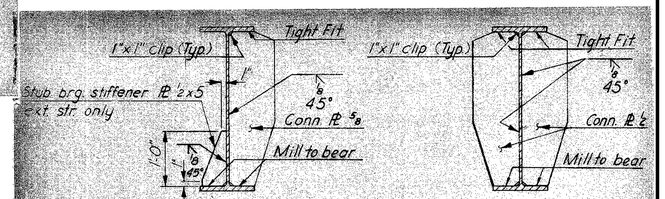
SECTION B-B



SECTION C—C

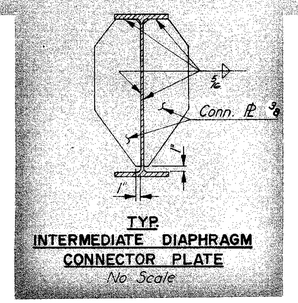


SECTION D—D



TYP
END DIAPHRAGM
CONNECTOR PLATE
AT EXTERIOR STRINGER
No Scale

TYP
END DIAPHRAGM
CONNECTOR PLATE
AT INTERIOR STRINGER
No Scale



TYP
INTERMEDIATE DIAPHRAGM
CONNECTOR PLATE
No Scale

NOTE "A"
Dimension shown is measured from top of stringer to top of slab at the intersection of the centerline of stringer and the centerline of bearing. At exterior stringers this is measured to the cross slope extended. This dimension may be varied between bearings as required to care for variation in camber, except that no portion of the stringer flange may fall within the 8" slab.

NOTES:
For spacing and location of utility supports and diaphragms, see Framing Plan sheet.

For Basic Attachment Details for cement asbestos conduit, see Standard Conduit Installation Details sheet.

For details showing gas and water mains thru abutments, see Standard Utility Support Details At Bridge Abutments sheet.

	BY	DATE
MADE	EVR	10-9
CHECKED	T.E.M.	2-68
IN CHARGE	P.R.Y.	

NO.	REVISION	BY	DATE
1	As Built	TEM	7-77

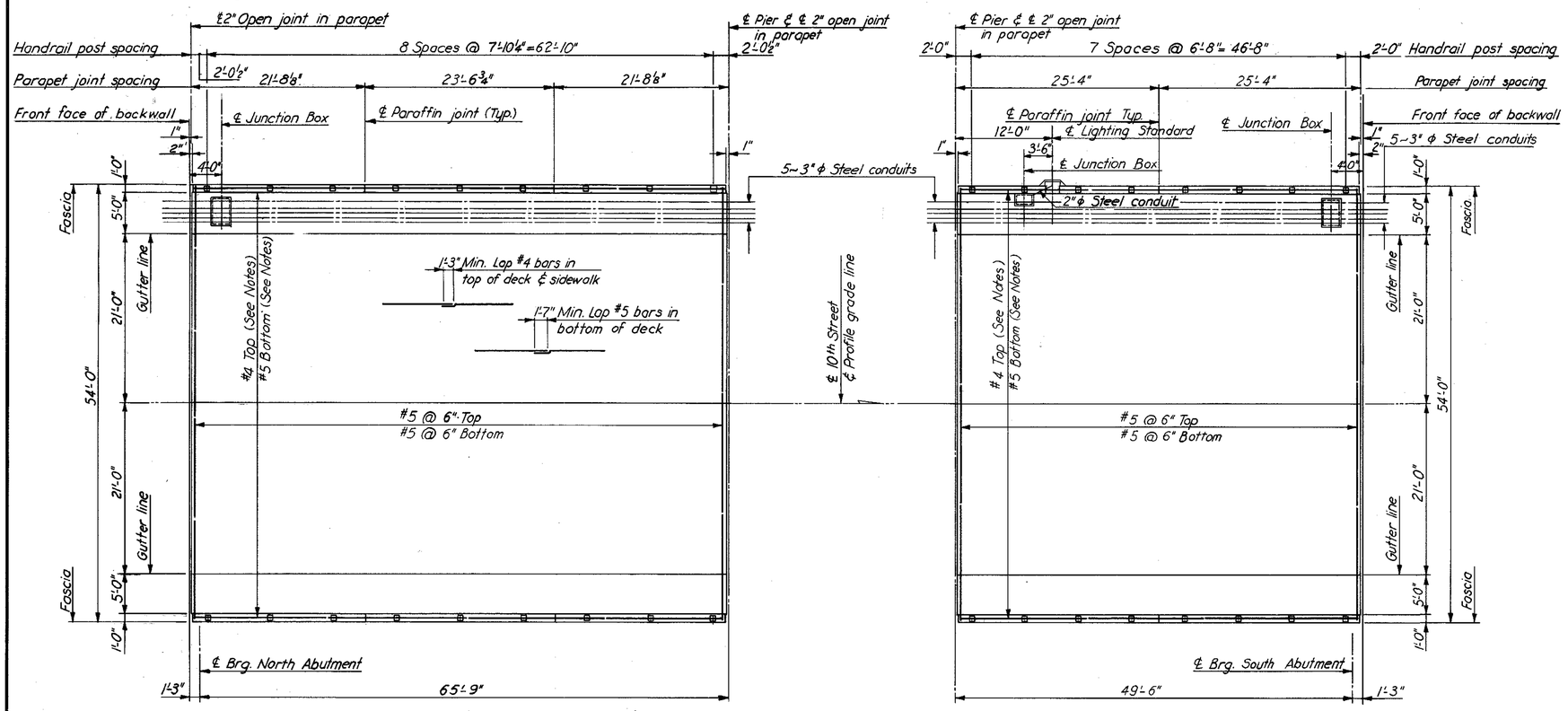
AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE B-60
10TH STREET OVER DOWNTOWN EXPRESSWAY
CROSS SECTION AND UTILITY DETAILS

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

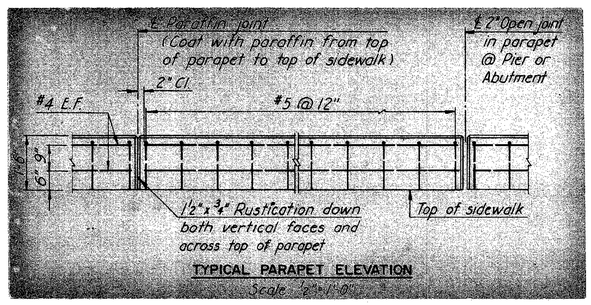
SCALE: AS SHOWN
CONTRACT NO.: 9
SHEET NO. 13 OF 17

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
9	DOWNTOWN EXPRESSWAY	217	

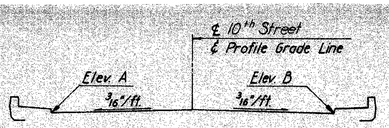


PLAN-UNIT 1
Scale: ⅛"=1'-0"

PLAN - UNIT 2
Scale: ⅛"=1'-0"



TYPICAL PARAPET ELEVATION
Scale: 2"=1'-0"



(LOOKING IN DIRECTION OF STATIONING)

PAVEMENT ELEVATIONS

STATION	ELEV. A	℄ & P.G.L.	ELEV. B	STATION	ELEV. A	℄ & P.G.L.	ELEV. B
20+20	—	*86.14	—	+27.72	85.00	85.32	85.00
+30		*86.21		+30	84.92	85.25	84.92
+40	*85.95	*86.28	*85.82	+40	84.55	84.87	84.55
+50	*86.02	*86.35	*86.02	+50	84.12	84.45	84.12
+60	86.07	86.39	86.07	+60	83.67	84.06	83.67
+60.72	86.07	86.40	86.07	+70	83.22	83.55	83.22
+70	86.06	86.39	86.06	+78.47	82.84	83.17	82.84
+80	86.00	86.33	86.00	+80	82.79	83.10	82.77
+90	85.89	86.21	85.89	+90	*82.24	*82.65	*82.32
21+00	85.72	86.05	85.72	221+00	*81.56	*82.20	*81.92
+10	85.51	85.83	85.51	+10	—	*81.75	—
+20	85.24	85.57	85.24				

* Elevations shown are given to top of bituminous surfacing.

NOTES:

For location and spacing of deck, parapet and sidewalk reinforcing, see Cross Section and Utility Details sheet.

For location and spacing of reinforcing in haunch over end diaphragms, see Joint Details sheet.

For lighting standard base, junction box details and additional reinforcing, see Standard Electrical Details sheet S4.

	BY	DATE				
MADE	EVR	10-67				
CHECKED	T.E.M	2-68	1	As Built	TEM	7-77
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE B-60
10TH STREET OVER
DOWNTOWN EXPRESSWAY

DECK PLANS

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

SCALE: AS SHOWN
CONTRACT NO. 9
SHEET NO. 14 OF 17

217